

Thermal Audit – Mercy Gate Church Box Elder

Address: 400 225th St, Box Elder SD 57719

Date: 17 March 2023 @ 8pm (1 Hour After Sunset)

Exterior Air Temperature: 21* F

Interior Air Temperature: 70* F

Equipment: FLIROne 435-0003-01-00 (Self-Calibrated)

Note: This audit is for informational purposes only. This audit was performed using commercially available FLIR equipment; recommendations should be taken only as recommendations and may or may not improve the energy efficiency of the property. This report only surveyed the interior of the building; an external and attic audit looking for heat loss is recommended.

Unrelated to this audit, more than 10 rolls of unused batt insulation were observed in the attic by a maintenance team.

Worship Hall

The Drop Ceiling is missing insulation in various places, this has a small impact on energy loss (Figure 1-Light Panel - Drop Ceiling). The original ceiling is the primary offender in energy loss. Most significant is the left ceiling above the stage (Figure 2-Left Ceiling Above Stage) and right ceiling in the right storage room (Figure 3-Right Storage Room Ceiling); another is the forward right support post (Figure 4-Front Right Support Post). The windows are in good condition, and the shutters further increase the R-value of the window openings.

Both exterior doors have a high impact on energy loss (Figure 5-Worship Hall Doors).

Boiler feed lines are 178°F and 124°F. Damage to human skin occurs in seconds above 140°F. accidental contact with the 178°F line is precluded by its location in the North ceiling behind the confidence monitor; recommend seeking the input of an expert as to safety of this line. The 124°F line is in the North West corner of the Worship Hall; recommend insulation to prevent accidental exposure which could lead to first degree burns.

Insulating the attic space will improve the R-value of the worship hall. Replacing missing insulation in the drop ceiling will also help. One or the other is recommended, both would likely not provide a high return on investment over one or the other.

Replacing or sealing the exterior doors will drastically improve efficiency in the Worship Hall.

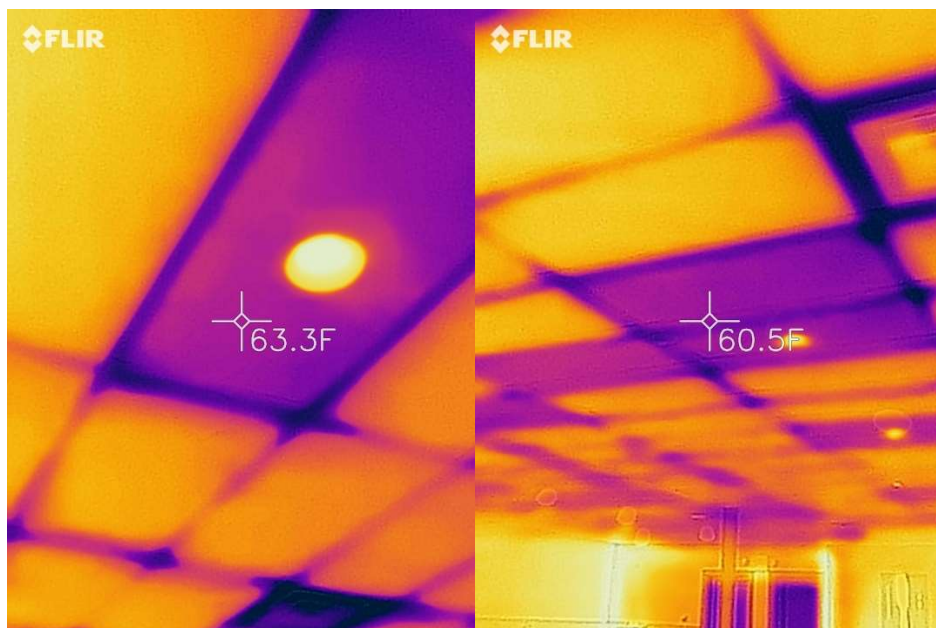


Figure 1-Light Panel - Drop Ceiling

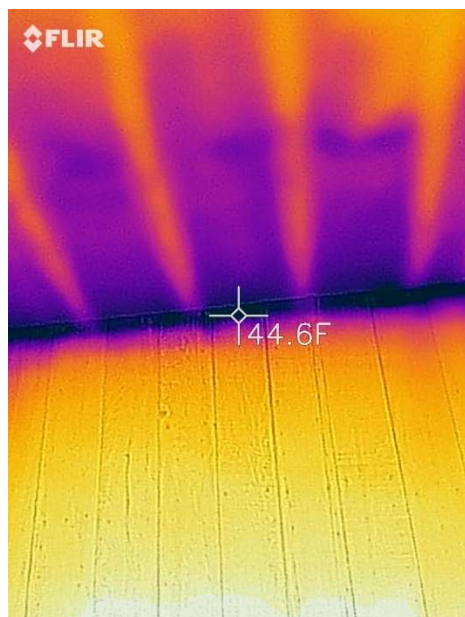


Figure 2-Left Ceiling Above Stage

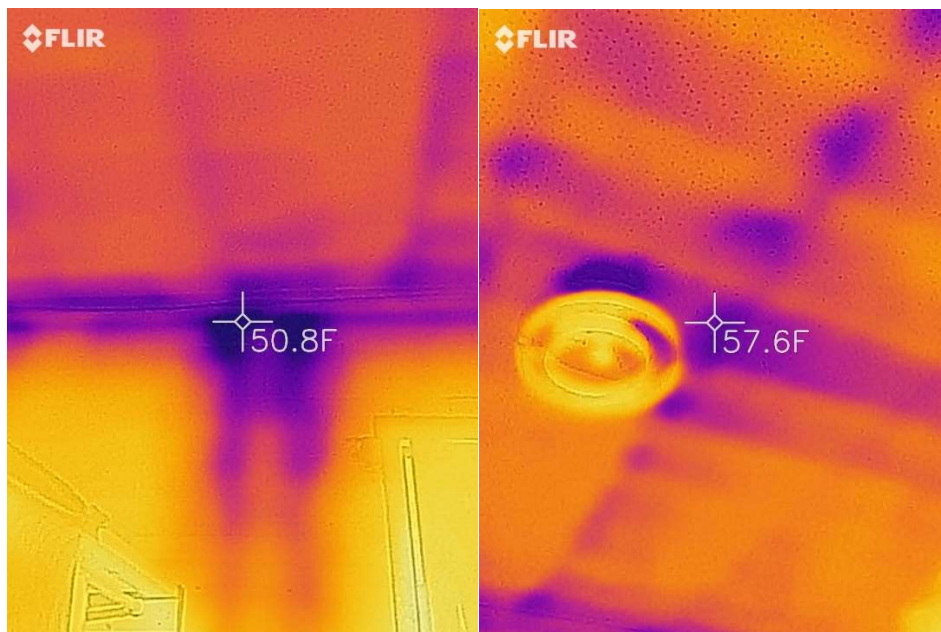


Figure 3-Right Storage Room Ceiling – Circular Fixture is the Light

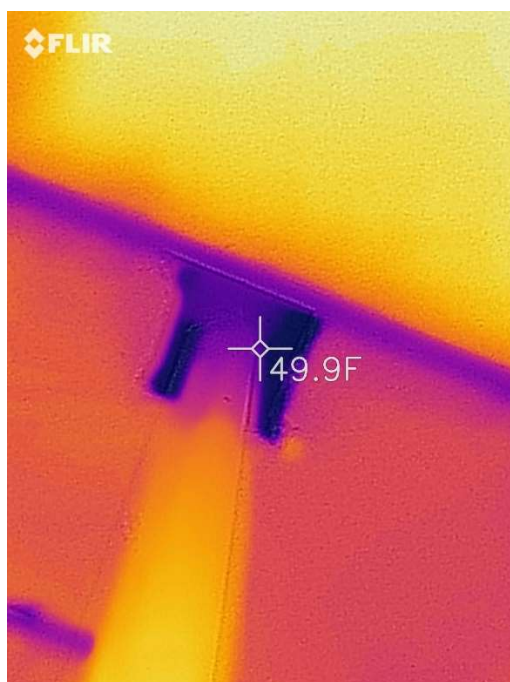


Figure 4-Front Right Support Post Drop Ceiling



Figure 5-Worship Hall Doors

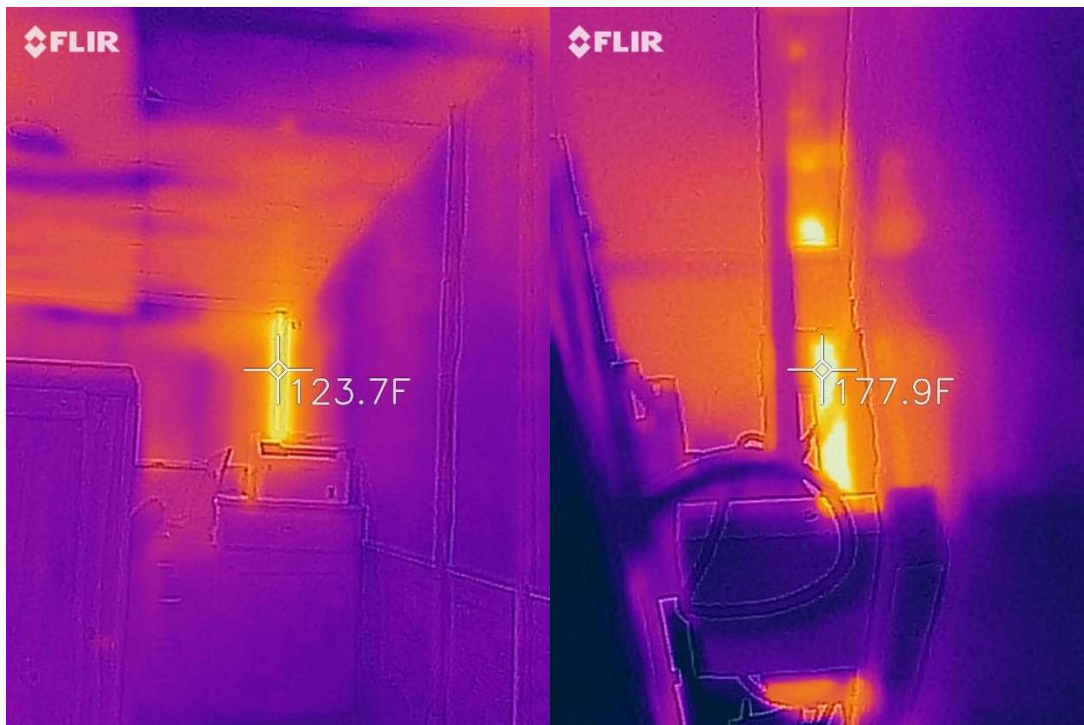


Figure 6-Boiler Feed Lines

Classrooms & Foyer

Exterior brick walls have a small impact on energy loss, specifically in the East wall and children's bathroom West wall. The foyer entry door could use a better seal. Ceilings are moderate energy loss points, especially in the children's bathroom and storage room.

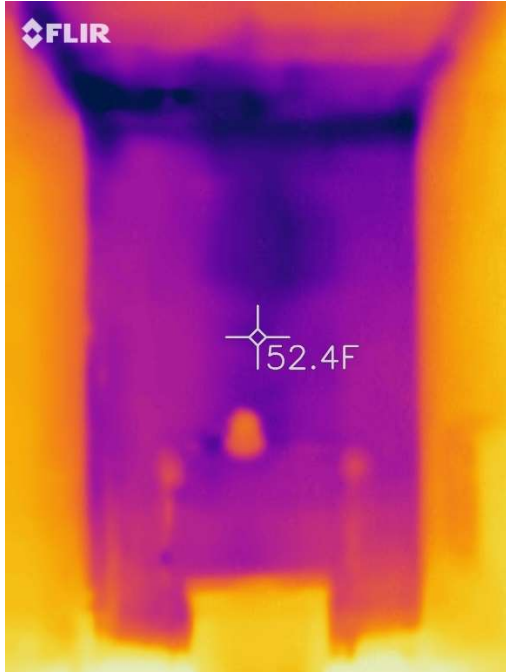


Figure 7-Childrens Bathroom West Wall

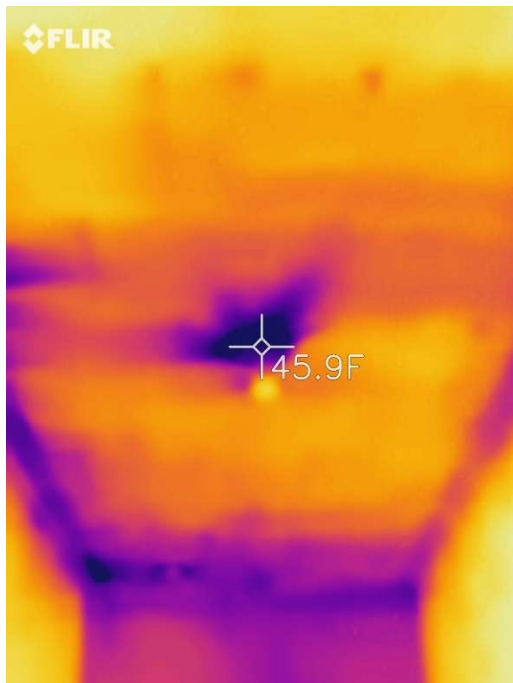


Figure 8-Children's Bathroom Ceiling



Figure 9-Foyer Door

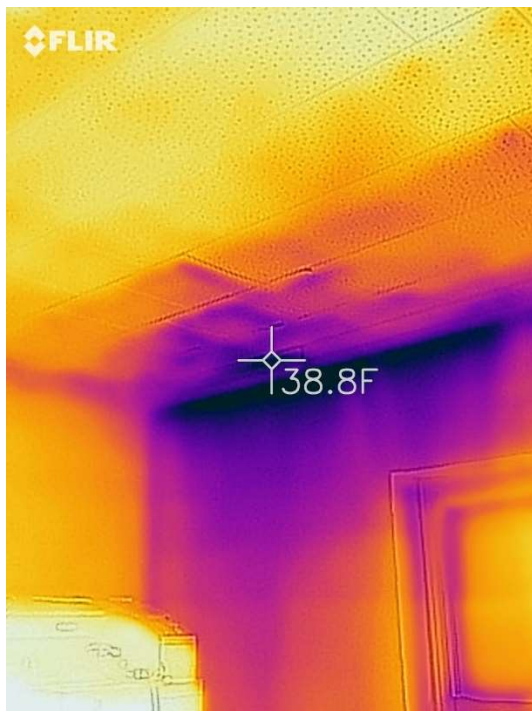


Figure 10-Children's Storage Room Ceiling

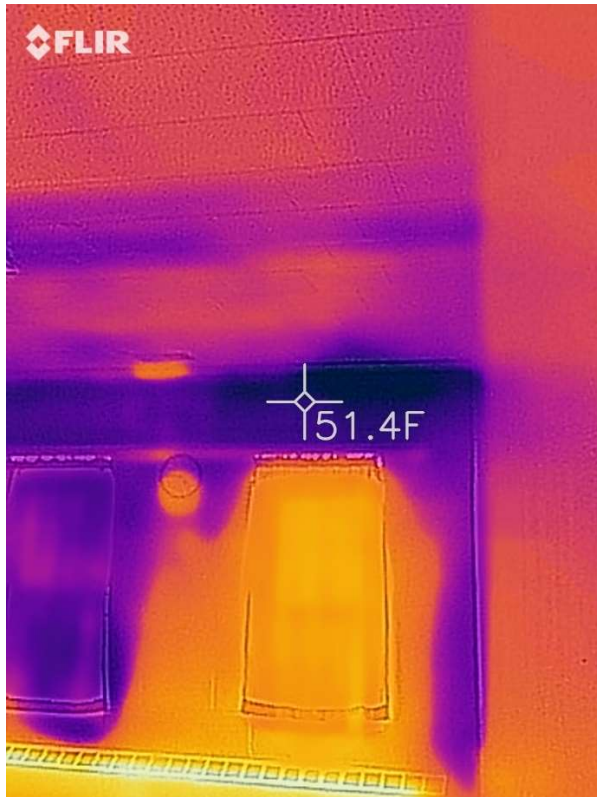


Figure 11-Classroom Closest to Children's Bathroom

Breezeway and Janitor's Closet

The middle exterior door leading to the janitor's closet seals well except at the bottom, and the door handle and deadbolt provide quite a bit of thermal conduction. The bottom of the door should be sealed. (Figure 12-Breezeway Exterior Door Bottom)

The janitor's closet is well insulated except the two power outlets on the East wall, and the attic access point. Recommend insulation around the outlets, and on the access panel. There is moderate wind at the janitor's closet light switch, however the switch is the same 67°F temperature as the surrounding surfaces. (Figure 14-Janitor's Closet Outlets)

The stairs to the Fellowship Hall are moderate heat loss points, and should be insulated from the trailer crawl space. (Figure 15-Breezeway Stairs to Fellowship Hall)

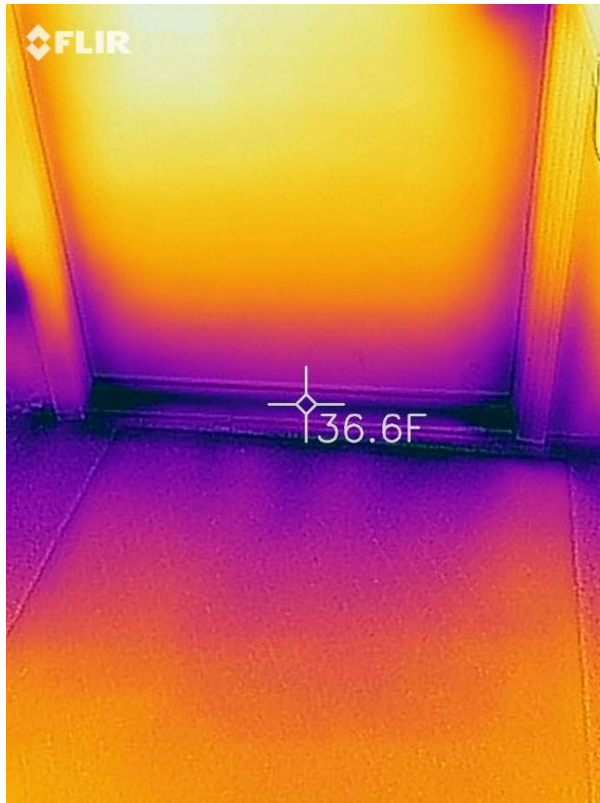


Figure 12-Breezeway Exterior Door Bottom



Figure 13-Janitor's Closet Attic Access Point

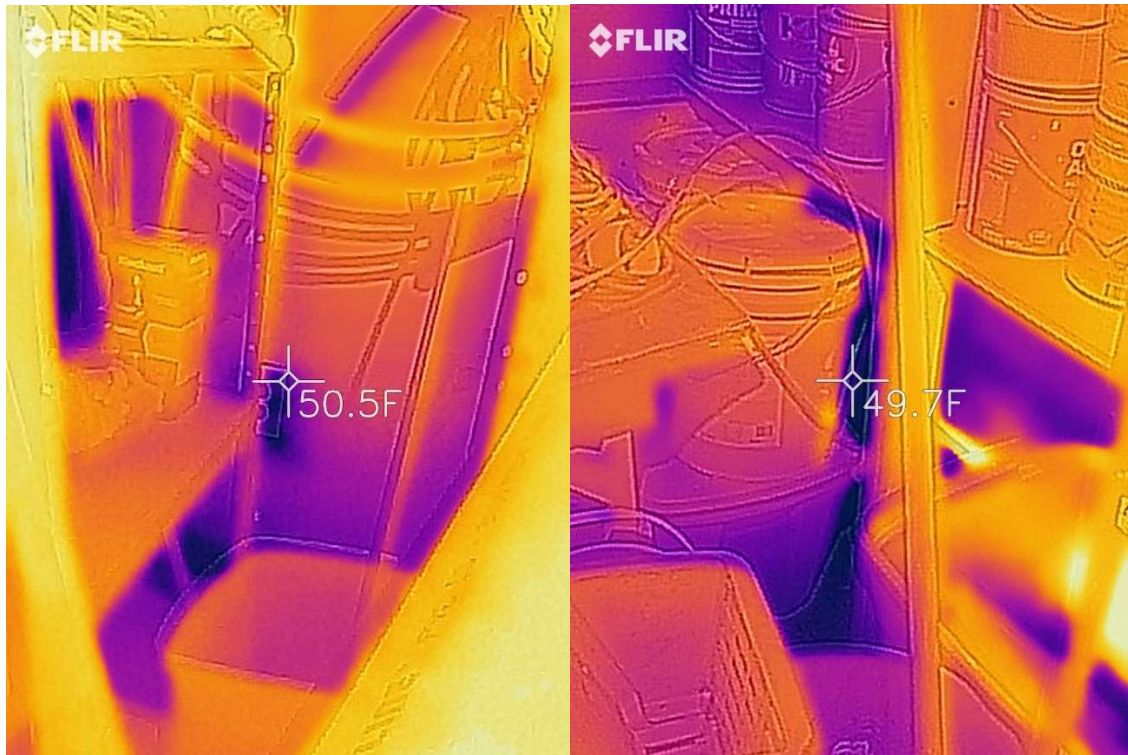


Figure 14-Janitor's Closet Outlets



Figure 15-Breezeway Stairs to Fellowship Hall

Fellowship Hall

The ceiling in the fellowship hall is fairly well insulated. Care should be taken to fill all gaps in the attic with insulation.

The wall above the stairs leading to the Breezeway and Children's Area appears to be an old window which has been sheet-rocked over (Figure 16-Wall Above Fellowship Hall Stairs). This is a moderate energy-loss point, especially for heat. Recommend insulating this wall and replacing the cardboard above the window. The cardboard is not a significant energy loss point.

The walls in the fellowship hall are low energy loss points, should the sheetrock be removed it is recommended that the insulation be improved, but the cost benefit of removing the walls to replace the insulation is not recommended.

The fellowship hall door is a low energy loss point, its seals are in good condition and it works as well as most doors. Recommend keeping the blinds down and shut when the outdoor temperature is extreme.

The windows in the fellowship hall are extreme energy loss points. Recommend replacing windows or installing curtains or blinds. (Figure 17-Two Fellowship Hall Windows, typical of all Fellowship Hall windows)



Figure 16-Wall Above Fellowship Hall Stairs

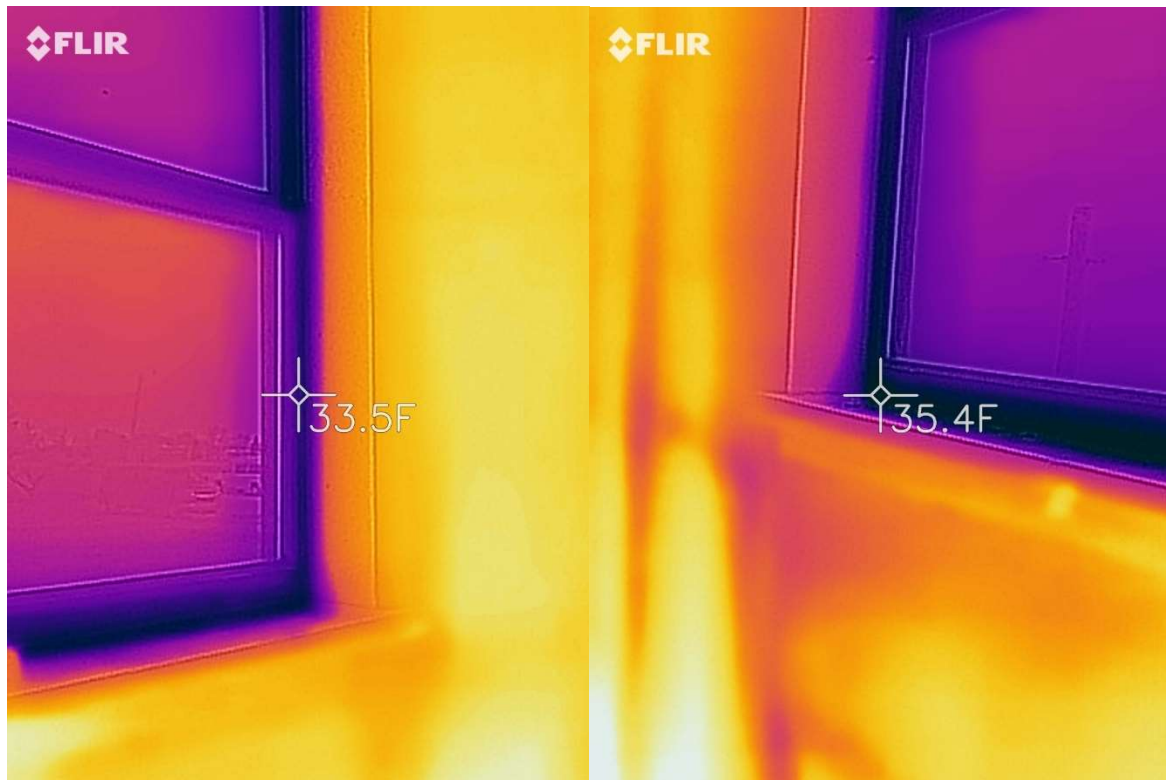


Figure 17-Two Fellowship Hall Windows, typical of all Fellowship Hall windows

Kitchen

The floor in the kitchen is substantially colder than the walls. (Figure 18-Kitchen Floor Near Oven Outlet)

The wall under the North East window has inadequate insulation and/or the baseboard heat is not radiating in this area. (Figure 19-North East Window Wall Insulation)

The North window is an extreme energy loss point. (Figure 20-North Window)

The undersink area, despite having a boiler heat radiator, is extremely cold and in danger of freezing. (Figure 21-Undersink)

The ceiling is inadequately insulated. (Figure 22-Kitchen Ceiling – Warm Rectangle is the Neon Light)

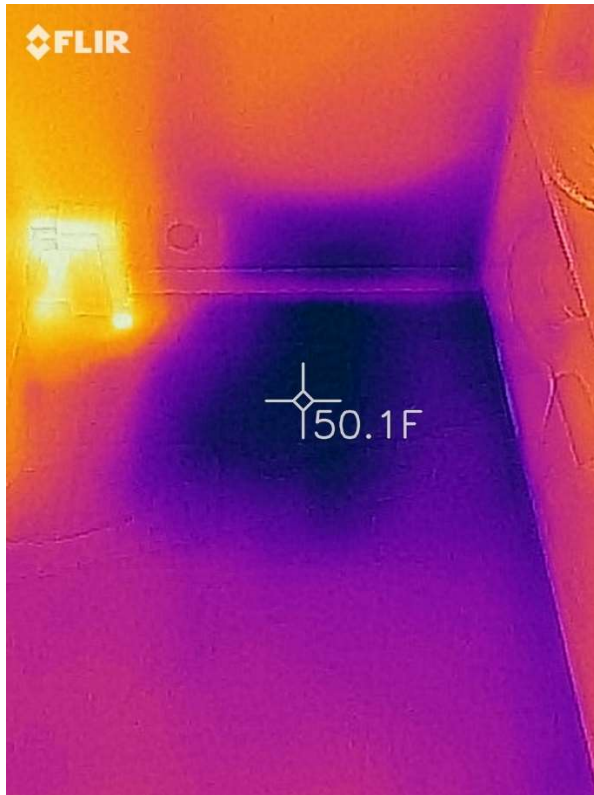


Figure 18-Kitchen Floor Near Oven Outlet

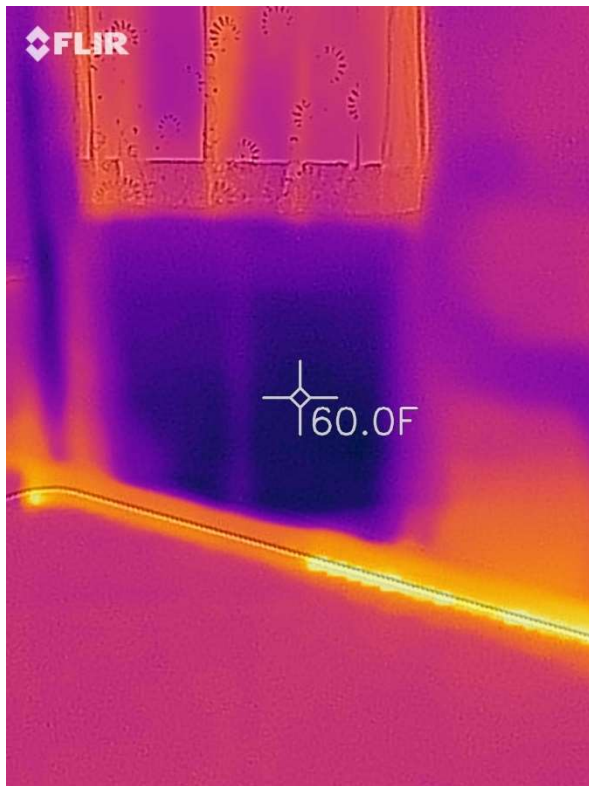


Figure 19-North East Window Wall Insulation

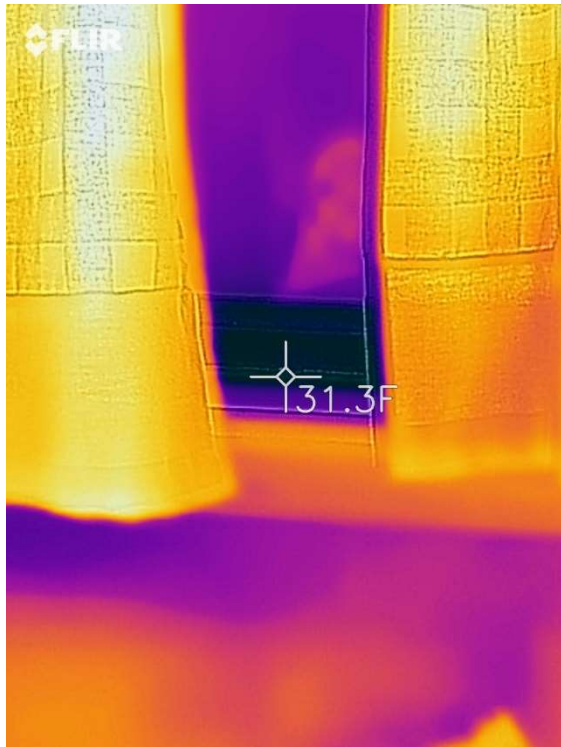


Figure 20-North Window



Figure 21-Undersink



Figure 22-Kitchen Ceiling – Warm Rectangle is the Neon Light

Shower/Bathroom Block

The primary energy loss points are the North wall and Attic Access. (Figure 23-Shower/Bathroom Attic Access, Figure 24-North Wall-Hall, Figure 25-North Wall - Bathroom)

The ceiling is insulated, care should be taken to ensure insulation lays flat with no gaps, specifically—but not limited to—above the laundry room and furnace room.

The East / Shower walls could be better insulated, but are effective until more and/or better insulation can be installed during other siding or drywall work.

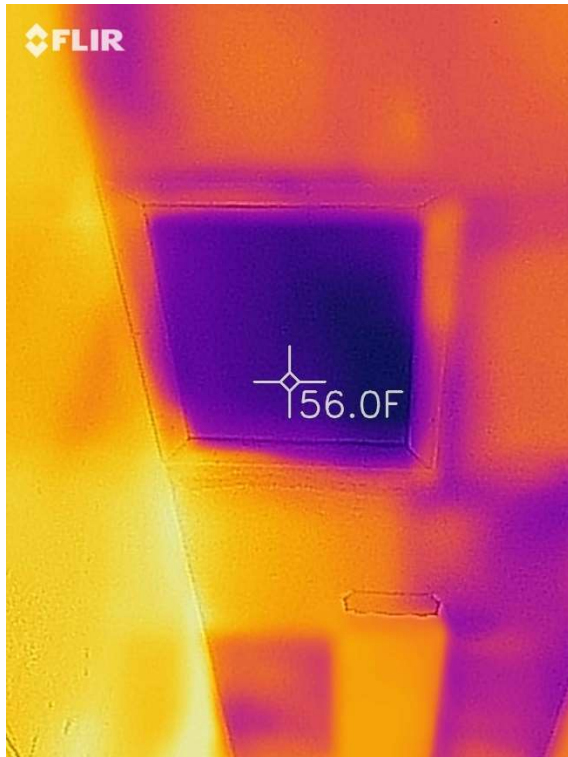


Figure 23-Shower/Bathroom Attic Access



Figure 24-North Wall-Hall

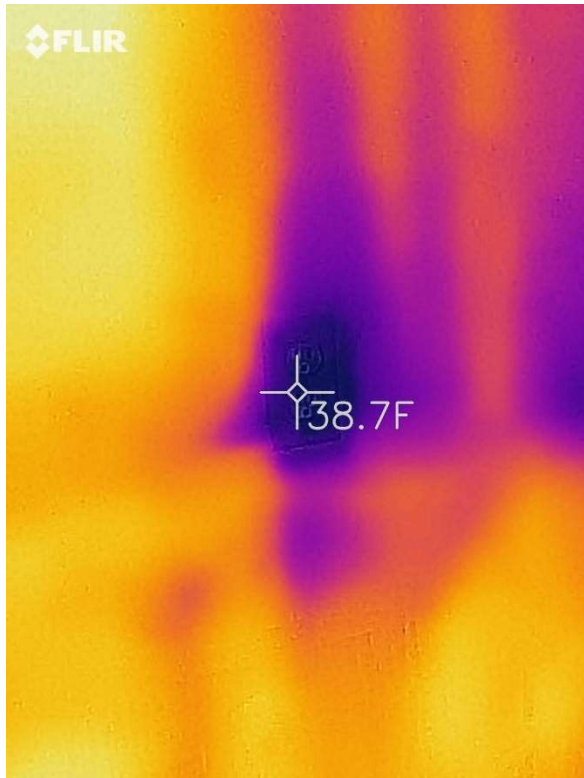


Figure 25-North Wall - Bathroom