

January 6, 2010

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Mr. Dan Wakefield
BLDD Architects, Inc.
17 East Taylor
Champaign, IL 61820

SUBJECT: 6385, Task 003

**Urbana Park District
Comparative Energy Models**

Dear Dan:

At your request, we built a simplified computer model of the proposed facility for the purposes of comparing energy performance of two different envelope systems. The computer model used is eQuest. We used four block buildings to represent the four major functional areas in the facility.

		<u>SF</u>
Admin / Crew	(Heat to 70°F / Cool to 75°F)	7,635
Maintenance	(Heat to 60°F / No Cool)	8,300
Shops	(Heat to 60°F / No Cool)	8,374
Vehicle Storage	(Heat to 55°F / No Cool)	<u>9,588</u>
Total		33,897

We assigned modest areas of glass to the four block buildings and assumed the glass had reasonably good performance characteristics ($U = .52$, $SHGC = .70$ [clear]). The percentage of this glass was held the same as we compared two variations on the building skin.

Condition one is precast wall construction with a composite R-value of 22.0. This condition includes a nailable roof system with a composite R-value of 22.3.

Condition two is metal building construction with composite R-values of 14.0 for the walls and 13.0 for the roof. These figures were extracted from a report by U of I researches on the actual R-values that result from typical metal building construction.

The amount of infiltration through the envelope was assumed to be the same (zero) for both conditions. Mechanically introduced outside air was assumed to be zero as well since the purposes of this exercise is to compare the envelopes and not model actual energy performance. The sole purpose of this exercise was to compare heat transfer through the two envelope conditions.

Here are the results for heating expressed in millions of Btu's:

	Admin / Crew (mmbtu)	Maint (mmbtu)	Shops (mmbtu)	Vehicle Storage (mmbtu)	Totals (mmbtu)
Condition One (Precast)	122	65	74	33	297
Condition Two (Metal Building)	145	87	97	50	379
Difference					85

This shows it will cost about 29% more to heat the metal building option than the precast option. This represents an additional expenditure of 850 therms of gas or \$850 if gas costs a buck a therm.

For cooling we only looked at the Admin / Crew area since it's the only area that's cooled. The cooling energy is expressed in thousands of kilowatt hours.

Condition One (Precast)	29.08
Condition Two (Metal Building)	29.37

As you can see, the cooling energy is virtually identical despite the better envelope offered by the precast system. This is due to the relatively low temperature difference between inside and outside in the summer (20°F) coupled with the influence of the windows we built into the model. The performance of the windows tends to dominate the overall heat gain.

Please note we deliberately simplified this model to isolate the performance of the roof and wall systems. Infiltration was not considered nor was mechanical ventilation.

Call me if you have any questions.

Very truly yours,

GHR ENGINEERS and ASSOCIATES, Inc.



Jim Gleason

JNG/smh

cc: Chad Sedlak - GHR