

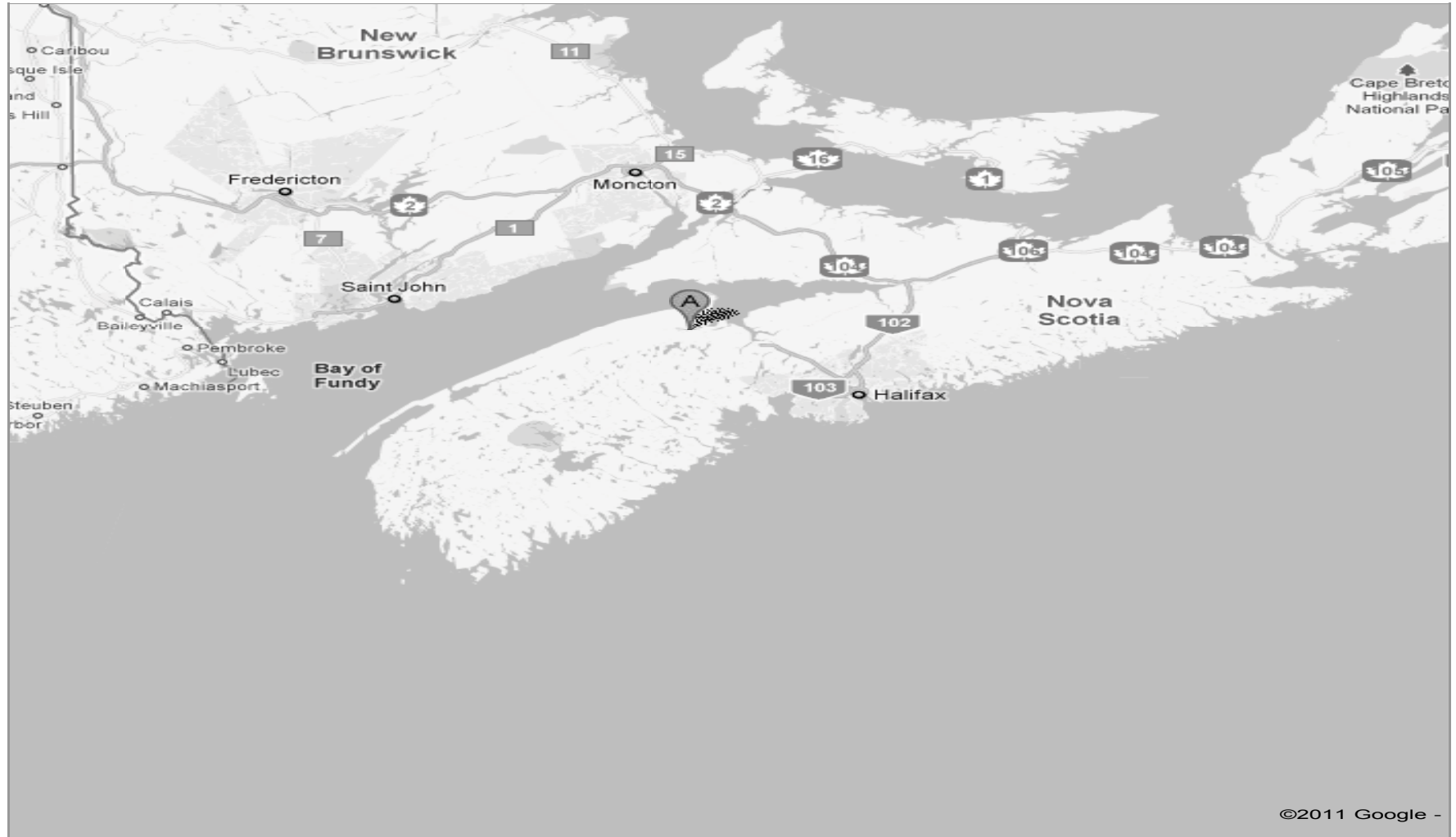


## Valley Waste Resource Management: Administration Offices

Kentville, Nova Scotia, Canada

Google

Address **Kentville, NS**



# Design Team

- Green architecture firm
- Civil and structural consultant
- Electrical engineer
- Mechanical engineer
- Sustainable landscape architect
- Passive House consultant
- LEED consultant

Solterre Design



**SHERWOOD ENTERPRISES INC.**  
Engineering, Construction Mgmt., Quantity Surveying



**CBCL LIMITED**

Consulting Engineers

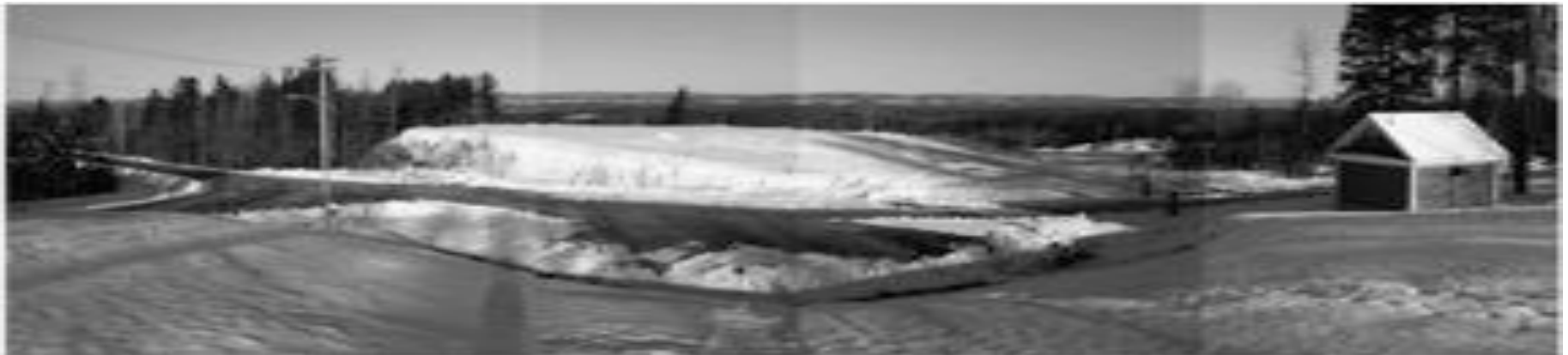
ISO 9001 CERTIFIED



Passive House E-Design

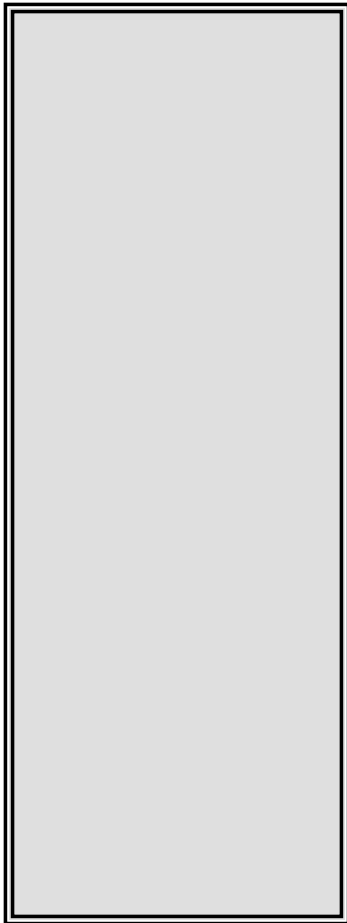
# Design Challenges: Valley Waste

- North facing view and site slope
- Fully exposed site
- Long heating season: 7287 HDD
- Designing for award to contractor through government tender
- Some LEED credits clash with Passive House approach
  - Example: Increased ventilation
- Limited budget with a wide range of green priorities (\$200 SF)



# Design Opportunities

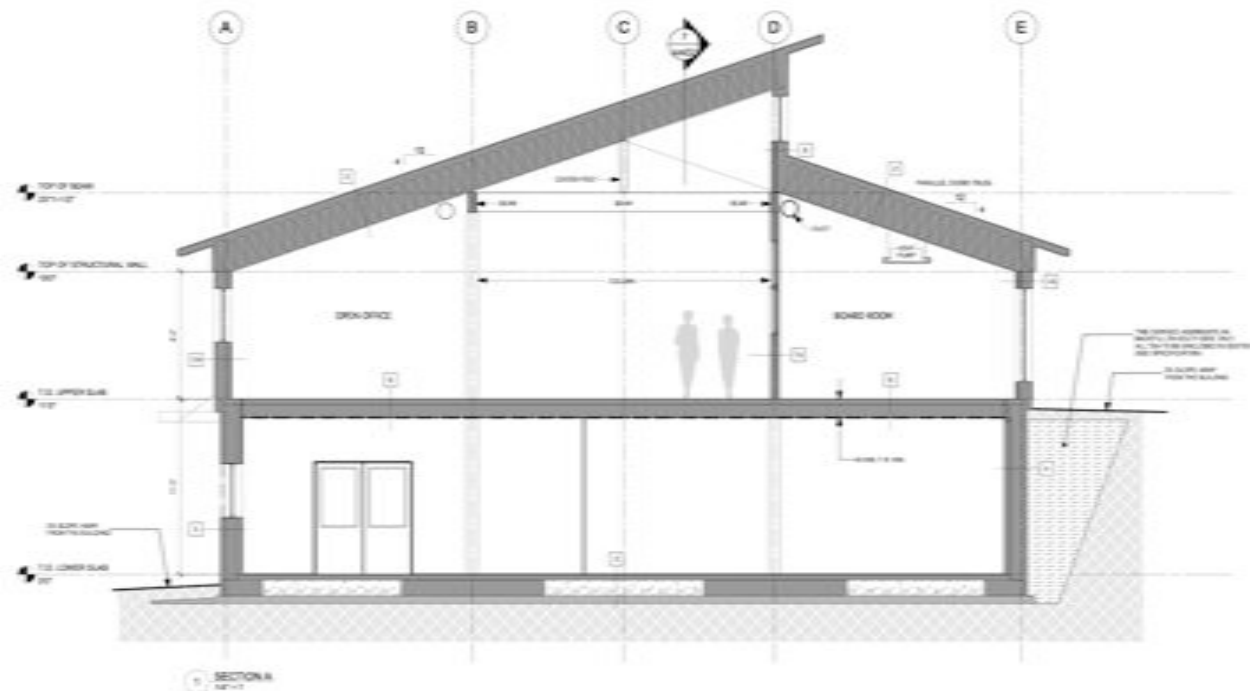
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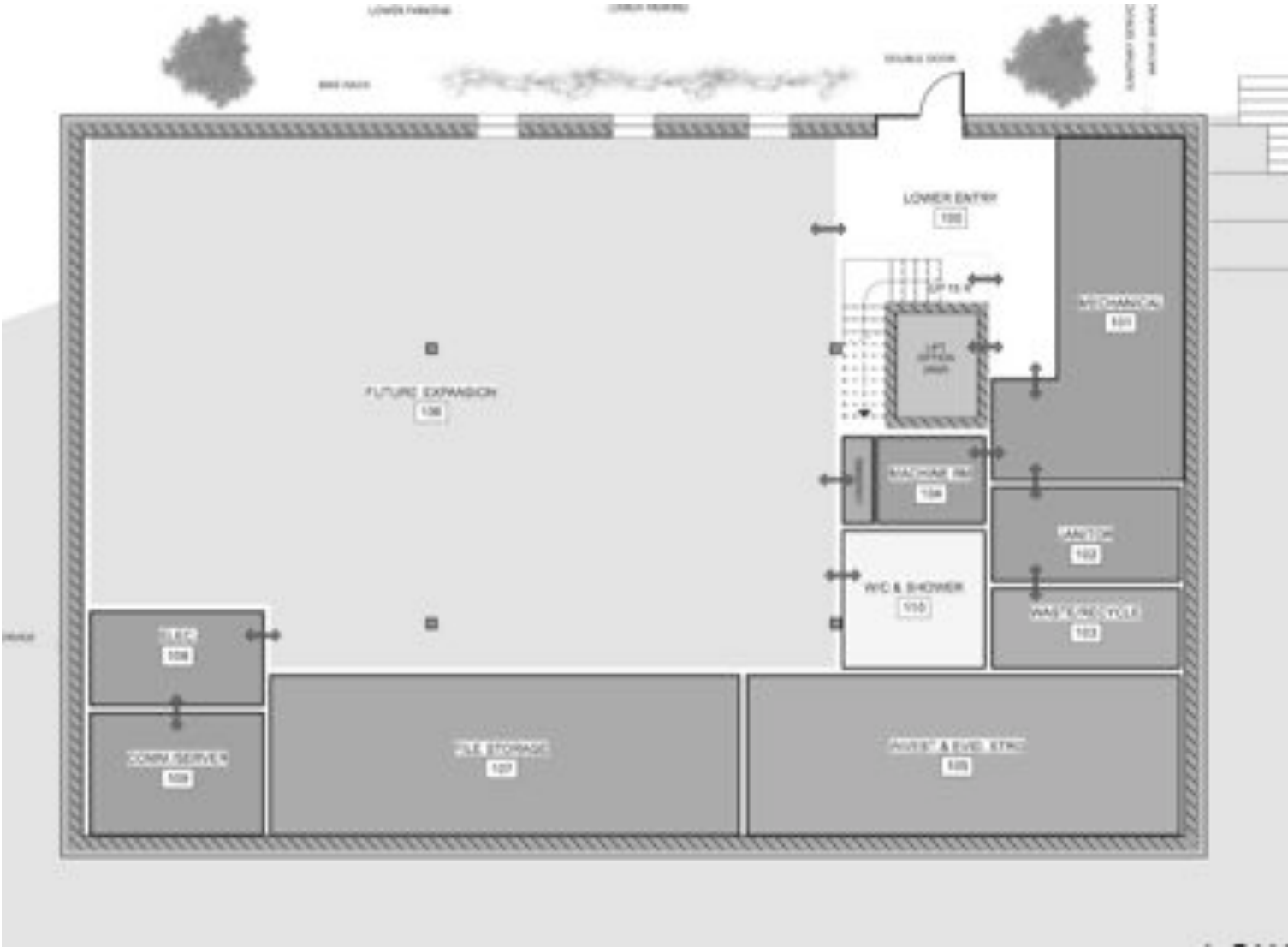
- Progressive consulting team
- Owner team with strong commitment to trying new methods
- Large lot allowing ideal orientation
- Good solar access, tree line 150' away
- Commitment to simple building shape
- Passive House approach and LEED align on many aspects
  - Examples: hot water efficiency, high efficiency mechanical systems

# Building Summary: 5771 SF

- 2-storey new construction
- Concrete, wood and steel structure
- Targeting Passive House and LEED Silver certification
- Demonstration project for “Green” salvaged and recycled materials
- Using local and resource-efficient materials



# Design – Lower Floor Plan



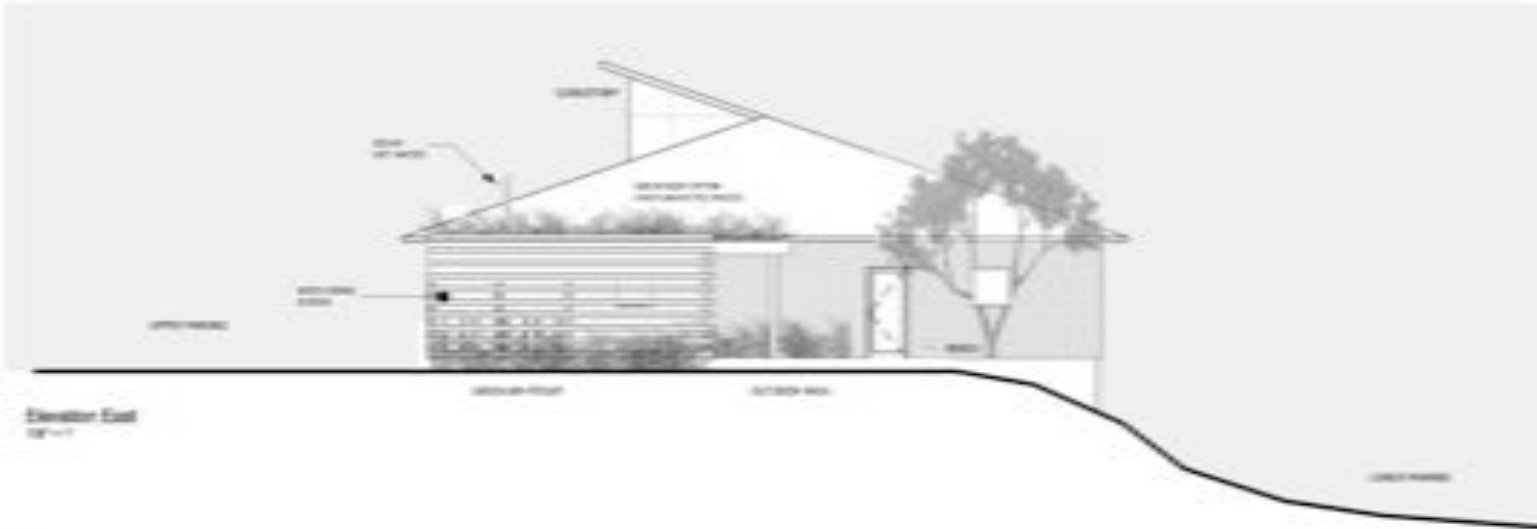
# Design - Upper Floor Plan

MAN FLOOR 3815 sf (interior floor space)      TOTAL AREA 8250 sf (exterior dimensions)  
MAN FLOOR 4160 sf (exterior dimensions)  
FOYER/ BIN STORAGE 150 sf (unheated)





# Building Elevations - East/West



# Building Elevations - South/North

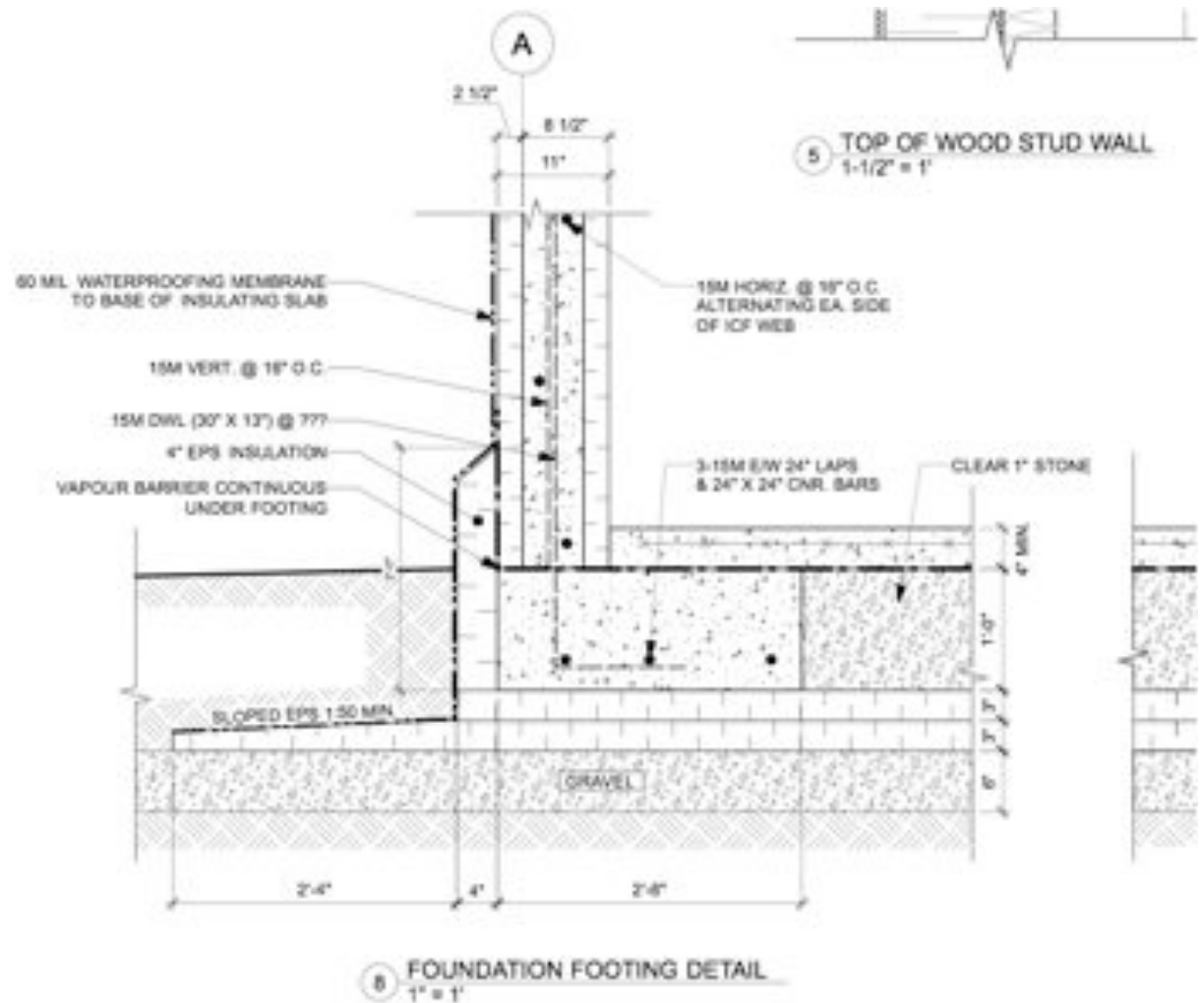


Elevation South  
1/8" = 1'



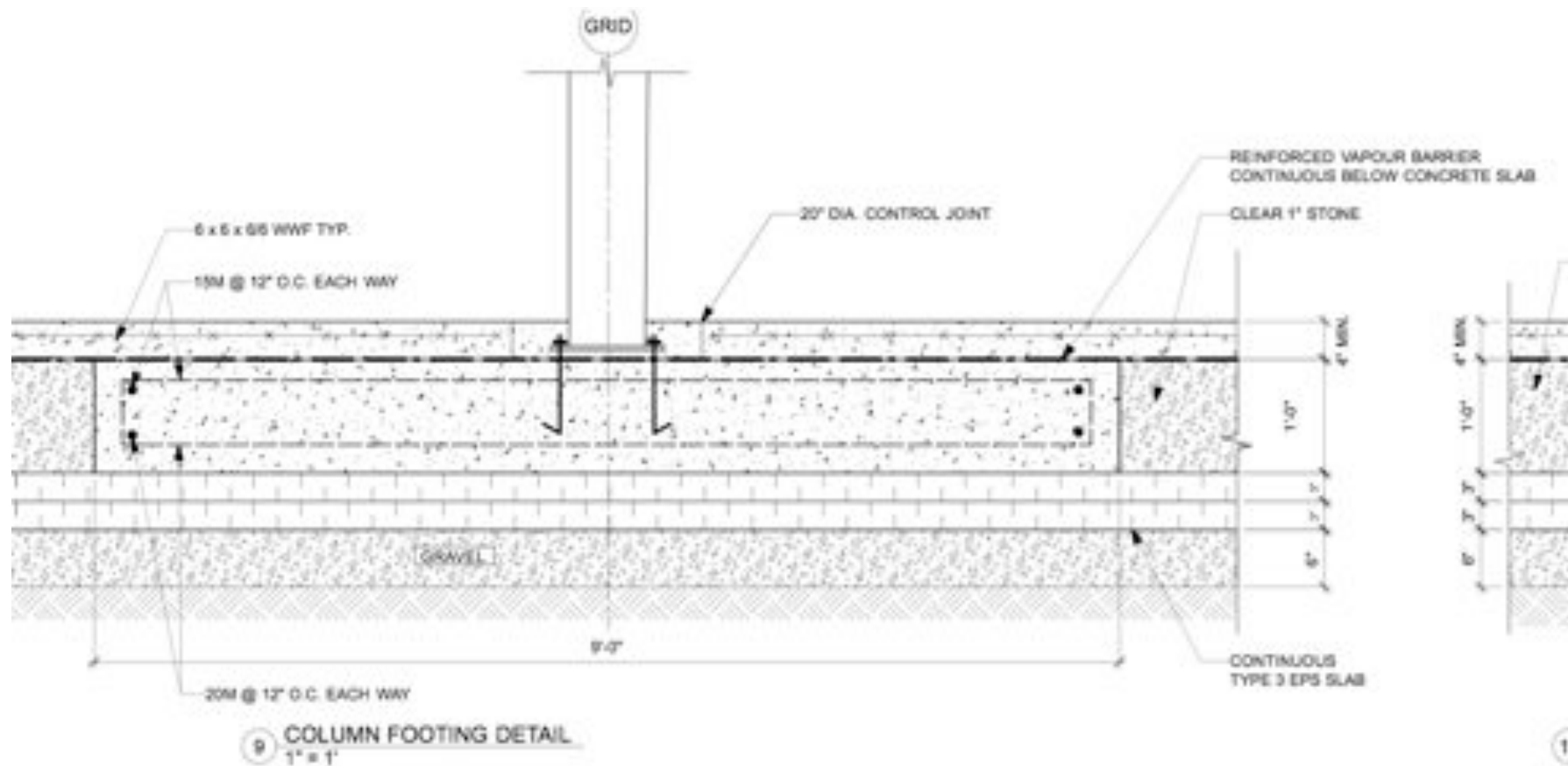
# Foundation: R 27

- 6" EPS Type 3 sub slab and footers
- ICF foundation walls
- Heavy thermal mass with gravel infill
- Thermal break at footer



# Insulation Structural Design

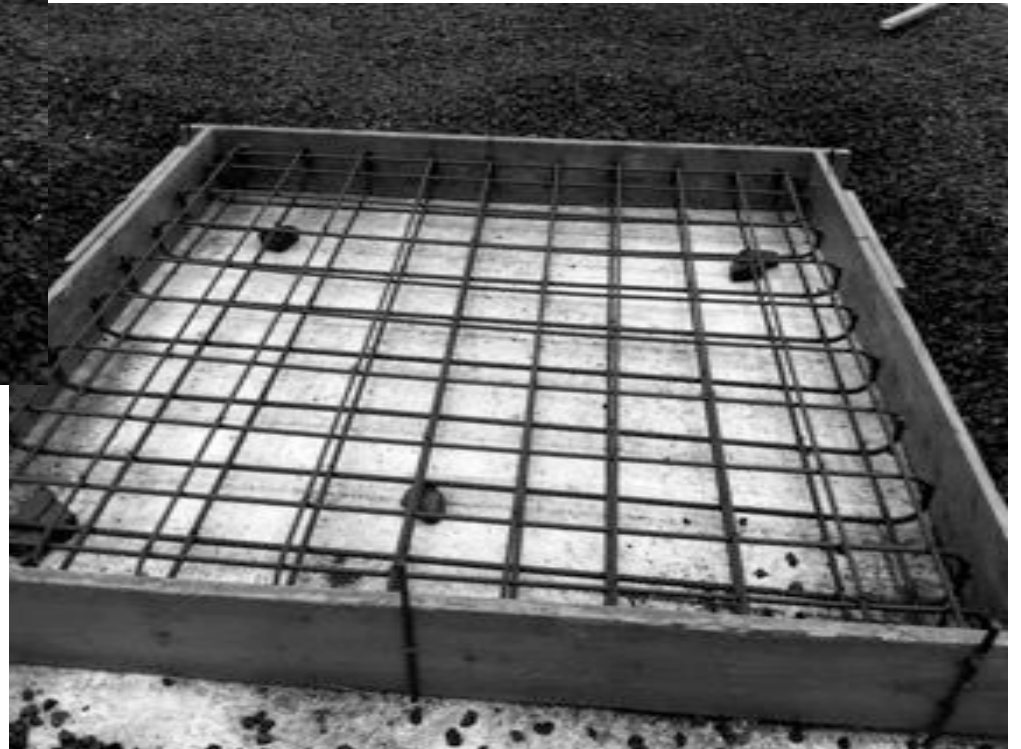
Equal bearing at perimeter and interior footers



# Pad Preparation and Foam Install

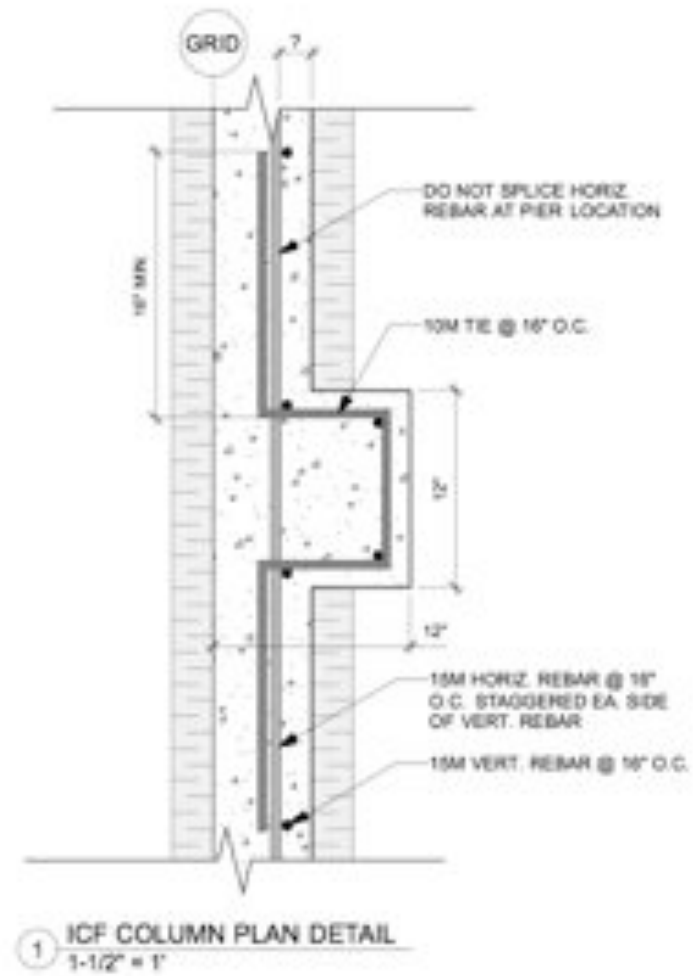


# Perimeter and Interior Footers

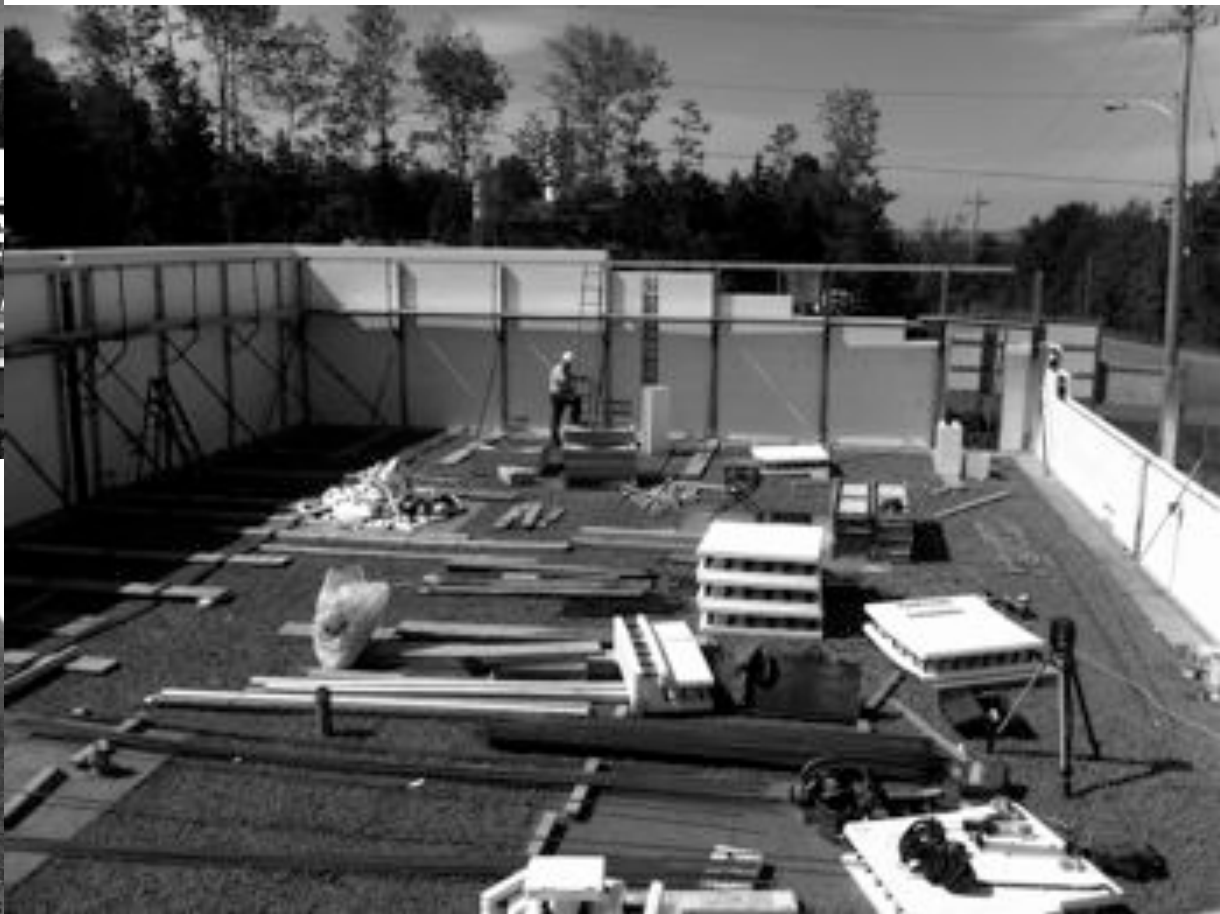


# Lower Wall Assembly: R 34

- ICF wall with interior 2 x 4 wall with roxul insulation
- Concrete bearing columns designed to the interior.



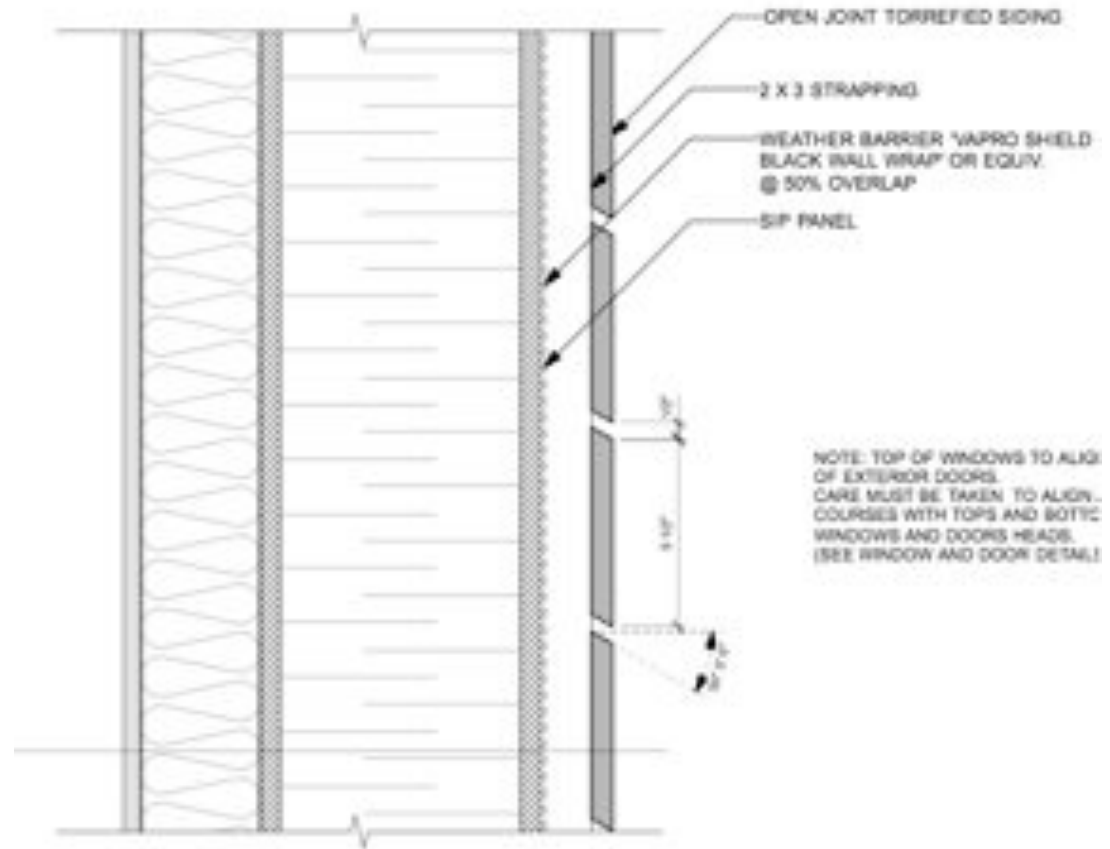
# Lower Level Wall Construction - 11' ICF



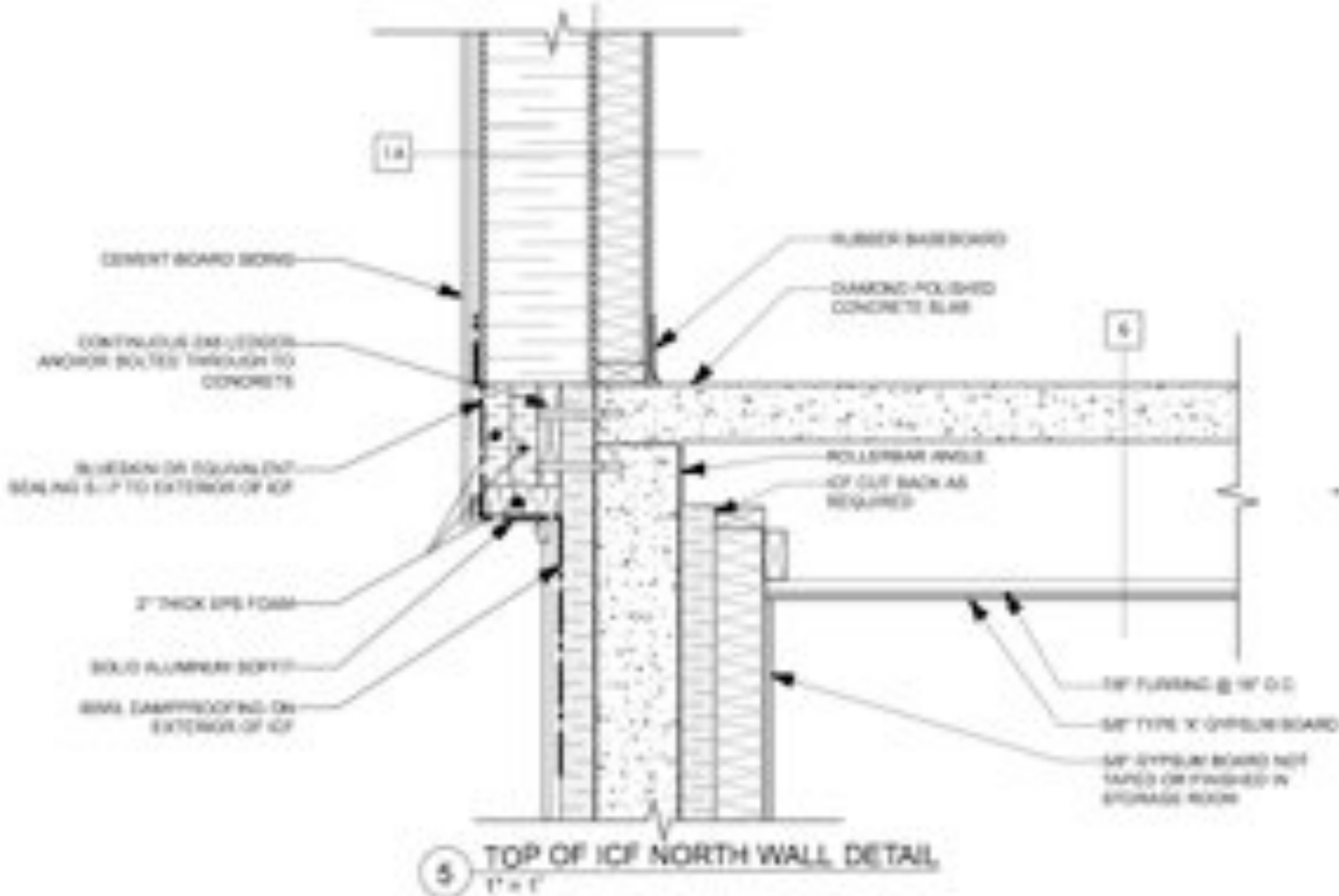


# Upper Wall Construction: R 46

- 2 x 4 structural framing with Rockwool batt insulation
- 8.25 SIP with HD EPS foam core
- Air/weather barrier
- Rain screen and wood/fibre board siding

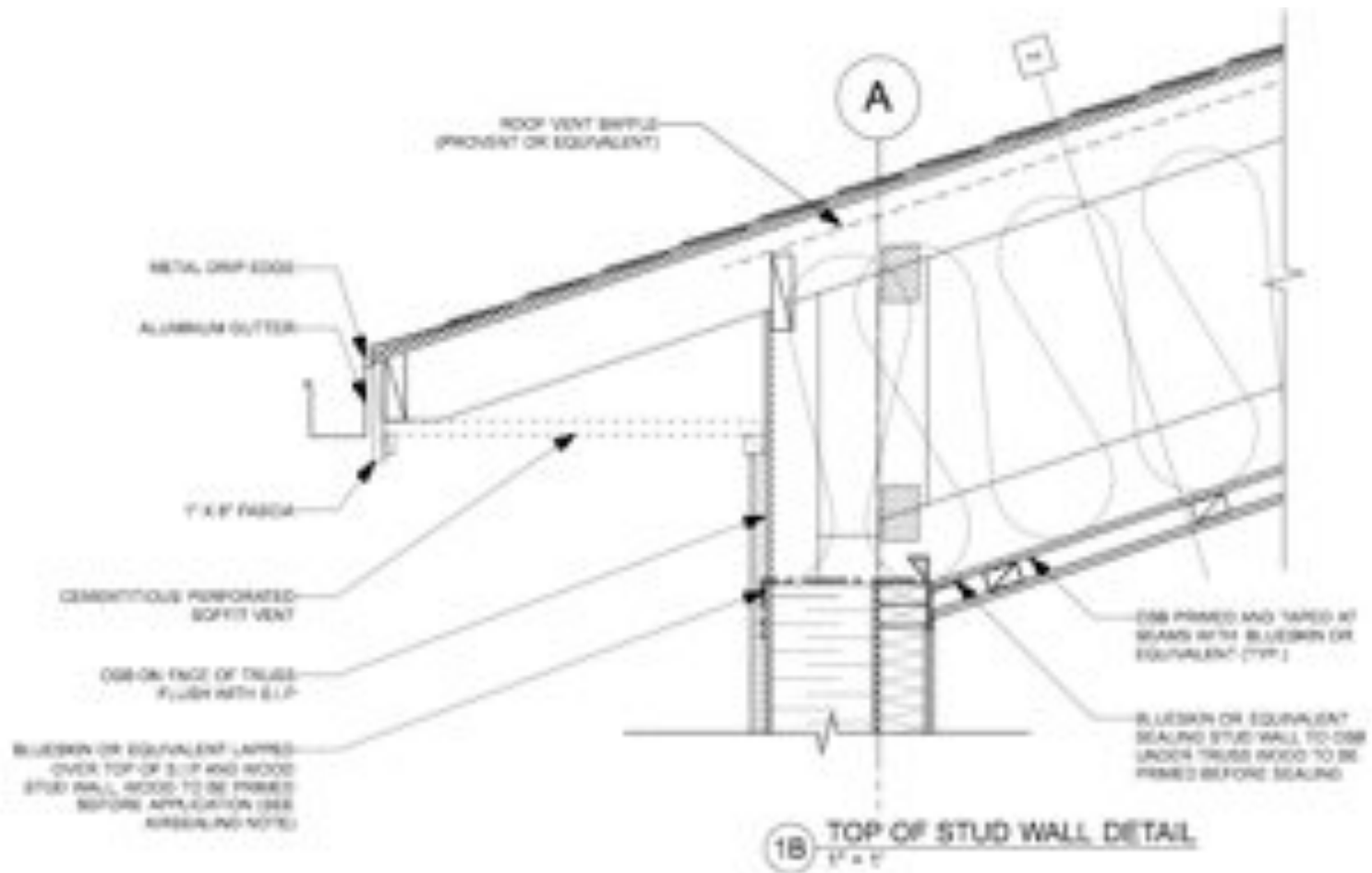


# ICF to SIP Wall Connection

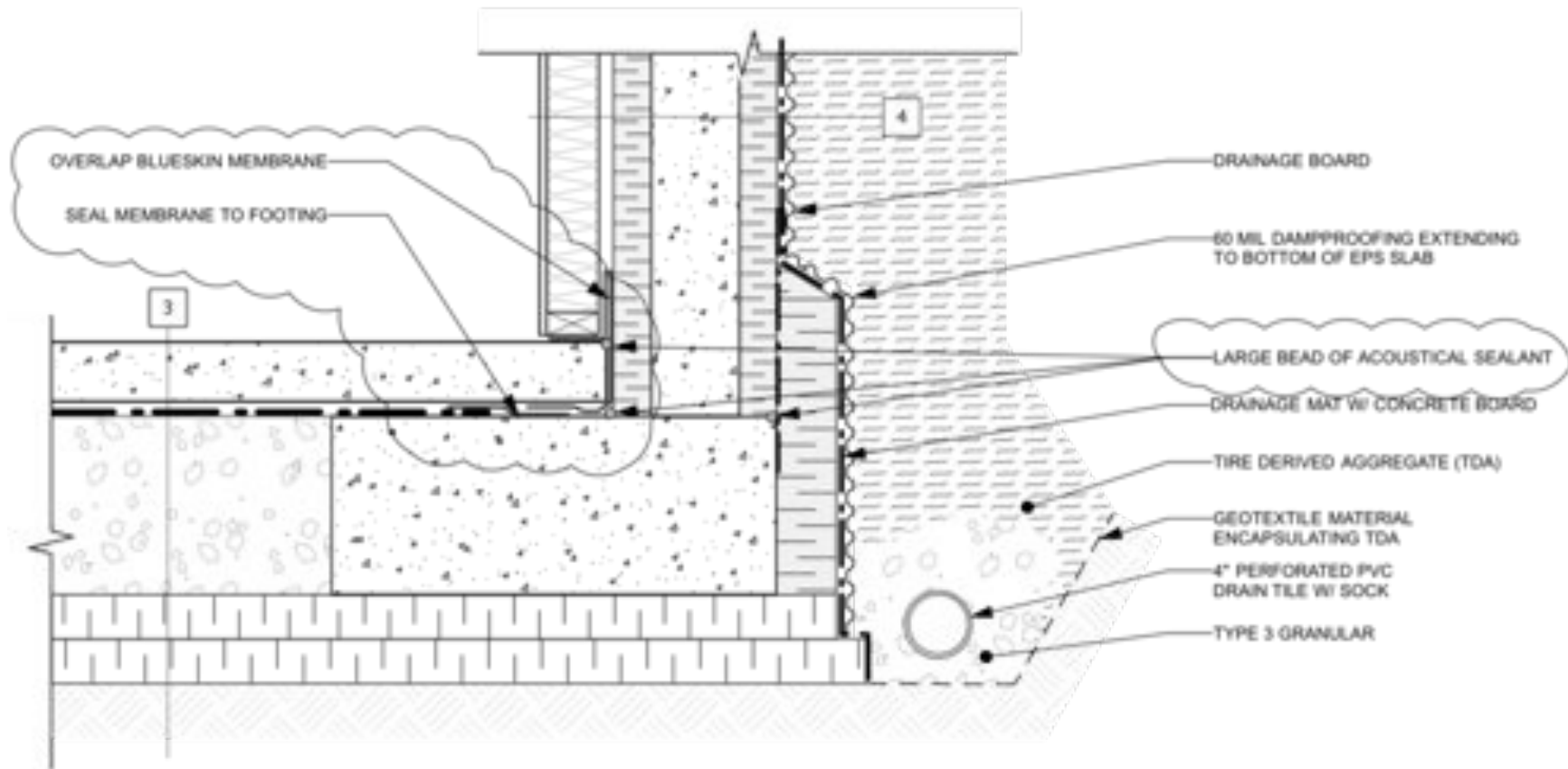


# Roof Assembly - R 96

Parallel chord truss with space for 26" blown-in cellulose



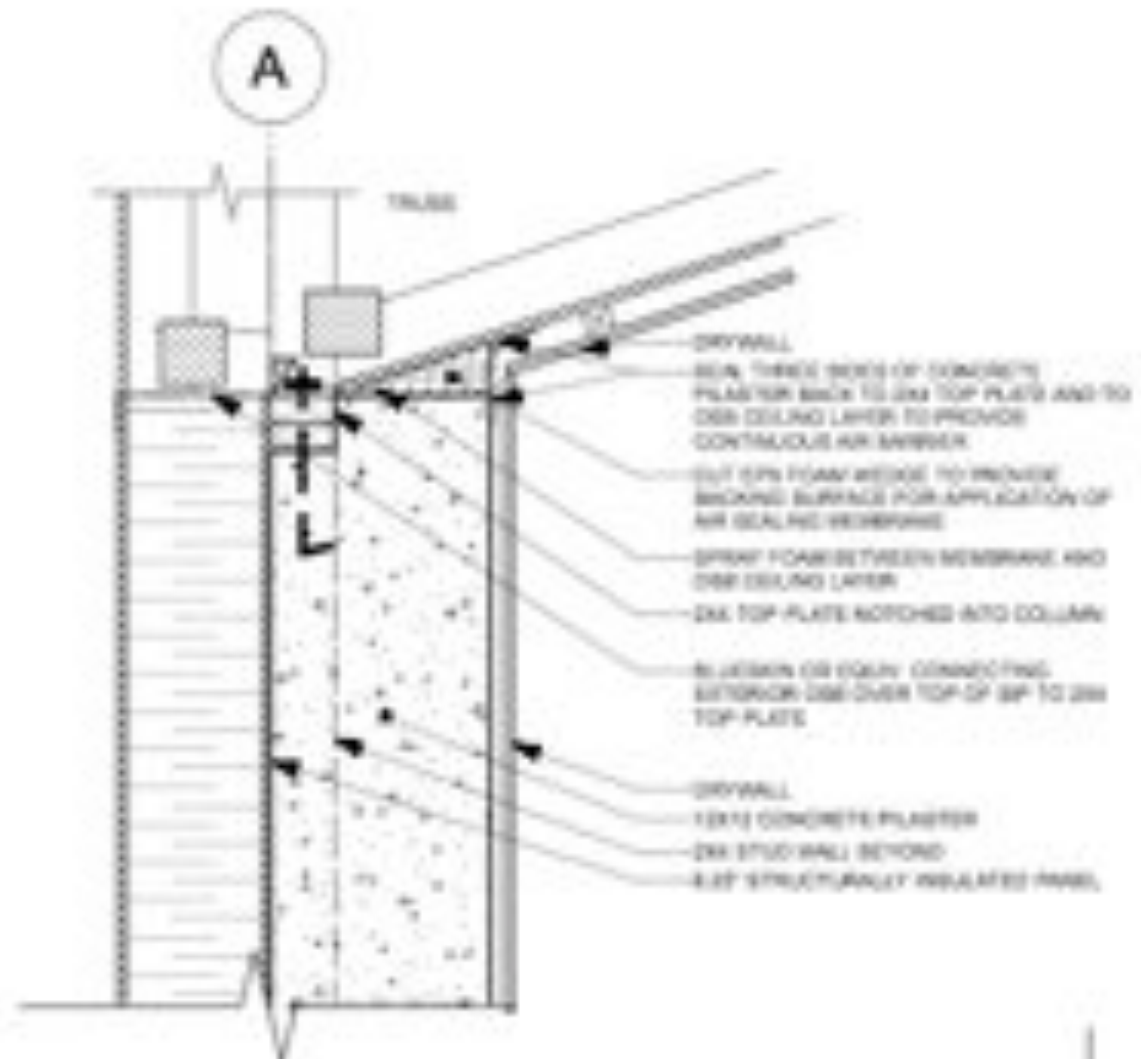
# Air Sealing Details



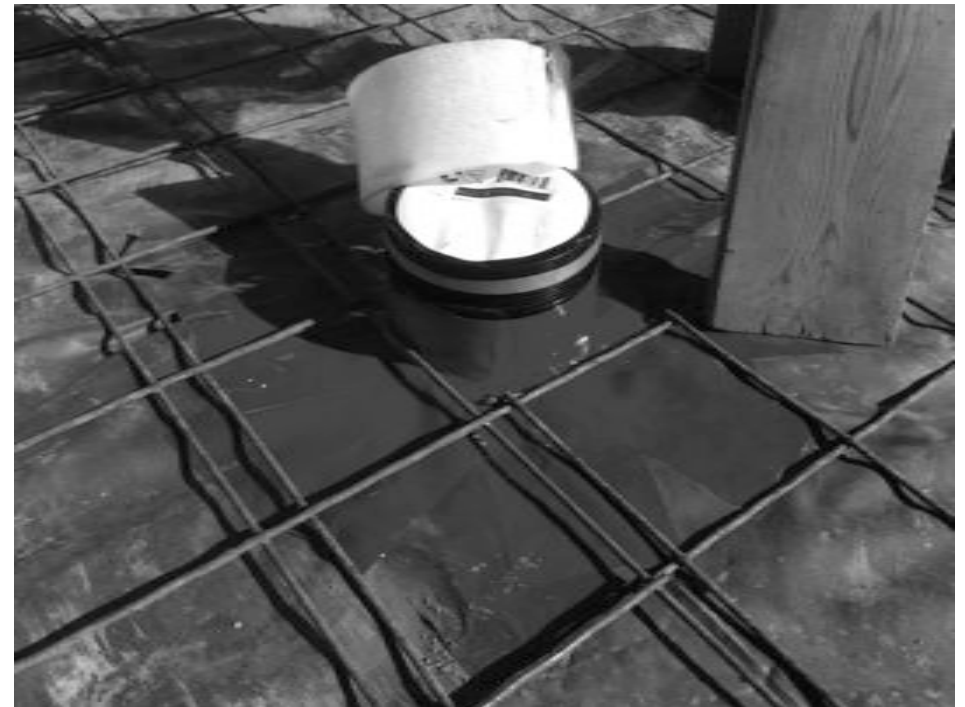
1 AIR SEALING AT FOOTING  
Scale: 1" = 1'-0"

# Air Sealing Details - Wall to Roof

Top of Structural Columns

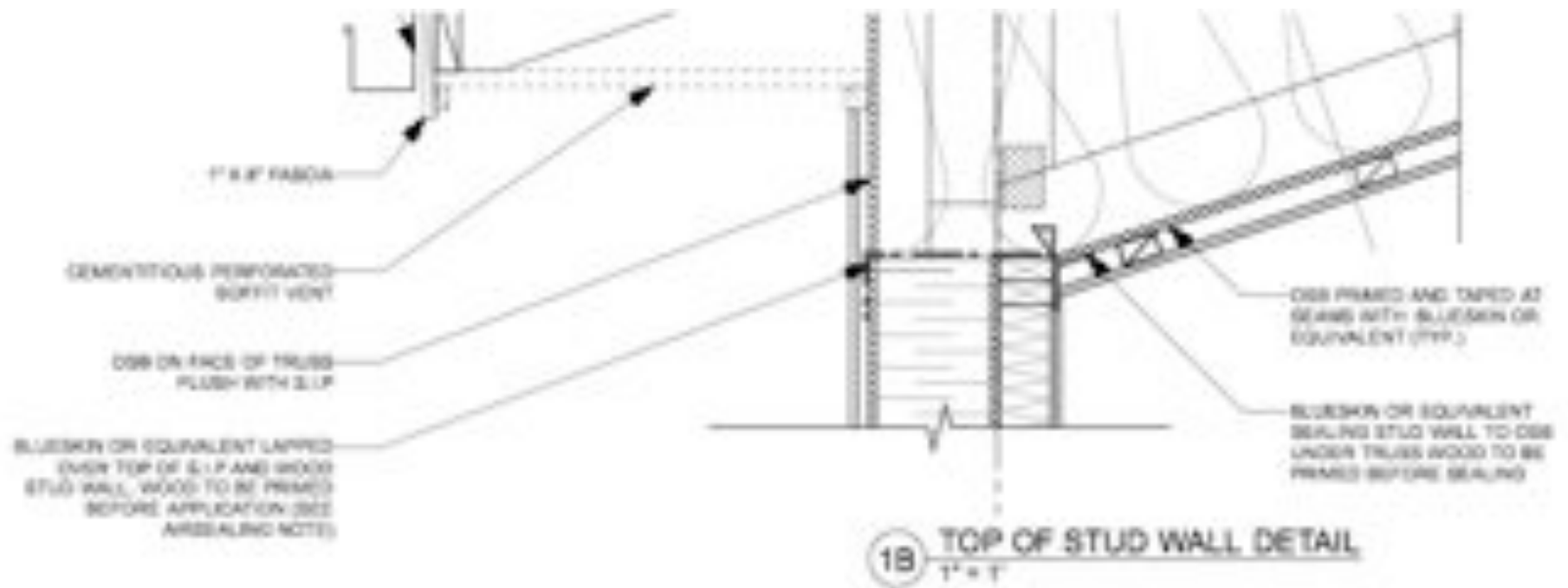


# Air sealing vapour barrier sub slab



# Air Sealing – Wall to Roof

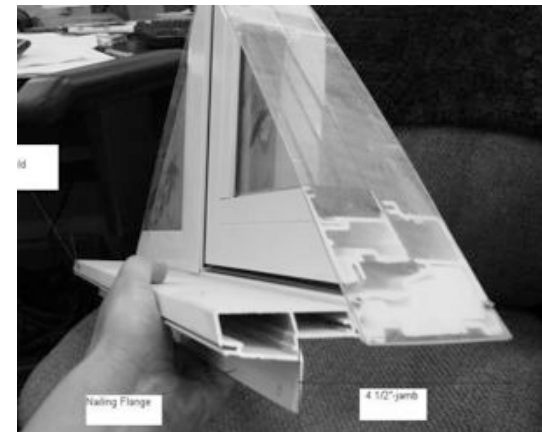
- Sealed from exterior OSB layer of SIP to interior ceiling OSB layer



# Canadian Fiberglass Windows



- Awning, casement and fixed for air tightness
- Insulated fiberglass frames
- Triple glazed, argon filled
- Customized low E coatings
- Manufactured in Winnipeg, Manitoba since 1983





# Doors – Norwood

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- Double glazed
- Fiberglass slab
- Vinyl clad wood frames
- Multipoint lock
- Accessible sills
- Weakest link in building envelope

# Windows in PHPP

			Heating Degree Days:	
			7287	
Glazing Area	Glazing Area as % of Gross Floor Area	Average Global Radiation	Transmission Losses	Heat Gains Solar Radiation
ft <sup>2</sup>		kBTU/ft <sup>2</sup> yr	kBTU/yr	kBTU/yr
127.5	3.1%	38	7466	1314
43.3	1.0%	91	3000	1537
217.4	5.2%	180	11159	17059
34.6	0.8%	94	2039	1318
0.0	0.0%	144	0	0
<b>422.8</b>			<b>23664</b>	<b>21228</b>

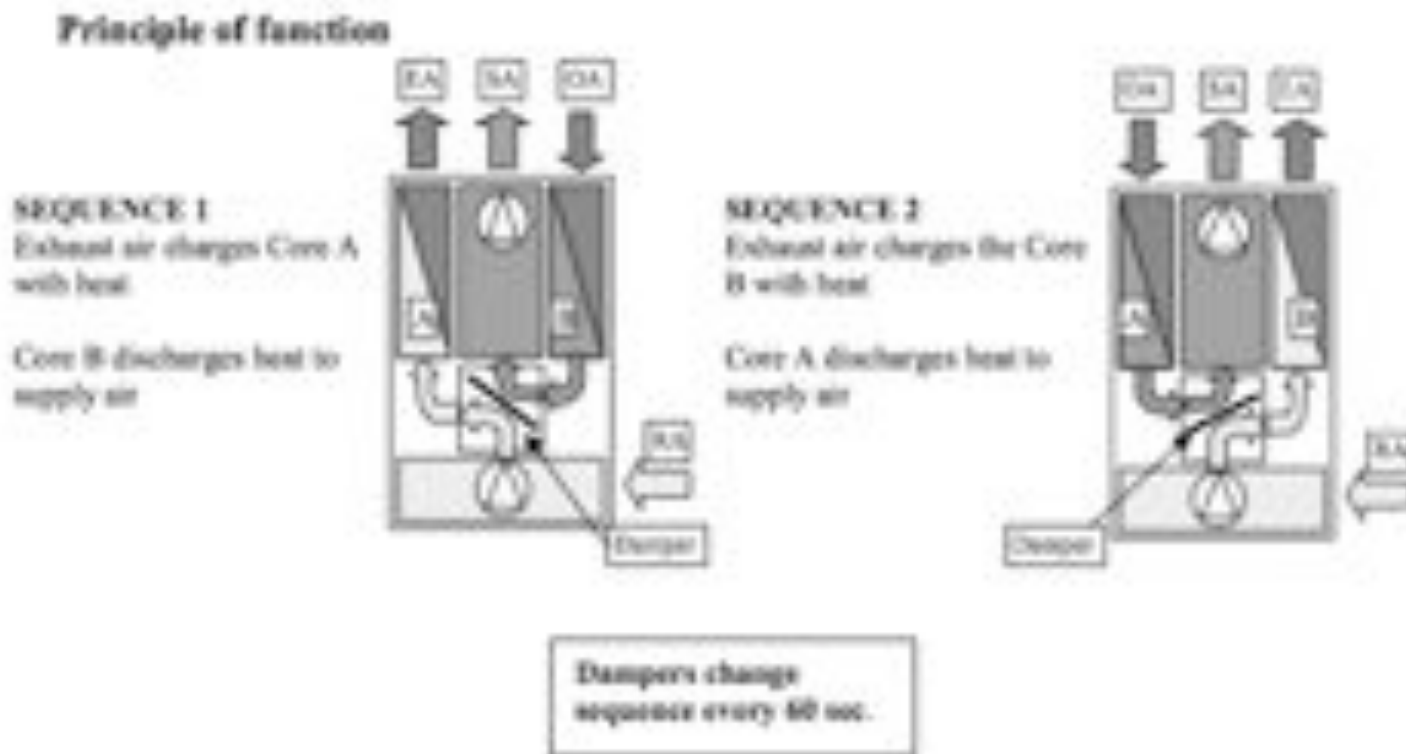
# Heating and Cooling

- Mixed system with heat pump and electric baseboards
- Controlled to operate with heat pump priority
- Mainly cooled with manual night ventilation
- Heat pump will provide cooling as needed
- Reduced heat pump sizing for passive house standard saved \$20K on initial equipment cost



# Ventilation System: Tempeff Model RGSP 1800

- Regenerative, cyclical, dual core, heat exchanger.
- 90% efficiency
- Manufactured in Sweden



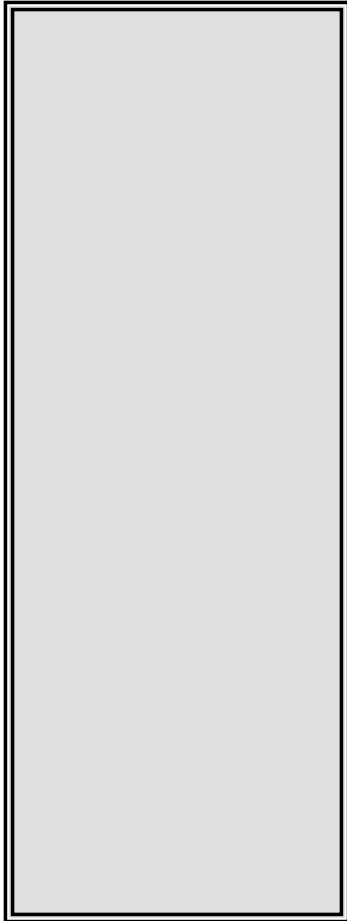
# Electrical Efficiencies

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- Building designed for natural lighting where possible
- Lighting and heating controlled by automated central system for hours of operation
- Most lighting is LED
- Motion sensor power bars at work stations to turn off non-essential plug loads within 5 minutes
- ECM pumps and fans in mechanical systems
- Automation insures cooling equipment will not operate if heating equipment is on
- Solar powered lighting in parking lot

# Solar Hot Water ?

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- LEED credit for water efficiency requires ultra low flow toilets and lavatory faucets.
- Layout designed to minimize hot water runs
- Staff uses showers on rare occasions
- Hot water use is too low to justify the cost of solar thermal hot water.
  
- Owner is considering a wind turbine to offset electrical use.

# Estimated Energy Costs

## ENERGY COSTS

<b>Treated Floor Area</b> (useable interior space, not including stairs, walls, elev., etc., and a reduced percentage for halls, mech. areas, etc.)	5771.40 sf 536.18 m <sup>2</sup>
PH Heat Demand	8042.71 kWh/yr
<b>PH Cost for Electric Heat at NSPI rate .119/kWh</b>	<b>\$957.08 /yr</b>
Cost for Electric Heat for Conventional Construction	\$6,986.00 /yr
PH Total Energy	23591.95 kWh/yr
<b>PH Total Cost for Power at NSPI rate .119/kWh</b>	<b>\$2,807.44 /yr</b>
Cost for Total Energy for Average Conventional Commercial Construction 433 kWh/m <sup>2</sup> *	\$27,627.78 /yr

\*Energy Intensity of the Canadian Commercial Building Stock in NS (2006)

# Questions

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Passive House E-Design

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