



Partnerships, projects and creating a sustainable future

Erasito

BECA

Andrew Harvey - Beca

Ports and Coastal Technical Director



- Based in Auckland Andrew has been with Beca for over 3 years now working on numerous projects across New Zealand and the Pacific.
- Andrew's work has included many aspects of coastal and maritime engineering with a strong emphasis on contract preparation and administration, design work, multidisciplinary team management and construction management. Andrew is a Member of the Institute of Civil Engineers, and having undertaken a Masters in Construction Law and Dispute Resolution, is a Member of the Chartered Institute of Arbitrators.
- Andrew has gained widespread international experience of major projects covering many aspects of the planning, design and execution of port and maritime related projects. He has design and supervision experience of large scale development schemes including land reclamation and breakwater projects in the UK, Europe, South East Asia, Australia, India and the Caribbean as well as experience of managing large multidisciplinary design teams for Ro-Ro facilities, container terminals and both liquid and bulk handling facilities.
- Andrew has also undertaken the port master-planning of a number of International Shipyards, General Cargo, Bulk, RoRo and Container Terminals

Terence Erasito – Erasito

Director – Erasito Consultants



- Terence Erasito is the Director of Erasito Consultants Limited. With 36 years of postgraduate work experience in New Zealand, Fiji, and the Pacific Region, he brings a wealth of expertise to his role.
- Terence has extensive experience in the design, documentation, and coordination of engineering projects across the region. He holds a Master of Structural Engineering from the University of New South Wales and a Bachelor of Civil Engineering from the University of Auckland. Terence has extensive experience in construction supervision and contract administration procedures and civil engineering software applications, enabling him to solve practical engineering problems effectively.
- Erasito Consultants has completed approximately 3,500 projects under his leadership, with a total capital value exceeding F\$400M. The firm operates from offices in Suva and Nadi, serving Fiji and the wider Pacific region.
- His country experience includes Rotuma, Fiji, Tonga, Samoa, Tuvalu, Kiribati, Cook Islands, New Zealand, and Australia.
- In addition to his professional achievements, Terence is the President of Engineers Fiji and a Member of Engineers New Zealand.

Partnerships



Beca and Erasito have been working together for 30 years to bring international experience and knowledge to the projects in the Pacific



Exchange of staff and knowledge



Understanding importance of local cultural and relationships



Understanding of the use of the assets, material availability, access, and construction issues



Challenges

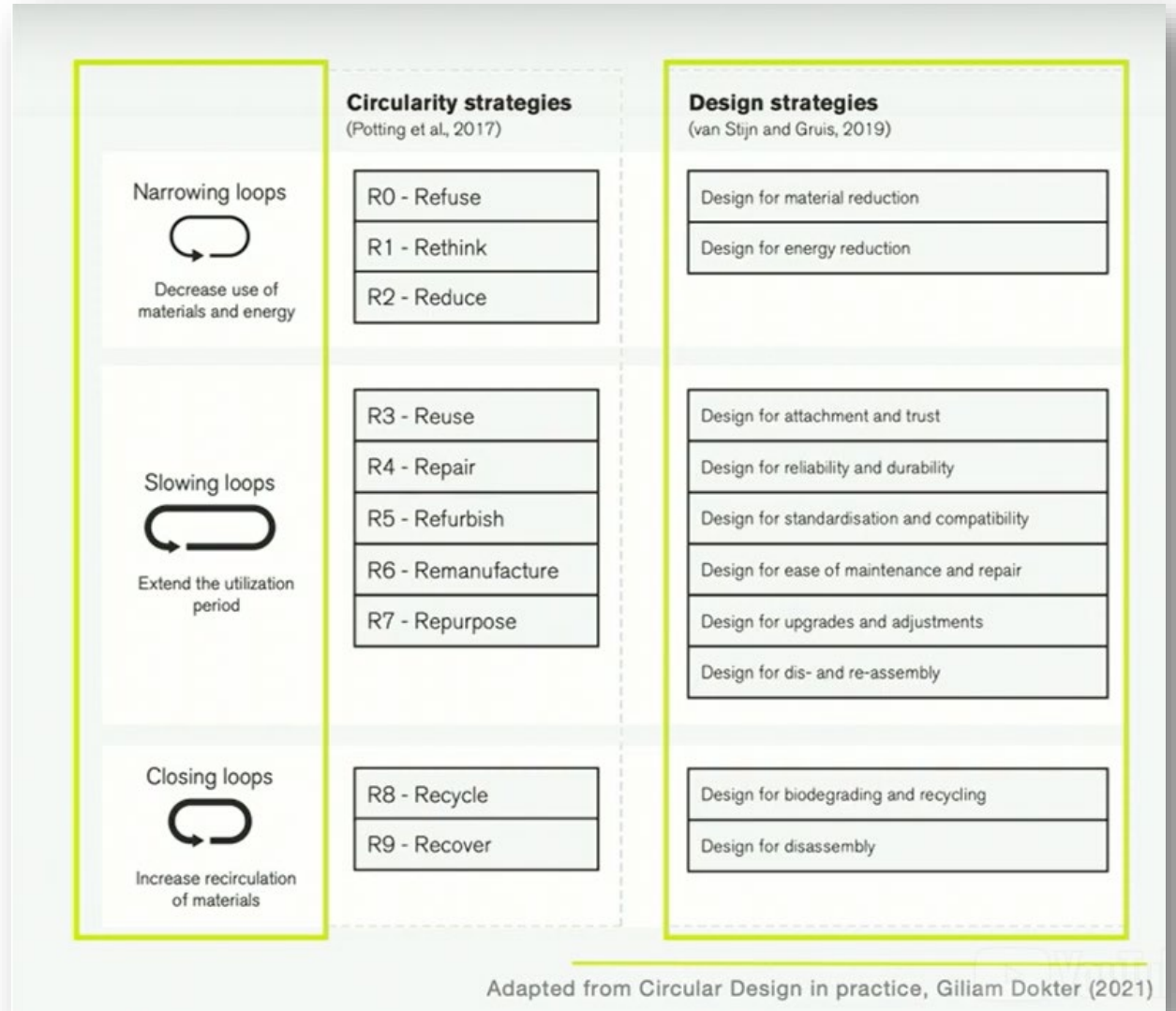
- Impact of changes to sea levels and weather patterns
- Relatively small trade volumes compared to cost of infrastructure
- High costs of infrastructure maintenance and rebuild
- Funding and the build costs due to remote locations
- Limited construction plant, equipment and materials
- Fuel & Power
- Retaining staff and knowledge



How do we bring Circular Economy thinking to Port Infrastructure

Shifting to a circular economy involves promoting sustainable thinking, design and construction patterns, by following a hierarchy of circular actions:

- **reducing waste** significantly by beginning upstream with circular design (including modularity and designing for adaptable operations) and circular sourcing (for instance, renewable or on island materials and recycled materials),
- **keeping materials** within the economy through:
 - reuse,
 - repair,
 - refurbishing,
 - and repurposing, thus reducing the embodied carbon of buildings
- at **end of a life**, recovering and recycling resources to feed them back into the same or different purposes and capturing and creating further value.



Resilience

World Class Seismic Knowledge

Since the 1960's Beca has been a leader in the field of earthquake (seismic) engineering with our innovative solutions helping improve the seismic resilience for our clients.

Currently using the latest design techniques and international practice of Displacement Based Design for seismic design of wharf structure.

In a recent major wharf project in New Zealand the design of the wharf structure had to accommodate sea level rise – the design of the deck was future proofed to allow it to be raised up in the future.

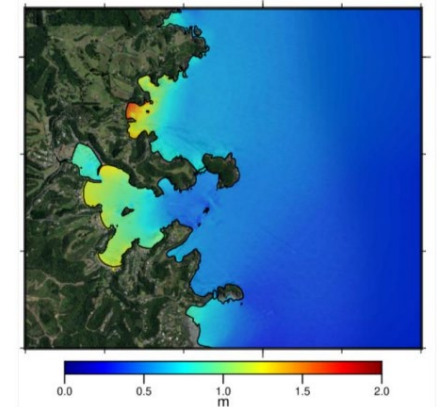
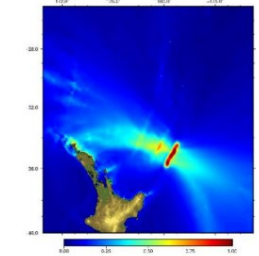
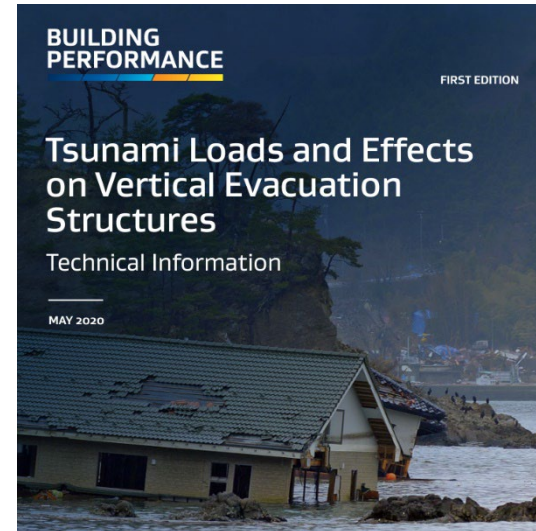
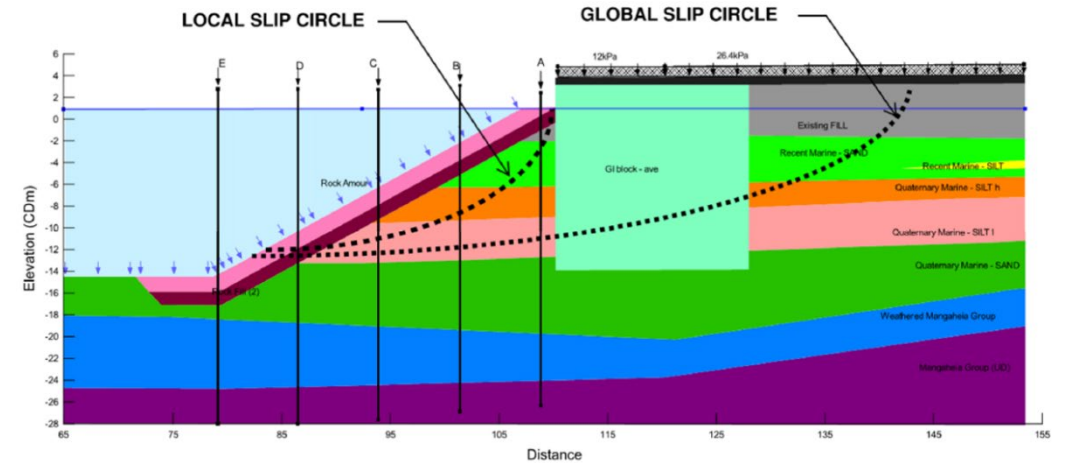
In the Asia Pacific region Beca were involved in drafting new seismic loadings codes for Indonesia, PNG, Philippines and Nepal.

Tsunami Engineering

- Tsunami hazard modelling using commercial simulation packages such as Delft3D
- Desktop assessment of tsunami risk using available information.

Tsunami Resilient Design:

- Our team played a key role in the working group that prepared the tsunami design guidelines for the **New Zealand Building Code**.



Project Examples



South Paray, Vanuatu 2023/24



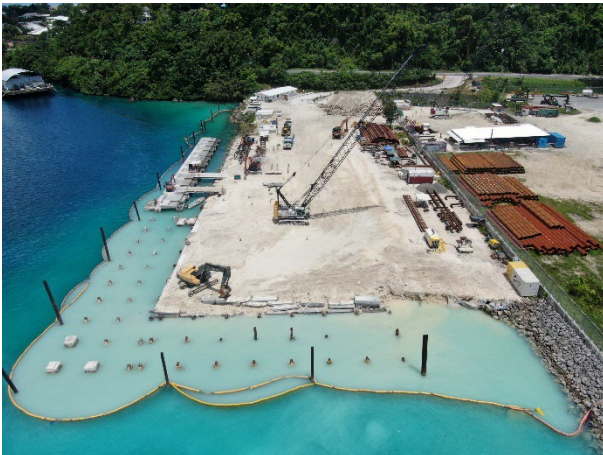
Re-use of old rock armour
in sheltered locations



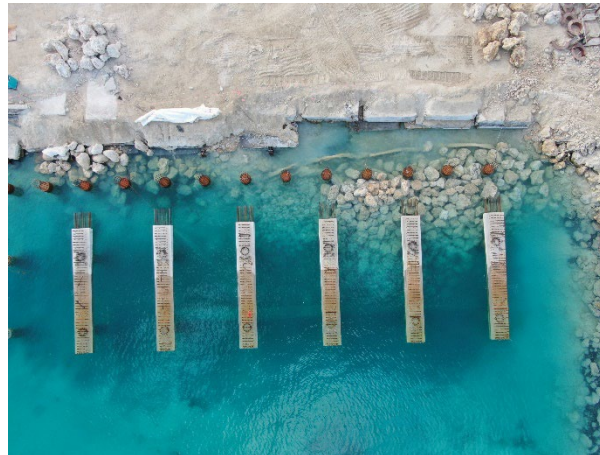
Reuse of old beams in
mass retaining wall



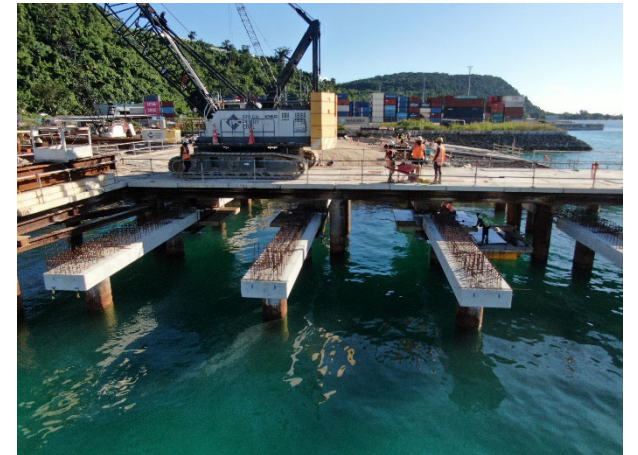
Upcycled precast for
revetment toe



Use of precast to protect
from erosion



Revetment toe beams in
place

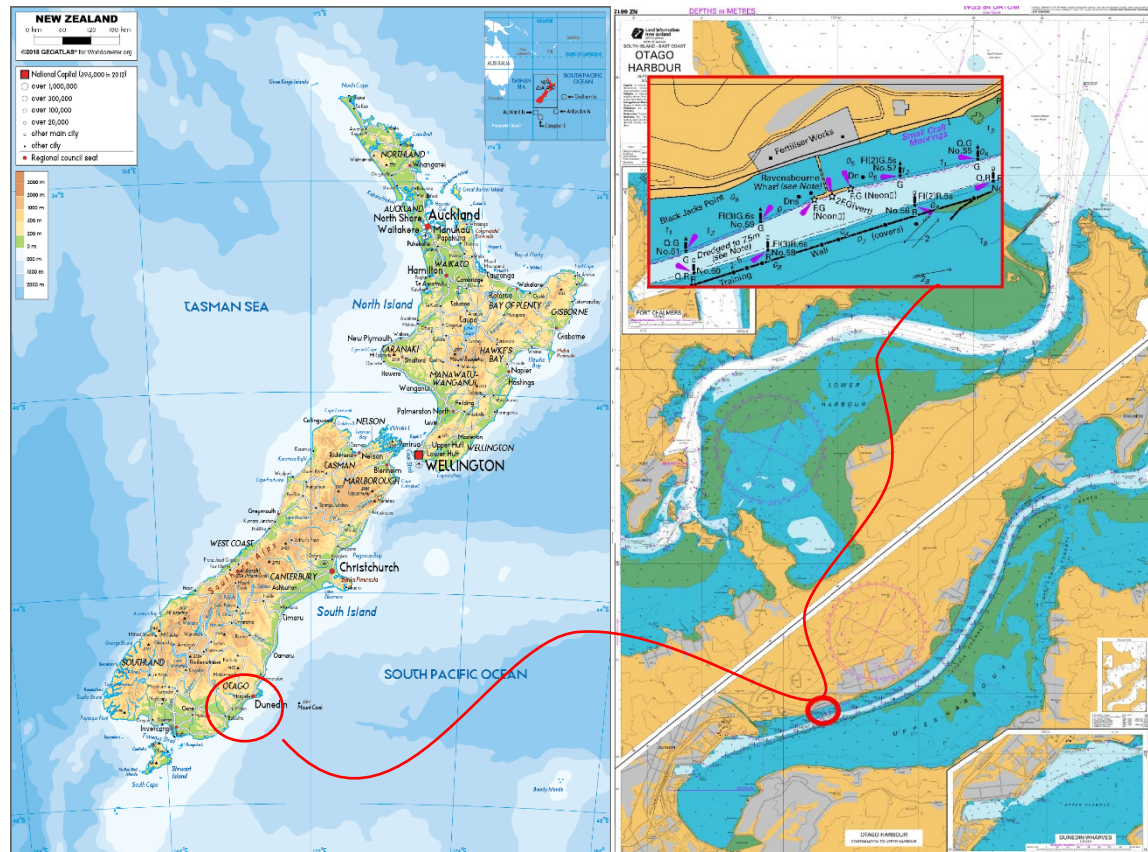
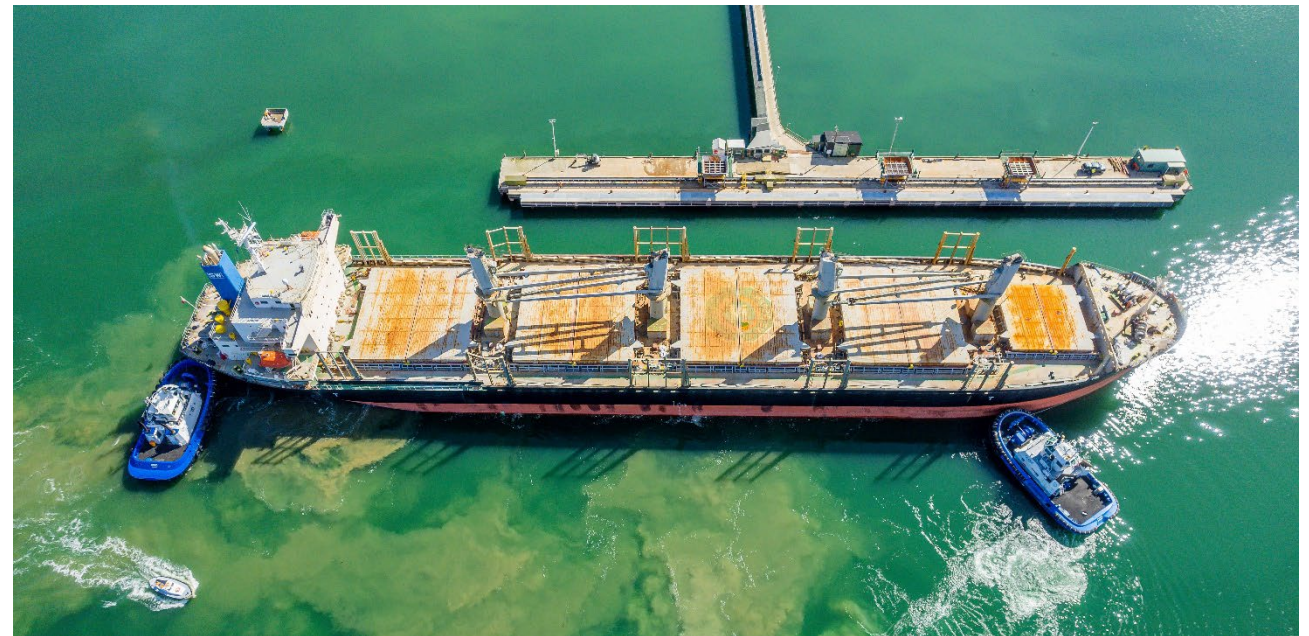


Temporary staging using old
existing materials on site

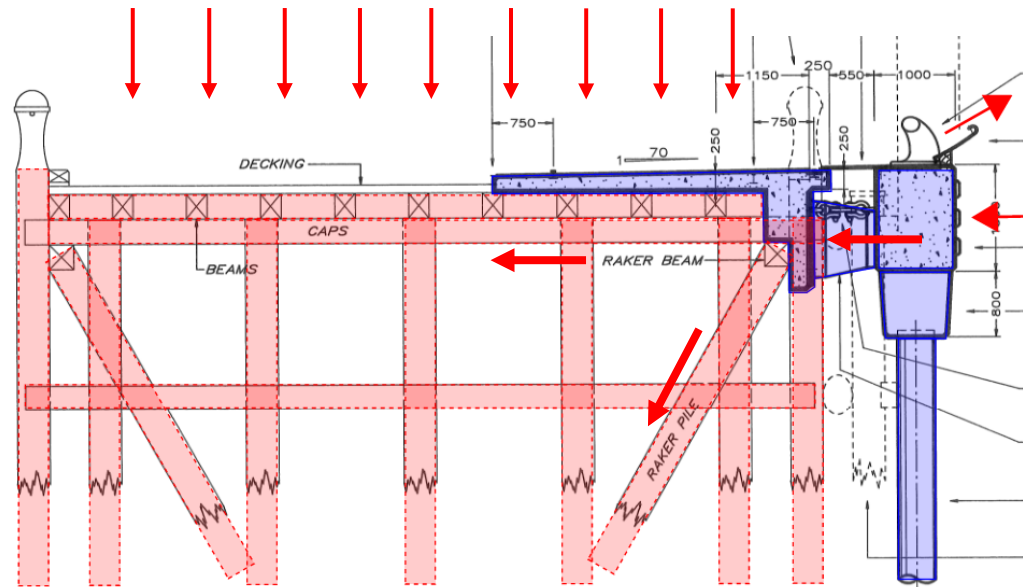
Ravensborne Wharf Port Otago NZ

The problem:

- A relatively remote facility which had reached end of life, the owner operator required a further 10 years life.
- The wharf had no remaining lateral capacity

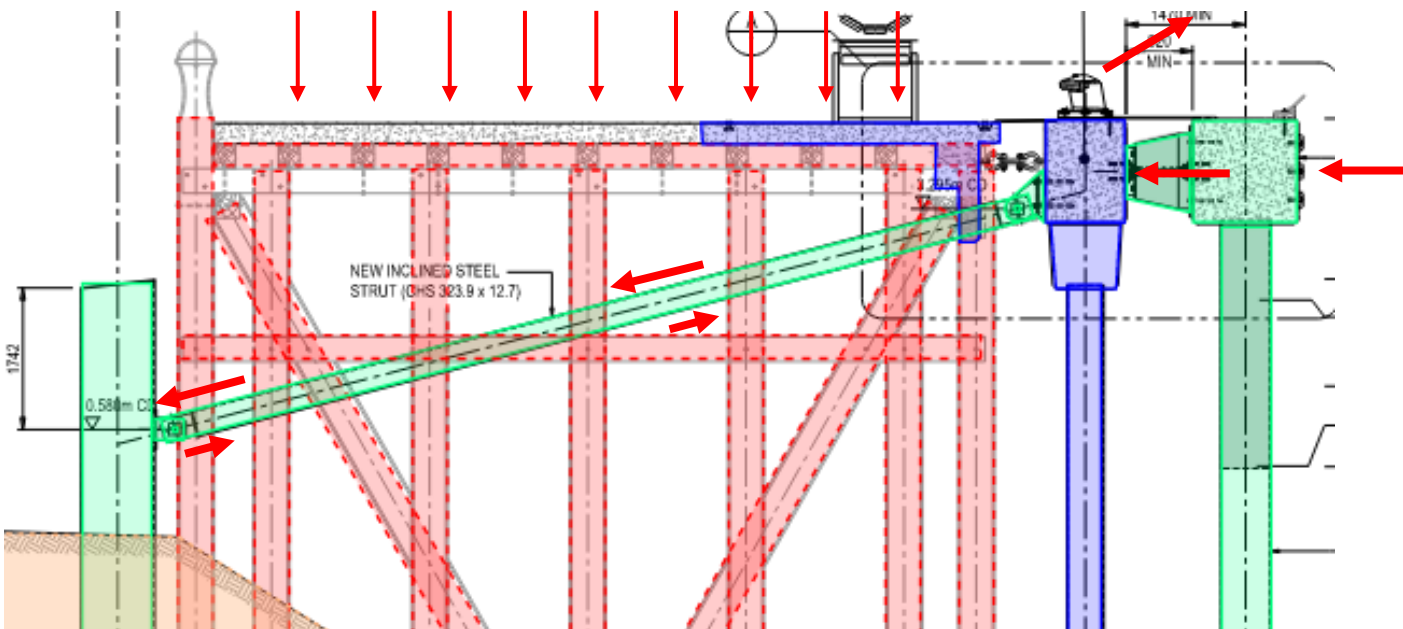


Resolving the issues efficiently



Existing Structure

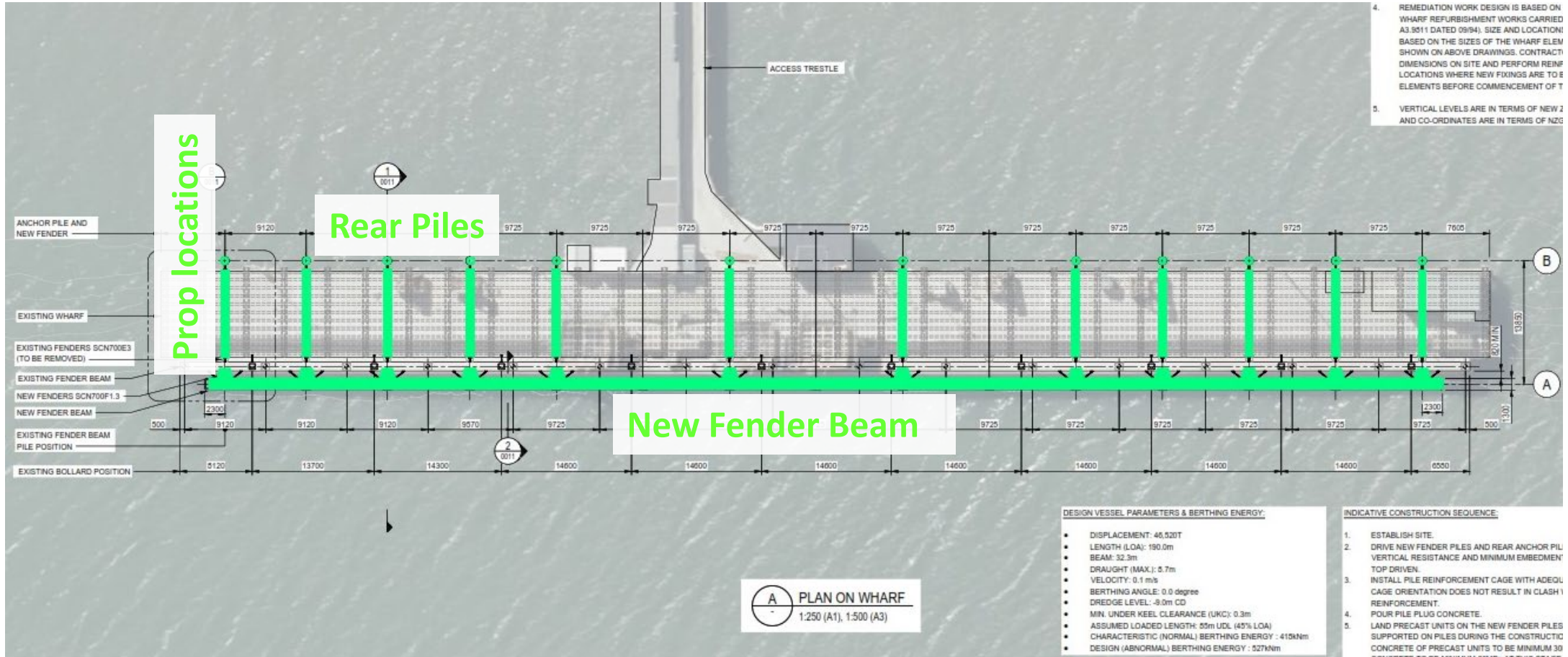
- Mooring, Berthing and Axial loadings pass into the timber deck structure.
- Raker piles were mostly end of life and vertical piles have only limited axial capacity, no lateral capacity
- The existing fender beam (blue) and supporting piles did have limited lateral capacity.



Revised Structure

- Large Diameter pile driven at rear of structure to provide lateral stiffness
- Rear pile connected to existing fender beam via pinned props.
- Existing fender beam disconnected from timber structure.
- New fender beam and supporting piles driven and constructed in front of wharf.
- Lateral loads now dissipated through fender absorption, flexure of front pile and stiffness of the prop and rear pile.
- Only minimal axial loads from deck remain on existing structure.

Separation of new and old



Resolving the issues efficiently

Utilise the remaining strengths of the existing Structure

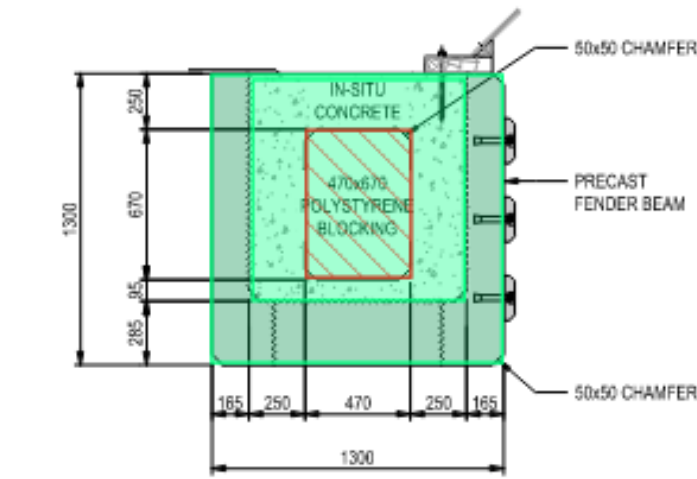
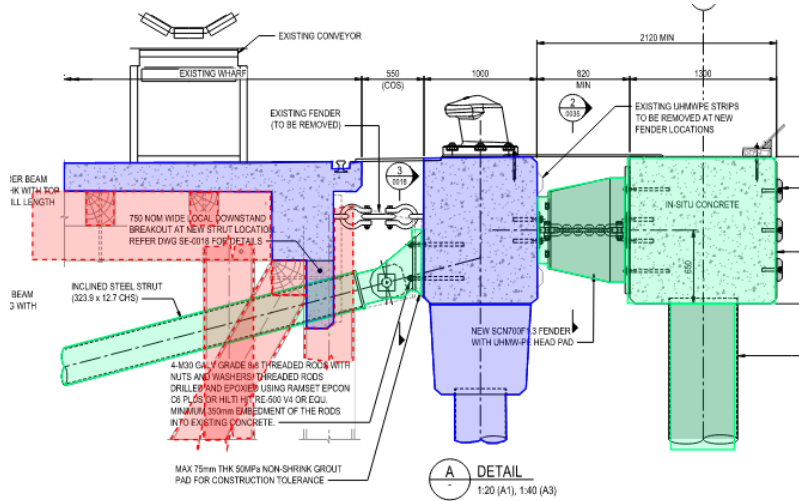
- The existing deck still has sufficient (limited) axial capacity
- The existing fender beam and supporting piles can provide some lateral restraint



Plant and Materials

- Pile sizing and driving designed to meet the lift and reach constraints of plant that is locally available.
- Suppliers contacted to find out what steel sizes were readily available.
- Concrete transport to site was a logistical challenge and incurred high costs. Solutions:

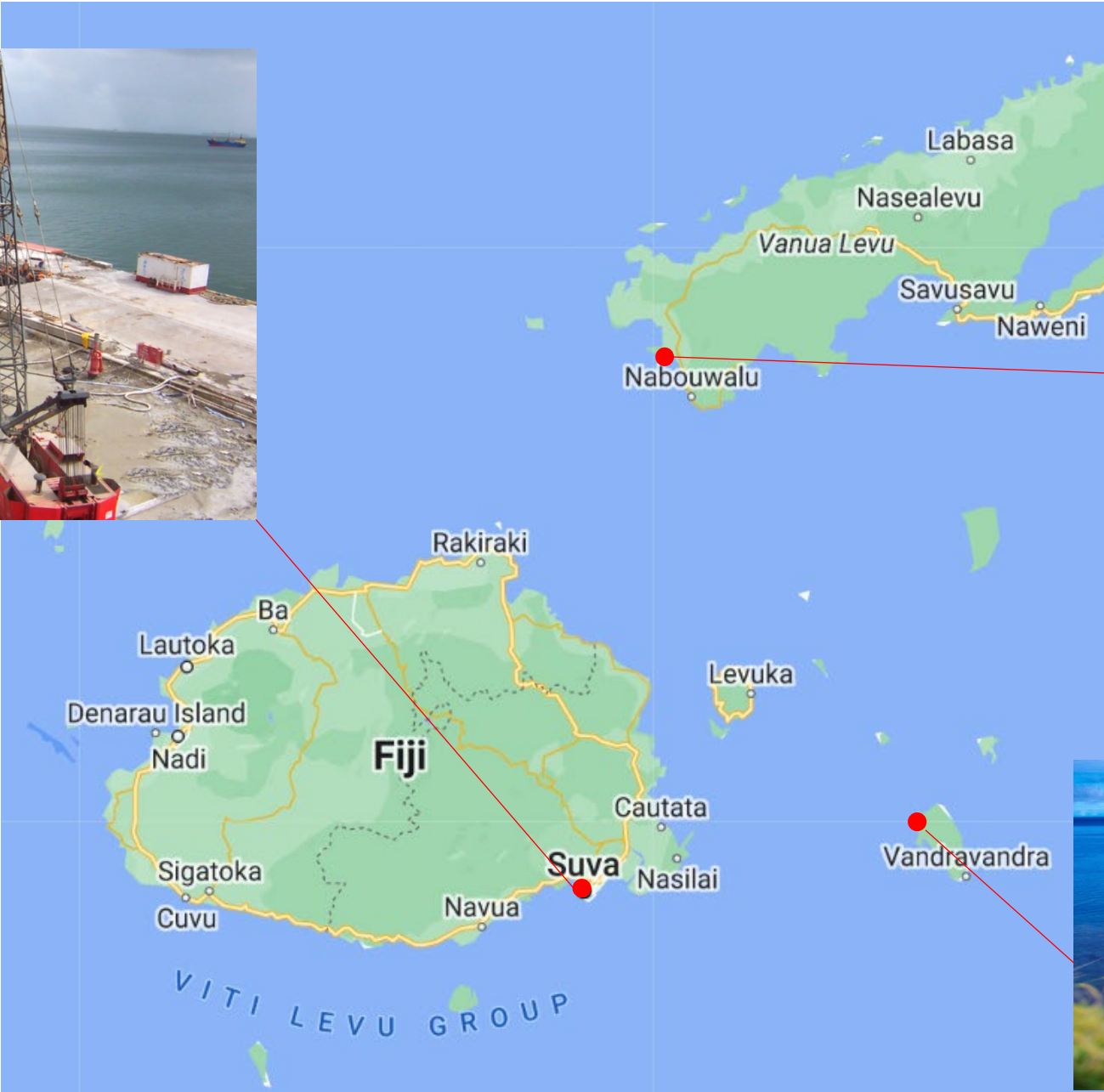
- Pre-cast shall units designed for fender beam to increase quality control and reduce formwork and working over water.
- Polystyrene void former utilised in centre of beam to reduce insitu concrete by over 30%



Erasito Beca Partnership in Fiji



Kings Wharf, Suva



Bua Bay, Wairiki



Qarani Jetty, Gau

Working together to bring better results



Working together is better, bring local and international knowledge together and keep learning



Use what we have in the best way possible to provide the best results for the communities:

- reuse,
- repair,
- refurbishing,
- and repurposing



Work together to make sure funding is spent wisely on planning and design that provides the best value and **not** the simplest path or the cheapest option



**Port Vila, Vanuatu
Completed 2017**

