

Lab 1. (2.5 Points)

Please use the following notes and attached materials to determine the total UA and “average U-value” for the ceiling and above-grade walls of this house. Develop your own table or spreadsheet, but please use the general format of the 2000 Minnesota Energy Code Summary U-Value Worksheet provided in this packet. You must submit your completed U-value worksheet, along with a short commentary on what you learned or any energy insights the worksheet might provide.

Notes: The basic house is a 32' by 32' two-story with a walkout basement on the south side. It has an attached garage that wraps around a portion of the first floor on the west and north sides. There is an open porch across the front of the first floor (north) and a screened porch across one-half of the first floor on the east side. The home is located in St. Paul, Minnesota

Area Take-Offs:

- Basement slab is a total 1024 square feet
- South side of basement level is 32' of walkout (4' stem wall) and 256 square foot of frame wall
- Basements walls are 7' below grade and 1' above grade for the other three sides
- Total rim joist for both floors is 256 square feet (52 square feet of the total is into the garage)
- Total gross wall area for 1st and 2nd floors is 2176 square feet (234 sq. ft. is into the garage)
- Garage entry door of 20 square feet on west side
- Front door and sidelight on the north side are 40 square feet
- Patio door to the east is 40 square feet
- Patio door to the south on the basement walkout wall is 60 square feet
- Window area on the south is 162 square feet (including 28 square feet on the walkout wall)
- Window area on the west is 18 square feet
- Window area on the north is 63 square feet
- Window area on the east is 48 square feet
- Ceiling area is 1024 square feet with a 3 square foot attic hatch
- Total volume is 27,648 cubic feet

Important Construction Details:

- 4" basement floor slab is uninsulated
- 10" concrete basement walls have exterior waterproofing with 1" extruded polystyrene
- Rim joist has 2" of extruded polystyrene on the outside of the rim joist
- Exterior walls are 2x6 @ 16" o.c. with fiberglass batt (R-19) and 25/32" fiberboard sheathing
- Assume vinyl siding for all exterior walls
- House/garage wall is 2x6 @ 16" o.c. with fiberglass batt (R-19) and 5/8" drywall
- Ceiling is roof trusses @ 24' o.c. with R-40 blown-in fiberglass
- Attic hatch is drywall plus 3" of extruded polystyrene plus an R-19 batt
- Windows and patio doors are clad wood frame with double glazing and low-e (U-value of 0.35)
- 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
- Ventilation is provided with a 75% efficient HRV; normal ventilation rate will be 90 cfm
- Heating is a forced air furnace at 92% AFUE and the water heater has an Energy Factor of 0.65