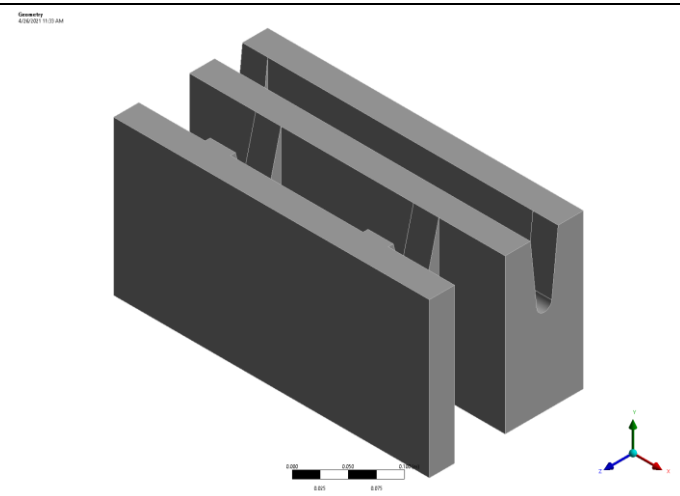
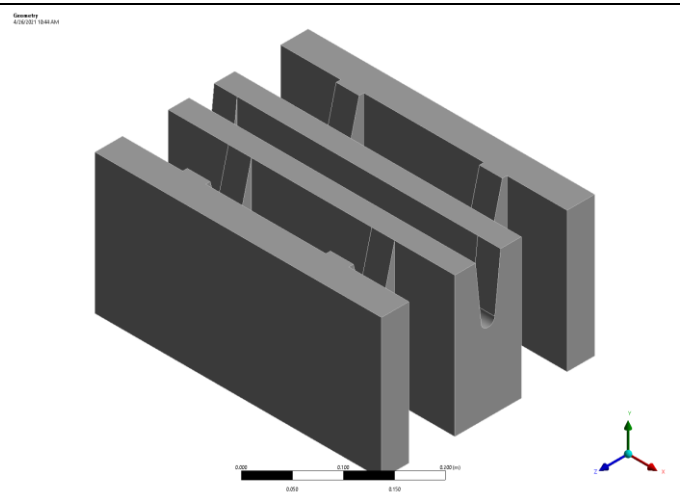
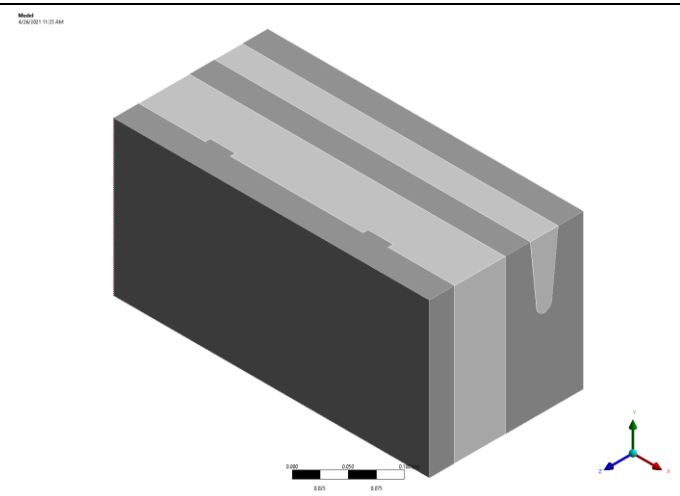
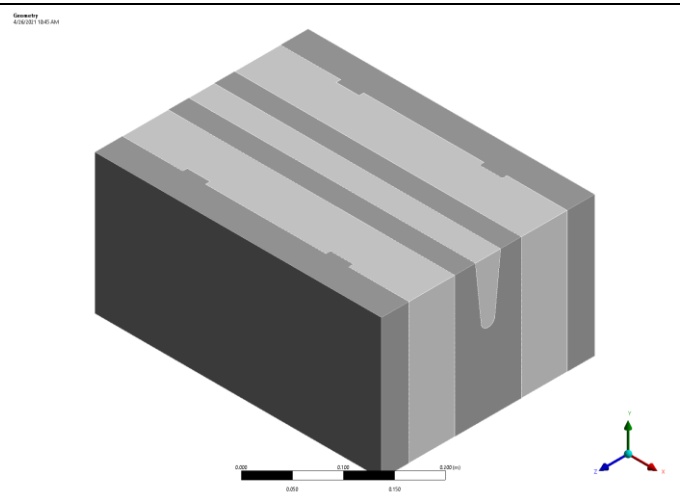
Advanced Masonry Consulting, INC ANSYS Modeling

NBRC 10102

Table 1 – Model Overview

	8x8 Insul-Block	12x8 Insul-Block
Insul-Block Hollow		
Insul-Block with inserts		

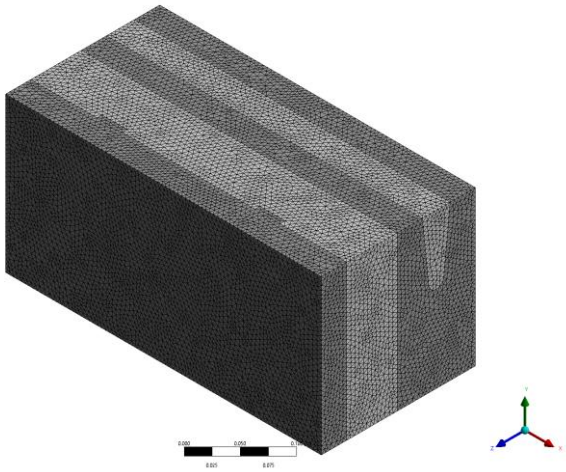
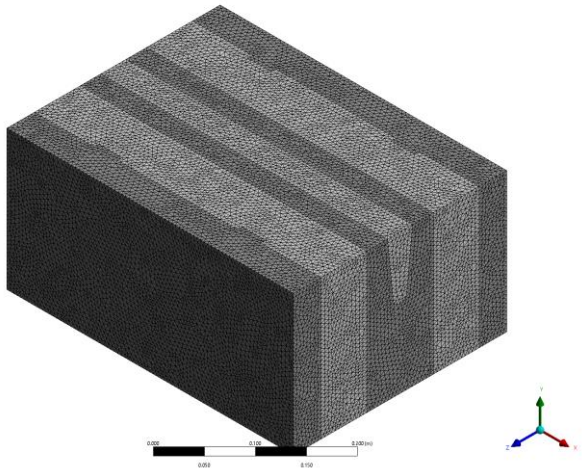
Insul-Block Mesh		

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^2K]	33.4[ii]	33.4[ii]
Interior Heat Transfer Coefficient [W/m^2K]	8.4[ii]	8.4[ii]

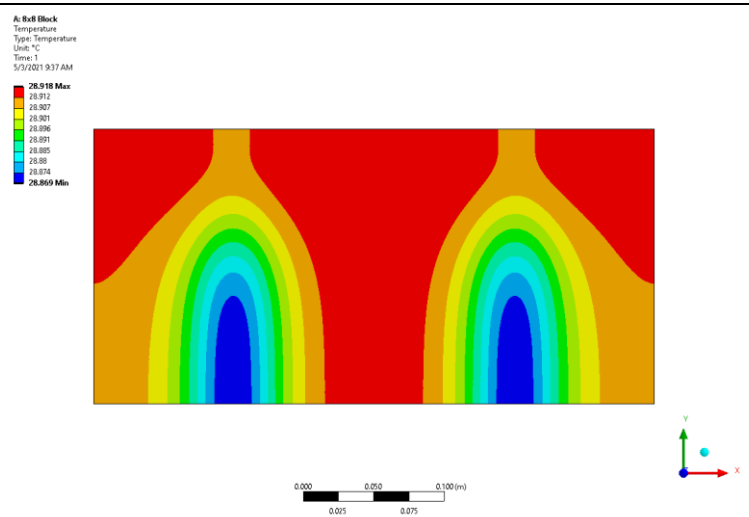
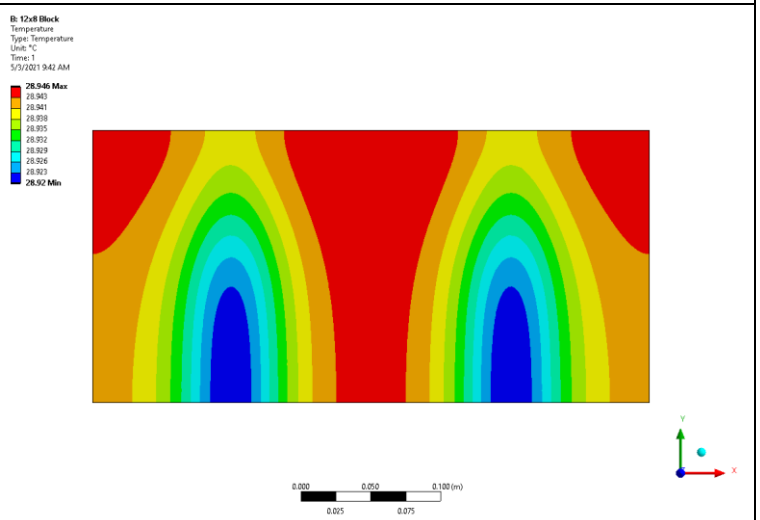
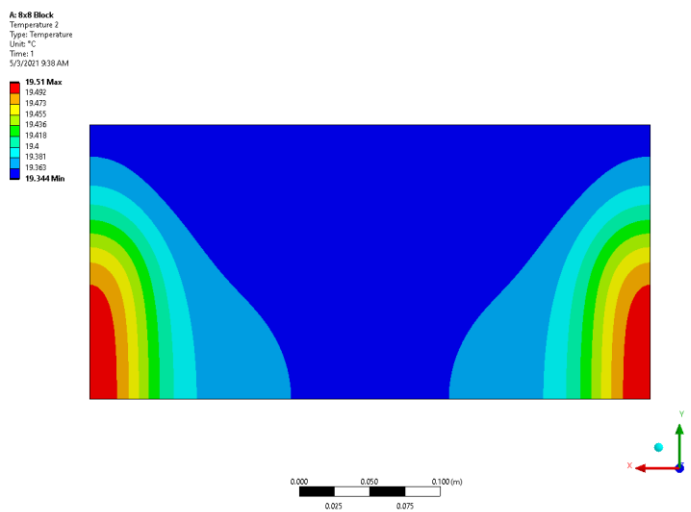
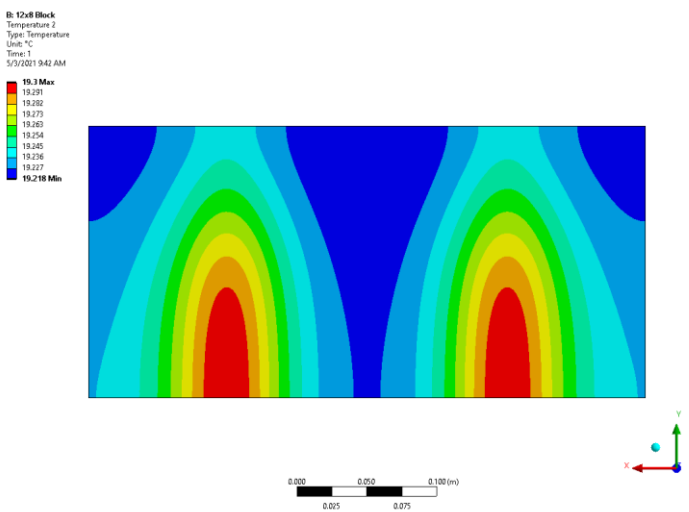
Table 4 – Numerical Results

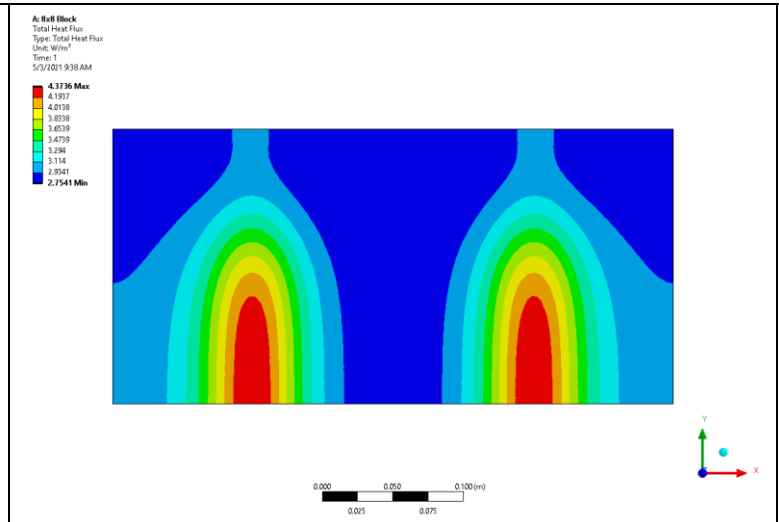
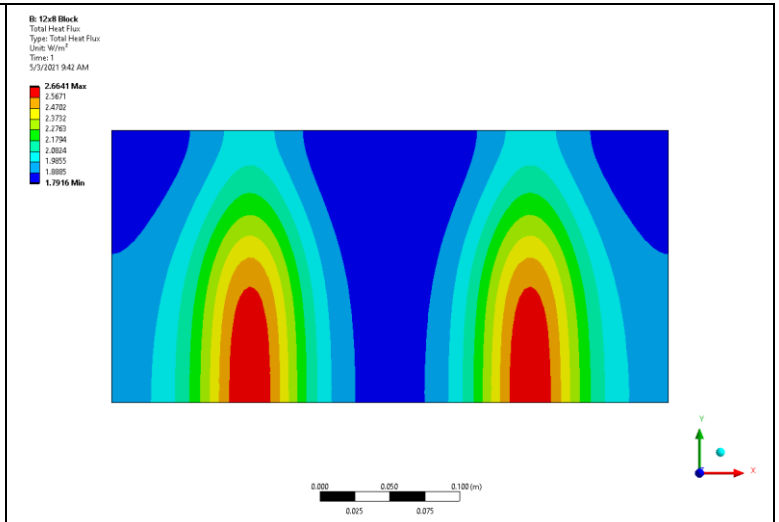
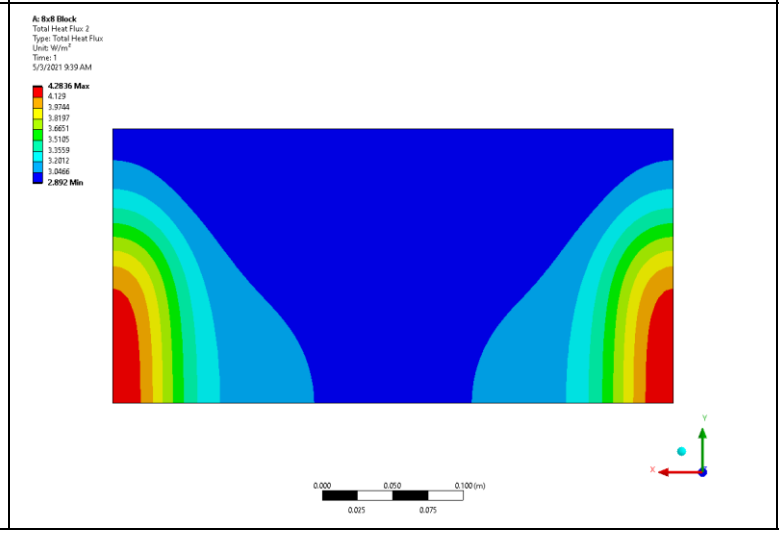
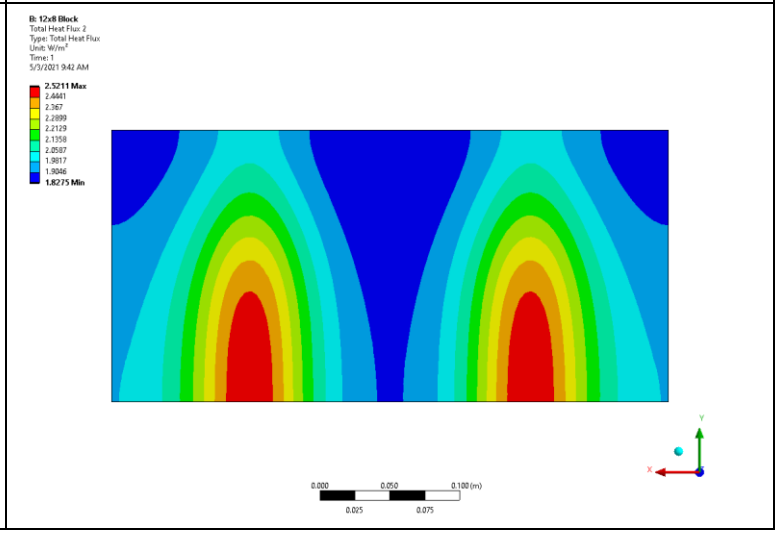
Property	8x8 Insul-Block	12x8 Insul-Block
Exterior Surface Temperature [C]	28.83	28.89
Interior Surface Temperature [C]	19.66	19.44
Exterior Surface Heat Flux [W/m^2]	5.6492	3.697
Interior Surface Heat Flux [W/m^2]	5.8930	3.839

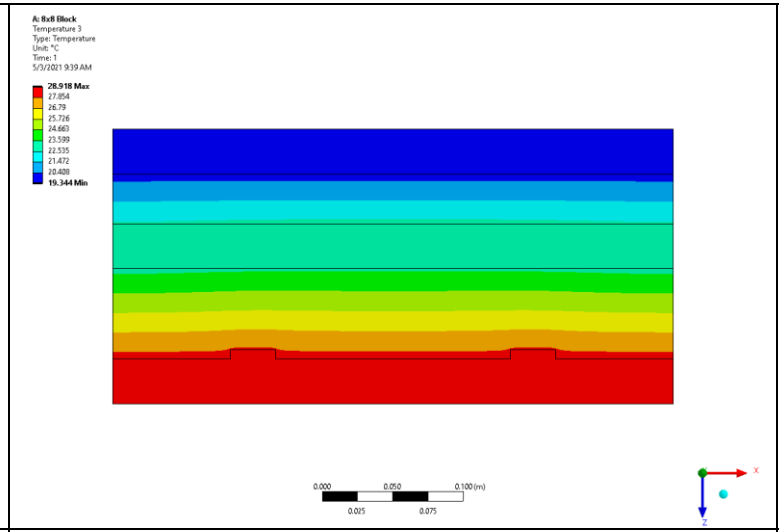
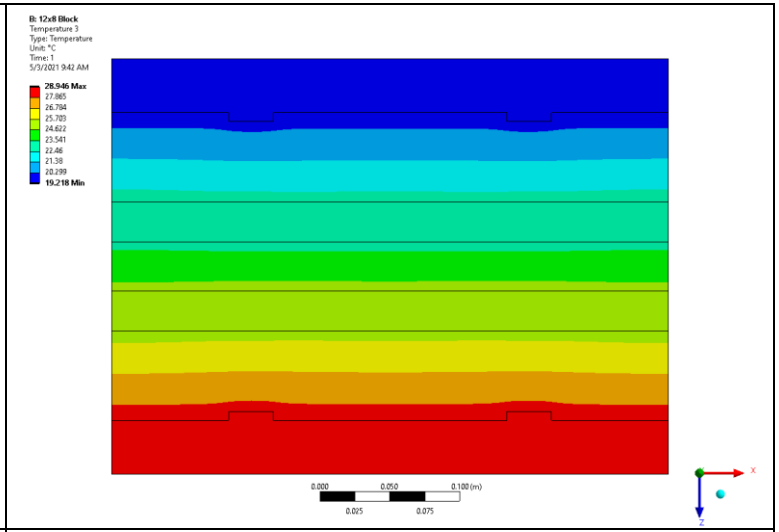
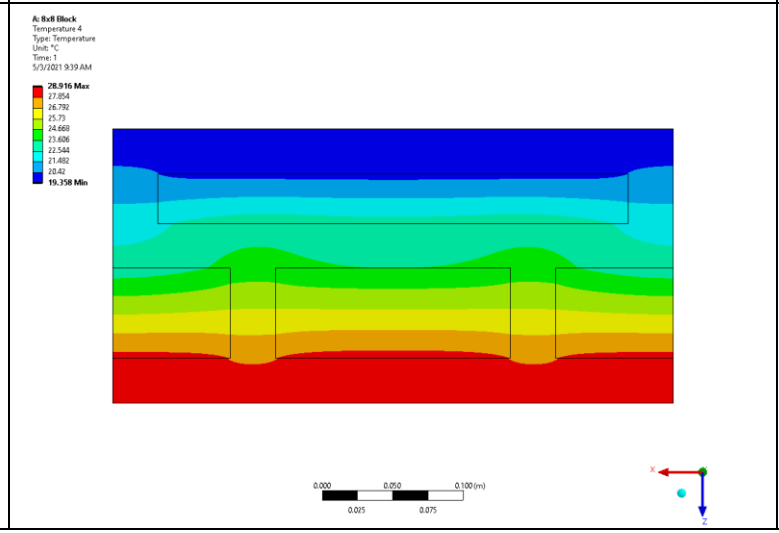
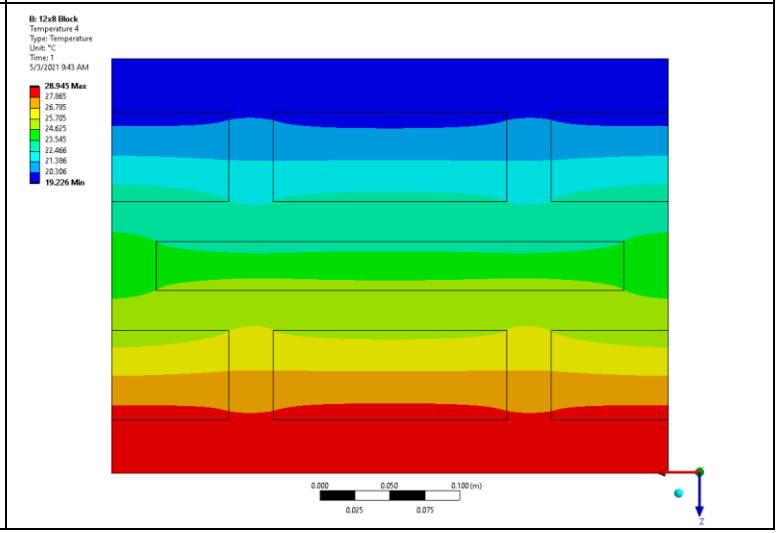
R-value [ft^2°Fhr/BTU]	10.88	16.64

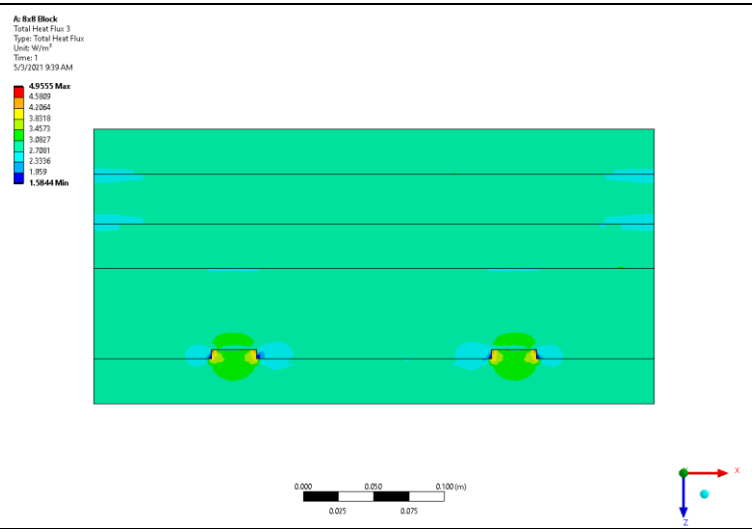
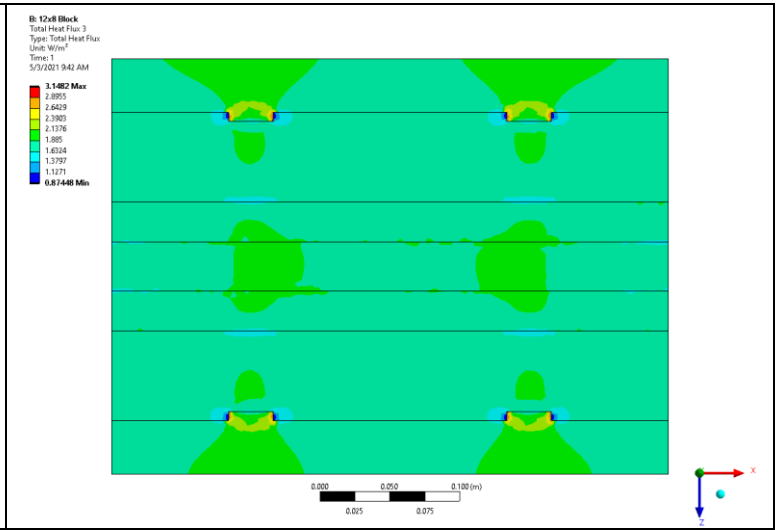
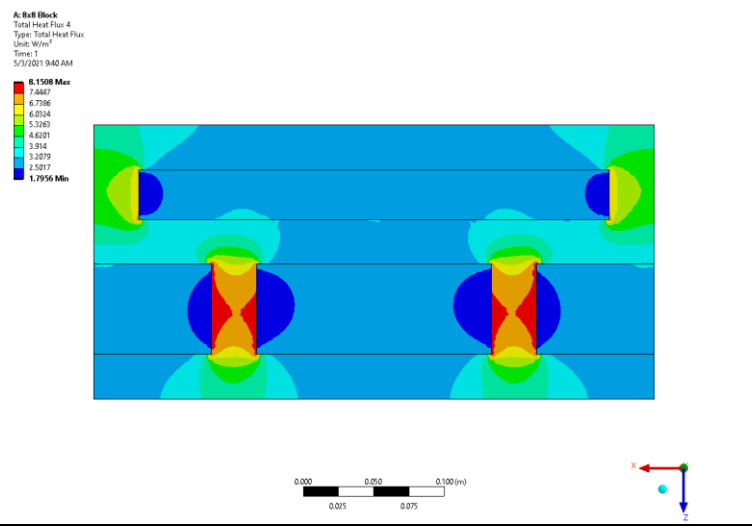
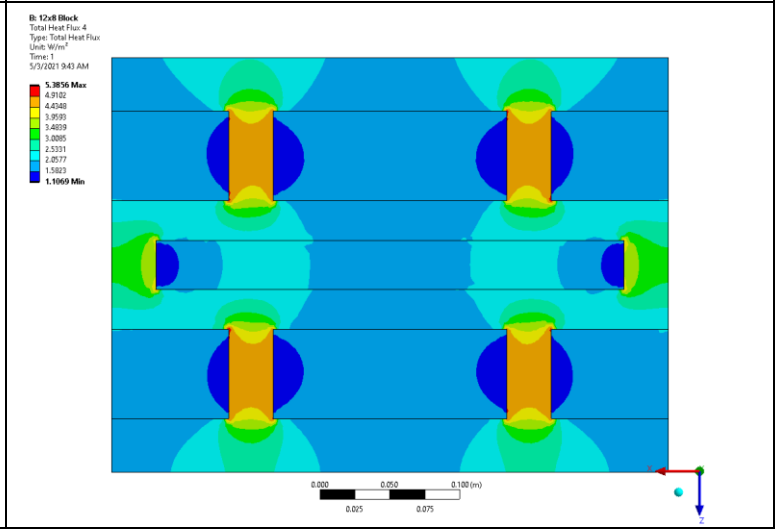
U-factor Oven Dry – With Air Film[ii] [BTU/ft^2°Fhr]	0.0919	0.06010

Table 4 - Graphical Results

	8x8 Insul-Block	12x8 Insul-Block
Exterior Surface Temperature		
Interior Surface Temperature		

Exterior Surface Heat Flux		
Interior Surface Heat Flux		

Cross Sectional Temperature – Top		
Cross Sectional Temperature – Bottom		

Cross Sectional Heat Flux – Top		
Cross Sectional Heat Flux – 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.