The Pi’ilani/Hana Arches are three historic masonry arches designed to support the Pi’ilani Highway—one of Hawaii’s most scenic and rugged highways—on the southeast coast of Maui. Following a damaging earthquake in 2008 and subsequent closure of the highway, Kleinfelder was retained to provide engineering and observation services for repair and stabilization of the arches.

**PROJECT RESULTS**

*Funded by the Federal Emergency Management Agency (FEMA), the project was completed in a record two-and-half months—meeting all client requirements well ahead of schedule. We utilized our rock engineering and mountaineering techniques to complete work on the rugged slopes, and our onsite staff during construction enabled immediate design changes when needed to keep the project moving forward.*

**REPAING A VITAL, HISTORIC ROADWAY**

During the earthquake, loosened rock fell from beneath the highway and undercut the arche foundations, jeopardizing their stability and forcing the County of Maui to close the highway. Because of the arches’ historical nature and that Pi’ilani Highway is the only link to the Hana Highway, the County needed to repair and stabilize the road and slope beneath the arches. The design had to address environmental and historical concerns, while meeting anchor strength and sustainability requirements.

**COLLABORATIVE ENGINEERING AND OBSERVATION**

As geotechnical engineer of record, Kleinfelder provided review of existing conceptual designs. Based on our observations and collaboration with project stakeholders, we modified the designs and provided stamped design and construction drawings, rock anchor and shotcrete specifications, and construction best management practices that protected the historical structures and rock environment. Kleinfelder provided engineering and observation services during stabilization. We also monitored construction activities to mitigate any issues and help keep the project on schedule and budget.

**Location:**
Island of Maui, Hawaii

**Owner:**
County of Maui