

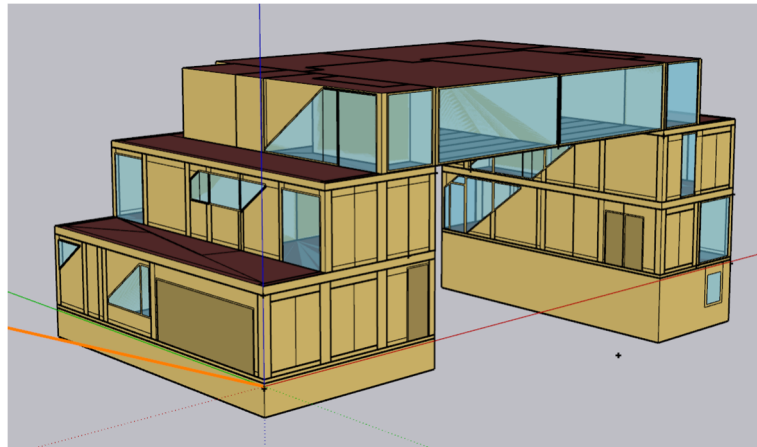
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# BUILDING ENVELOPE ANALYSIS

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3508 96th Ave SE  
MERCER ISLAND, WASHINGTON 98040

PROJECT: HEP-24-04



FOR:

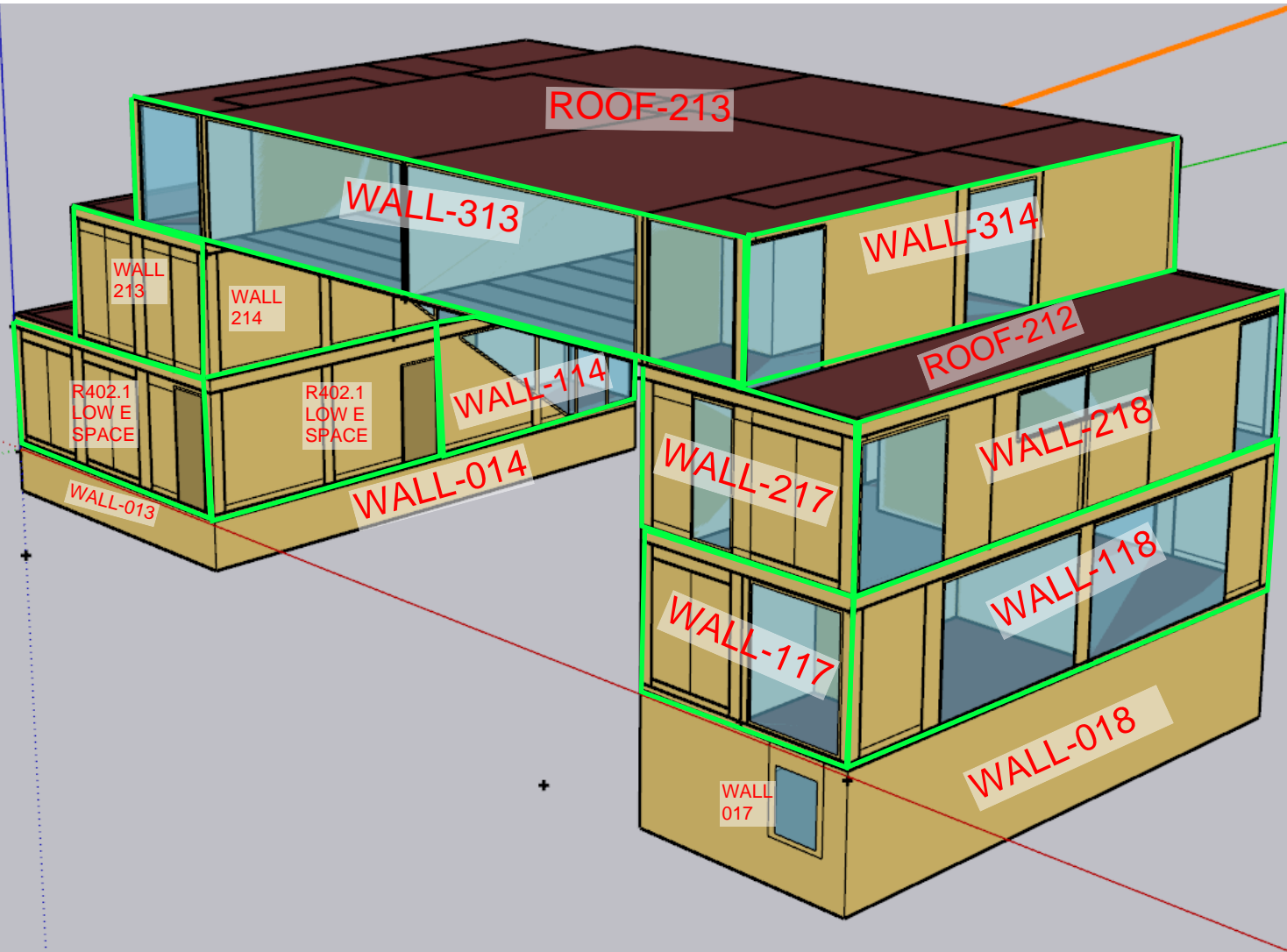
SAM ADAMS  
2622 123rd Ave SE, Bellevue, WA 98005

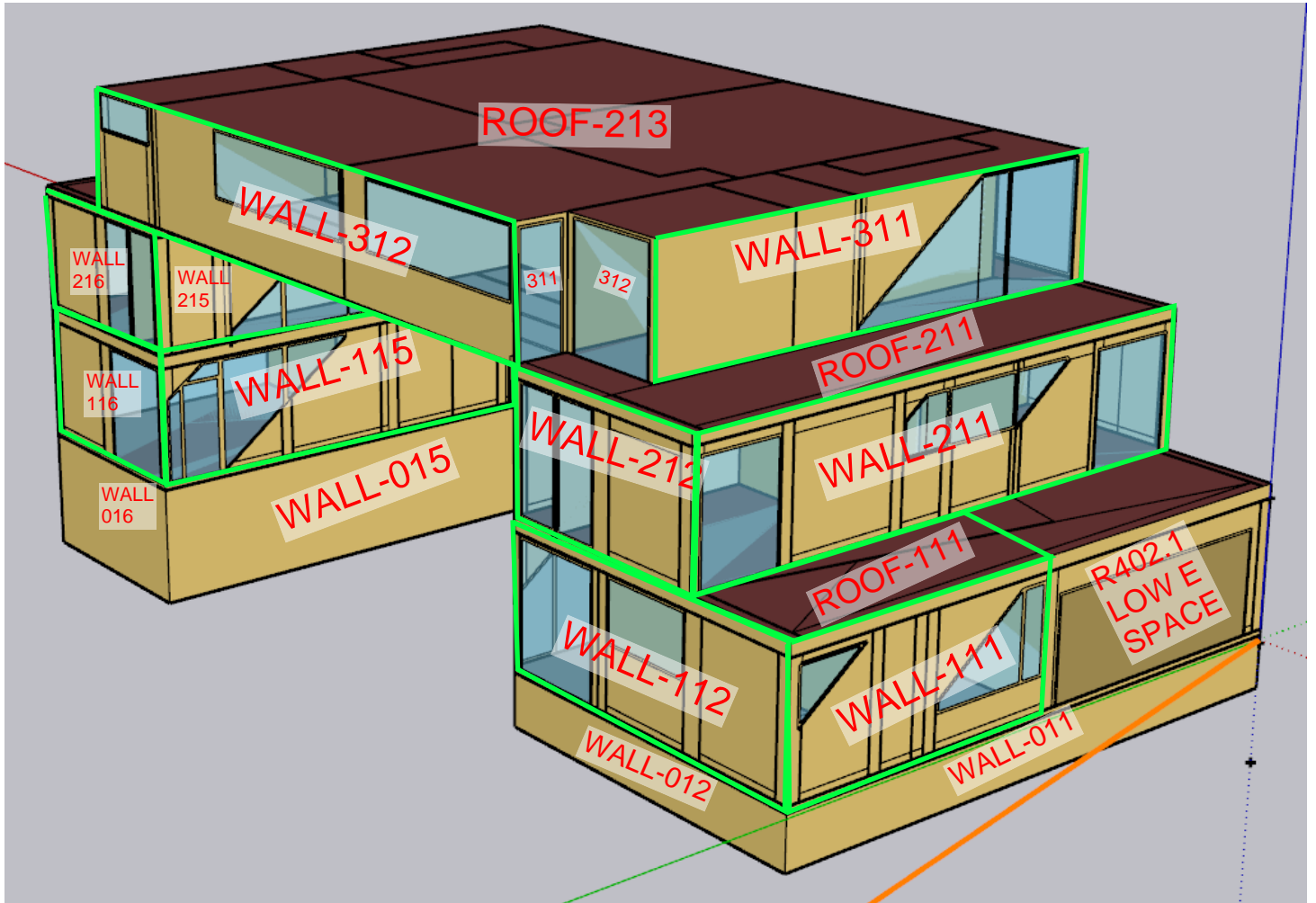
SUBMITTED BY:  
HELIX ENERGY PARTNERS LLC

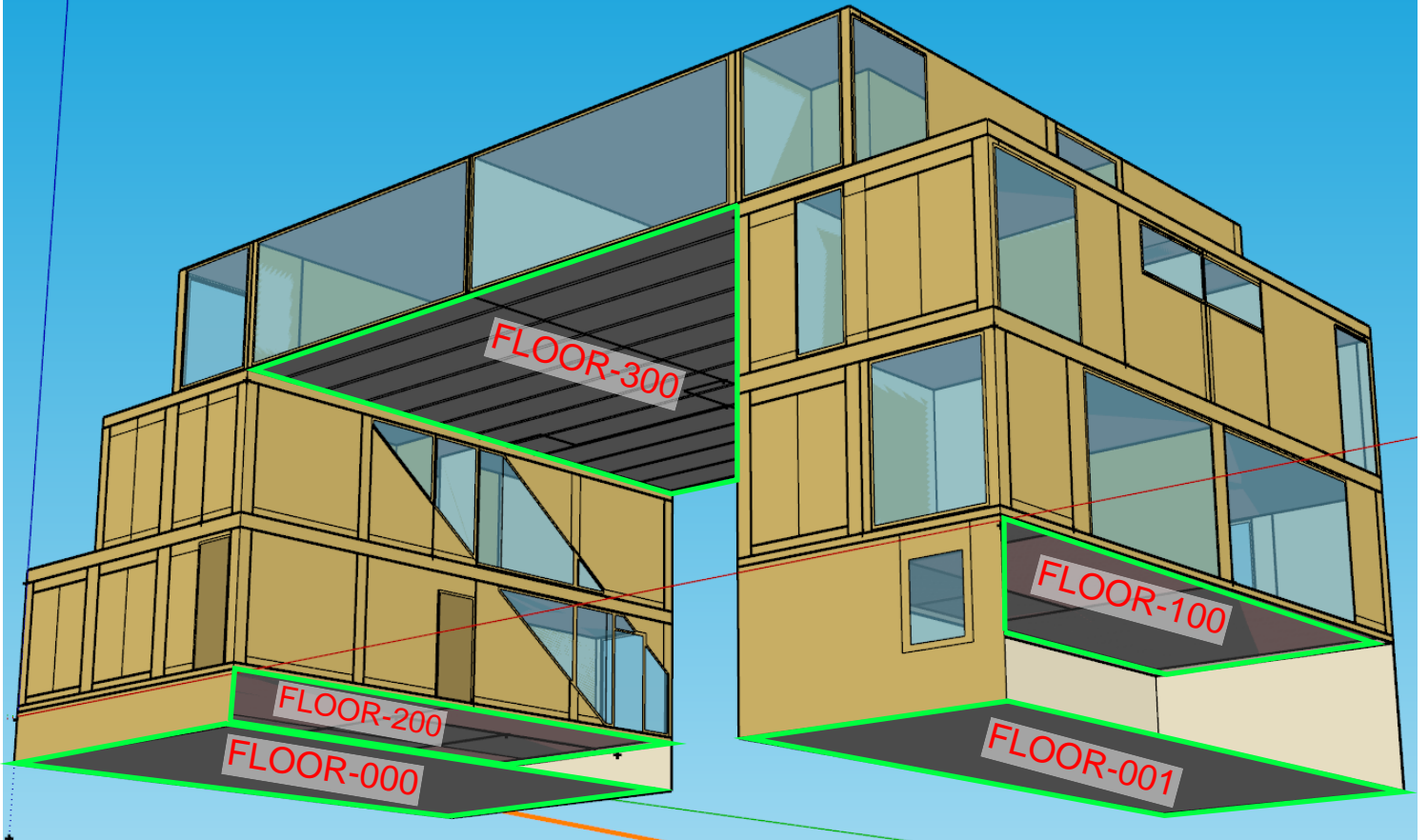
JUN 26<sup>th</sup>, 2024  
v003



RENEWAL DATE DEC. 31, 2024







**BUILDING SUMMARY**

		R-Value
Above-Grade Wall U-Factor	0.047704	20.9626146
Ceiling (Roof) U-Factor	0.036255	27.5827827
Below Grade Wall U-Factor	0.056496	17.7002377
Floor U-Factor	0.036823	27.1572229
Opaque Doors U-Factor	0.233	4.29184549
Fenestration U-Factor	0.28	3.57142857

**R402.1.5 Total UA alternative**

UAT	TARGET	PROPOSED
	1065.1	1057.0
UW	0.056	0.04770397
AW	5572	5572
UBGW	0.035	0.05649642
ABGW	1378	1378
UVG	0.3	0.28
AVG	1961	1961
UOG	-	-
AOG	-	-
UF	0.029	0.045
AF	935	935
URC	0.024	0.0362545
ARC	3117	3117
UD	0.37	0.233
AD	39.44	39.44
FS	-	-
PS	-	-
FBGS	-	-
PBGS	-	-

$$UA_T = U_W A_W + U_{BGW} A_{BGW} + U_{VG} A_{VG} + U_{OG} A_{OG} + U_F A_F + U_{RC} A_{RC} + U_D A_D + F_S P_S + F_{BGS} P_{BGS}$$

**Where:**

- UA<sub>T</sub> = the target combined thermal transmittance of the gross exterior wall, floor and roof/ceiling area.
- U<sub>W</sub> = the thermal transmittance value of the opaque above grade wall found in Table R402.1.2.
- A<sub>W</sub> = opaque above grade wall area.
- U<sub>BGW</sub> = the thermal transmittance value of the below grade opaque wall found in Table R402.1.2.
- A<sub>BGW</sub> = opaque below grade wall area.
- U<sub>VG</sub> = the thermal transmittance value of the fenestration found in Table R402.1.2.
- A<sub>VG</sub> = (a) The proposed glazing area; where proposed fenestration glazing area is less than 15% of the conditioned floor area, minus A<sub>OG</sub>.  
(b) 15% of the conditioned floor area; where the proposed fenestration glazing area is 15% or more of the conditioned floor area, minus A<sub>OG</sub>.
- U<sub>OG</sub> = the thermal transmittance value of the skylight glazing found in Table R402.1.2.
- A<sub>OG</sub> = skylight glazing area (if the proposed A<sub>OG</sub> exceeds 15 percent, the target A<sub>OG</sub> shall be 15 percent of the total floor area of the conditioned space).
- U<sub>F</sub> = the thermal transmittance value of the floor found in Table R402.1.2.
- A<sub>F</sub> = floor area over unconditioned space.
- U<sub>RC</sub> = the thermal transmittance value of the ceiling found in Table R402.1.2.
- A<sub>RC</sub> = roof/ceiling area.
- U<sub>D</sub> = the thermal transmittance value of the fenestration found in Table R402.1.2.
- A<sub>D</sub> = opaque door area.
- F<sub>S</sub> = concrete slab on grade component F-factor found in Table R402.1.2.
- P<sub>S</sub> = lineal ft. of concrete slab on grade perimeter.
- F<sub>BGS</sub> = concrete below grade slab component F-factor found in Table R402.1.2.
- P<sub>BGS</sub> = lineal ft. of concrete below grade slab perimeter.

**Opaque Exterior**

**FLOOR-000**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
FLOOR-000-001	CONSTR-DET13.1	0.5	0.056	0.059	934.59	934.59	12.5	180		52.33704
TOTAL					934.59					52.33704

**U-FACTOR: 0.056**  
**R-VALUE: 17.857**

**FLOOR-001**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
FLOOR-001-001	CONSTR-DET13.1	0.5	0.056	0.059	613.83	613.83	12.5	180		34.37448
TOTAL					613.83					34.37448

**U-FACTOR: 0.056**  
**R-VALUE: 17.857**

**WALL-011**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-011-001	CONSTR-DET13.1	0.5	0.057	0.059	138.43	138.43	282.5	90	W	7.89051
TOTAL					138.43					7.89051

**U-FACTOR: 0.057**  
**R-VALUE: 17.544**

**WALL-012**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-012-001	CONSTR-DET13.1	0.5	0.057	0.059	82.71	82.71	12.5	90	N	4.71447
TOTAL					82.71					4.71447

**U-FACTOR: 0.057**  
**R-VALUE: 17.544**

**WALL-013**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-013-001	CONSTR-DET13.1	0.5	0.057	0.059	82.71	82.71	192.5	90	S	4.71447
TOTAL					82.71					4.71447

**U-FACTOR: 0.057**  
**R-VALUE: 17.544**

**WALL-014**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-014-001	CONSTR-DET13.1	0.5	0.057	0.059	138.43	138.43	102.5	90	E	7.89051
TOTAL					138.43					7.89051

**U-FACTOR: 0.057**  
**R-VALUE: 17.544**

**WALL-015**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-015-001	CONSTR-DET13.1	0.5	0.057	0.059	336.18	336.18	282.5	90	W	19.16226
TOTAL					336.18					19.16226

**U-FACTOR: 0.057**  
**R-VALUE: 17.544**

**WALL-016**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-016-001	CONSTR-DET13.1	0.5	0.057	0.059	131.93	131.93	12.5	90	N	7.52001
TOTAL					131.93					7.52001

**U-FACTOR: 0.057**  
**R-VALUE: 17.544**

**WALL-017**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-017-001	CONSTR-DET13.1	0.5	0.057	0.059	109.74	109.74	192.5	90	S	6.25518
WALL-017-001 1	CONSTR-DET13.1	0.5	0.056	0.059	22.19	10.19	192.5	90	S	0.57064
TOTAL					131.93					6.82582

**U-FACTOR: 0.052**  
**R-VALUE: 19.328**

**WALL-018**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-018-001	CONSTR-DET13.1	0.5	0.057	0.059	336.18	336.18	102.5	90	E	19.16226

TOTAL

336.18

19.16226

**U-FACTOR: 0.057**  
**R-VALUE: 17.544**

**FLOOR-100**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
FLOOR-100-001 2 CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	49.21	49.21	12.5	180		2.21445
FLOOR-100-001 4 CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	38.08	38.08	12.5	180		1.7136
FLOOR-100-001 1 CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	46.57	46.57	12.5	180		2.09565
FLOOR-100-001 3 CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	145.81	145.81	12.5	180		6.56145
FLOOR-100-001 5 CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	287.51	287.51	12.5	180		12.93795
FLOOR-100-001 CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	46.64	46.64	12.5	180		2.0988
<b>TOTAL</b>				<b>613.82</b>					<b>27.6219</b>

**U-FACTOR: 0.045**  
**R-VALUE: 22.222**

**WALL-111**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-111-001 CONSTR-DET4.1	0.5	0.063	0.066	37.28	37.28	282.5	90 W		2.34864
PLENWALL-111-001 CONSTR-DET4.1	0.5	0.063	0.066	16.48	16.48	282.5	90 W		1.03824
WALL-111-003 2 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W		0.55056
WALL-111-003 3 CONSTR-DET1.0	0.5	0.033	0.033	0.24	0.24	282.5	90 W		0.00792
WALL-111-003 6 CONSTR-DET2.1	0.5	0.072	0.077	0.47	0.47	282.5	90 W		0.03384
WALL-111-003 7 CONSTR-DET2.1	0.5	0.072	0.077	4.36	4.36	282.5	90 W		0.31392
WALL-111-003 8 CONSTR-DET1.0	0.5	0.033	0.033	7.49	7.49	282.5	90 W		0.24717
WALL-111-003 9 CONSTR-DET1.0	0.5	0.033	0.033	40.43	40.43	282.5	90 W		1.33419
WALL-111-004 CONSTR-DET3.1	0.5	0.405	0.618	29.14	3.94	282.5	90 W		1.5957
WALL-111-001 CONSTR-DET3.1	0.5	0.405	0.618	9.36	2.32	282.5	90 W		0.9396
WALL-111-002 10 CONSTR-DET1.0	0.5	0.033	0.033	19.04	19.04	282.5	90 W		0.62832
WALL-111-002 2 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W		0.55056
WALL-111-002 4 CONSTR-DET1.2	0.5	0.074	0.079	6.54	6.54	282.5	90 W		0.48396
WALL-111-002 6 CONSTR-DET2.1	0.5	0.072	0.077	2.55	2.55	282.5	90 W		0.1836
WALL-111-002 7 CONSTR-DET2.1	0.5	0.072	0.077	1.19	1.19	282.5	90 W		0.08568
WALL-111-002 9 CONSTR-DET1.0	0.5	0.033	0.033	32.41	32.41	282.5	90 W		1.06953
<b>TOTAL</b>				<b>221.86</b>					<b>11.41143</b>

**U-FACTOR: 0.051**  
**R-VALUE: 19.442**

**ROOF-111**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
ROOF-111-001 CONSTR-DET4.1	0.5	0.063	0.066	6.34	6.34	102.5	0		0.39942
ROOF-111-001 1 CONSTR-DET5.0	0.5	0.034	0.035	36.13	36.13	12.48	0		1.22842
ROOF-111-001 2 CONSTR-DET5.0	0.5	0.034	0.035	54.98	54.98	293.26	0		1.86932
ROOF-111-001 3 CONSTR-DET5.0	0.5	0.034	0.035	101.2	101.2	74.39	0		3.4408
ROOF-111-001 4 CONSTR-DET5.0	0.5	0.034	0.035	82.06	82.06	27.9	0		2.79004
ROOF-111-001 5 CONSTR-DET4.1	0.5	0.063	0.066	30.36	30.36	12.5	0		1.91268
ROOF-111-001 6 CONSTR-DET4.1	0.5	0.063	0.066	6.35	6.35	12.5	0		0.40005
<b>TOTAL</b>				<b>317.42</b>					<b>12.04073</b>

**U-FACTOR: 0.038**  
**R-VALUE: 26.362**

**WALL-112**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-112-001 CONSTR-DET4.1	0.5	0.063	0.066	22.28	22.28	12.5	90 N		UA
PLENWALL-112-001 CONSTR-DET4.1	0.5	0.063	0.066	9.85	9.85	12.5	90 N		0.62055
WALL-112-002 CONSTR-DET1.0	0.5	0.033	0.033	0.73	0.73	12.5	90 N		0.02409
WALL-112-002 1 CONSTR-DET1.1	0.5	0.083	0.089	4.53	4.53	12.5	90 N		0.37599
WALL-112-002 2 CONSTR-DET1.1	0.5	0.083	0.089	4.91	4.91	12.5	90 N		0.40753
WALL-112-002 3 CONSTR-DET3.1	0.5	0.405	0.618	56.21	3.86	12.5	90 N		1.5633
WALL-112-001 CONSTR-DET2.1	0.5	0.072	0.077	3.34	3.34	12.5	90 N		0.24048
WALL-112-001 1 CONSTR-DET4.1A	0.5	0.802	2.518	11.87	11.87	12.5	90 N		9.51974
WALL-112-001 2 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	12.5	90 N		0.55056
WALL-112-001 3 CONSTR-DET3.1	0.5	0.405	0.618	27.92	3.51	12.5	90 N		1.42155
WALL-112-001 5 CONSTR-DET1.1	0.5	0.083	0.089	6.39	6.39	12.5	90 N		0.53037
WALL-112-001 6 CONSTR-DET1.0	0.5	0.033	0.033	0.54	0.54	12.5	90 N		0.01782
WALL-112-001 7 CONSTR-DET2.1	0.5	0.072	0.077	3.06	3.06	12.5	90 N		0.22032
WALL-112-001 8 CONSTR-DET1.0	0.5	0.033	0.033	25	25	12.5	90 N		0.825
WALL-112-001 9 CONSTR-DET1.0	0.5	0.033	0.033	48.94	48.94	12.5	90 N		1.61502
<b>TOTAL</b>				<b>200.88</b>					<b>17.31177</b>

**U-FACTOR: 0.086**  
**R-VALUE: 11.604**

**WALL-114**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-114-001CONSTR-DET4.1	0.5	0.063	0.066	37.28	37.28	102.5	90 E	2.34864	
PLENWALL-114-001CONSTR-DET4.1	0.5	0.063	0.066	16.48	16.48	102.5	90 E	1.03824	
WALL-114-001 1 CONSTR-DET3.1	0.5	0.405	0.618	94.02	13	102.5	90 E	5.265	
WALL-114-001 13 CONSTR-DET1.2	0.5	0.074	0.079	2.16	2.16	102.5	90 E	0.15984	
WALL-114-001 14 CONSTR-DET2.1	0.5	0.072	0.077	1.24	1.24	102.5	90 E	0.08928	
WALL-114-001 15 CONSTR-DET1.0	0.5	0.033	0.033	1.77	1.77	102.5	90 E	0.05841	
WALL-114-001 16 CONSTR-DET1.0	0.5	0.033	0.033	7.41	7.41	102.5	90 E	0.24453	
WALL-114-001 17 CONSTR-DET1.2	0.5	0.074	0.079	0.08	0.08	102.5	90 E	0.00592	
WALL-114-001 2 CONSTR-DET2.1	0.5	0.072	0.077	4.55	4.55	102.5	90 E	0.3276	
WALL-114-001 5 CONSTR-DET1.2	0.5	0.074	0.079	4.7	4.7	102.5	90 E	0.3478	
WALL-114-001 6 CONSTR-DET1.0	0.5	0.033	0.033	52.16	52.16	102.5	90 E	1.72128	
<b>TOTAL</b>				<b>221.85</b>				<b>11.60654</b>	

**U-FACTOR: 0.052**  
**R-VALUE: 19.114**

**WALL-115**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-115-001CONSTR-DET4.1	0.5	0.063	0.066	37.28	37.28	282.5	90 W	2.34864	
PLENWALL-115-001CONSTR-DET4.1	0.5	0.063	0.066	16.48	16.48	282.5	90 W	1.03824	
WALL-115-001 15 CONSTR-DET1.0	0.5	0.033	0.033	6.12	6.12	282.5	90 W	0.20196	
WALL-115-001 16 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W	0.55056	
WALL-115-001 2 CONSTR-DET1.0	0.5	0.033	0.033	34.01	34.01	282.5	90 W	1.12233	
WALL-115-001 21 CONSTR-DET2.1	0.5	0.072	0.077	2.13	2.13	282.5	90 W	0.15336	
WALL-115-001 22 CONSTR-DET2.1	0.5	0.072	0.077	0.12	0.12	282.5	90 W	0.00864	
WALL-115-001 5 CONSTR-DET3.1	0.5	0.405	0.618	22.15	2.43	282.5	90 W	0.98415	
WALL-115-001 1 CONSTR-DET1.0	0.5	0.033	0.033	5.38	5.38	282.5	90 W	0.17754	
WALL-115-001 13 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W	0.55056	
WALL-115-001 14 CONSTR-DET1.0	0.5	0.033	0.033	40.05	40.05	282.5	90 W	1.32165	
WALL-115-001 19 CONSTR-DET2.1	0.5	0.072	0.077	0.34	0.34	282.5	90 W	0.02448	
WALL-115-001 20 CONSTR-DET2.1	0.5	0.072	0.077	2.5	2.5	282.5	90 W	0.18	
WALL-115-001 CONSTR-DET3.1	0.5	0.405	0.618	81.79	13.61	282.5	90 W	5.51205	
WALL-115-001 10 CONSTR-DET1.0	0.5	0.033	0.033	51.96	51.96	282.5	90 W	1.71468	
WALL-115-001 11 CONSTR-DET1.2	0.5	0.074	0.079	0.11	0.11	282.5	90 W	0.00814	
WALL-115-001 12 CONSTR-DET1.0	0.5	0.033	0.033	3.34	3.34	282.5	90 W	0.11022	
WALL-115-001 17 CONSTR-DET2.1	0.5	0.072	0.077	2.21	2.21	282.5	90 W	0.15912	
WALL-115-001 18 CONSTR-DET2.1	0.5	0.072	0.077	3.93	3.93	282.5	90 W	0.28296	
WALL-115-001 6 CONSTR-DET1.2	0.5	0.074	0.079	3.46	3.46	282.5	90 W	0.25604	
WALL-115-001 8 CONSTR-DET1.0	0.5	0.033	0.033	6.4	6.4	282.5	90 W	0.2112	
WALL-115-001 9 CONSTR-DET1.2	0.5	0.074	0.079	4.26	4.26	282.5	90 W	0.31524	
WALL-115-001 23 CONSTR-DET2.1	0.5	0.072	0.077	0.95	0.95	282.5	90 W	0.0684	
WALL-115-001 3 CONSTR-DET3.1	0.5	0.405	0.618	23.11	3.39	282.5	90 W	1.37295	
WALL-115-001 4 CONSTR-DET1.0	0.5	0.033	0.033	19.55	19.55	282.5	90 W	0.64515	
WALL-115-001 7 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W	0.55056	
<b>TOTAL</b>				<b>389.95</b>				<b>19.86882</b>	

**U-FACTOR: 0.051**  
**R-VALUE: 19.626**

**WALL-116**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-116-001CONSTR-DET4.1	0.5	0.063	0.066	14.63	14.63	12.5	90 N	0.92169	
PLENWALL-116-001CONSTR-DET4.1	0.5	0.063	0.066	6.47	6.47	12.5	90 N	0.40761	
WALL-116-001 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	12.5	90 N	0.55056	
WALL-116-001 1 CONSTR-DET3.1	0.5	0.405	0.618	55.75	3.85	12.5	90 N	1.55925	
WALL-116-001 2 CONSTR-DET1.0	0.5	0.033	0.033	49.11	49.11	12.5	90 N	1.62063	
WALL-116-001 3 CONSTR-DET1.2	0.5	0.074	0.079	4.7	4.7	12.5	90 N	0.3478	
WALL-116-001 4 CONSTR-DET1.1	0.5	0.083	0.089	11.87	11.87	12.5	90 N	0.98521	
WALL-116-001 5 CONSTR-DET2.1	0.5	0.072	0.077	3.07	3.07	12.5	90 N	0.22104	
<b>TOTAL</b>				<b>153.04</b>				<b>6.61379</b>	

**U-FACTOR: 0.043**  
**R-VALUE: 23.140**

**WALL-117**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-117-001CONSTR-DET4.1	0.5	0.063	0.066	14.63	14.63	192.5	90 S	0.92169	
PLENWALL-117-001CONSTR-DET4.1	0.5	0.063	0.066	6.47	6.47	192.5	90 S	0.40761	
WALL-117-001 1 CONSTR-DET1.2	0.5	0.074	0.079	4.96	4.96	192.5	90 S	0.36704	
WALL-117-001 2 CONSTR-DET3.1	0.5	0.405	0.618	55.36	4.88	192.5	90 S	1.9764	
WALL-117-001 4 CONSTR-DET1.0	0.5	0.033	0.033	0.53	0.53	192.5	90 S	0.01749	
WALL-117-001 6 CONSTR-DET1.0	0.5	0.033	0.033	0.59	0.59	192.5	90 S	0.01947	
WALL-117-001 7 CONSTR-DET4.1A	0.5	0.802	2.518	4.47	4.47	192.5	90 S	3.58494	
WALL-117-001 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	192.5	90 S	0.55056	
WALL-117-001 10 CONSTR-DET1.0	0.5	0.033	0.033	21.7	21.7	192.5	90 S	0.7161	
WALL-117-001 11 CONSTR-DET1.0	0.5	0.033	0.033	21.7	21.7	192.5	90 S	0.7161	

WALL-117-0013	CONSTR-DET4.1	0.5	0.063	0.066	4.77	4.77	192.5	90 S	0.30051
WALL-117-0015	CONSTR-DET2.1	0.5	0.072	0.077	3.01	3.01	192.5	90 S	0.21672
WALL-117-0019	CONSTR-DET4.1A	0.5	0.802	2.518	7.4	7.4	192.5	90 S	5.9348
<b>TOTAL</b>					<b>153.03</b>				<b>15.72943</b>

**U-FACTOR: 0.103**

**R-VALUE: 9.729**

**WALL-118**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-118-001	CONSTR-DET4.1	0.5	0.063	0.066	37.28	37.28	102.5	90 E	2.34864
PLENWALL-118-001	CONSTR-DET4.1	0.5	0.063	0.066	16.48	16.48	102.5	90 E	1.03824
WALL-118-001	CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	102.5	90 E	0.55056
WALL-118-0015	CONSTR-DET1.0	0.5	0.033	0.033	41.05	41.05	102.5	90 E	1.35465
WALL-118-0018	CONSTR-DET2.1	0.5	0.072	0.077	2.57	2.57	102.5	90 E	0.18504
WALL-118-0011	CONSTR-DET3.1	0.5	0.405	0.618	102.53	4.77	102.5	90 E	1.93185
WALL-118-0013	CONSTR-DET1.0	0.5	0.033	0.033	25.14	25.14	102.5	90 E	0.82962
WALL-118-0012	CONSTR-DET3.1	0.5	0.405	0.618	116.2	4.44	102.5	90 E	1.7982
WALL-118-0014	CONSTR-DET2.1	0.5	0.072	0.077	1.85	1.85	102.5	90 E	0.1332
WALL-118-0016	CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	102.5	90 E	0.55056
WALL-118-0017	CONSTR-DET1.0	0.5	0.033	0.033	31.97	31.97	102.5	90 E	1.05501
<b>TOTAL</b>					<b>389.95</b>				<b>11.77557</b>

**U-FACTOR: 0.030**

**R-VALUE: 33.115**

**FLOOR-200**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
FLOOR-200-0012	CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	84.57	84.57	12.5	180	3.80565
FLOOR-200-0013	CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	82.14	82.14	12.5	180	3.6963
FLOOR-200-001	CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	158.72	158.72	12.5	180	7.1424
FLOOR-200-0011	CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	308.58	308.58	12.5	180	13.8861
FLOOR-200-0014	CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	154.41	154.41	12.5	180	6.94845
FLOOR-200-0015	CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	72.02	72.02	12.5	180	3.2409
FLOOR-200-0016	CONSTR-DET2.2 W 2INCH	0.5	0.045	0.049	74.15	74.15	12.5	180	3.33675
<b>TOTAL</b>					<b>934.59</b>				<b>42.05655</b>

**U-FACTOR: 0.045**

**R-VALUE: 22.222**

**WALL-211**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-211-001	CONSTR-DET4.1	0.5	0.063	0.066	30.69	30.69	282.5	90 W	1.93347
WALL-211-002	CONSTR-DET2.1	0.5	0.072	0.077	1.58	1.58	282.5	90 W	0.11376
WALL-211-0021	CONSTR-DET3.1	0.5	0.405	0.618	11.92	2.2	282.5	90 W	0.891
WALL-211-0022	CONSTR-DET3.1	0.5	0.405	0.618	20.43	2.97	282.5	90 W	1.20285
WALL-211-0023	CONSTR-DET1.2	0.5	0.074	0.079	4.39	4.39	282.5	90 W	0.32486
WALL-211-0024	CONSTR-DET1.0	0.5	0.033	0.033	2.76	2.76	282.5	90 W	0.09108
WALL-211-0025	CONSTR-DET2.1	0.5	0.072	0.077	2.48	2.48	282.5	90 W	0.17856
WALL-211-0026	CONSTR-DET1.2	0.5	0.074	0.079	2.35	2.35	282.5	90 W	0.1739
WALL-211-0027	CONSTR-DET1.0	0.5	0.033	0.033	18.85	18.85	282.5	90 W	0.62205
WALL-211-0028	CONSTR-DET1.0	0.5	0.033	0.033	12.98	12.98	282.5	90 W	0.42834
WALL-211-0029	CONSTR-DET1.0	0.5	0.033	0.033	2.15	2.15	282.5	90 W	0.07095
WALL-211-003	CONSTR-DET1.2	0.5	0.074	0.079	2.04	2.04	282.5	90 W	0.15096
WALL-211-0031	CONSTR-DET3.1	0.5	0.405	0.618	49.83	3.63	282.5	90 W	1.47015
WALL-211-00310	CONSTR-DET1.0	0.5	0.033	0.033	38.31	38.31	282.5	90 W	1.26423
WALL-211-0033	CONSTR-DET2.1	0.5	0.072	0.077	3.1	3.1	282.5	90 W	0.2232
WALL-211-0034	CONSTR-DET1.2	0.5	0.074	0.079	6.05	6.05	282.5	90 W	0.4477
WALL-211-0035	CONSTR-DET1.2	0.5	0.074	0.079	3.87	3.87	282.5	90 W	0.28638
WALL-211-0036	CONSTR-DET3.1	0.5	0.405	0.618	8.96	1.8	282.5	90 W	0.729
WALL-211-0037	CONSTR-DET1.0	0.5	0.033	0.033	3.37	3.37	282.5	90 W	0.11121
WALL-211-0038	CONSTR-DET1.2	0.5	0.074	0.079	0.26	0.26	282.5	90 W	0.01924
WALL-211-0039	CONSTR-DET1.0	0.5	0.033	0.033	3.97	3.97	282.5	90 W	0.13101
WALL-211-001	CONSTR-DET3.1	0.5	0.405	0.618	47.15	3.58	282.5	90 W	1.4499
WALL-211-0011	CONSTR-DET1.2	0.5	0.074	0.079	5.43	5.43	282.5	90 W	0.40182
WALL-211-0012	CONSTR-DET1.0	0.5	0.033	0.033	3.27	3.27	282.5	90 W	0.10791
WALL-211-0013	CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W	0.55056
WALL-211-0014	CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W	0.55056
WALL-211-0015	CONSTR-DET2.1	0.5	0.072	0.077	3.87	3.87	282.5	90 W	0.27864
WALL-211-0016	CONSTR-DET1.0	0.5	0.033	0.033	55.8	55.8	282.5	90 W	1.8414
WALL-211-0017	CONSTR-DET1.0	0.5	0.033	0.033	6.13	6.13	282.5	90 W	0.20229
<b>TOTAL</b>					<b>366.87</b>				<b>16.24698</b>

**U-FACTOR: 0.044**

**R-VALUE: 22.581**

**ROOF-211**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft <sup>2</sup> -F]	U-Factor no Film [Btu/h-ft <sup>2</sup> -F]	Gross Area [ft <sup>2</sup> ]	Net Area [ft <sup>2</sup> ]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
ROOF-211-001	CONSTR-DET4.1	0.5	0.063	0.066	6.48	6.48	11.86	0		0.40824
ROOF-211-001 1	CONSTR-DET5.0	0.5	0.034	0.035	264.12	264.12	102.5	0		8.98008
ROOF-211-001 2	CONSTR-DET4.1	0.5	0.063	0.066	6.15	6.15	12.5	0		0.38745
ROOF-211-001 3	CONSTR-DET4.1	0.5	0.063	0.066	30.45	30.45	102.5	0		1.91835
<b>TOTAL</b>					<b>307.2</b>					<b>11.69412</b>

**U-FACTOR: 0.038**  
**R-VALUE: 26.270**

**WALL-212**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft <sup>2</sup> -F]	U-Factor no Film [Btu/h-ft <sup>2</sup> -F]	Gross Area [ft <sup>2</sup> ]	Net Area [ft <sup>2</sup> ]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-212-001	CONSTR-DET4.1	0.5	0.063	0.066	12.11	12.11	12.5	90 N		0.76293
WALL-212-001	CONSTR-DET1.0	0.5	0.033	0.033	28.54	28.54	12.5	90 N		0.94182
WALL-212-001 1	CONSTR-DET3.1	0.5	0.405	0.618	26.91	3.75	12.5	90 N		1.51875
WALL-212-001 2	CONSTR-DET1.1	0.5	0.083	0.089	11.87	11.87	12.5	90 N		0.98521
WALL-212-001 3	CONSTR-DET2.1	0.5	0.072	0.077	3.03	3.03	12.5	90 N		0.21816
WALL-212-001 4	CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	12.5	90 N		0.55056
WALL-212-001 5	CONSTR-DET1.0	0.5	0.033	0.033	43.67	43.67	12.5	90 N		1.44111
WALL-212-001 6	CONSTR-DET1.0	0.5	0.033	0.033	4.8	4.8	12.5	90 N		0.1584
WALL-212-002	CONSTR-DET1.0	0.5	0.033	0.033	33.31	33.31	12.5	90 N		1.09923
WALL-212-002 1	CONSTR-DET3.1	0.5	0.405	0.618	26.67	3.74	12.5	90 N		1.5147
<b>TOTAL</b>					<b>198.35</b>					<b>9.19087</b>

**U-FACTOR: 0.046**  
**R-VALUE: 21.581**

**ROOF-212**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft <sup>2</sup> -F]	U-Factor no Film [Btu/h-ft <sup>2</sup> -F]	Gross Area [ft <sup>2</sup> ]	Net Area [ft <sup>2</sup> ]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
ROOF-212-001	CONSTR-DET4.1	0.5	0.063	0.066	6.32	6.32	12.5	0		0.39816
ROOF-212-001 1	CONSTR-DET4.1	0.5	0.063	0.066	6.32	6.32	12.5	0		0.39816
ROOF-212-001 2	CONSTR-DET4.1	0.5	0.063	0.066	30.45	30.45	12.5	0		1.91835
ROOF-212-001 3	CONSTR-DET5.0	0.5	0.034	0.035	272.4	272.4	12.5	0		9.2616
<b>TOTAL</b>					<b>315.49</b>					<b>11.97627</b>

**U-FACTOR: 0.038**  
**R-VALUE: 26.343**

**WALL-213**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft <sup>2</sup> -F]	U-Factor no Film [Btu/h-ft <sup>2</sup> -F]	Gross Area [ft <sup>2</sup> ]	Net Area [ft <sup>2</sup> ]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-213-001	CONSTR-DET4.1	0.5	0.063	0.066	12.11	12.11	192.5	90 S		0.76293
WALL-213-001	CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	192.5	90 S		0.55056
WALL-213-001 1	CONSTR-DET1.1	0.5	0.083	0.089	11.87	11.87	192.5	90 S		0.98521
WALL-213-001 10	CONSTR-DET2.1	0.5	0.072	0.077	1.56	1.56	192.5	90 S		0.11232
WALL-213-001 2	CONSTR-DET1.0	0.5	0.033	0.033	2.48	2.48	192.5	90 S		0.08184
WALL-213-001 3	CONSTR-DET1.0	0.5	0.033	0.033	22.45	22.45	192.5	90 S		0.74085
WALL-213-001 4	CONSTR-DET2.1	0.5	0.072	0.077	1.56	1.56	192.5	90 S		0.11232
WALL-213-001 5	CONSTR-DET2.1	0.5	0.072	0.077	1.57	1.57	192.5	90 S		0.11304
WALL-213-001 6	CONSTR-DET1.0	0.5	0.033	0.033	2.47	2.47	192.5	90 S		0.08151
WALL-213-001 7	CONSTR-DET1.0	0.5	0.033	0.033	22.57	22.57	192.5	90 S		0.74481
WALL-213-001 8	CONSTR-DET1.0	0.5	0.033	0.033	2.47	2.47	192.5	90 S		0.08151
WALL-213-001 9	CONSTR-DET1.0	0.5	0.033	0.033	22.45	22.45	192.5	90 S		0.74085
WALL-213-002	CONSTR-DET2.1	0.5	0.072	0.077	1.55	1.55	192.5	90 S		0.1116
WALL-213-002 1	CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	192.5	90 S		0.55056
WALL-213-002 2	CONSTR-DET1.0	0.5	0.033	0.033	2.45	2.45	192.5	90 S		0.08085
WALL-213-002 3	CONSTR-DET1.0	0.5	0.033	0.033	22.34	22.34	192.5	90 S		0.73722
<b>TOTAL</b>					<b>144.78</b>					<b>6.58798</b>

**U-FACTOR: 0.046**  
**R-VALUE: 21.976**

**ROOF-213**

	Construction	Reflectance	U-Factor with Film [Btu/h-ft <sup>2</sup> -F]	U-Factor no Film [Btu/h-ft <sup>2</sup> -F]	Gross Area [ft <sup>2</sup> ]	Net Area [ft <sup>2</sup> ]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
ROOF-213-001 10	CONSTR-DET8.1A	0.5	0.012	0.013	41.03	41.03	12.5	0		0.49236
ROOF-213-001 3	CONSTR-DET8.1A	0.5	0.012	0.013	105.59	105.59	12.5	0		1.26708
ROOF-213-001 4	CONSTR-DET8.1B	0.5	0.044	0.046	370.23	370.23	192.5	0		16.29012
ROOF-213-001 5	CONSTR-DET8.1B	0.5	0.044	0.046	475.34	475.34	12.5	0		20.91496
ROOF-213-001 11	CONSTR-DET8.1A	0.5	0.012	0.013	107.91	107.91	12.5	0		1.29492
ROOF-213-001	CONSTR-DET8.1A	0.5	0.012	0.013	88.8	88.8	12.5	0		1.0656
ROOF-213-001 6	CONSTR-DET8.1B	0.5	0.044	0.046	504.35	504.35	12.5	0		22.1914
ROOF-213-001 9	CONSTR-DET8.1A	0.5	0.012	0.013	83.33	83.33	12.5	0		0.99996
ROOF-213-001 2	CONSTR-DET8.1A	0.5	0.012	0.013	59.74	59.74	12.5	0		0.71688
ROOF-213-001 12	CONSTR-DET8.1A	0.5	0.012	0.013	47.06	47.06	12.5	0		0.56472
ROOF-213-001 1	CONSTR-DET8.1A	0.5	0.012	0.013	44.21	44.21	12.5	0		0.53052
ROOF-213-001 7	CONSTR-DET8.1B	0.5	0.044	0.046	248.84	248.84	192.5	0		10.94896
<b>TOTAL</b>					<b>2176.43</b>					<b>77.27748</b>

**U-FACTOR: 0.036**

R-VALUE: 28.164

WALL-214

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-214-001CONSTR-DET4.1	0.5	0.063	0.066	30.69	30.69	102.5	90 E		1.93347
WALL-214-001 CONSTR-DET3.1	0.5	0.405	0.618	15.72	3.51	102.5	90 E		1.42155
WALL-214-001 14 CONSTR-DET2.1	0.5	0.072	0.077	4.24	4.24	102.5	90 E		0.30528
WALL-214-001 15 CONSTR-DET2.1	0.5	0.072	0.077	2.78	2.78	102.5	90 E		0.20016
WALL-214-001 3 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	102.5	90 E		0.55056
WALL-214-001 7 CONSTR-DET1.0	0.5	0.033	0.033	67.76	67.76	102.5	90 E		2.23608
WALL-214-001 8 CONSTR-DET1.2	0.5	0.074	0.079	7.42	7.42	102.5	90 E		0.54908
WALL-214-001 9 CONSTR-DET1.0	0.5	0.033	0.033	28.76	28.76	102.5	90 E		0.94908
WALL-214-001 10 CONSTR-DET1.0	0.5	0.033	0.033	68.96	68.96	102.5	90 E		2.27568
WALL-214-001 11 CONSTR-DET1.2	0.5	0.074	0.079	4.99	4.99	102.5	90 E		0.36926
WALL-214-001 12 CONSTR-DET1.2	0.5	0.074	0.079	0.12	0.12	102.5	90 E		0.00888
WALL-214-001 13 CONSTR-DET2.1	0.5	0.072	0.077	1.26	1.26	102.5	90 E		0.09072
WALL-214-001 17 CONSTR-DET2.1	0.5	0.072	0.077	3.56	3.56	102.5	90 E		0.25632
WALL-214-001 2 CONSTR-DET3.1	0.5	0.405	0.618	63.37	6.77	102.5	90 E		2.74185
WALL-214-001 5 CONSTR-DET1.0	0.5	0.033	0.033	18.38	18.38	102.5	90 E		0.60654
WALL-214-001 6 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	102.5	90 E		0.55056
WALL-214-001 1 CONSTR-DET1.0	0.5	0.033	0.033	5.65	5.65	102.5	90 E		0.18645
WALL-214-001 16 CONSTR-DET2.1	0.5	0.072	0.077	1.98	1.98	102.5	90 E		0.14256
WALL-214-001 4 CONSTR-DET3.1	0.5	0.405	0.618	26.35	4.51	102.5	90 E		1.82655
TOTAL					366.87				17.20063

U-FACTOR: 0.047

R-VALUE: 21.329

WALL-215

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-215-001CONSTR-DET4.1	0.5	0.063	0.066	30.69	30.69	282.5	90 W		1.93347
WALL-215-001 11 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W		0.55056
WALL-215-001 12 CONSTR-DET1.0	0.5	0.033	0.033	67.76	67.76	282.5	90 W		2.23608
WALL-215-001 2 CONSTR-DET1.0	0.5	0.033	0.033	29.61	29.61	282.5	90 W		0.97713
WALL-215-001 22 CONSTR-DET2.1	0.5	0.072	0.077	2.13	2.13	282.5	90 W		0.15336
WALL-215-001 23 CONSTR-DET2.1	0.5	0.072	0.077	4.24	4.24	282.5	90 W		0.30528
WALL-215-001 3 CONSTR-DET3.1	0.5	0.405	0.618	4.41	1.34	282.5	90 W		0.5427
WALL-215-001 6 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W		0.55056
WALL-215-001 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W		0.55056
WALL-215-001 15 CONSTR-DET1.0	0.5	0.033	0.033	3.58	3.58	282.5	90 W		0.11814
WALL-215-001 16 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	282.5	90 W		0.55056
WALL-215-001 17 CONSTR-DET1.0	0.5	0.033	0.033	28.48	28.48	282.5	90 W		0.93984
WALL-215-001 18 CONSTR-DET2.1	0.5	0.072	0.077	1.78	1.78	282.5	90 W		0.12816
WALL-215-001 19 CONSTR-DET2.1	0.5	0.072	0.077	0.22	0.22	282.5	90 W		0.01584
WALL-215-001 1 CONSTR-DET2.1	0.5	0.072	0.077	0.71	0.71	282.5	90 W		0.05112
WALL-215-001 10 CONSTR-DET1.2	0.5	0.074	0.079	0.08	0.08	282.5	90 W		0.00592
WALL-215-001 13 CONSTR-DET1.0	0.5	0.033	0.033	10.94	10.94	282.5	90 W		0.36102
WALL-215-001 14 CONSTR-DET1.2	0.5	0.074	0.079	3.79	3.79	282.5	90 W		0.28046
WALL-215-001 20 CONSTR-DET1.0	0.5	0.033	0.033	0.45	0.45	282.5	90 W		0.01485
WALL-215-001 21 CONSTR-DET2.1	0.5	0.072	0.077	2.5	2.5	282.5	90 W		0.18
WALL-215-001 4 CONSTR-DET1.0	0.5	0.033	0.033	24.93	24.93	282.5	90 W		0.82269
WALL-215-001 5 CONSTR-DET3.1	0.5	0.405	0.618	101.89	11.79	282.5	90 W		4.77495
WALL-215-001 7 CONSTR-DET1.0	0.5	0.033	0.033	17	17	282.5	90 W		0.561
WALL-215-001 8 CONSTR-DET1.2	0.5	0.074	0.079	1.45	1.45	282.5	90 W		0.1073
WALL-215-001 9 CONSTR-DET1.0	0.5	0.033	0.033	0.48	0.48	282.5	90 W		0.01584
TOTAL					366.88				16.72739

U-FACTOR: 0.046

R-VALUE: 21.933

WALL-216

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-216-001CONSTR-DET4.1	0.5	0.063	0.066	12.05	12.05	12.5	90 N		0.75915
WALL-216-001 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	12.5	90 N		0.55056
WALL-216-001 10 CONSTR-DET3.1	0.5	0.405	0.618	25.67	3.22	12.5	90 N		1.3041
WALL-216-001 5 CONSTR-DET1.0	0.5	0.033	0.033	27.22	27.22	12.5	90 N		0.89826
WALL-216-001 6 CONSTR-DET2.1	0.5	0.072	0.077	3.07	3.07	12.5	90 N		0.22104
WALL-216-001 7 CONSTR-DET1.1	0.5	0.083	0.089	11.96	11.96	12.5	90 N		0.99268
WALL-216-001 8 CONSTR-DET1.0	0.5	0.033	0.033	49.11	49.11	12.5	90 N		1.62063
WALL-216-001 3 CONSTR-DET1.0	0.5	0.033	0.033	29.33	29.33	12.5	90 N		0.96789
WALL-216-001 4 CONSTR-DET1.2	0.5	0.074	0.079	3.8	3.8	12.5	90 N		0.2812
WALL-216-001 9 CONSTR-DET3.1	0.5	0.405	0.618	26.17	3.72	12.5	90 N		1.5066
TOTAL					195.82				9.10211

U-FACTOR: 0.046

R-VALUE: 21.514

**WALL-217**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-217-001 CONSTR-DET4.1	0.5	0.063	0.066	12.05	12.05	192.5	90 S		0.75915
WALL-217-001 CONSTR-DET3.1	0.5	0.405	0.618	25.49	3.05	192.5	90 S		1.23525
WALL-217-001 10 CONSTR-DET2.1	0.5	0.072	0.077	0.66	0.66	192.5	90 S		0.04752
WALL-217-001 12 CONSTR-DET1.0	0.5	0.033	0.033	22.9	22.9	192.5	90 S		0.7557
WALL-217-001 13 CONSTR-DET1.1	0.5	0.083	0.089	9.53	9.53	192.5	90 S		0.79099
WALL-217-001 14 CONSTR-DET1.0	0.5	0.033	0.033	22.9	22.9	192.5	90 S		0.7557
WALL-217-001 2 CONSTR-DET4.1	0.5	0.063	0.066	0.39	0.39	192.5	90 S		0.02457
WALL-217-001 4 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	192.5	90 S		0.55056
WALL-217-001 5 CONSTR-DET1.0	0.5	0.033	0.033	0.23	0.23	192.5	90 S		0.00759
WALL-217-001 6 CONSTR-DET4.1	0.5	0.063	0.066	1.05	1.05	192.5	90 S		0.06615
WALL-217-001 7 CONSTR-DET4.1	0.5	0.063	0.066	5.03	5.03	192.5	90 S		0.31689
WALL-217-001 9 CONSTR-DET2.1	0.5	0.072	0.077	3.18	3.18	192.5	90 S		0.22896
WALL-217-001 1 CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	192.5	90 S		0.55056
WALL-217-001 11 CONSTR-DET1.0	0.5	0.033	0.033	21.79	21.79	192.5	90 S		0.71907
WALL-217-001 3 CONSTR-DET4.1	0.5	0.063	0.066	2.39	2.39	192.5	90 S		0.15057
WALL-217-001 8 CONSTR-DET2.1	0.5	0.072	0.077	1.51	1.51	192.5	90 S		0.10872
<b>TOTAL</b>				<b>143.98</b>					<b>7.06795</b>

**U-FACTOR: 0.049**

**R-VALUE: 20.371**

**WALL-218**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
PLENWALL-218-001 CONSTR-DET4.1	0.5	0.063	0.066	30.69	30.69	102.5	90 E		1.93347
WALL-218-001 14 CONSTR-DET1.2	0.5	0.074	0.079	2.37	2.37	102.5	90 E		0.17538
WALL-218-001 15 CONSTR-DET1.2	0.5	0.074	0.079	0.12	0.12	102.5	90 E		0.00888
WALL-218-001 5 CONSTR-DET3.1	0.5	0.405	0.618	17.9	2.98	102.5	90 E		1.2069
WALL-218-001 6 CONSTR-DET1.0	0.5	0.033	0.033	51.2	51.2	102.5	90 E		1.6896
WALL-218-001 16 CONSTR-DET1.0	0.5	0.033	0.033	31.7	31.7	102.5	90 E		1.0461
WALL-218-001 17 CONSTR-DET1.0	0.5	0.033	0.033	1.59	1.59	102.5	90 E		0.05247
WALL-218-001 2 CONSTR-DET1.2	0.5	0.074	0.079	0.12	0.12	102.5	90 E		0.00888
WALL-218-001 7 CONSTR-DET3.1	0.5	0.405	0.618	17.79	2.75	102.5	90 E		1.11375
WALL-218-001 8 CONSTR-DET1.2	0.5	0.074	0.079	2.37	2.37	102.5	90 E		0.17538
WALL-218-001 CONSTR-DET3.1	0.5	0.405	0.618	58.47	3.87	102.5	90 E		1.56735
WALL-218-001 10 CONSTR-DET1.2	0.5	0.074	0.079	3.56	3.56	102.5	90 E		0.26344
WALL-218-001 4 CONSTR-DET1.0	0.5	0.033	0.033	34.81	34.81	102.5	90 E		1.14873
WALL-218-001 11 CONSTR-DET1.0	0.5	0.033	0.033	75.48	75.48	102.5	90 E		2.49084
WALL-218-001 3 CONSTR-DET3.1	0.5	0.405	0.618	35.35	3.4	102.5	90 E		1.377
WALL-218-001 9 CONSTR-DET1.2	0.5	0.074	0.079	3.37	3.37	102.5	90 E		0.24938
<b>TOTAL</b>				<b>366.89</b>					<b>14.50755</b>

**U-FACTOR: 0.040**

**R-VALUE: 25.290**

**FLOOR-300**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
FLOOR-300-001 CONSTR-DET10.1_11.1	0.5	0.094	0.103	6.74	6.74	12.5	180		0.63356
FLOOR-300-001 10 CONSTR-DET10.1_11.1	0.5	0.094	0.103	6.74	6.74	12.5	180		0.63356
FLOOR-300-001 11 CONSTR-DET9.0	0.5	0.022	0.022	51.33	51.33	12.5	180		1.12926
FLOOR-300-001 12 CONSTR-DET10.1_11.1	0.5	0.094	0.103	6.74	6.74	12.5	180		0.63356
FLOOR-300-001 39 CONSTR-DET10.1_11.1	0.5	0.094	0.103	0.99	0.99	12.5	180		0.09306
FLOOR-300-001 4 CONSTR-DET9.0	0.5	0.022	0.022	70.26	70.26	12.5	180		1.54572
FLOOR-300-001 40 CONSTR-DET9.0	0.5	0.022	0.022	3.19	3.19	12.5	180		0.07018
FLOOR-300-001 5 CONSTR-DET9.0	0.5	0.022	0.022	70.26	70.26	12.5	180		1.54572
FLOOR-300-001 6 CONSTR-DET10.1_11.1	0.5	0.094	0.103	6.74	6.74	12.5	180		0.63356
FLOOR-300-001 7 CONSTR-DET9.0	0.5	0.022	0.022	70.26	70.26	12.5	180		1.54572
FLOOR-300-001 8 CONSTR-DET10.1_11.1	0.5	0.094	0.103	6.74	6.74	12.5	180		0.63356
FLOOR-300-001 9 CONSTR-DET9.0	0.5	0.022	0.022	70.26	70.26	12.5	180		1.54572
FLOOR-300-001 1 CONSTR-DET9.0	0.5	0.022	0.022	18.93	18.93	12.5	180		0.41646
FLOOR-300-001 13 CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.89	5.89	12.5	180		0.55366
FLOOR-300-001 14 CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.75	5.75	12.5	180		0.5405
FLOOR-300-001 15 CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.88	5.88	12.5	180		0.55272
FLOOR-300-001 16 CONSTR-DET9.0	0.5	0.022	0.022	46.35	46.35	12.5	180		1.0197
FLOOR-300-001 17 CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.85	5.85	12.5	180		0.5499
FLOOR-300-001 18 CONSTR-DET9.0	0.5	0.022	0.022	61.17	61.17	12.5	180		1.34574
FLOOR-300-001 19 CONSTR-DET9.0	0.5	0.022	0.022	60.94	60.94	12.5	180		1.34068
FLOOR-300-001 20 CONSTR-DET9.0	0.5	0.022	0.022	60.7	60.7	12.5	180		1.3354
FLOOR-300-001 21 CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.83	5.83	12.5	180		0.54802
FLOOR-300-001 22 CONSTR-DET9.0	0.5	0.022	0.022	60.46	60.46	12.5	180		1.33012
FLOOR-300-001 23 CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.81	5.81	12.5	180		0.54614
FLOOR-300-001 24 CONSTR-DET9.0	0.5	0.022	0.022	60.23	60.23	12.5	180		1.32506
FLOOR-300-001 25 CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.79	5.79	12.5	180		0.54426
FLOOR-300-001 26 CONSTR-DET9.0	0.5	0.022	0.022	60	60	12.5	180		1.32
FLOOR-300-001 27 CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.76	5.76	12.5	180		0.54144
FLOOR-300-001 2 CONSTR-DET9.0	0.5	0.022	0.022	41.61	41.61	12.5	180		0.91542

FLOOR-300-001 41	CONSTR-DET10.1_11.1	0.5	0.094	0.103	4.08	4.08	12.5	180	0.38352
FLOOR-300-001 42	CONSTR-DET9.0	0.5	0.022	0.022	59.11	59.11	192.5	180	1.30042
FLOOR-300-001 43	CONSTR-DET10.1_11.1	0.5	0.094	0.103	6.03	6.03	12.5	180	0.56682
FLOOR-300-001 44	CONSTR-DET9.0	0.5	0.022	0.022	62.74	62.74	12.5	180	1.38028
FLOOR-300-001 45	CONSTR-DET10.1_11.1	0.5	0.094	0.103	6	6	12.5	180	0.564
FLOOR-300-001 46	CONSTR-DET9.0	0.5	0.022	0.022	62.5	62.5	12.5	180	1.375
FLOOR-300-001 47	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.98	5.98	12.5	180	0.56212
FLOOR-300-001 48	CONSTR-DET9.0	0.5	0.022	0.022	62.27	62.27	12.5	180	1.36994
FLOOR-300-001 49	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.96	5.96	12.5	180	0.56024
FLOOR-300-001 50	CONSTR-DET9.0	0.5	0.022	0.022	62.03	62.03	12.5	180	1.36466
FLOOR-300-001 51	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.94	5.94	12.5	180	0.55836
FLOOR-300-001 52	CONSTR-DET9.0	0.5	0.022	0.022	61.79	61.79	12.5	180	1.35938
FLOOR-300-001 53	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.91	5.91	12.5	180	0.55554
FLOOR-300-001 54	CONSTR-DET9.0	0.5	0.022	0.022	46.51	46.51	12.5	180	1.02322
FLOOR-300-001 55	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.9	5.9	12.5	180	0.5546
FLOOR-300-001 28	CONSTR-DET9.0	0.5	0.022	0.022	52.71	52.71	12.5	180	1.15962
FLOOR-300-001 29	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.05	5.05	12.5	180	0.4747
FLOOR-300-001 3	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.05	5.05	12.5	180	0.4747
FLOOR-300-001 30	CONSTR-DET9.0	0.5	0.022	0.022	52.71	52.71	12.5	180	1.15962
FLOOR-300-001 31	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.05	5.05	12.5	180	0.4747
FLOOR-300-001 32	CONSTR-DET9.0	0.5	0.022	0.022	52.71	52.71	12.5	180	1.15962
FLOOR-300-001 33	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.05	5.05	12.5	180	0.4747
FLOOR-300-001 34	CONSTR-DET9.0	0.5	0.022	0.022	52.71	52.71	12.5	180	1.15962
FLOOR-300-001 35	CONSTR-DET10.1_11.1	0.5	0.094	0.103	5.05	5.05	12.5	180	0.4747
FLOOR-300-001 36	CONSTR-DET9.0	0.5	0.022	0.022	11.1	11.1	12.5	180	0.2442
FLOOR-300-001 37	CONSTR-DET10.1_11.1	0.5	0.094	0.103	0.98	0.98	12.5	180	0.09212
FLOOR-300-001 38	CONSTR-DET9.0	0.5	0.022	0.022	0.66	0.66	12.5	180	0.01452
TOTAL					1598.78				46.20932

**U-FACTOR: 0.029**

**R-VALUE: 34.599**

**WALL-311**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-311-001 2	CONSTR-DET1.2	0.5	0.074	0.079	3.72	3.72	282.5	90 W	0.27528
WALL-311-001 8	CONSTR-DET1.0	0.5	0.033	0.033	40.78	40.78	282.5	90 W	1.34574
WALL-311-001 3	CONSTR-DET3.1	0.5	0.405	0.618	51.85	3.85	282.5	90 W	1.55925
WALL-311-001 4	CONSTR-DET3.1	0.5	0.405	0.618	65.94	6.14	282.5	90 W	2.4867
WALL-311-001 5	CONSTR-DET1.0	0.5	0.033	0.033	46.25	46.25	282.5	90 W	1.52625
WALL-311-001 6	CONSTR-DET1.0	0.5	0.033	0.033	0.62	0.62	282.5	90 W	0.02046
WALL-311-001 9	CONSTR-DET1.2	0.5	0.074	0.079	3.42	3.42	282.5	90 W	0.25308
WALL-311-001 1	CONSTR-DET1.0	0.5	0.033	0.033	90.39	90.39	282.5	90 W	2.98287
WALL-311-001	CONSTR-DET3.1	0.5	0.405	0.618	27.03	3.22	282.5	90 W	1.3041
WALL-311-001 7	CONSTR-DET3.1	0.5	0.405	0.618	6.18	6.18	282.5	90 W	2.5029
TOTAL					336.18				14.25663

**U-FACTOR: 0.042**

**R-VALUE: 23.581**

**WALL-312**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-312-001 10	CONSTR-DET4.1A	0.5	0.802	2.518	6.37	6.37	12.5	90 N	5.10874
WALL-312-001 3	CONSTR-DET1.2	0.5	0.074	0.079	6.33	6.33	12.5	90 N	0.46842
WALL-312-001 4	CONSTR-DET3.1	0.5	0.405	0.618	17.72	2.98	12.5	90 N	1.2069
WALL-312-001 8	CONSTR-DET1.0	0.5	0.033	0.033	32.62	32.62	12.5	90 N	1.07646
WALL-312-001 9	CONSTR-DET1.0	0.5	0.033	0.033	1.09	1.09	12.5	90 N	0.03597
WALL-312-001 11	CONSTR-DET4.1A	0.5	0.802	2.518	4.51	4.51	12.5	90 N	3.61702
WALL-312-001 2	CONSTR-WSEC_A103.3.6.	0.32	0.045	0.047	191.83	191.83	12.5	90 N	8.63235
WALL-312-001 5	CONSTR-DET3.1	0.5	0.405	0.618	70.21	6.41	12.5	90 N	2.59605
WALL-312-001	CONSTR-DET3.1	0.5	0.405	0.618	57.11	3.86	12.5	90 N	1.5633
WALL-312-001 7	CONSTR-DET3.1	0.5	0.405	0.618	9.51	9.51	12.5	90 N	3.85155
WALL-312-001 1	CONSTR-DET4.1A	0.5	0.802	2.518	0.18	0.18	12.5	90 N	0.14436
WALL-312-001 12	CONSTR-WSEC_A103.3.6.	0.32	0.045	0.047	77.84	77.84	12.5	90 N	3.5028
WALL-312-001 13	CONSTR-DET4.1A	0.5	0.802	2.518	0.07	0.07	12.5	90 N	0.05614
WALL-312-001 6	CONSTR-DET3.1	0.5	0.405	0.618	69.2	6.34	12.5	90 N	2.5677
TOTAL					544.59				34.42776

**U-FACTOR: 0.063**

**R-VALUE: 15.818**

**WALL-313**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-313-001 14	CONSTR-DET12	0.3	0.03	0.031	1.58	1.58	192.5	90 S	0.0474
WALL-313-001 2	CONSTR-DET1.2	0.5	0.074	0.079	7.52	7.52	192.5	90 S	0.55648
WALL-313-001 6	CONSTR-DET3.1	0.5	0.405	0.618	162.71	9.18	192.5	90 S	3.7179
WALL-313-001	CONSTR-DET1.2	0.5	0.074	0.079	6.23	6.23	192.5	90 S	0.46102
WALL-313-001 11	CONSTR-DET1.2	0.5	0.074	0.079	3.3	3.3	192.5	90 S	0.2442

WALL-313-001 12	CONSTR-DET3.1	0.5	0.405	0.618	2.01	2.01	192.5	90 S	0.81405
WALL-313-001 4	CONSTR-DET3.1	0.5	0.405	0.618	55.08	4.87	192.5	90 S	1.97235
WALL-313-001 10	CONSTR-DET1.2	0.5	0.074	0.079	3.32	3.32	192.5	90 S	0.24568
WALL-313-001 3	CONSTR-DET1.2	0.5	0.074	0.079	4.87	4.87	192.5	90 S	0.36038
WALL-313-001 7	CONSTR-DET3.1	0.5	0.405	0.618	54.74	4.86	192.5	90 S	1.9683
WALL-313-001 8	CONSTR-DET2.1	0.5	0.072	0.077	0.66	0.66	192.5	90 S	0.04752
WALL-313-001 9	CONSTR-DET4.1	0.5	0.063	0.066	0.54	0.54	192.5	90 S	0.03402
WALL-313-001 1	CONSTR-DET12	0.3	0.03	0.031	1.3	1.3	192.5	90 S	0.039
WALL-313-001 13	CONSTR-DET1.2	0.5	0.074	0.079	7.27	7.27	192.5	90 S	0.53798
WALL-313-001 5	CONSTR-DET3.1	0.5	0.405	0.618	163.25	9.2	192.5	90 S	3.726
TOTAL					474.38				14.77228

**U-FACTOR: 0.031**

**R-VALUE: 32.113**

**WALL-314**

Construction	Reflectance	U-Factor with Film [Btu/h-ft2-F]	U-Factor no Film [Btu/h-ft2-F]	Gross Area [ft2]	Net Area [ft2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction	UA
WALL-314-001 2	CONSTR-DET1.0	0.5	0.033	0.033	111.54	111.54	102.5	90 E	3.68082
WALL-314-001 5	CONSTR-DET1.2	0.5	0.074	0.079	7.44	7.44	102.5	90 E	0.55056
WALL-314-001	CONSTR-DET3.1	0.5	0.405	0.618	51.47	3.71	102.5	90 E	1.50255
WALL-314-001 3	CONSTR-DET1.0	0.5	0.033	0.033	97.04	97.04	102.5	90 E	3.20232
WALL-314-001 6	CONSTR-DET1.2	0.5	0.074	0.079	1.38	1.38	102.5	90 E	0.10212
WALL-314-001 1	CONSTR-DET3.1	0.5	0.405	0.618	51.54	3.71	102.5	90 E	1.50255
WALL-314-001 4	CONSTR-DET1.2	0.5	0.074	0.079	8.67	8.67	102.5	90 E	0.64158
WALL-314-001 7	CONSTR-DET1.0	0.5	0.033	0.033	7.1	7.1	102.5	90 E	0.2343
TOTAL					336.18				11.4168

**U-FACTOR: 0.034**

**R-VALUE: 29.446**

### Exterior Fenestration

	Construction	Area of One Opening [ft2]	Glass U-Factor [Btu/h-ft2-F]	Glass SHGC	Glass Visible Transmittance
WINDOW-111-002	W1-DUAL PANE LOW E	15.75	0.28	0.18	0.401
WINDOW-111-003	W1-DUAL PANE LOW E	9.44	0.28	0.18	0.401
WINDOW-111-004	W1-DUAL PANE LOW E	50.48	0.28	0.18	0.401
GLASSDOOR-111-001	D1-DUAL PANE LOW E	52.35	0.28	0.18	0.401
GLASSDOOR-111-002	D1-DUAL PANE LOW E	21.3	0.28	0.18	0.401
WINDOW-111-005	W1-DUAL PANE LOW E	20.78	0.28	0.18	0.401
WINDOW-111-006	W1-DUAL PANE LOW E	5.07	0.28	0.18	0.401
WINDOW-111-007	W1-DUAL PANE LOW E	1.47	0.28	0.18	0.401
WINDOW-111-008	W1-DUAL PANE LOW E	12.7	0.28	0.18	0.401
WINDOW-111-009	W1-DUAL PANE LOW E	19.71	0.28	0.18	0.401
GLASSDOOR-111-003	D1-DUAL PANE LOW E	97.76	0.28	0.18	0.401
GLASSDOOR-111-005	D1-DUAL PANE LOW E	19.72	0.28	0.18	0.401
WINDOW-111-010	W1-DUAL PANE LOW E	5.6	0.28	0.18	0.401
WINDOW-111-011	W1-DUAL PANE LOW E	1.95	0.28	0.18	0.401
WINDOW-111-012	W1-DUAL PANE LOW E	30.86	0.28	0.18	0.401
WINDOW-111-013	W1-DUAL PANE LOW E	10.04	0.28	0.18	0.401
GLASSDOOR-111-004	D1-DUAL PANE LOW E	51.9	0.28	0.18	0.401
GLASSDOOR-111-006	D1-DUAL PANE LOW E	111.77	0.28	0.18	0.401
WINDOW-111-001	W1-DUAL PANE LOW E	7.04	0.28	0.18	0.401
WINDOW-111-014	W1-DUAL PANE LOW E	24.41	0.28	0.18	0.401
WINDOW-111-015	W1-DUAL PANE LOW E	5.33	0.28	0.18	0.401
WINDOW-111-016	W1-DUAL PANE LOW E	4.39	0.28	0.18	0.401
WINDOW-111-017	W1-DUAL PANE LOW E	17.46	0.28	0.18	0.401
WINDOW-111-018	W1-DUAL PANE LOW E	14.91	0.28	0.18	0.401
WINDOW-111-019	W1-DUAL PANE LOW E	15.04	0.28	0.18	0.401
GLASSDOOR-111-007	D1-DUAL PANE LOW E	46.2	0.28	0.18	0.401
WINDOW-111-020	W1-DUAL PANE LOW E	7.16	0.28	0.18	0.401
GLASSDOOR-111-010	D1-DUAL PANE LOW E	43.57	0.28	0.18	0.401
WINDOW-111-023	W1-DUAL PANE LOW E	23.17	0.28	0.18	0.401
WINDOW-111-021	W1-DUAL PANE LOW E	22.44	0.28	0.18	0.401
GLASSDOOR-111-008	D1-DUAL PANE LOW E	54.6	0.28	0.18	0.401
WINDOW-111-022	W1-DUAL PANE LOW E	22.45	0.28	0.18	0.401
GLASSDOOR-111-009	D1-DUAL PANE LOW E	31.95	0.28	0.18	0.401
WINDOW-111-024	W1-DUAL PANE LOW E	12.21	0.28	0.18	0.401
WINDOW-111-025	W1-DUAL PANE LOW E	22.93	0.28	0.18	0.401
WINDOW-111-026	W1-DUAL PANE LOW E	36.6	0.28	0.18	0.401
WINDOW-111-027	W1-DUAL PANE LOW E	2.48	0.28	0.18	0.401
WINDOW-111-028	W1-DUAL PANE LOW E	0.27	0.28	0.18	0.401
WINDOW-111-029	W1-DUAL PANE LOW E	17.25	0.28	0.18	0.401
WINDOW-111-030	W1-DUAL PANE LOW E	3.07	0.28	0.18	0.401
WINDOW-111-031	W1-DUAL PANE LOW E	22.45	0.28	0.18	0.401
WINDOW-111-032	W1-DUAL PANE LOW E	13	0.28	0.18	0.401
WINDOW-111-033	W1-DUAL PANE LOW E	32.19	0.28	0.18	0.401
WINDOW-111-034	W1-DUAL PANE LOW E	15.29	0.28	0.18	0.401
WINDOW-111-035	W1-DUAL PANE LOW E	8.45	0.28	0.18	0.401
WINDOW-111-036	W1-DUAL PANE LOW E	21.18	0.28	0.18	0.401
WINDOW-111-037	W1-DUAL PANE LOW E	21.84	0.28	0.18	0.401
WINDOW-111-038	W1-DUAL PANE LOW E	14.73	0.28	0.18	0.401
WINDOW-111-039	W1-DUAL PANE LOW E	63.8	0.28	0.18	0.401
WINDOW-111-040	W1-DUAL PANE LOW E	153.53	0.28	0.18	0.401
GLASSDOOR-111-011	D1-DUAL PANE LOW E	48	0.28	0.18	0.401
WINDOW-111-041	W1-DUAL PANE LOW E	41.52	0.28	0.18	0.401
WINDOW-111-042	W1-DUAL PANE LOW E	18.29	0.28	0.18	0.401
WINDOW-111-043	W1-DUAL PANE LOW E	50.21	0.28	0.18	0.401
WINDOW-111-044	W1-DUAL PANE LOW E	49.88	0.28	0.18	0.401
GLASSDOOR-111-012	D1-DUAL PANE LOW E	47.75	0.28	0.18	0.401
WINDOW-111-045	W1-DUAL PANE LOW E	154.05	0.28	0.18	0.401
GLASSDOOR-111-013	D1-DUAL PANE LOW E	53.25	0.28	0.18	0.401
GLASSDOOR-111-014	D1-DUAL PANE LOW E	47.83	0.28	0.18	0.401
GLASSDOOR-111-015	D1-DUAL PANE LOW E	23.81	0.28	0.18	0.401
WINDOW-111-046	W1-DUAL PANE LOW E	62.86	0.28	0.18	0.401
WINDOW-111-047	W1-DUAL PANE LOW E	12	0.28	0.18	0.401
WINDOW-111-048	W1-DUAL PANE LOW E	12	0.28	0.18	0.401
Total or Average			0.28	0.18	0.401
North Total or Average			0.28	0.18	0.401
Non-North Total or Average			0.28	0.18	0.401

### Exterior Door (Opaque)

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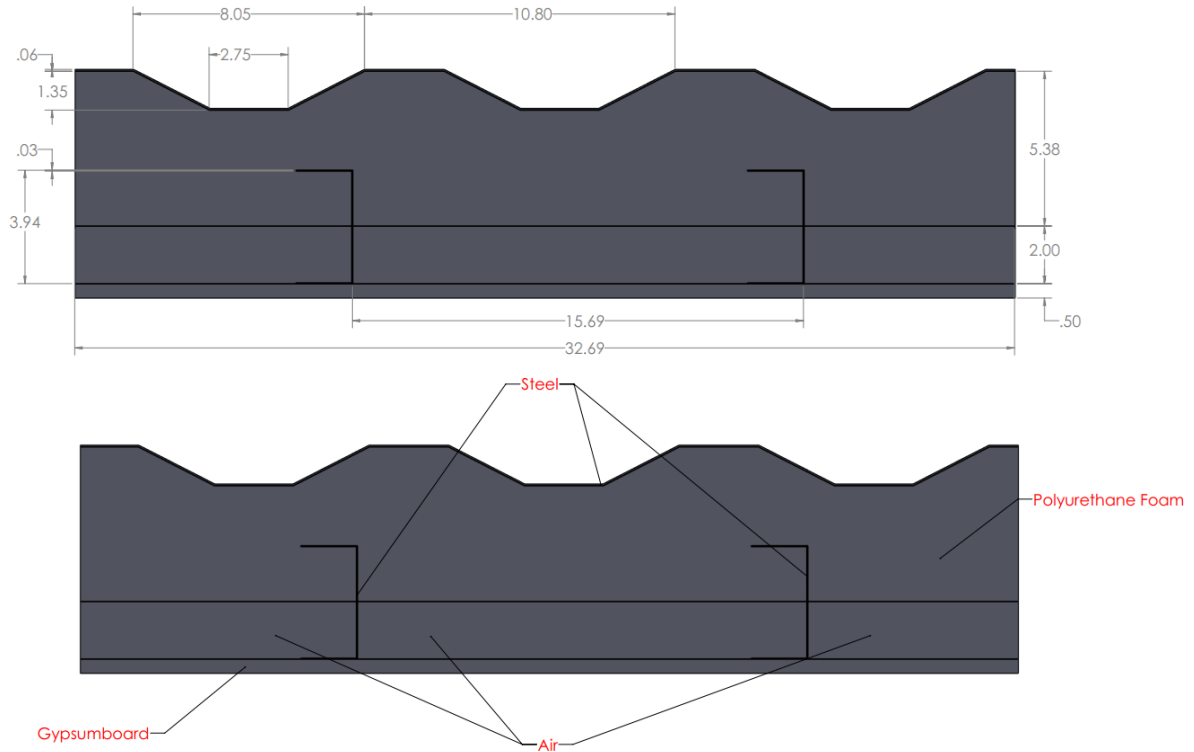
	Construction	U-Factor with Film [Btu/h-ft <sup>2</sup> -F]	U-Factor no Film [Btu/h-ft <sup>2</sup> -F]	Gross Area [ft <sup>2</sup> ]	Parent Surface
DOOR-113-002	D2-STEEL DOOR BLACK	0.233	0.29	19.72	WALL-115-001 5
DOOR-113-003	D2-STEEL DOOR BLACK	0.233	0.29	19.72	WALL-115-001 3

# DET1.0 Wall R-value Estimate

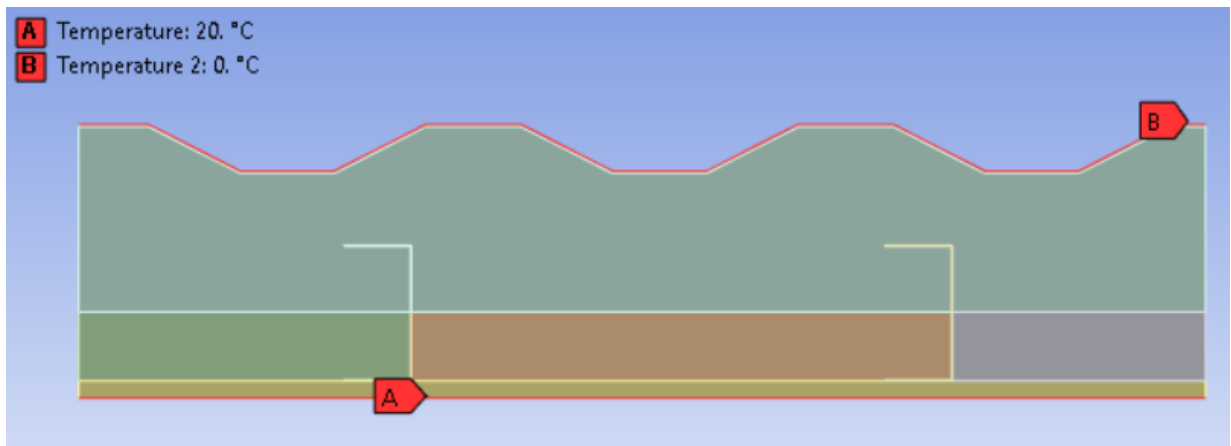
## 1. Geometry

The 2D geometry was made according to the attached geometry sent.

**Dimensions are in inches.**



## 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Gypsum Board	0.2
Air	0.026
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

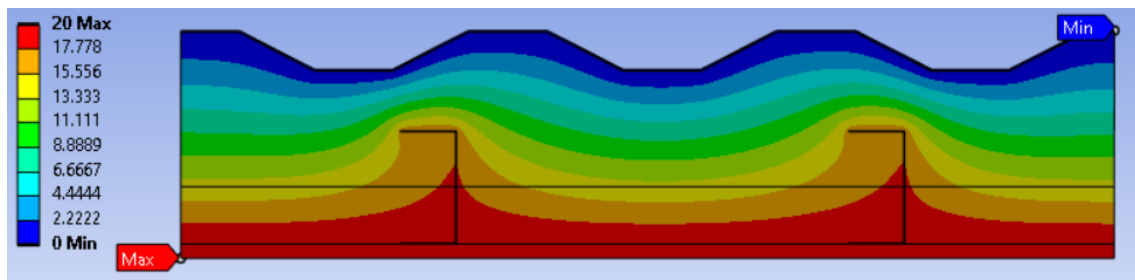
Average 16.622 W/m<sup>2</sup>

Average Directional Heat Flux (W/m<sup>2</sup>) = 16.622

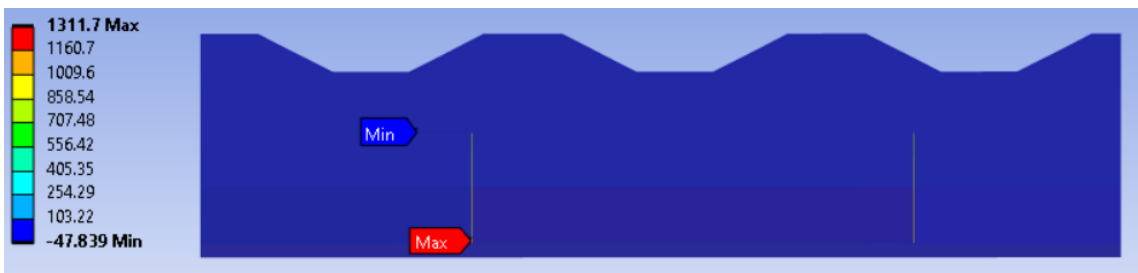
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
16.622	20	1.203224642	6.831909518

#### 4.2 Temperature Distribution (°C)



#### 4.3 Y-Axis Directional Heat Flux (W/m<sup>2</sup>)



### 5. Conclusion

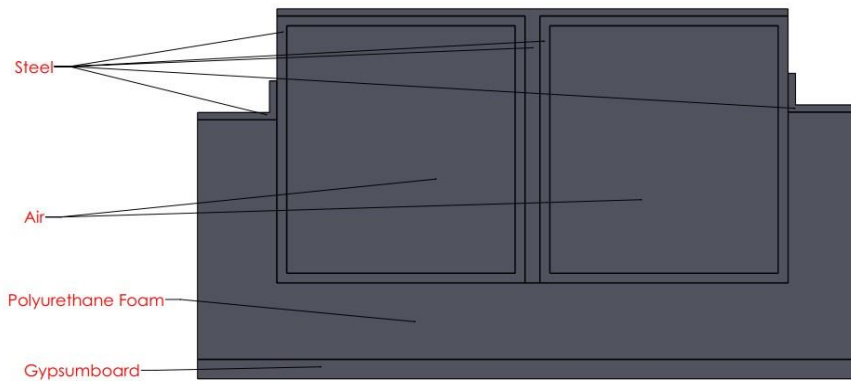
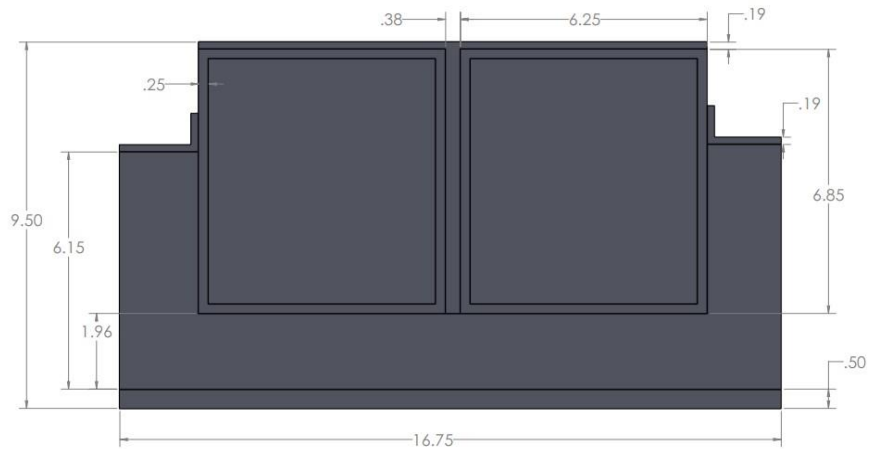
The calculated R-value for this combined wall is 8.319 (hr ft<sup>2</sup> F/Btu)

# DET1.1 Wall R-value Estimate

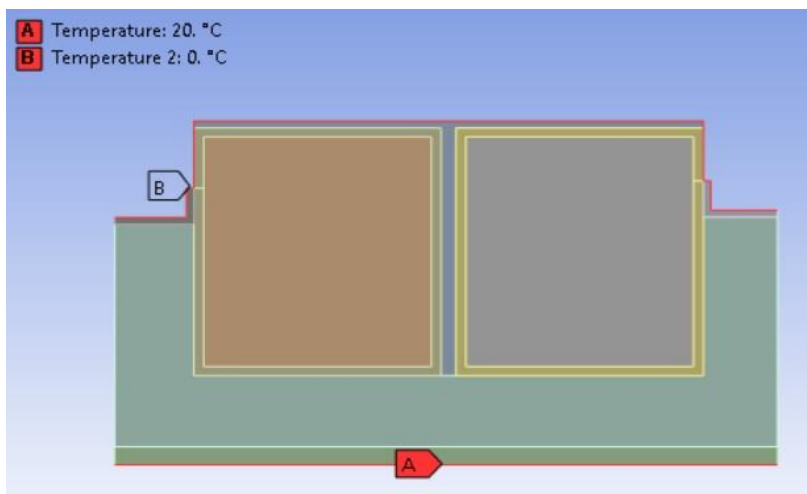
## 1. Geometry

The 2D geometry was made according to the attached geometry sent.

Dimensions are in inches.



## 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Gypsum Board	0.2
Air	0.026
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

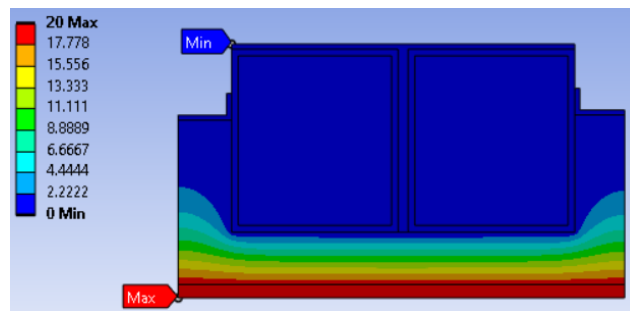
Average 8.8057 W/m<sup>2</sup>

Average Heat Flux (W/m<sup>2</sup>) = 8.8057

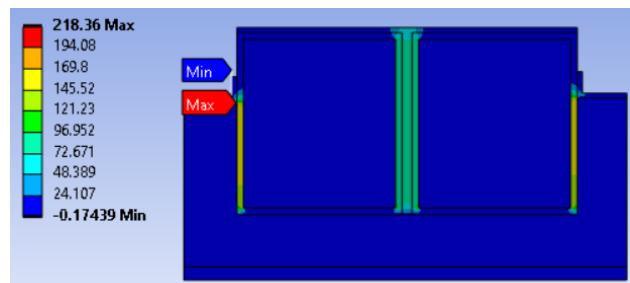
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
8.8057	20	2.271256118	12.89619224

#### 4.2 Temperature Distribution (°C)



#### 4.3 Directional Heat Flux (W/m<sup>2</sup>)



### 5. Conclusion

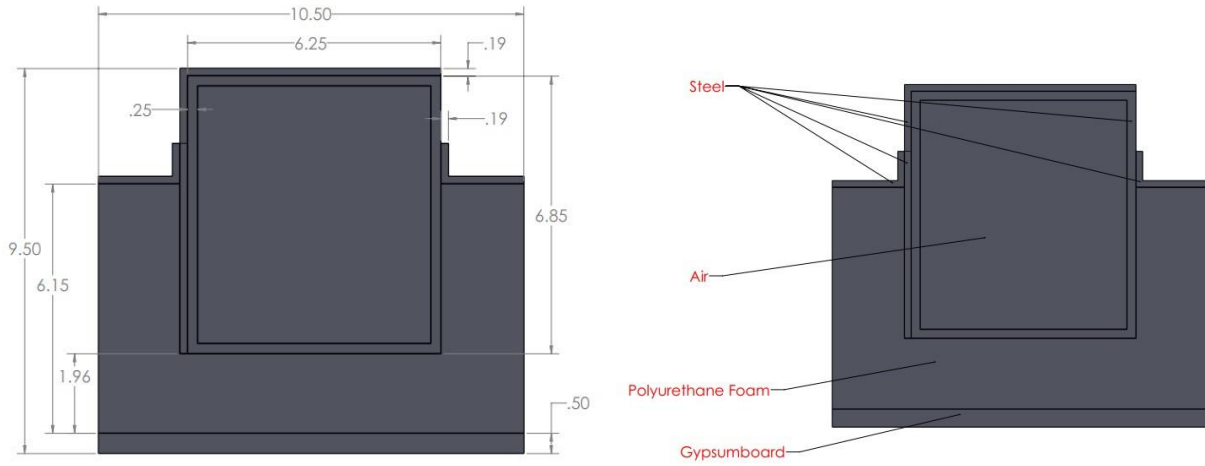
The calculated R-value for this combined wall is 12.896 (hr ft<sup>2</sup> F/Btu)

# DET1.2 Wall R-value Estimate

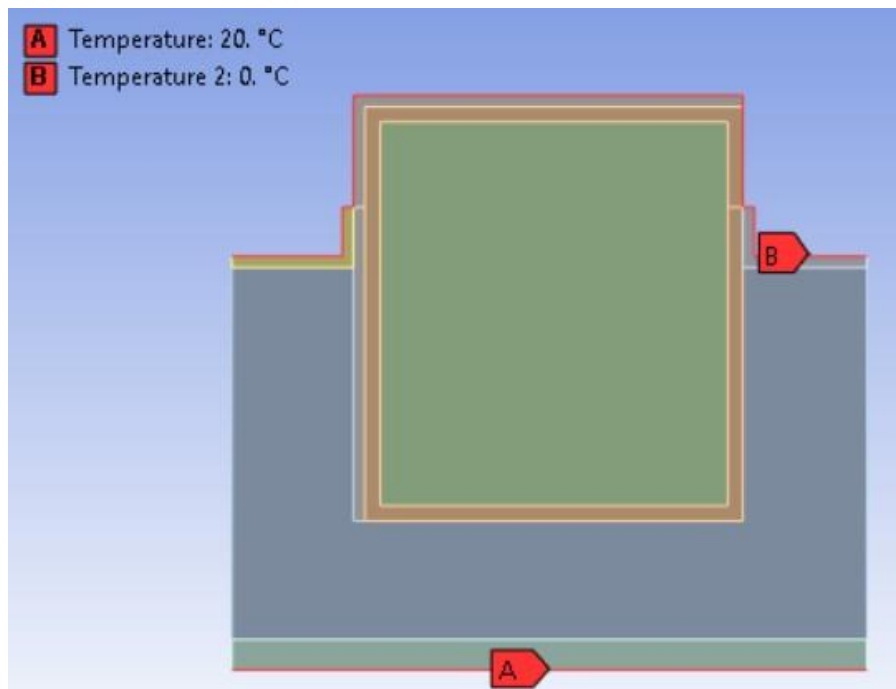
## 1. Geometry

The 2D geometry was made according to the attached geometry sent.

Dimensions are in inches.



## 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Gypsum Board	0.2
Air	0.026
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

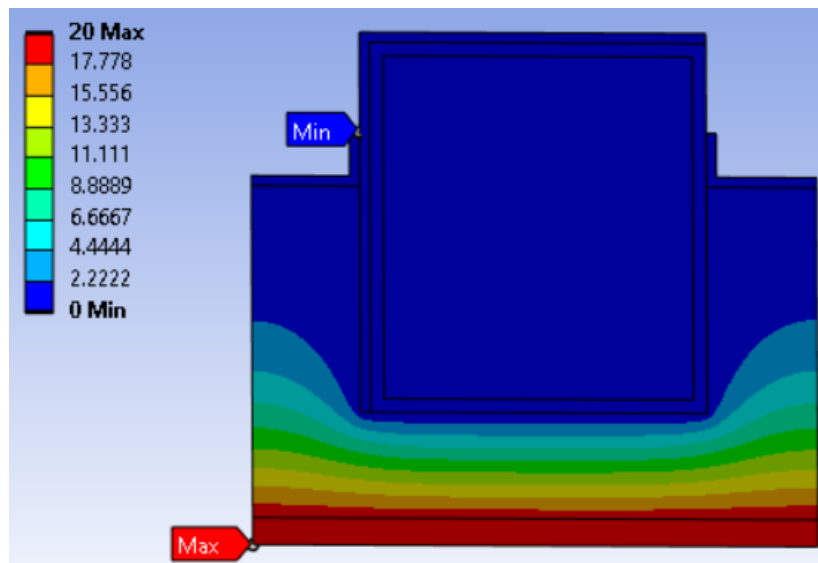
Average 7.705 W/m<sup>2</sup>

Average Heat Flux (W/m<sup>2</sup>) = 7.705

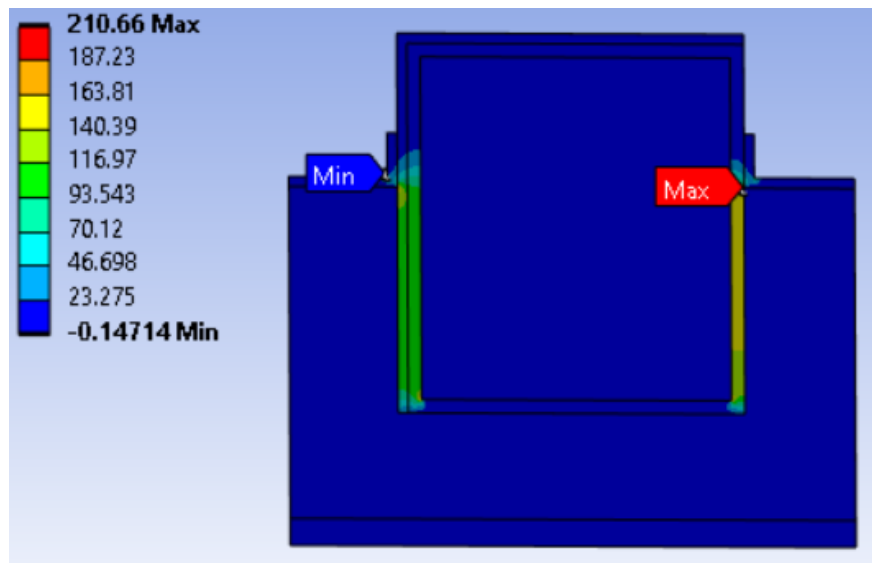
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
7.705	20	2.595717067	14.73848151

#### 4.2 Temperature Distribution (°C)



### 4.3 Directional Heat Flux ( $\text{W/m}^2$ )



### 5. Conclusion

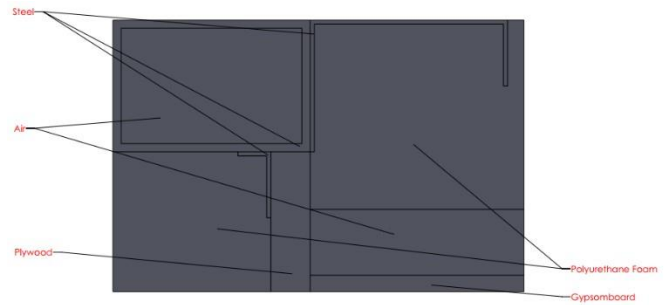
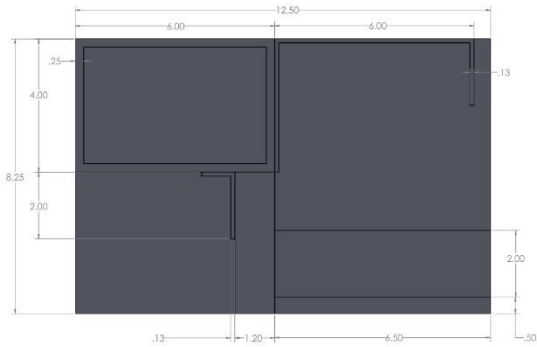
The calculated R-value for this combined wall is 14.738 ( $\text{hr ft}^2 \text{ F/Btu}$ )

## DET2.1 Wall R-value Estimate

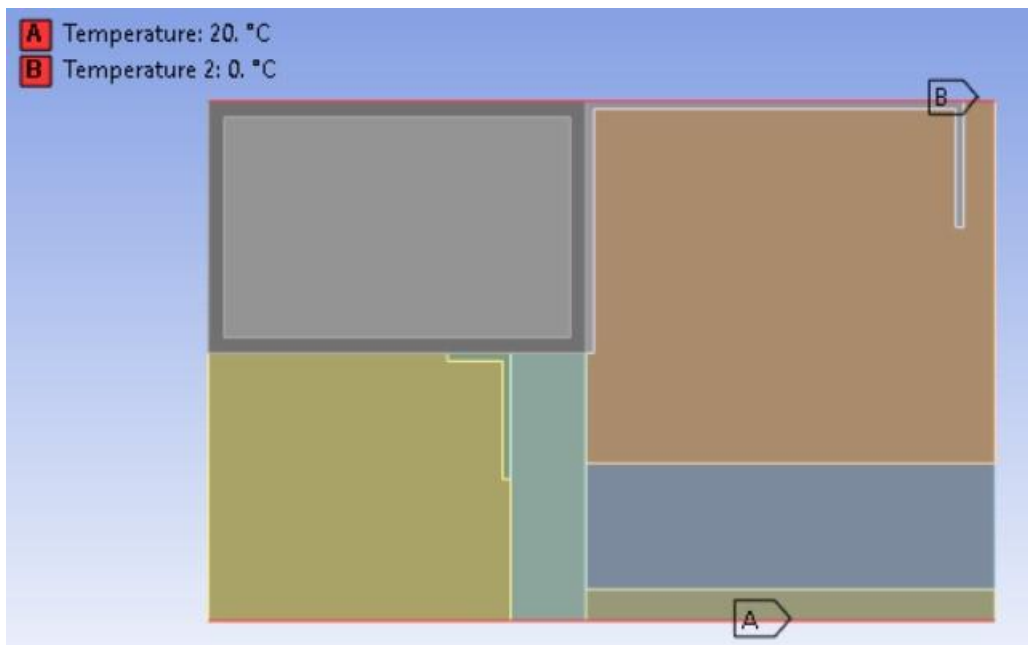
### 1. Geometry

The 2D geometry was made according to the attached geometry sent.

Dimensions are in inches.



### 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Gypsum Board	0.2
Air	0.026
Plywood	0.125
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

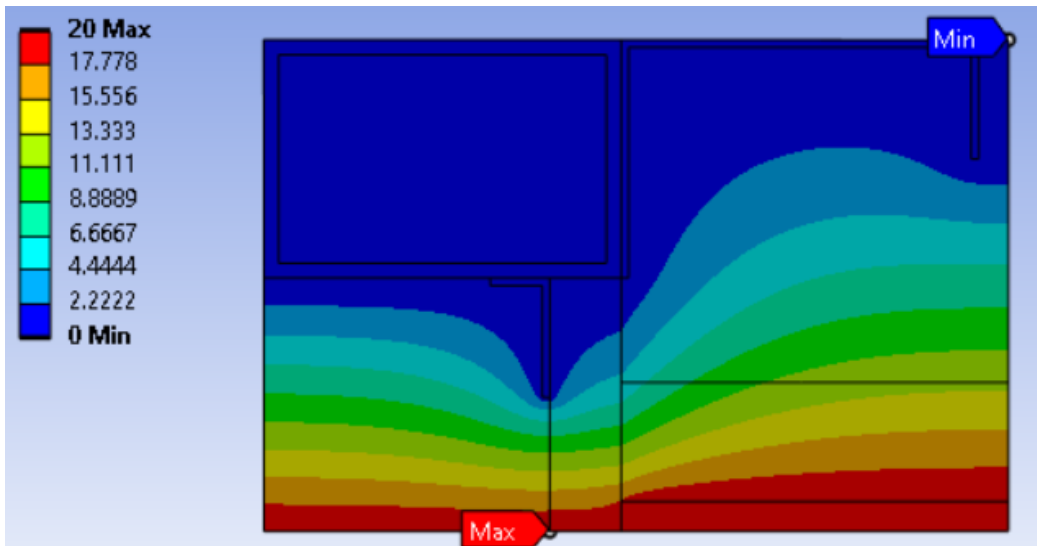
Average 8.254 W/m<sup>2</sup>

Average Heat Flux (W/m<sup>2</sup>) = 8.254

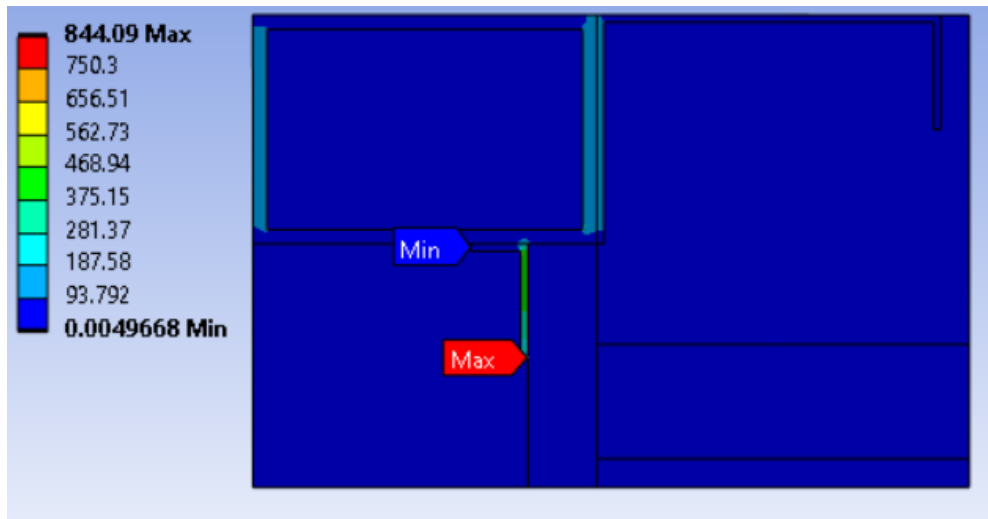
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
8.254	20	2.423067604	13.75817785

#### 4.2 Temperature Distribution (°C)



### 4.3 Directional Heat Flux ( $\text{W}/\text{m}^2$ )



### 5. Conclusion

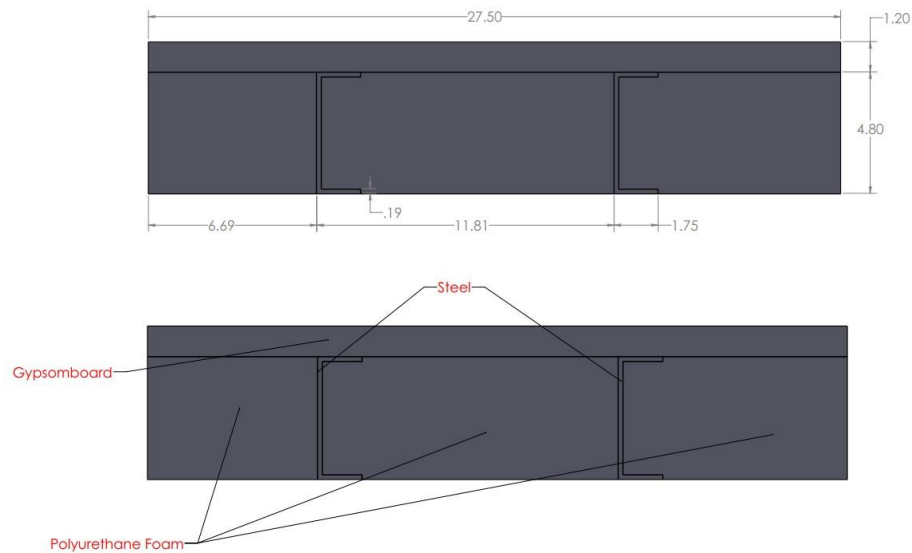
The calculated R-value for this combined wall is  $13.758 \text{ (hr ft}^2 \text{ F/Btu)}$

## DET2.2 Wall R-value Estimate

### 1. Geometry

The 2D geometry was made according to the attached geometry sent.

Dimensions are in inches.



### 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Plywood	0.125
Polyurethane Foam	0.025
Steel	60

## 4. Results

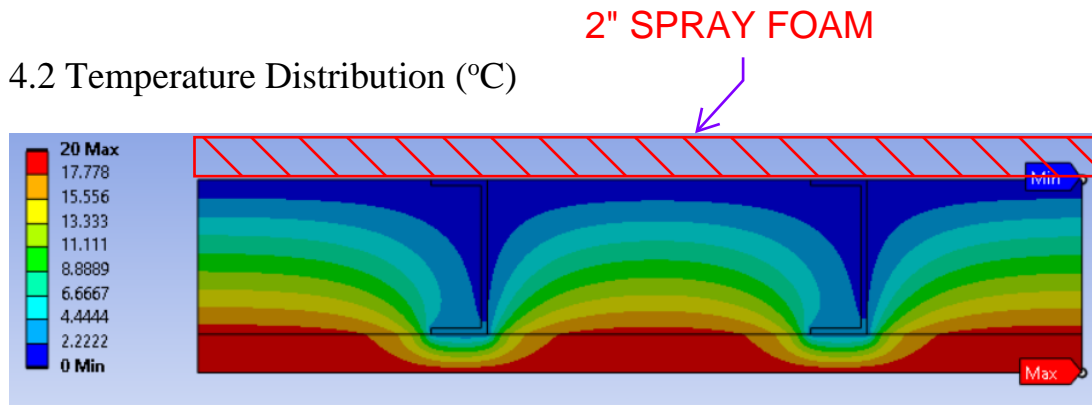
### 4.1 R-value

Average 22.874 W/m<sup>2</sup>

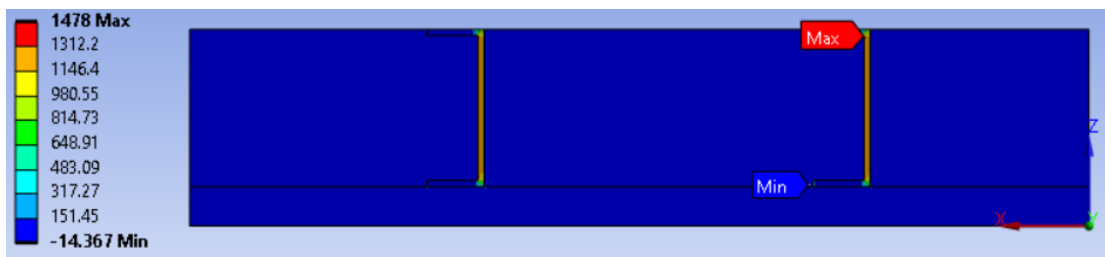
Average Directional Heat Flux (W/m<sup>2</sup>) = 22.874

R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
22.874	20	0.874355163	4.964588616



### 4.3 Z-Axis Directional Heat Flux (W/m<sup>2</sup>)



## 5. Conclusion

The calculated R-value for this combined wall is ~~4.96 (hr ft<sup>2</sup> F/Btu)~~

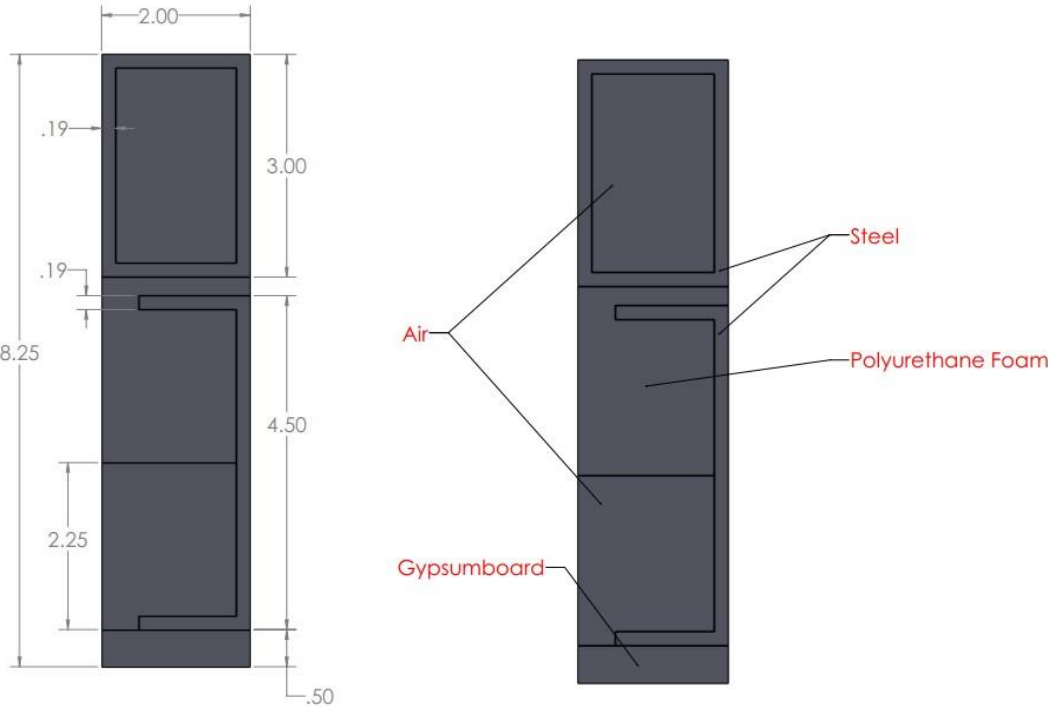
This construction amended with an additional 2" thick of spray foam (R=12). Total construction R-value for this combined assembly is 16.48 (hr ft<sup>2</sup> F/Btu)

# DET3.1 Wall R-value Estimate

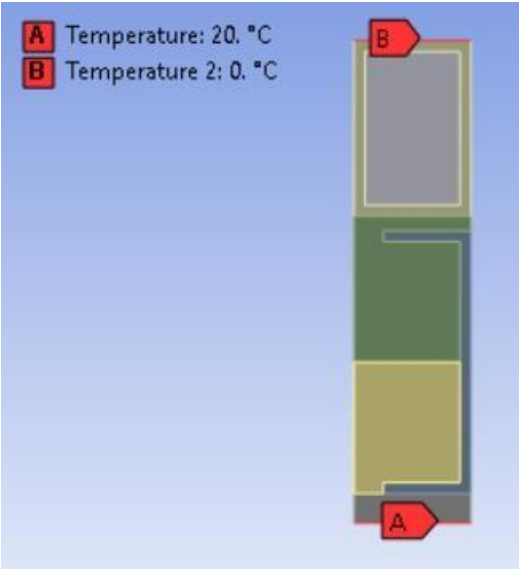
## 1. Geometry

The 2D geometry was made according to the attached geometry sent.

Dimensions are in inches.



## 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Air	0.026
Gypsum Board	0.2
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

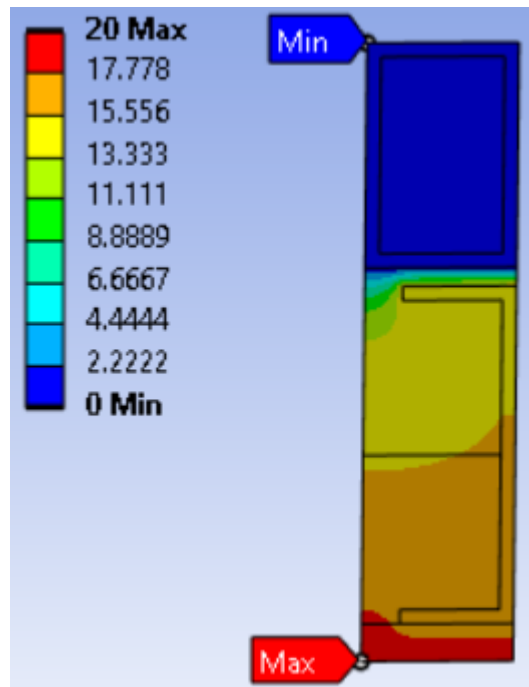
Average 58.727 W/m<sup>2</sup>

Average Heat Flux (W/m<sup>2</sup>) = 58.727

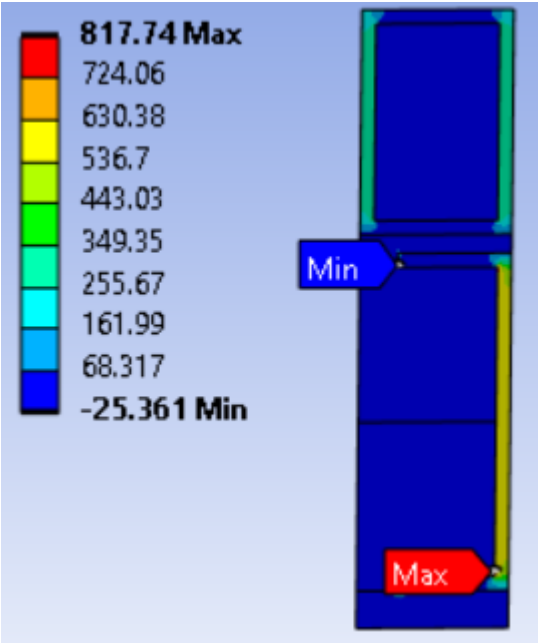
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
58.727	20	0.340558857	1.933693191

#### 4.2 Temperature Distribution (°C)



4.3 Directional Heat Flux (W/m<sup>2</sup>)



5. Conclusion

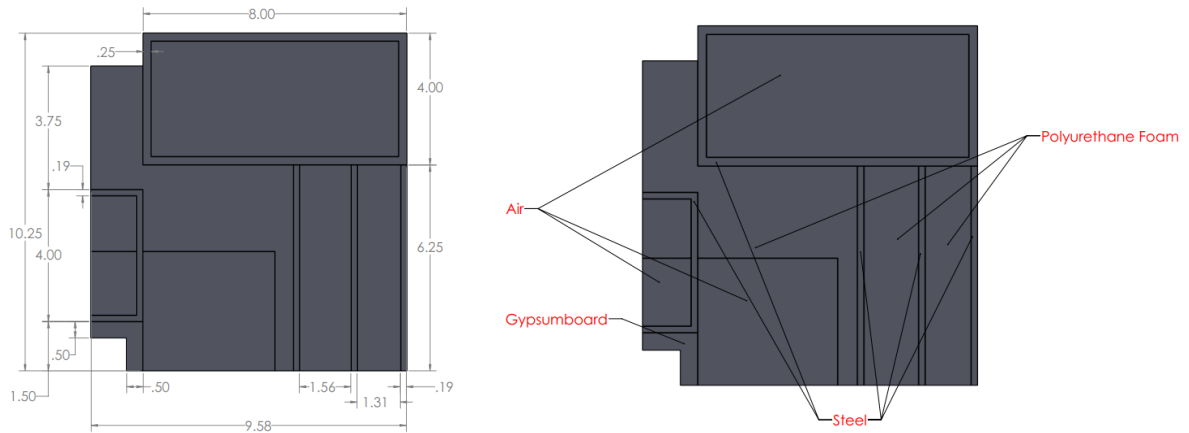
The calculated R-value for this combined wall is 1.9336 (hr ft<sup>2</sup> F/Btu)

# DET4.1 Wall R-value Estimate

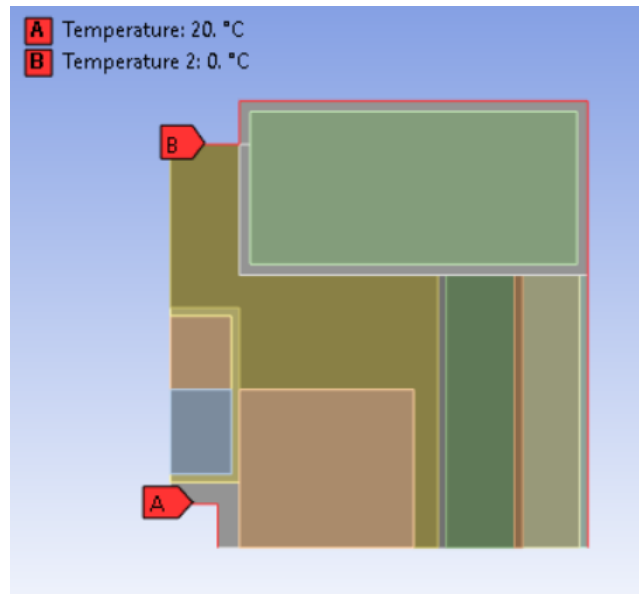
## 1. Geometry

The 2D geometry was made according to the attached geometry sent.

**Dimensions are in inches.**



## 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Gypsum Board	0.2
Air	0.026
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

R-value for the combined wall = Temperature Difference / Heat Flux

Average X-Axis Heat Flux (W/m<sup>2</sup>) = 2.638

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
2.638	20	7.581501137	43.04776346

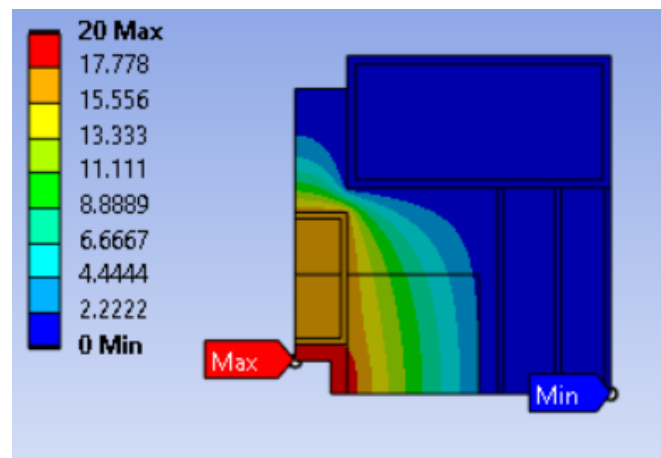
Average Y-Axis Heat Flux (W/m<sup>2</sup>) = 4.938

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
4.938	20	4.050222762	22.99716484

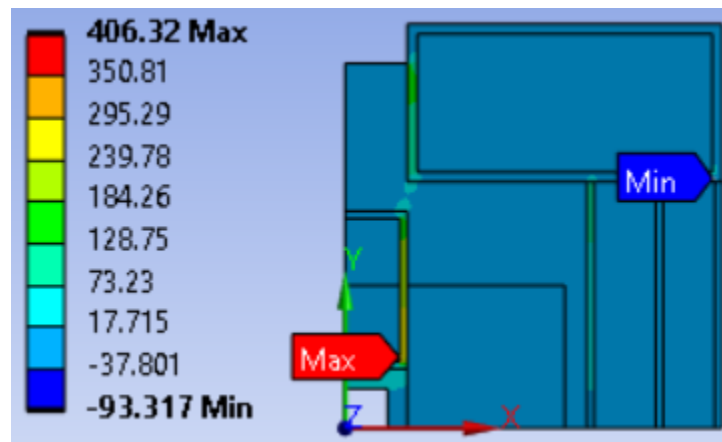
Average Total Heat Flux (W/m<sup>2</sup>) = 7.5078

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
7.5	20	2.666666667	15.14133333

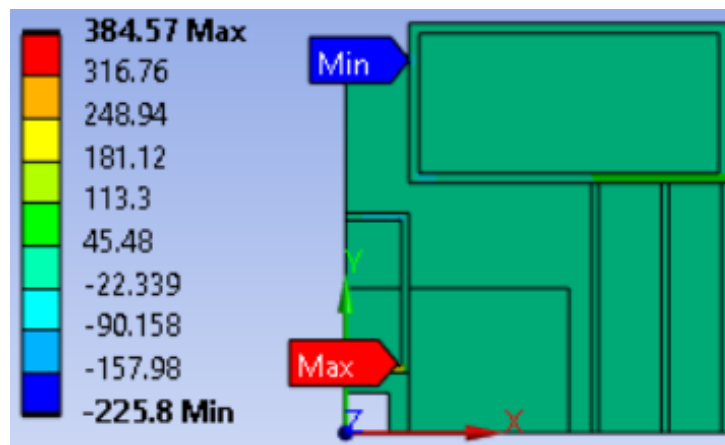
#### 4.2 Temperature Distribution (°C)



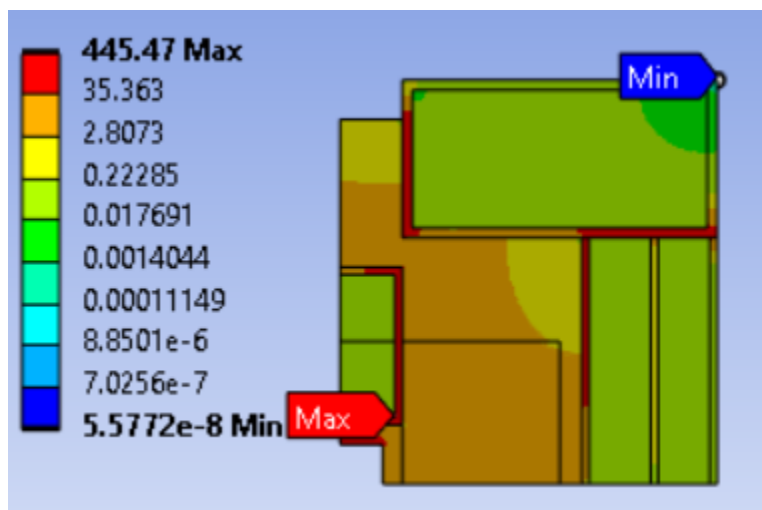
### 4.3 Y-Axis Directional Heat Flux (W/m<sup>2</sup>)



### 4.4 X-Axis Directional Heat Flux (W/m<sup>2</sup>)



### 4.5 Total Heat Flux (W/m<sup>2</sup>)



## 5. Conclusion

The calculated R-value for this combined wall is:

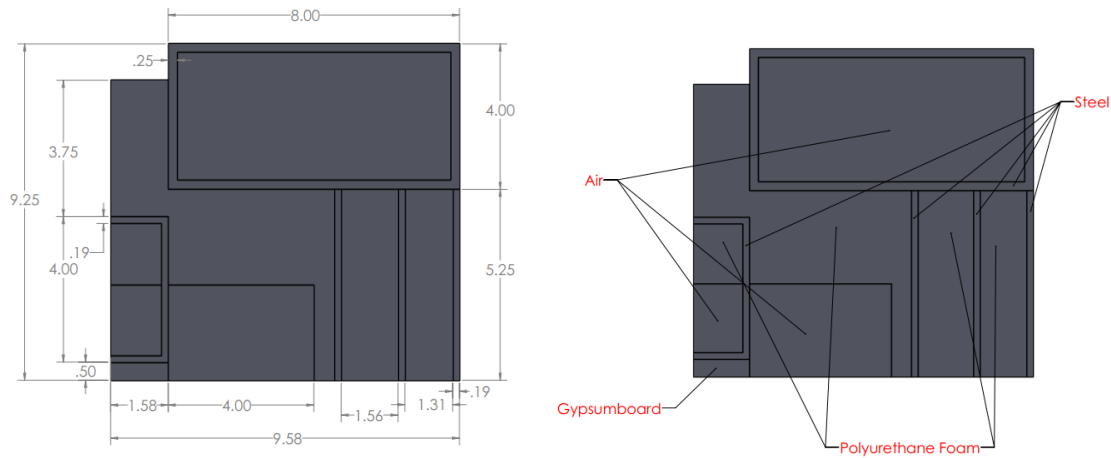
- 1- X-Axis: 43.047 (hr ft<sup>2</sup> F/Btu)
- 2- Y-Axis: 22.997 (hr ft<sup>2</sup> F/Btu)
- 3- Total: 15.141 (hr ft<sup>2</sup> F/Btu)

## DET4.1A Wall R-value Estimate

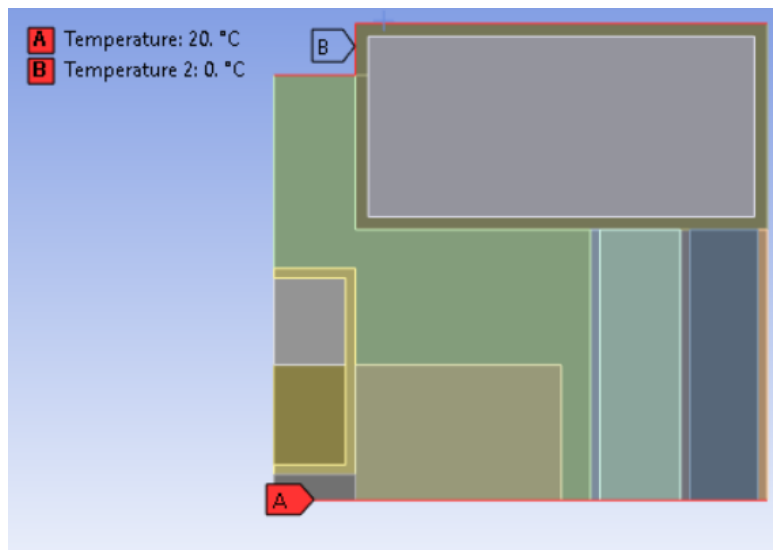
### 1. Geometry

The 2D geometry was made according to the attached geometry sent.

**Dimensions are in inches.**



### 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Gypsum Board	0.2
Air	0.026
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

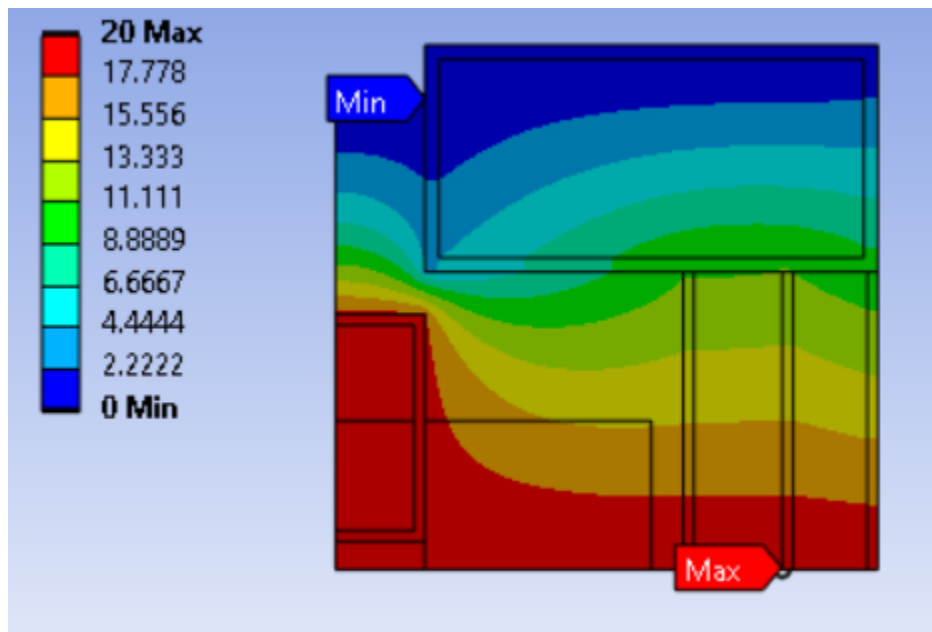
R-value for the combined wall = Temperature Difference / Heat Flux

Average 285.73 W/m<sup>2</sup>

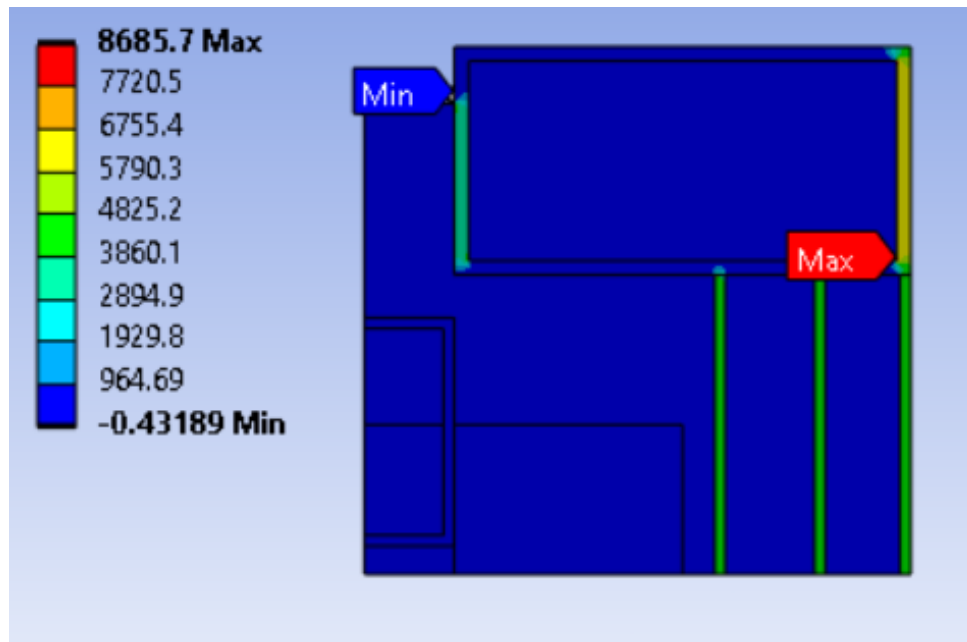
Average Y-Axis Heat Flux (W/m<sup>2</sup>) = 285.7

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
285.7	20	0.0700035	0.397479874

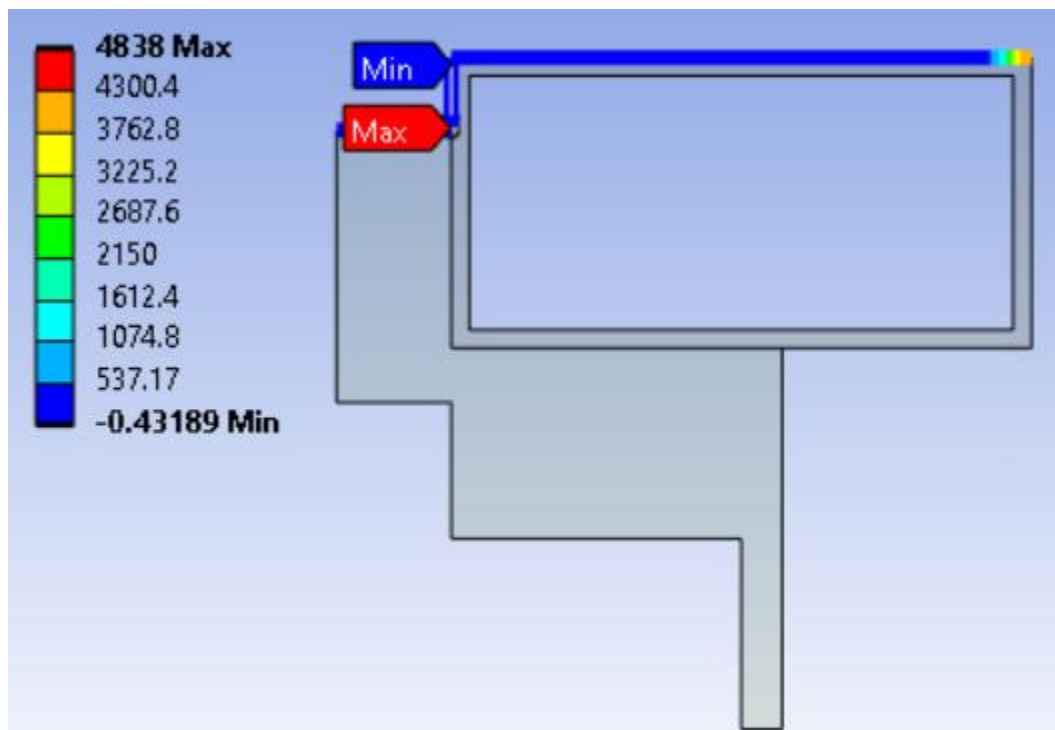
#### 4.2 Temperature Distribution (°C)



#### 4.3 Directional Heat Flux ( $\text{W}/\text{m}^2$ )



#### 4.4 Directional Heat Flux at Outside Boundary Condition ( $\text{W}/\text{m}^2$ )



## 5. Conclusion

The calculated R-value for this combined wall is 0.397 hr ft<sup>2</sup> F/Btu

**Note:** The temperature distribution at the outside boundary condition is applied on a line and because this simulation is steady-state BVP (Boundary Value Problem) and the outside boundary condition for this problem is 0 °C, the temperature will **Always** be 0 °C, hence there is no temperature distribution at this condition.

If the outside boundary condition is heat flux, there will be a temperature distribution at the outside boundary, which is not the case in this simulation.

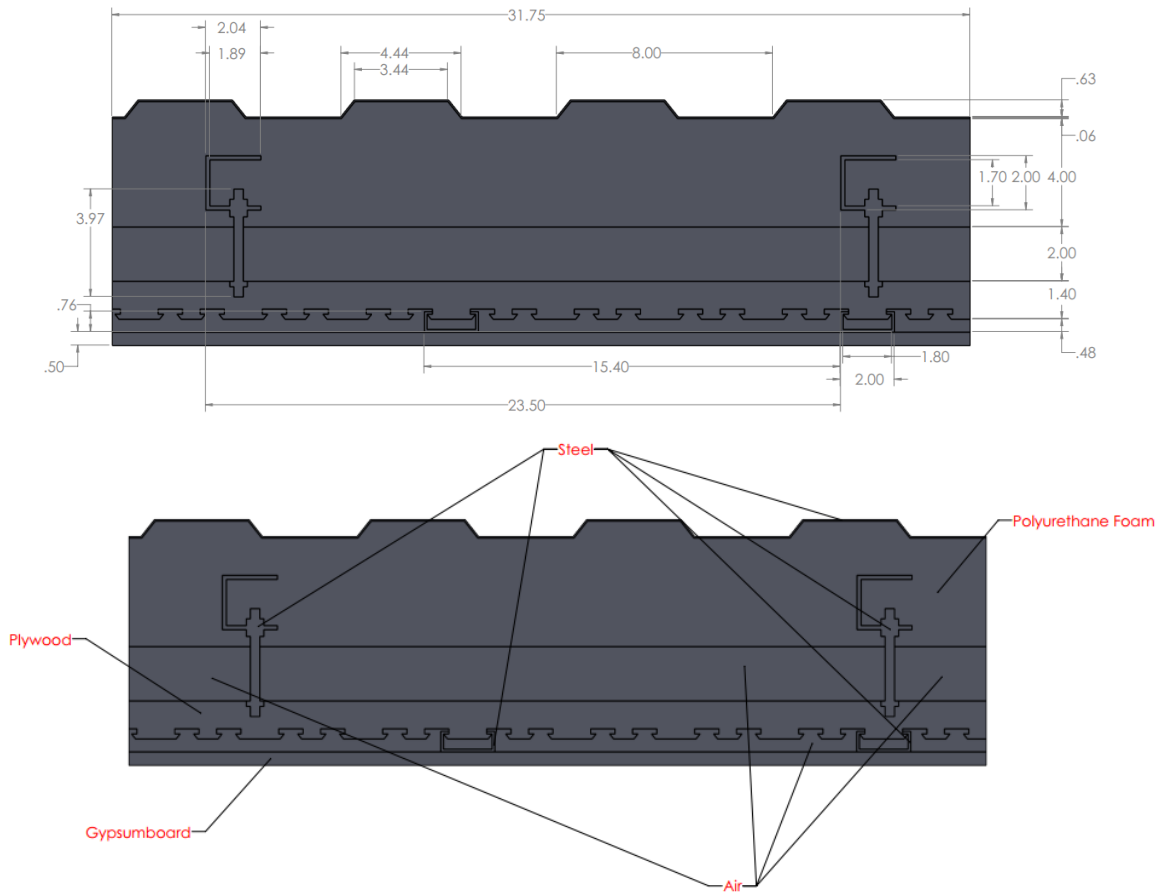
Also, the R-value is low due to the thermal bridging as there are no thermal breaks between the steel parts and the heat source, as the steel is a highly conductive material and the steel facing the heat source is smaller compared to the DET4.1 where there a thermal break and the steel are facing the heat source is wider.

# DET5.0 Wall R-value Estimate

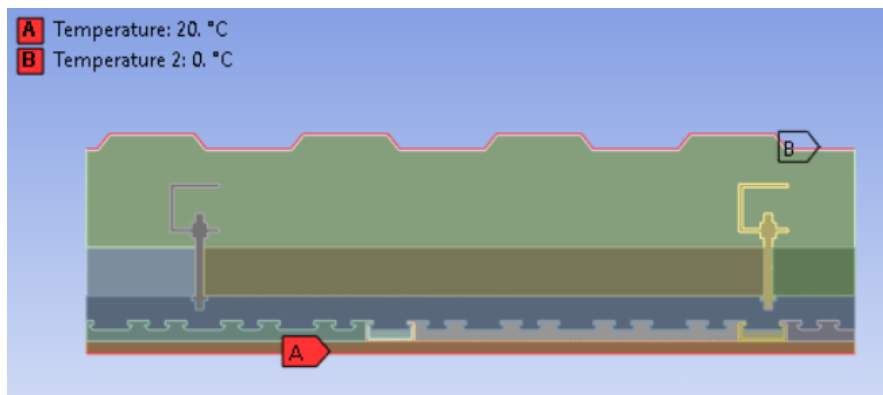
## 1. Geometry

The 2D geometry was made according to the attached geometry sent.

**Dimensions are in inches.**



## 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Gypsum Board	0.2
Air	0.026
Plywood	0.125
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

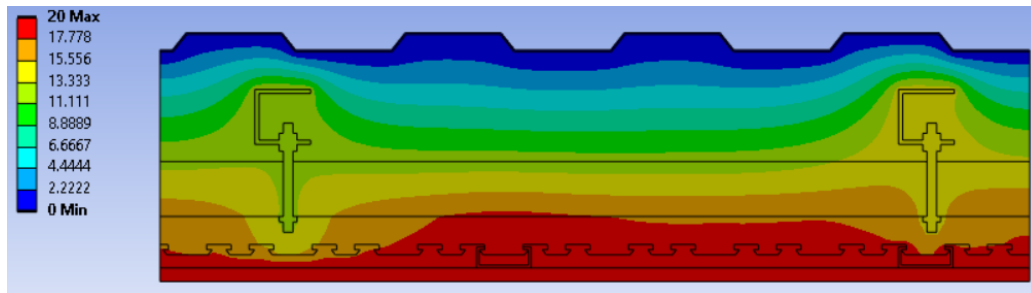
Average 7.2378 W/m<sup>2</sup>

Average Directional Heat Flux (W/m<sup>2</sup>) = 7.2378

R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
7.2378	20	2.763270607	15.68985051

#### 4.2 Temperature Distribution (°C)



#### 4.3 Y-Axis Directional Heat Flux (W/m<sup>2</sup>)



### 5. Conclusion

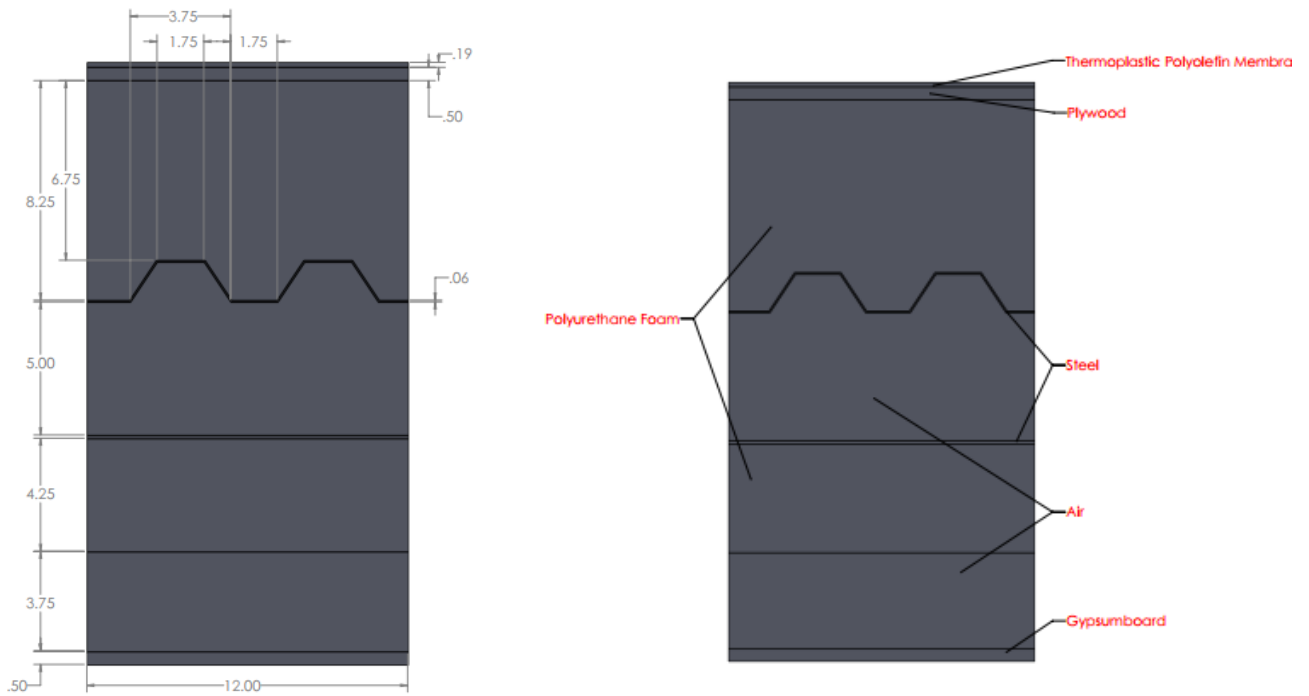
The calculated R-value for this combined wall is 15.689 (hr ft<sup>2</sup> F/Btu)

# DET8.1 Wall R-value Estimate

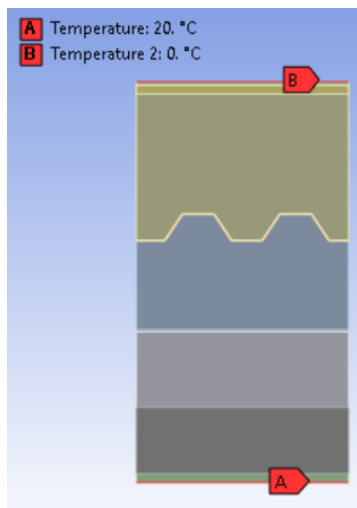
## 1. Geometry

The 2D geometry was made according to the attached geometry sent.

**Dimensions are in inches.**



## 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Gypsum Board	0.2
Air	0.026
Thermoplastic Polyolefin Membrane	0.033
Plywood	0.125
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

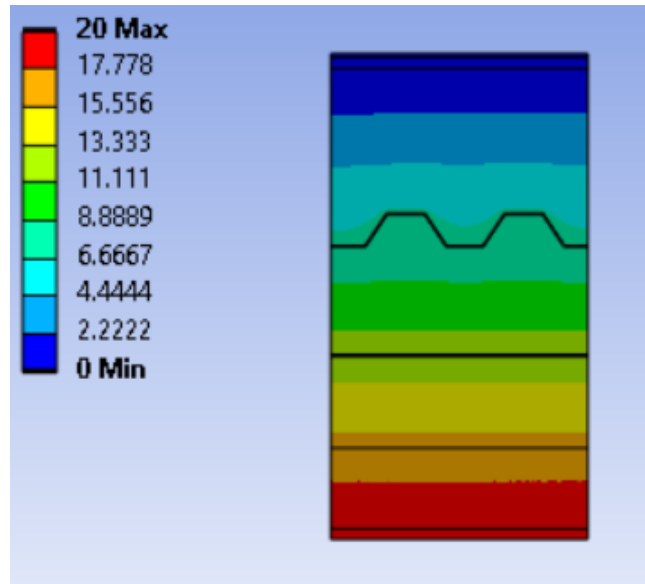
Average 1.2228 W/m<sup>2</sup>

Average Directional Heat Flux (W/m<sup>2</sup>) = 1.2228

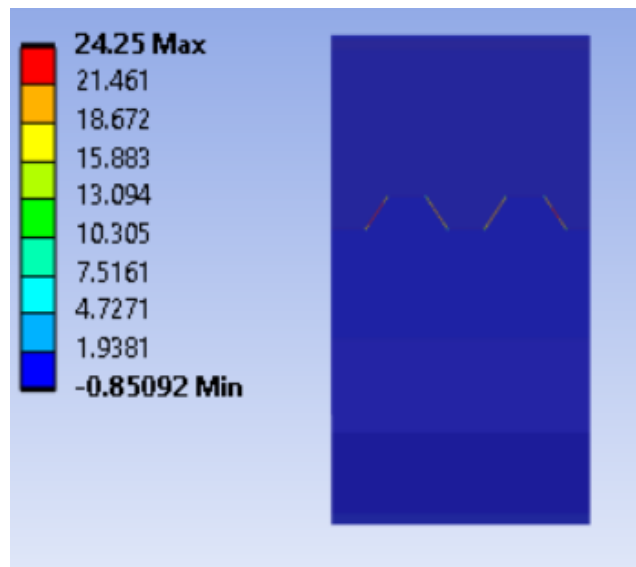
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
1.2228	20	16.35590448	92.86882565

#### 4.2 Temperature Distribution (°C)



#### 4.3 Y-Axis Directional Heat Flux ( $\text{W/m}^2$ )



#### 5. Conclusion

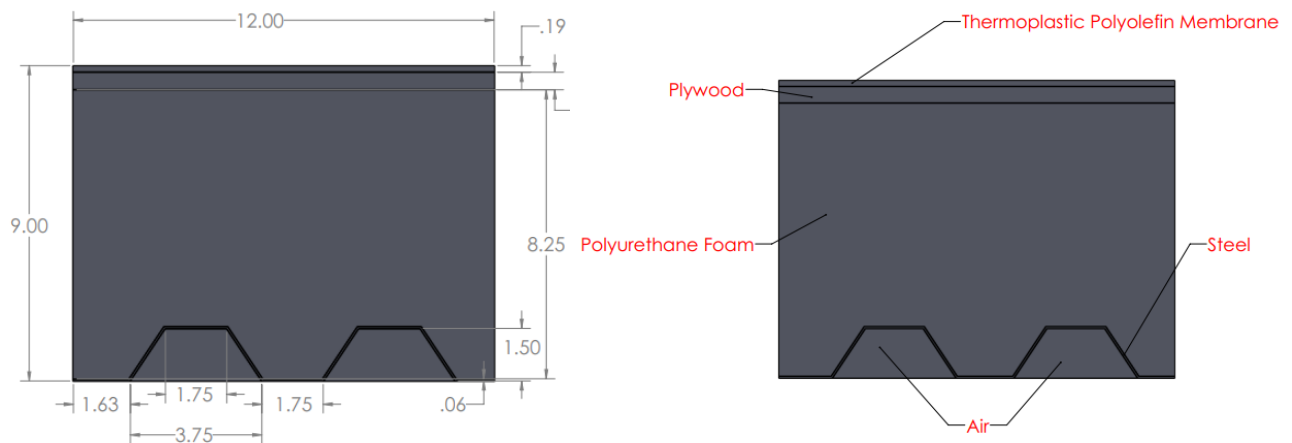
The calculated R-value for this combined wall is 92.868 ( $\text{hr ft}^2 \text{ F/Btu}$ )

## DET8.1B Wall R-value Estimate

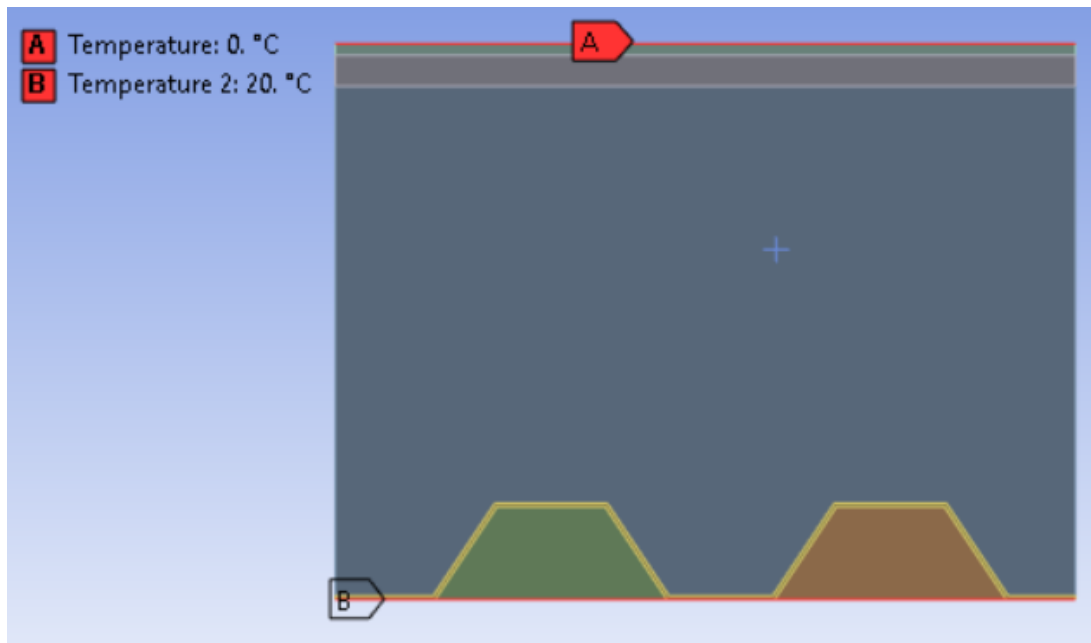
### 1. Geometry

The 2D geometry was made according to the attached geometry sent.

**Dimensions are in inches.**



### 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Air	0.026
Thermoplastic Polyolefin Membrane	0.033
Plywood	0.125
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

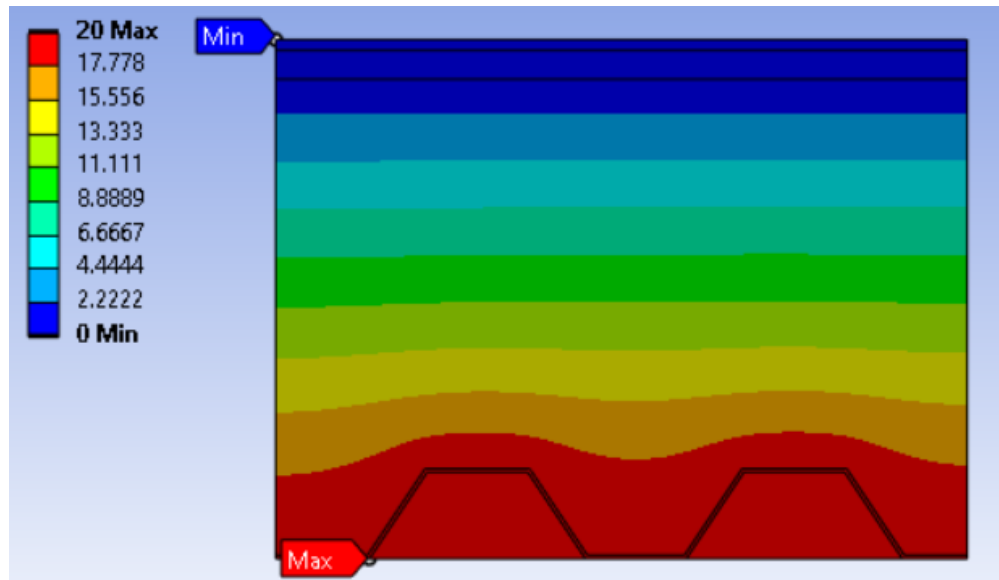
Average 5.1901 W/m<sup>2</sup>

Average Directional Heat Flux (W/m<sup>2</sup>) = 5.19

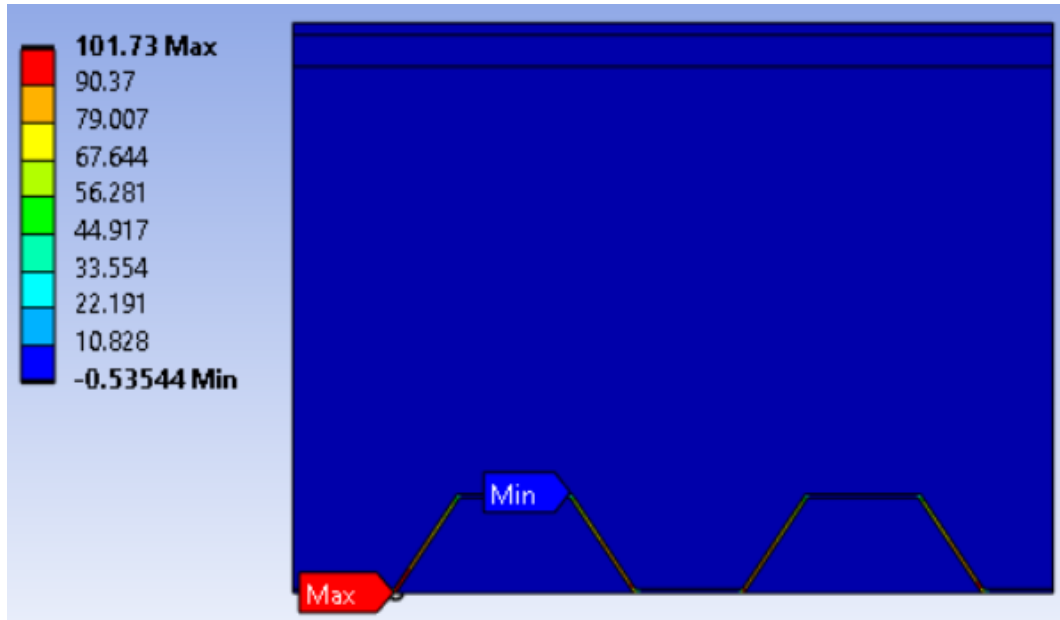
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
5.19	20	3.853564547	21.8805395

#### 4.2 Temperature Distribution (°C)



### 4.3 Directional Heat Flux ( $\text{W}/\text{m}^2$ )



### 5. Conclusion

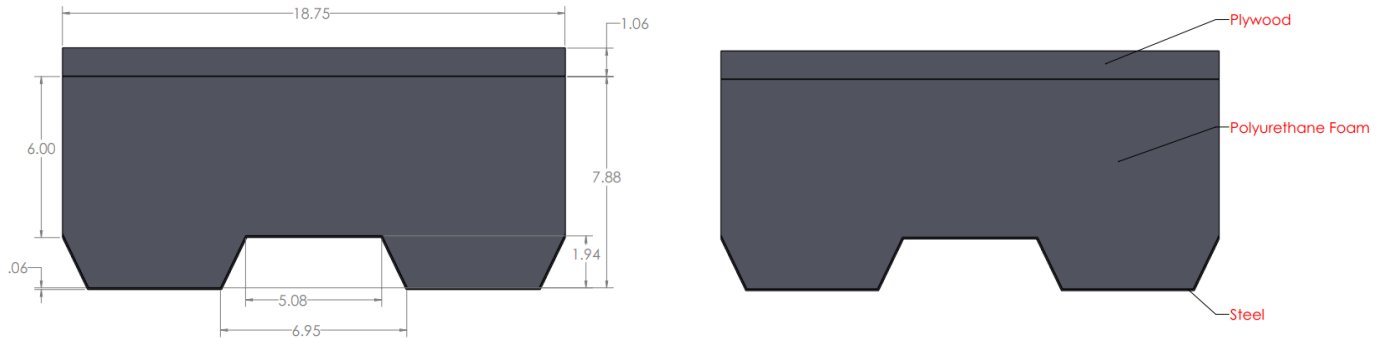
The calculated R-value for this combined wall is 21.88 ( $\text{hr ft}^2 \text{ F}/\text{Btu}$ )

# DET9.0 Wall R-value Estimate

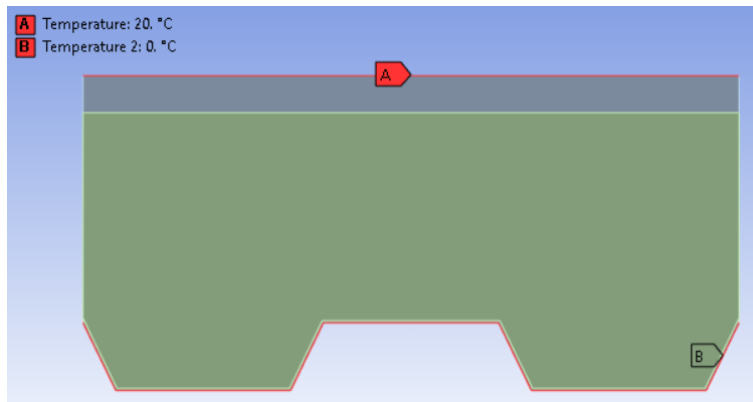
## 1. Geometry

The 2D geometry was made according to the attached geometry sent.

**Dimensions are in inches.**



## 2. Boundary Conditions



## 3. Materials

Name	Thermal Conductivity(W/m.°C)
Plywood	0.125
Polyurethane Foam	0.025
Steel	60

## 4. Results

### 4.1 R-value

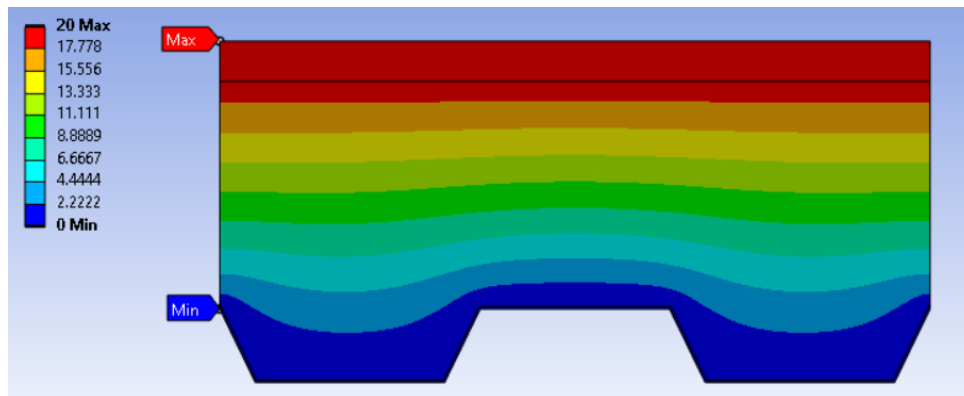
Average 2.4996 W/m<sup>2</sup>

Average Directional Heat Flux (W/m<sup>2</sup>) = 2.499

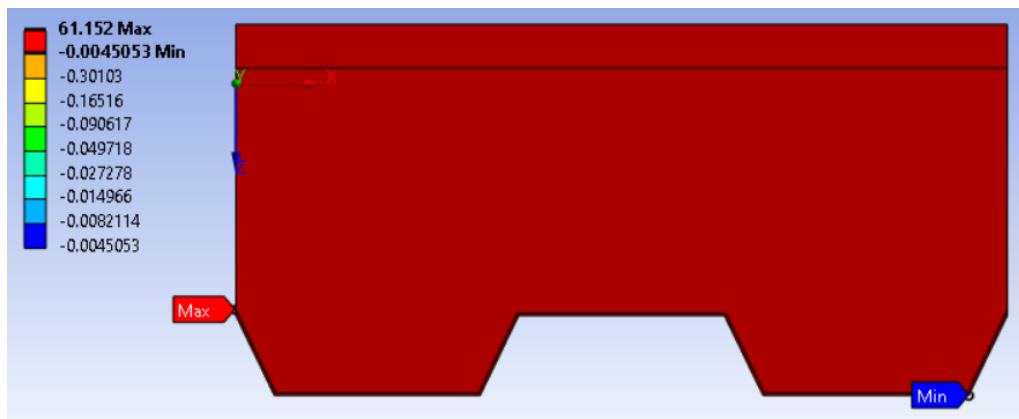
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
2.499	20	8.003201281	45.44217687

### 4.2 Temperature Distribution (°C)



### 4.3 Z-Axis Directional Heat Flux (W/m<sup>2</sup>)



## 5. Conclusion

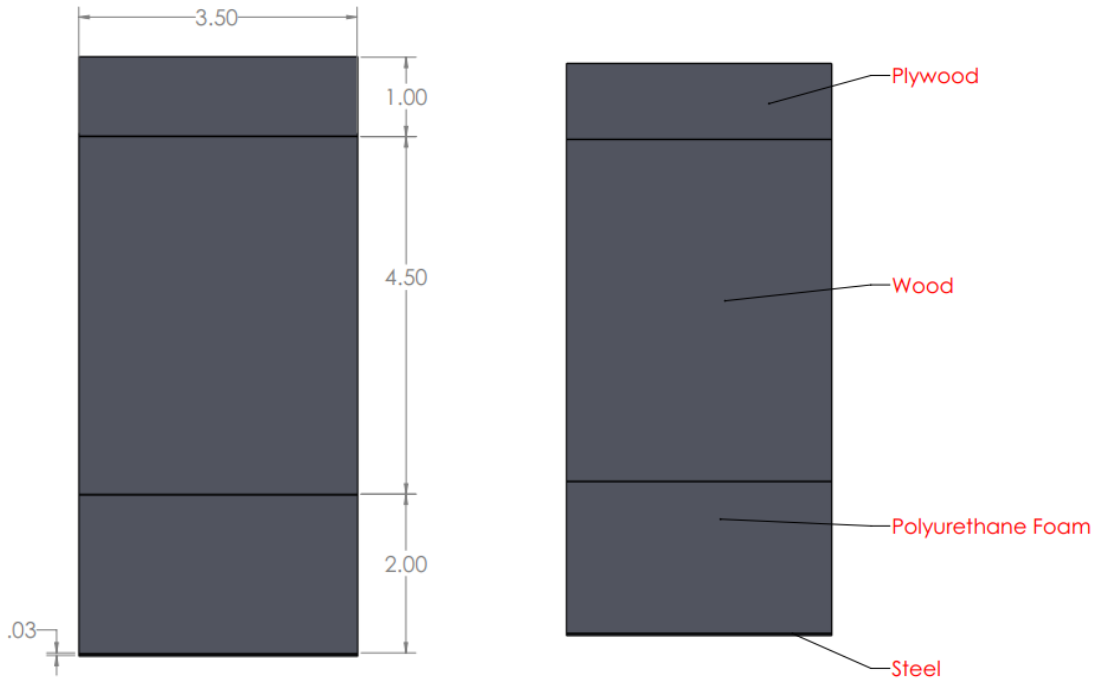
The calculated R-value for this combined wall is 45.44 (hr ft<sup>2</sup> F/Btu)

## DET11.1 Wall R-value Estimate

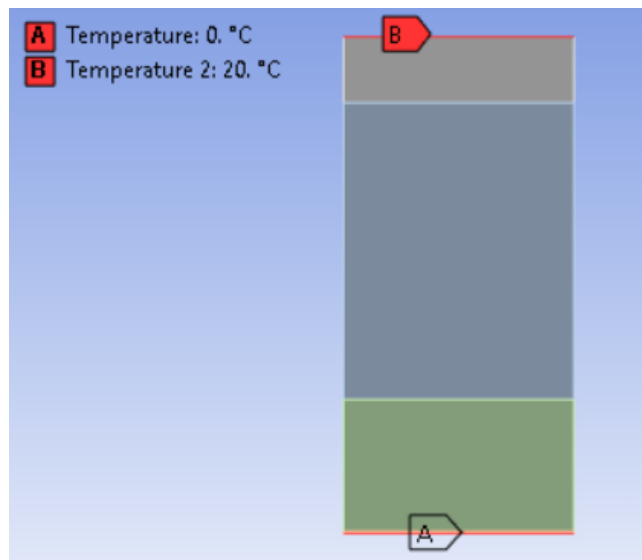
### 1. Geometry

The 2D geometry was made according to the attached geometry sent.

**Dimensions are in inches.**



### 2. Boundary Conditions



### 3. Materials

Name	Thermal Conductivity(W/m.°C)
Wood	0.23
Plywood	0.125
Polyurethane Foam	0.025
Steel	60

### 4. Results

#### 4.1 R-value

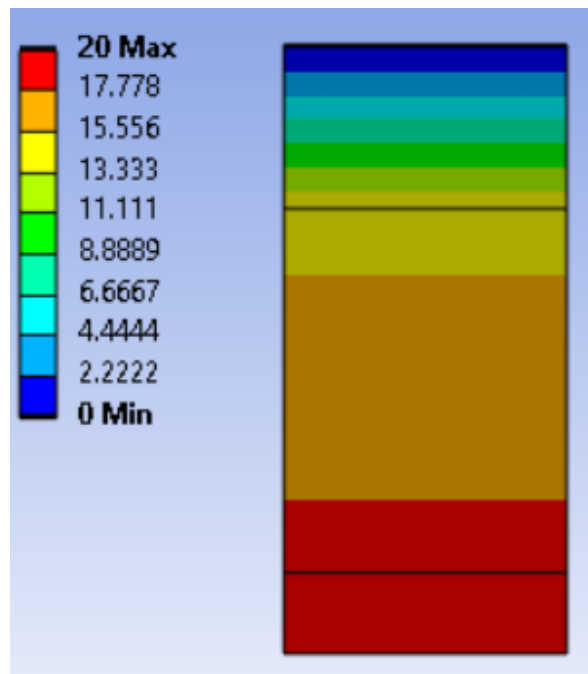
Average 7.3199 W/m<sup>2</sup>

Average Directional Heat Flux (W/m<sup>2</sup>) = 7.3199

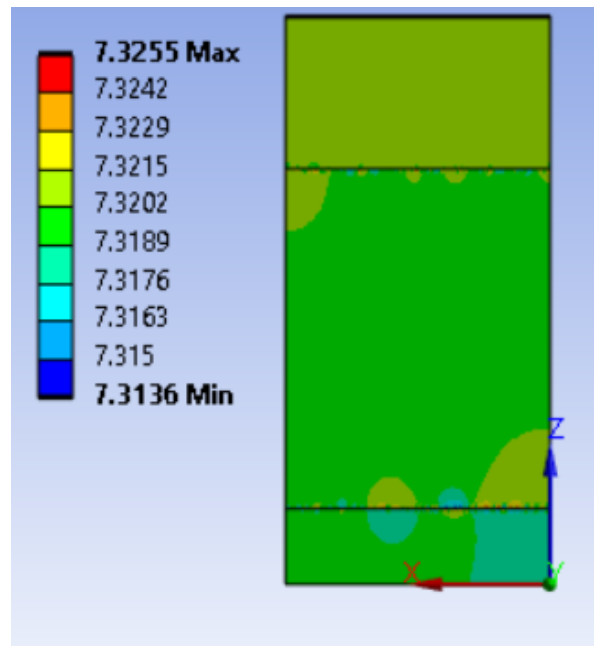
R-value for the combined wall = Temperature Difference / Heat Flux

Heat Flux (W/m <sup>2</sup> )	T <sub>1</sub> -T <sub>2</sub> (°C)	R-Value (°C.m <sup>2</sup> /W)	R-Value (hr ft <sup>2</sup> F/Btu)
7.3199	20	2.732277763	15.51387314

#### 4.2 Temperature Distribution (°C)



#### 4.3 Z-Axis Directional Heat Flux ( $\text{W/m}^2$ )



#### 5. Conclusion

The calculated R-value for this combined wall is 15.513 ( $\text{hr ft}^2 \text{ F/Btu}$ )