Advanced Building Science **Name: _____**

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BBE 4414/5414 **Huelman**

Department of Bioproducts & Biosystems Engineering **University of Minnesota**

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Lab 7. Residential Cooling Load (2.5 Points)

This assignment will take you further into the science (and art) of cooling load calculations. I want you to do a detailed heat gain calculation for the house being used in Lab 6.

Located in St. Paul, Minnesota
Use 1% dry bulb and mean coincident wet bulb design conditions
Assume indoor temperature of 75 degrees and 50% RH

Area Take-offs

Basement slab is a total 1024 square feet
Total volume is 27,648 cubic feet

Important Construction Details

4" basement floor slab is insulated with extruded polystyrene; southern 8' has 3" and rest has 2"
10" basement walls (and stem wall) have exterior waterproofing with 2-¾ " extruded polystyrene.
Rim joist has 2" of extruded polystyrene and ¾" plywood sheathing on the outside of the rim joist (1-1/8" OSB) and 1-1/2"extruded covered by ¾" polyisocyanurate on the inside.
Exterior walls are 2x6 @ 16" o.c. with blown-in-blanket (R-22) and 25/32" fiberboard sheathing
Assume vinyl siding for all exterior walls
House/garage wall is 2x6 @ 16" o.c. with blown-in blanket fiberglass and 5/8" drywall
Ceiling is raised heel roof trusses @ 24' o.c. with R-50 blown-in fiberglass
Attic hatch is drywall plus 3" of extruded polystyrene and an R-19 batt
Windows and patio doors are aluminum clad wood with triple glazing, two 0.10 low-e coatings, and ½" argon
Front door and sidelights are insulated steel in wood frame with 45% double low-e, argon glass
House/garage door is insulated steel in wood frame
Airtight construction (350 cfm @ 50 Pa; effective leakage area of 25 sq. in.)
Ventilation is provided with a 75% efficient HRV; normal ventilation rate will be 90 cfm
Heating will be a combination space and water heat; CAE = 92%
Ductwork is uninsulated, but pretty tight (5%/5%)