

'ŌPAEKA'A BRIDGE REHABILITATION



*Retrofitted bridge, completed in 2020
Steel railings have been added to protect the trusses from vehicle impact*

LOCATION District of Kapaa, Kauai, HI
OWNER County of Kauai - DPW
 Island of Kauai, HI
FIRM KAI Hawaii, Inc., Honolulu, HI

The project involved the replacement of the 'Ōpaeka'a Bridge which crosses the 'Ōpaeka'a Stream on the Island of Kauai. This single-lane, 73 ft. long bridge may be the only remaining British-built bridge in the United States, with steel trusses originally forged by the Alexander Findlay & Company in Motherwell, Scotland in 1890, as evident by the still-visible manufacturer's plaque. The 'Ōpaeka'a Bridge was listed on the State Inventory and the National Register of Historic Places in 1983, as a Category 1 bridge, meaning it is one of the most highly rated bridges on the island for its unique historical representation and atypical engineering characteristics. In extremely poor condition and no longer capable of safely supporting vehicles, the design team concluded the bridge must be replaced.

However, what do you do when the local residents and historic community insist that this registered historic bridge be repaired and not replaced?

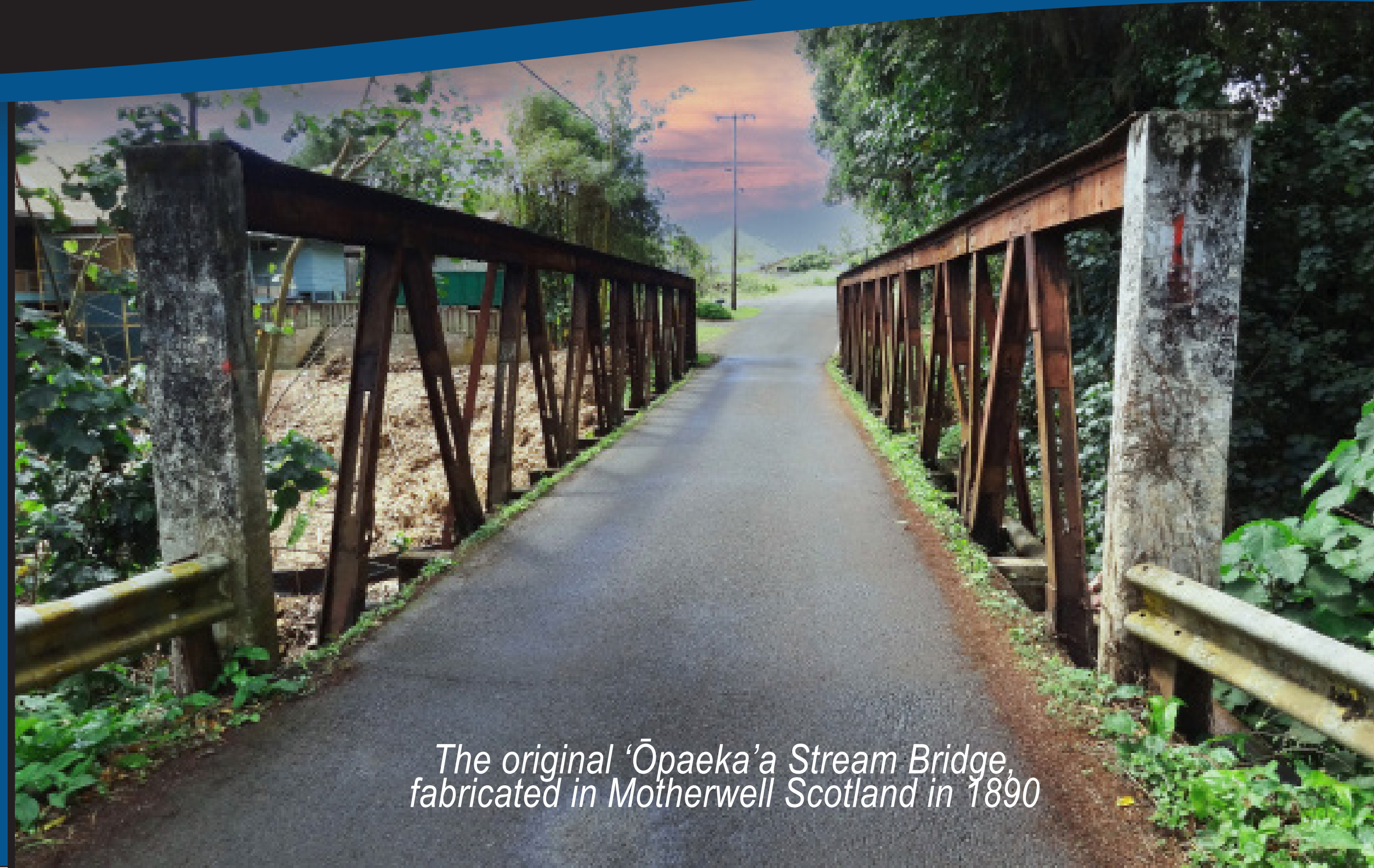
The ultimate solution was to design a retrofitted bridge that incorporates the original steel trusses giving the 'Ōpaeka'a Bridge its iconic 19th century aesthetic appearance, while maintaining its historic integrity. Retrofitting/repairing old steel trusses for reuse is sustainable, but it is unique and has rarely, if ever, been accomplished for a bridge in Hawaii as old and severely damaged as this one. This is because the design and construction was costly, complex, and challenging.



Original plaque that is attached to the top truss chord

CHALLENGES

- » **Community Involvement:** Resistance to a bridge replacement; input of design expectations
- » **Bridge rehabilitation:** Provide a bridge strong enough to support current legal design loads, while remaining a one-lane bridge and retaining original truss members
- » **Reuse of original steel truss:** thorough assessment of each truss member; strengthening damaged truss members
- » **Construction:** Duplicating the 19th century method of construction; use of riveted connections – unique contractor skill



The original 'Ōpaeka'a Stream Bridge, fabricated in Motherwell Scotland in 1890



View looking up at the top truss chord. Note the extreme corrosion and section loss to the 130 year-old steel