Solomon Islands

Solomon Islands – Modular Bridges for Resilient Transport

CASE SNAPSHOT

SECTOR

Transport (Roads & Bridges)

COUNTRY

Solomon Islands

TIMELINE

2019–2023

COST

US$30 million (World Bank project)

RESULT

- 100,000+ beneficiaries reached via safer crossings
- Bridge installation times reduced from months to weeks - 30% cost savings vs. traditional builds
- Post-disaster isolation days cut by 75%

CASE STUDY SUMMARY:
SOLOMON ISLANDS – MODULAR BRIDGES FOR RESILIENT TRANSPORT

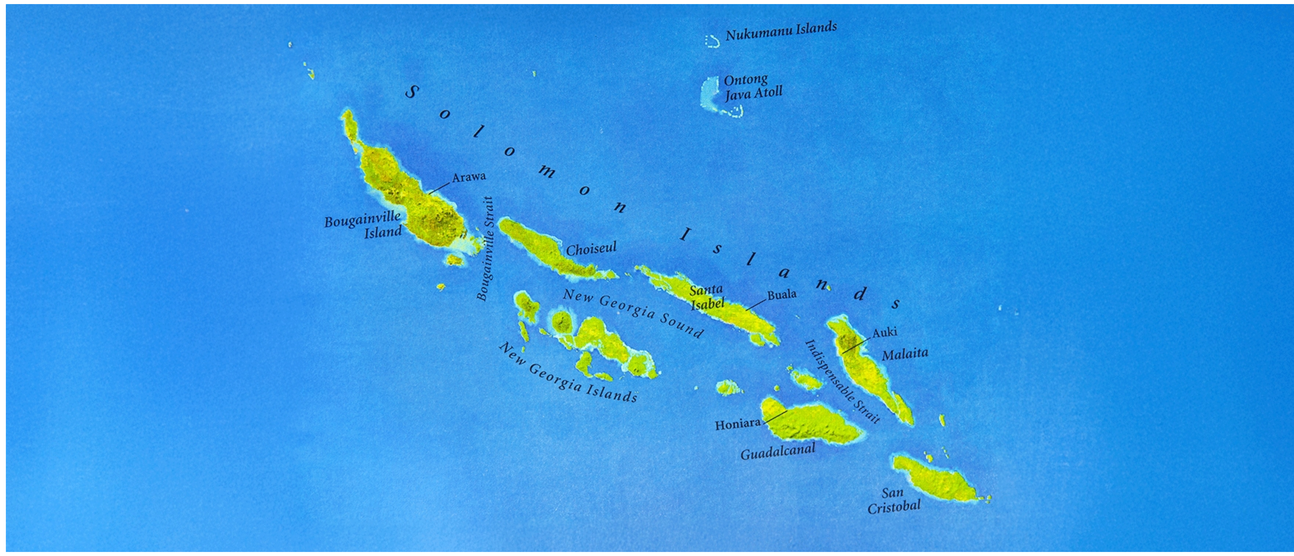
THE OBJECTIVE

To ensure the safety, efficiency, and durability of the country's transport lifelines - especially rural bridges - against increasingly frequent climate hazards and disasters

THE CHALLENGE

Spread across more than 900 islands, the Solomon Islands faces acute geographical and financial challenges in maintaining its transport network. Many existing bridges were built decades ago using locally available timber, steel, and basic concrete, leaving them vulnerable to cyclones, flooding, earthquakes, and long-term environmental degradation. When extreme weather strikes, crucial routes become impassable, isolating villages from essential services.

Frequent floods and storms demonstrated the limitations of traditional approaches - construction took months, and repairs after each disaster were slow and expensive. The government needed a resilient and cost-effective solution, but capacity and resources were limited.



Drivers for Change:

- Escalating climate threats: The frequency and intensity of cyclones and flash floods have sharply increased, exposing the vulnerability of the country's road and bridge infrastructure. Each event exacerbates the risk of isolating rural communities dependent on a small number of vital crossings for health, markets, and schooling.
- Critical disruptions to connectivity: When bridges fail, food supply chains and emergency response are stalled, and economic life comes to a halt. Recovery was consistently hampered by slow and labor-intensive reconstruction, deepening hardship and increasing costs for families and the government.
- Outdated and fragile infrastructure: With most bridges built from basic materials decades ago, wear and environmental exposure have led to inevitable failures even in "normal" years, before the full impacts of climate change hit.
- Limited fiscal and technical capacity: The Solomon Islands government faces major budget constraints and a shortage of skilled engineers and contractors. Traditional construction methods require significant time and outside expertise, making sustained improvement across 900+ islands nearly impossible.

Outcome Needed:

- Rapid restoration of transport lifelines during and after disasters and storms, ensuring communities remain connected and able to access essential services
- Long-term durability against cyclones, flooding, earthquakes, and the effects of climate change, so infrastructure investments deliver value for decades with minimal maintenance
- Efficient and cost-effective delivery: Solutions that reduce dependence on specialized outside labor, shrink construction and restoration timelines, and fit within national budgets
- Building local technical and operational capacity: Empowering Solomon Islands engineers and contractors with the knowledge to install, maintain, and repair modern resilient bridges
- Financial and institutional sustainability: Approaches that maximize economic returns, leverage international support, and embed "resilience" as a guiding feature not just for the bridges themselves, but for the future of the country's transport planning and disaster readiness

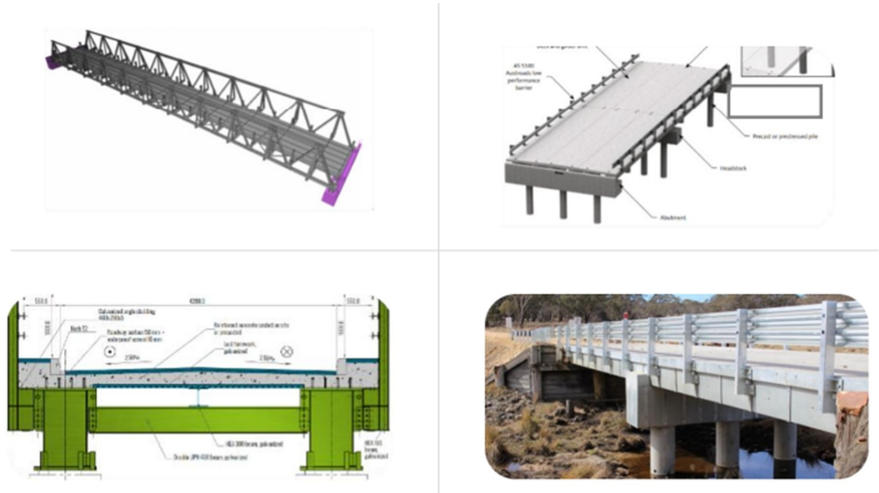
THE SOLUTION

Backed by technical and financial assistance from the World Bank and the Quality Infrastructure Investment (QII) Partnership, in [year] the Solomon Islands launched an innovative program to upgrade priority bridges using prefabricated modular systems. Modular bridges are manufactured off-site using steel or concrete components and then shipped in sections, ready for rapid assembly. For the Solomon Islands, this meant bridge spans of 10–20 meters could be deployed faster, replacing vulnerable crossings with robust structures designed for long-term resilience.

The approach unlocked several efficiencies:

- Construction times shrank from months to weeks - sometimes even days for short spans.
- Fewer skilled laborers and less heavy equipment were necessary, making it feasible in remote areas.
- Standardized design allowed easy replacement or repair after major events.
- Bridges were engineered to survive cyclones, floods, and earthquakes, protecting life and assets.

A crucial dimension was knowledge transfer and capacity building. Japanese and World Bank engineers collaborated with Solomon Islands teams, leading hands-on workshops and sharing international best practices in modular bridge deployment and maintenance. Local contractors were trained in installation techniques and routine inspection, ensuring the long-term sustainability of the investment.



Long-term Modular Bridge Types

(source: https://documents1.worldbank.org/curated/en/099307004292220446/pdf/IDU0ed85d1840ffad04ccd0aed80adae36eb0699.pdf, pg 8)

Approach to Resilience

The heart of the Solomon Islands modular bridge program is its climate- and disaster-proof engineering. The design of each bridge is tailored precisely to local threats, based on hazard modelling data - whether cyclonic winds, river floods, seismic risks, or coastal corrosion. Prefabricated steel and concrete components are manufactured to exacting standards, with modular spans configured for rapid on-site assembly even in remote regions. Bridges are anchored with reinforced abutments and elevated decks, maintaining structural integrity against floodwaters and debris flows that routinely undermine conventional crossings. Galvanized elements and protective coatings safeguard against saltwater - and every joint and connection is detailed for durability and ease of future replacement. These technical choices mean that, when storms or disasters hit, damaged elements can be swapped out quickly and bridges returned to service in days, rather than months. Comprehensive capacity building - from installation to maintenance - ensures local engineers and contractors master these cutting-edge methods, embedding technical resilience and operational readiness within the national transport system.

Approach to Climate Change

Solomon Islands' modular bridge program is designed with climate adaptation at its core. Each bridge is engineered to withstand the region's increasingly unpredictable extreme weather, from more intense cyclones and flooding to accelerated coastal erosion. Climate hazard analysis informs site selection and elevation, ensuring crossings remain passable under future rainfall and sea-level scenarios predicted by climate models. Flexible installation allows for bridges to be relocated, raised, or expanded as conditions change over their lifespan.. By institutionalizing climate-informed design, standards, and training, the project ensures new infrastructure will endure not just today's risks but tomorrow's uncertainties - safeguarding livelihoods in a changing Pacific climate.

THE ENABLERS

Within the first phase, the Solomon Islands successfully replaced several bridges across the islands of Malaita and Guadalcanal, cutting downtime, transport costs, and vulnerability to floods.

After severe storms, bridges remained open or were rapidly restored, limiting negative impacts for thousands of residents. The approach set a benchmark for transport resilience across the Pacific, now being replicated in Samoa, Tonga, and Vanuatu, supported by ongoing Japanese and World Bank engagement.

The program demonstrated how modular infrastructure, climate-smart standards, and capacity building - driven by global partnership - can transform small island states' vulnerability into adaptable, sustainable solutions.

THE RESULT

The rollout of prefabricated modular bridges has delivered tangible and measurable resilience and efficiency for Solomon Islands communities. By 2023, the program had installed modular bridges at key crossings on the main island of Malaita and other critical locations, directly benefiting over **100,000 people** who rely on these links for market access, healthcare, and education.

- **Reduced downtime:** The new modular bridges can be erected in as little as **two weeks**. This rapid installation reduces "isolation days" for communities after floods from several weeks to under five days.
- **Cost savings:** The modular approach achieves unit cost reductions of up to **30%** compared to custom-designed, site-specific repairs—helping national budgets go further and freeing resources for maintenance and additional upgrades.
- **Improved disaster recovery:** During the 2022 flood events, modular bridges withstood severe rainfall, and damaged sections were rapidly swapped out, restoring uninterrupted access for thousands. Surveys show that road and bridge availability after storms improved by **over 75%** compared to pre-project infrastructure.
- **Local capacity: Local engineers and contractors** gained training through hands-on workshops and direct collaboration with Japanese and World Bank specialists, institutionalizing maintenance and disaster response abilities in-country.
- **Regional influence:** Following the Solomon Islands pilot, similar modular bridge systems have begun scaling into Samoa, Tonga, and Vanuatu, reflecting a regional transformation in climate-resilient transport.

QII PRINCIPLES IN ACTION

Principle 4: Resilience

The resilience principle is woven into every phase of the Solomon Islands' modular bridge initiative. From hazard diagnostics and climate risk modeling through design and deployment, each decision is shaped by a commitment to withstand disaster and adapt to uncertainty. International technical exchange - anchored by Japanese and World Bank engineers - ensured every bridge's structural standards matched the realities of cyclones, flooding, and seismic events unique to the Pacific. Prefabricated components were selected for their ability to be rapidly installed, replaced, or upgraded in response to natural hazards, dramatically reducing service disruption and enabling swift recovery after disaster. Resilience is further institutionalized through capacity building: local teams received hands-on training in maintenance, monitoring, and emergency restoration, transforming imported expertise into enduring local capability. Through its financing, partnership structure, and adaptive technology, the project creates a living resilience system - one where transport infrastructure, human know-how, and disaster response are fully integrated to protect vital connections, safeguard communities, and future-proof development.

RELATED REFERENCES

Want to explore this case further? Access the detailed case study *here*.

Related Materials

- https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099307004292220446/idu0ed85d1840ffad04ccd0aed80adae36eb0699
- https://blogs.worldbank.org/en/ppps/modular-bridges-climate-resilient-solution-small-bridges-pacific
- https://www.worldbank.org/en/news/feature/2019/06/11/in-small-island-states-resilient-transport-is-providing-a-lifeline-against-disasters