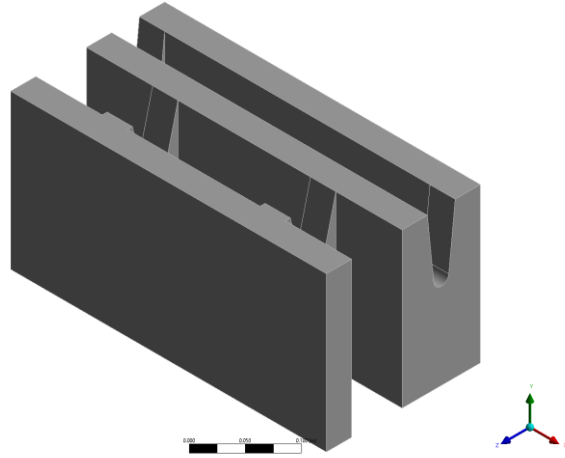
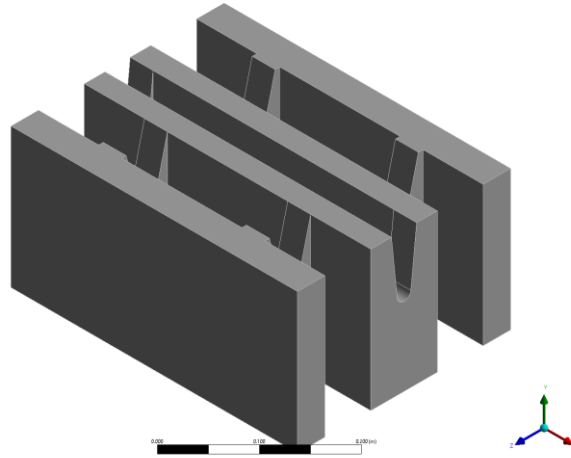
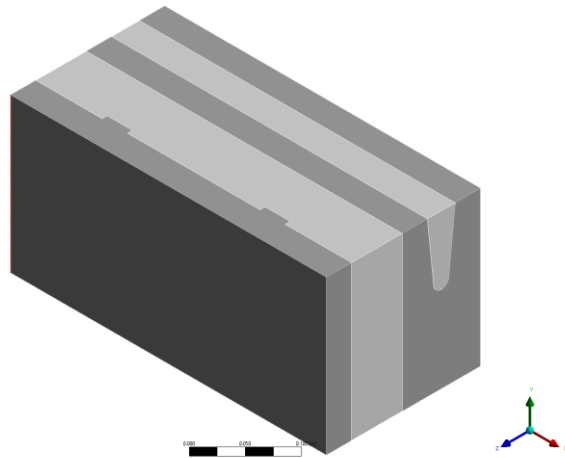
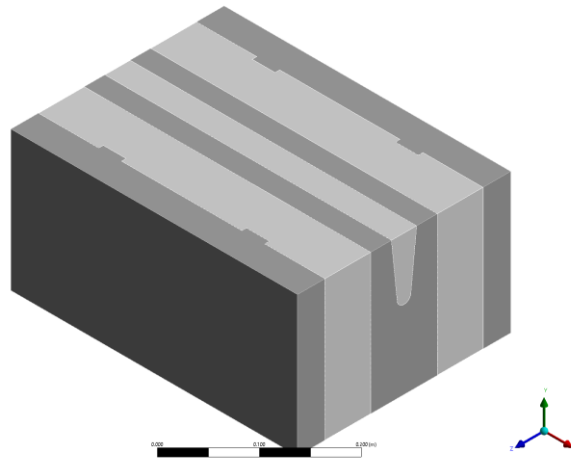


Advanced Masonry Consulting, INC ANSYS Modeling

NBRC 10102

Table 1 – Model Overview

	8x8 Insul-Block	12x8 Insul-Block
Insul-Block Hollow	 <p>A 3D perspective view of a hollow 8x8 Insul-Block. The block is dark gray with a central vertical cavity. A scale bar at the bottom indicates dimensions of 0.00, 0.05, and 0.10. A 3D coordinate system (X, Y, Z) is shown at the bottom right.</p>	 <p>A 3D perspective view of a hollow 12x8 Insul-Block. The block is dark gray with a central vertical cavity. A scale bar at the bottom indicates dimensions of 0.00, 0.10, and 0.20. A 3D coordinate system (X, Y, Z) is shown at the bottom right.</p>
Insul-Block with inserts	 <p>A 3D perspective view of an 8x8 Insul-Block with inserts. The block is dark gray with a central vertical cavity. The top surface is covered with a lighter gray material, representing the inserts. A scale bar at the bottom indicates dimensions of 0.00, 0.05, and 0.10. A 3D coordinate system (X, Y, Z) is shown at the bottom right.</p>	 <p>A 3D perspective view of a 12x8 Insul-Block with inserts. The block is dark gray with a central vertical cavity. The top surface is covered with a lighter gray material, representing the inserts. A scale bar at the bottom indicates dimensions of 0.00, 0.10, and 0.20. A 3D coordinate system (X, Y, Z) is shown at the bottom right.</p>

Insul-Block
Mesh

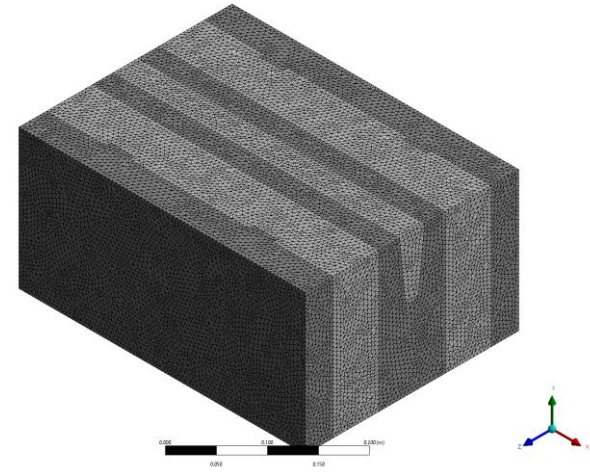
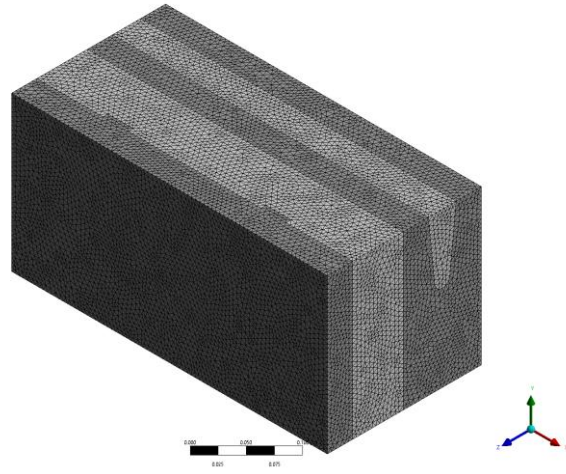


Table 2 – Material Properties

Material	Thermal Conductivity [W/mK]
Concrete – Mix Design Oven-Dry	0.479 ⁱ
Concrete – Mix Design	0.584 ⁱ
Type VIII EPS Cellofoam®	0.03675

Table 3 – Boundary Conditions

	8x8 Insul-Block	12x8 Insul-Block
Exterior Air Temperature [C]	29.00	29.00
Interior Air Temperature [C]	19.00	19.00
Mean Temperature [C]	24.00	24.00
Temperature Gradient [C]	10.00	10.00
Exterior Heat Transfer Coefficient [W/m ² K]	33.4 ⁱⁱ	33.4 ⁱⁱ
Interior Heat Transfer Coefficient [W/m ² K]	8.4 ⁱⁱ	8.4 ⁱⁱ

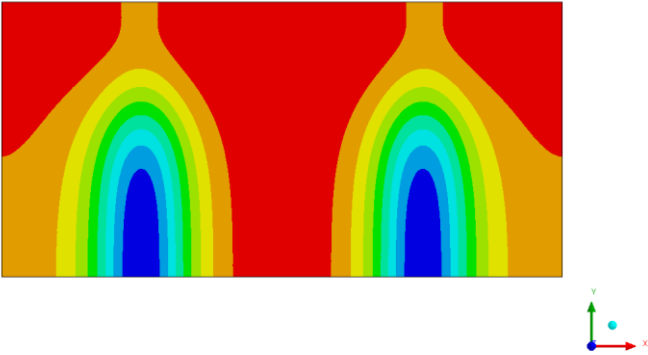
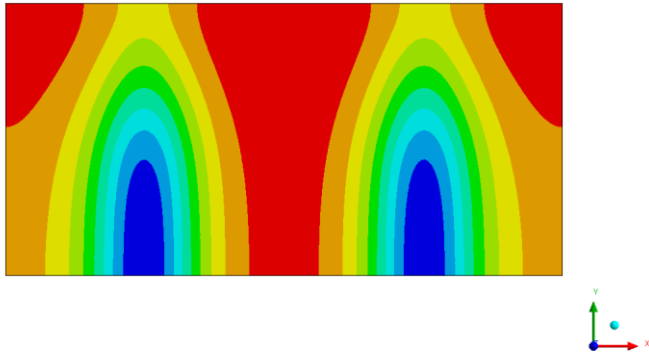
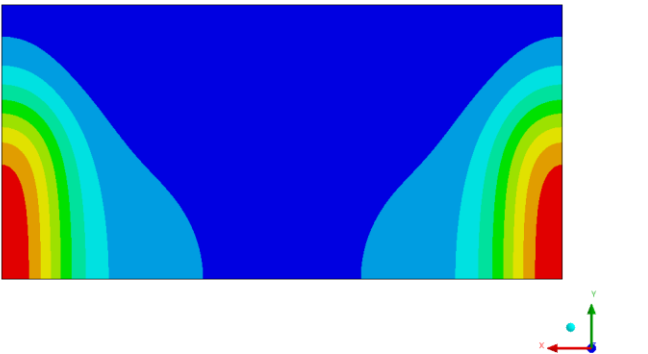
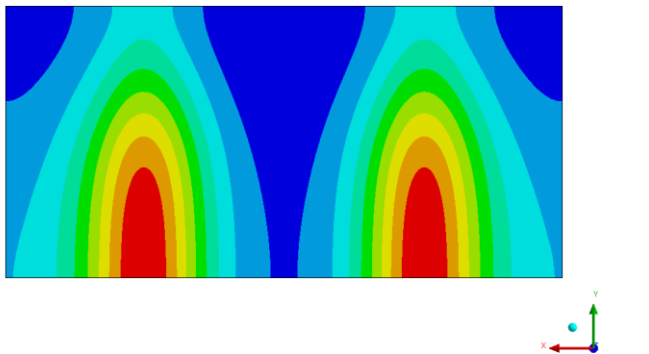
Table 4 – Numerical Results

Property	8x8 Insul-Block	12x8 Insul-Block
Exterior Surface Temperature [C]	28.83	28.89
Interior Surface Temperature [C]	19.66	19.44
Exterior Surface Heat Flux [W/m ²]	5.6492	3.697
Interior Surface Heat Flux [W/m ²]	5.8930	3.839

R-value [ft ² °Fhr/BTU]	10.88	16.64
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U-factor Oven Dry – With Air Film ⁱⁱ [BTU/ft ² °Fhr]	0.0919	0.06010
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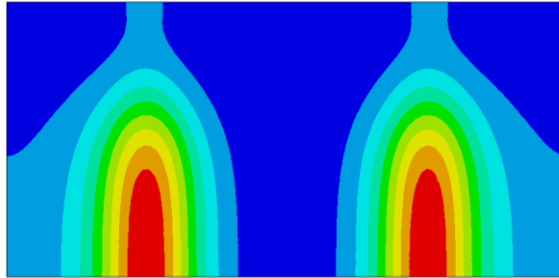
Table 4 - Graphical Results

	8x8 Insul-Block	12x8 Insul-Block
<p>Exterior Surface Temperature</p>	<p>A: 8x8 Block Temperature Type: Temperature Units: °C Time: 1 5/3/2021 9:37 AM</p> <p>28.918 Max 28.912 28.907 28.901 28.896 28.891 28.885 28.880 28.874 28.869 Min</p> 	<p>B: 12x8 Block Temperature Type: Temperature Units: °C Time: 1 5/3/2021 9:42 AM</p> <p>28.946 Max 28.940 28.941 28.938 28.935 28.932 28.929 28.926 28.923 28.922 Min</p> 
<p>Interior Surface Temperature</p>	<p>A: 8x8 Block Temperature 2 Type: Temperature Units: °C Time: 1 5/3/2021 9:39 AM</p> <p>19.311 Max 19.402 19.473 19.405 19.436 19.418 19.4 19.381 19.363 19.344 Min</p> 	<p>B: 12x8 Block Temperature 2 Type: Temperature Units: °C Time: 1 5/3/2021 9:42 AM</p> <p>19.3 Max 19.291 19.282 19.273 19.263 19.254 19.245 19.236 19.227 19.218 Min</p> 

Exterior Surface Heat Flux

A: 8x8 Block
Total Heat Flux
Type: Total Heat Flux
Units: W/m²
Time: 1
5/3/2021 9:39 AM

4.3736 Max
4.3307
4.0138
3.8338
3.6338
3.4759
3.334
3.134
2.9341
2.7541 Min

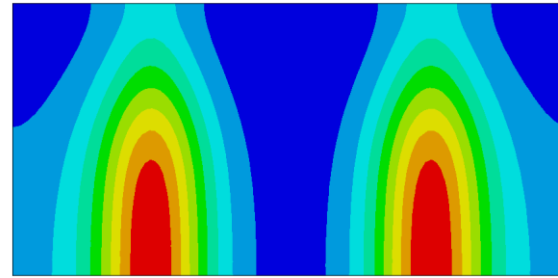


0.000 0.050 0.100 (m)
0.025 0.075



B: 12x8 Block
Total Heat Flux
Type: Total Heat Flux
Units: W/m²
Time: 1
5/3/2021 9:42 AM

2.6641 Max
2.6471
2.4792
2.3732
2.2782
2.1794
2.0824
1.9855
1.8885
1.7916 Min



0.000 0.050 0.100 (m)
0.025 0.075



Interior Surface Heat Flux

A: 8x8 Block
Total Heat Flux 2
Type: Total Heat Flux
Units: W/m²
Time: 1
5/3/2021 9:39 AM

4.2836 Max
4.129
3.9744
3.8197
3.6651
3.5105
3.3559
3.2012
3.0466
2.892 Min

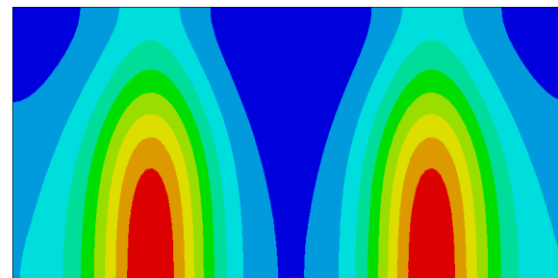


0.000 0.050 0.100 (m)
0.025 0.075



B: 12x8 Block
Total Heat Flux 2
Type: Total Heat Flux
Units: W/m²
Time: 1
5/3/2021 9:42 AM

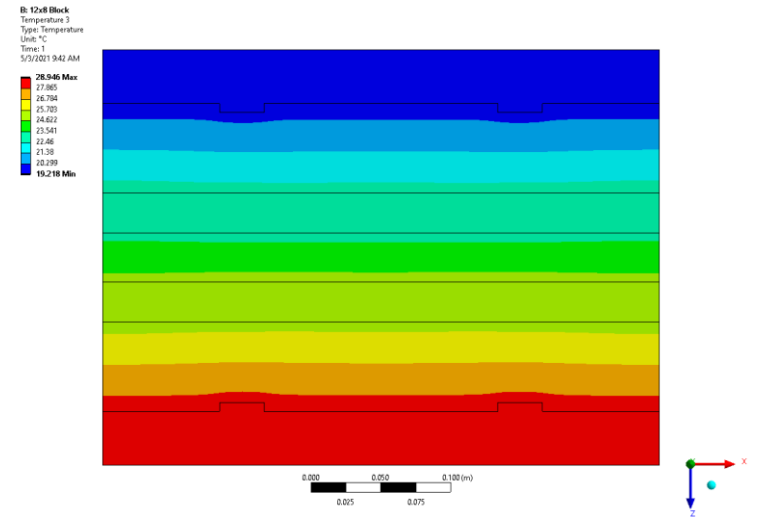
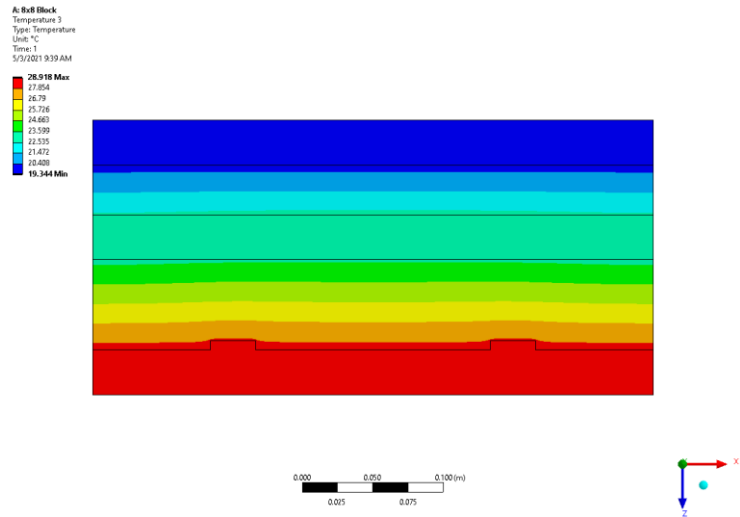
2.5211 Max
2.4641
2.367
2.2899
2.2129
2.1358
2.0587
1.9817
1.9046
1.8275 Min



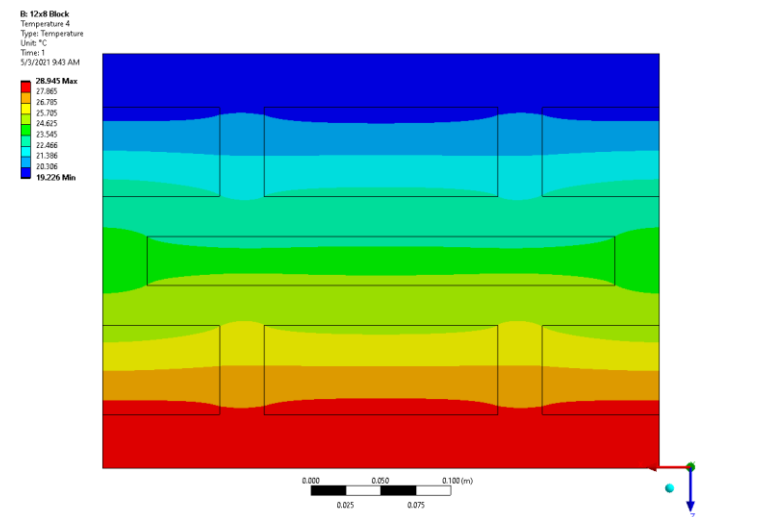
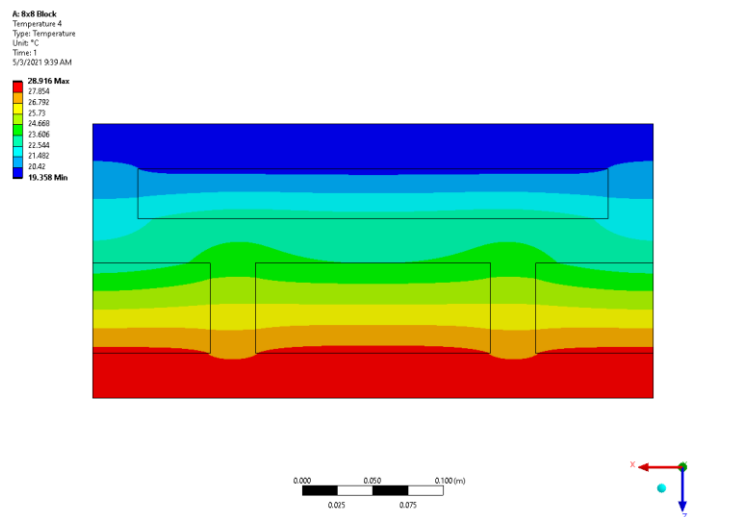
0.000 0.050 0.100 (m)
0.025 0.075

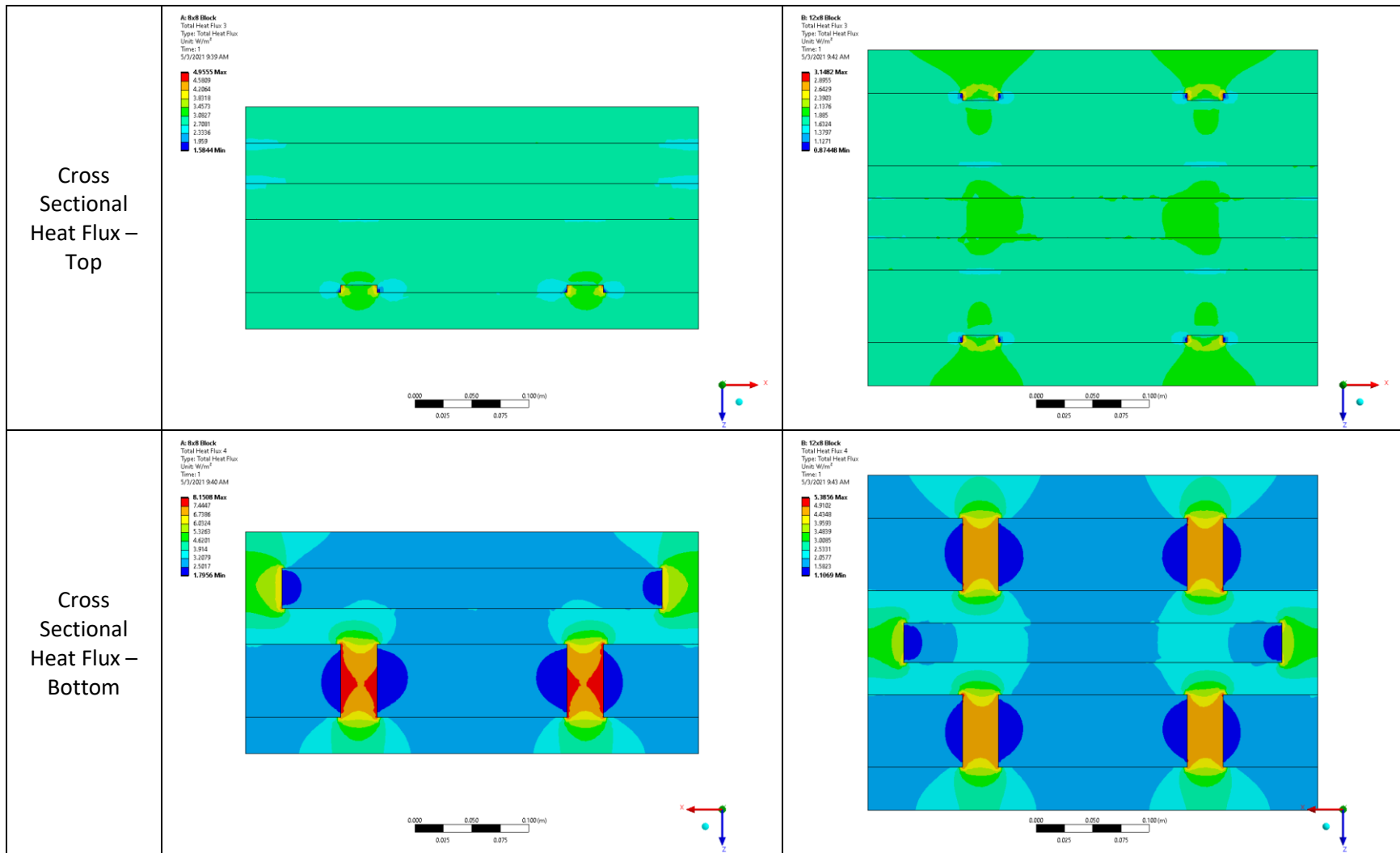


Cross Sectional Temperature – Top



Cross Sectional Temperature – Bottom





ⁱ Values obtained from ACI 122R-02

ⁱⁱ Air film values are taken from ASHRAE handbook of fundamentals chapter 26. Interior air film resistance of R-0.68 and exterior air film resistance of R-0.17 were used.