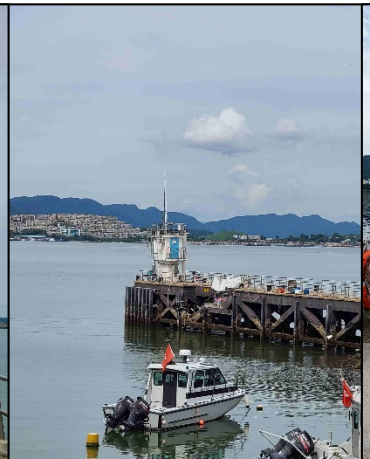
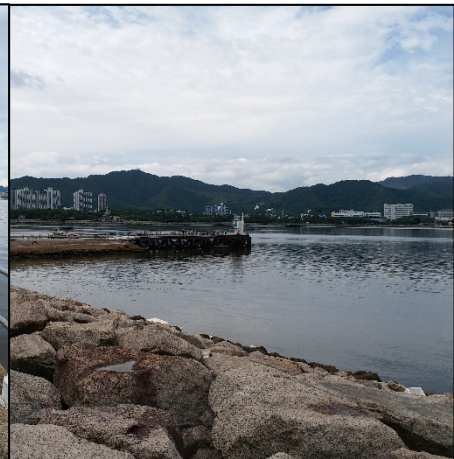
香港天文台
HONG KONG OBSERVATORY

Hong Kong Observatory's Tai Po Kau Tide Gauge Station





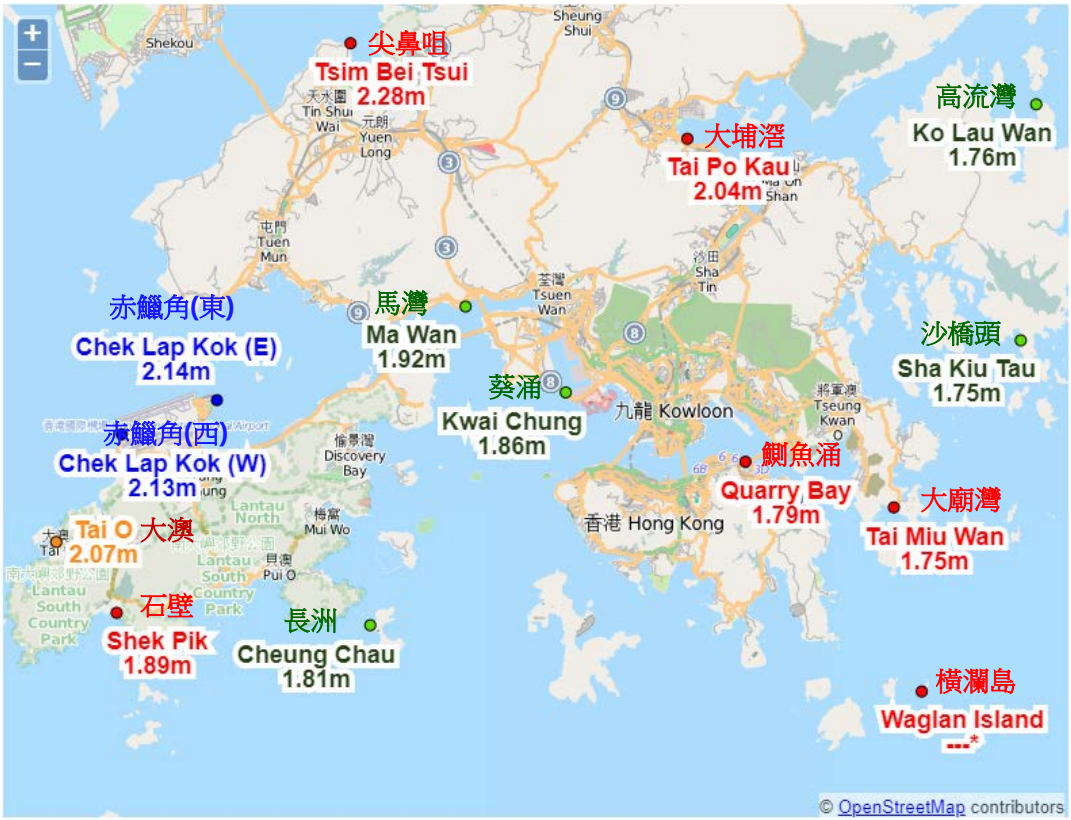
A typhoon struck in September 1937, causing the loss of more than 11,000 lives. The Kowloon – Canton Railway track at Sha Tin was damaged during the typhoon.
Courtesy Hong Kong SAR Public Records Office

Estimated high water mark in Tai Po left by 1937 typhoon was about 20 ft 6 inches above chart datum (~ 6.25 mCD)

Tide Gauge Stations

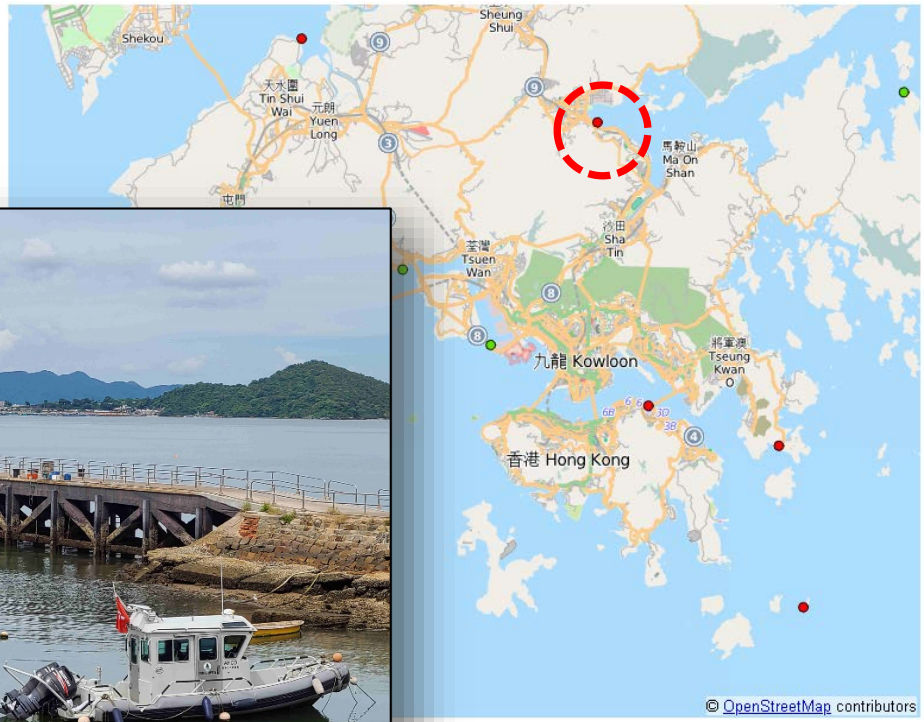
- Tide gauge managed by
  - Hong Kong Observatory
  - Marine Department
  - Airport Authority Hong Kong
  - Drainage Services Department
- Real-time tide data is available at HKO Website
- Provide information for
  - tidal prediction
  - storm surge advisories
  - tsunami warning
  - mean sea level analysis

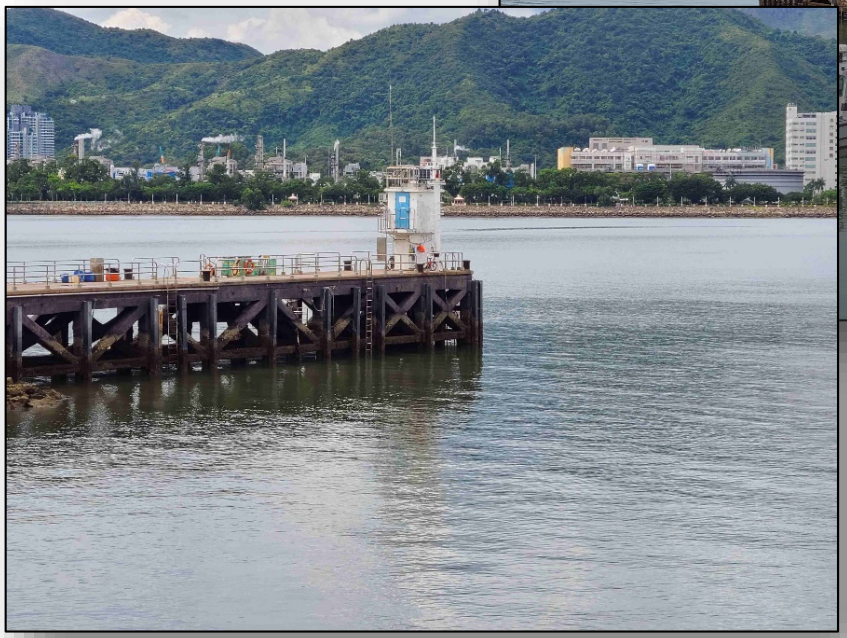
潮汐資料



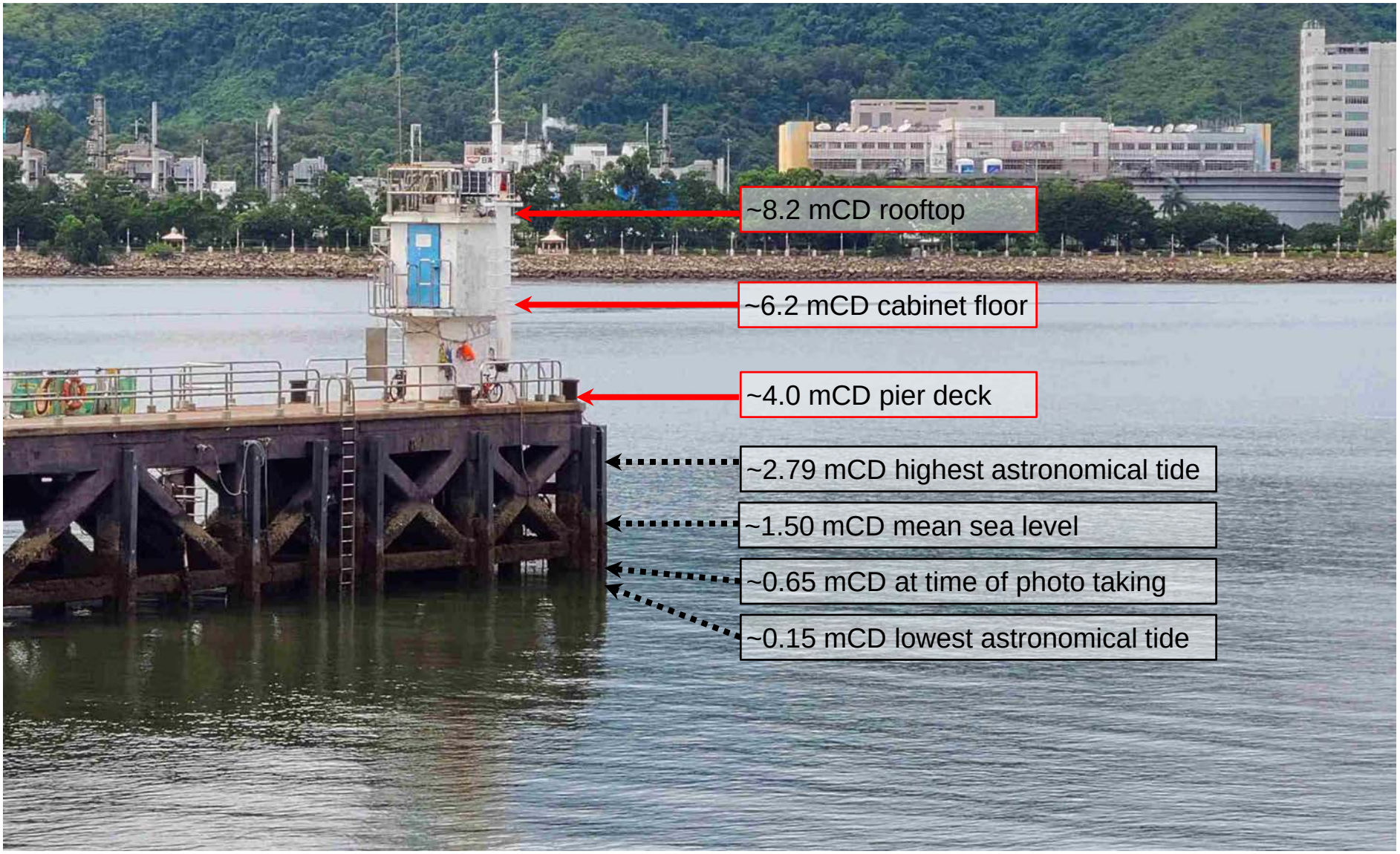
Website： http://www.weather.gov.hk/en/tide/marine/realtide.htm

Tai Po Kau Tide Gauge Stations





Tai Po Kau Tide Gauge Stations



Super Typhoon Hato (August 2017)

Tai Po Kau Tide Gauge Station

Tide level ~1.3 m at time of photo taking

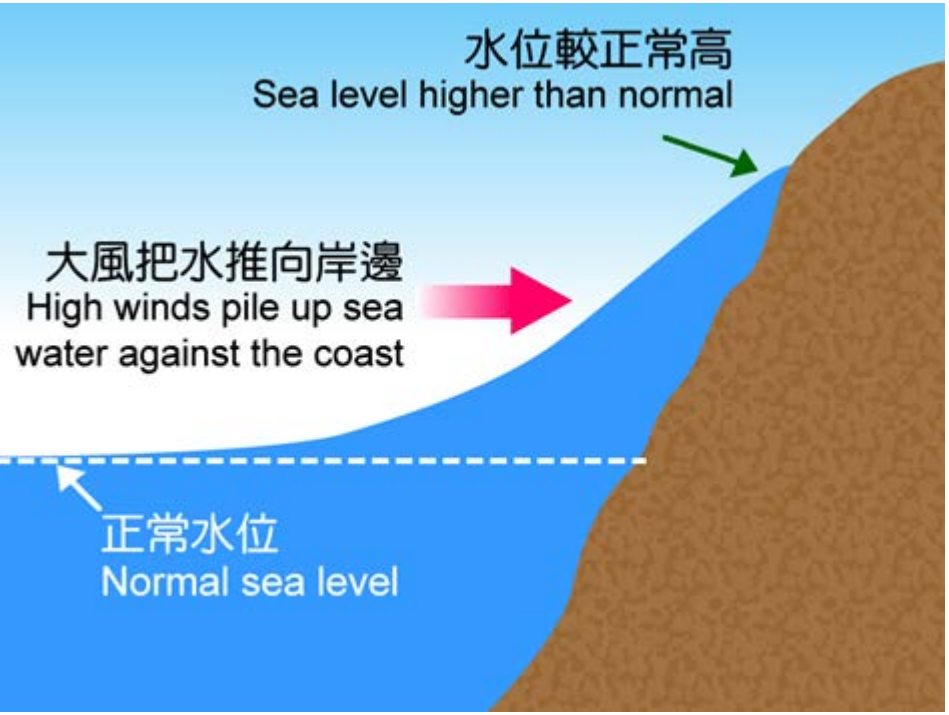
Tide level ~4.0 m during passage of Hato
(Photo: Weather Underground)

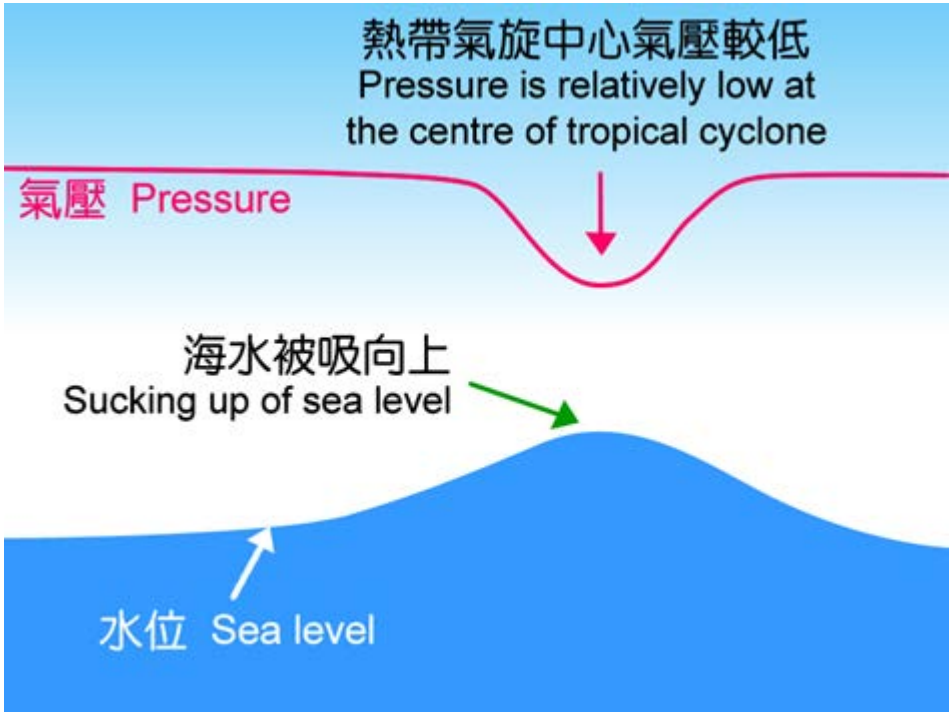
Super Typhoon Mangkhut (September 2018)

Track of Mangkhut

Lam Tsuen River during passage of Mangkhut (Photo:Nick Ho)

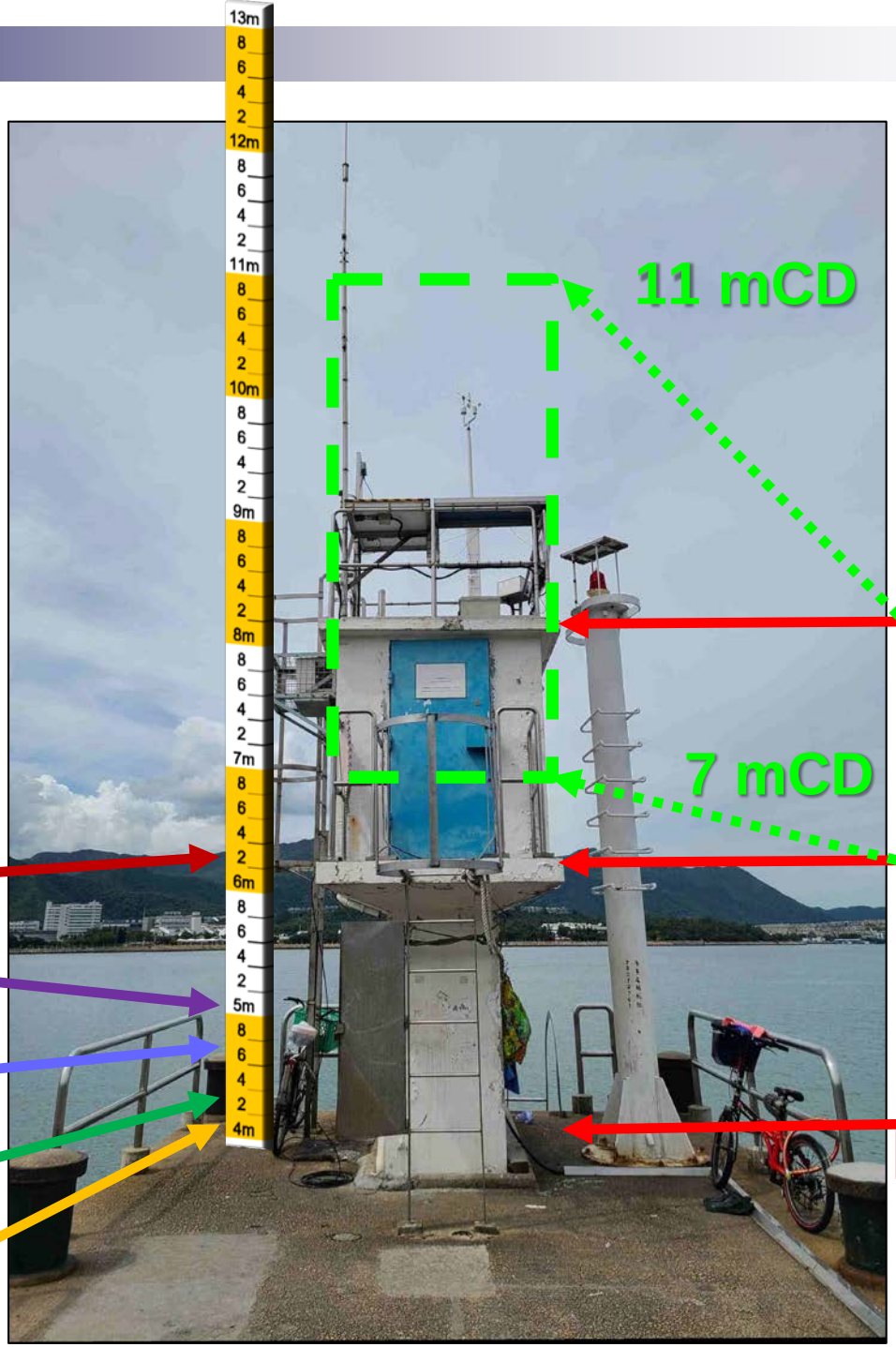
Storm Surge





Chance of coastal inundation (flooding) and the impact of storm surges brought by tropical cyclones will increase with the sea level rise due to climate change

List of historical extreme tide level recorded in Tai Po Kau (Height in mCD)



1937 Typhoon 6.25

Wanda (1962) 5.03

Mangkhut (2018) 4.71

Hope (1979) 4.33

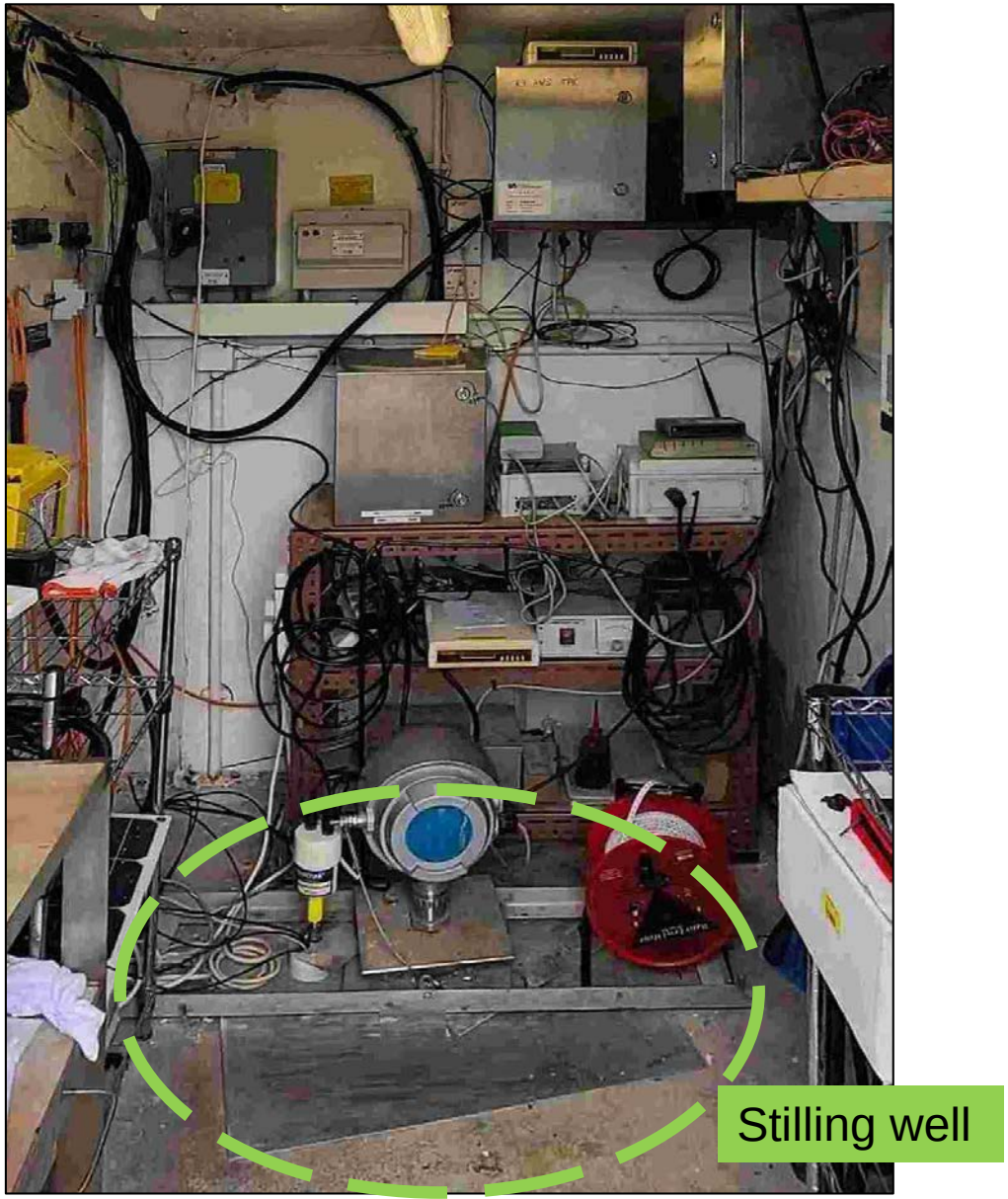
Hato (2017) 4.09

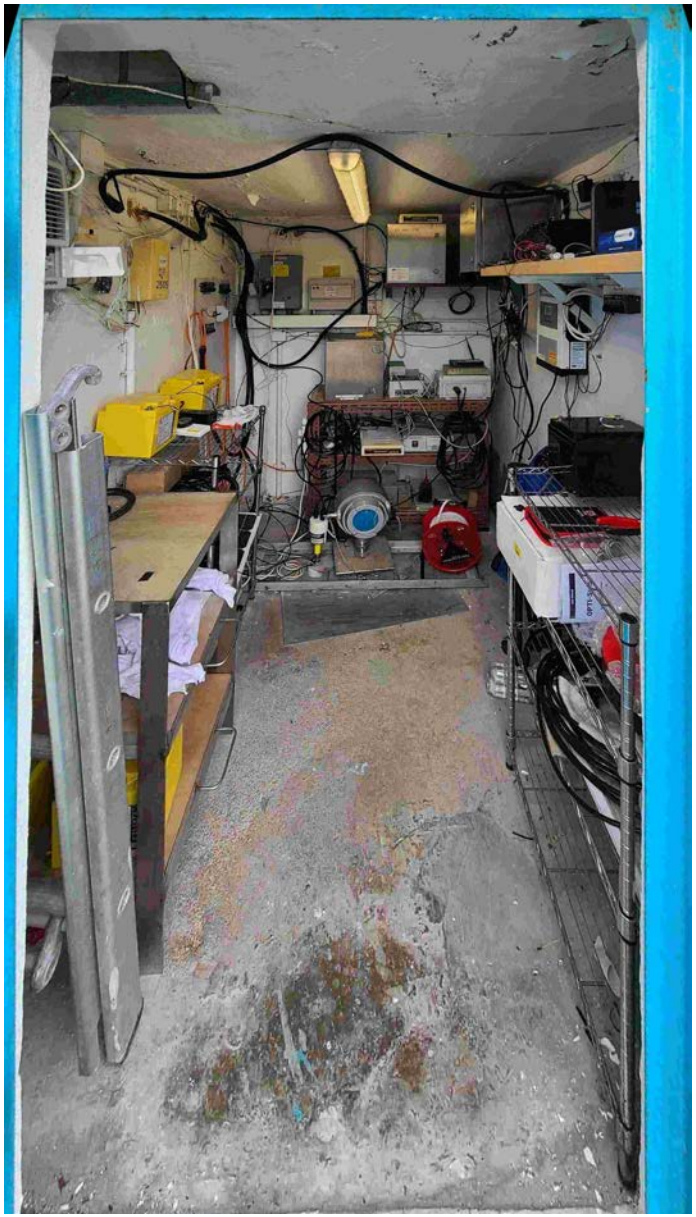
~8.2 rooftop

~6.2 cabinet floor

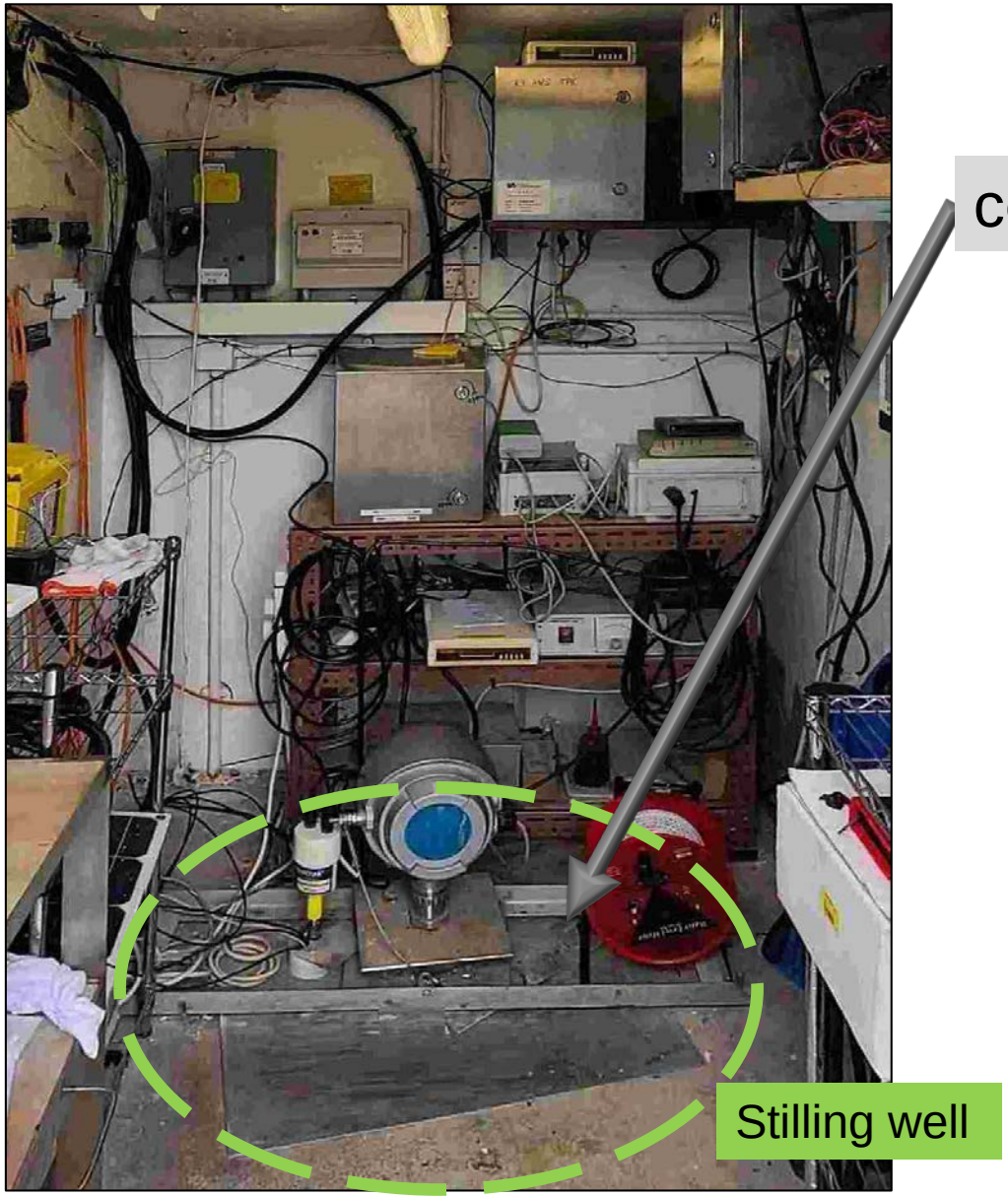
~4.0 pier deck

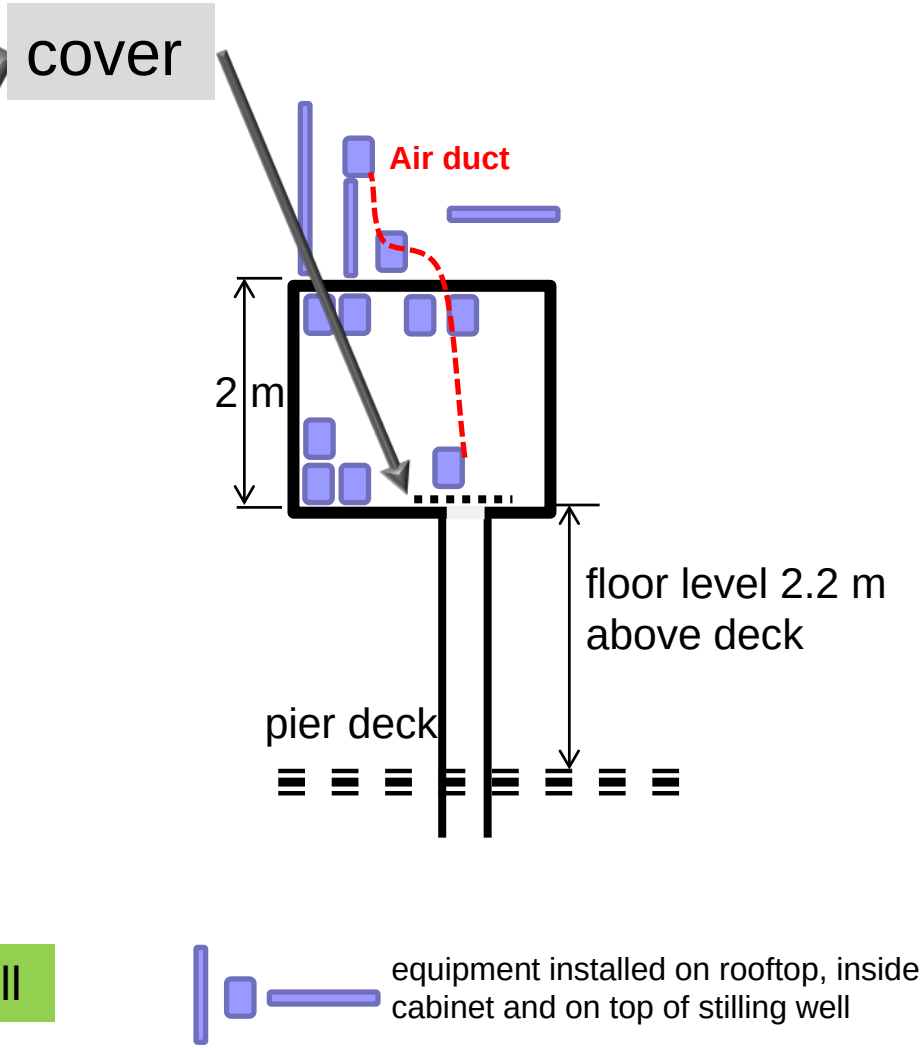
Interior of Station



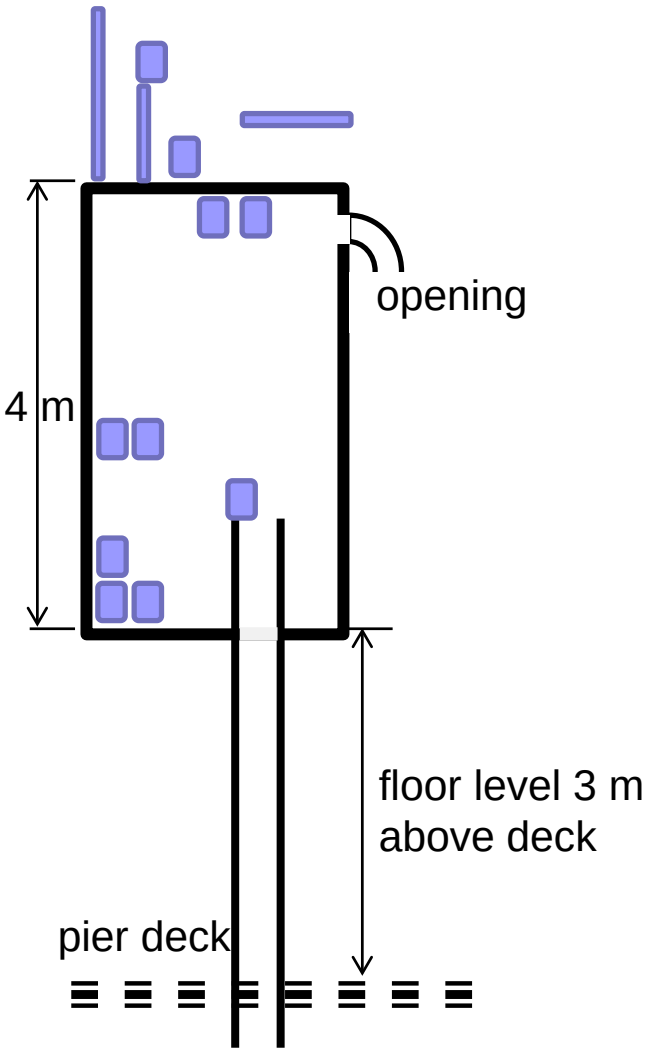


Stilling Well of Existing Station





Stilling Well of Future Station

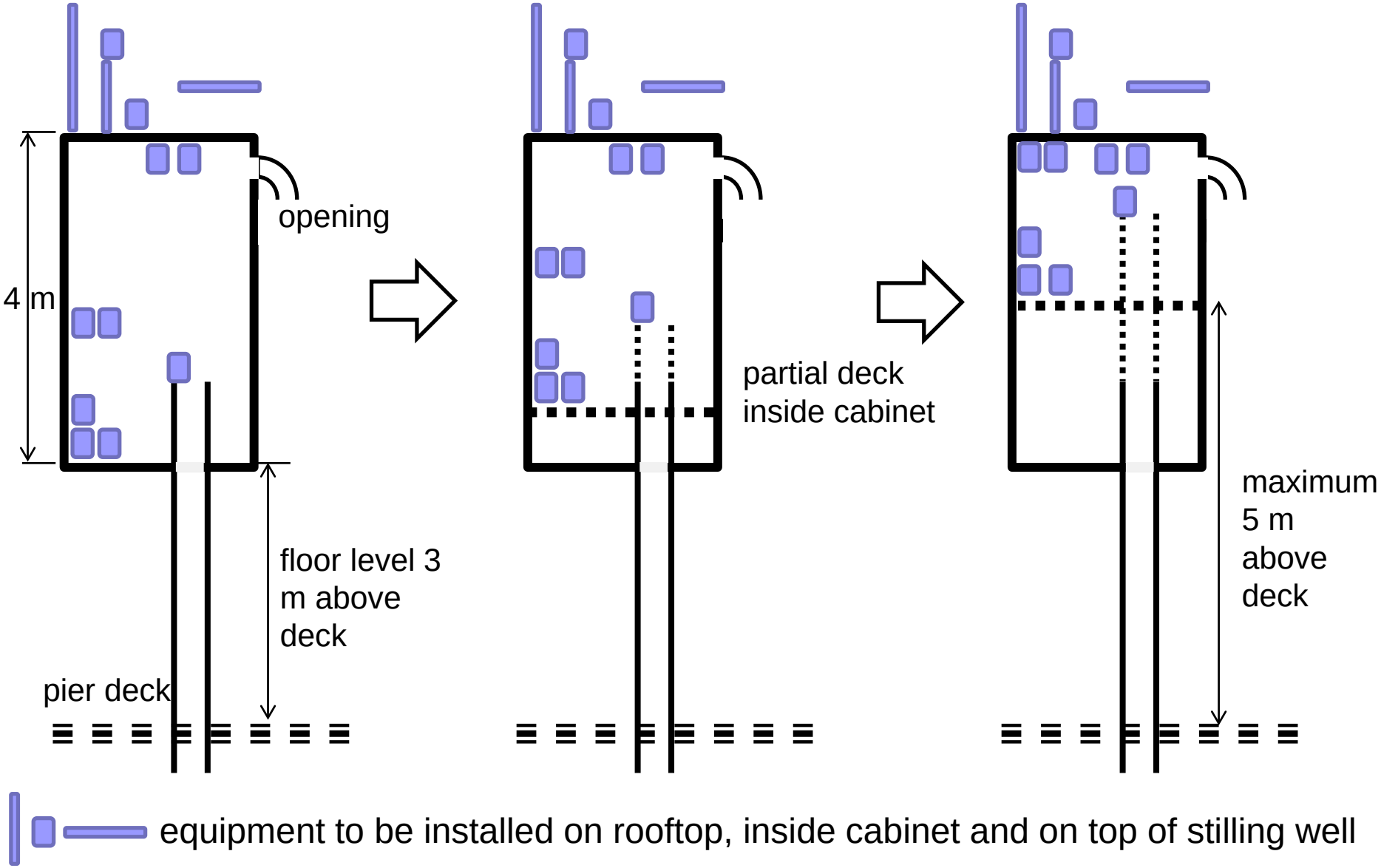


Opening 1 m above floor

Stilling well must be vertically aligned

equipment to be installed on rooftop, inside cabinet and on top of stilling well

Progressive adaptive design approach to sustain future tide measurement



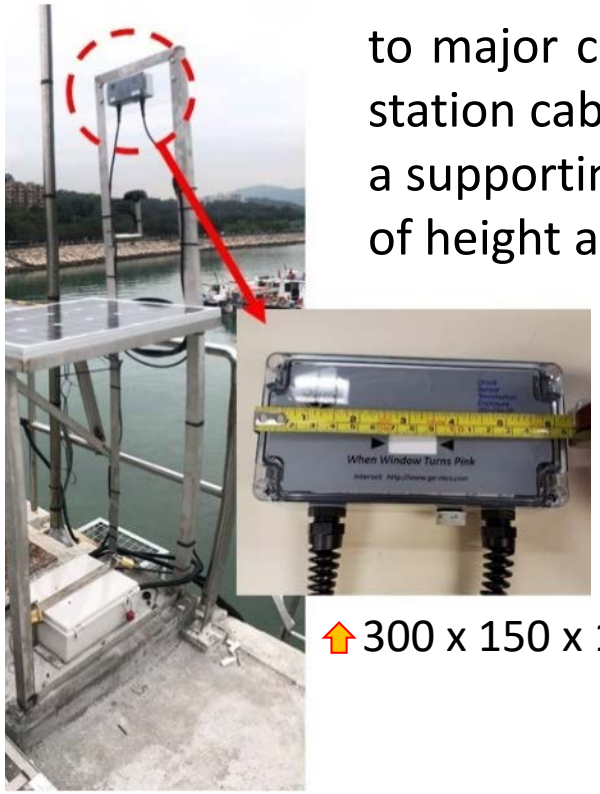
Existing Equipment

Roof top

Equipment

Equipment

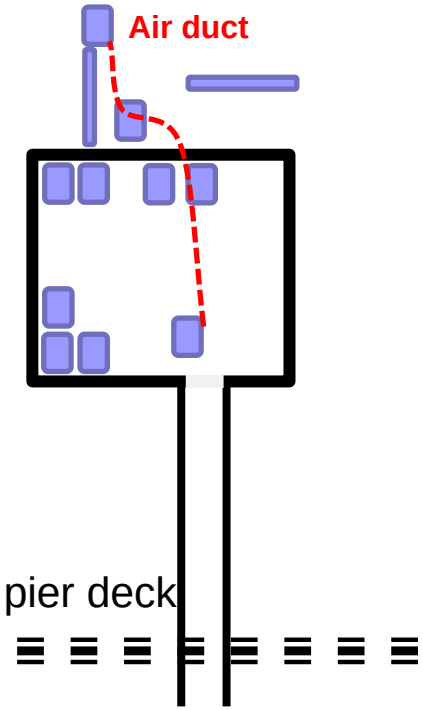
Termination box for tide level sensors and supporting mast



One termination box, with signal cable and air duct connecting to major components of tide level sensor installed inside the station cabinet, will be mounted on top of a supporting mast of diameter 100mm, of height above roof around 2m.

300 x 150 x 150 (mm)

Example of tide level sensor



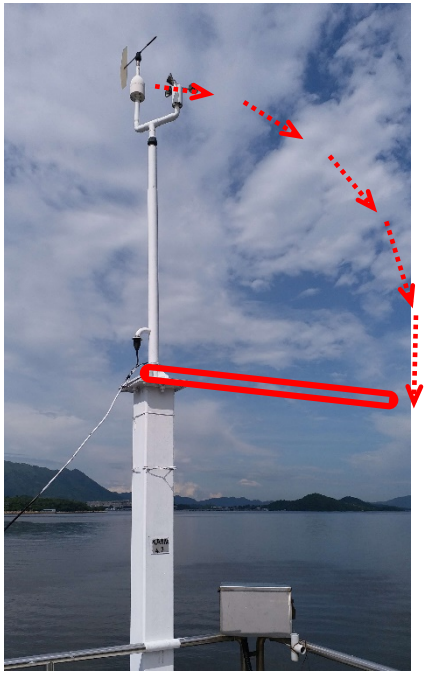
Equipment

Pier-head-light

In accordance with Cap. 313A Shipping and Port Control Regulations, at all times between sunset and sunrise cause a red light to be exhibited within 2 m of the outer end of the pier and at a height above it of not less than 3 m nor more than 6 m, and such red light shall be of such intensity and so constructed as to be visible from seaward in clear atmosphere on a dark night at a distance of at least one nautical mile

Equipment

Wind sensors and supporting mast



500 x 500 x 650 (mm)

Two sets of wind sensor mounted on a supporting frame of width 1 m and a supporting mast. The mast should be of diameter 200mm, of height such that the wind sensors should be at a height of at least one building width or building length, whichever is longer, above the rooftop height.

The mast will be tiltable so that staff can stand on rooftop to repair the wind sensors.

Equipment

Temperature sensors and solar radiation shield

Temperature sensors, housed inside a solar radiation shield, should be mounted on top of supporting mast of diameter 100mm, of height above roof around 1.5m.

250 x 250 x 300 (mm)

Equipment

Raingauge

The raingauge should not be blocked by solar PV panels.

250 x 250 x 350 (mm)

Equipment

Weather camera and protective cabinet

800 x 500 x 500 (mm)

Weather camera, housed inside a protective cabinet, should be installed at roof top for viewing the sky and surrounding environment.

Currently, the camera is looking towards the northeast.

Equipment

GNSS satellite data reception antenna

450 x 450 x 800 (mm)

The antenna should be installed on a supporting mounting. The exact height will depend on the surrounding environment for data reception.

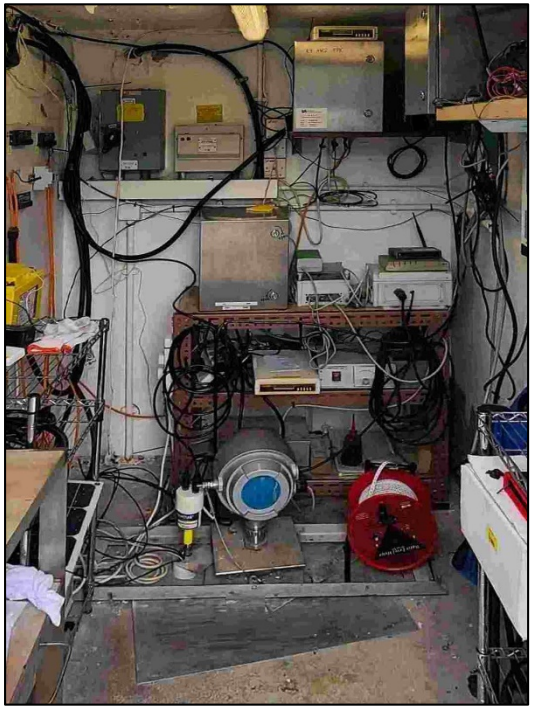
Equipment

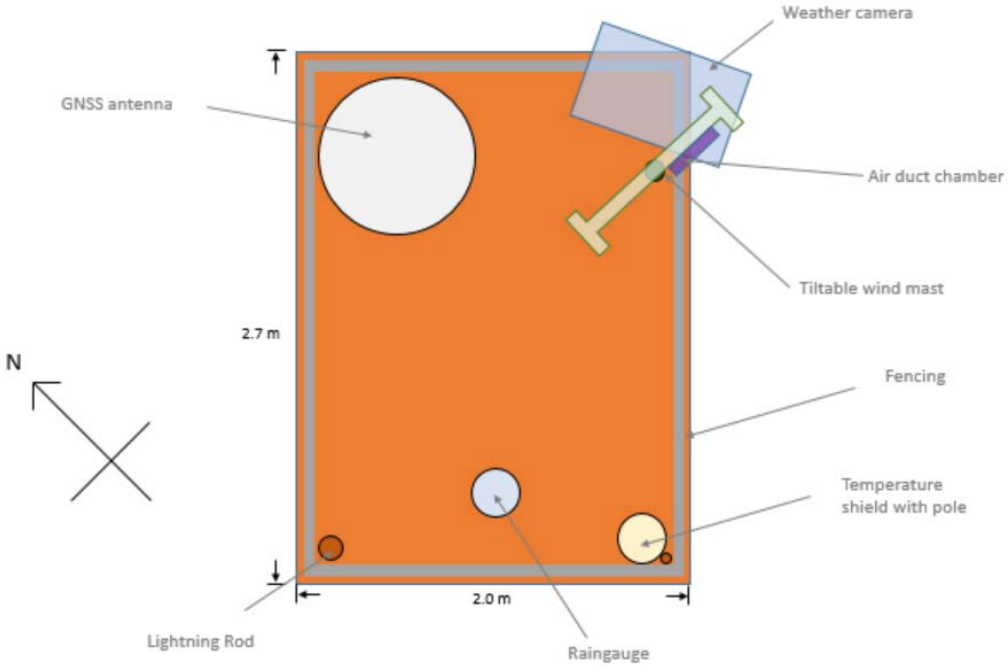
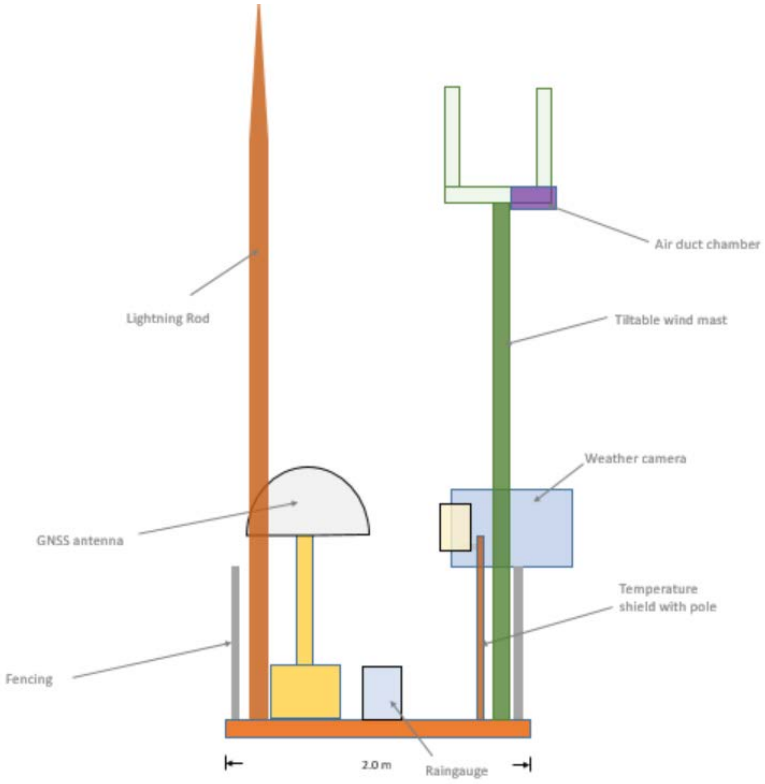
Solar PV panels

4 to 6 pieces of solar PV panels with a total area at least 2.5 m^2. Preferably facing south with a tilted angle of 23 deg.

To allow for more space and flexibility for installing other equipment on rooftop, solar PV panels facing other directions and with a tilted angle other than 23 deg can be considered.

- Existing tide gauge station almost 60 years ago
- Need to be replaced in good time on durability reasons and also to sustain the anticipated higher tide measurement for the Tolo Harbour area.
- Elevate the Station Cabinet to keep the equipment inside from sea waves and storm surge associated with tropical cyclones



- Provide sufficient internal space and clearance on the roof of the Station Cabinet for accommodation and installation of various equipment.
- Safe and easy access from the pier deck to the Station Cabinet as well as its roof shall be designed and provided.
- The design of the TGS should allow the maintenance staff to work in compliance with Occupational Safety and Health Ordinance.

Sample layout of equipment on rooftop