

Alterations to Commercial Buildings

Eric Makela



Alterations – 2003 IECC Provision

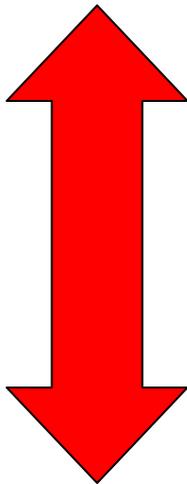
- “[EB] 101.2.2.2 Additions, alterations or repairs. Additions, **alterations**, renovations or repairs to a building envelope, mechanical, service water-heating, electrical distribution or illumination system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing system to comply with all of the requirements of this code. Additions, alterations or repairs shall not cause any one of the aforementioned and existing systems to become unsafe, hazardous or overloaded.”

Alterations – 2003 IECC Definition

- “**ALTERATION.** Any construction, renovation or change in a mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.”

Alterations

**Must Comply
Make Less
Efficient**



**Make More
Efficient
Must Comply**

■ So What Does This All Mean?

- If I increase the load on the energy using feature of the building it must comply with the IECC
- If I decrease the load on the energy using feature of the building it must comply with the IECC
- Does this make sense at all???

Alterations

- What Are the Implications to this Interpretation?
 - Decrease the lighting load by exchanging more efficient, lower wattage fixtures for higher wattage less efficient fixtures.
 - Decrease the load on the building envelope by replacing old glazing with more efficient glazing.
 - Replace old HVAC units with new systems with a greater output capacity.

What Options to Do I Have?

- Under the Strict Interpretation of the IECC –
None
- If a More Flexible Approach is Considered
 - Alteration rules of ASHRAE 90.1

ASHRAE 90.1 Alteration Requirements

- Building Envelope
 - Building envelope alterations need not comply with the envelope requirements provided they do not increase the energy usage of the building

ASHRAE 90.1 Alteration Requirements

■ Building Envelope

- Installation of storm windows over existing windows
- Replacement of glazing
- Alterations to the building envelope assemblies which are insulated with a minimum value of R-3.0 per inch

ASHRAE 90.1 Alteration Requirements

■ Building Envelope

- Alterations to walls and floors where there are no existing framing cavities and no new framing cavities are created
- Replacement of roof membranes
- Replacement of existing doors
- Replacement of existing fenestration

ASHRAE 90.1 Alteration Requirements

■ Building Mechanical Systems

- Equipment that is being modified or repaired but not replaced
- Where the replacement or alteration of equipment requires extensive renovations to other systems, equipment, or elements of a building, and such replaced or altered equipment is a like-for-like replacement

ASHRAE 90.1 Alteration Requirements

- Building Mechanical Systems
 - Refrigerant charge or existing equipment
 - Relocation of existing equipment
 - For ducts and pipes where there is insufficient space or access to meet the requirements

ASHRAE 90.1 Alteration Requirements

- Lighting Alterations
 - Alterations that replace less than 50% of the luminaires in the space provided the alteration does not increase the overall lighting load

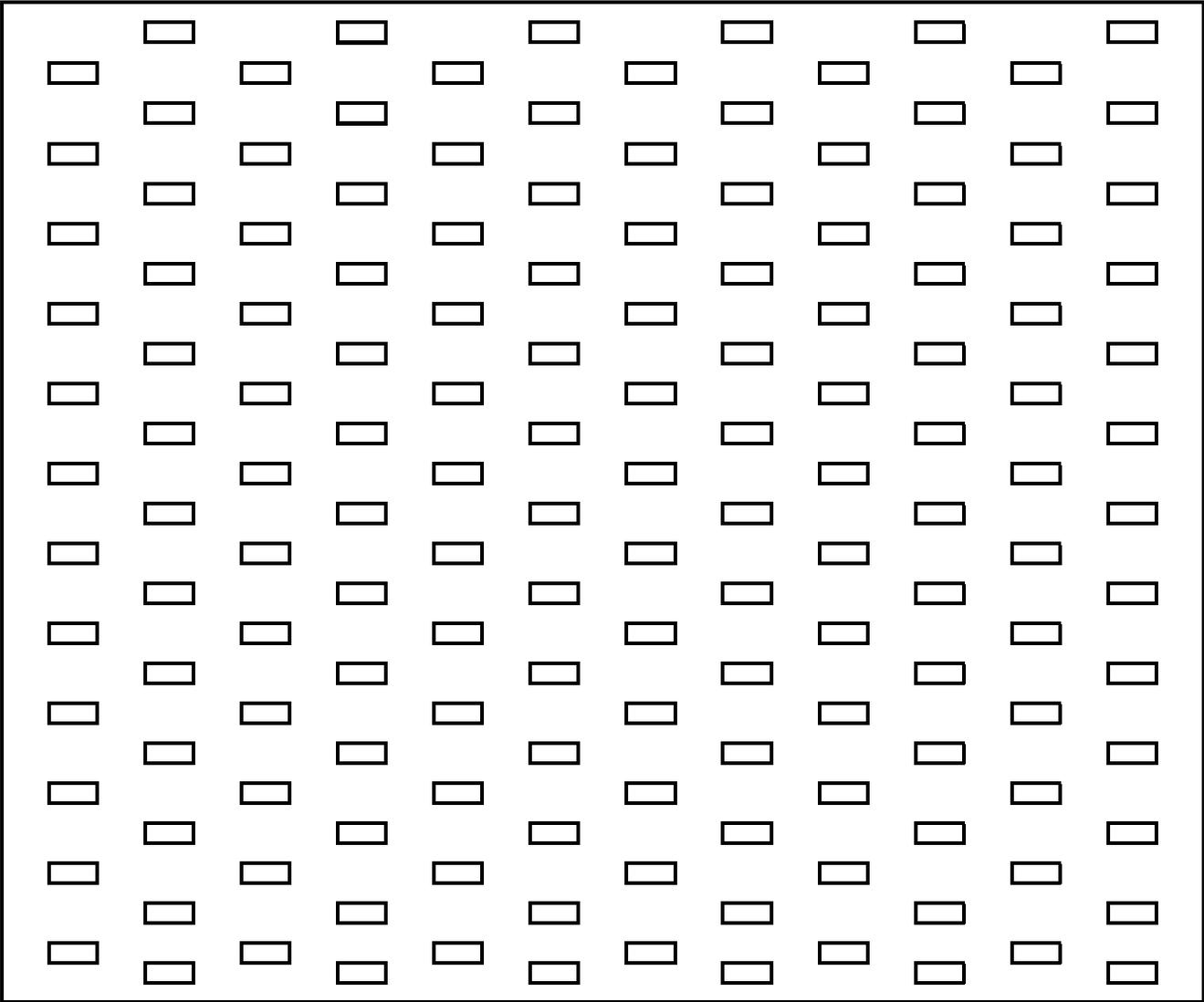
Alteration

Exemption Options (cont'd)

- Exceptions (Commercial Occupancies Continued)
 - Replacement of existing fenestration
 - Modification or repair of subsystem that does not result in an increase of energy use
 - Relocation of existing equipment
 - Replacement of less than 50% of luminaries provided alternatives do not increase lighting load

Fixture Type

☐ 48" T12 40W 3 Bulb 106 Watts/Fixture 150 Fixtures 1.59 Watts/sq.ft.



**Existing Building
Reflected Ceiling
Plan**

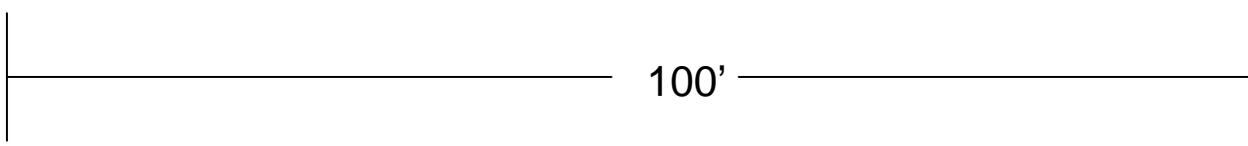
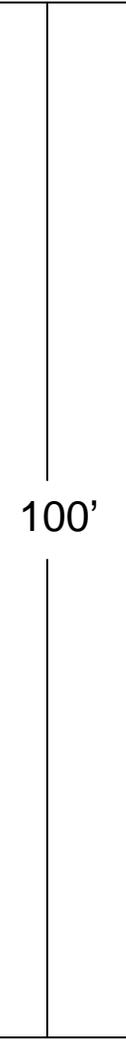
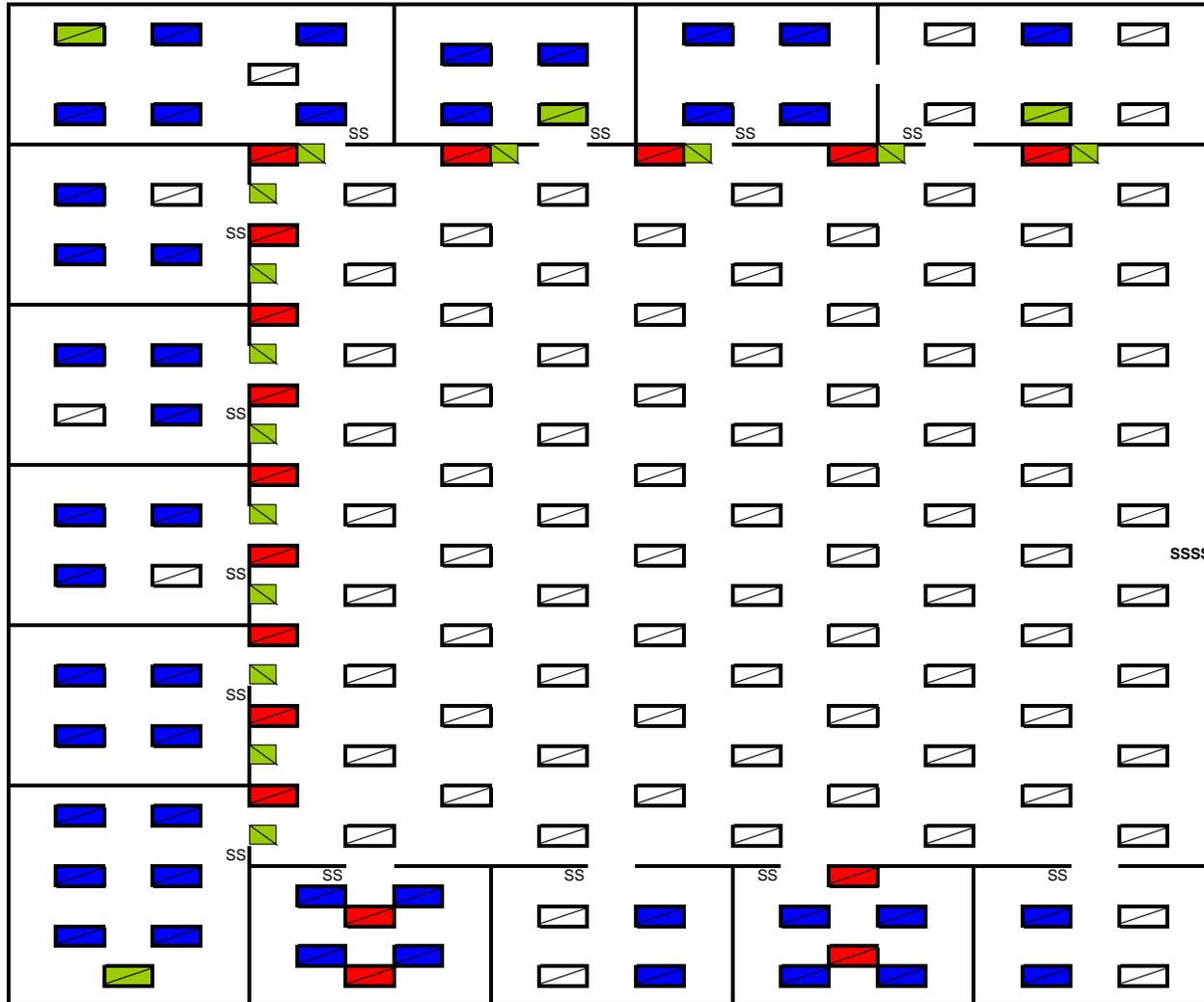
Fixture Type

 48" T12 40W 3 Bulb 106 Watts/Fixture

 24" T8U 32W

 Moved Fixture

 Removed Fixture



Lighting Changes - Summary

- Total Number of Existing Fixtures: 150
- Existing Wattage: 15,900 Watts
- Existing Watts/sq.ft.: 1.59 Watts/sq.ft.
- Moving 44 Fixtures – 3 X 48” T12 40 W/Bulb
- Removing 17 Fixtures - 3 X 48” T12 40 W/Bulb
- Adding 4 Fixtures - 3 X 48” T12 40 W/Bulb
- Adding 14 Fixtures 24” T8U 32W

Lighting Changes - Summary

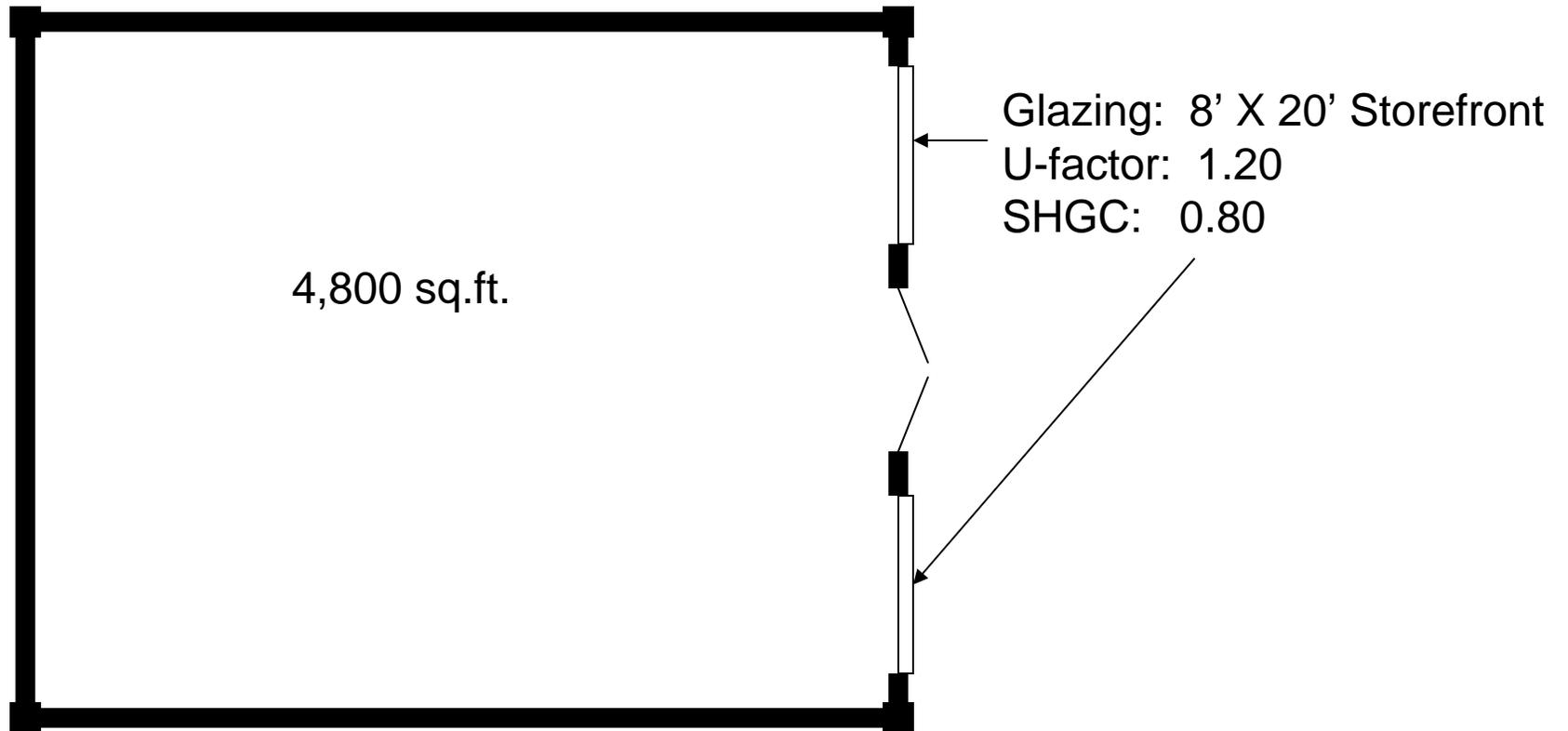
- Proposed Wattage: 14,970 Watts
- Proposed Watts/sq.ft.: 1.497 Watts/sq.ft.
- Allowed Watts/sq.ft (2003 IECC): 1.3

Building Envelope Alterations

- Compliance Options

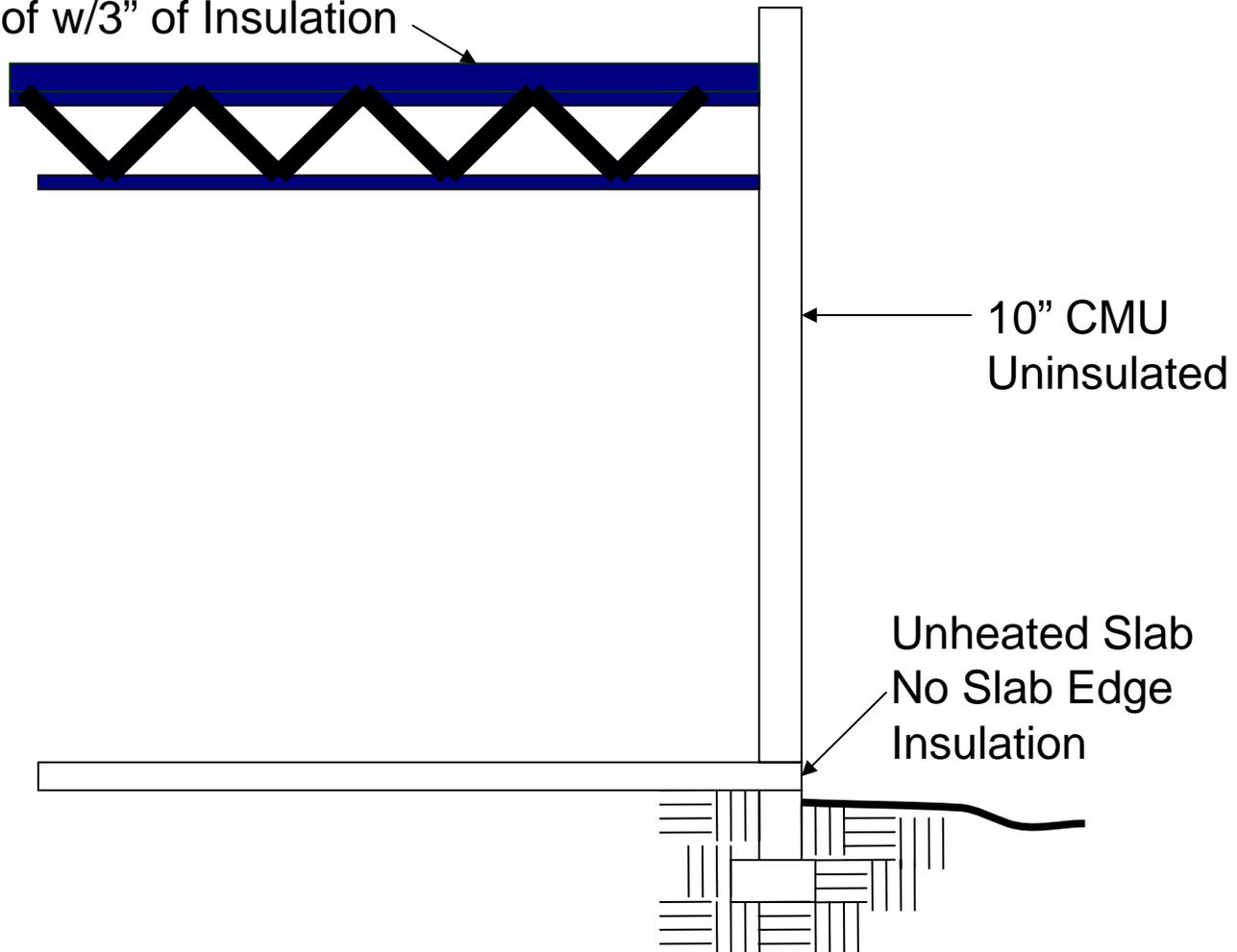
- Make the entire building shell comply with the IECC
- Demonstrate that the altered building uses no more energy than the existing building

Existing Building

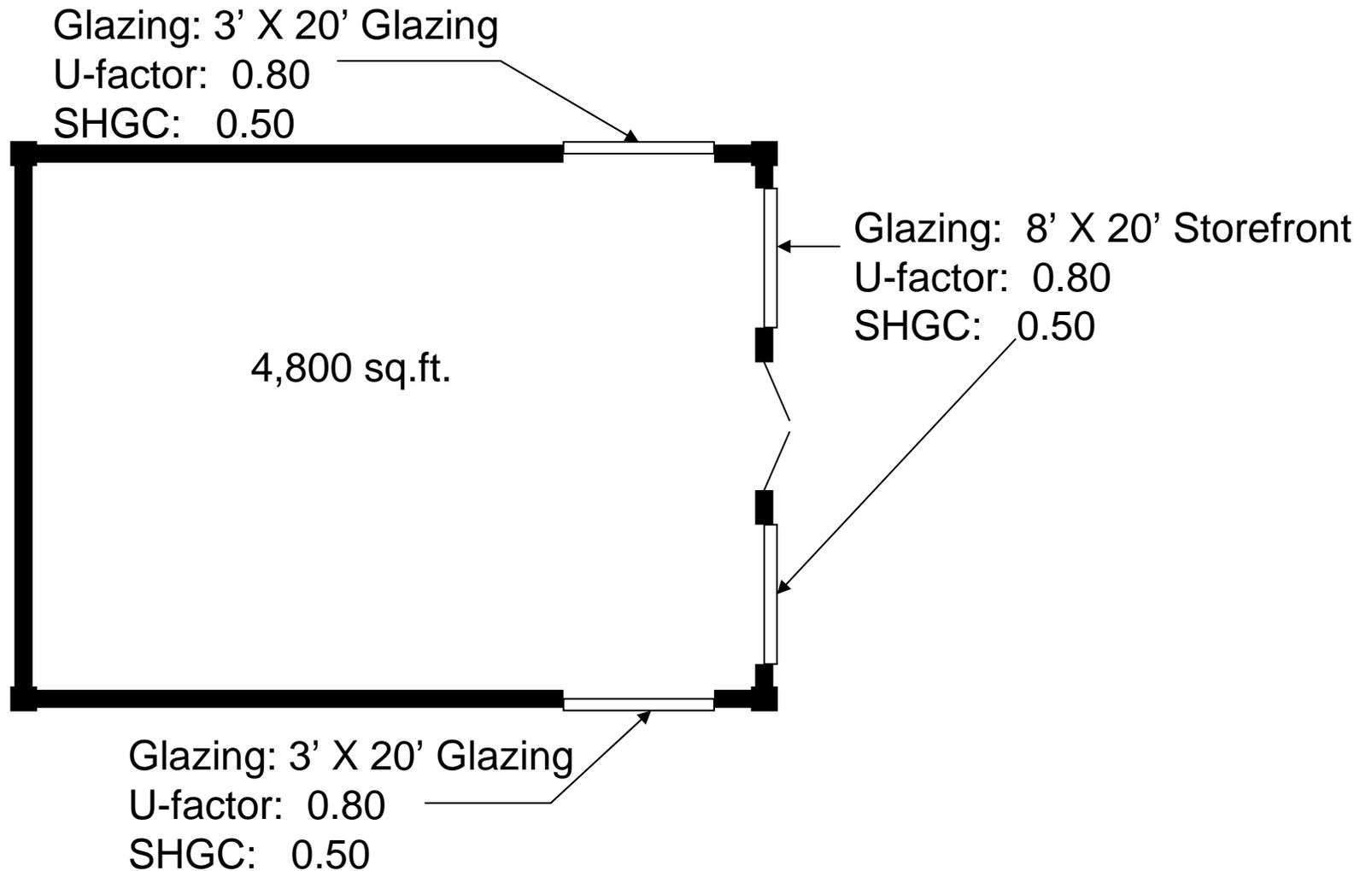


Building Cross Section

Built-up Roof w/3" of Insulation



Proposed Building



Proposed Building Cross Section

