

Thermal imaging for facade performance evaluation: informing decisions for SRG's PSU School of Business renovation



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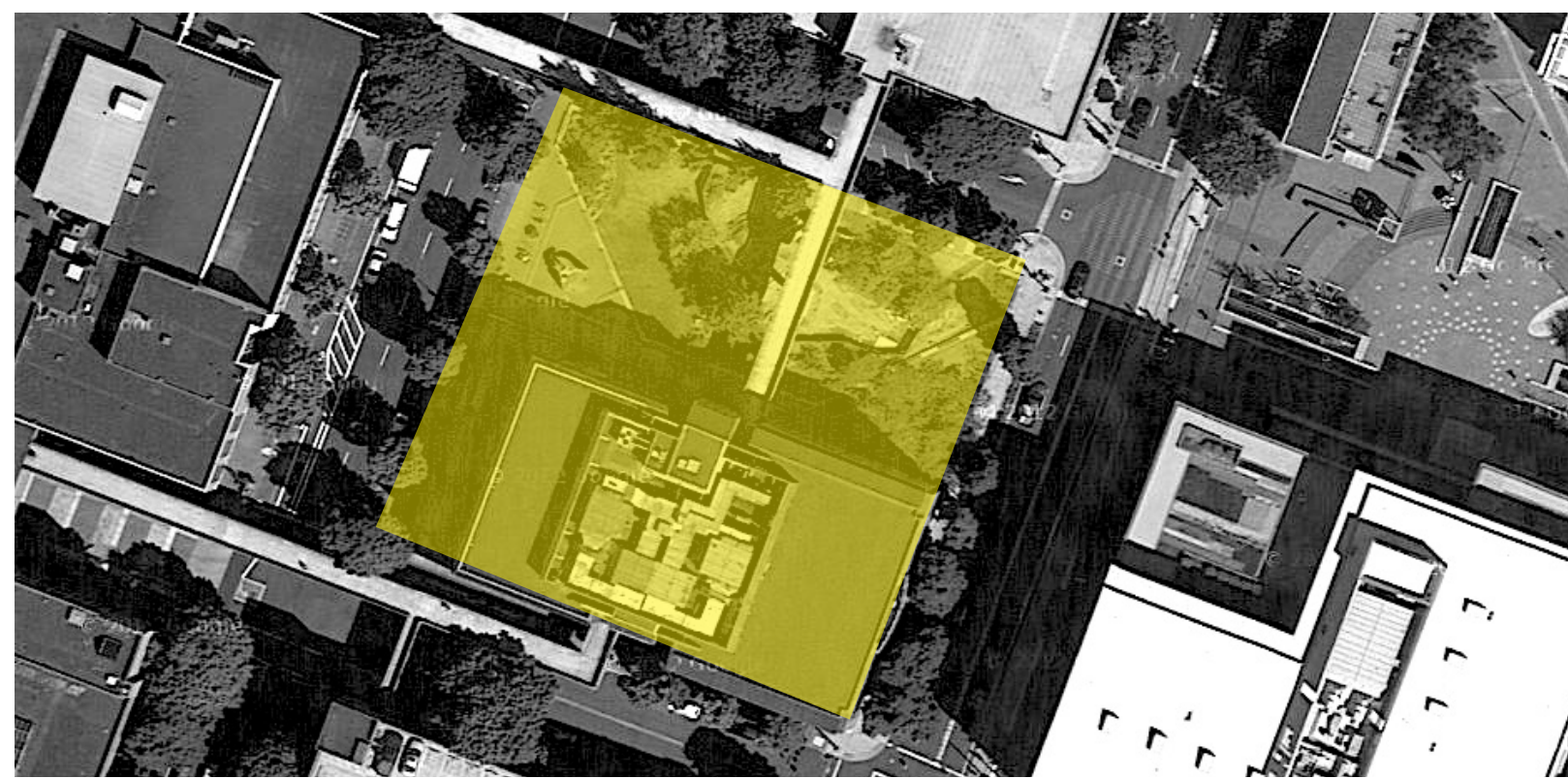
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Overview

This research serves to evaluate the current condition of existing building skins on The School of Business and The School of Education at Portland State University (PSU) through infrared thermography. The buildings were constructed at two different points: The School of Education in 1979 and The School of Business in 1986. Both have had minor renovations since their construction, and each are articulated in differing materiality. Infrared thermography is best suited for the researcher's purposes as it is non-invasive and will allow them to produce a data analysis of building structures before any deconstruction is conducted.

The research will inform the project currently being designed by SRG Partnership in collaboration with Behnisch Architekten. They will be renovating both existing buildings and designing a new addition for the School of Business. Their project aims to unify the two existing buildings and the new addition while upgrading the appearance and performance of the existing buildings. Primary stakeholders for this project wish to achieve a LEED Platinum certification set by the 2012 guidelines, with the possibility of addressing key components set by the Living Building Challenge. To achieve this will require an in-depth analysis of the existing structures as well as all future proposals early in the design stages. The results of infrared testing will contribute to this analysis.

The results show the greatest opportunity for improvement would be to address the School of Education. Compared to the School of Business, the facade of the education building did not perform as well, with bridging occurring more frequently and in larger areas. One of the primary goals SRG Partnership and Behnisch Architekten is the unification of the two existing buildings and the new addition, any changes to improve the performance of the education building could simultaneously contribute to the design of a more cohesive, unified composition.

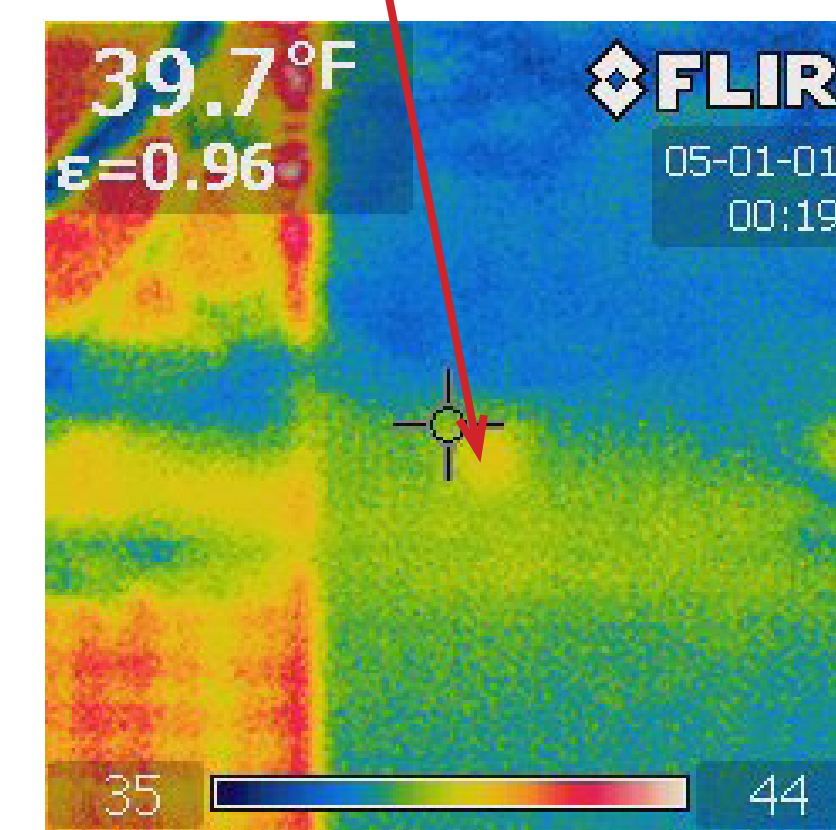
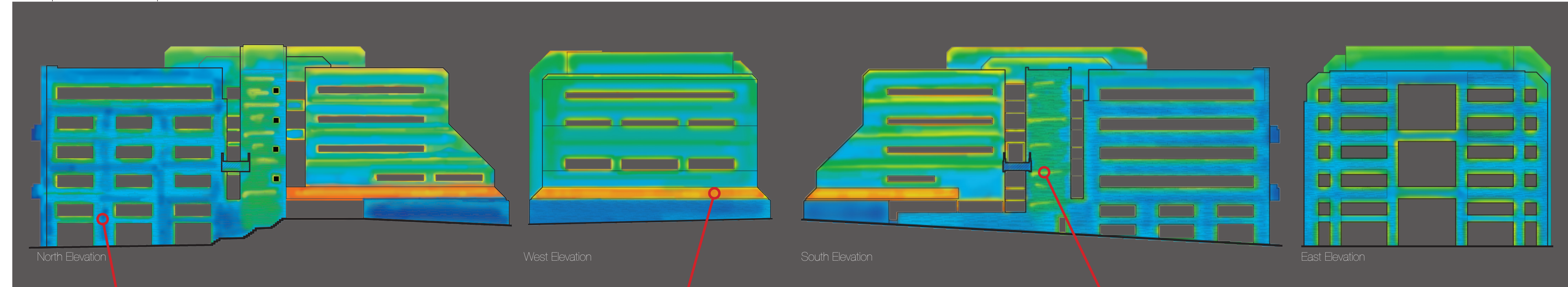


Project Location



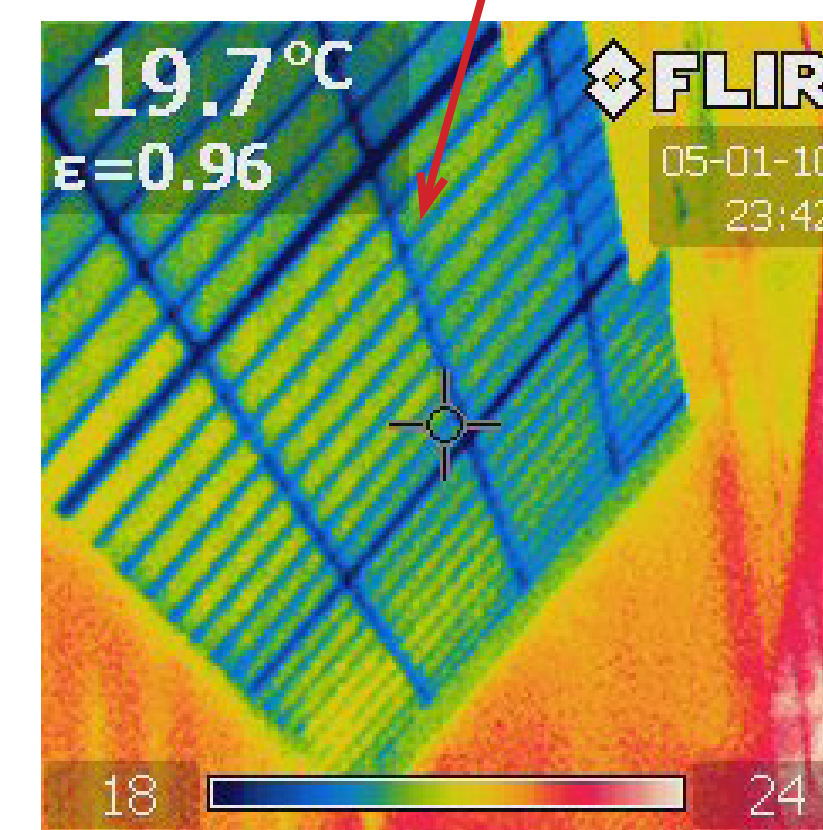
School of Business

Graphical Interpretations of Data



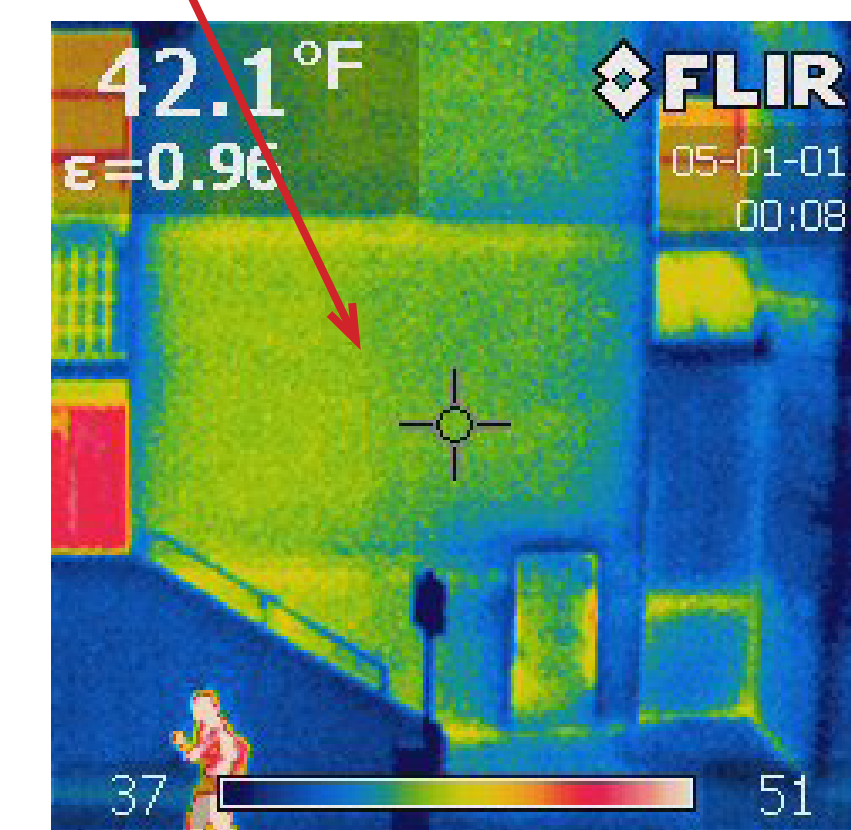
Exterior | Brick Tie

The School of Business building had a few problem areas though to a lesser degree. It also had issues with heat loss where the concrete slab floor meets the steel framing. The IR testing showed thermal bridging as well as attachment points between the brick facade and the framing.



Interior | Sloped Glazing

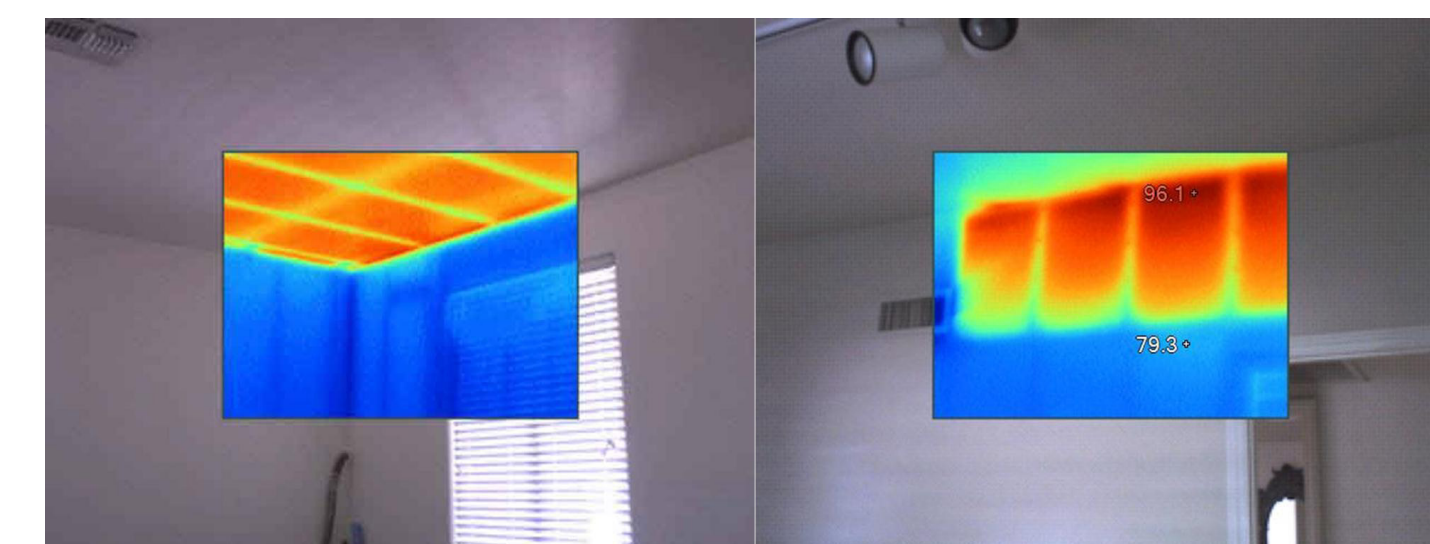
The IR reading showed notable heat loss where the concrete slab flooring meets the exterior steel framing. It appears that this may be due to thermal bridging caused by the minimal insulation between the concrete slab and the exterior facade. There was also a great deal of heat loss through the sloped glazing on the west and north facades.



Exterior | Stairwell

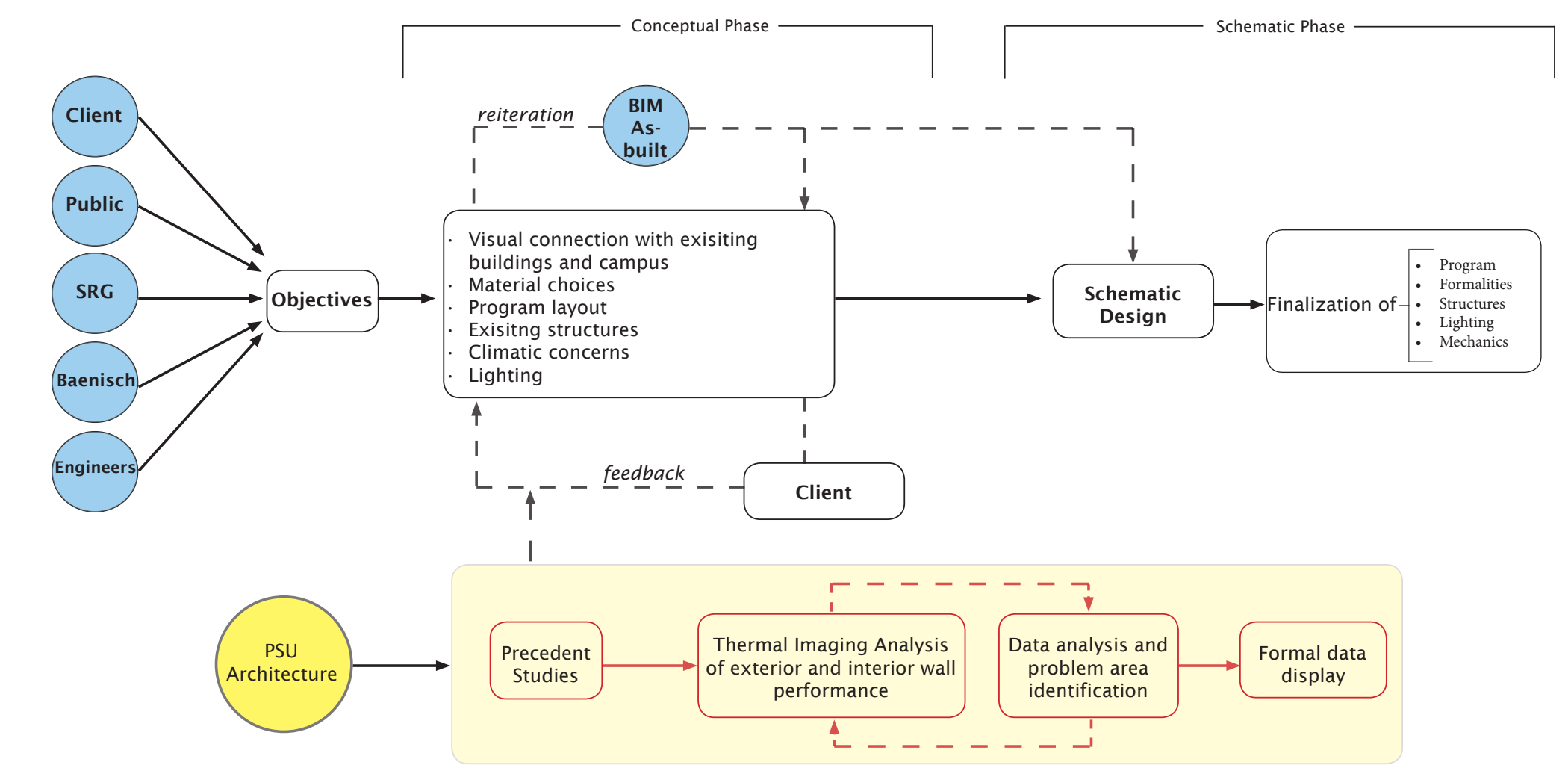
The transitional space between the two buildings that hold the staircases was a problem area as it showed about 5°F greater heat loss than the rest of The School of Business and at least 2°F greater heat loss than the non-problem areas of The School of Education's facade.

The thermographic sensors of the IR gun detect radiation in the infrared range of the electromagnetic spectrum, measuring temperature differences and variations. This tool will assist in mapping the surface of walls, pointing out weaknesses in building construction.



FLIR B60 R Gun

This research serves to evaluate the current condition of existing building skins on The School of Business and The School of Education at Portland State University through the use of infrared thermography. The data details heat loss through the building envelope.



Methodology Diagram