

CON970 – Principal's Requirements

For Pouto Wharf – Design & Build New Structure

February 2021

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Principal's Design Criteria

The Principal's Design Criteria are described in the following sections:

Standards, Manuals and Publications

The Contractor's Design, and carrying out of the Contract Works shall be in accordance with the version current at time of tender of the following standards, manuals and publications except where amended by these Principals' Requirements. The Contractor shall ensure that the version of the document used incorporates the most recent amendments:

- a) The Building Act
- b) Health and Safety at Work Act 2015
- c) Resource Management Act
- d) Kaipara District Council Engineering Standards
- e) appropriate national and international design codes / standards and guidance, including but not limited to:
 - a. AS/NZS 1170 suite of standards – Structural design actions
 - b. BS 6349 suite of standards – Maritime works
 - c. AS 4997-2005 – Guidelines for the design of maritime structures
 - d. AS 3962-2001 – Guidelines for design of marinas
 - e. PIANC Report 149 Part 4 – Guidelines for marina design
 - f. PIANC Report WG33 – Guidelines for the design of fender systems
 - g. NZS 3603 – Timber structures standard
 - h. NZS 3404 – Steel structures standard
 - i. NZS 3109 – Concrete construction standard

Where the above does not explicitly cover all parts or issues relating to the design or construction, such applicable codes or standards that are applicable in respect of a part or issue shall apply.

Wharf structure design criteria

Maximum Design Vessel: Existing Kaipara Harbour 'MV Kewpie Too' ferry (24 m LOA). The range of smaller design vessels shall be as per the lesser length of typical marina vessel types in Table 4-1 of PIANC Report 149 Part 1, 2016

Design life: 50 years

Design loading: 5 kPa as per Category C3 of AS/NZS 1170.1.

Wharf guardrail loading: Category C5 of AS/NZS 1170.1

Berthing loads: Determined for the maximum size design vessel using the methods in BS 6349-4 and PIANC Report WG33 with the following assumptions:

- Berthing mode = Side berthing, quarter point contact
- Max. angle of approach = 8°
- Approach velocity = 0.3 m/s (AS 3962-2001 for vessels <25 m LOA)
- Factor of safety for abnormal berthing impact = 2 (could be relaxed with justification)
- Softness coefficient, $C_s = 1$
- Berth configuration coefficient, $C_c = 1$ (open berth)

Mooring loads: To be calculated based on the annual wind loading i.e. 100% AEP / 1-year ARI value.

Seismic loading: The wharf shall be considered an importance level 2 (IL2) structure.

Vessels shall be able to berth alongside tidal stairs / landings at the wharf head. The range of design vessel freeboards shall be agreed to determine the setting of landing levels

Sea level rise: 0.45 m in accordance with NZ RCP8.5 M scenario for 2070 (end of 50 year design life)

Storm surge: Allowance for a 2% annual exceedance probability (AEP) / 50-year annual recurrence interval (ARI) storm surge shall be made. The wharf shall be resilient to this magnitude of design event without any requirements for post-event repair to the structure or its fender and mooring systems

Wave action: Site swell wave conditions from wave propagation up the channel after breaking on the shoals at the harbour mouth, including height, period and direction, are unknown and shall be established by appropriate numerical methods. The 2% AEP swell wave height shall be adopted for design.

Directional fetch and depth limited wind wave heights at the site that are locally generated within the harbour shall be verified by appropriate numerical methods. The 2% AEP wind wave height shall be adopted for design.

Preliminary assessment using AS/NZS 1170.2 directional site windspeeds for a MHWS tide level and future sea level rise allowance of 0.45 m yielded the following directional 2% AEP significant wave heights and periods. These indicate the northerly direction governs:

Directional significant wave height (H_s), m, and period (T_s), s															
N		NE		E		SE		S		SW		W		NW	
H_s	T_s	H_s	T_s	H_s	T_s	H_s	T_s	H_s	T_s	H_s	T_s	H_s	T_s	H_s	T_s
2.14	4.68	2.09	4.54	1.71	3.94	* 1.9	6.13	1.74	4.09	0.00	0.00	0.00	0.00	0.00	0.00
* Depth limited condition allowing for charted sandbanks along the relevant fetch direction															

Tides: The new wharf should useable through an expected 'normal' range of water levels (i.e. astronomical tide range) over its 50-year design life, with berthed vessel passenger access/egress by way of tidal landings and stairs at the wharf head. The wharf head shall be positioned such that the range of design vessels can use the berth at all astronomical tidal states.

Underkeel clearance: minimum 2 m for the maximum design vessel draught after allowances for vessel movements under wind, wave and current action.

Accessibility: The wharf access walkway shall be subject to public pedestrian usage

Vehicle Access: Dependent on design and construction methodology of the Contractor (i.e. vehicular access may not be possible if a lightweight narrow aluminum walkway is chosen to keep costs down etc.).

However, if vehicular access is possible, maintenance vehicle access only. In such a case, lockable traffic bollards shall be provided in-front of the access walkway. Vehicle weight limits shall be posted.

Dredging: Dredging shall be avoided or minimised where practicable.

Fender system: The wharf head shall be provided with a fender system of proprietary rubber fender units and facing panels or piles

Fender unit selection will be based on a single unit having the capacity to absorb the abnormal berthing energy of the maximum size design vessel.

Fender unit facing panels shall be steel with a protective paint coating for corrosion resistance, and ultra-high molecular weight polyethylene (UHMWPE) facing units for contact with the vessel hulls (low friction and high wear resistance).

Fender piles (protective coated steel or timber) shall be similarly faced with UHMPE rubbing strips.

Bollards: The wharf head shall be provided with proprietary bollard or cleat units based on a single unit having the capacity to sustain the maximum mooring line load of the maximum size design vessel (i.e. that with the greatest windage area) for the annual wind loading i.e. 100% AEP / 1-year ARI value. Bollard or cleat units will be ductile cast iron with a protective paint coating for

corrosion resistance. The assumed 'six point' conventional mooring line pattern is to be confirmed in agreement with the existing ferry/charter boat operators.

Navigation aids: The requirement for, or omission of, navigation aids and/or lighting of the wharf shall be agreed in consultation with the NRC harbourmaster.

Services: No services shall be provided on the wharf (i.e. potable water, electrical power and lighting etc.).

Stormwater: Stormwater runoff from the deck of the wharf shall not be collected.

Vessel operation and maintenance facilities: No vessel operation and maintenance facilities shall be located on the wharf.

Safety equipment:

Ladder(s): To enable self-rescue in case of falls into the water, safety ladder(s) shall be provided on the perimeter of the wharf head in accordance with the applicable design standards and guidelines.

Lifebuoys: Lifebuoys shall be provided at locations in accordance with the applicable design standards and guidelines. As a minimum there should be separate provisions at the wharf head and on the access walkway.

Guardrails: Stainless steel or aluminium tubular guardrails shall be provided on the access walkway and at the perimeter of the wharf head (where vessel operations permit).

Non-slip surface: The wharf deck shall have a textured all-weather non-slip surface. Beyond the concrete surface finish, additional coatings or tread fixing provisions may be required on stairs, ramps and landings at the wharf head, particularly within intertidal zones.

Signage: Appropriate safety signage will be provided on the wharf in accordance with the applicable design standards and guidelines. Safety signage is expected to relate to load limits, pertinent hazards, emergency contacts and prohibited activities. Requirements will be agreed with KDC and ferry and charter service users.

Deck furniture:

Shelters and seating: No shelters or seating will be provided on the wharf.

Signage: Appropriate passenger and ferry timetable information signage will be provided on the wharf (i.e. not advertisements). Requirements will be agreed with KDC and ferry and charter service users.

Waste collection: No waste collection facilities / bins will be provided on the wharf.

Landside area design criteria

- Provide a land build up area:
 - A path/steps are to be constructed that connect the end of wharf to land. This is to remain above water at all tides levels. This is to be protected by an armoustone revetment to allow for anticipated wave run-up in accordance with 2% AEP design wave heights.
- Storm surge: Allowance for a 2% annual exceedance probability (AEP) / 50-year annual recurrence interval (ARI) storm surge shall be made

Geotechnical Information

- Foundation soils belong to an old dune deposition (Kariotahi Group) and consist of interbedded sand with variable strength cemented layers due the limonitic reactions. The profile can vary from a "hard pan" (UCS >1MPa) to weakly cement sands UCS <0.5MPa)

- CPT tests on the foreshore and terrain evaluation indicate 1 to 2m of cemented sand over highly cement sand or “hard pan”. Offshore the former will have been eroded leaving the highly cemented sand or “hard pan” as the surface material.
- A preliminary design assessment can be made based on a design vertical capacity of 1.25MPa from the steel shell and a lateral capacity of the 2.5MPa below an embedment of 1m.

Principal Supplied Drawings

The detailed design shall be in general accordance with the concept design as shown on the following drawing sheets. However :

Sheet	Rev	Date	Title
C-1101	A	2020-11-11	General Arrangement
C-1102	A	2020-11-11	General Arrangement - Head
C-1103	A	2020-11-11	Access Track Options
C-2101	A	2020-11-11	Long Elevation and Part Section
C-3101	A	2020-11-11	Cross Section and Elevation

PRINCIPAL'S REQUIREMENTS APPENDICES