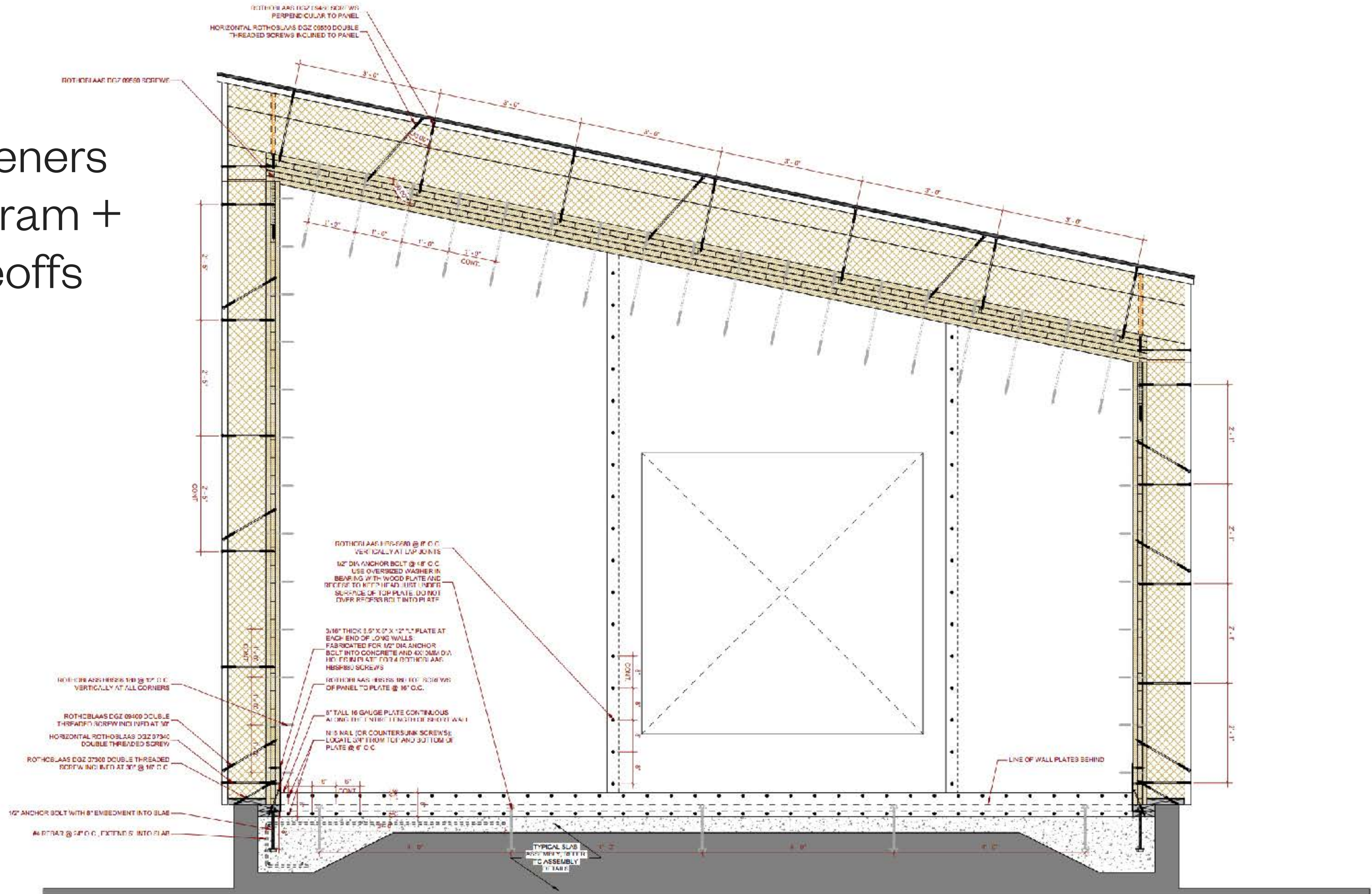




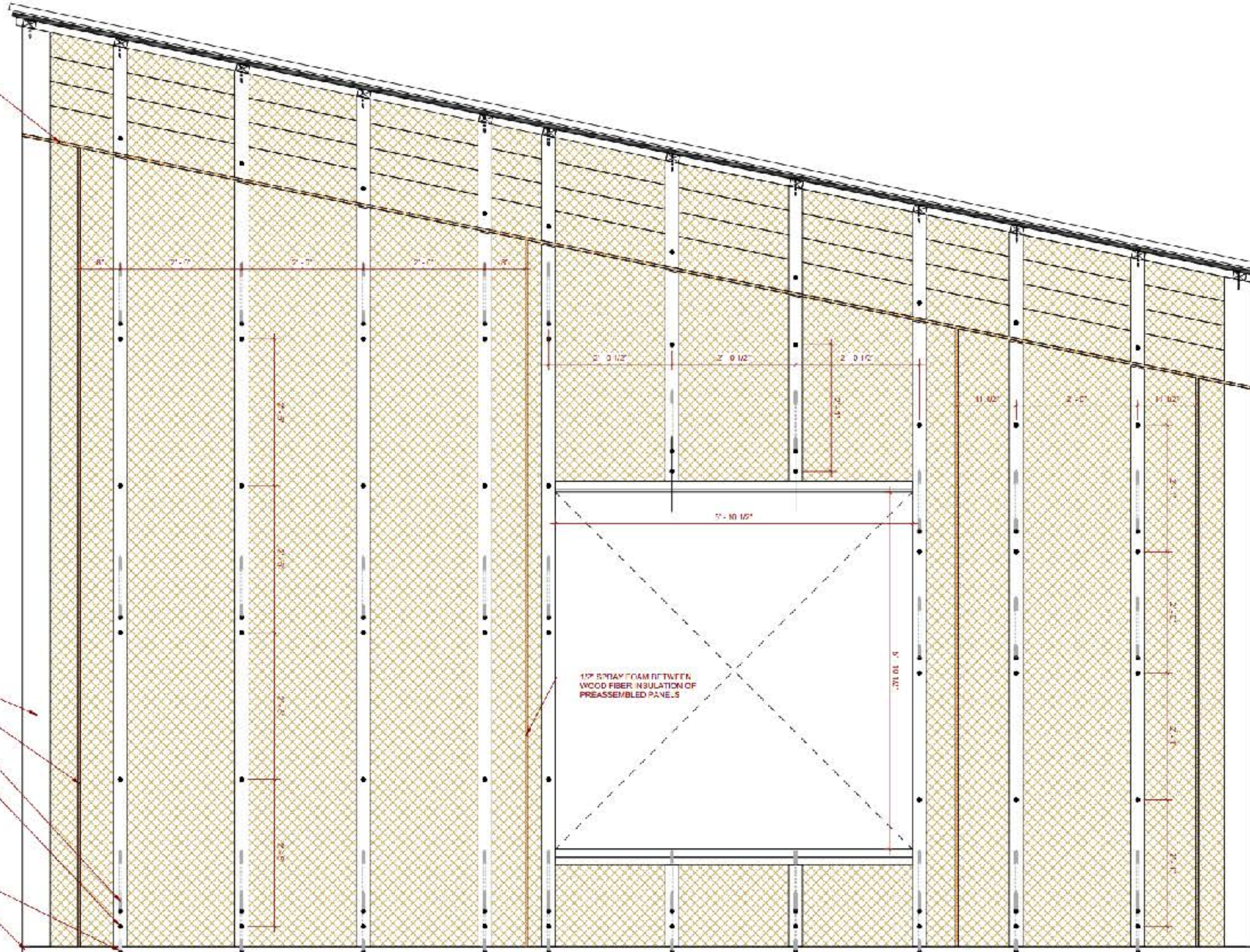
the annex

Cornerspring Montessori, Belfast, ME

Fasteners Diagram + Takeoffs



1/2" SPRAY FOAM BETWEEN WOOD FIBER INSULATION



2x6

1/2" SPRAY FOAM BETWEEN WOOD FIBER INSULATION

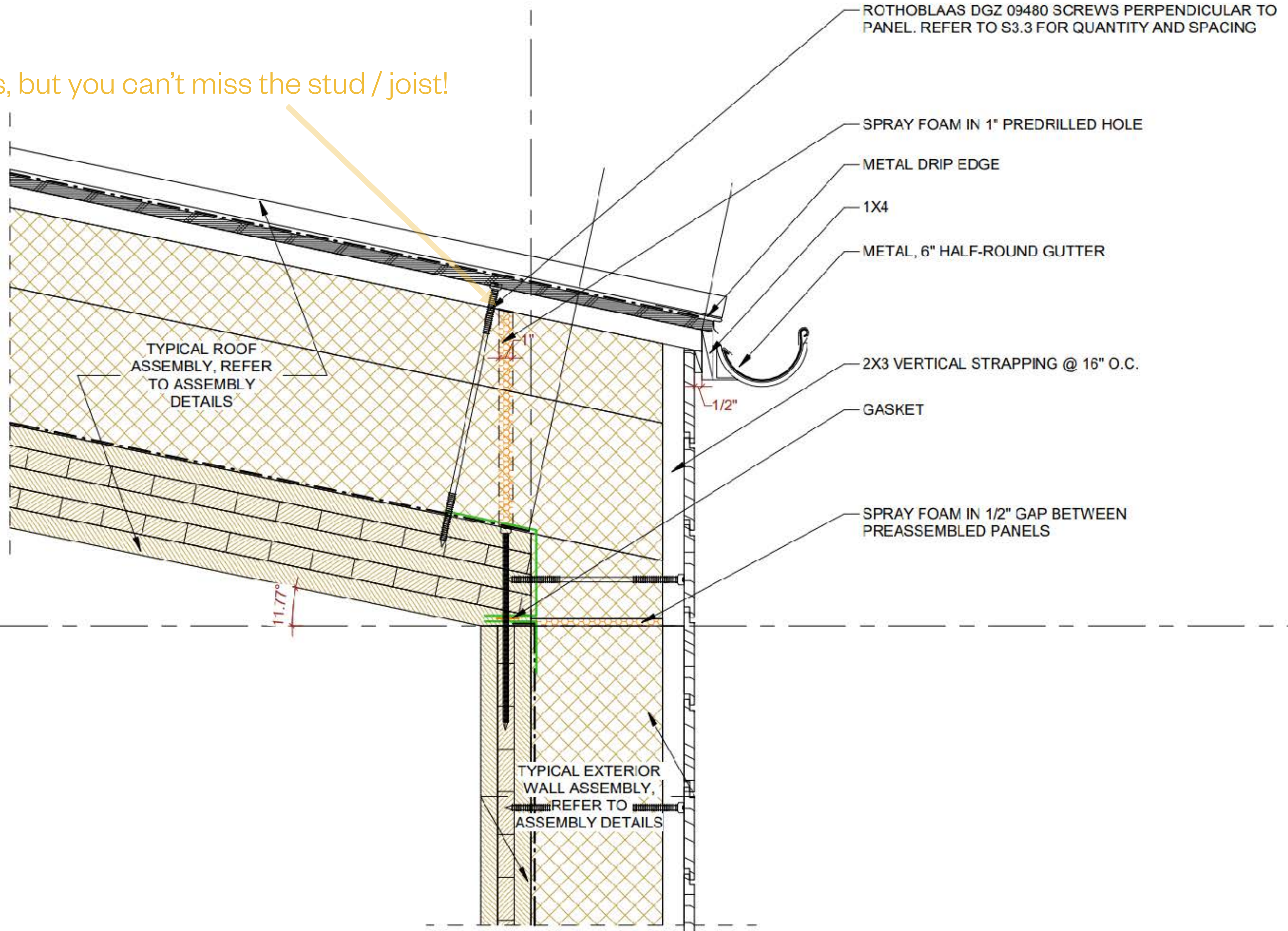
ROTHER AAR D07 D6470 DOUBLE THREADED SCREW INCLINED AT 30°
HORIZONTAL ROTHELANAS DGZ C7340 DOUBLE ETCALLO SCHLAW

ROTHER AAR D07 D7300 DOUBLE THREADED SCREW INCLINED AT 30°

FT 2X10

1/2" SPRAY FOAM BETWEEN WOOD FIBER INSULATION OF PREASSEMBLED PANELS

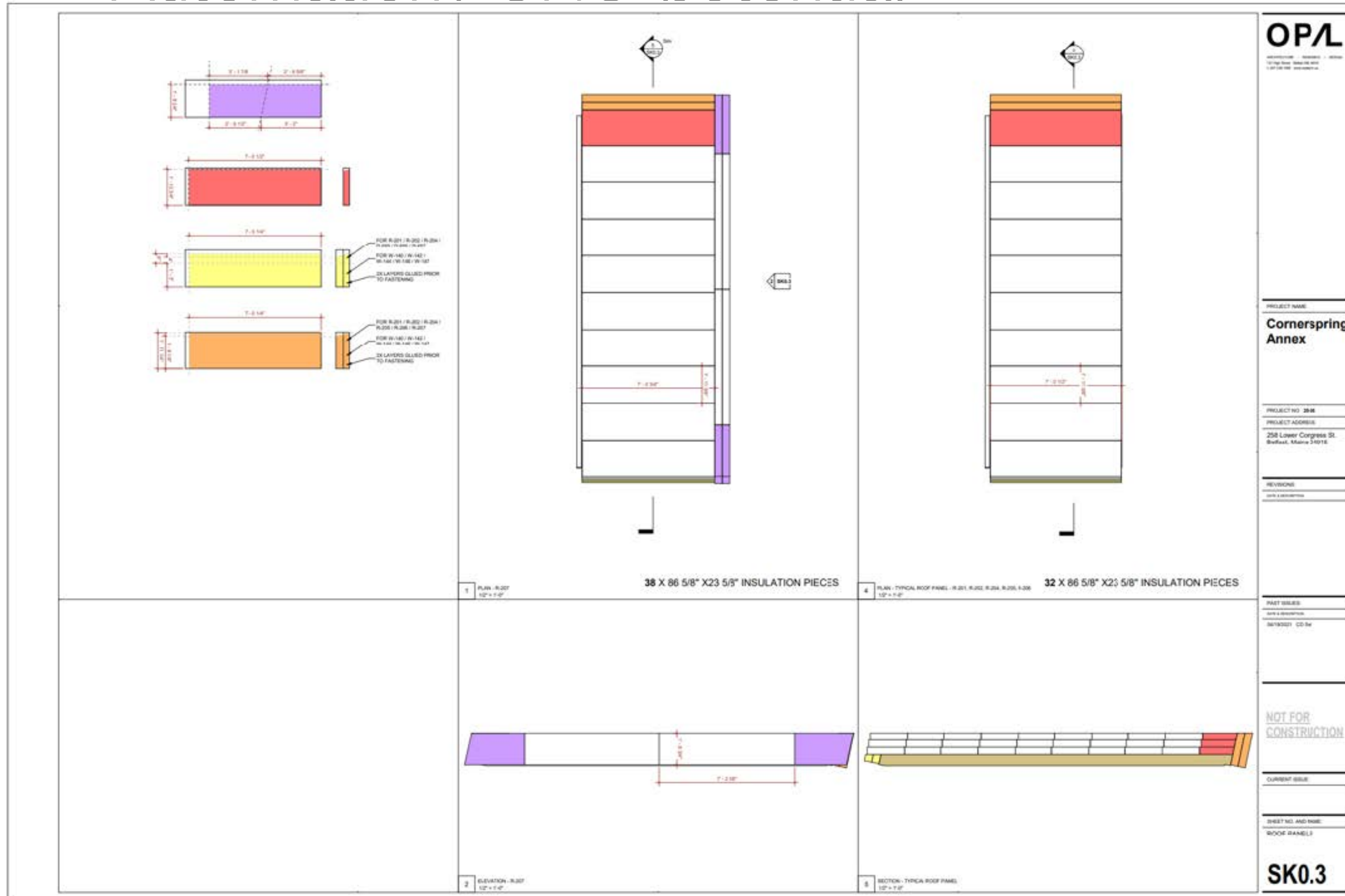
Long fasteners, but you can't miss the stud / joist!



T.O. Wall Panel
150' - 6"

Insulation cut & Fastener Lists

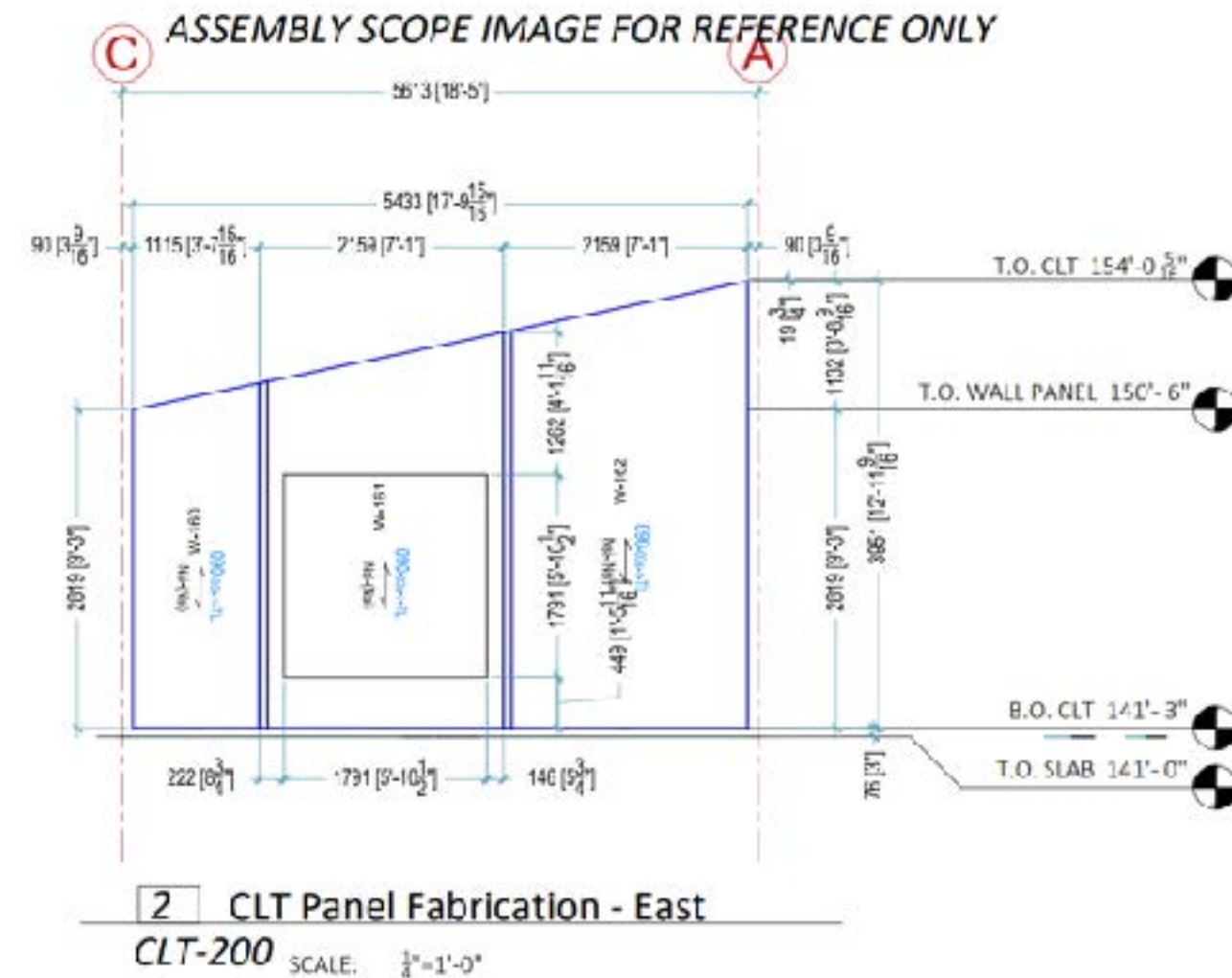
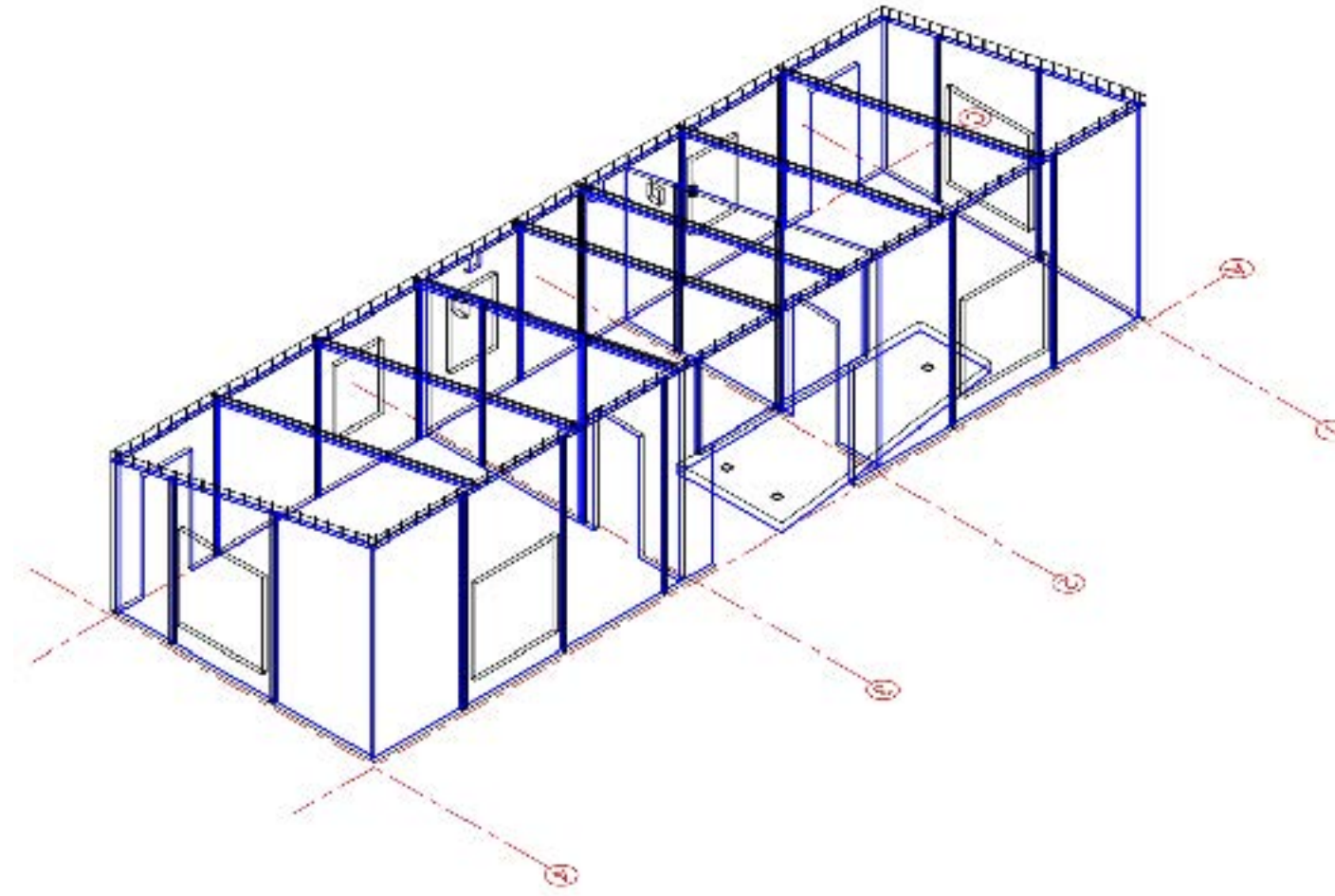
- In-housed
- Automation / CNC-potential



MODEL	MANUF	Q	USED FOR
HBS1080	Rothoblaas	150	Lifting uninsulated wall panels tabletop
HBS10100	Rothoblaas	150	Lifting uninsulated wall panels tabletop
HBS10360	Rothoblaas	100	Lifting insulated wall panels in tabletop
VGS11375	Rothoblaas	100	Lifting insulated wall panels in tabletop
VGS11275	Rothoblaas	75	Lifting insulated wall panels vertical
Assy Kombi 12x160	MTC Solutions	100	Lifting uninsulated roof panels
VGS11600	Rothoblaas	50	Lifting insulated roof panels
GRK R4 12 x 5 5/8"	GRK	100	Fastening C.T to PT shelves
VGZ9360	Rothoblaas	200	Roof to wall
TBS8360	Rothoblaas	50	Roof to wall for pulling connection tight
VGZ9400	Rothoblaas	25	Canopy Roof
VGZ11550	Rothoblaas	25	Canopy Roof
VGZ9260	Rothoblaas	15	Canopy Roof
HBS6180	Rothoblaas	350	Wall to wall (corners) + Int. wall to roof
HBS6160	Rothoblaas	200	Roof lap joint
HBS680	Rothoblaas	350	Wall lap joint
HBSP880	Rothoblaas	200	connecting bent plates + Hold down plate

CLT Shops

- Manuf-provided
- Data-rich
- 2 week process min.



KLH USA Element List

Client Label	*Label-Number	KLH	Panel Type	Quantity [Panel]	Thickness [mm]	Length/Grain Direction [cm]	Width [cm]	Nett. Weight [kg]	[Delivery]	Lifting Type
W-100	090-03s-1-TL-NSI-(NS)			1	90	395.1	215.9	243	-	
W-101	090-03s-1-TL-NSI-(NS)			1	90	397	221.1	342	-	
W-102	090-03s-1-TL-NSI-(NS)			1	90	395.1	215.9	243	-	
W-103	090-03s-1-TL-NSI-(NS)			1	90	397	105.6	148	-	
W-104	090-03s-1-TT-NSI-(NS)			1	90	172.9	366.7	263	-	
W-105	090-03s-1-TL-NSI-(NS)			1	90	351.7	223.5	300	-	
W-106	090-03s-1-TL-NSI-(NS)			1	90	306.8	119.1	141	-	
W-107	090-03s-1-TL-NSI-(NS)			1	90	351.7	223.5	300	-	
W-108	090-03s-1-TL-NSI-(NS)			1	90	306.8	119.1	141	-	
W-109	090-03s-1-TL-NSI-(NS)			1	90	397	223.5	227	-	
W-110	090-03s-1-TL-NSI-(NS)			1	90	397	194.5	321	-	
W-120	090-03s-1-TL-NSI-(NS)			1	90	395.1	215.9	335	-	
W-121	090-03s-1-TL-NSI-(NS)			1	90	351.7	223.5	164	-	
W-122	090-03s-1-TL-NSI-(NS)			1	90	306.8	119.1	144	-	
W-140	090-03s-1-TL-NSI-(NS)			1	90	281.9	223.5	163	-	
W-141	090-03s-1-TL-NSI-(NS)			1	90	281.9	223.5	200	-	
W-142	090-03s-1-TL-NSI-(NS)			1	90	281.9	223.5	255	-	
W-143	090-03s-1-TL-NSI-(NS)			1	90	281.9	139.7	158	-	
W-144	090-03s-1-TL-NSI-(NS)			1	90	281.9	223.5	197	-	
W-145	090-03s-1-TL-NSI-(NS)			1	90	281.9	223.5	200	-	
W-146	090-03s-1-TL-NSI-(NS)			1	90	281.9	223.5	258	-	
W-147	090-03s-1-TL-NSI-(NS)			1	90	281.9	223.5	163	-	
W-160	090-03s-1-TL-NSI-(NS)			1	90	306.8	119.1	144	-	
W-161	090-03s-1-TL-NSI-(NS)			1	90	351.7	223.5	164	-	
W-162	090-03s-1-TL-NSI-(NS)			1	90	395.1	215.9	335	-	
W-180	090-03s-1-TL-NSI-(NS)			1	90	397	202.1	333	-	
W-181	090-03s-1-TL-NSI-(NS)			1	90	397	223.5	227	-	
W-182	090-03s-1-TL-NSI-(NS)			1	90	397	223.5	363	-	
				28				6473		

2 CLT Wall Panel Schedule CLT-300

WFI cut with Cable Saw Future: CNC



WFI precut, labeled,
bundled by panel



60-ton bridge crane



20-ton load





CLT

SLED

40k lbs

Move pieces using
Rothoblaas Wasps





Padded Sawhorses



Lift roof panels from the top



U-Maine Installs Sensors in Roof + Wall Assemblies







WRB shouldn't be strictly necessary, but **supply chain issues** forced the purchase of a zero-paraffin WFI for this project, thereby necessitating WRB











U-Maine finishes up sensor installation











Costs

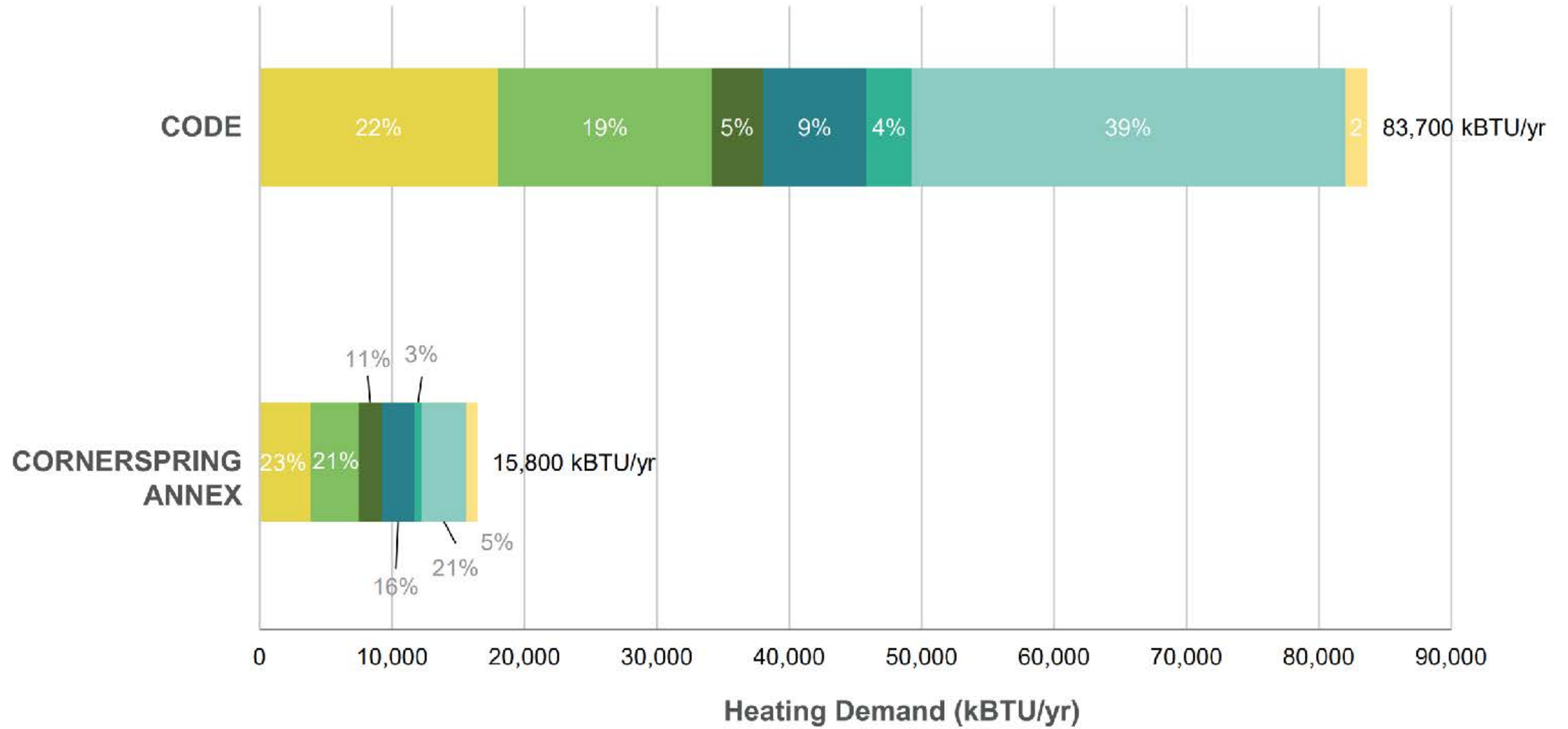
35% of this is insulation fasteners!
Adhesives have potential to be a game-changing solution here: eliminate thermal bridging, dramatically reduce cost. U-Maine is working on this!

	Actual / Factor	/GSF to FO CLT	/GSF to FO WFI	/Total SA to FO WFI w/out ROs	/Total SA to FO WFI w/ROs	
CMS		998	1056	2579	2876	%
CLT	\$52,550.00	\$52.66	\$49.76	\$20.38	\$18.27	29%
WFI	\$22,707.38	\$22.75	\$21.50	\$8.80	\$7.90	12%
Windows / Doors	\$16,940.99	\$16.97	\$16.04	\$6.57	\$5.89	9%
Lumber Fasteners Moisture	\$26,780.16	\$26.83	\$25.36	\$10.38	\$9.31	15%
Labor	\$41,498.75	\$41.58	\$39.30	\$16.09	\$14.43	23%
Gen. Con.	\$22,198.39	\$22.24	\$21.02	\$8.61	\$7.72	12%
Total Cost	\$182,675.67	\$183.04	\$172.99	\$70.83	\$63.52	

HEATING DEMAND BY COMPONENT

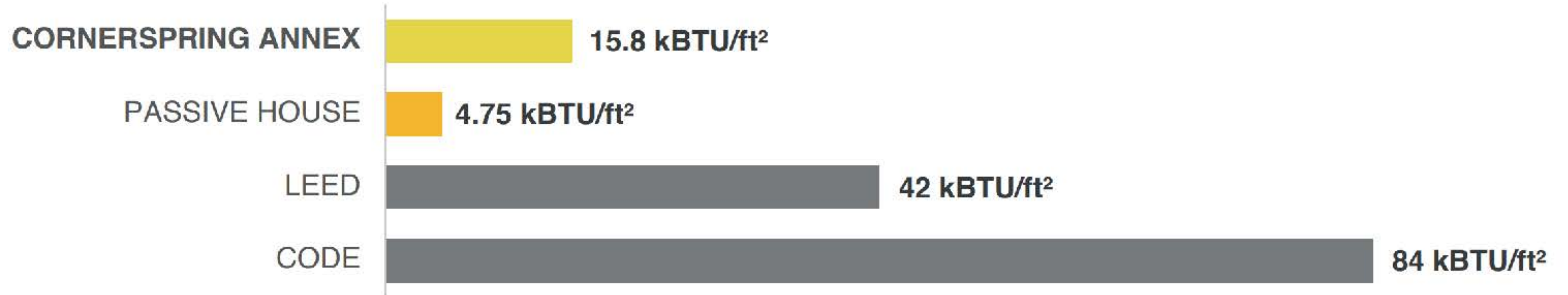
Model

■ Windows & Glazed Doors ■ Net Wall ■ Roof ■ Foundation Wall ■ Slab & Floor ■ Ventilation ■ Infiltration



Model

ANNUAL HEATING DEMAND (kBTU/ft²)



ANNUAL SITE ENERGY USE INTENSITY (kBTU/ft²)



National average obtained through EIA CBECS database.

Model



-2.7t
OTHERS



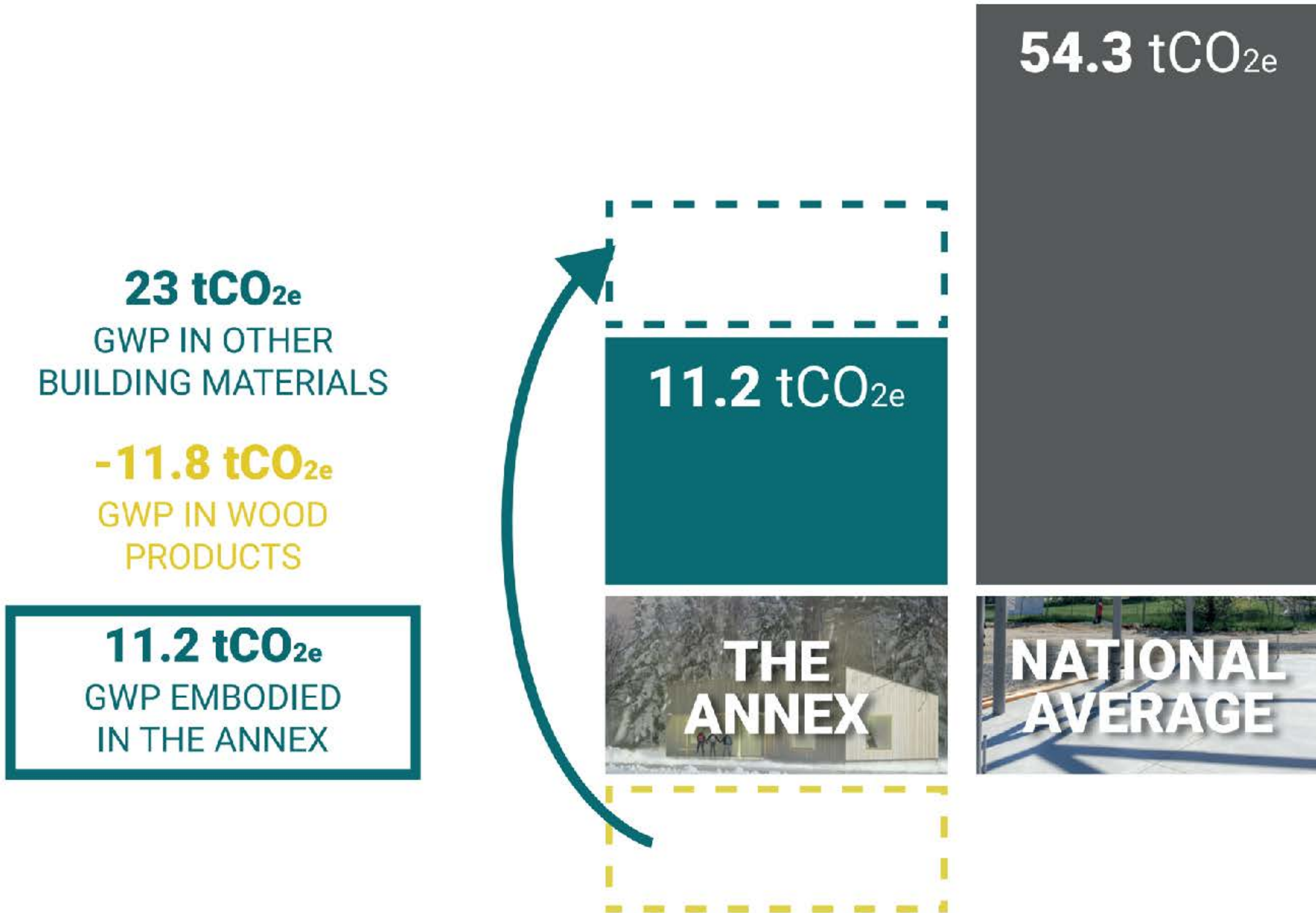
-6.5t
WOOD FIBER INSULATION



-2.6t
CLT

-11.8 tCO_{2e}
WOOD PRODUCTS
IN THE ANNEX

Model



Data inclusive of biogenic carbon. Full building envelope cradle-to-grave (excluding wood fiber insulation) results generated through Tally. CLT LCI Source - "RNA: Glue laminated timbers CORRIM (2011)". Wood fiber insulation cradle-to-grave data obtained through Sphera; assumed landfill as end-of-life treatment. National average obtained through AIA2030 database.

Model



-51%

WOOD PRODUCTS

THE ANNEX



57%

CONCRETE



15%

OPENINGS



19%

THERMAL & MOISTURE CONTROL



9%

OTHERS



THE ANNEX



11.2 tCO_{2e}

NATIONAL AVERAGE

54.3