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Thermal weak spots in your building envelope design can have U-values several times higher than the rest of the envelope. Consequently, they can contribute significantly to conductive heat flow even if they make up a small area. Improving those weak spots thus can substantially improve performance.

Two design iterations for a building envelope renovation on a 4 storey mixed use building are depicted in the plots below.

The bars show the total conductive heat flow rate through each assembly type. The different colours in each bar indicate where the heat flow is occurring: the field of the assembly or at thermal anomalies in those assemblies.

The weak spots in the first design include whole assemblies that have high U-values, as well as thermal anomalies in well insulated assemblies.

Thermally weak assemblies include the CMU walls and fenestration. Within the roofs, excess heat flow occurs at the parapets.

These weak spots make up 17% of the above grade envelope area, but contribute 50% to total conductive heat flow.

Insulation was added to the CMU walls, thermal breaks were added to the parapets, and the glazing was improved everywhere except the storefronts, which are not being replaced. This resulted in a 15% reduction in total conductive heat flow rate.

Total Heat Flow Rate By Assembly Name And Location

