

An Engineering Success Story

Natural Hazard Risks



Recently, a GRM client with locations in Honolulu requested assistance with a reroofing project in an effort to reduce the company's natural hazard risks due to hurricane exposure. Using a solution developed by GRM, the client saved millions in retrofit costs, created access to additional insurance capacity and, most importantly, protected their property and its income stream from a significant hurricane hitting Hawaii.

Prior roof assessments performed by different insurance companies resulted in inconsistent mandates. One insurer wanted the roofs to be reinforced for 170 mph wind speeds, while another indicated the existing 1960s era design was adequate. FM's wind study revealed the roofs should be designed for 135 mph winds, recommended additional deck attachments at roof corners and perimeters (in accordance with the company's datasheets), and uplift testing to determine existing capacities. These improvements would add at least \$5 million to the cost of the reroof project. The 2003 International Building Code (IBC) with Honolulu amendments only re-

quired roofs to be designed for 110 mph wind speeds. So which is the proper approach?

REGION	ROOF WIND PRESSURES			
	IBC 03		FM	
	Load on Roof Material ¹	Load on Metal Deck: Encl. ²	Load on Roof Material ¹	Load on Metal Deck: Encl. ²
...	32	0	53	0
...	39	0	96	40
...	39	0	150	93
...	32	23	53	48
...	39	30	96	90
...	39	30	150	144
...	29	0	49	0
...	36	0	88	31
...	91	31	137	80

GRM's structural engineers analyzed the site hazard and determined that FM's 135 mph recommendation was an appropriate upper level risk for the location. Our engineers then reviewed actual structural drawings and conducted field measurements to determine the capacity of existing structural deck-beam connections and other roof parameters. The results from the evaluation showed that, for the IBC, no deck attachment reinforcements were needed. In fact, most of the structural connections were found to be adequate for FM level forces. FM level deck attachment reinforcing was required at only a few places (mostly at roof corners), at a cost of \$250,000.

This GRM client was able to meet

both the IBC and FM's wind criteria cost effectively once GRM provided the science to help make sound business decisions. Hiring licensed structural engineers experienced in natural hazard risks to analyze the problem prevented money from being spent for little-to-no risk improvement.

This particular client installed a better-than-code roof system that will withstand expected hurricane forces using a methodical approach that cost pennies on the dollar to what they would have spent by simply following insurance company mandates. In the end, one smart risk manager saved his company millions of dollars using the resources of GRM to develop a logical risk-based solution.

	Incremental Cost	Wind uplift rating
Compliance with 2003 IBC code and local requirements	\$0	110 mph
FM deck attachment requirements	\$5,000,000	135 mph
Incremental Cost of GRC solution	\$250,000	135 mph
Net Savings	\$4,750,000	