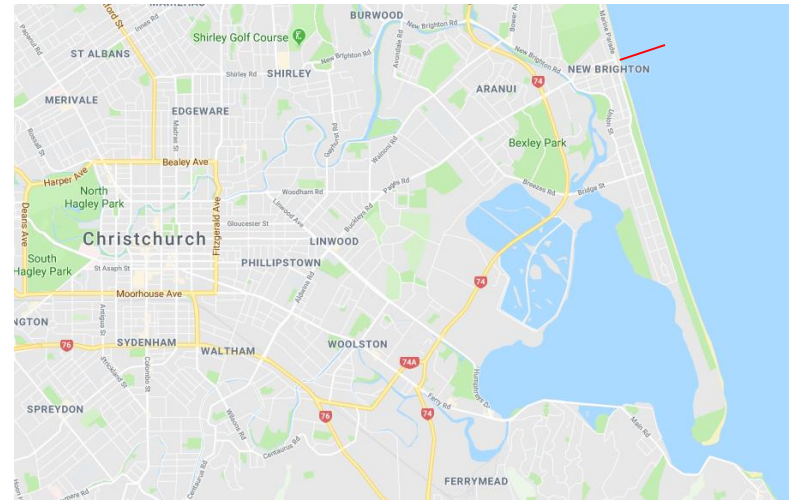


New Brighton Pier Earthquake Repairs

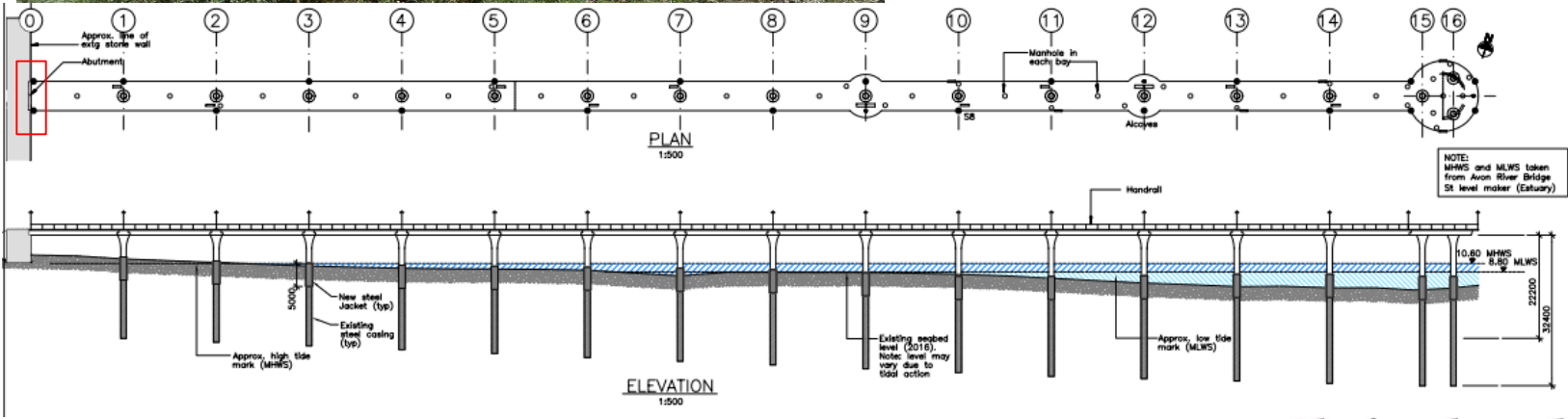
Safety in Design Considerations

Mark Humphery
Senior Structural Engineer
CCC Technical Services and Design

New Brighton Pier



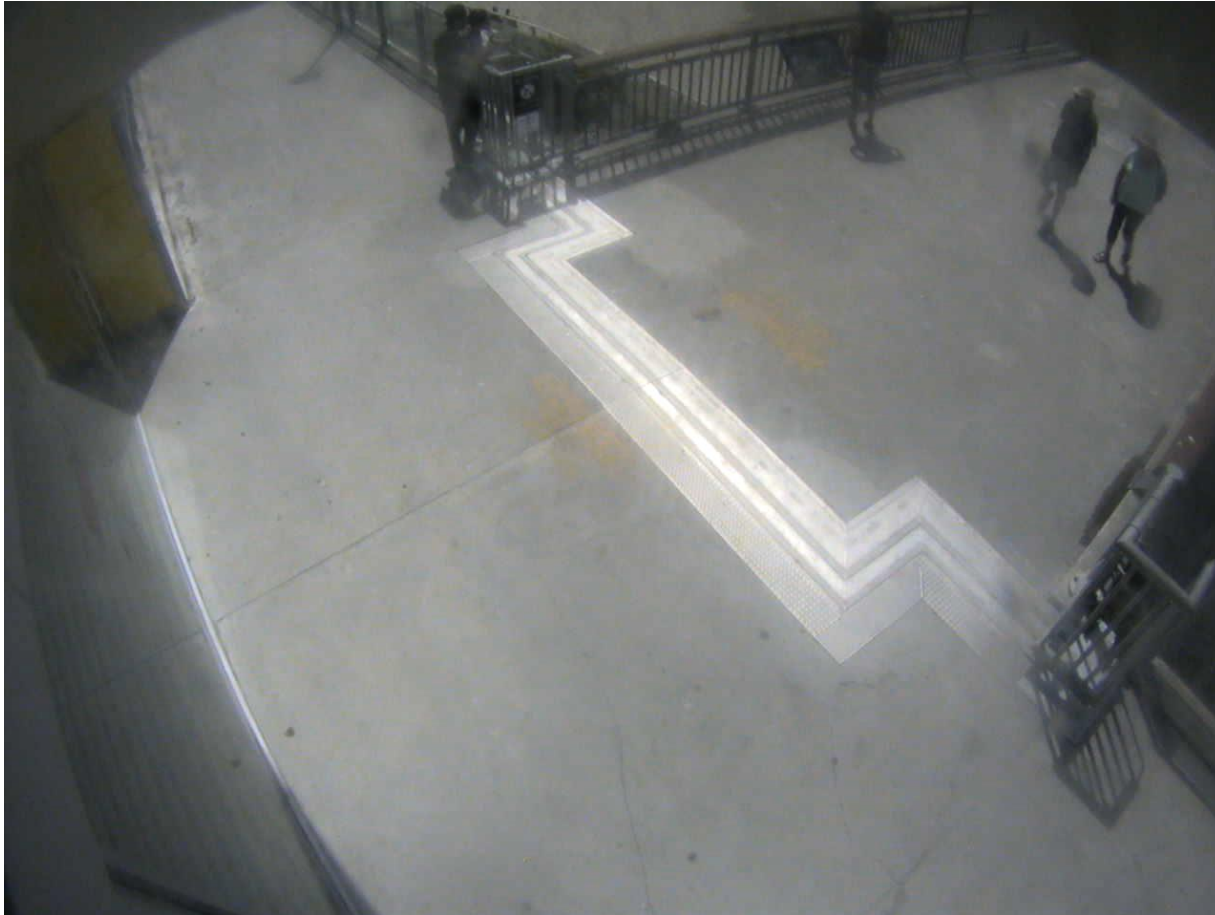
LIBRARY



February 2011 Earthquake



February 2016 Aftershock



4

EQ Damage

- Loss of Seismic Strength
- Corrosion of reinforcement
- Settlement of column #4



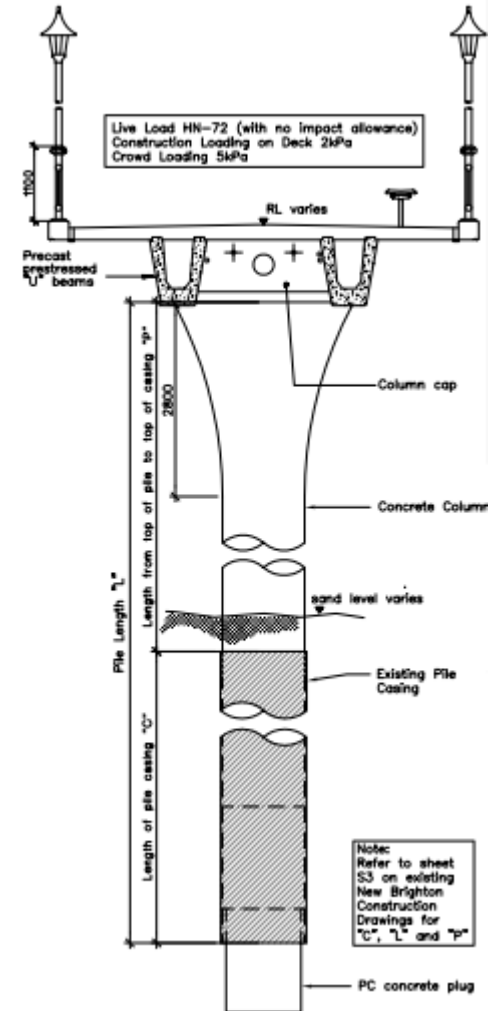
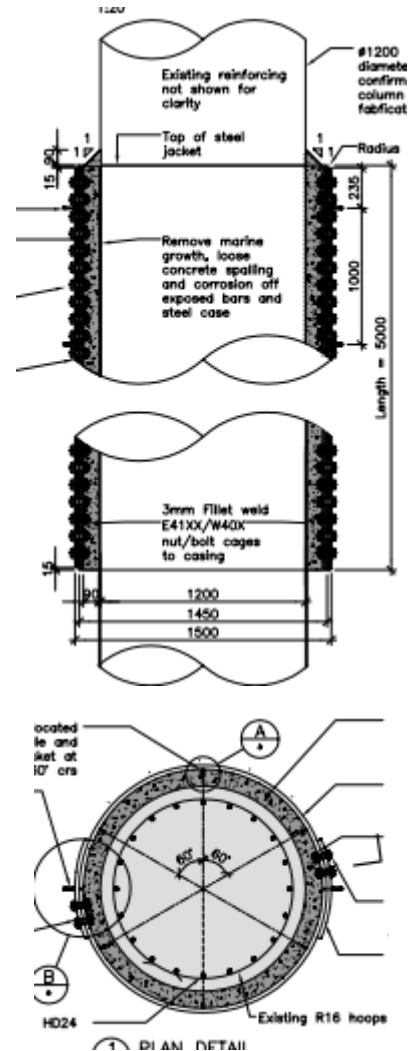
Project Aims

1. Achieve Pre-Earthquake Condition
2. SIMPLE solution
3. SAFE to install
4. DURABLE
5. COST effective

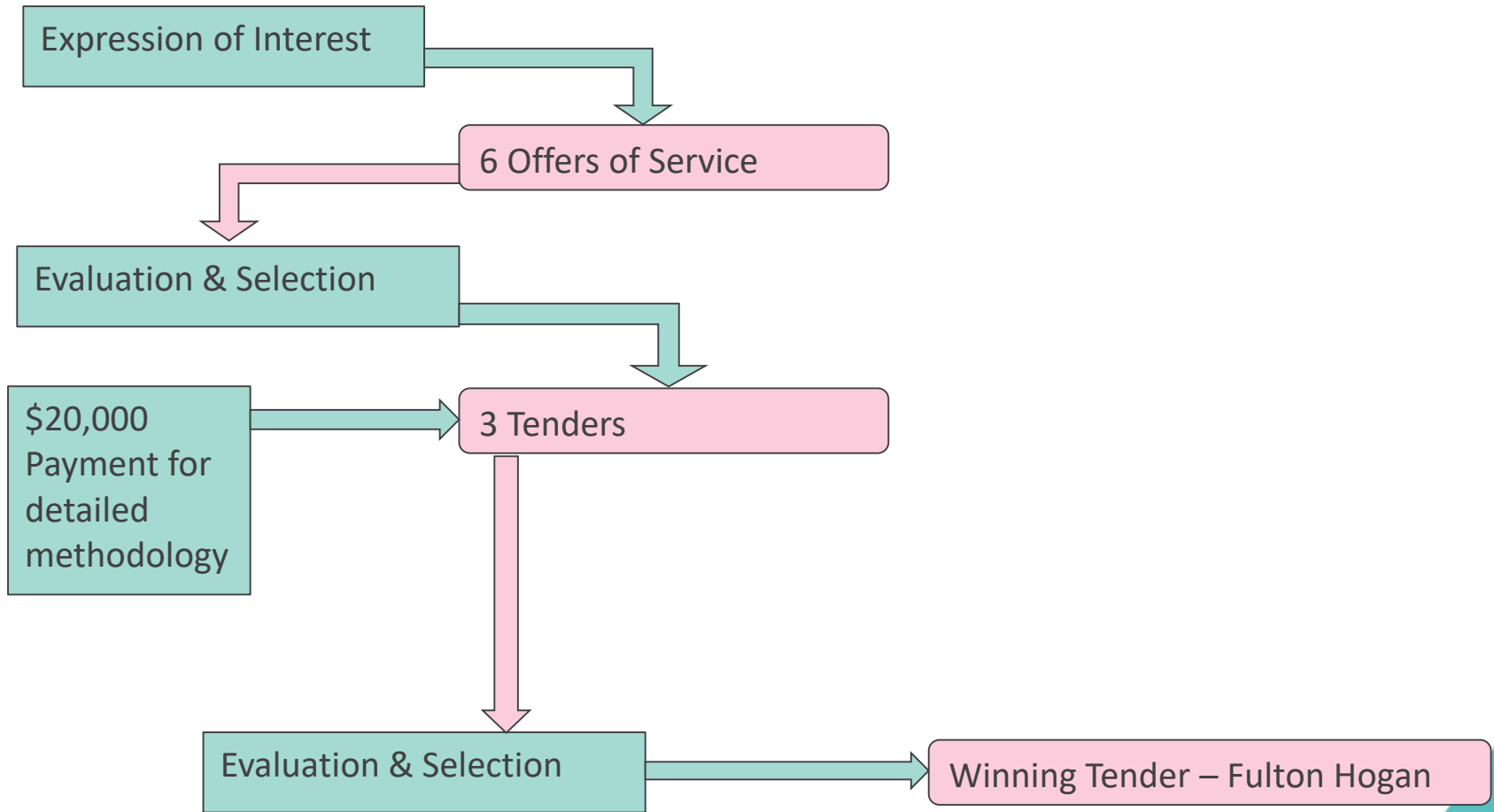
Critical Safety Issues

- Working in marine environment
 - Deep excavations below sea bed/beach level
 - Very difficult conditions for divers
- Safety of the public
- Reduced seismic capacity and limited live load capacity of pier deck
- Unique construction methodology for NZ

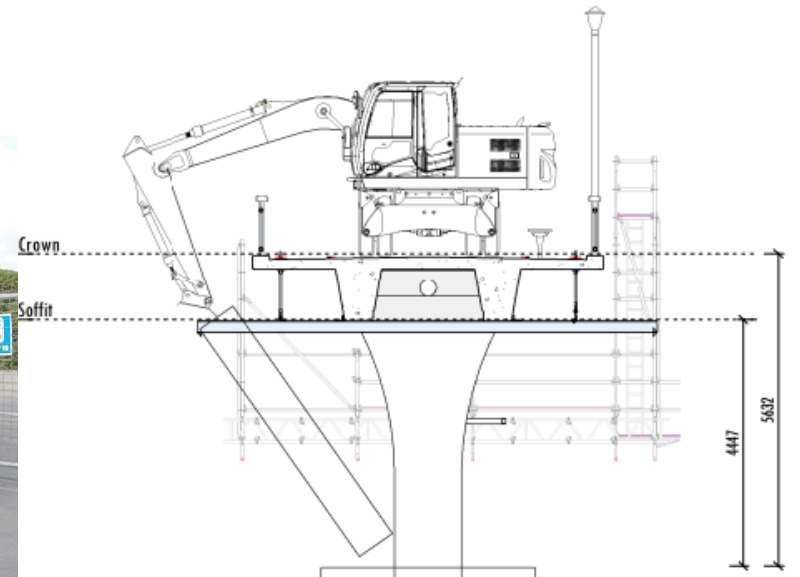
Design Solution



Contractor Selection

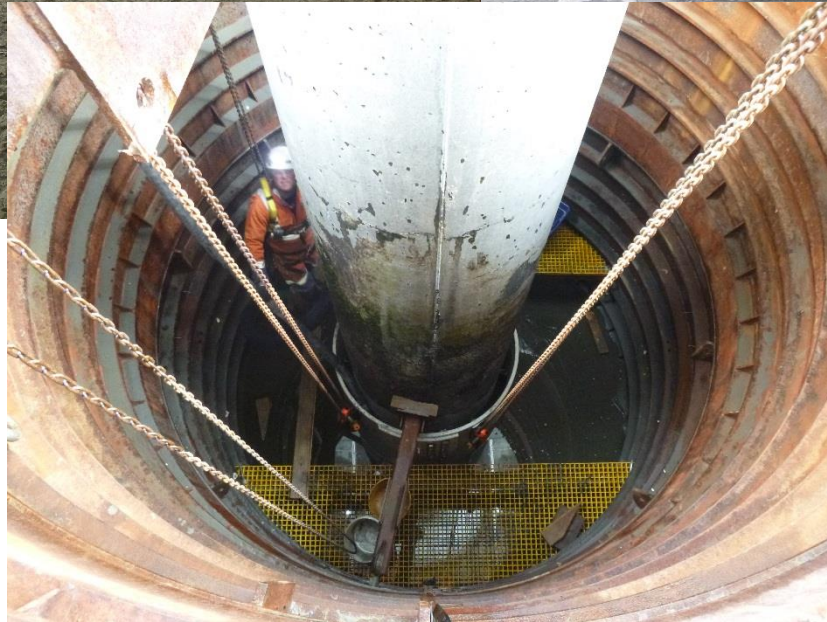


Methodology



EXCAVATOR DELIVERING PILE JACKET
1 : 100

Construction Issues



Construction Safety



11 Construction Safety

4.1. Construction Risks

Risks (to achieving a quality outcome)	Likelihood	Consequence		Proposed Treatment / Mitigation Measures	Proposed Measure included in Methodology	
		Describe Impact	Estimated Remedial Cost		What can we do to remove or mitigate the risk?	Y
What Could go Wrong?	H = High M = Moderate L = Low					
Lifting gear fails during removal of caisson shells.	M	Injury to site personal. Damage to equipment.	>\$50K	Check all lifting gear is certified before any lifting is done.	Y	
Falls – working at height.	M	Injury or death	>\$50K	Working at height procedure to be followed. Harnesses to worn when on scaffold.	Y	
Connection failure.	L	Injury or death	>\$50K	Connections to be reviewed by engineer.		
Pedestrian hit with plant/equipment.	L	Injury or death	>\$50K	Exclusion zones to be established before lifting/moving plant.	Y	
Using hand tools incorrectly	M	Injury	<\$5K	Ensure that the correct tools are used for the job.	Y	
Damage to existing pier structure	M	Damage	<\$10K	Jacking load limits are not to be exceeded.	Y	

- Working Instruction
- Job Safety & Environmental Assessment (JSEA)
- Safety Inspections (weekly)
- Safety Audits (monthly)
- Incident Reporting (immediate)
- Same level of reporting for Environmental

Fulton Hogan Job Safety and Environmental Assessment (JSEA) – Revision 1 **STAY SAFE**

Project/Site:	15/16 New Brighton Pier	Foreman / Supervisor:	Richard Dodds	Date:	
Activity or Task:	WI 011 Caisson Removal – Revision 1	Reviewed By:	Hayden Sturzaker	Date:	

JSEA Reviewed Daily or When Conditions or Task Changes.
JSEA Amended Weekly.

Hazard Identification – Tick all that apply and write in additional hazards identified.

Hazard Identification		High Risk Area's	
Unauthorised Personnel	<input checked="" type="checkbox"/>	Weather	<input checked="" type="checkbox"/>
Restricted Work Area	<input checked="" type="checkbox"/>	Air Emission or Dust	<input type="checkbox"/>
Manual Handling	<input checked="" type="checkbox"/>	Sediment Runoff	<input type="checkbox"/>
Sharp Objects	<input type="checkbox"/>	General Waste	<input type="checkbox"/>
Exposed Reo Bars	<input type="checkbox"/>	Gas or Fumes	<input type="checkbox"/>
Difficult Entry or Exit	<input type="checkbox"/>	Noise	<input type="checkbox"/>
	<input type="checkbox"/>	Other _____	<input type="checkbox"/>
	<input type="checkbox"/>	Falling Objects / Suspended Loads	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	Scaffolding or EWP	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	Soil Disturbance or Erosion	<input type="checkbox"/>
	<input type="checkbox"/>	Flammable Substances	<input type="checkbox"/>
	<input type="checkbox"/>	Pressurized Gas or Fluids	<input type="checkbox"/>
	<input type="checkbox"/>	Moving Parts or Machinery	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	Electrical Equipment	<input type="checkbox"/>
	<input type="checkbox"/>	Traffic	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	Moving Plant	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	Fall Prevention	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	Underground Services	<input type="checkbox"/>
	<input type="checkbox"/>	Overhead Services	<input type="checkbox"/>
	<input type="checkbox"/>	Hazardous Materials	<input type="checkbox"/>

PPE Required – Tick all that apply (Compulsory PPE already ticked)

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Providing a controlled environment



Flyby of Pier during Construction

What worked Well?

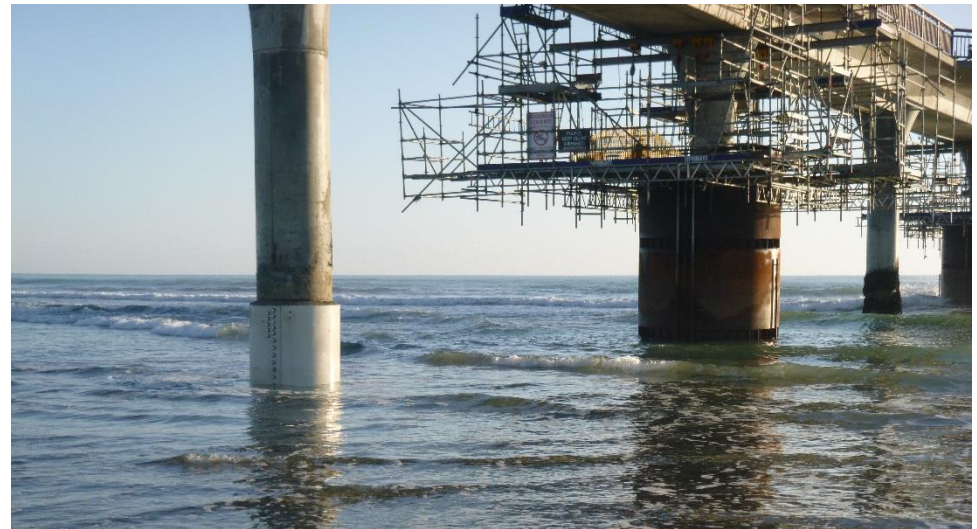
- Assessment of project risks during the design phase and how they could be mitigated through design changes
- A simple solution
- Contractor selection based on a detailed methodology
- Collaboration with Contractor throughout to manage Safety Risks
- Always have a plan B, C & D in place
- Allowance for inclement weather days to reduce pressure on Contractor

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Project H&S Summary

As of April 2018 (completion)

- Man Hours = 32835
- Incidents = 4
- Long Term Injury = 0
- Medical Treatment Injuries = 4
- Near Misses = 11
- Construction Cost = \$7.5m (on time and on budget)



Any Questions?

