Coastal Structures

An Introduction

Haryo Dwito Armono

7 Agustus 2007

Function

- Protect form wave attack
- Prevent erosion and other damage from wave action
- Trap or hold sand from longshore transport
- Reduce inlet filling
- Mooring vessels

Breakwater

structure that protects the area in its lee from wave attack.

Breakwaters can be connected to the shoreline (attached breakwater)

or completely isolated from the shore (detached breakwater)

(rubble mound structure or composite)

Ventura Harbor, US

Attached Breakwaters

Hiroshima seaport

Harbors for fishing boats, ferries, coasters and yachts; Scheveningen, The Netherlands

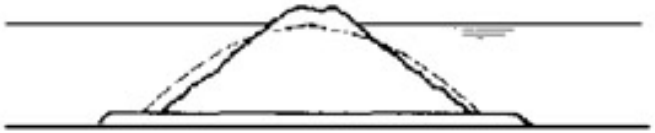
Detached Breakwaters

A system of detached breakwaters protects the coast at an eroding river delta; Fiumicino, Italy

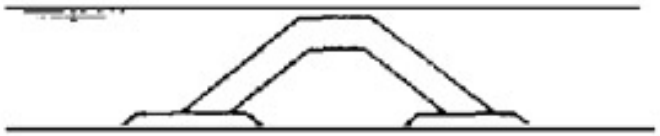
Mound Breakwater Type

conventional rubble mound

berm breakwater

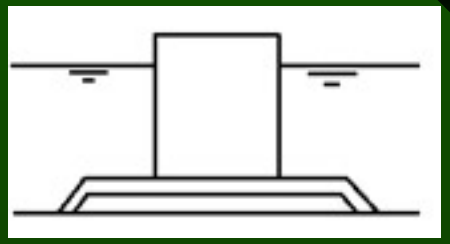


reef breakwater



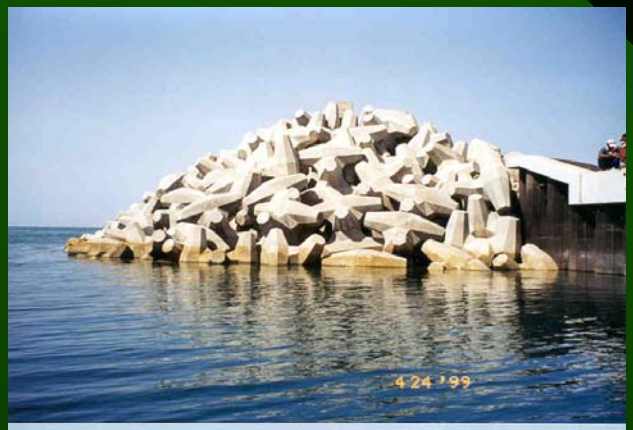
low-crested / submerged breakwater

Monolithic Breakwater



Cardiff Barrage 14 m tidal range
(situation at high water)

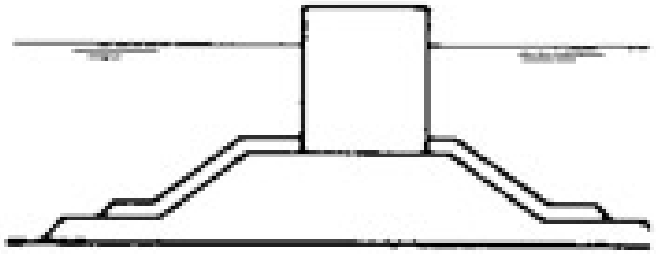
Rubble Mound



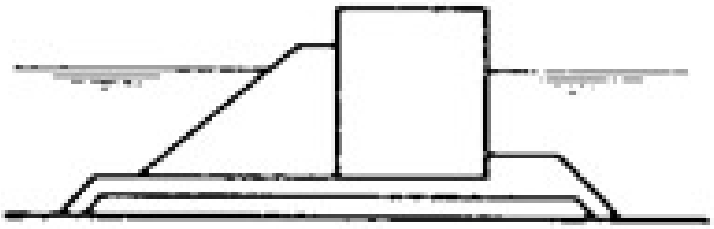
Bolungarvik, Iceland

Dolos Armoured,
Oman

Composite Breakwater

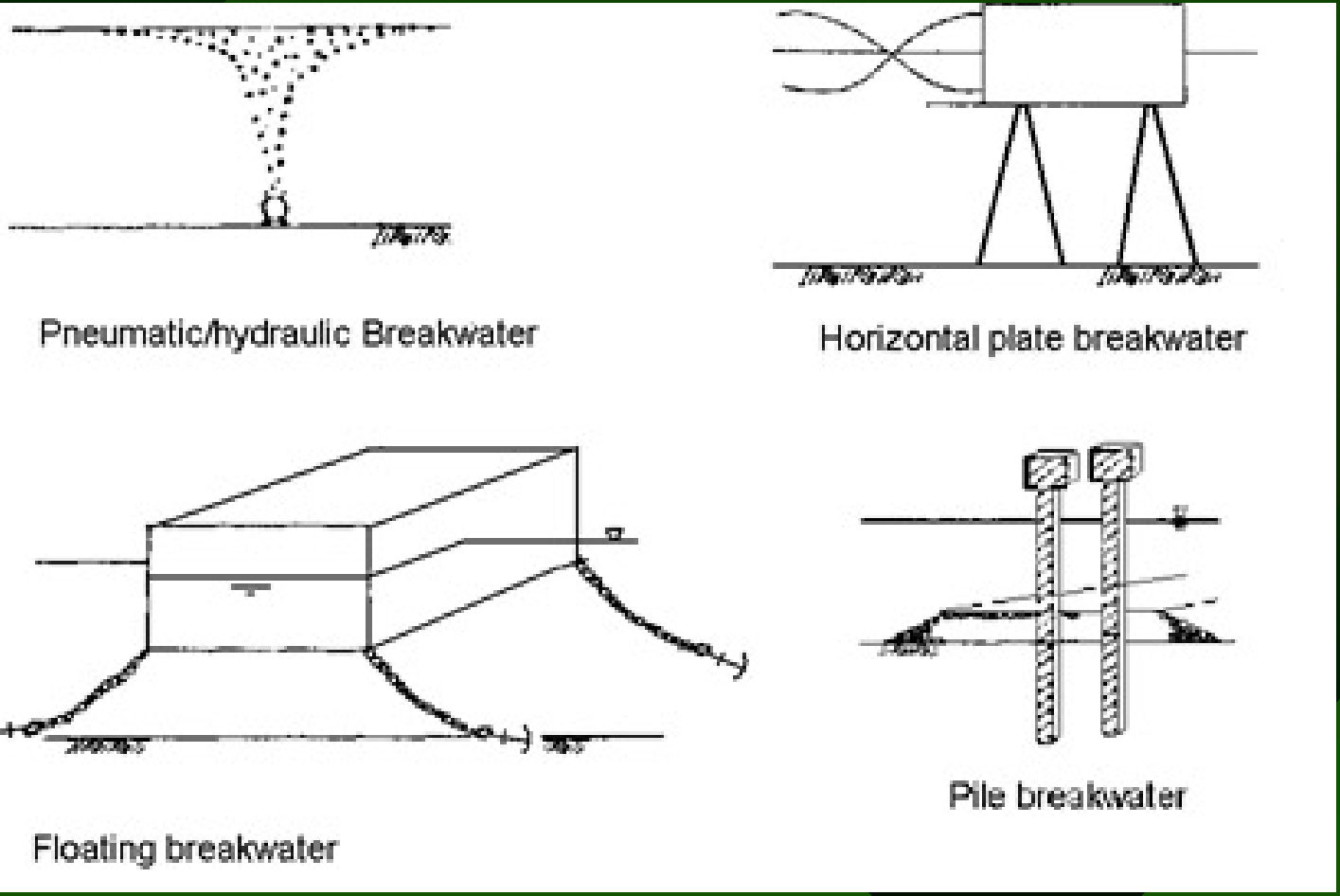


Vertically composite caisson/rock breakwater



Horizontally composite caisson/rock breakwater

Special Type



Floating Breakwater,
Marina di Verbania, Lago Maggiore, Italy

Vertical screens
Royal Prince Alfred Yacht Club, Sydney, Australia

Bulkhead, Revetment, Seawall

a structures built to separate the land from the water to prevent erosion and other damage primarily due to wave action.

- Bulkhead

  are typically smaller structures designed to retain shore material under less severe wave conditions than seawalls.

- Revetment

  are designed to protect shorelines and waterways from erosion by currents and small waves.
  (generally a rubble mound structure built on sloping bank)

- Seawalls

  are typically large and designed to withstand the full force of storm waves.

Bulkhead

Bolinas Lagoon Steel Bulkhead Replacement,
Stinson Beach, CA

Revetment

Figure 20 Goose Bay Park shoreline, prior to rehabilitation, was badly eroding.

Figure 22 Goose Bay Park enhancements, such as rock groynes, were undertaken to improve fish spawning and refuge habitat.

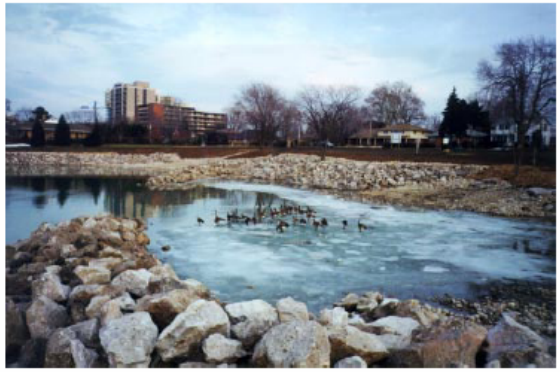


Figure 21 Goose Bay Park shoreline, after rehabilitation, is protected from erosion and enhanced for fish and wildlife habitat.

Goose Bay, Canada
Shoreline Stabilization and Habitat Enhancement

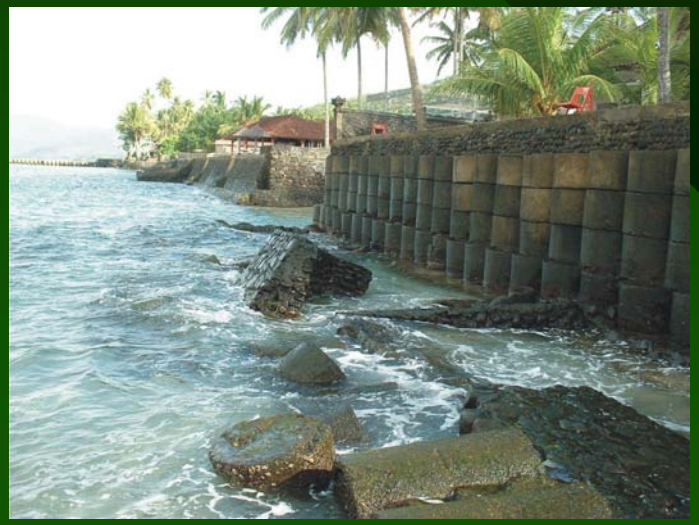
Construction of Revetment

Steel Sheet pile Wall

Losari Beach Revitalization , Makassar

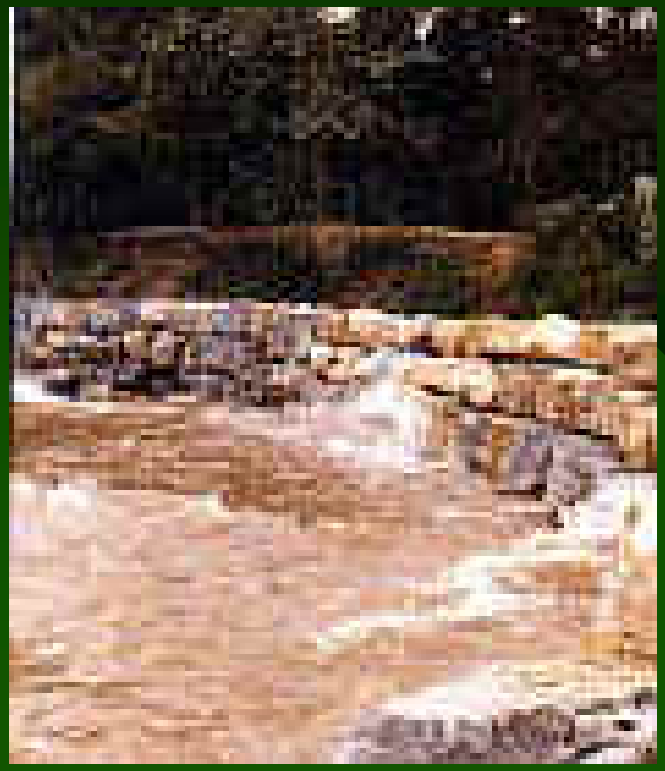
Seawall

Wave reflection on seawalls



Steel Sheet pile Wall

Rock walls



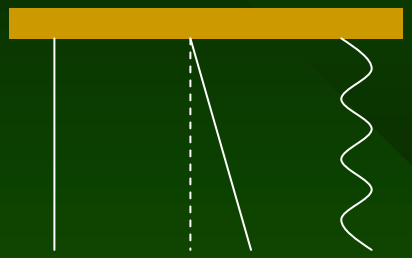
Indonesia

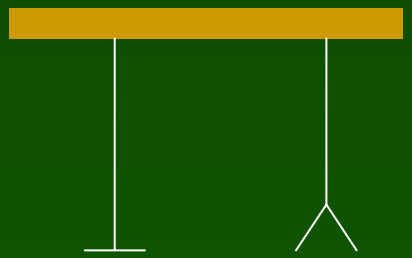
US

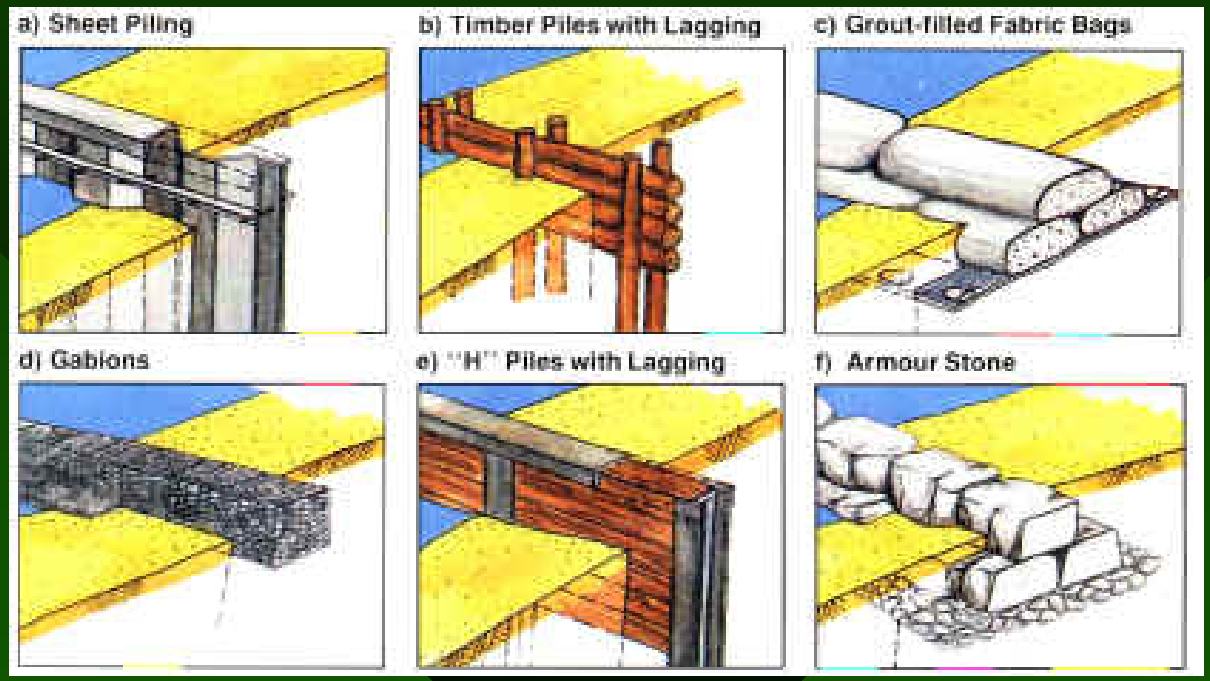
Quebec, Canada

Groin

shore perpendicular structure, installed singly or as a field of groins, designed to trap sand from the littoral drift system or to hold sand in place. (rubble mound structure)







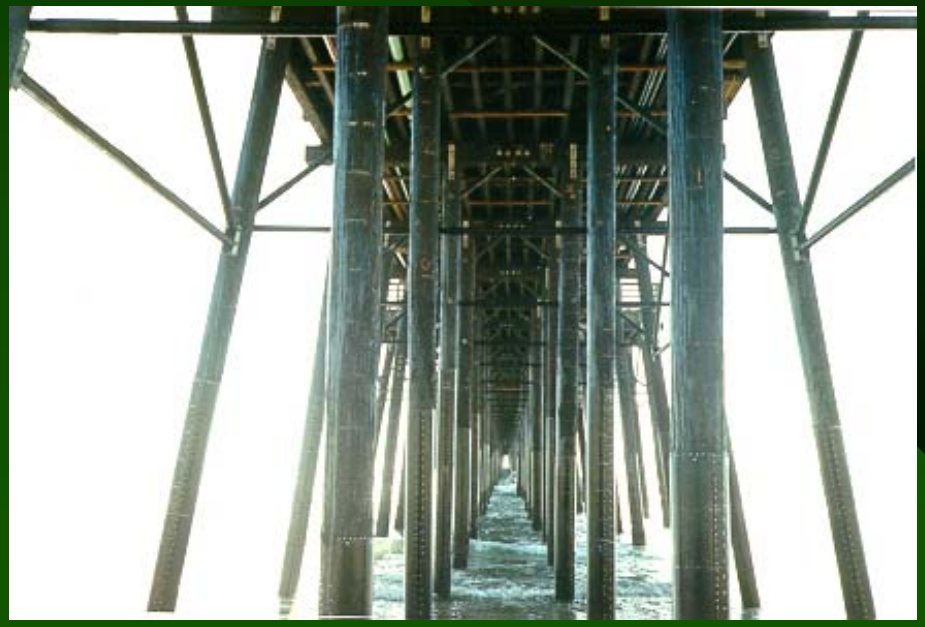
Cadzand, coastline of the boarder between Netherlands and Belgium, Zwin Inlet

Nusadua Beach, Bali

Jetty

a shore perpendicular structure located near an inlet or harbor entrance to reduce in-filling of the inlet or channel, protect the entrance and provide vessel sheltering from waves. (rubble mound structure)

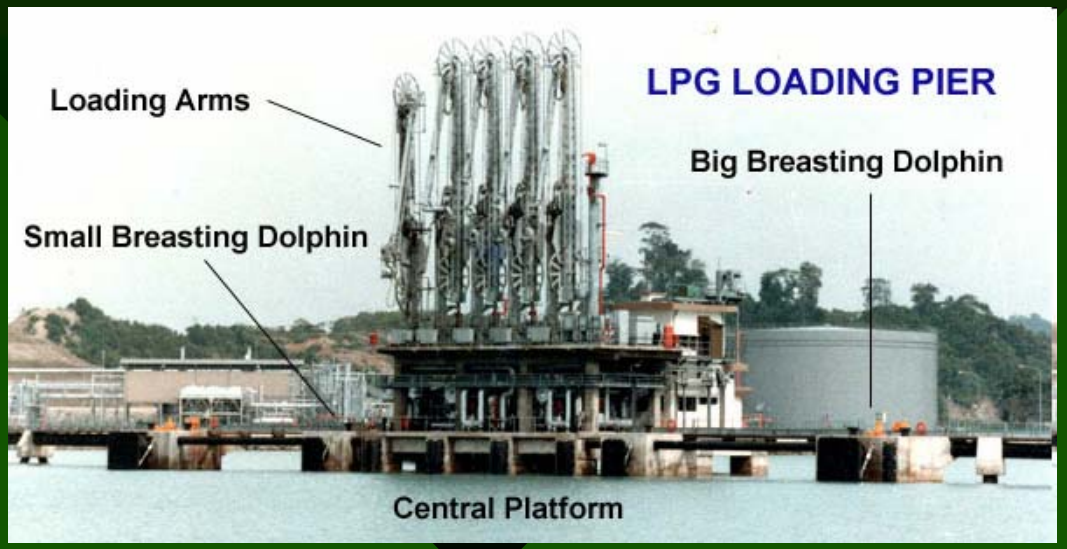
Pier

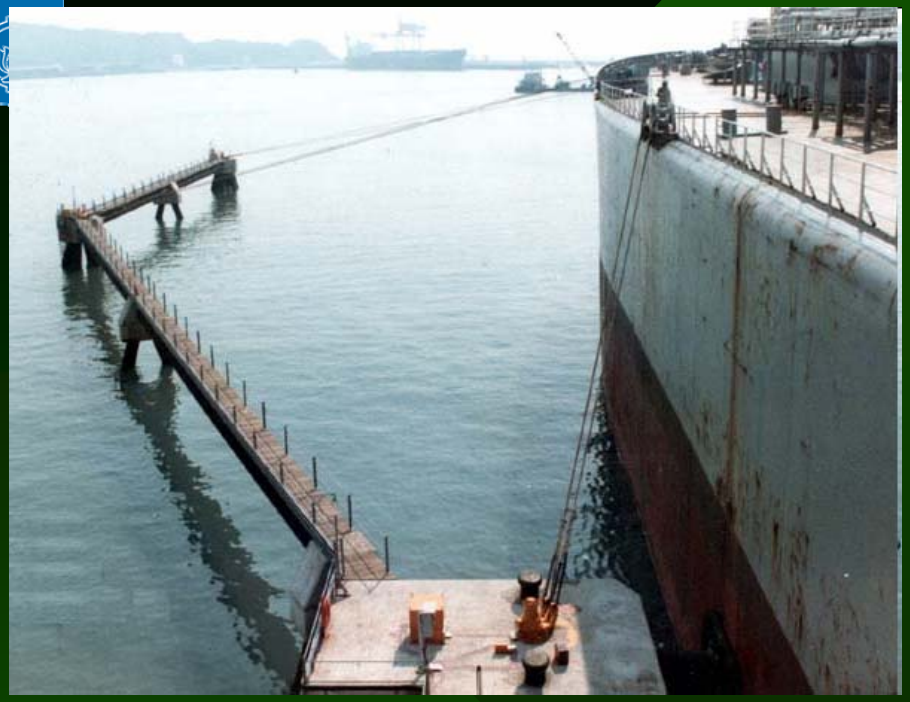


Dolphin

a marine structure (usually a cluster of piles) for mooring vessels;

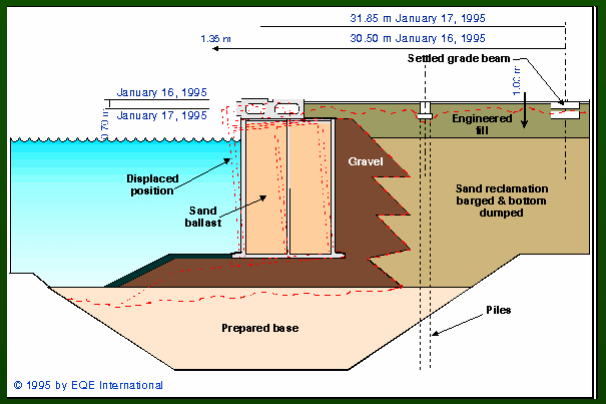
1. a mooring dolphin is designed only as a mooring structure and cannot support an impact force,
2. a berthing / breasting dolphin is designed to support the impact of a ship when mooring

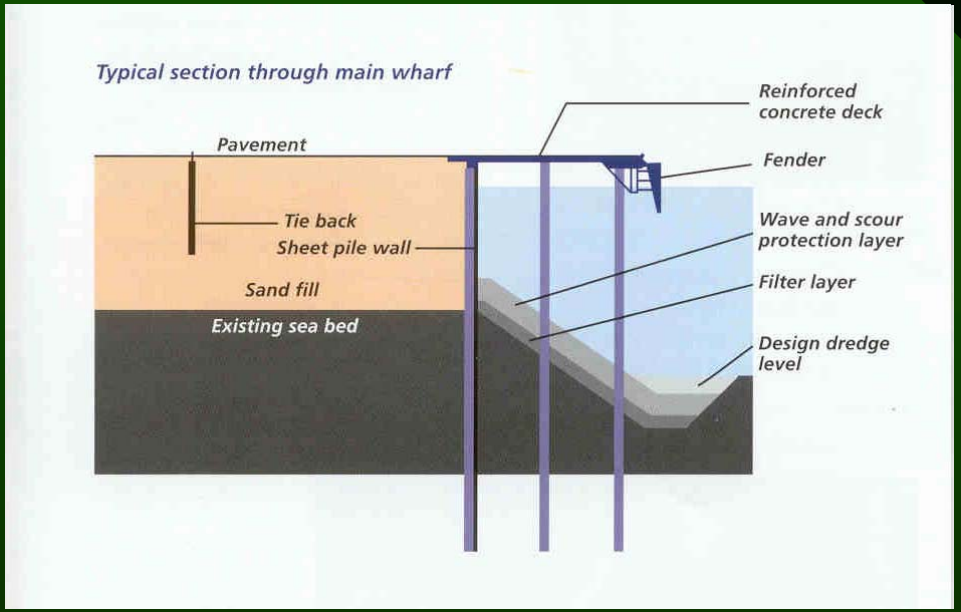

LPG LOADING PIER
Loading Arms
Big Breasting Dolphin
Small Breasting Dolphin
Central Platform



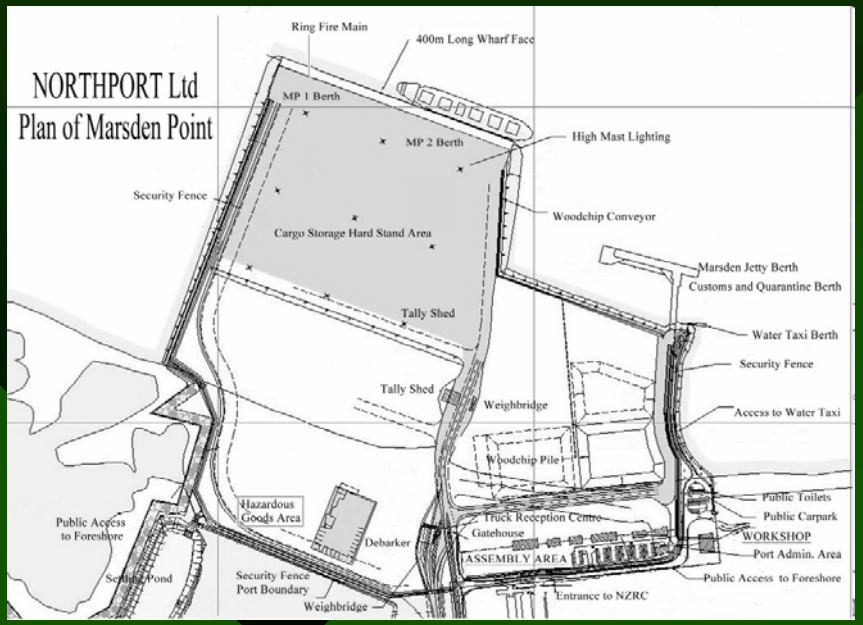
Wharf or Quay

a dock consisting of a reinforced shore or riverbank where ships are loaded or unloaded. Generally, vessels may only moor on one side of a wharf, but on either side of a quay.


31.85 m January 17, 1995
30.50 m January 16, 1995
1.35 m
Settled grade beam
1.00 m
January 16, 1995
January 17, 1995
7.0 m
Engineered fill
Gravel
Displaced position
Sand ballast
Sand reclamation barged & bottom dumped
Piles
Prepared base
© 1995 by EQE International



Northport Wharf Construction, NZ


NORTHPORT Ltd
Plan of Marsden Point
Ring Fire Main
400m Long Wharf Face
MP 1 Berth
MP 2 Berth
High Mast Lighting
Security Fence
Woodchip Conveyor
Cargo Storage Hard Stand Area
Marsden Jetty Berth
Customs and Quarantine Berth
Tally Shed
Water Taxi Berth
Security Fence
Tally Shed
Weighbridge
Access to Water Taxi
Woodchip Pile
Public Toilets
Public Carpark
Hazardous Goods Area
Public Access to Foreshore
Truck Reception Centre
Gatehouse
Debarker
WORKSHOP
Port Admin. Area
ASSEMBLY AREA
Security Fence Port Boundary
Public Access to Foreshore
Entrance to NZRC
Weighbridge