PROJECT PROFILE

Mauna Kea Beach Hotel

Earthquake Investigation and Litigation Consulting | Kohala Coast, HI

CLIENT

GMA Insurance
Adjusters/Affiliated FM

BACKGROUND

Mauna Kea Beach Hotel is one of the world's most structurally convoluted and architecturally significant midcentury concrete buildings. Edward Charles Bassett from Skidmore, Owings and Merrill designed the original 151-room signature building, which was built in 1965 of cast-in-place concrete. The buildings were designed to conform to, and not intrude on, the natural surroundings.

In October 2006, a 6.7-magnitude offshore earthquake occurred six miles from Puako, Hawaii. WJE was retained to help determine the extent of damage caused by the earthquake and the nature and extent of engineering and construction activities required to repair the damage. The hotel remained open with discreet areas closed to the public until December 2006, when the owners suddenly closed the hotel because they felt it was a safety hazard. The clients requested that WJE develop conceptual repair scopes with the goal of accelerating the hotel's reopening.

SOLUTION

Between October 2006 and August 2009, WJE personnel from six offices conducted over seventeen site visits. Each visit required precise coordination, with up to twelve people on-site for up to fourteen days at a time. Team members spent many hours completing damage assessments by mapping cracks, surveying the roof and lava rock walls, observing repairs, and marking core locations for future destructive testing programs. WJE prepared conceptual repair plans, elevations, detailed drawings, and technical specifications for the repair of the roof trellis at the Beach Cottage, lava rock landscaping walls, pedestrian bridges, cruciform piers, cracks and shear walls. State-of-the-art nonlinear analysis methods were used to explore the behavior of the building during construction, under sustained dead load and shrinkage, and during an earthquake event.

WJE used the finite element program Adina to model and analyze a portion of the main building and considered every piece of reinforcing steel and construction sequencing. Aggregates were obtained by WJE from a long-abandoned local quarry to recreate the original concrete mix in order to conduct laboratory studies to quantify shrinkage and tensile creep properties. WJE also provided litigation support.

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