(Photos: Michael Roberts)

WINNER: UMTANUM SUSPENSION BRIDGE REHABILITATION USA

Spanning 67m over Washington State's only blue-ribbon trout stream, the Umtanum Suspension Bridge has served as a vital link over the Yakima Canyon for more than a century. Originally built in the early 1900s to connect homesteaders and railroad pioneers, it once accommodated the passage of vehicles like the Model-T before being narrowed to a 1m-wide footbridge. Today, it links the US Bureau of Land Management's Umtanum Recreation Area and campground to the rugged, uninhabited terrain on the opposite bank, serving more than 100,000 visitors each year.

Over time, ageing and exposure to inclement weather led to significant deterioration, raising safety concerns and increasing maintenance demands. In response, the Bureau of Land Management initiated a rehabilitation project to upgrade the structure to modern standards while preserving its historic character and protecting the site's sensitive natural environment. The project was guided by a context-sensitive design approach that balanced structural improvements with respect for the bridge's historical significance, its ecologically important setting, and the client's goal of minimising community and environmental impact.

With no original plans or as-built information available, the team had to reverse-engineer the misaligned and damaged bridge to determine the best approach for rehabilitation. They began by gathering detailed data, conducting a rope-and-ladder access condition assessment, measuring the as-built geometry and member sizes, and completing a full site survey. The compiled data was then used to develop 3D structural analysis models of the bridge.

Commissioning authority: US Bureau of Land Management
Principal designer: HDR
Principal contractor: Rickabaugh Construction

By combining conventional structural analysis with advanced real-time parametric design tools and techniques, the team was able to estimate internal stresses through geometric form-finding and evaluate the bridge's response to wind and pedestrian-induced vibrations using dynamic time-history analysis. This approach provided critical insight into the bridge's behaviour, particularly in the absence of foundation design details, ground condition data, or known anchorage capacities.

The developed design features a lightweight timber deck engineered for durability, reduced wind loading, and environmental compatibility. Sustainable, rot-resistant wood – free of chemical preservatives – was sourced through a collaboration with a local university and a client-owned property. A tensioned stainless-steel wire railing was added to improve user safety and structural stability under pedestrian and wind-induced vibrations while maintaining the bridge's historical character.

Construction took place during the Covid-19 pandemic, requiring adaptability in the face of supply chain disruptions. The team responded by approving material substitutions that maintained the integrity of the design. Shortages of wire rope, wood decking, and railing components were addressed through creative solutions and close collaboration with available suppliers to ensure the project met both the design intent and the client's broader goals. Throughout the process, the

JURY'S COMMENTS

This project entails a thoughtful and innovative renovation of a distinguished historic structure. It preserves the fundamental character of the former bridge while revitalising it for future use.

rehabilitation prioritised preservation of the existing historic structure, replacing only deteriorated elements with sustainable alternatives. The careful, resource-conscious approach significantly reduced the project's environmental impact, resulting in a carbon footprint of just 20tCO_2e – less than the annual emissions of six average cars.

The rehabilitation effort met the client's stringent environmental and historic preservation standards, safeguarding the surrounding ecosystem and local wildlife. Completed on time and within budget in July 2021 for US$800,000, the project delivered a context-sensitive rehabilitation that preserved the bridge's role in the landscape and enhanced its functionality and long-term resilience ■

HIGHLY COMMENDED: CAMBUS O'MAY SUSPENSION FOOTBRIDGE REPAIR AND RESTORATION SCOTLAND

The Cambus O'May suspension footbridge is a riveted wrought-iron structure spanning 50m across the River Dee, east of Ballater in Aberdeenshire, Scotland. Built in 1905 by James Abernethy & Sons, it was a gift from the estate of local philanthropist Alexander Gordon.

The bridge features a 1.2m-wide deck flanked by 1.2m-high lattice trusses that serve both as parapets and deck stiffeners. Two steel suspension cables are supported by tapered lattice towers topped with ball-shaped finials. The bridge was granted B-listed status in 1971, recognising its significance as a regional landmark.

The crossing was closed in 2015 after Storm Frank raised the River Dee to a record 3.3m, partially submerging the deck. A large tree struck the structure, twisting and buckling the deck and shearing several hangers. With no immediate funding, the bridge's future was uncertain until Aberdeenshire Council secured Scottish Government funding in 2019, which was boosted by the Ballater Royal Deeside Community Group.

Repairs were carried out manually due to limited access preventing the use of a crane. A cantilevered scaffolding platform enabled work on the worst-damaged areas. The twisted deck was realigned using controlled heating, hydraulic jacks, tirfors and a winch, allowing severely damaged sections to be removed and replaced. To minimise the risk of further movement or distortion during the replacement of damaged balustrade sections, the contractor prefabricated the new panels to allow for rapid installation.

New steel components were finished with a three-layer protective paint system, and the refurbishment scope was extended to overcoat the suspension towers and remaining steelwork. Timber runners and treads were replaced with locally sourced, pressure-treated Douglas Fir, joined with glued half-lapped joints. Tubular steel handrails were added to both approaches for visual harmony. The sensitive scheme restored the bridge's structural integrity while preserving its historic character ■

JURY'S COMMENTS

Very challenging restoration project with a thorough respect for what needs to be preserved and replaced.

Commissioning authority: Aberdeenshire Council
Principal designer: Moray Blast