

Achieving AAA in Passive House Multi-Family: Approachable, Achievable, Affordable

On the example of Multi-Family project construction
built in Hampton Falls, NH

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



Course Description

The Meadows in Hampton Falls, New Hampshire is a 72-unit, senior apartment campus that, once complete, will be among just a handful of passive house multi-family projects in New England. Thanks to close collaboration between the owner and design/construction team through all stages of the project, it will also be a model of both high-performance *and* affordability. In this panel presentation, the developer, architect and contractor will discuss why wood framing was chosen to meet passive house levels of energy efficiency, details that reduced budget while meeting core objectives such as thermal continuity and continuous air barriers, and aspects of the design and construction process that led the project to success.

Learning Objectives

1. Review the basic principles of passive house design and discuss unique aspects that arise when implementing these techniques in large, multi-family projects.
2. Highlight benefits associated with the use of wood framing in affordable multi-family passive house projects.
3. Demonstrate successful detailing options for walls and roofs in multi-family projects with an emphasis on air tightness and insulation continuity.
4. Discuss design guidelines for implementation of low-energy projects in cold climates with an emphasis on cost competitiveness with traditional project types.



Step 1:
Analyzing the problem and asking the right question

Why Avesta Builds High performance Buildings?

Outlining the market demands

Pinpointing management challenges

Brief introduction of the results



Today's Housing criteria

MEETING THE CHALLENGES

Budget

- ☐ Fixed cost cap financing
- ☐ Rising Labor and Material costs

Nature

- ☐ Exterior Temps Range from **-10° to 90°+**
- ☐ Exterior Humidity Range from **55% - 95%**

Resident

- ☐ Interior Temp Range from **70° to 75°**
- ☐ Interior Humidity Range from **40% - 60%**

Management

- ☐ Properties that reduce Energy Demands
- ☐ Provide Residents with Thermal Comfort



THERMAL COMFORT

ESSENTIAL FACTORS

☐ Air Temperature

Consistent temp range

☐ Surface Temperatures

Radiant Temp between surfaces 7.56°F

☐ Local Temperature Differences

Temp from ankle to head seated 3.6°F

Room to Room Temp 1.44°F

☐ Eliminate Drafts

Unwanted heat, cold & moisture

☐ Relative Humidity of the air

Limited moisture content

☐ Clothing and degree of activity

Based on resident personal preferences

THERMAL COMFORT

BUILDING & SYSTEM STRATEGIES

❑ Continuous Insulation
Walls & Roof $\geq R-30$ to $R-60$
Floor $\geq R-11$

❑ Airtight Barrier
Eliminate Thermal Bridging
 ≤ 0.06 h n50 (blower door test)

❑ High Performance Windows
SHGC of 45%-55%
Windows $R-7.1$ (triple glazed)

❑ Heat Recovery Ventilation
75% Efficient Heat Recovery
 ≤ 0.76 W/cfm electricity demand

❑ Electrical Appliance
Energy Efficient / Energy Star

❑ Glazing Design
Location & Size
(larger-southern exposure)

Examples of Avesta High performance Buildings

Brief introduction of the results





- Gorham Maine
- Completed in 2017
- 24 Units - Senior housing
- 1 Bldg. 23,026 Gross SF
- Wood Frame Construction
- Electric Baseboard
- Solar Array
- Natural Gas for DHW

Ridgewood II

2017 New Construction LEED Platinum

Project outcome

- Cost per watt - \$0.15
- Cost per therm.- \$1.14
- Average Energy Cost –
- \$23,358 per year
- Total Unit – 24
- Total Gross SF – 23,026
- Unit Energy Cost –
- \$70.74 per month
- Building Energy Usage Cost –
- \$0.88 per SF / per year
- \$0.07 per SF / per month



2017	USAGE	COST
• Nat Gas	2,336	\$ 2,663
• KWH	140,680	\$21,102

2018	USAGE	COST
• Nat Gas	2,435	\$ 2,776
• KWH	117,320	\$17,598



- Portland Maine
- Completed in 2017
- 45 Units – Family Housing
- 1 Bldg. 37,815 SF
- Wood Frame Construction
- Electric Baseboard
- Solar Array
- Natural Gas for DHW



Bayside Anchor 2017 New Construction Passive House

Project outcome

- Cost per watt - \$0.15
- Cost per therm.- \$1.14
- Average Energy Cost –
- \$32,404 per year
- Total Unit – 45
- Total Gross SF – 37,815
- Unit Energy Cost –
- \$69.71 per month
- Building Energy Usage Costs –
- \$0.99 per SF / per year
- \$0.08 per SF / per month

- PHPP estimated electricity use – 188,052kWH/YEAR
- Estimated cost at \$0.15 - \$28,207/YEAR
- PHPP estimated GAS use- 242,438kBTU/YEAR
- Estimated cost at 1.14 therm. - \$2,763/YEAR



	2017	USAGE	COST
• Nat Gas		2,496	\$ 2,845
• KWH		162,120	\$24,318

	2018	USAGE	COST
• Nat Gas		3,287	\$ 3,747
• KWH		225,978	\$33,897

1BR (Bedroom)

Heating	\$107
Cooking	\$ 11
Lighting	\$ 32
DHWS	\$ 32
Range	\$ 9
Fridge	\$ 11

Total

\$203

Allowances for Tenant-Furnished Utilities and Other Services		U.S. Department of Housing and Urban Development Office of Public and Indian Housing		Date January 1, 2019				
Locality 4,5,6,7		Unit Type Low Rise,Walk up, Row,Garden,Townhouse						
Utility or Service		Monthly Dollar Allowances						
		0BR	1BR	2BR	3BR	4BR	5BR	6BR
HEATING								
a. Oil		77	107	140	174	221	247	284
b. Electric		77	107	154	195	222	258	297
c. Natural Gas		46	65	77	87	103	114	127
d. Bottle Gas(Propane)		90	123	159	192	246	282	324
e. Wood		38	51	67	81	94	110	138
f. Kerosene		89	124	162	201	255	286	328
g. Electric(heat pump)Other/Other		36	43	51	57	63	70	75
AIR CONDITIONING								
COOKING								
a. Electric		9	11	14	18	24	28	30
b. Natural Gas		5	6	8	9	12	14	15
c. Bottle Gas(Propane)		16	19	25	30	38	44	49
OTHER ELECTRIC LIGHTING		24	32	42	52	64	75	80
REFRIGERATION, ETC.								
WATER HEATING								
a. Oil		27	33	43	55	70	79	91
b. Electric		30	41	54	67	86	99	105
c. Natural Gas		17	23	29	36	45	53	60
d. Bottle Gas(Propane)		41	46	60	74	96	109	126
WATER		11	13	17	21	25	29	34
SEWER		13	15	20	25	30	35	40
TRASH COLLECTION		27	27	27	27	27	27	27
RANGE		9	9	9	9	9	9	9
REFRIGERATOR		11	11	11	11	11	11	11
ACTUAL FAMILY ALLOWANCES (To be used by family to compute allowance)		Utility or Service						Per Month
Name of Family		Heating.....						
		Air Conditioning.....						
Address of Unit		Cooking.....						
		Other Electric.....						
		Water Heating.....						
		Water.....						
		Sewer.....						
		Trash Collection.....						
		Range.....						
		Refrigerator.....						
Number of Bedrooms		Other.....						
		TOTAL						

2 BR (Bedroom)

Heating	\$154
Cooking	\$ 14
Lighting	\$ 42
DHWS	\$ 54
Range	\$ 9
Fridge	\$ 11

Total

\$284

But what if all buildings are different

Brief introduction into The Meadows



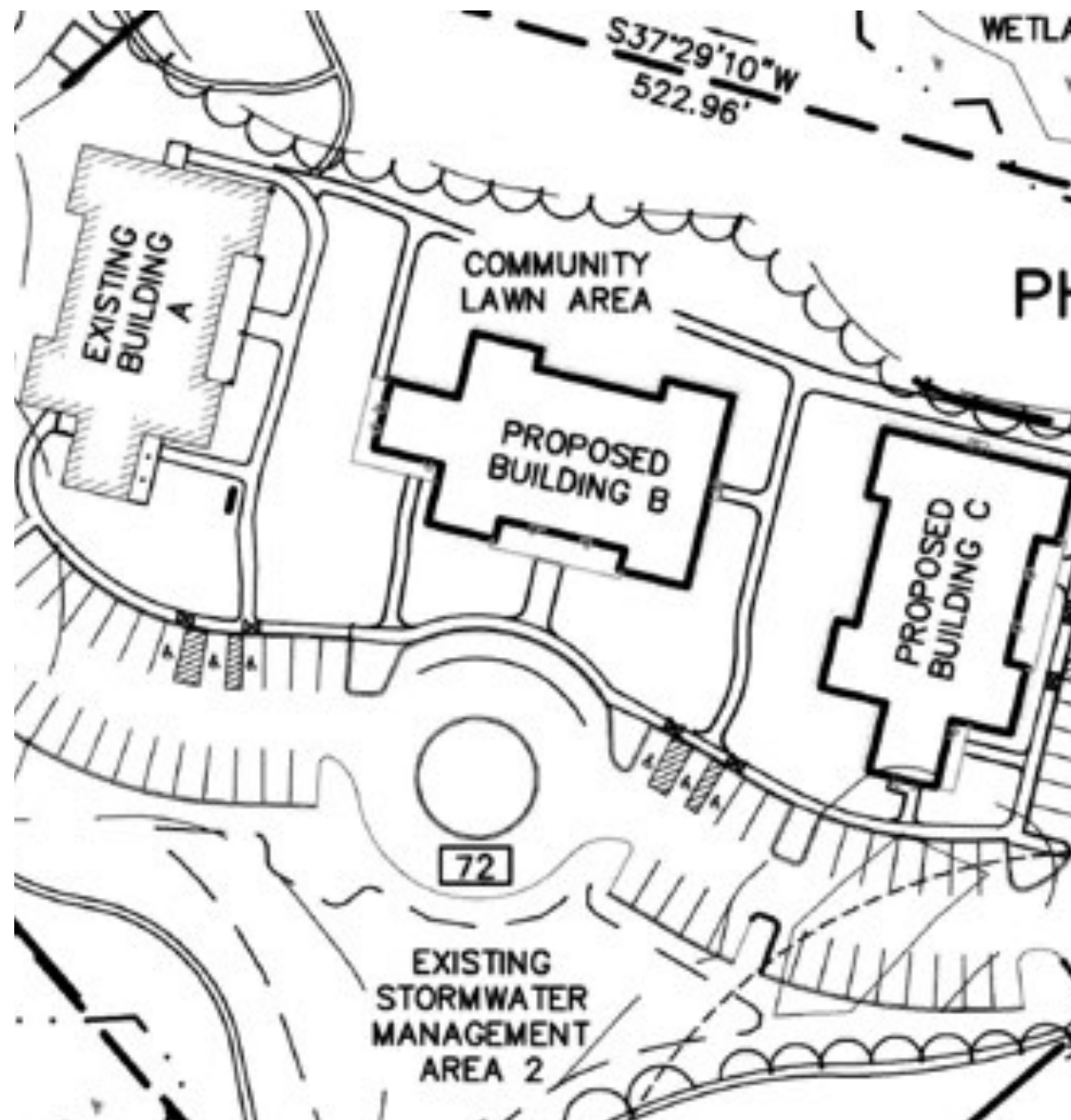
THE MEADOWS AT GRAPEVINE RUN

2017 New Construction – code compliant – Red

2019 New Construction – passive house – Blue

- Constructed in 2017
- (1) 24 Unit housing in Hampton Falls
- 1 Bldg. 20,290 SF
- Slab on grade wood structure
- Central Boiler system – Baseboard fixtures
- Propane Fuel
- Completion in 2019
- (2) 24 Unit housing in Hampton Falls
- 2 Bldgs. 20,290 SF Each
- Slab on grade wood structure
- Heat Pump Heating, Cooling & DHW
- Electric Fuel Source

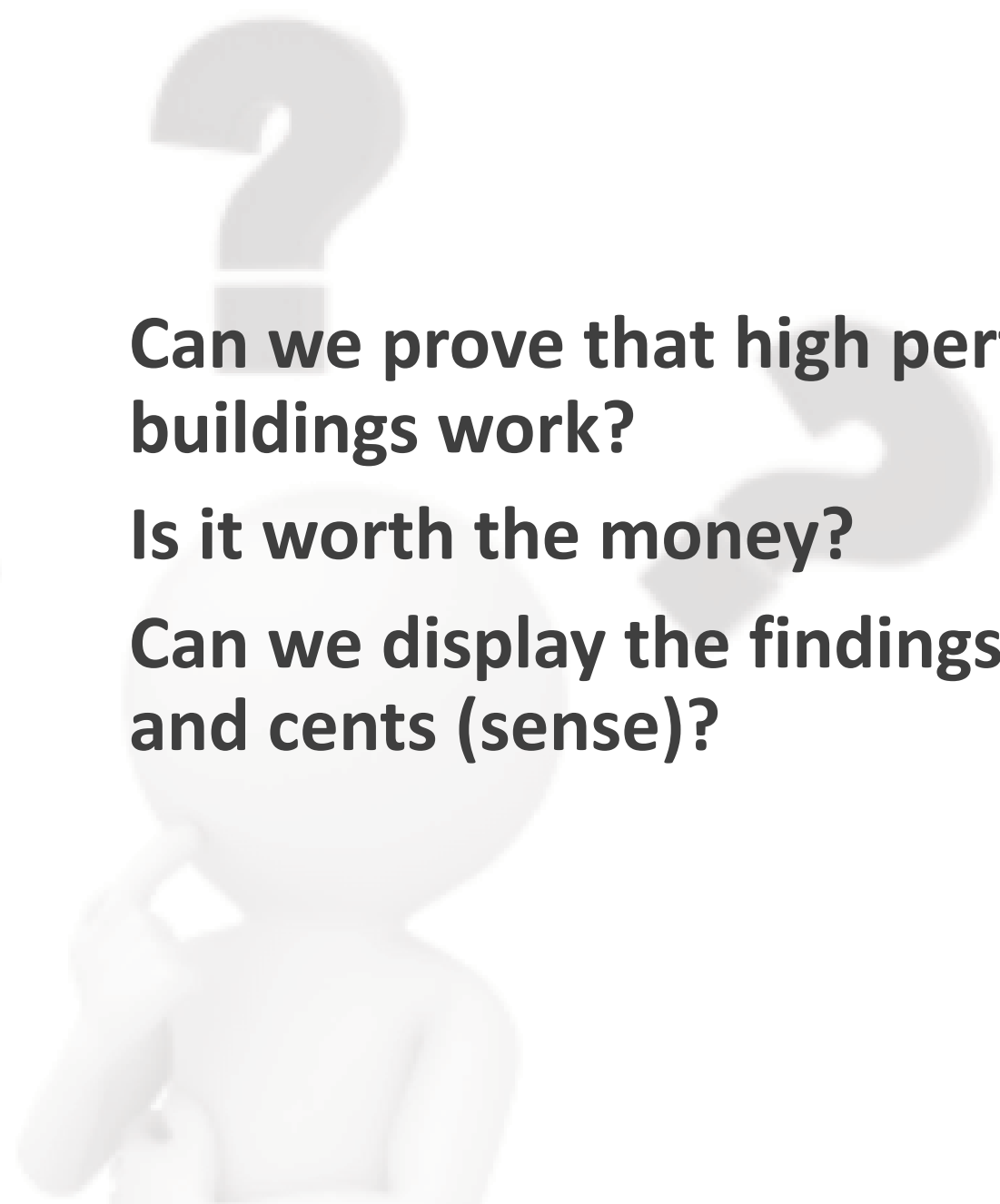




The Meadows at grapevine run

Project: Meadows One		Date: 8/15/16
SCHEDULE OF VALUES		
Location: Hampton Falls, NH		
Description	Total Cost	
General labor	\$ 83,200.00	
Construction layout	\$ 5,000.00	
Final clean	\$ 7,463.00	
Rubbish removal	\$ 14,700.00	
Site improvements	\$ 2,400.00	
Foundation	\$ 56,235.00	
Flatwork	\$ 62,707.00	
Masonry	\$ 23,279.00	
Metal fabrications	\$ 11,340.00	
Rough carpentry, roofing, siding	\$ 535,214.00	
Homasote Layer	\$ 15,000.00	
Finish carpentry & cabinetry	\$ 151,575.00	
Insulation	\$ 88,240.00	
Gutters & downspouts	\$ 8,000.00	
Snowguards	\$ 6,660.00	
Roof hatch	\$ 1,500.00	
Access doors	\$ 3,600.00	
Firestopping	\$ 5,000.00	
Windows	\$ 35,851.00	
Storefront/glass	\$ 16,310.00	
Doors and hardware	\$ 101,611.00	
Drywall	\$ 163,950.00	
Flooring	\$ 82,163.00	
Acoustic ceiling	\$ 12,317.00	
Painting	\$ 49,495.00	
Specialties/FRP	\$ 42,947.00	
Appliances	\$ 37,589.00	
Window treatment	\$ 5,946.00	
Fire protection *	\$ 210,283.00	
Elevator	\$ 77,860.00	
Plumbing	\$ 185,000.00	
HVAC	\$ 348,543.00	
Electrical	\$ 409,017.00	
Solar Electric Photovoltaic (PV)	\$ 0.00	
Construction equipment	\$ 10,000.00	
Winter Conditions	\$ 26,000.00	
Total	2,895,995.00	

Project: Meadows Two		Date: 9/5/18
SCHEDULE OF VALUES		
Location: Hampton Falls, NH		
Description	Total Cost	
General labor	\$ 0.00	
Construction layout	\$ 0.00	
Final clean	\$ 0.00	
Rubbish removal	\$ 10,000.00	
Site improvements	\$ 2,400.00	
Foundation	\$ 58,500.00	
Flatwork	\$ 53,214.00	
Masonry	\$ 20,592.00	
Metal fabrications	\$ 4,500.00	
Rough carpentry, roofing, siding	\$ 422,092.00	
Homasote Layer (gyperete)	\$ 15,706.00	
Finish carpentry & cabinetry	\$ 281,417.00	
Insulation	\$ 369,094.00	
Gutters & downspouts	\$ 0.00	
Snowguards	\$ 0.00	
Roof hatch	\$ 0.00	
Access doors	\$ 3,000.00	
Firestopping	\$ 0.00	
Windows	\$ 57,106.00	
Storefront/glass	\$ 12,800.00	
Doors and hardware	\$ 158,351.00	
Drywall	\$ 285,750.00	
Flooring	\$ 122,771.00	
Acoustic ceiling	\$ 14,900.00	
Painting	\$ 49,748.00	
Specialties/FRP	\$ 30,248.00	
Appliances	\$ 38,803.00	
Window treatment	\$ 13,250.00	
Fire protection *	\$ 51,960.00	
Elevator	\$ 72,600.00	
Plumbing	\$ 185,000.00	
HVAC	\$ 381,000.00	
Electrical	\$ 405,875.00	
Solar Electric Photovoltaic (PV)	\$ 0.00	
Construction equipment	\$ 0.00	
Winter Conditions	\$ 30,000.00	
Total	3,150,677.00	



**Answer the
questions**

**Can we prove that high performance
buildings work?**

Is it worth the money?

**Can we display the findings in dollars
and cents (sense)?**

Energy Performance

benchmarking tools & services

Operational Metrics - 2018													
Consumption Data - 2018													
Property	# Residents (Dec 2018)	Electricity - Total (KWH)	Total Per SQ Foot	Per Unit	PUPM	Fuel (Therms)	Per SQ Foot	Per Unit	Water (gall)	Per SQ Foot	Per Unit	Gal/Person (Annual)	Gal/Person (Day)
Meeting Place 3	19	36,400	0.94	847	71	259	0.01	6	65,000	1.68	1,512	3,421	9
Blackstone II	22	59,912	4.10	3,328	277		0.00	0	235,000	16.09	13,056	10,682	29
Meadows 1	26	188,325	8.69	7,847	654	4,411	0.20	184		0.00	0	0	0
Carlson Street	46	64,356	2.38	1,739	145	12,993	0.48	351	530,000	19.64	14,324	11,522	32
Bertlet Woods	34	110,700	4.58	3,954	329	5,763	0.24	206	456,000	18.88	16,296	13,412	37
Bayside Anchor	57	224,943	5.95	4,999	417	3,274	0.09	73	838,000	22.11	18,578	14,867	40
Butler Building	46	105,785	11.11	3,318	276	21,860	1.31	390	761,000	45.50	13,589	16,543	45
Huston Commons	29	146,805	6.87	4,894	408	11,041	0.52	368	637,000	29.80	21,233	21,968	60
Payson Building	20	72,117	4.31	1,288	107	15,172	0.91	271	249,000	14.09	4,446	12,450	34
809 Cumberland	61	159,803	2.84	2,804	234	17,919	0.32	314	1,462,000	25.97	25,649	23,967	66
Meeting Place 1	61	27,097	0.76	695	58	29,768	0.83	763	1,081,000	30.21	27,718	17,721	49
Ridgewood II	28	117,320	5.10	4,888	407	2,435	0.11	101	375,000	16.29	15,625	13,383	37
Thomas Heights	18	102,585	7.62	5,698	475	5,659	0.42	314	271,000	20.15	15,056	15,056	41
Young Street	35	132,760	5.19	4,741	395	3,632	0.14	130	1,509,000	58.96	53,893	43,114	118
Pearl Street II	121	126,129	3.43	2,336	195	31,648	0.88	586	1,506,000	41.69	27,889	12,446	34
Cascade Brook	34	190,373	6.90	6,346	529	11,036	0.38	368	580,000	20	19,333	17,059	47
Emery School	29	83,303	3.06	3,471	289	10,337	0.38	431	585,000	20.73	23,542	19,483	53
Meeting Place 6	28	56,858	1.45	2,187	182	1,329	0.03	51	320,000	8.18	12,308	11,429	31
Oak Street Lofts	38	74,570	2.95	2,015	168	12,496	0.49	338	1,941,000	76.83	52,459	51,079	140
Park Street Apartments	36	153,375	3.95	5,113	426	11,744	0.30	381	485,000	12.50	16,167	13,472	37
Florence House	25	396,752	12.66	15,870	1,323	17,903	0.57	716	2,109,000	67.28	84,360	84,360	231
Pearl Place	86	136,362	4.68	2,273	189	31,648	1.09	527	2,994,000	102.69	49,900	34,894	95
Logan Place	30	78,965	4.29	2,632	219	13,351	0.73	445	1,120,000	60.85	37,333	37,333	102

Energy Performance

benchmarking tools & services

AVESTA HOUSING - NEW CONSTRUCTION 2005 - 2017											
Property	C.O. Year	Resident Type	Number Unit	Gross Floor Area	Total MMBTU	MMBTU / Unit	MMBTU / Sq. Ft.	Total Operating Costs (elec. heat, water)	Total Operating Costs/Unit	Total Operating Costs / Sq. Ft.	Building Design
Bartlet Woods	2017	Senior	28	24,347	954	34	0.040	\$23,175	\$828	\$0.96	High Performance
Carlson Street	2017	Family	37	26,986	1,539	41	0.056	\$24,465	\$661	\$0.91	High Performance
Bayside Anchor	2016	Family	45	37,815	1,095	24	0.029	\$37,474	\$833	\$0.99	Passive Design
Huston Commons	2016	Housing First	30	21,375	1,605	53	0.075	\$34,607	\$1,254	\$1.62	Code Compliance
Ridgewood II	2015	Senior	24	23,026	644	27	0.028	\$20,374	\$849	\$0.88	LEED
Young Street	2015	Senior	28	25,594	816	29	0.032	\$24,127	\$862	\$0.94	High Performance
409 Cumberland	2015	Family	57	56,286	2,337	41	0.042	\$44,398	\$779	\$0.79	High Performance
Thomas Heights	2015	Housing First	18	13,452	916	51	0.068	\$21,836	\$1,213	\$1.62	Code Compliance
Meeting Place 1	2015	Family	39	35,780	3,069	79	0.086	\$38,000	\$974	\$1.06	Code Compliance
Pearl Street II	2013	Family	54	56,764	3,594	67	0.063	\$54,998	\$1,018	\$0.97	Code Compliance
Oak Street Lofts	2012	Family	37	25,263	1,504	41	0.060	\$25,431	\$687	\$1.01	LEED
Cascade Brook	2012	Senior	30	29,278	1,753	58	0.060	\$47,096	\$1,570	\$1.61	Code Compliance
Florence House	2010	Housing First	25	31,345	3,144	126	0.100	\$79,922	\$3,197	\$2.55	Code Compliance
Pearl Place	2007	Family	60	65,279	3,629	60	0.056	\$56,533	\$942	\$0.87	LEED
Fore River Apartments	2006	Family	30	20,189	1,272	64	0.063	\$21,473	\$1,074	\$1.06	Code Compliance
Little Falls Landing	2006	Senior	24	20,805	1,766	74	0.085	\$32,917	\$1,372	\$1.58	Code Compliance
Logan Place	2005	Housing First	30	18,407	1,604	53	0.087	\$27,065	\$902	\$1.47	Code Compliance

Energy Performance

benchmarking tools & services

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Pearl Street II	2013	Family	54	56,764	3,594	67	0.063	\$54,998	\$1,018	\$0.97	Code Compliance
Bayside Anchor	2016	Family	45	37,815	1,095	24	0.029	\$37,474	\$833	\$0.99	Passive Design
Oak Street Lofts	2012	Family	37	25,263	1,504	41	0.060	\$25,431	\$687	\$1.01	LEED
Meeting Place 1	2015	Family	39	35,780	3,069	79	0.086	\$38,000	\$974	\$1.06	Code Compliance
Fore River Apartments	2006	Family	20	20,189	1,272	64	0.063	\$21,473	\$1,074	\$1.06	Code Compliance
Logan Place	2005	Housing First	30	18,407	1,604	53	0.087	\$27,065	\$902	\$1.47	Code Compliance
Little Falls Landing	2006	Senior	24	20,805	1,766	74	0.085	\$32,917	\$1,372	\$1.58	Code Compliance
Cascade Brook	2012	Senior	30	29,278	1,753	58	0.060	\$47,096	\$1,570	\$1.61	Code Compliance
Huston Commons	2016	Housing First	30	21,375	1,605	53	0.075	\$34,607	\$1,154	\$1.62	Code Compliance
Thomas Heights	2015	Housing First	18	13,452	916	51	0.068	\$21,836	\$1,213	\$1.62	Code Compliance
Florence House	2010	Housing First	25	31,345	3,144	126	0.100	\$79,922	\$3,197	\$2.55	Code Compliance

Summation of high performance buildings

EXCEED EXPECTATIONS

Budget

- ☐ Modest increase of 3%-5% first costs

Nature

- ☐ Create more resilient buildings

Resident

- ☐ Residents receive thermal comfort

Management

- ☐ Building can save operations Money
- ☐ Building can reduce Energy consumption
- ☐ Building can reduce or eliminate Carbon output





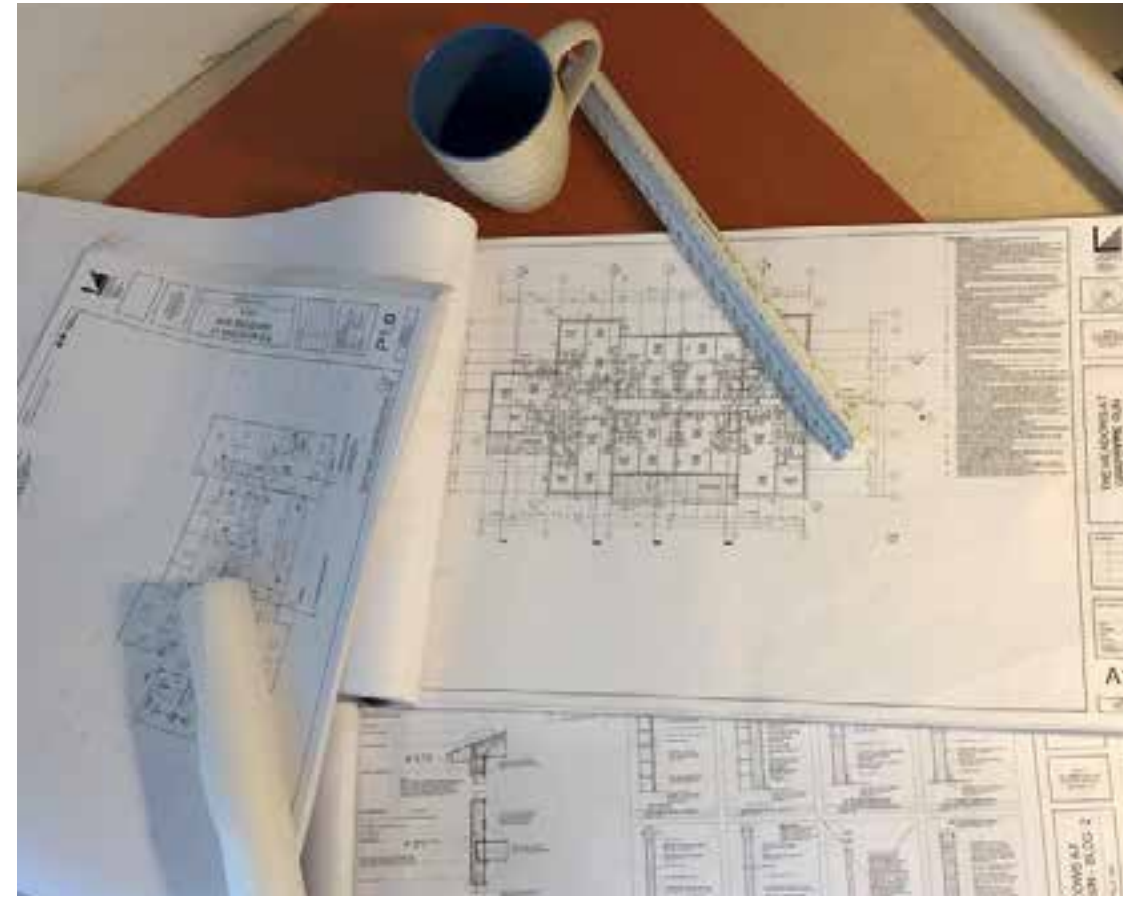
Step 2:
Coming up with solution

Designing high performance building Without blowing the budget

Provide highest standard at affordable rate

Introduce highest efficiency to
traditional techniques

Come up with approachable model solution



Gliwice, Poland
Typical housing development, built 1920s

... MY HOUSE



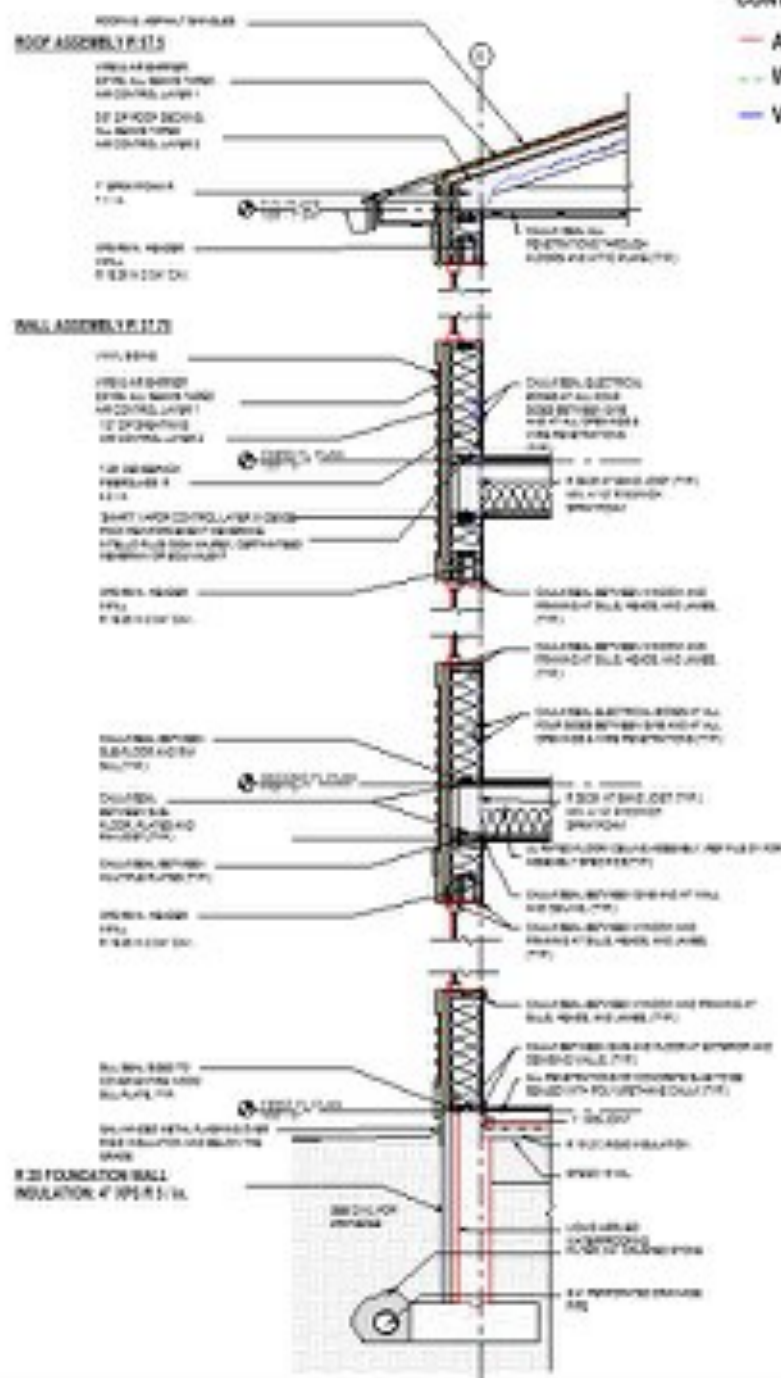
2001 – WHY DO YOU NEED EXTERIOR INSULATION ?!
2006 – WHAT DO YOU MEAN “NO EXTERIOR INSULATION?!”

AFFORDABLE HOUSING – DRIVEN BY REASON

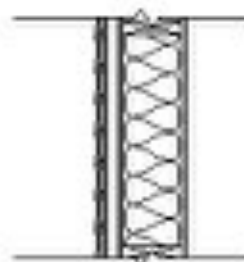
Sized just right, **built of available components**, low maintenance, simple, **approachable and accessible**, good quality



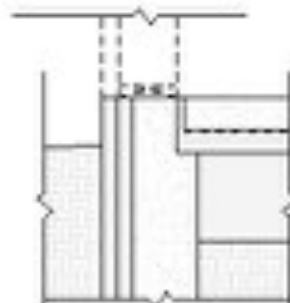




1. WALL ASSEMBLY
R 37.76



2. FROST WALL
R 20



3. ROOF ASSEMBLY



2. WALL ASSEMBLY

MODELED R 37.75

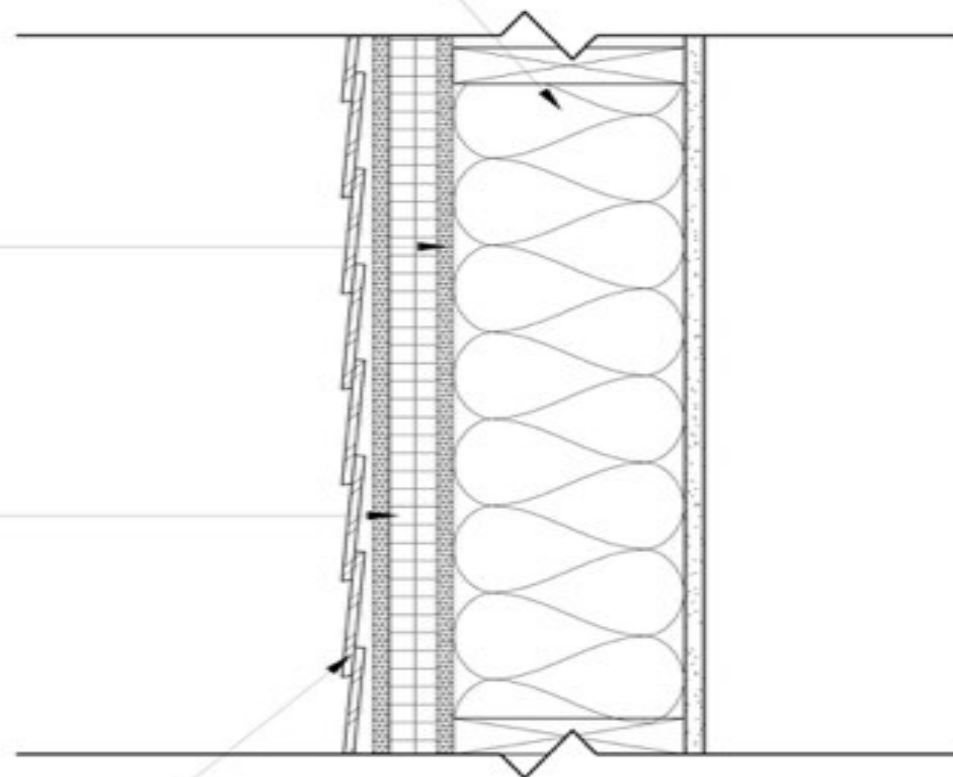


2X8 FRAMING CAV. WITH BLOWN IN
FIBERGLASS
R 31

ZIP SHEATHING, ALL SEAMS TAPED

ZIP R 9, ALL SEAMS TAPED

VINYL SIDING



2. WALL ASSEMBLY

MODELED R 37.75

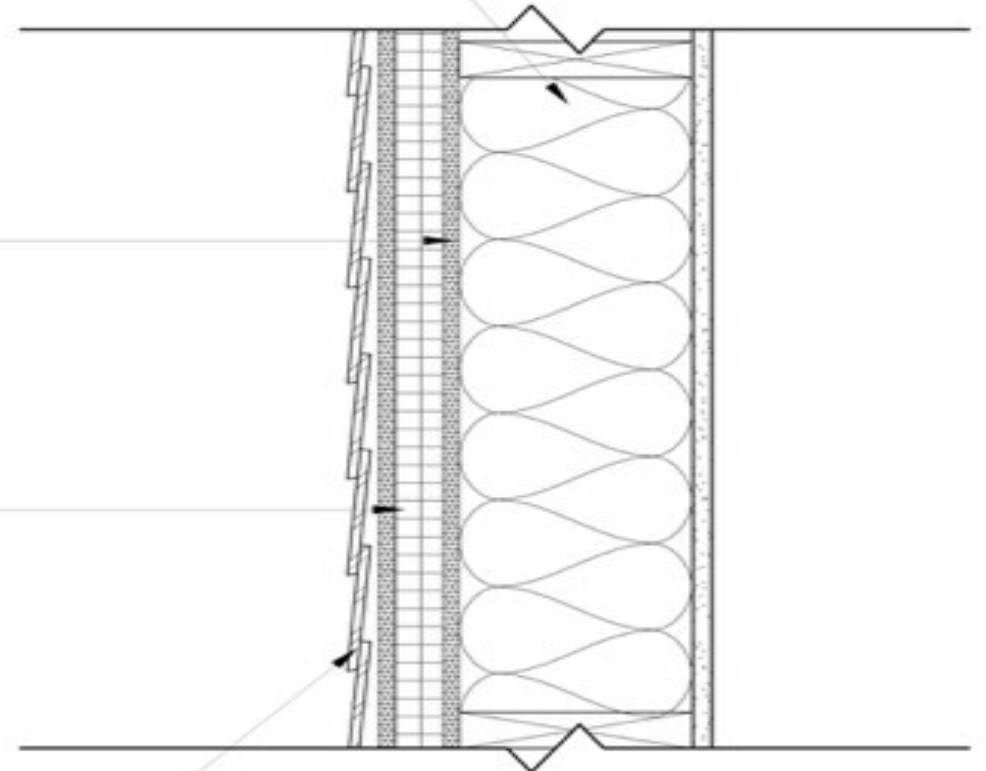


2X8 FRAMING CAV. WITH BLOWN IN
FIBERGLASS
R 31

ZIP SHEATHING, ALL SEAMS TAPED

ZIP R 9, ALL SEAMS TAPED

VINYL SIDING



2. WALL ASSEMBLY

MODELED R 37.75

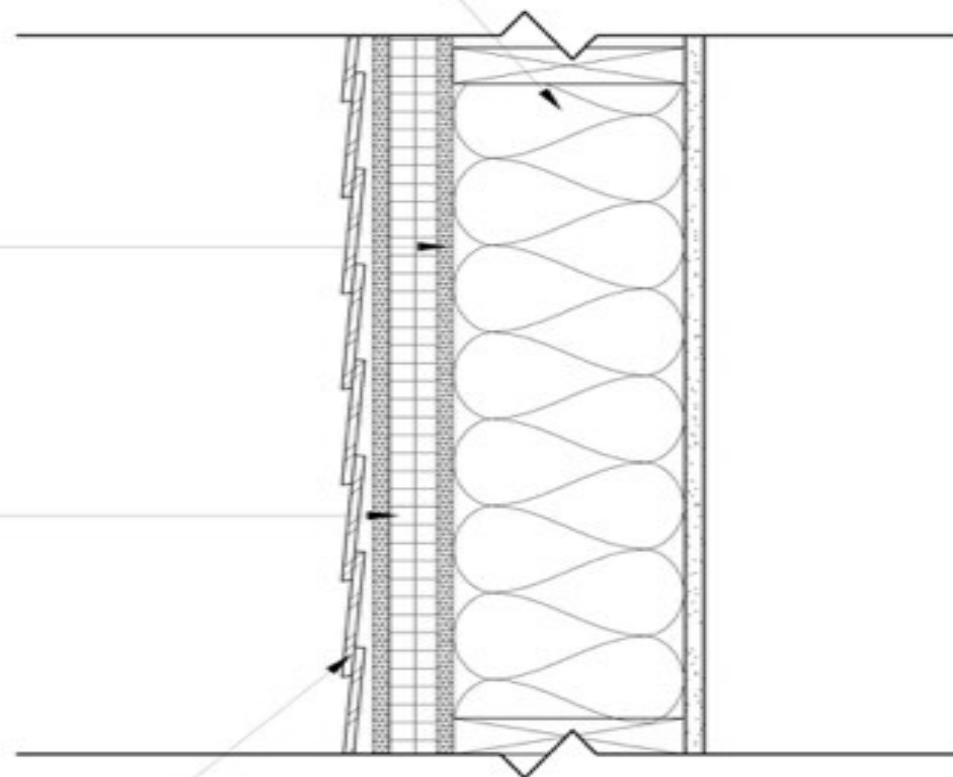


2X8 FRAMING CAV. WITH BLOWN IN
FIBERGLASS
R 31

ZIP SHEATHING, ALL SEAMS TAPED

ZIP R 9, ALL SEAMS TAPED

VINYL SIDING



2. WALL ASSEMBLY

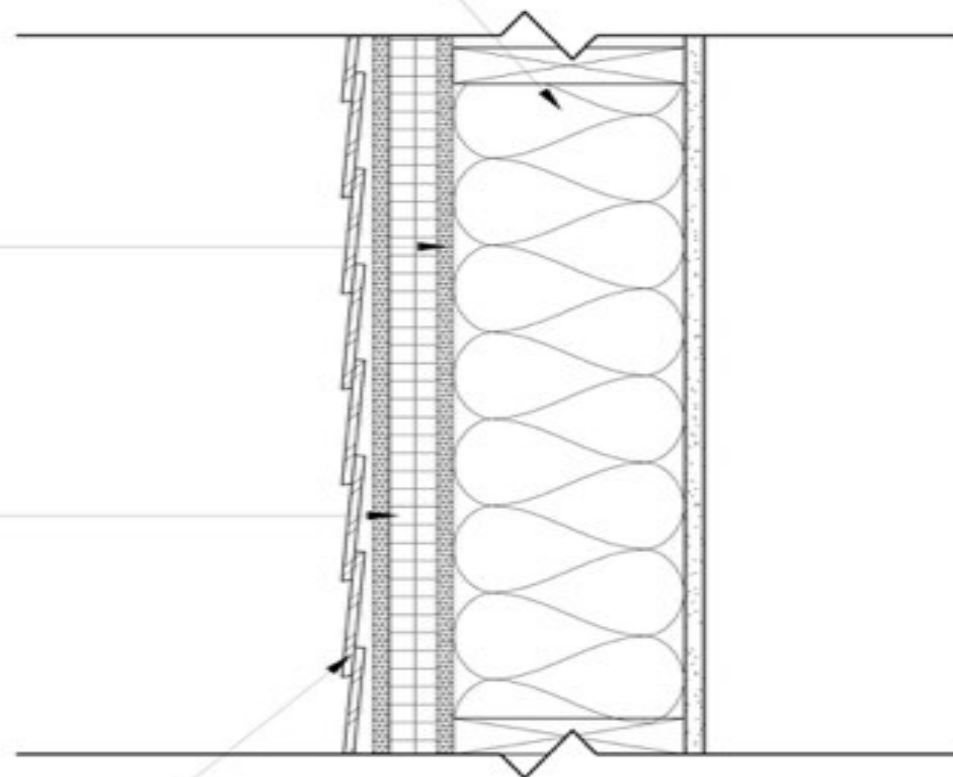
MODELED R 37.75

2X8 FRAMING CAV. WITH BLOWN IN
FIBERGLASS
R 31

ZIP SHEATHING, ALL SEAMS TAPED

ZIP R 9, ALL SEAMS TAPED

VINYL SIDING



2. WALL ASSEMBLY

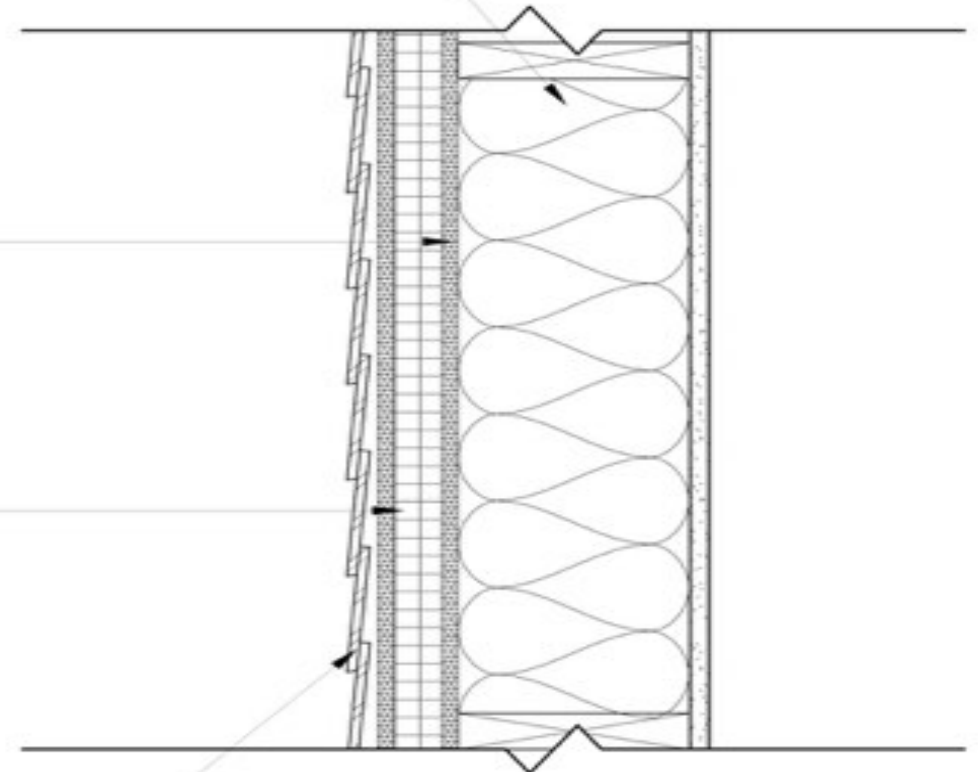
MODELED R 37.75

2X8 FRAMING CAV. WITH BLOWN IN
FIBERGLASS
R 31

ZIP SHEATHING, ALL SEAMS TAPED

ZIP R 9, ALL SEAMS TAPED

VINYL SIDING



2. WALL ASSEMBLY

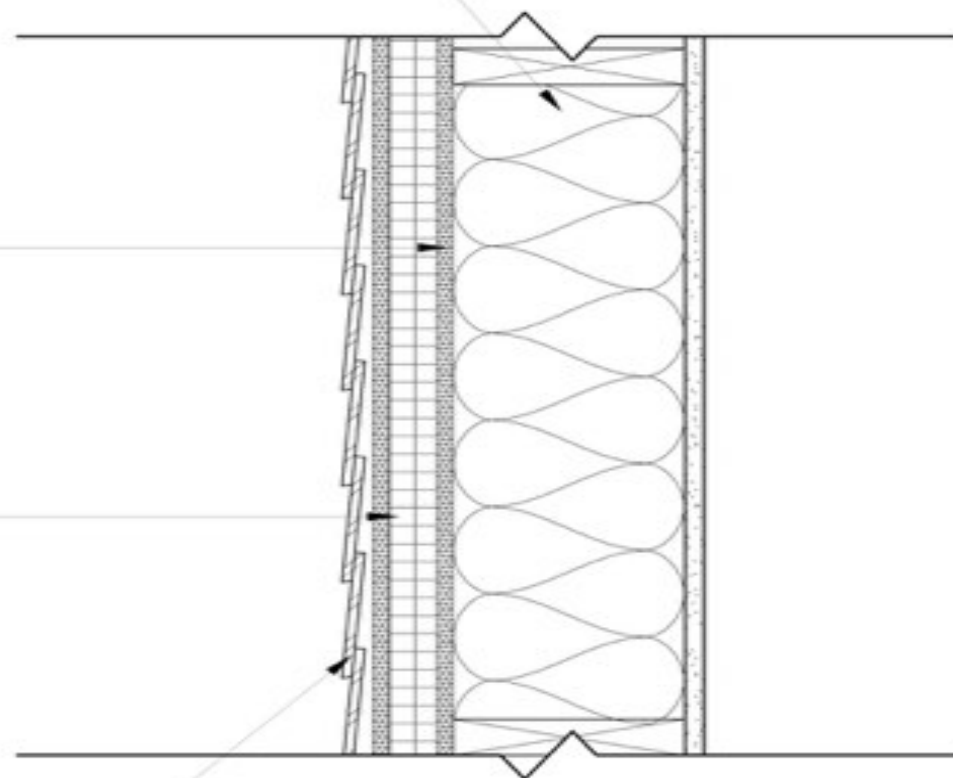
MODELED R 37.75

2X8 FRAMING CAV. WITH BLOWN IN
FIBERGLASS
R 31

ZIP SHEATHING, ALL SEAMS TAPED

ZIP R 9, ALL SEAMS TAPED

VINYL SIDING

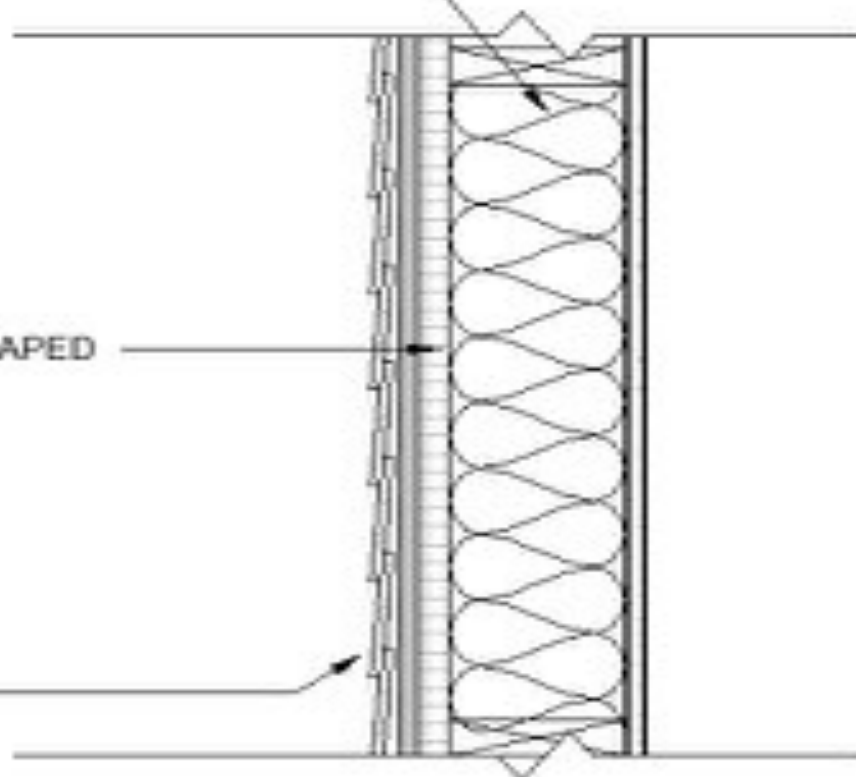


PHASE I WALL ASSEMBLY R 26.85

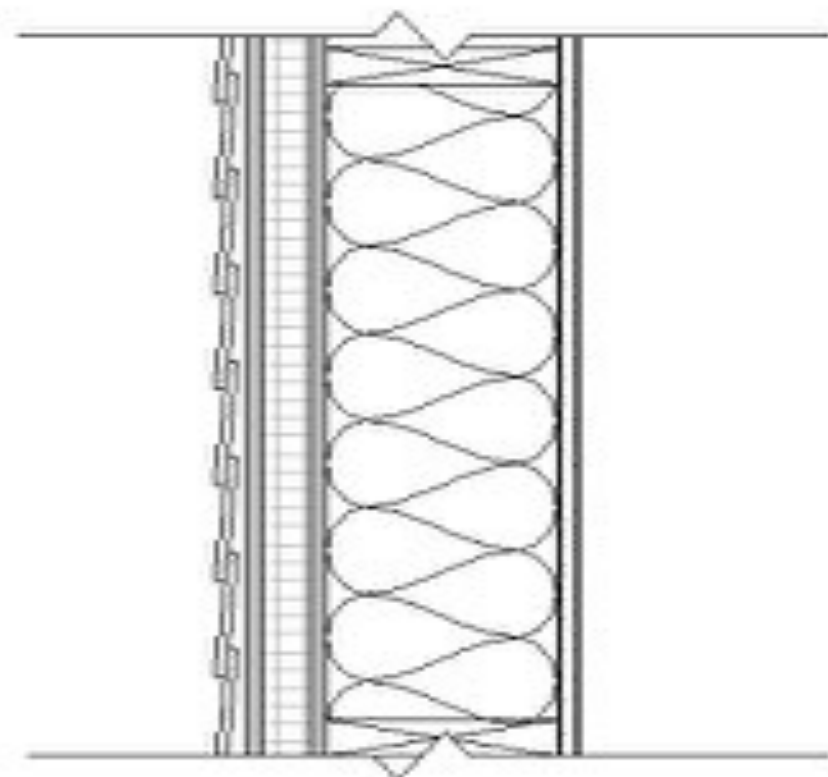
2X6 FRAMING CAV. WITH BLOWN IN
FIBERGLASS
R 23

ZIP R 6, ALL SEAMS TAPED

VINYL SIDING

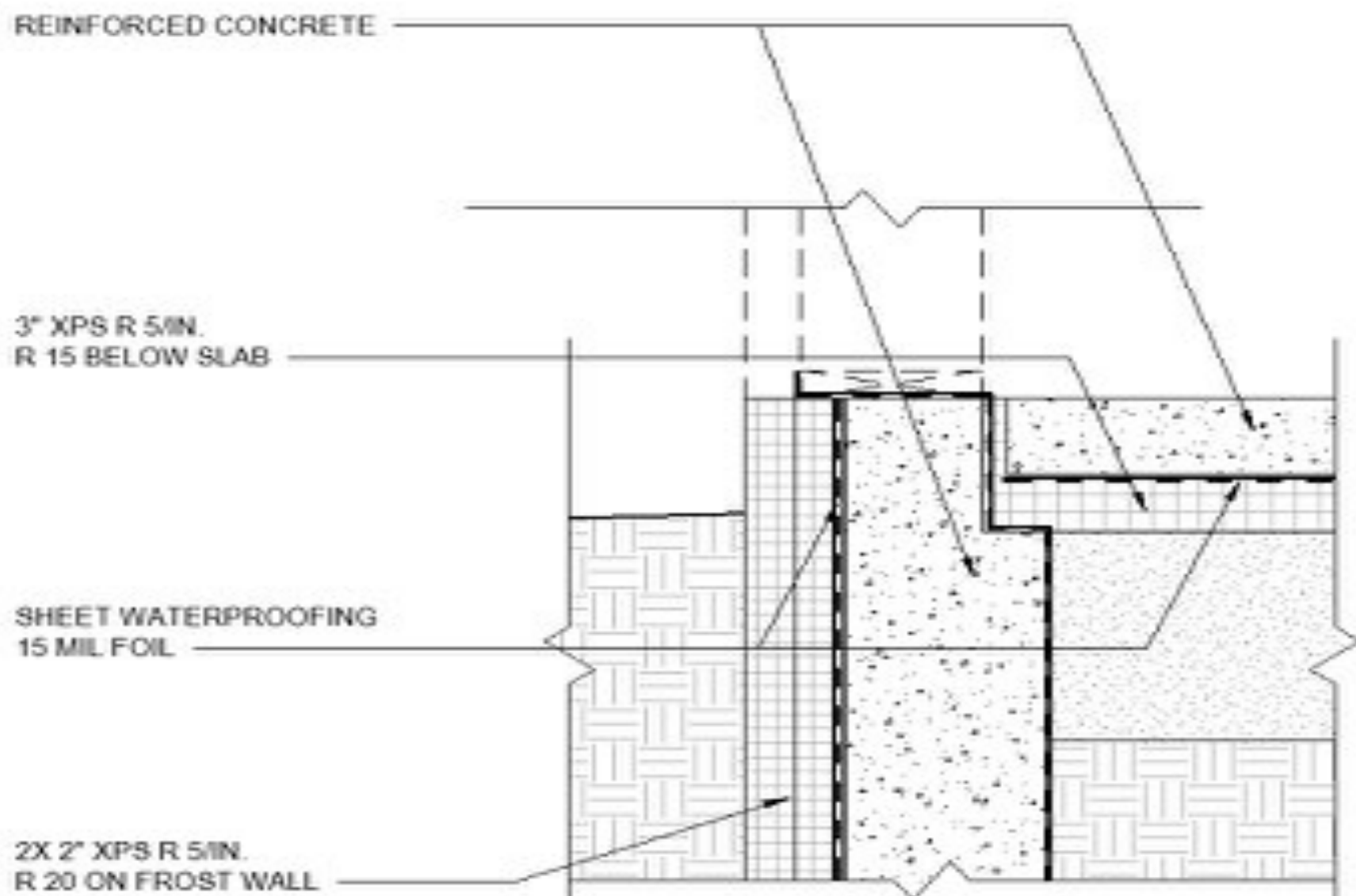


PHASE II WALL ASSEMBLY R 37.75





3. FOUNDATION MODELED R 20 AT WALL; R15 UNDERSLAB



3. FOUNDATION MODELED R 20 AT WALL; R15 UNDERSLAB

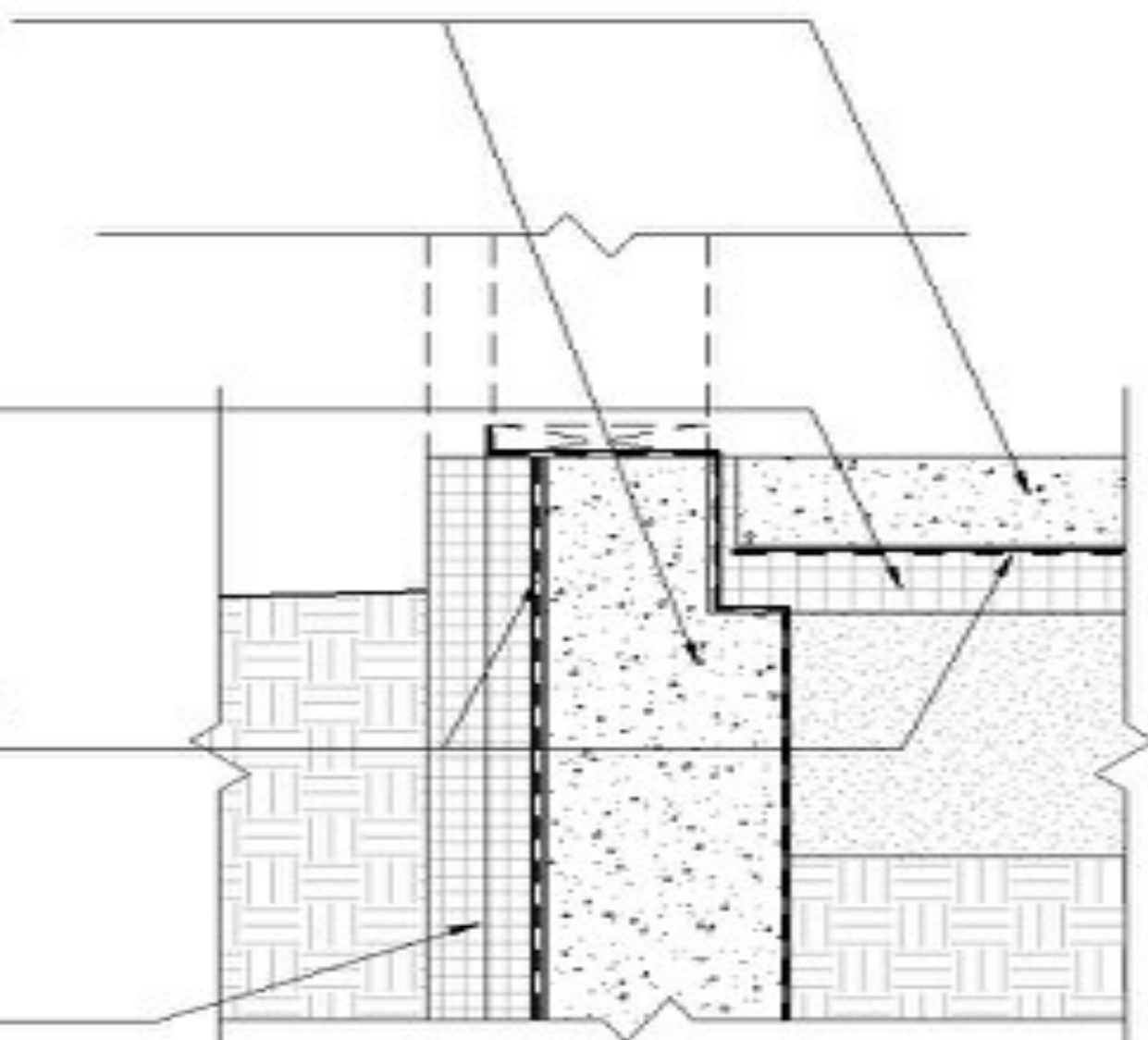


REINFORCED CONCRETE

3" XPS R 5/IN.
R 15 BELOW SLAB

SHEET WATERPROOFING
15 MIL FOIL

2X 2" XPS R 5/IN.
R 20 ON FROST WALL



3. FOUNDATION MODELED R 20 AT WALL; R15 UNDERSLAB

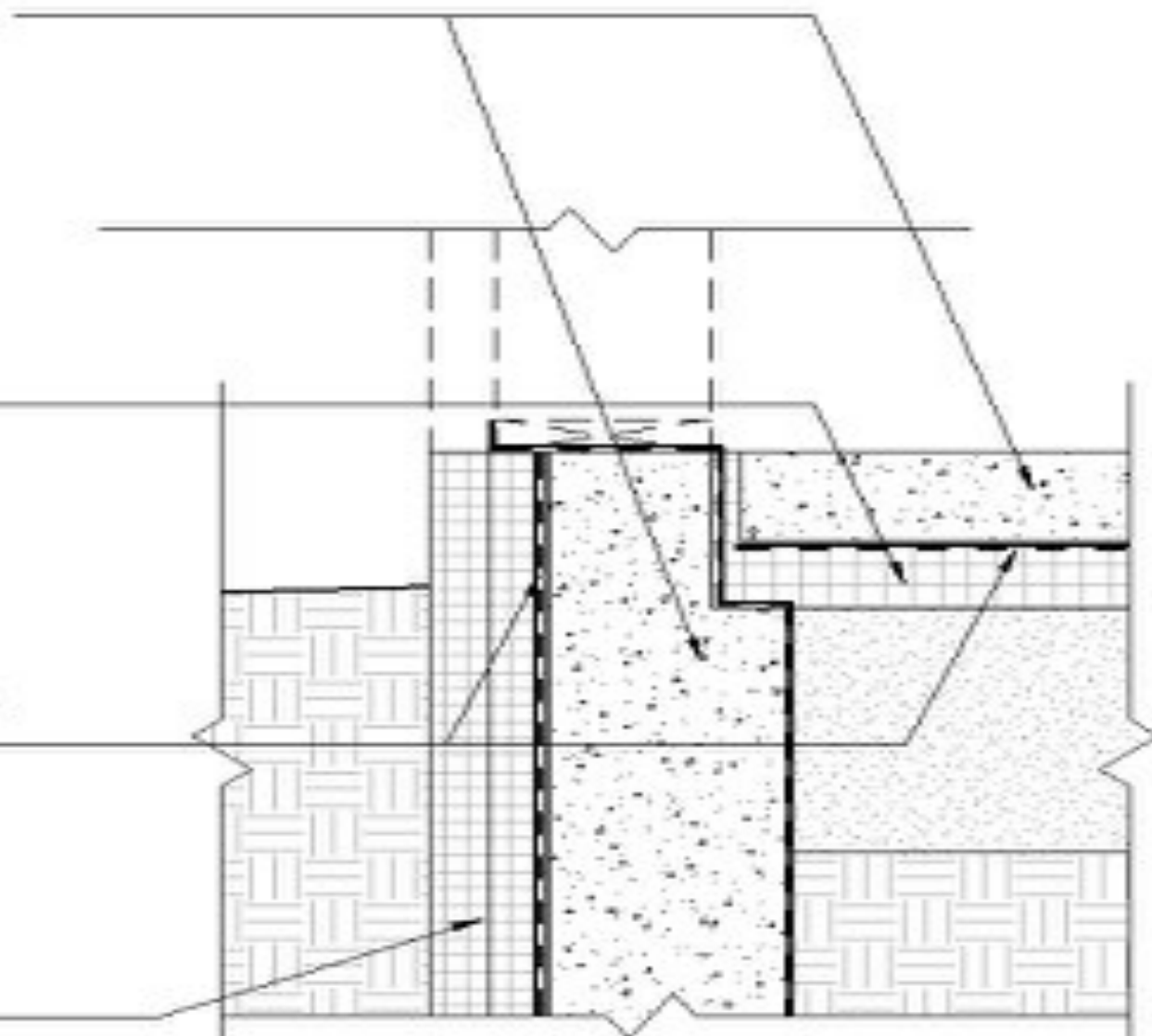


REINFORCED CONCRETE

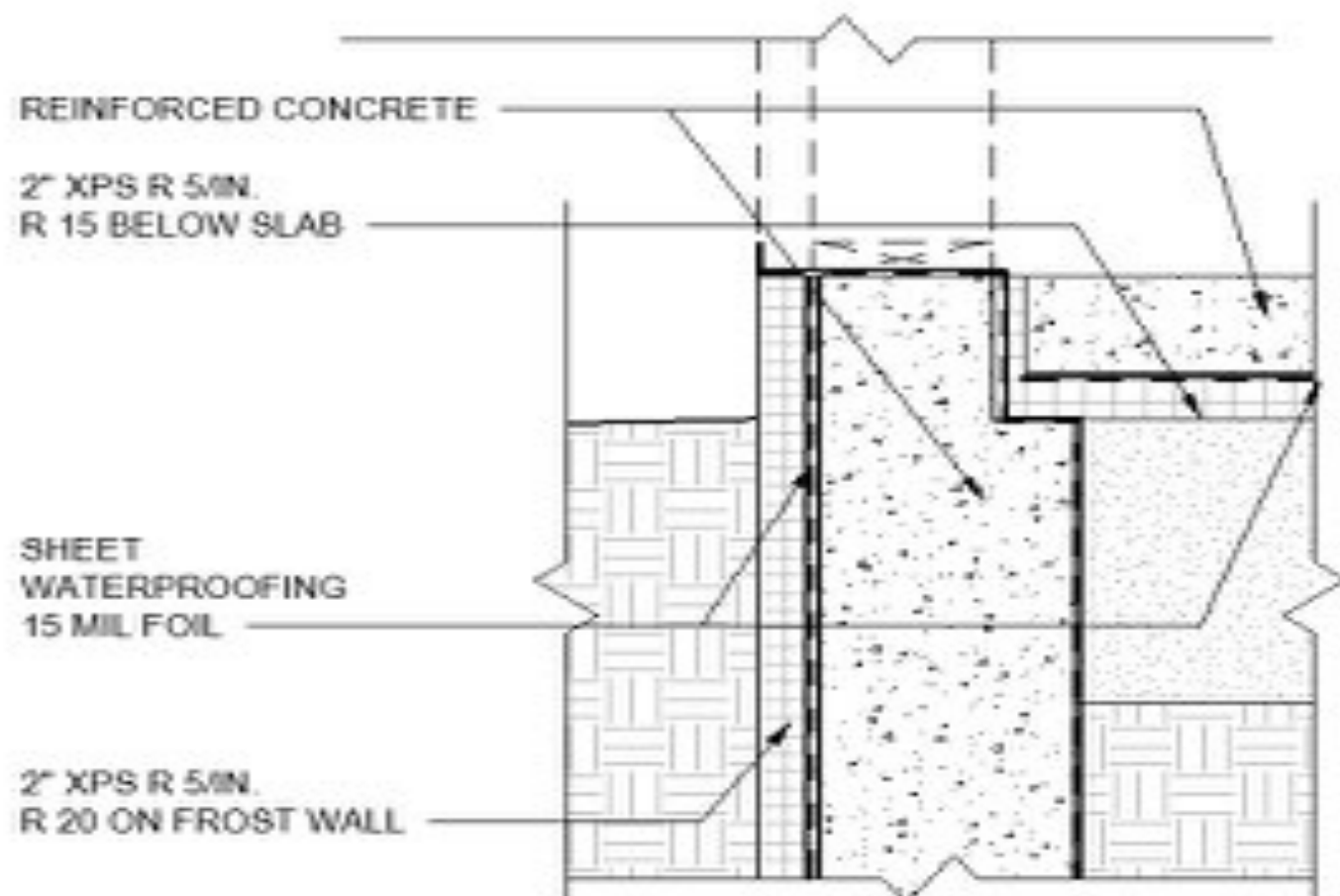
3" XPS R 5/IN.
R 15 BELOW SLAB

SHEET WATERPROOFING
15 MIL FOIL

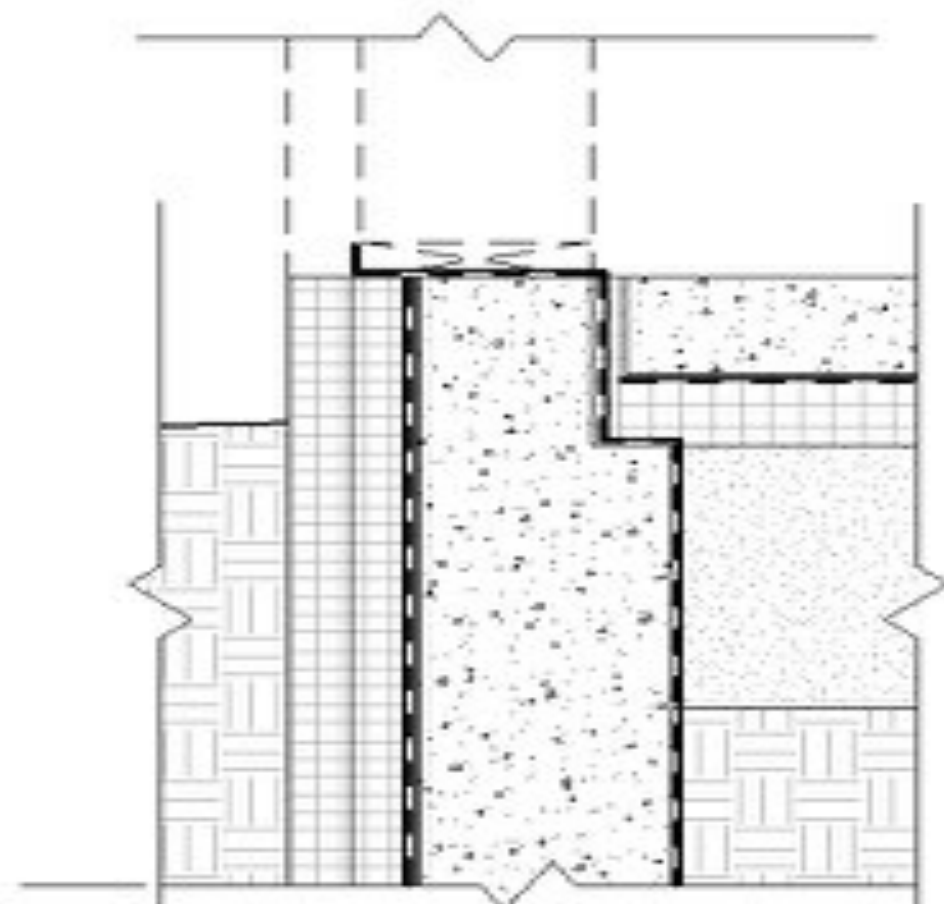
2X 2" XPS R 5/IN.
R 20 ON FROST WALL



PHASE I FOUNDATIONS R 10



PHASE II FOUNDATIONS R 20 & R15



1. ROOF ASSEMBLY

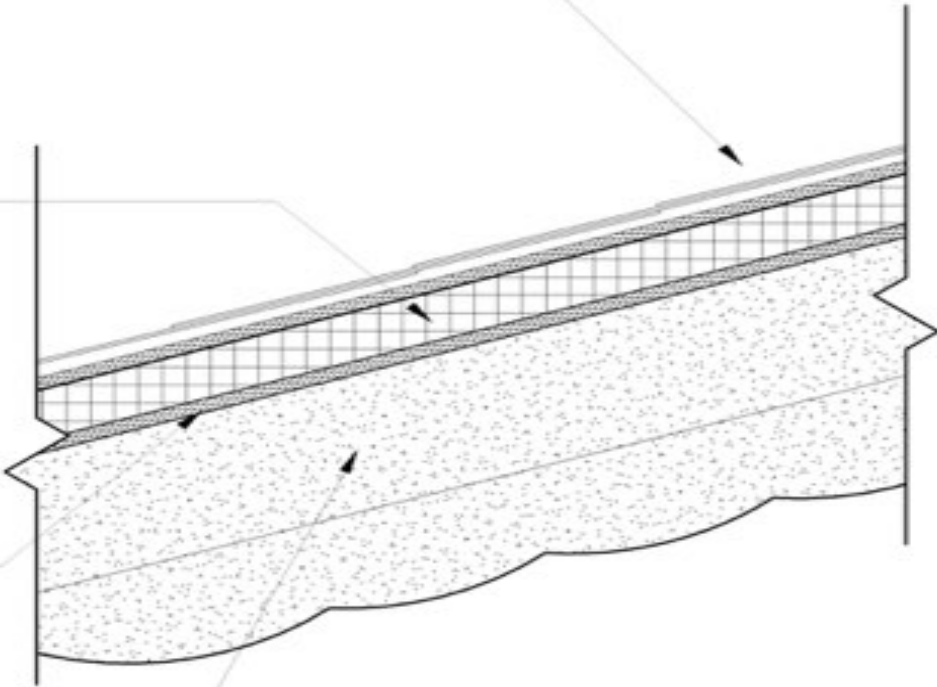
MODELED R 57.5

ASPHALT SHINGLE / EPDM ROOFING

ZIP R 9, ALL SEAMS TAPED

ZIP SHEATHING, ALL SEAMS TAPED

ABREIATED TRUSS
7" SPRAFOAM, R49



1. ROOF ASSEMBLY

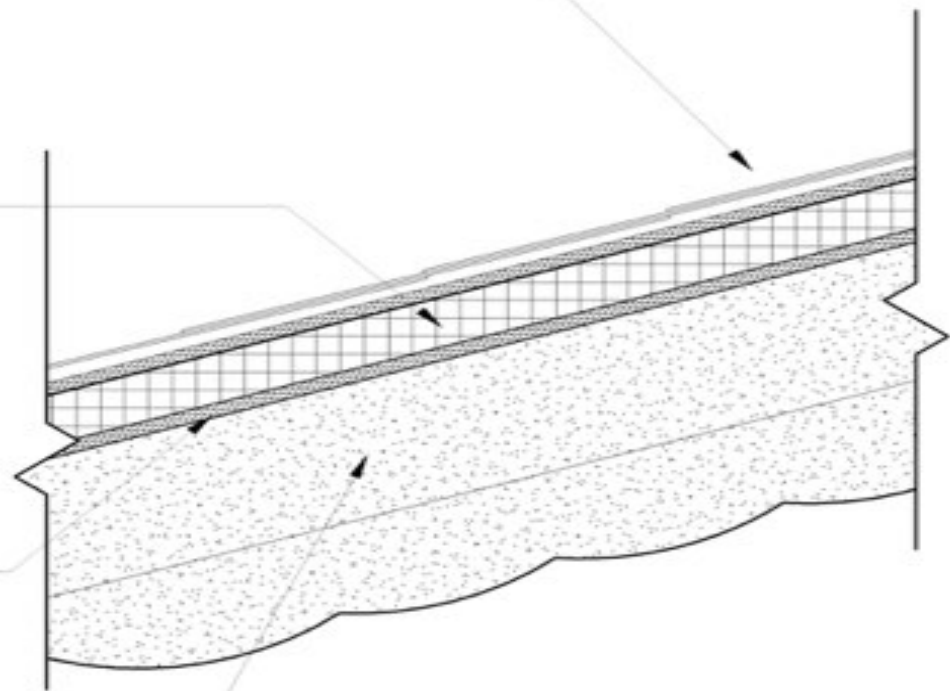
MODELED R 57.5

ASPHALT SHINGLE / EPDM ROOFING

ZIP R 9, ALL SEAMS TAPED

ZIP SHEATHING, ALL SEAMS TAPED

ABREIATED TRUSS
7" SPRAFOAM, R49



1. ROOF ASSEMBLY

MODELED R 57.5

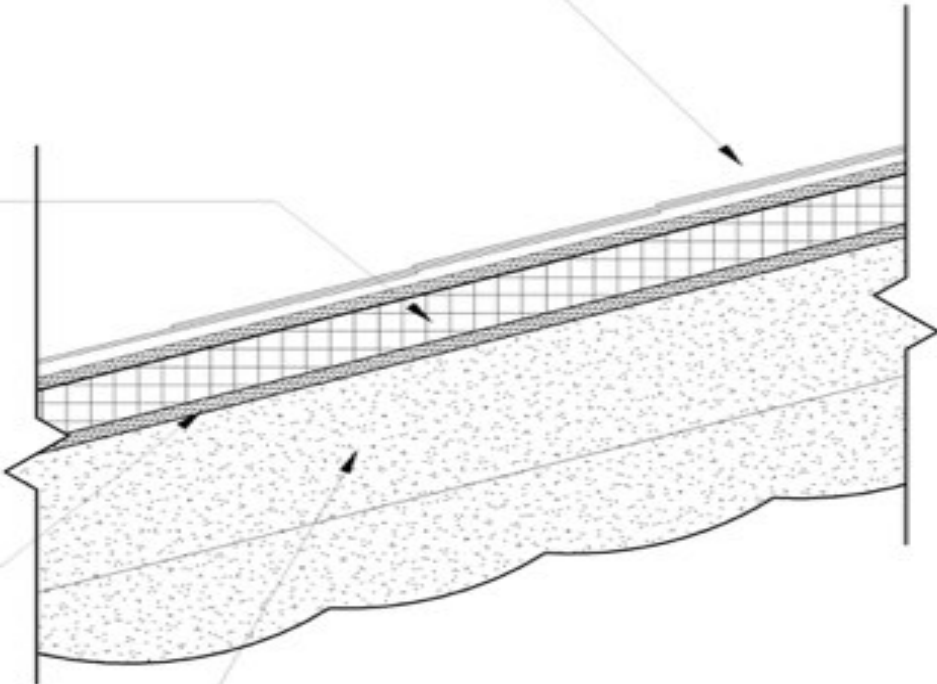


ASPHALT SHINGLE / EPDM ROOFING

ZIP R 9, ALL SEAMS TAPED

ZIP SHEATHING, ALL SEAMS TAPED

ABREIATED TRUSS
7" SPRAFOAM, R49



1. ROOF ASSEMBLY

MODELED R 57.5

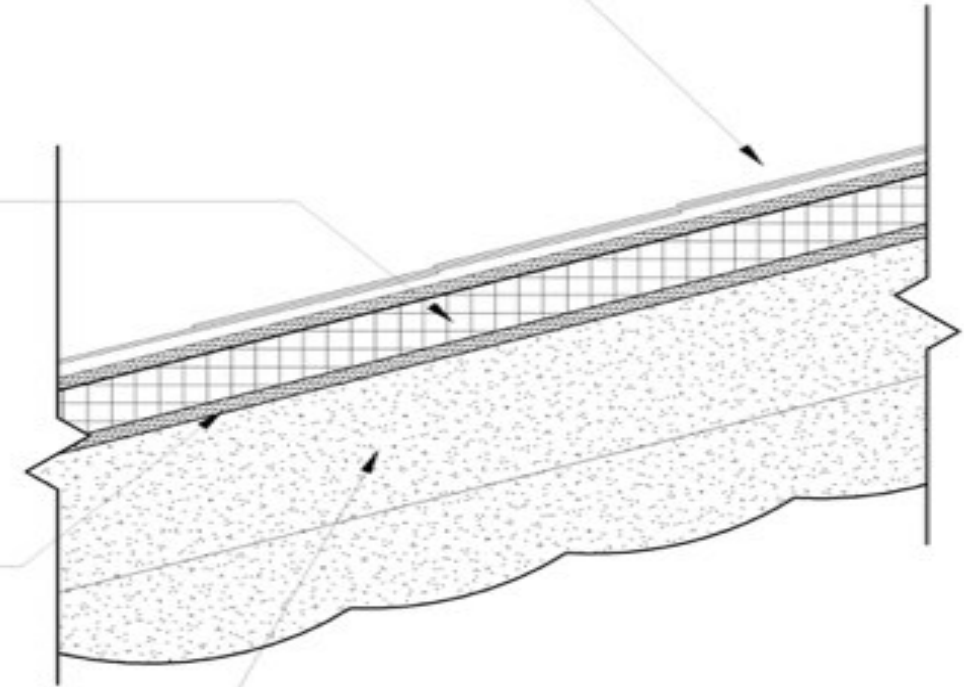


ASPHALT SHINGLE / EPDM ROOFING

ZIP R 9, ALL SEAMS TAPED

ZIP SHEATHING, ALL SEAMS TAPED

ABREIATED TRUSS
7" SPRAFOAM, R49



1. ROOF ASSEMBLY

MODELED R 57.5

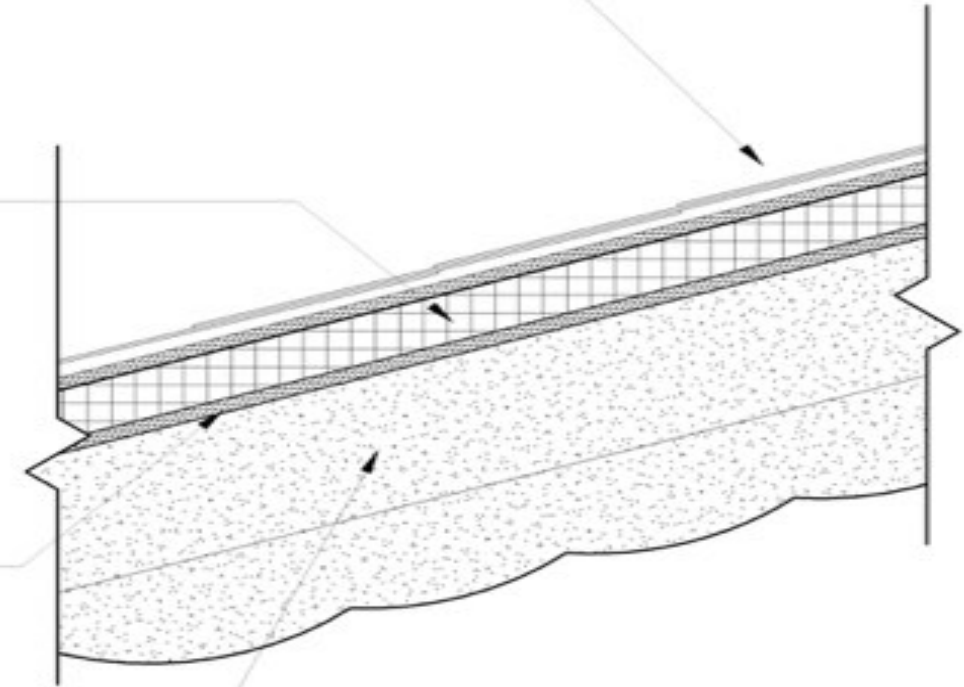


ASPHALT SHINGLE / EPDM ROOFING

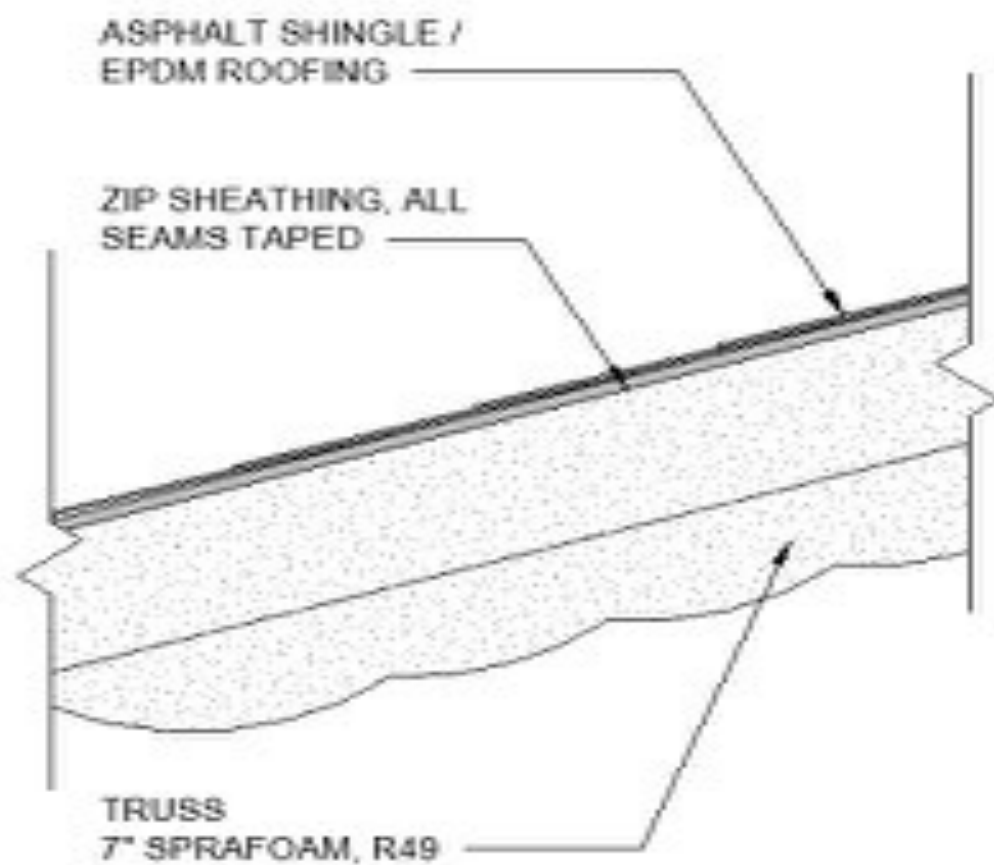
ZIP R 9, ALL SEAMS TAPED

ZIP SHEATHING, ALL SEAMS TAPED

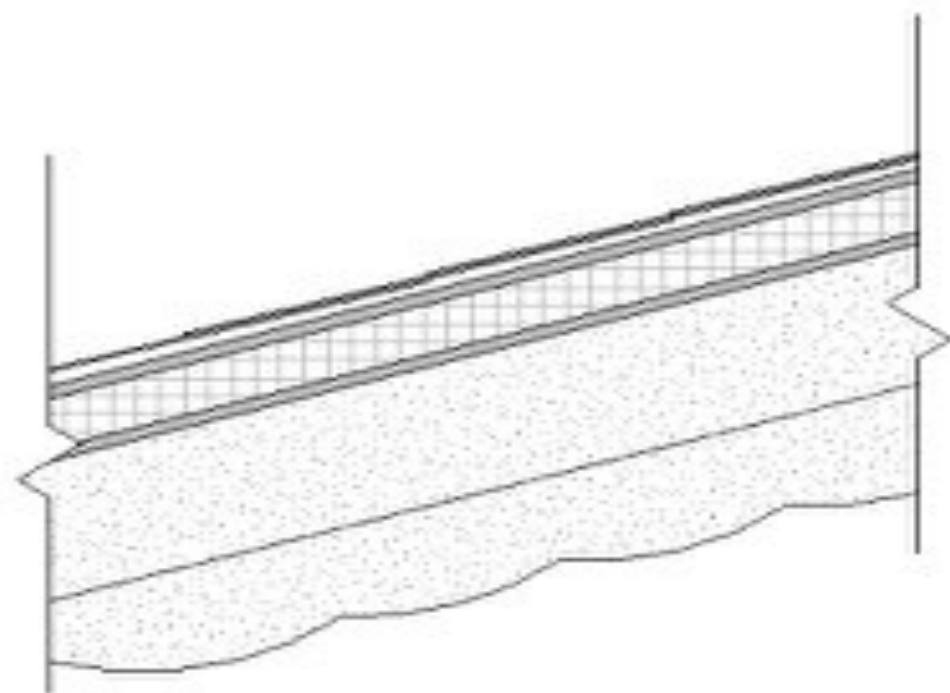
ABREIATED TRUSS
7" SPRAFOAM, R49



PHASE I ROOF ASSEMBLY MODELED R 47.65



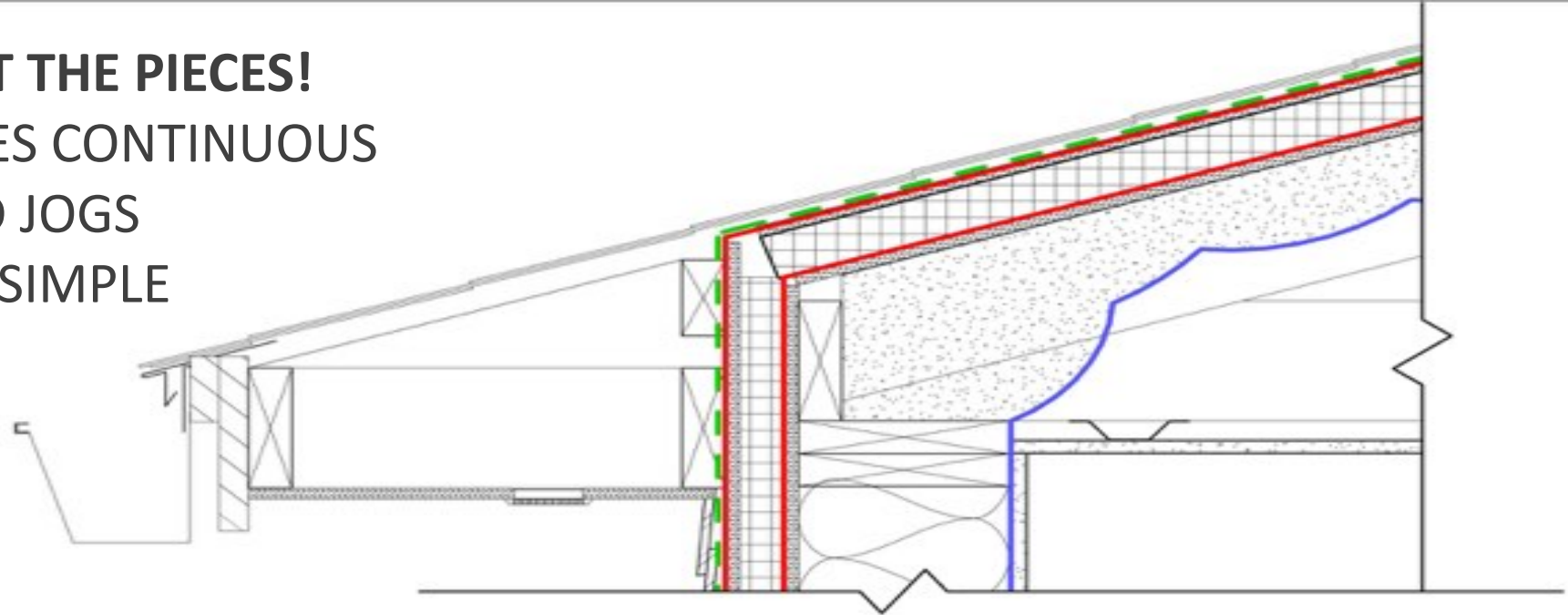
PHASE II ROOF ASSEMBLY MODELED R 57.5








CONNECT THE PIECES!

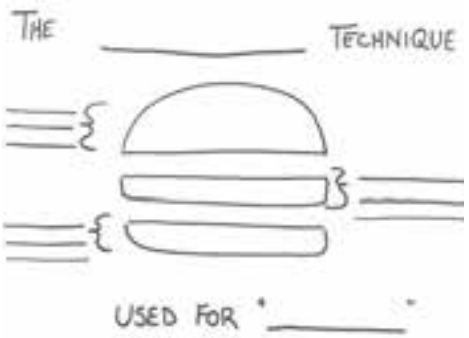
- ALL LINES CONTINUOUS
- LIMITED JOGS
- KEEP IT SIMPLE



CONTROL LAYERS LEGEND

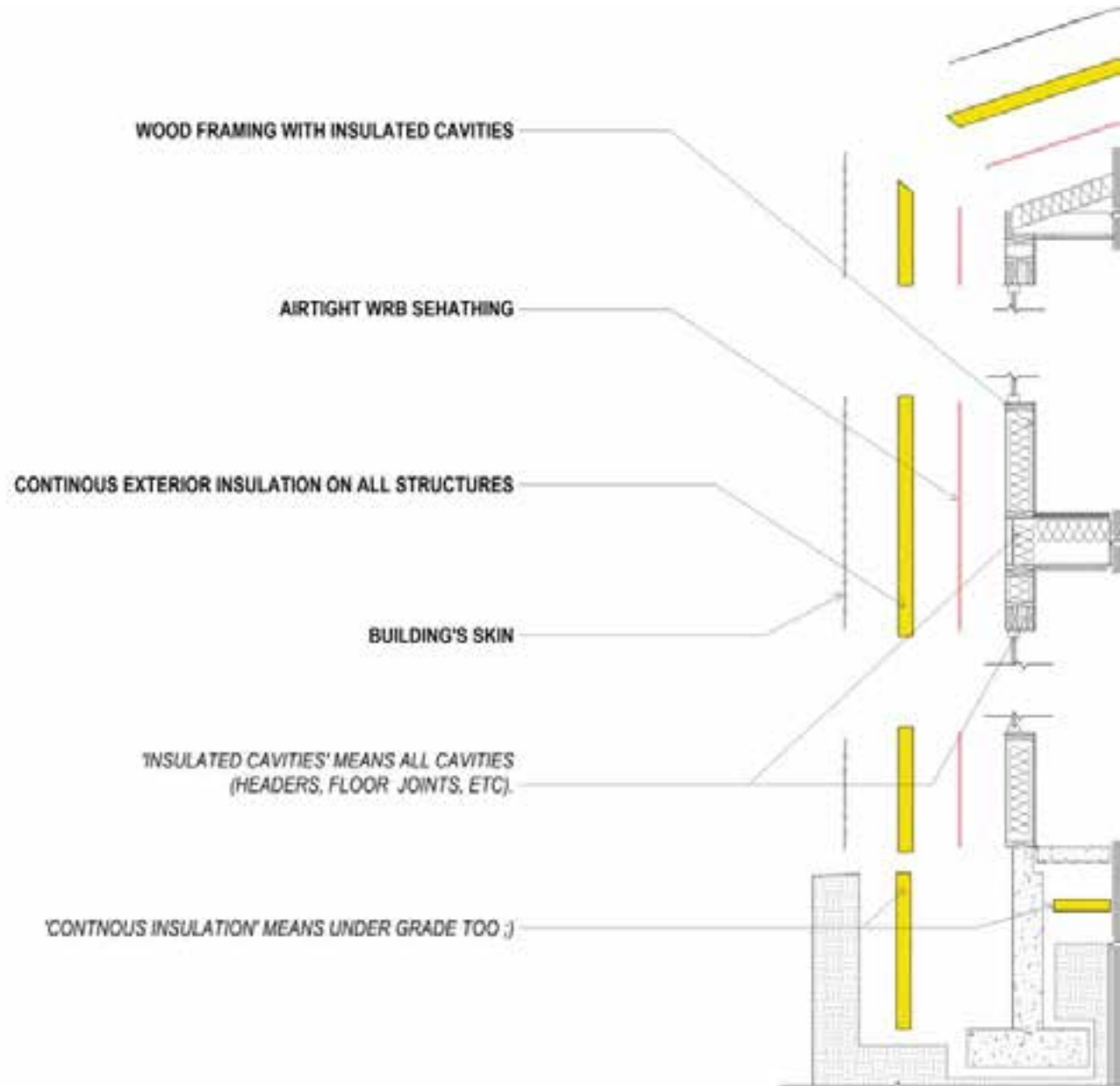
-  AIR TIGHTNESS CONTROL
-  WRB CONTROL
-  VAPOR CONTROL LAYER





UNIVERSAL DESIGN, VARIABLE RESULTS

MULTIPLE APPLICATIONS, COUNTLESS POSSIBILITIES

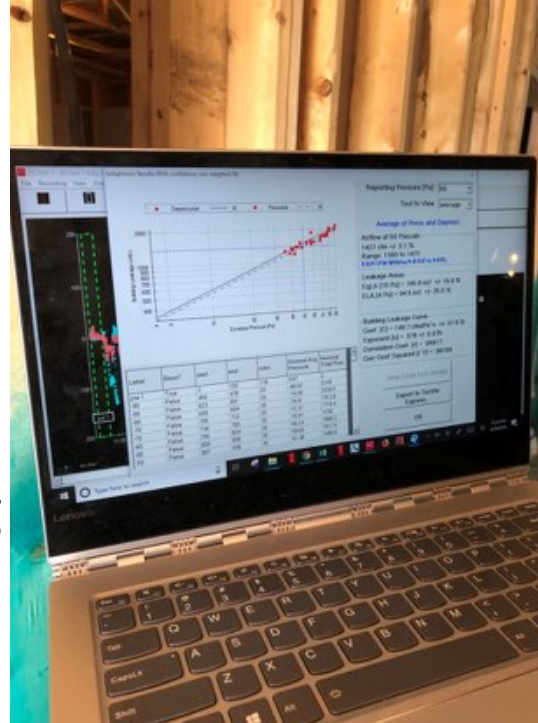


PRECERTIFICATION PROCESS:

- 1st round: 8 weeks
- 2nd round: 6 weeks
- 3rd round: 4 weeks

CERTIFICATION AND RATING:

- Assembly blower door testing
- compartmentalisation testing
- WaterSense testing
- field reports



Heating demand: 5.16 kBtu/ft²yr

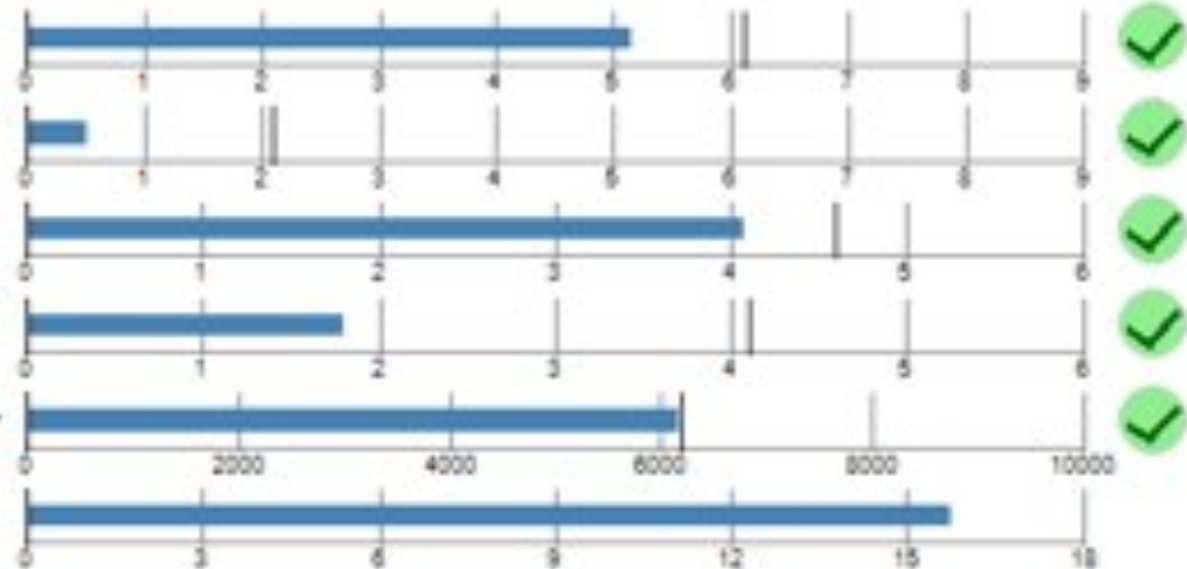
Cooling demand: 0.51 kBtu/ft²yr

Heating load: 4.07 Btu/hr ft²

Cooling load: 1.8 Btu/hr ft²

Source energy: 6,160 kWh/Person yr

Site energy: 15.74 kBtu/ft²yr





RYAN SYLVIA

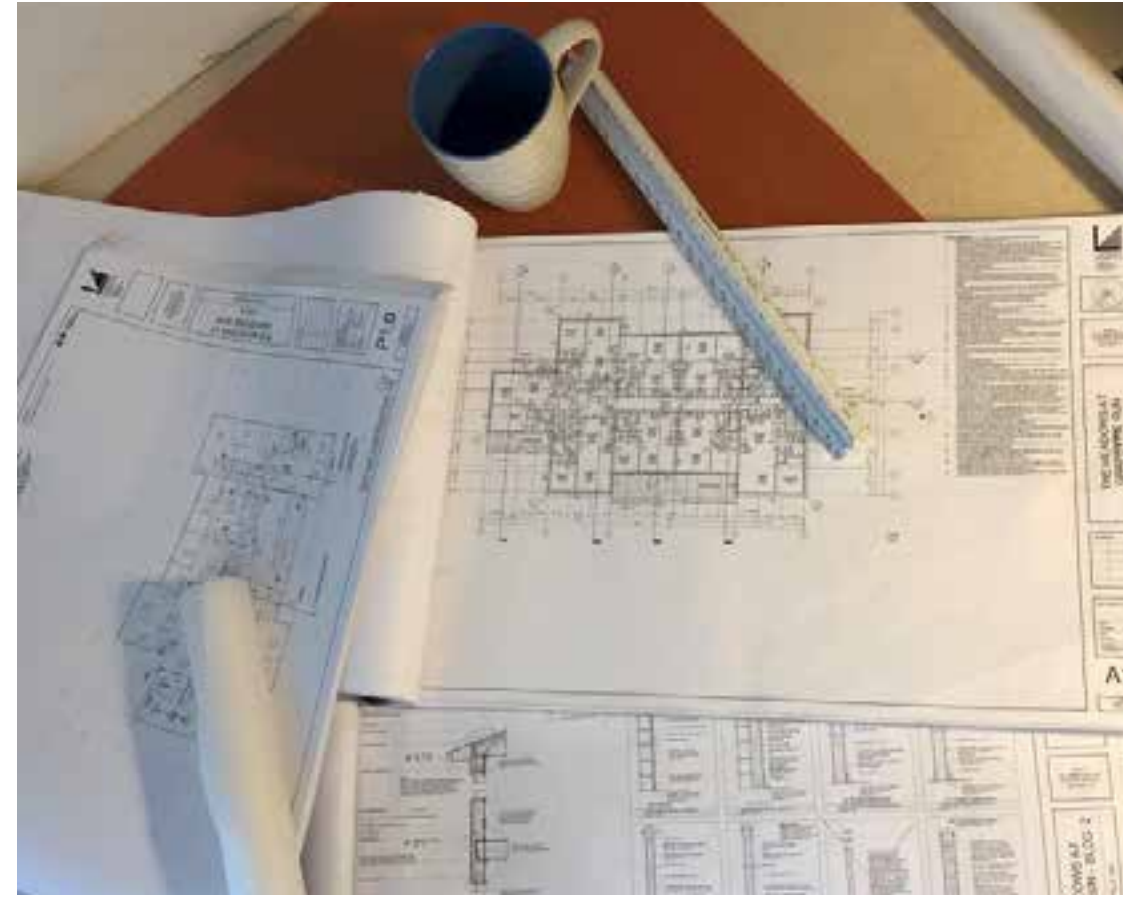
Step 3:
Making it work and making it right

Putting the design into the reality

Quality control from the design phase to construction

Communications and problem solving

Creative trouble shooting





Building Passive House
Methods That Work

Passive House & Wood Construction



Readily Available



Cost Effective



Familiar & Easily Worked



Easily Modified/Corrected



Constant Innovation in
Wood Industry

Wood Treatments

Composites

Wood & Insulation Assemblies Save
Time

Designing & Planning With Wood

Wood vs. Metal Framing

Expansion & Contraction

Tools From Product Reps

Manufacturer's Specs

Warranty Compatibility

Builder's Approach to a PH Project





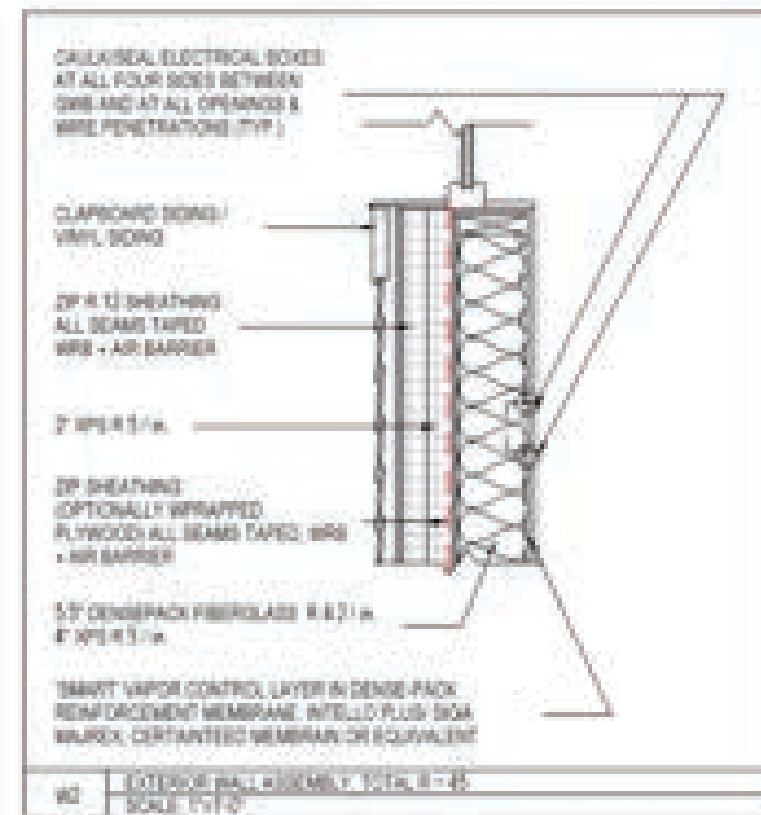
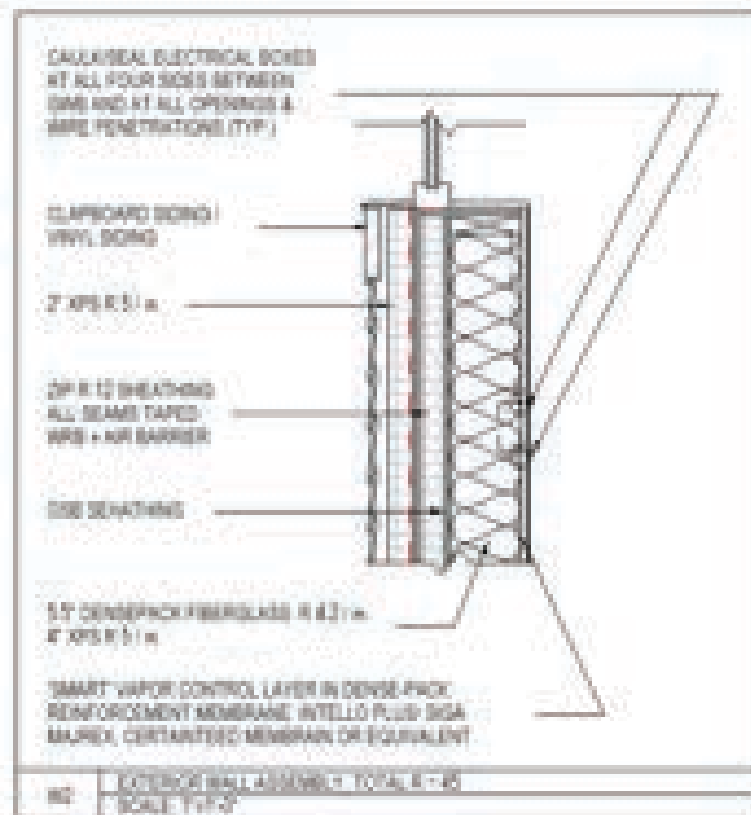
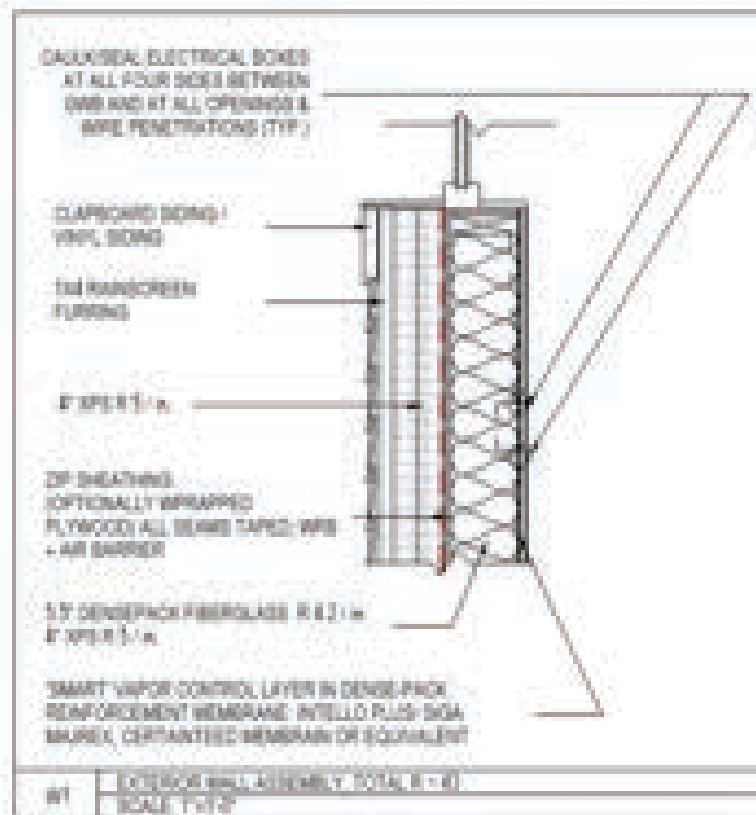
Collaborate On Details That Work

Use The Team's Experience

- Roof Eaves
- Avoiding Exterior Penetrations

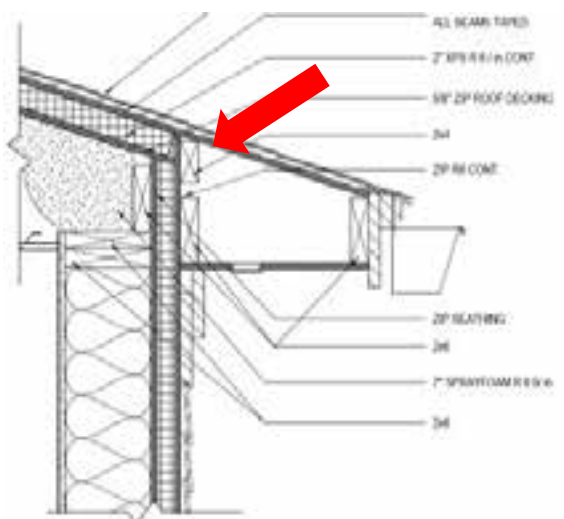
Pick Up Cheap Insurance – Double
Taping

Lining Up Air Barriers & Insulation



Work Together On Tough Questions

Do Really Good Suspenders Need Help From A Belt?
Your Energy Model Can Help Cut Cost & Save Time!



SELF ADHERED MEMBRANE FLASHING TO SEAL HEAD OF MTL DRIP EDGE (TYP.)

METAL DRIP EDGE FLASHING (TYP.)

SELF ADHERED MEMBRANE FLASHING TO SEAL HEAD OF PRE FINISHED MTL FLASHING (TYP.)

AIR SEALING GASKET TAPE

FIRST FL PLAN
100' - 0"

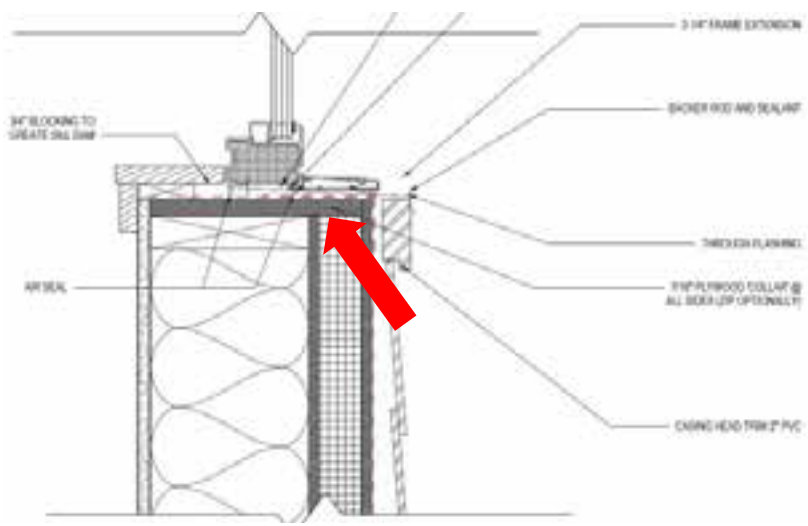
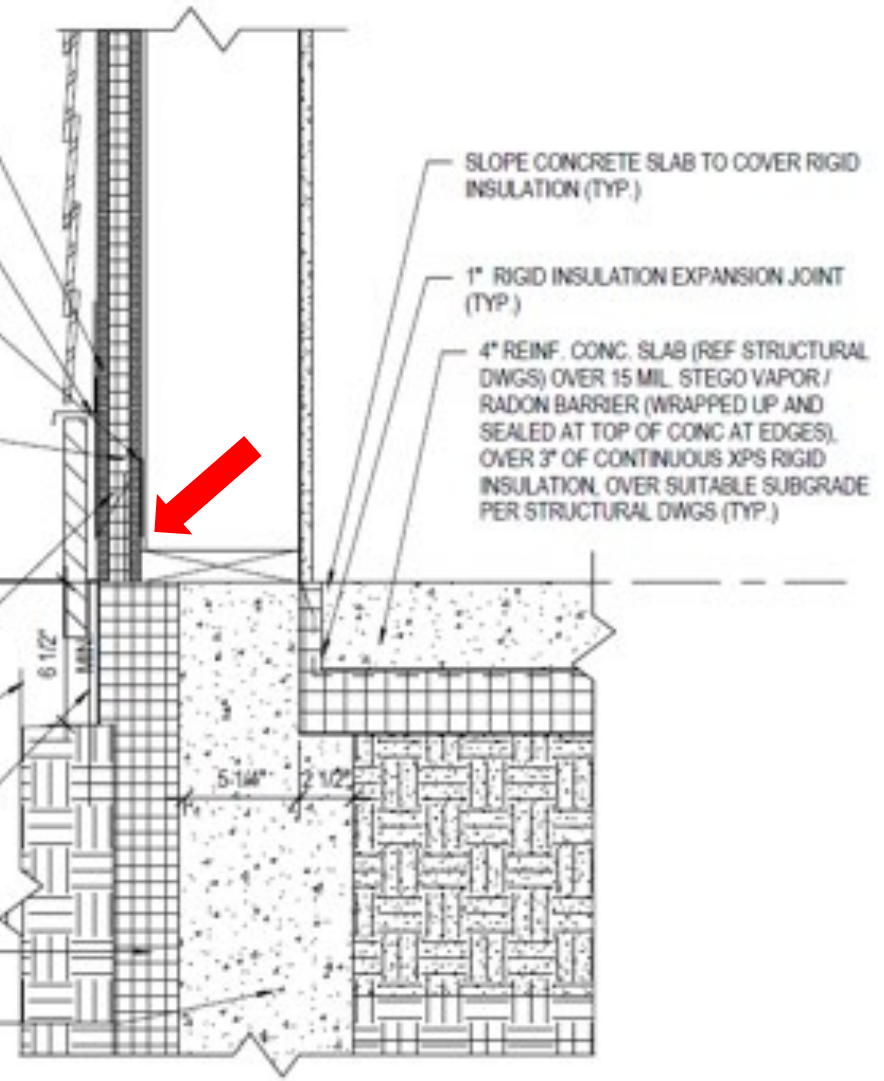
5/4 X 8" PVC EXTERIOR TRIM

GRADE TO SLOPE AWAY FROM BUILDING 1/4" PER 1", REF CIVIL FOR MORE GRADING INFORMATION (TYP.)

WRAP PRE FINISHED MTL FLASHING DOWN OVER THE TOP OF THE RIGID INSULATION AND BELOW GRADE (TYP.)

4" RIGID XPS INSULATION TO EXTEND DOWN FACE OF FOUNDATION

8" CONCRETE FOUNDATION WALL RE STRUCTURAL DWG FOR MORE INFO (TYP.)



Draw On All of The Knowledge Available

Good afternoon gentlemen

I'm following up with a quick note after yesterday's site meeting, please see the 3 discussion items from my list below:

1. After the discussion between the GC, the designer and the Rater, we've came up with a more cost effective and simple way to achieve the same R value and airiness with wall assembly. The revised exterior wall will have the following assembly:

- GWB + CertainTeed MemBrain vapor barrier
- 2x8 framing with CertainTeed TrueComfort densepack fiberglass cav insulation (R-31)
- Zip sheathing, all seams taped (structural Sheathing)
- Zip R 9, all seams taped (air control layer, WRB, Continuous insulation)

Such assembly reduces number of XPS continuous insulation layers (no layer overlapping) in lieu of additional taping on the interior sheathing
I will soon follow up with the revised sheet A1.0 to reflect those changes

2. Fiberglass insulation density at wall cav. is specified to be 2.0 lb/cu.ft weight to be at 1.2 lb/sq.ft. please access the manuf. specification at the link below:

<https://www.certainteed.com/resources/30-49-189%20TrueComfort.pdf>

please refer to the bottom chart showing the closed cavity conditions, R value of 31 in 2x8 cav.

3. Reviewing different framing sealant products, I found couple good reviews on the Nova Flex MP 100 (as discussed)

<https://buymbs.com/p-4198-novagard-solutions-novaflex-advanced-polymer-paintable-sealant-101oz-carton-of-12-tubes.aspx>

And also a few really promising reviews on the Contega HF sealant:

<https://foursevenfive.com/contega-hf/>

source: <https://kimchiandkraut.net/2017/01/25/framing/>

please let me know if the Contega product seems to be the reasonable alternate

kind regards

Our Energy Raters Is AWESOME And Always Lending Us A Hand Every Step of The Way

Education & Communications



PASSIVE HOUSE EDUCATION –
BETTER UNDERSTANDING
LEADS TO BETTER PROJECTS
0.034 CFM@50PA



WRITE CONTRACTS SPECIFIC
TO PASSIVE HOUSE
OBJECTIVES



PRECONSTRUCTION MEETINGS
– AIR SEALING IS FOR
EVERYONE



REMINDERS & UPDATES –
RESEALING AIR BARRIERS AT
PENETRATIONS

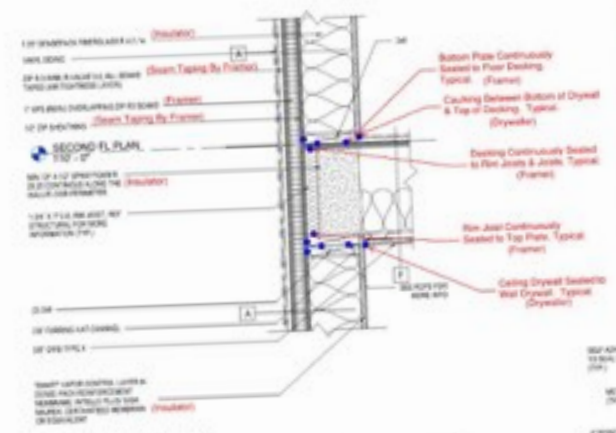
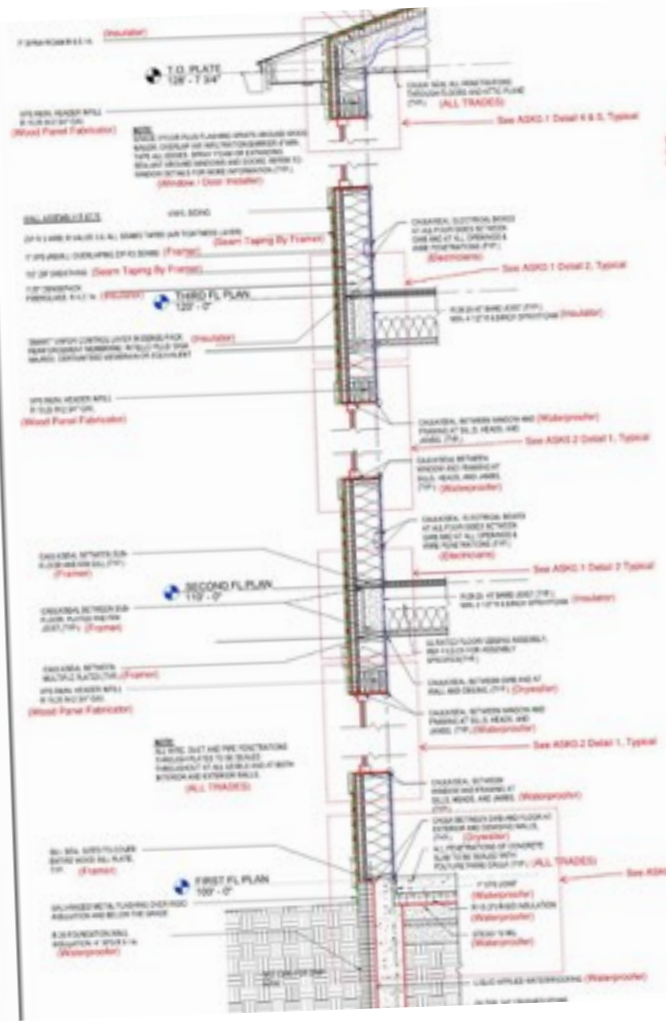


COORDINATE SUPPLIERS
AND/OR SINGLE-SOURCE
WHERE FEASIBLE TO REDUCE
OPPORTUNITIES FOR
CONFUSION

Mock-ups Sort Out Details & Add Value To Overall Project

Practicing Details Improves Quality
& Points Out Flaws In The Plan

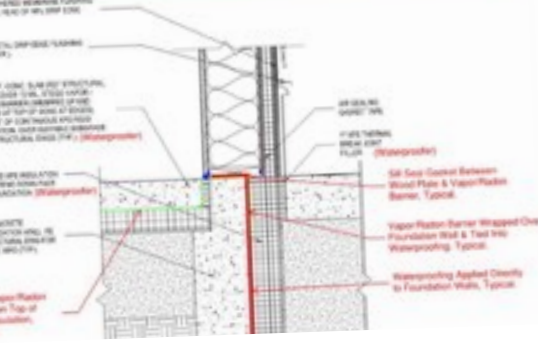
More
Cheap
Insurance



Blue Dots Indicate Sealant/Adhesive Locations

General Notes:
 All penetrations through exterior walls, demising walls, ceiling assemblies, floor decks, and roof decks must be sealed. All sealing notes are typical unless noted otherwise. Penetrations not shown in details are NOT exempt and must still be sealed.

All notes added by AlliedCook to these drawings are supplementary and do not negate notes made by the Architect. Conflicts between notes must be brought to the attention of AlliedCook immediately.



AGESTIA
 307 CUMBERLAND AVE
 PORTLAND, ME 04101
 (207) 565-7707

**THE MEADOWS AT
 GRAPEVINE RUN - BLDG. 2**

HAMPTON FALLS, NH

REVISIONS	

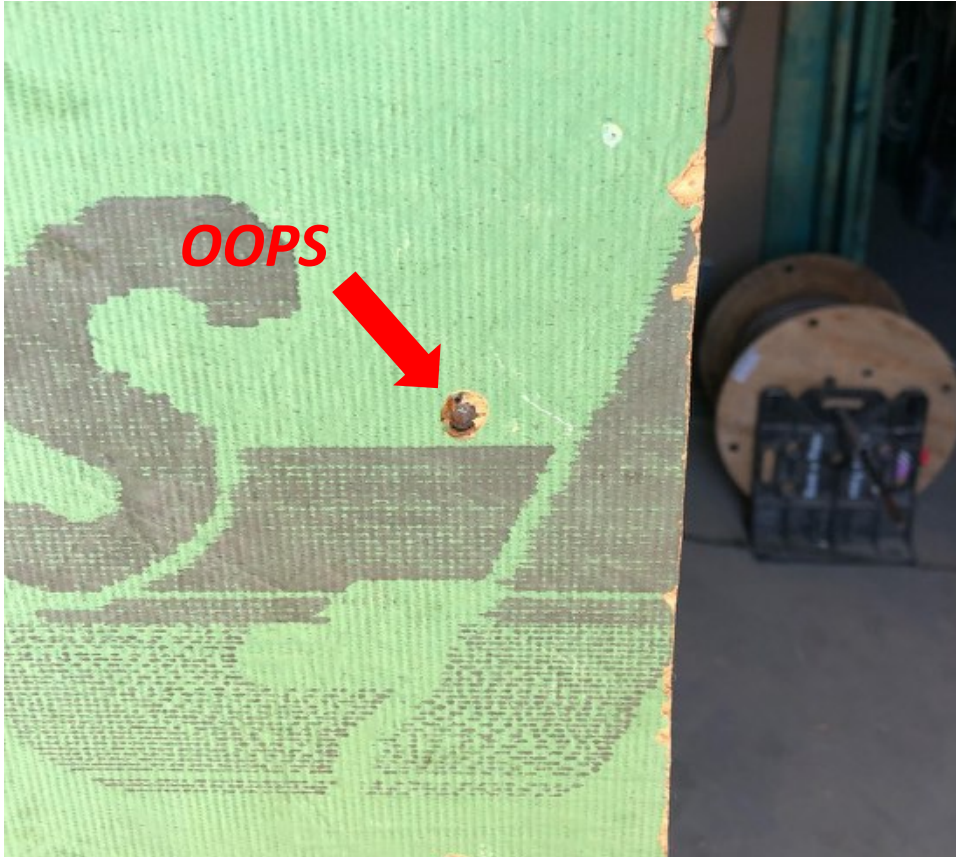
AIR SEALING DIAGRAMS	
DRAWN BY DATE JUNE 18, 2018 DESIGNED BY DATE	CHECKED BY DATE

Project-Specific Inspection Log

2 - Foundations	Insulation	Passive House & Energy Rating
2 - Underslab	Plumbing/Electrical	Code Enforcement
2 - Slabs	Subgrade Inspection	Town Engineer
	Insulation	Code Enforcement
	Underslab VB & Insulation	Passive House & Energy Rating
	Concrete & Rebar	Materials Testing & Inspection
	Rebar	Code Enforcement
2 - Elev Shaft	Masonry	Materials Testing & Inspection
2 - 1st Floor	Steel	Materials Testing & Inspection
2 - Entire Bldg	Shear Walls	Materials Testing & Inspection
	Structural Punch List Inspection	Design Engineer

2 - 3rd Floor	Plumbing/Electrical	Code Enforcement
	Insulation	Code Enforcement
	Firestopping	Code Enforcement
	Insulation, Sealing, Roofing, Windows	Passive House & Energy Rating
2 - 2nd Floor	Plumbing/Electrical	Code Enforcement
	Insulation	Code Enforcement
	Firestopping	Code Enforcement
	Insulation, Sealing, Roofing, Windows	Passive House & Energy Rating
2 - 1st Floor	Plumbing/Electrical	Code Enforcement
	Insulation	Code Enforcement
	Firestopping	Code Enforcement
	Insulation, Sealing, Roofing, Siding	Passive House & Energy Rating
2 -Final Inspections	Final Inspections & Testing	Passive House & Energy Rating
	Fire Alarm Inspection	Fire Department
	Fire Sprinkler & Egress	Fire Department
	Elevator Inspection	State Elevator Inspector
	Site Inspection	Town Engineer
	Certificate of Occupancy Inspection	Code Enforcement

Follow-Up & Follow-Through



Constant Inspection

- Zip System Install
- Insulation Thickness, Density & Consistency
- Air Sealing
- Sealed Outlet Boxes
- Panel Fabrication

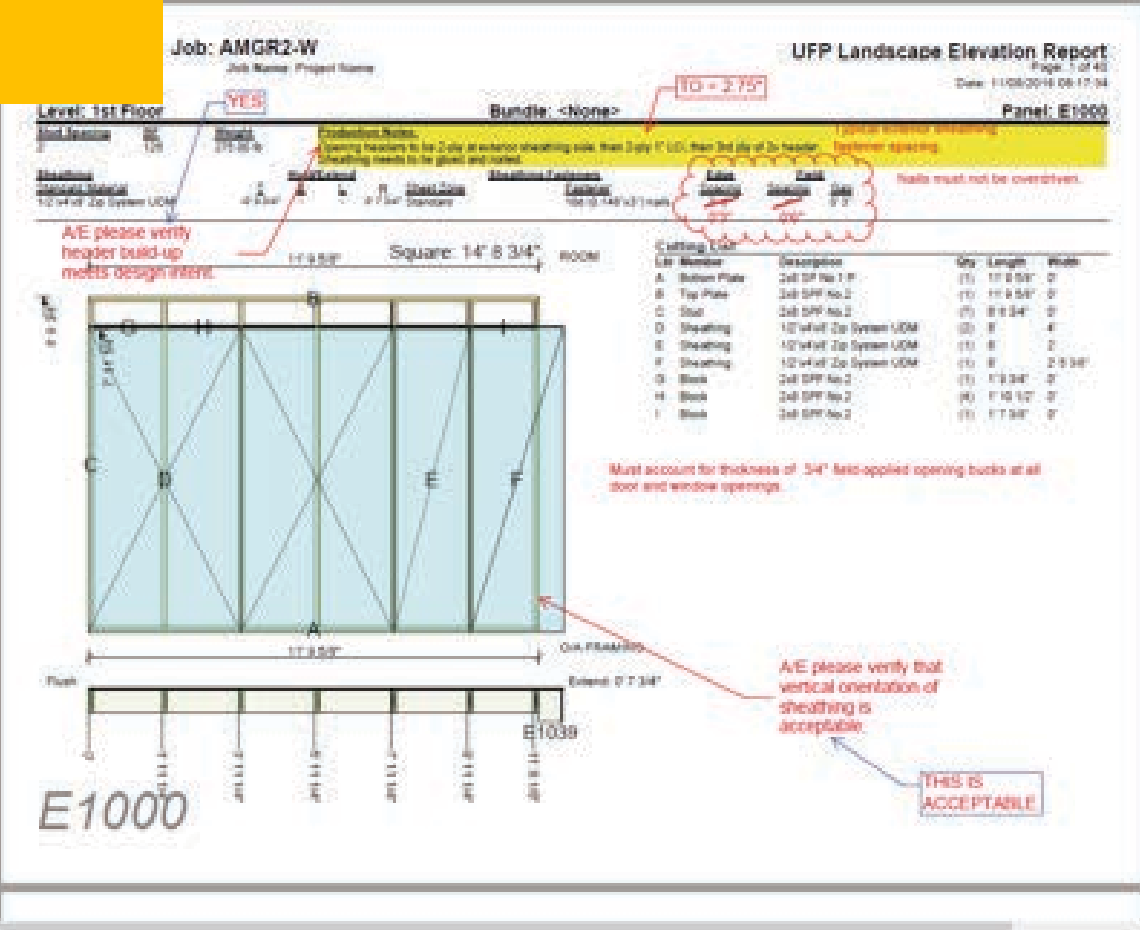
Upgrading Details

- Insulated Sleeves

Blower Door Testing



Shop Drawing Review



Trouble-Shooting

Screws & Plugs For Exterior PVC Trim

Air Barrier Connection Tapes

Vapor Control Layer Termination

Multiple Sheathing Layers & Over-Nailing



Things To Consider For Passive House



“Air-Tight” Windows – Not Really New But Not Always A Quick Sell – Does It Meet All The Needs

Heat Pump Clothes Dryers – Are They The Right Option For The Project

Generators – What Needs Backup?

“Air-Tight” & ADA Compliant Exterior Doors – Not Readily Available In Commercial Construction

3/8” PEX Domestic Water Piping – It’s Out There, Use It – Caution! No Fittings

Air-Tight Electrical Boxes – Variety Works



Conclusion

- Comfort is a primary objective in providing exceptional housing
- The better the envelope the simpler the mechanical systems
- Increase building cost – reduce utility expenses – reduce carbon emission
- Buildings can be constructed with standard and accessible materials
- Buildings can be constructed with standard construction methods
- Coordination meetings & planning systems are key. Start in preconstruction
- Managing challenges (DHW lines & Community Laundry)



> QUESTIONS?

This concludes The American Institute
of Architects Continuing Education
Systems Course

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Ryan Sylvia

Allied Cook Construction

rsylvia@alliedcook.com



THANK YOU FOR YOUR ATTENTION!