Heating/Cooling Benefits of Thermal Mass and High R-Value

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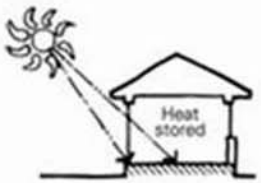
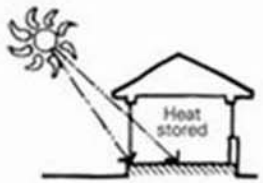
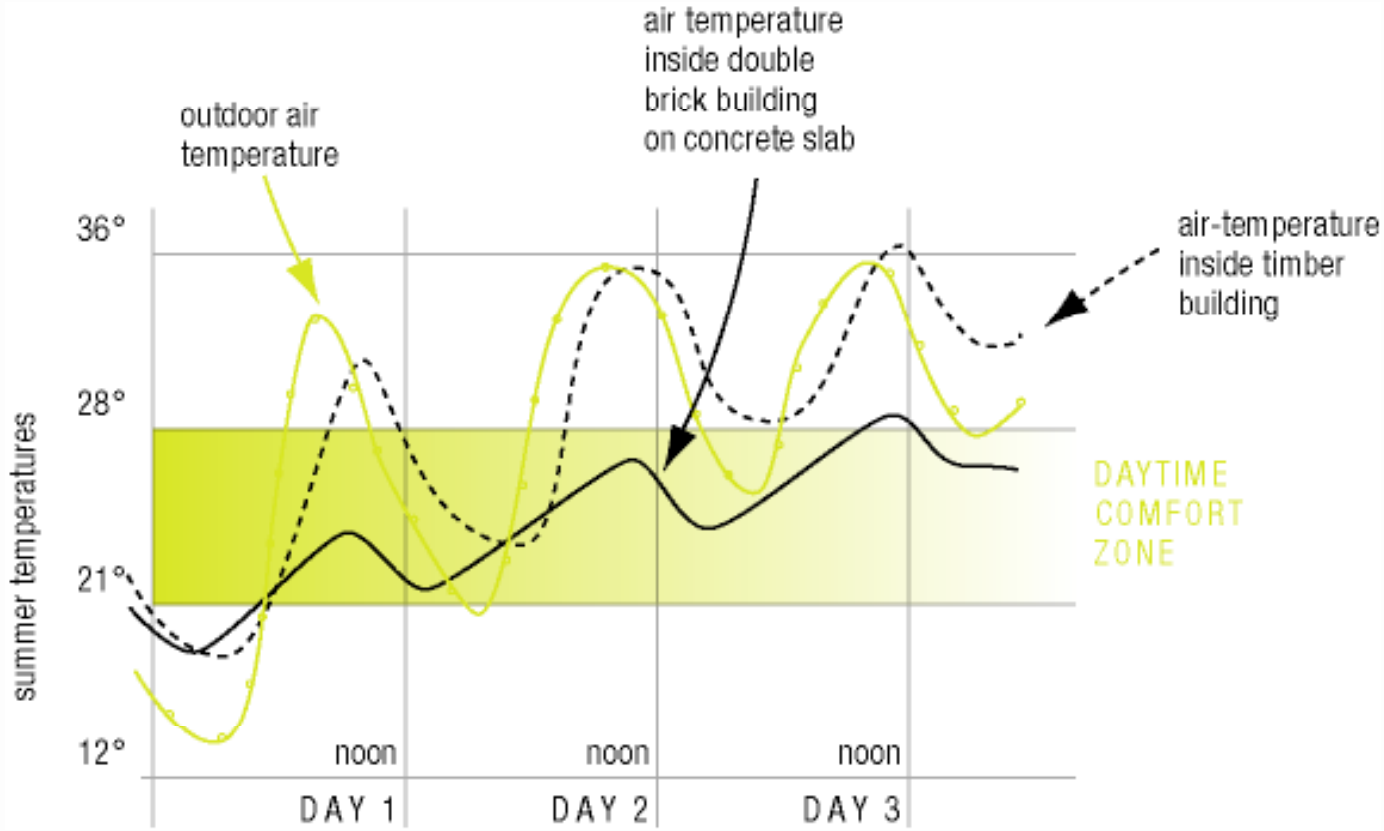


DOE – Building Technologies Goals

- 50% whole building energy reduction by 2015
- 75% whole building energy reduction by 2025.
- R25+ walls by 2025.



i. Damps out temperature swings



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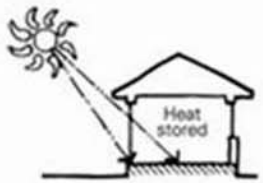
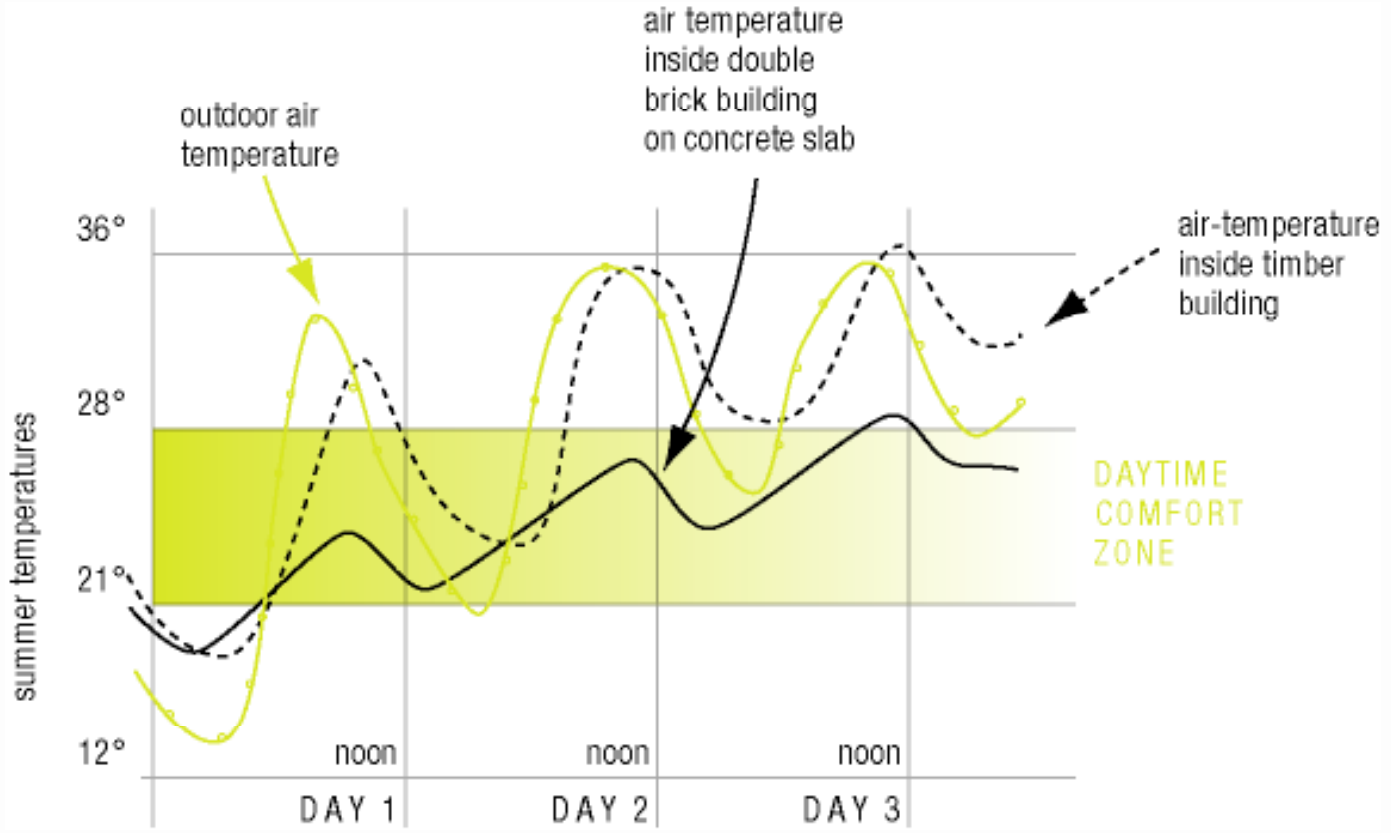


ii. Greater comfort with less reliance on mechanical systems



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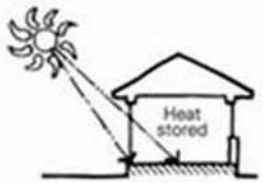
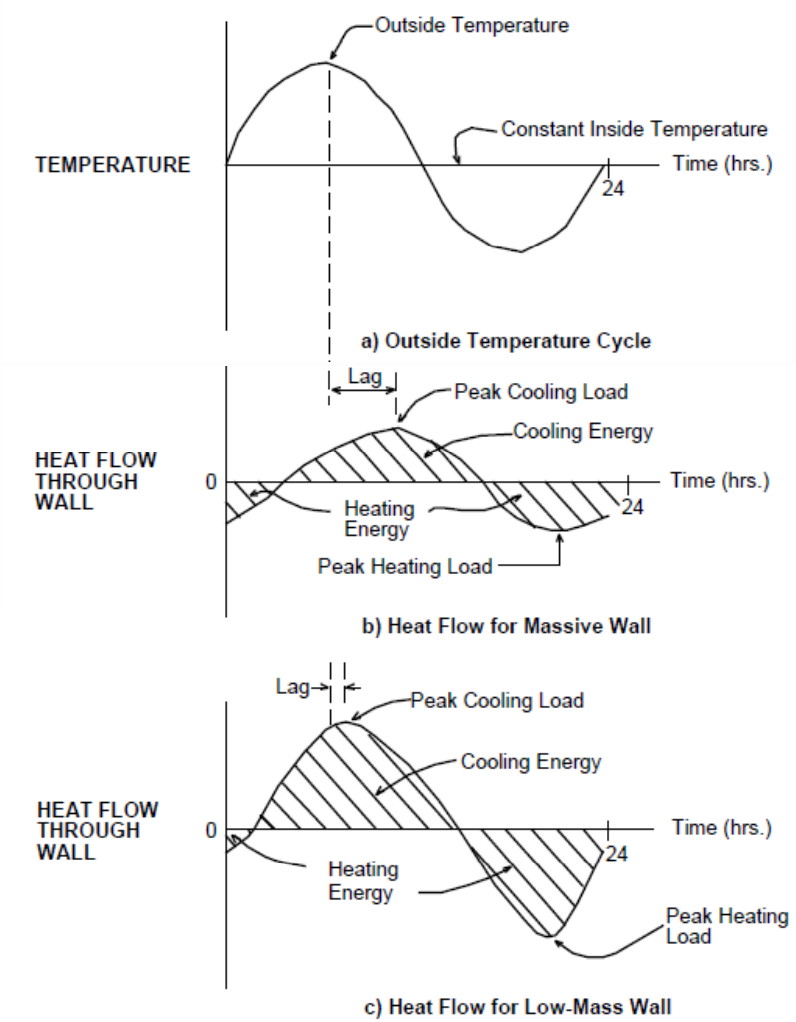
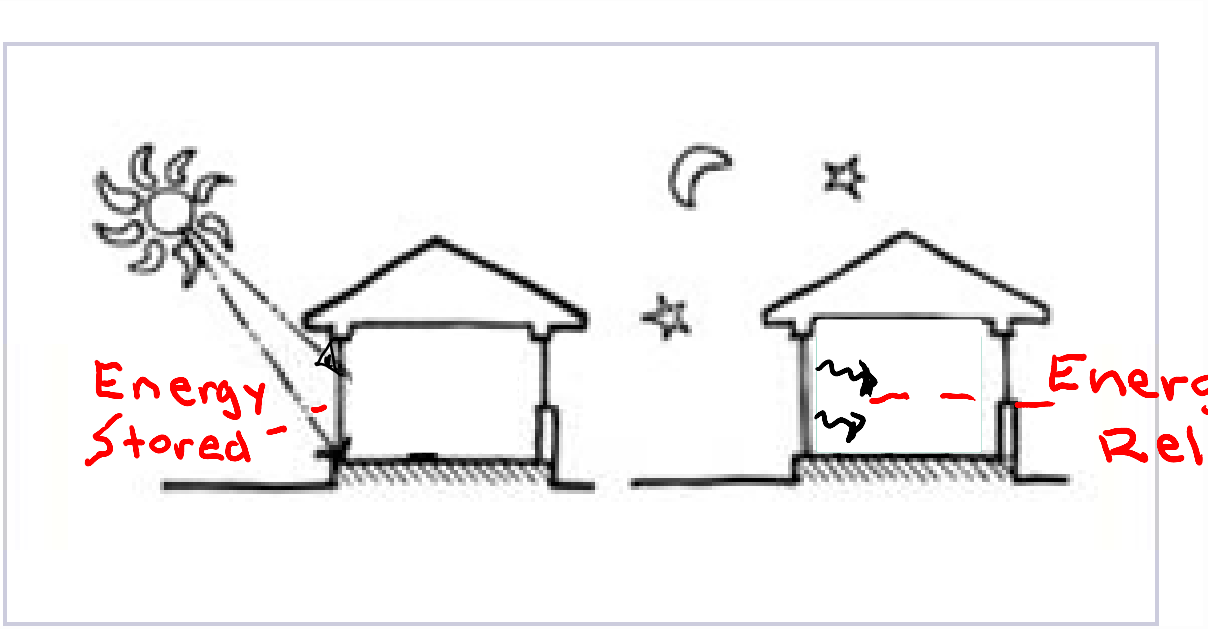
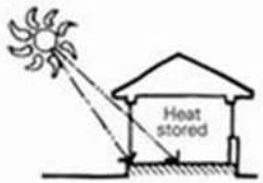


ii. Yields Lower Peak Loading (Potential to Downsize Heating / Cooling Systems)

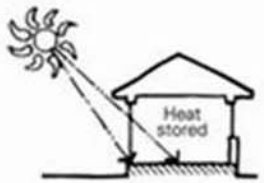


Thermal Mass Stores Solar Energy During the Winter





III. What Do the Building Codes Say About Thermal Mass?

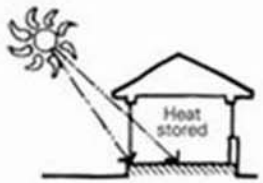


ASHRAE

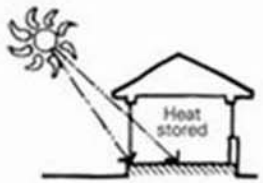
- ASHRAE Standard 90.1 -Energy Efficient Design of New Buildings, 3 options
  1. Prescriptive – Tables
  2. Overall Building Energy Analysis
  3. Compare Energy Costs to a Standard Building (e.g., 25% less energy than a standard building)

- ASHRAE Standard 90.2 -Residential

  Separate R-value graphs are provided for concrete and masonry walls with interior, exterior, or integral insulation. To use the tables the user only needs to know the heating and cooling degree days at the location where the building is to be located.



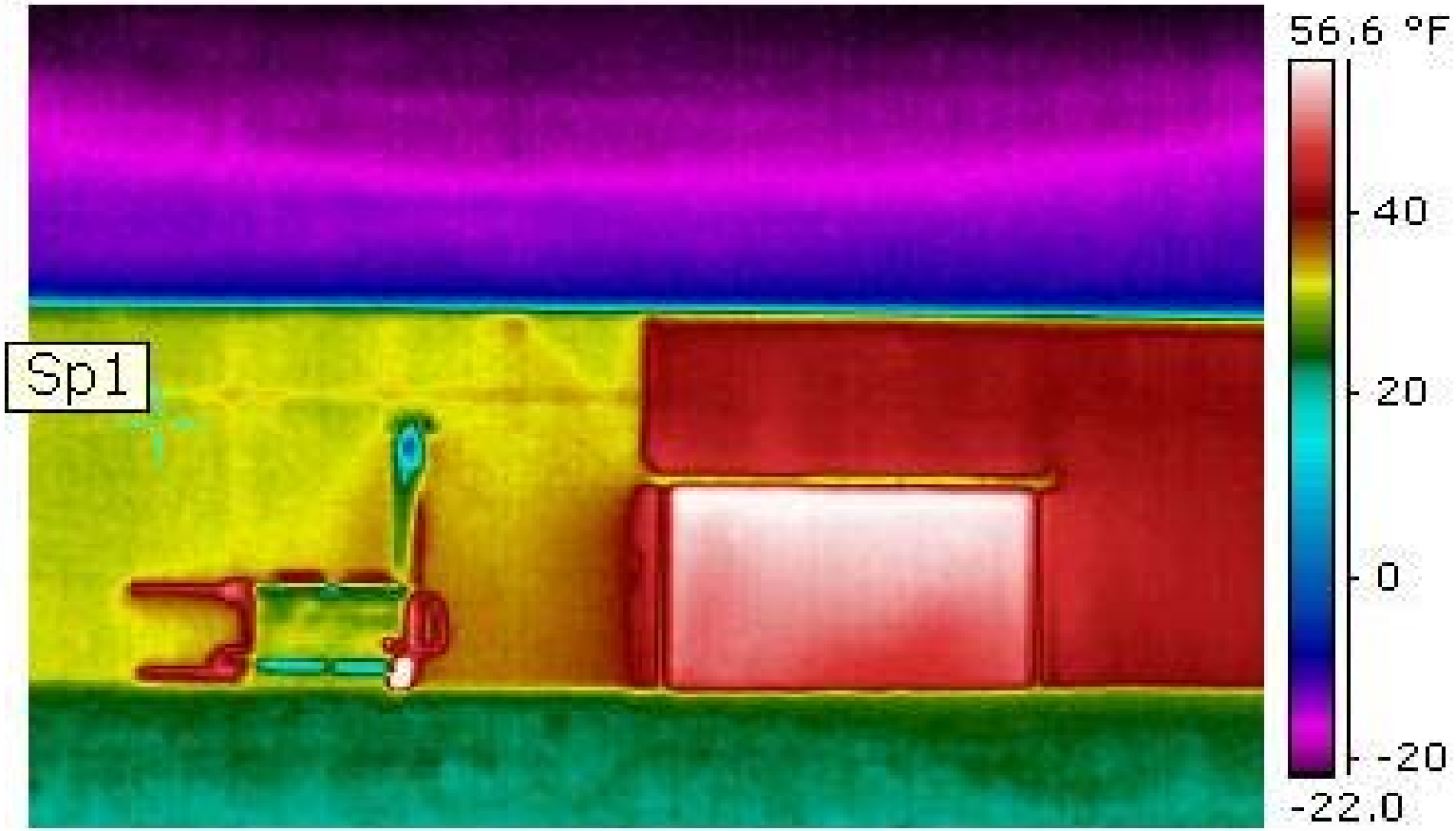
IV. Effective R-Value of AAC Products – Some Examples and Some Whole Building Simulations



8:00 AM

Performance temp = 31 F

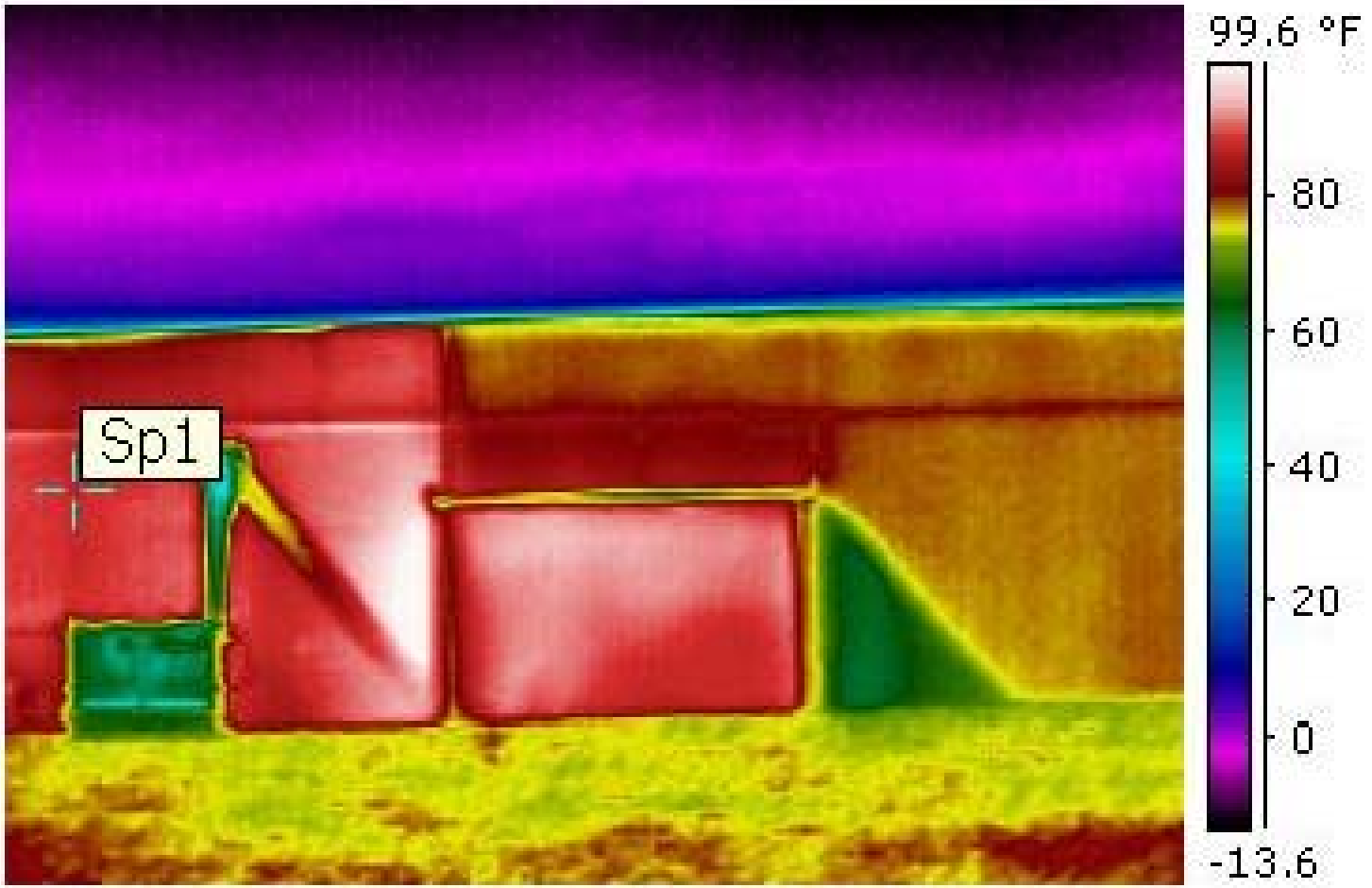
Other temp = 42 F



1:00 PM

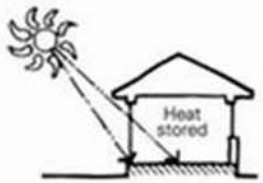
Performance temp = 88 F

Other temp = 78 F

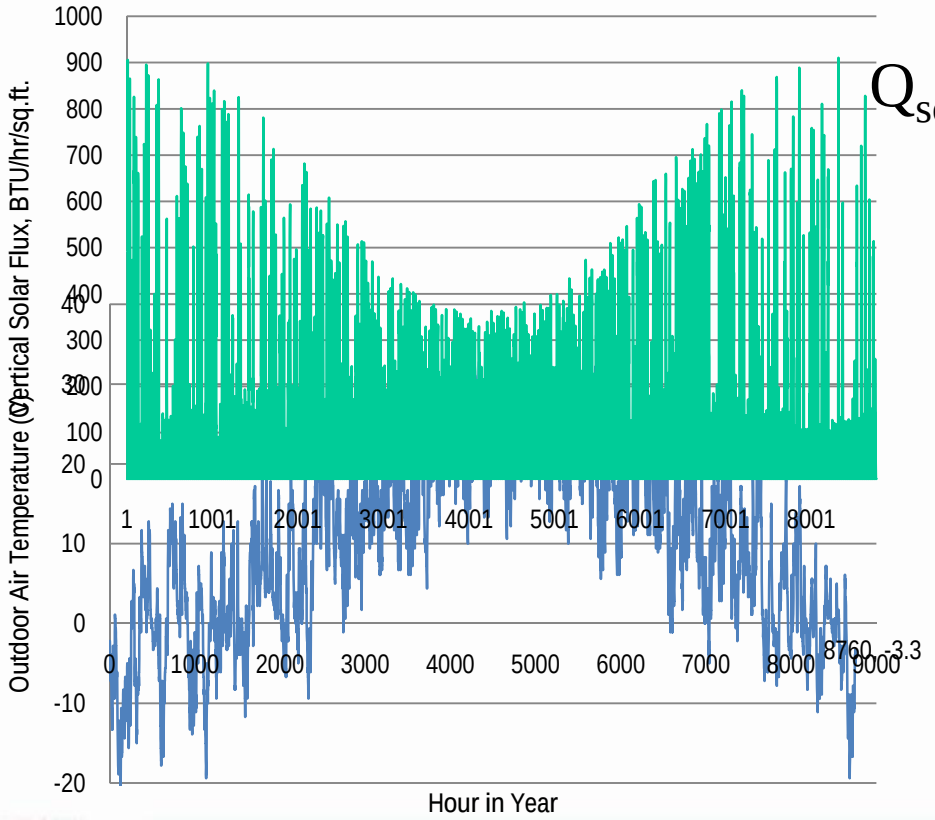


ii. Trotwood Middle School (AAC4 – 8" Walls Reduce Energy

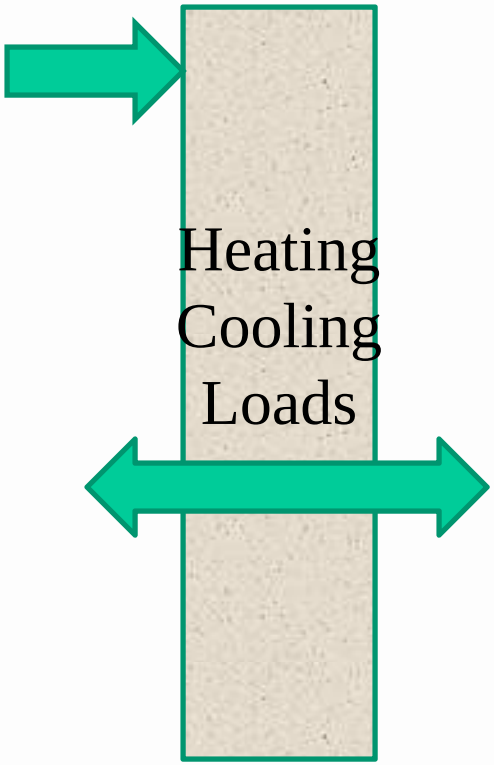
BUILDING NAME	FACILITY SIZE (S.F.)	FUEL KBTU/Sqft	TOTAL ANL COST	TOTAL KBtu/SqFt
High School	230,000	70.17	$ 457,743	119.89
Middle School*	**84,000**	**47.88**	**$ 127,940**	**92.55**
ELC*	66,456	48.65	$ 100,846	88.98
Madison Park	54,065	75.19	$ 115,137	119.51
Westbrooke	54,065	71.47	$ 112,526	119.75



iii. Annual Energy Modeling



Q_{solar}



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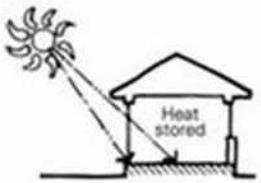
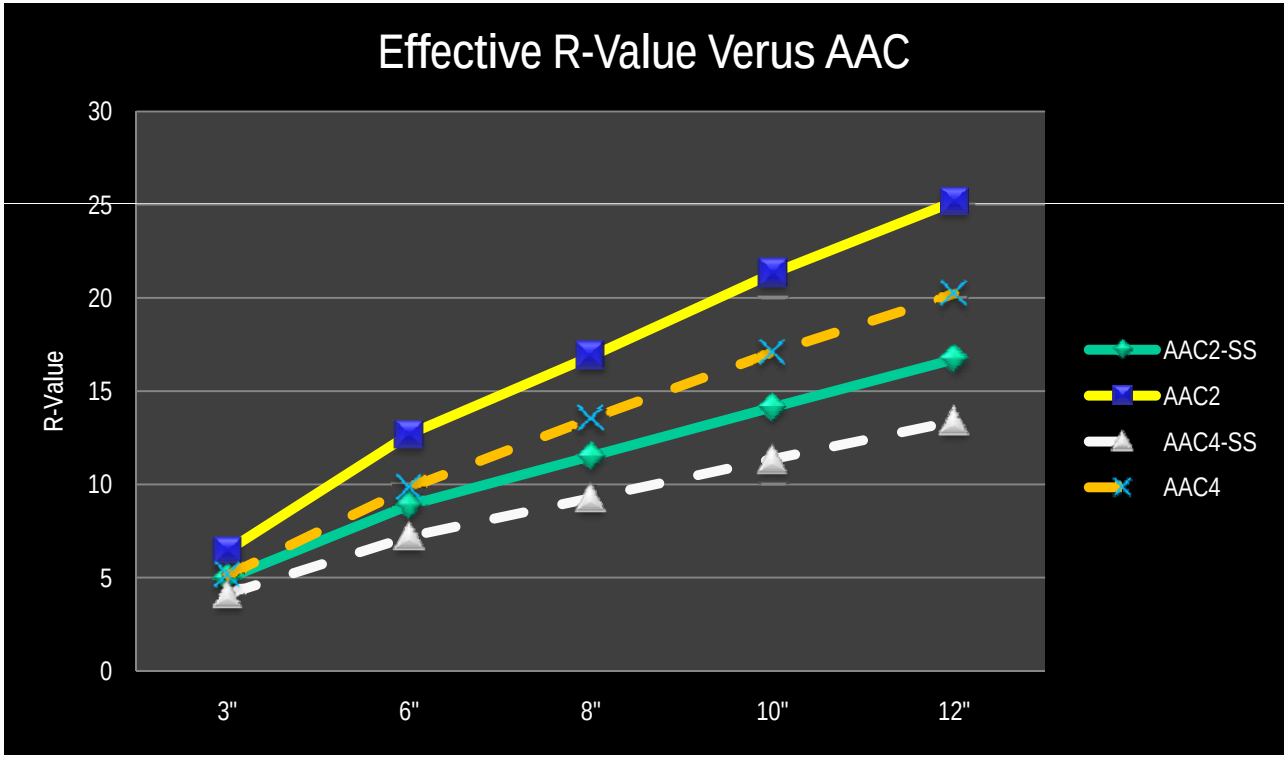


Results for the Effective R-value for the Bare AAC Walls



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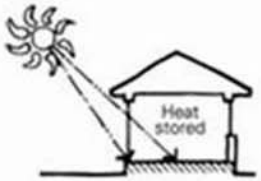
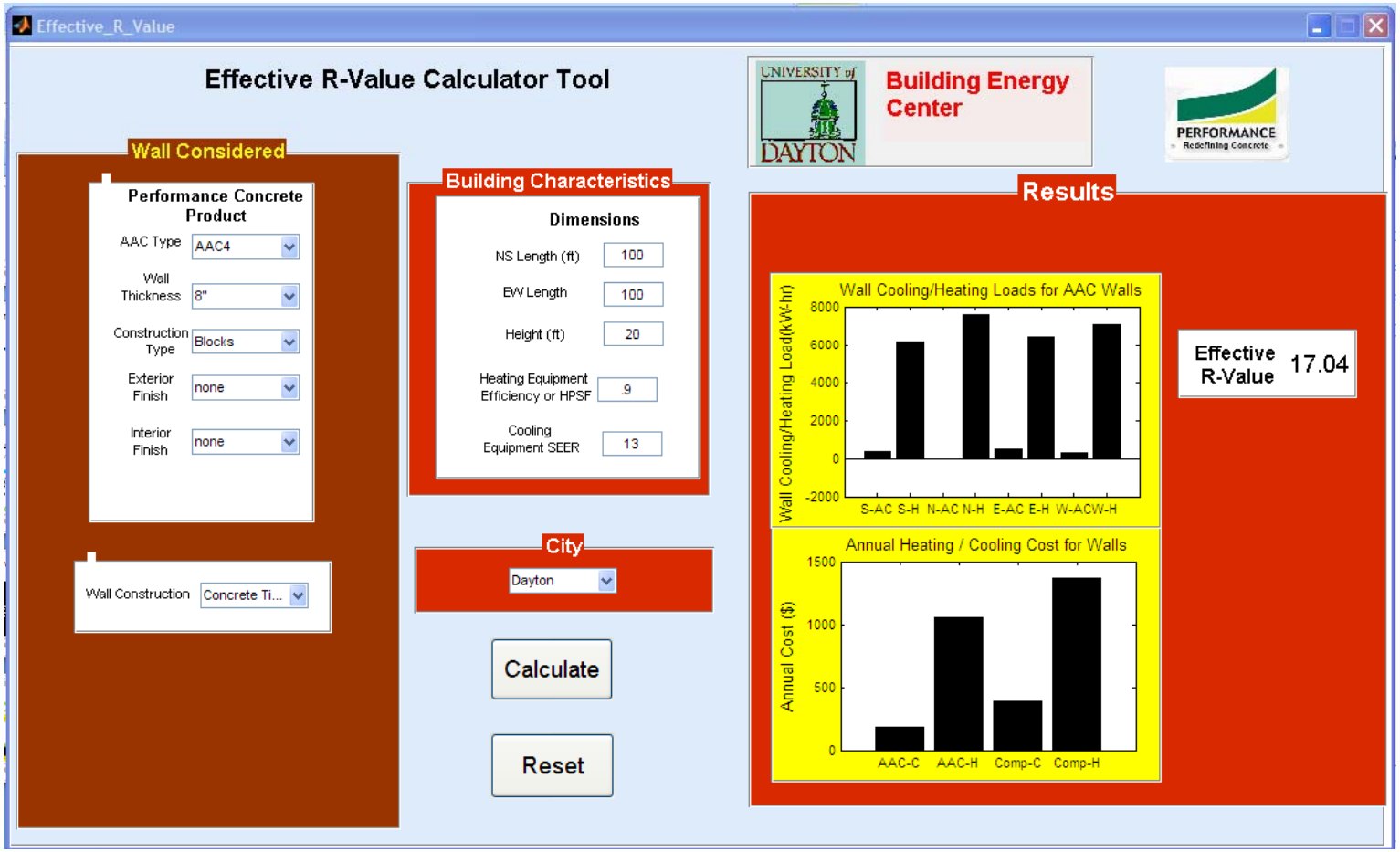


Effective R-Value Calculator Tool



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