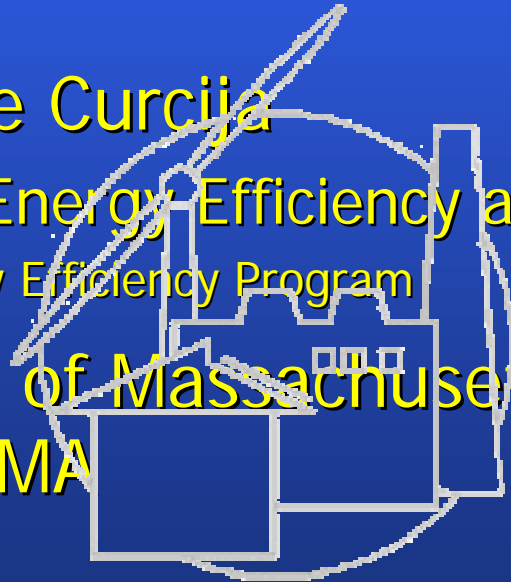


SELECTION OF REPRESENTATIVE PRODUCTS FOR RATING FENESTRATION SYSTEMS IN COMMERCIAL (SITE-BUILT) PROJECT

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INTRODUCTION

- Development of workable procedure for rating site built products and commercial windows
- Large variety of different framing configurations in a single building
- Do we need to model every single option in a building
- Part of the answer is in the energy effects that windows have on overall energy performance of a building

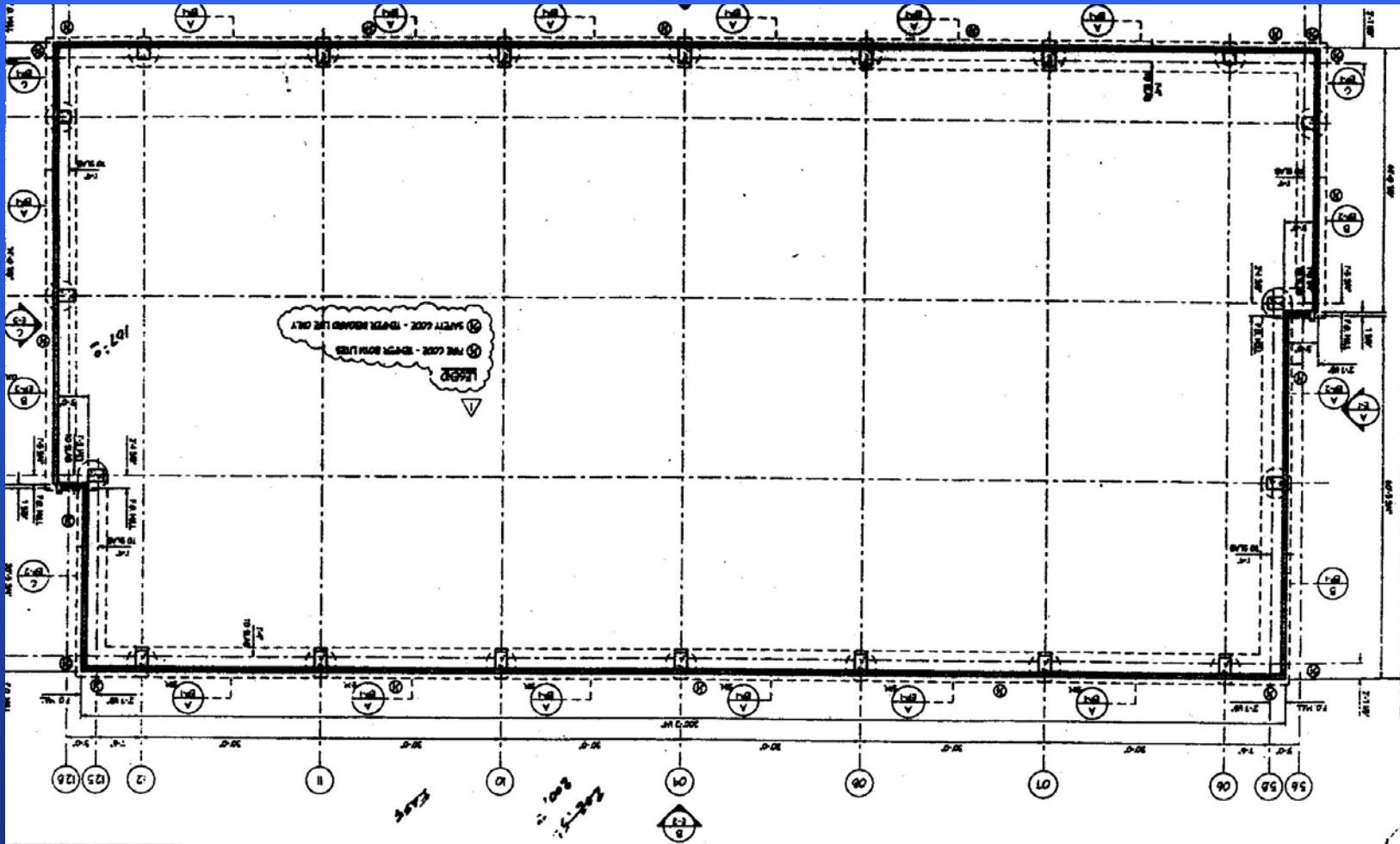


STUDY ON A TYPICAL BUILDING

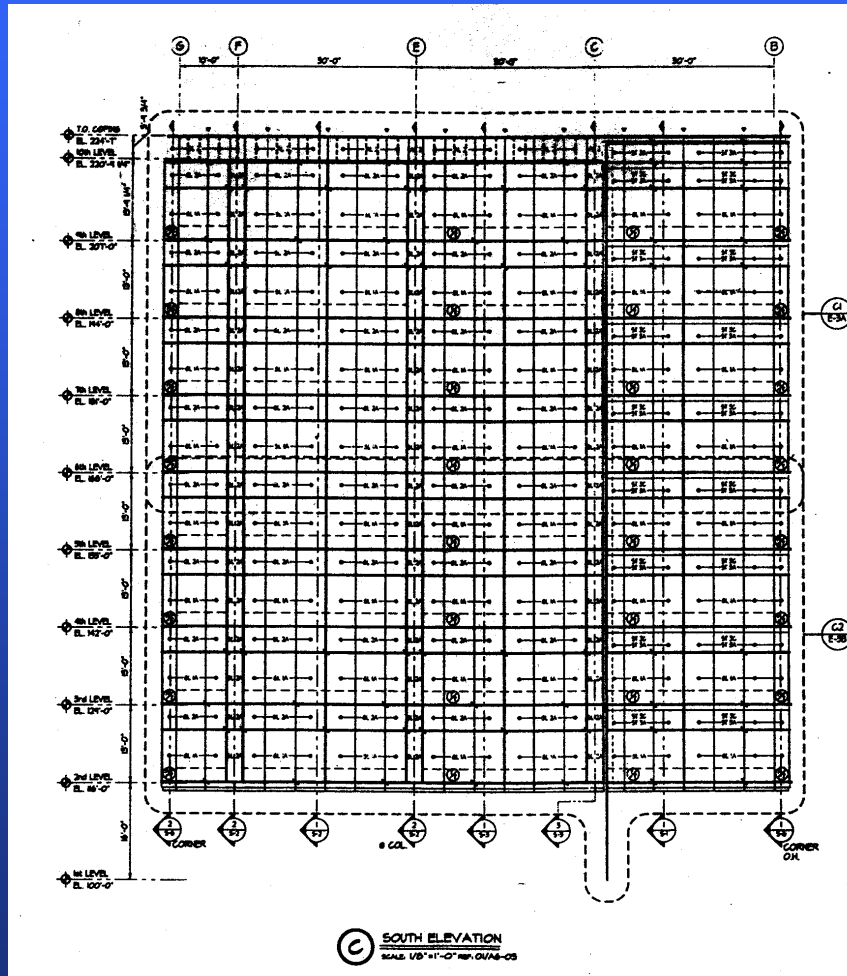
- Example Building: International Center III located in Dallas, TX
- Office building
- 10 floors
- 194,000 ft²
- 50,000 ft² of windows
- Approximately 5% is frame area
- Building details obtained from architectural and mechanical drawings



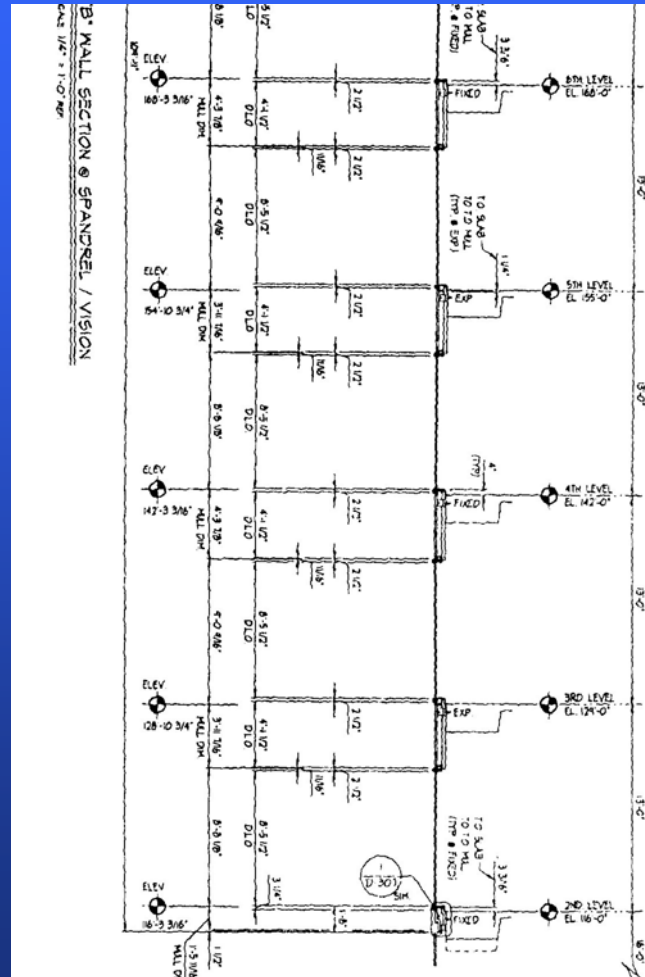
Building Floor Plan – 2nd FLOOR



SOUTH ELEVATION



TYPICAL WALL SECTION



BUILDING SIMULATION

- DOE 2.2 simulation (PowerDOE)
- Major fenestration configurations identified
- Detailed models in THERM and WINDOW of major configurations
- Minor configurations varied to investigate effect if those were ignored
- This building is analyzed in several typical climatic conditions, including Dallas, TX
- Perimeter zoning was used



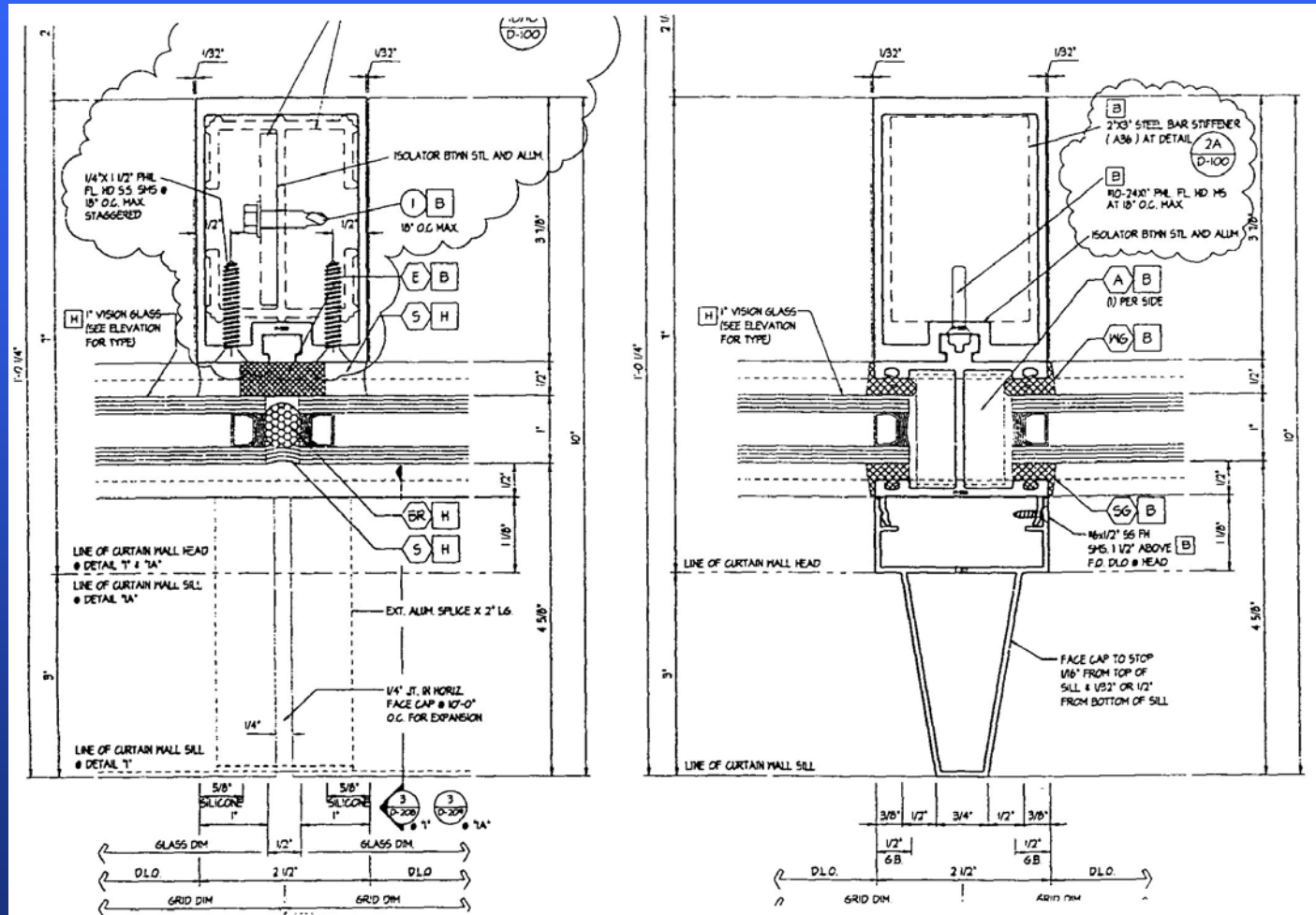
MAJOR WINDOW TYPES

Table 1: Description of glazing systems used in the building

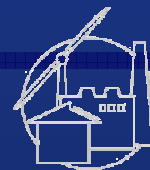
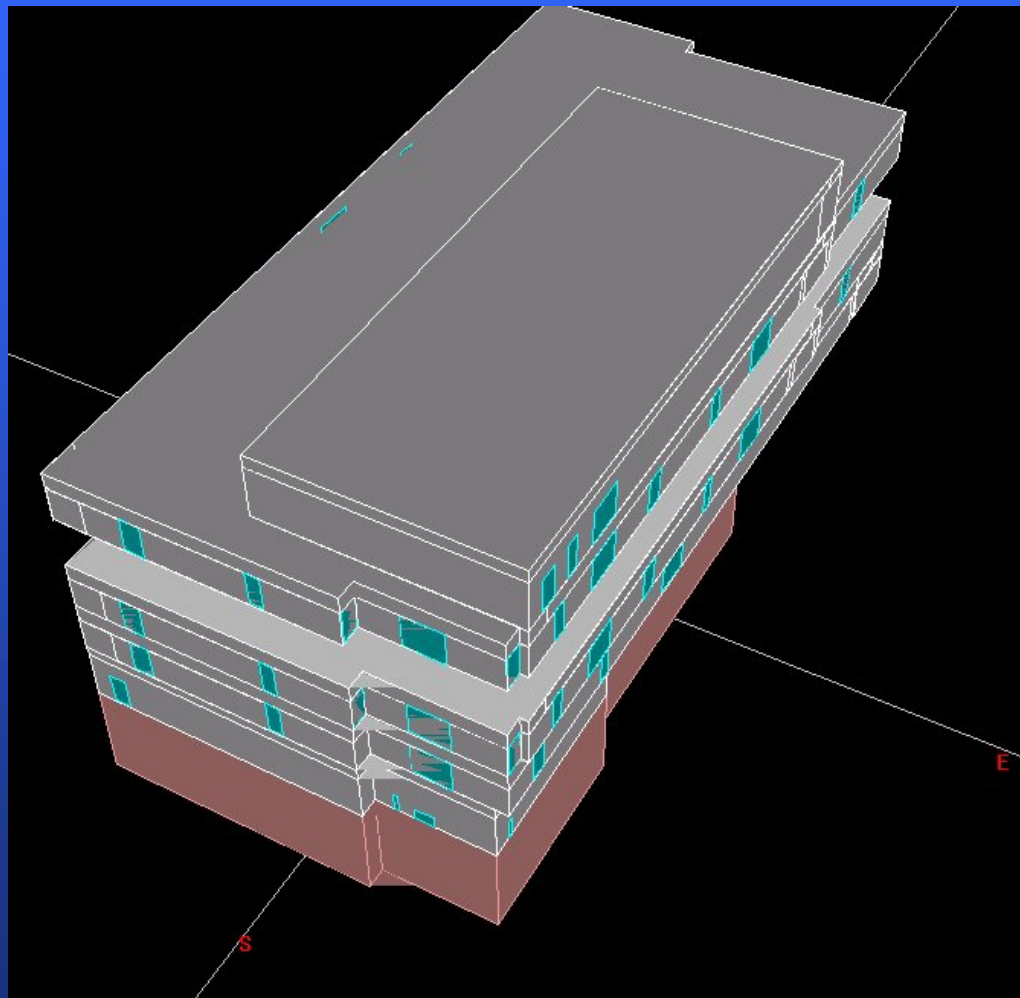
Glazing System	Description	Area (ft²)	U factor (Btu/hr-ft²-F)	SHGC	VT
GL-1A	Coated insulated vision glass VA- 1-22 with coating (e=0.528) at 2 nd surface	42187.9	0.43	0.24	0.20
GL-3A	Coated insulated vision glass Viracon 2/M super LowE, green outside lite, clear inside, coating (e=0.04) on surface 2	6733.7	0.29	0.30	0.60
GL-4A	Monolithic vision glass, clear, ¾" min thickness	789.98	0.99	0.81	0.88
GL-4B	Tempered monolithic vision glass, clear, ¾" min thickness	117.76	0.99	0.81	0.88



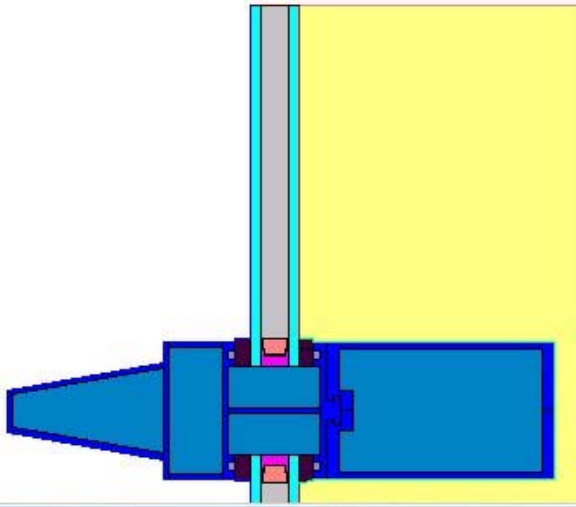
EXAMPLE OF WINDOW CONFIGURATION



3-D GEOMETRY IN POWERDOE



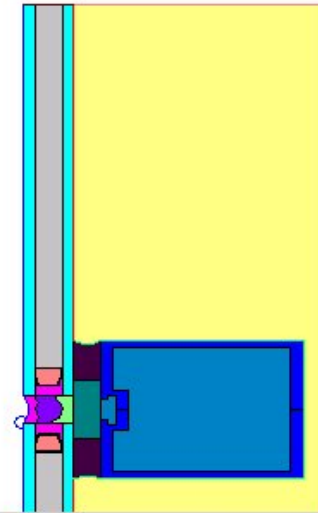
EXAMPLE THERM MODELS



	U-factor Btu/h-ft ² -F	delta T F	Length inches	
Frame	2.4609	70.0	2.61433	Projected Y
Edge	0.5284	70.0	5	Projected Y

% Error Energy Norm: 8.36%

Export OK



	U-factor Btu/h-ft ² -F	delta T F	Length inches	
Frame	1.1759	70.0	2.47499	Projected Y
Edge	0.5072	70.0	4.99994	Projected Y

% Error Energy Norm: 6.12%

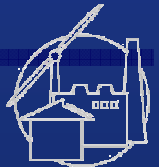
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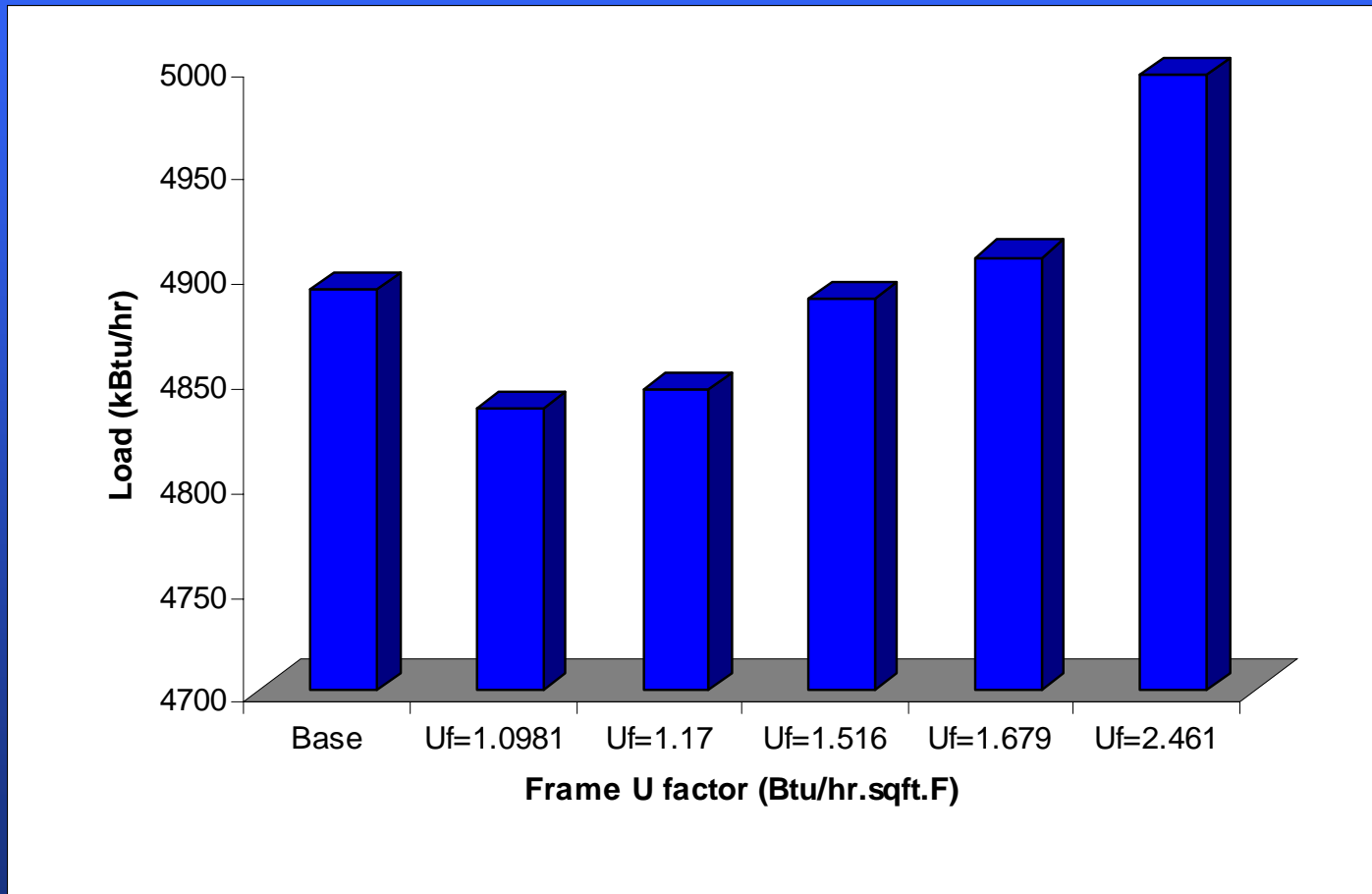
EFFECT OF FRAME U-FACTOR

Table 2: Effect of frame U value on building load and energy consumption for the building located in Dallas, Texas

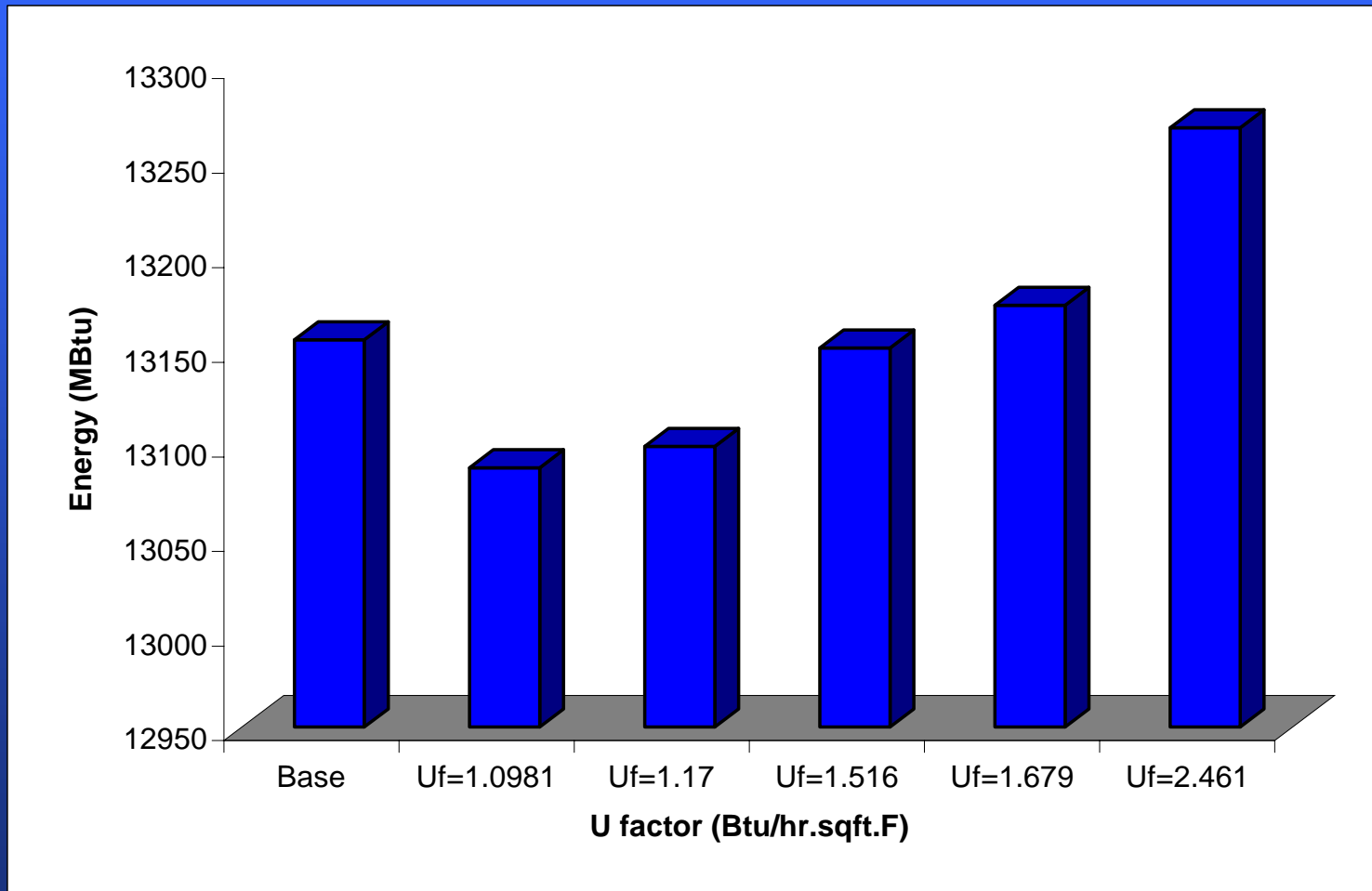
U factor of frame (Btu/hr.ft ² .F)	Building Load (kBtu/hr)				Building Energy demand MBtu			
	Cooling	Diff. in load	Heating	Diff. in load	Cooling	Diff. in energy	Heating	Diff. in energy
Actual	4891.549	-	1113.28	-	13154.720	-	663.528	-
1.098	4834.563	-56.986	1069.95	43.33	13087.100	-67.62	632.414	-31.114
1.17	4843.584	-47.965	1077.39	35.89	13098.403	-56.317	637.64	-25.888
1.516	4887.357	-4.192	1110.28	3.0	13150.307	-4.413	661.3	-2.228
1.679	4907.025	15.476	1124.29	-11.01	13172.904	18.184	671.65	8.122
2.461	4994.097	102.548	1183.46	-70.18	13266.799	112.079	715.42	51.892



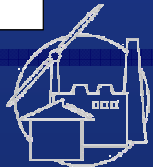
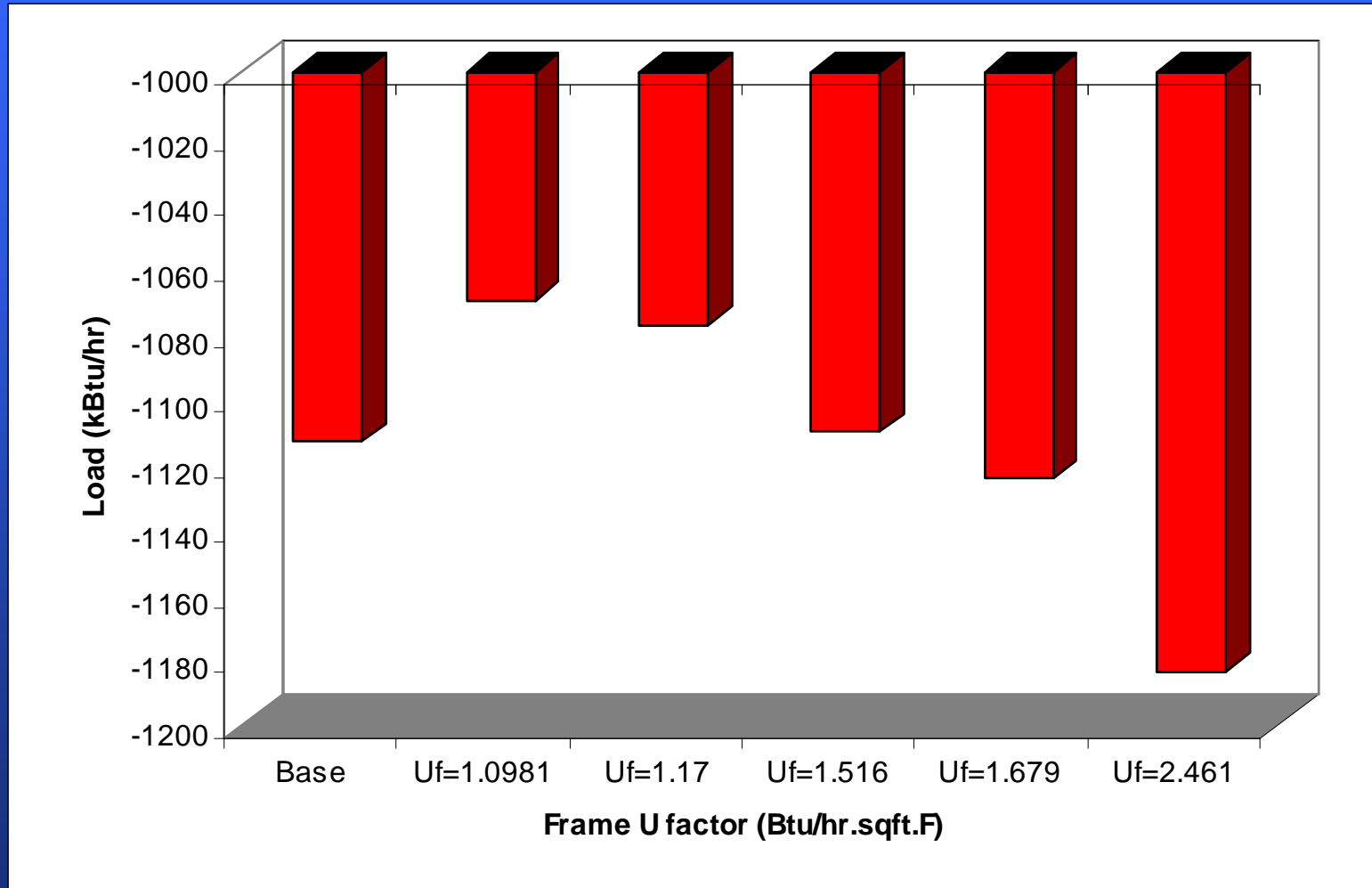
COOLING LOAD



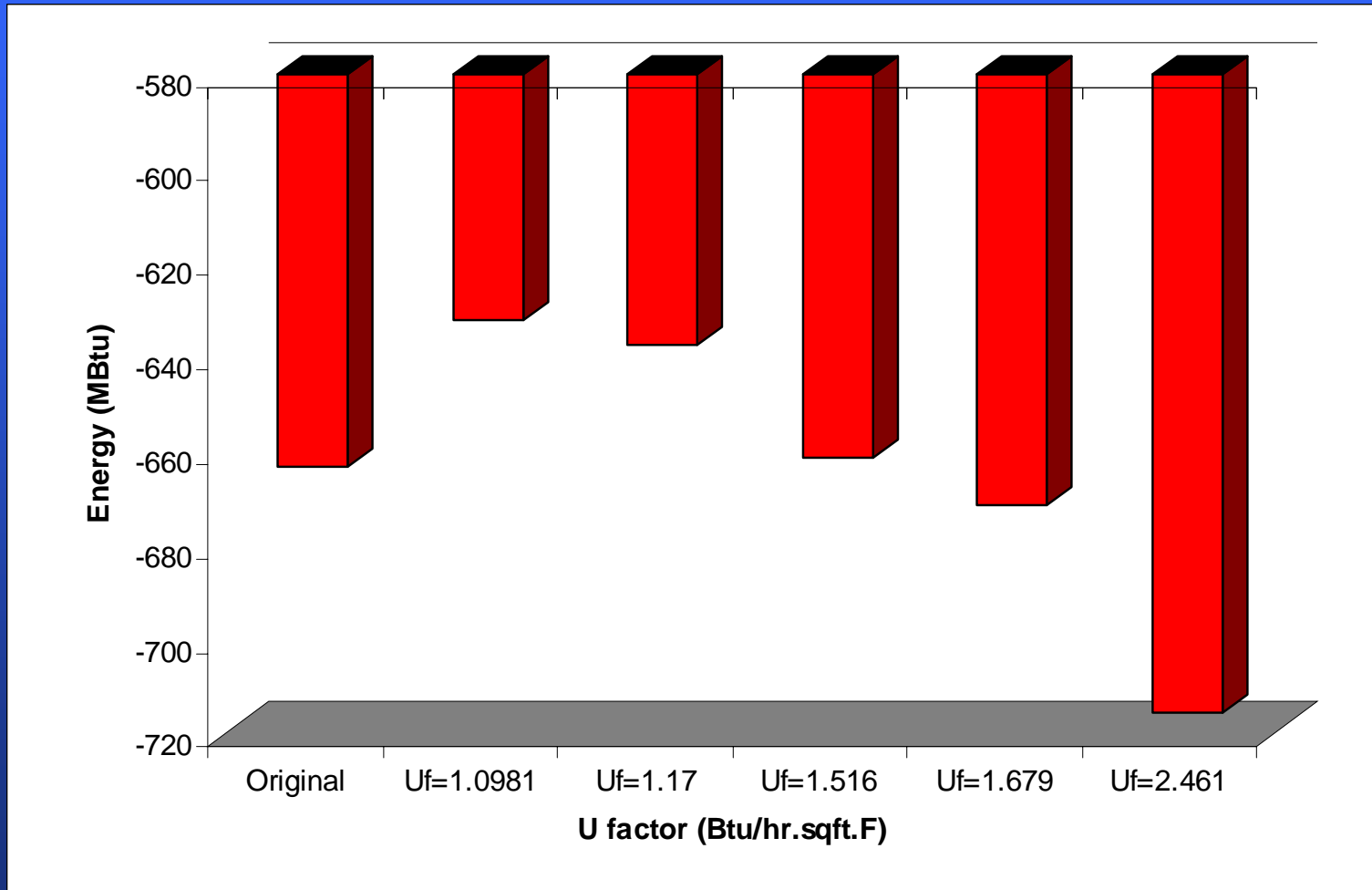
COOLING ENERGY



HEATING LOAD



HEATING ENERGY



CONCLUSIONS

- May not be necessary to get rating for every conceivable fenestration configuration that occurs in a commercial building
- Determine limiting areas for which rating would not be required
- Use default values for limiting areas?
- Size is also important on the overall energy consumption

