

Influence of Water Level on Wave Uplift Loading for a Cantilevered Walkway above a Vertical Seawall  
Ian R. Coghlan, Dan Howe, Matt J. Blacka and Peter Brooks

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Figure 2 Model side views [structure not present during wave calibration] (top: whole flume [model scale], bottom: bathymetry detail [prototype scale])

Two-dimensional modelling was completed using WRL's 1.2 m wave flume, which is 44 m long, 1.2 m wide and 1.6 m deep (Figure 2 top).

The wave flume was filled with fresh water rather than salt water to avoid corrosion of the hardware and to ensure responsible disposal of drained water. This is standard practice for almost all coastal hydraulic laboratories in the world [3].

omitted. The future earthworks level landward of the wave return wall was 6.5 m AHD and the scoured bed level adjacent to the seawall was assumed to be -3.5 m AHD.

### 2.3.2 Bathymetry

The seabed geometry adopted in WRL's 1.2 m wave flume was identical to that adopted in a previous physical modelling investigation of wave overtopping for the same structure at an earlier design phase [8], except that the scour level at the seawall was raised based on logging data from boreholes drilled at the site. The false floor was constructed from water-resistant plywood with the following characteristics (Figure 2 bottom):

- Intersected structure at -3.5 m AHD (flat for 47 m seaward from the toe of the seawall);
- 1V:6.2H slope from -3.5 to -7.26 m AHD; and
- Seaward of -7.26 m AHD the false floor sloped at 1V:20H until it intersected the permanent flume floor at -9.75 m AHD.

A combination of capacitance wave probes, load cells, and pressure sensors were used during testing (Table 2, Figures 3 and 4). These instruments are typically selected to have a capacity slightly larger than the expected range of each physical quantity to maximise the accuracy of the measurements obtained. However, in this case preliminary estimates of maximum wave height, uplift force and pressure were not available at the time of model design, and as such WRL relied on previous experience from modelling of similar coastal structures to select the most appropriate instrumentation. High-speed oblique videos were recorded for each test.

Table 2 Instruments used in testing

Wave probe	13	0 to 6.75 m wave height
Load cell (forces)	258	-1.73 to 1.73 MN (individual) -6.93 to 6.93 MN (total)
Pressure sensor	258	-150 to 700 kPa

A static calibration was performed on each instrument to ensure it was operating a

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The wave climates were calibrated with the bathymetry installed in the flume, but with the structure removed, to minimise wave reflections.

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