## Design Data

| | | |
|---|---|---|
| Reference City: | | Flint, Michigan |
| Building Orientation: | | Front door faces South |
| Daily Temperature Range: | | Medium |
| Latitude: | 42 | Degrees |
| Elevation: | 771 | ft. |
| Altitude Factor: | 0.972 | |

| | Outdoor Dry Bulb | Outdoor Wet Bulb | Outdoor Rel.Hum | Indoor Rel.Hum | Indoor Dry Bulb | Grains Difference |
|---|---|---|---|---|---|---|
| Winter: | 1 | 0.29 | n/a | n/a | 72 | n/a |
| Summer: | 87 | 72 | 49% | 50% | 75 | 31 |

## Check Figures

| | | | |
|---|---|---|---|
| Total Building Supply CFM: | 967 | CFM Per Square ft.: | 0.200 |
| Square ft. of Room Area: | 4,842 | Square ft. Per Ton: | 2,567 |
| Volume (ft³) of Cond. Space: | 45,786 | | |

## Building Loads

| | | | | |
|---|---|---|---|---|
| Total Heating Required Including Ventilation Air: | 37,561 | Btuh | 37.561 | MBH |
| Total Sensible Gain: | 20,697 | Btuh | 91 | % |
| Total Latent Gain: | 1,942 | Btuh | 9 | % |
| Total Cooling Required Including Ventilation Air: | 22,639 | Btuh | 1.89 | Tons (Based On Sensible + Latent) |

## Notes

Rhvac is an ACCA approved Manual J and Manual D computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.
All computed results are estimates as building use and weather may vary.
Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

# Load Preview Report

| Scope | Net Ton | ft.² /Ton | Area | Sen Gain | Lat Gain | Net Gain | Sen Loss | Sys Htg CFM | Sys Clg CFM | Sys Act CFM | Duct Size |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Building | 1.89 | 2,567 | 4,842 | 20,697 | 1,942 | 22,639 | 37,561 | 502 | 967 | 967 | |
| System 1 | 1.89 | 2,567 | 4,842 | 20,697 | 1,942 | 22,639 | 37,561 | 502 | 967 | 967 | 22x8 |
| Zone 1 - Clg.: 25%, Htg.: 53% | | | 2,549 | 6,410 | 476 | 6,886 | 19,908 | 266 | 300 | 300 | 8x8 |
| 1-B West Storage | | | 377 | 379 | 96 | 475 | 4,207 | 56 | 18 | 18 | 1-6 |
| 2-B Bedroom | | | 374 | 464 | 89 | 553 | 3,036 | 41 | 22 | 22 | 1-6 |
| 3-B Basement | | | 1,092 | 1,344 | 110 | 1,454 | 5,708 | 76 | 63 | 63 | 1-6 |
| 4-B Golf Rm | | | 255 | 2,906 | 72 | 2,978 | 2,431 | 32 | 136 | 136 | 2-6 |
| 5-B Stair | | | 165 | 986 | 25 | 1,011 | 938 | 13 | 46 | 46 | 1-6 |
| 6-B S E Storage | | | 286 | 331 | 84 | 415 | 3,588 | 48 | 15 | 15 | 1-6 |
| Zone 2 - Clg.: 75%, Htg.: 47% | | | 2,293 | 18,830 | 1,466 | 20,296 | 17,653 | 236 | 880 | 880 | 20x8 |
| 7-1 Master Br | | | 195 | 1,272 | 63 | 1,335 | 1,894 | 25 | 59 | 59 | 1-6 |
| 8-1 Bed Rm | | | 225 | 902 | 74 | 976 | 2,104 | 28 | 42 | 42 | 1-6 |
| 9-1 Great Rm | | | 411 | 3,115 | 1,012 | 4,127 | 2,974 | 40 | 146 | 146 | 2-6 |
| 10-1 Season Rm | | | 180 | 3,361 | 65 | 3,426 | 2,151 | 29 | 157 | 157 | 2-6 |
| 11-1 Master Bath | | | 130 | 379 | 22 | 401 | 707 | 9 | 18 | 18 | 1-6 |
| 12-1 Full Bath | | | 70 | 56 | 0 | 56 | 84 | 1 | 3 | 3 | 1-6 |
| 13-1 Laundry | | | 81 | 65 | 0 | 65 | 98 | 1 | 3 | 3 | 1-6 |
| 14-1 Kitchen | | | 288 | 4,075 | 38 | 4,113 | 1,370 | 18 | 190 | 190 | 2-6 |
| 15-1 Foyer | | | 286 | 979 | 44 | 1,023 | 1,717 | 23 | 46 | 46 | 1-6 |
| 16-1 Kitchen | | | 108 | 1,358 | 20 | 1,378 | 715 | 10 | 63 | 63 | 1-6 |
| 17-1 W I C | | | 78 | 161 | 43 | 204 | 1,058 | 14 | 8 | 8 | 1-6 |
| 18-1 Mud | | | 144 | 856 | 40 | 896 | 1,464 | 20 | 40 | 40 | 1-6 |
| 19-1 Office/bedroom | | | 96 | 2,251 | 45 | 2,296 | 1,317 | 18 | 105 | 105 | 1-6 |

Sum of room airflows may be greater than system airflow because system has multiple zones.

## Total Building Summary Loads

| Component Description | Area Quan | Sen Loss | Lat Gain | Sen Gain | Total Gain |
|---|---|---|---|---|---|
| U .13 SHGC .61: Glazing-WARTELLA GLAZING, outdoor insect screen with 50% coverage, u-value 0.13, SHGC 0.61 | 503.5 | 4,649 | 0 | 13,047 | 13,047 |
| 11F: Door-Wood - Solid Core With Metal Storm | 42 | 834 | 0 | 270 | 270 |
| 15A-10sfoc-2: Wall-Basement, concrete block wall, R-10 foam board to floor, no framing, no interior finish, open core, 2' floor depth | 1305 | 7,426 | 0 | 839 | 839 |
| 12F2-0bw: Wall-Frame, R-34 closed cell 2 lb. spray foam insulation in 2 x 6 stud cavity, no board insulation, brick finish, wood studs | 2537.9 | 9,910 | 0 | 1,062 | 1,062 |
| R-60: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Custom, ATTIC R-60 | 2293 | 2,767 | 0 | 1,833 | 1,833 |
| 21A-20: Floor-Basement, Concrete slab, any thickness, 2 or more feet below grade, no insulation below floor, any floor cover, shortest side of floor slab is 20' wide | 2549 | 4,886 | 0 | 0 | 0 |
| Subtotals for structure: | | 30,472 | 0 | 17,051 | 17,051 |
| People: | 4 | | 920 | 1,200 | 2,120 |
| Equipment: | | | 0 | 1,800 | 1,800 |
| Lighting: | 0 | | | 0 | 0 |
| Ductwork: | | 0 | 0 | 0 | 0 |
| Infiltration: Winter CFM: 93, Summer CFM: 50 | | 7,089 | 1,022 | 646 | 1,668 |
| Ventilation: Winter CFM: 0, Summer CFM: 0 | | 0 | 0 | 0 | 0 |
| Total Building Load Totals: | | 37,561 | 1,942 | 20,697 | 22,639 |

### Check Figures

| | | | |
|---|---|---|---|
| Total Building Supply CFM: | 967 | CFM Per Square ft.: | 0.200 |
| Square ft. of Room Area: | 4,842 | Square ft. Per Ton: | 2,567 |
| Volume (ft³) of Cond. Space: | 45,786 | | |

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|---|---|---|---|---|
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| Total Sensible Gain: | 20,697 | Btuh | 91 | % |
| Total Latent Gain: | 1,942 | Btuh | 9 | % |
| Total Cooling Required Including Ventilation Air: | 22,639 | Btuh | 1.89 | Tons (Based On Sensible + Latent) |

### Notes

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## System 1 Room Load Summary

| No | Room Name | Area SF | Htg Sens Btuh | Min Htg CFM | Run Duct Size | Run Duct Vel | Clg Sens Btuh | Clg Lat Btuh | Min Clg CFM | Act Sys CFM |
|---|---|---|---|---|---|---|---|---|---|---|
| ---Zone 1--- | | | | | | | | | | |
| 1 | B West Storage | 377 | 4,207 | 56 | 1-6 | 90 | 379 | 96 | 18 | 18 |
| 2 | B Bedroom | 374 | 3,036 | 41 | 1-6 | 110 | 464 | 89 | 22 | 22 |
| 3 | B Basement | 1,092 | 5,708 | 76 | 1-6 | 320 | 1,344 | 110 | 63 | 63 |
| 4 | B Golf Rm | 255 | 2,431 | 32 | 2-6 | 346 | 2,906 | 72 | 136 | 136 |
| 5 | B Stair | 165 | 938 | 13 | 1-6 | 235 | 986 | 25 | 46 | 46 |
| 6 | B S E Storage | 286 | 3,588 | 48 | 1-6 | 79 | 331 | 84 | 15 | 15 |
| | Zone 1 subtotal | 2,549 | 19,908 | 266 | | | 6,410 | 476 | 300 | 300 |
| ---Zone 2--- | | | | | | | | | | |
| 7 | 1 Master Br | 195 | 1,894 | 25 | 1-6 | 303 | 1,272 | 63 | 59 | 59 |
| 8 | 1 Bed Rm | 225 | 2,104 | 28 | 1-6 | 215 | 902 | 74 | 42 | 42 |
| 9 | 1 Great Rm | 411 | 2,974 | 40 | 2-6 | 371 | 3,115 | 1,012 | 146 | 146 |
| 10 | 1 Season Rm | 180 | 2,151 | 29 | 2-6 | 400 | 3,361 | 65 | 157 | 157 |
| 11 | 1 Master Bath | 130 | 707 | 9 | 1-6 | 90 | 379 | 22 | 18 | 18 |
| 12 | 1 Full Bath | 70 | 84 | 1 | 1-6 | 13 | 56 | 0 | 3 | 3 |
| 13 | 1 Laundry | 81 | 98 | 1 | 1-6 | 15 | 65 | 0 | 3 | 3 |
| 14 | 1 Kitchen | 289 | 1,370 | 18 | 2-6 | 485 | 4,075 | 38 | 190 | 190 |
| 15 | 1 Foyer | 286 | 1,717 | 23 | 1-6 | 233 | 979 | 44 | 46 | 46 |
| 16 | 1 Kitchen | 108 | 715 | 10 | 1-6 | 323 | 1,358 | 20 | 63 | 63 |
| 17 | 1 W I C | 78 | 1,058 | 14 | 1-6 | 38 | 161 | 43 | 8 | 8 |
| 18 | 1 Mud | 144 | 1,464 | 20 | 1-6 | 204 | 856 | 40 | 40 | 40 |
| 19 | 1 Office/bedroom | 96 | 1,317 | 18 | 1-8 | 536 | 2,251 | 45 | 105 | 105 |
| | Zone 2 subtotal | 2,293 | 17,653 | 236 | | | 18,830 | 1,466 | 880 | 880 |
| | System 1 total | 4,842 | 37,561 | 502 | | | 20,697 | 1,942 | 967 | 967 |

System 1 Main Trunk Size: 22x8 in.
Velocity: 792 ft./min
Loss per 100 ft.: 0.111 in.wg

Note: Since the system is multizone, the Peak Fenestration Gain Procedure was used to determine glass sensible gains at the room and zone levels, so the sums of the zone sensible gains and airflows for cooling shown above are not intended to equal the totals at the system level. Room and zone sensible gains and cooling CFM values are for the hour in which the glass sensible gain for the zone is at its peak. Sensible gains at the system level are based on the "Average Load Procedure + Excursion" method.

### Cooling System Summary

| | Cooling Tons | Sensible/Latent Split | Sensible Btuh | Latent Btuh | Total Btuh |
|---|---|---|---|---|---|
| Net Required: | 1.89 | 91% / 9% | 20,697 | 1,942 | 22,639 |