
Automatic Anti-Tsunami Systems

Lineup of Automatic Anti-Systems Facilities

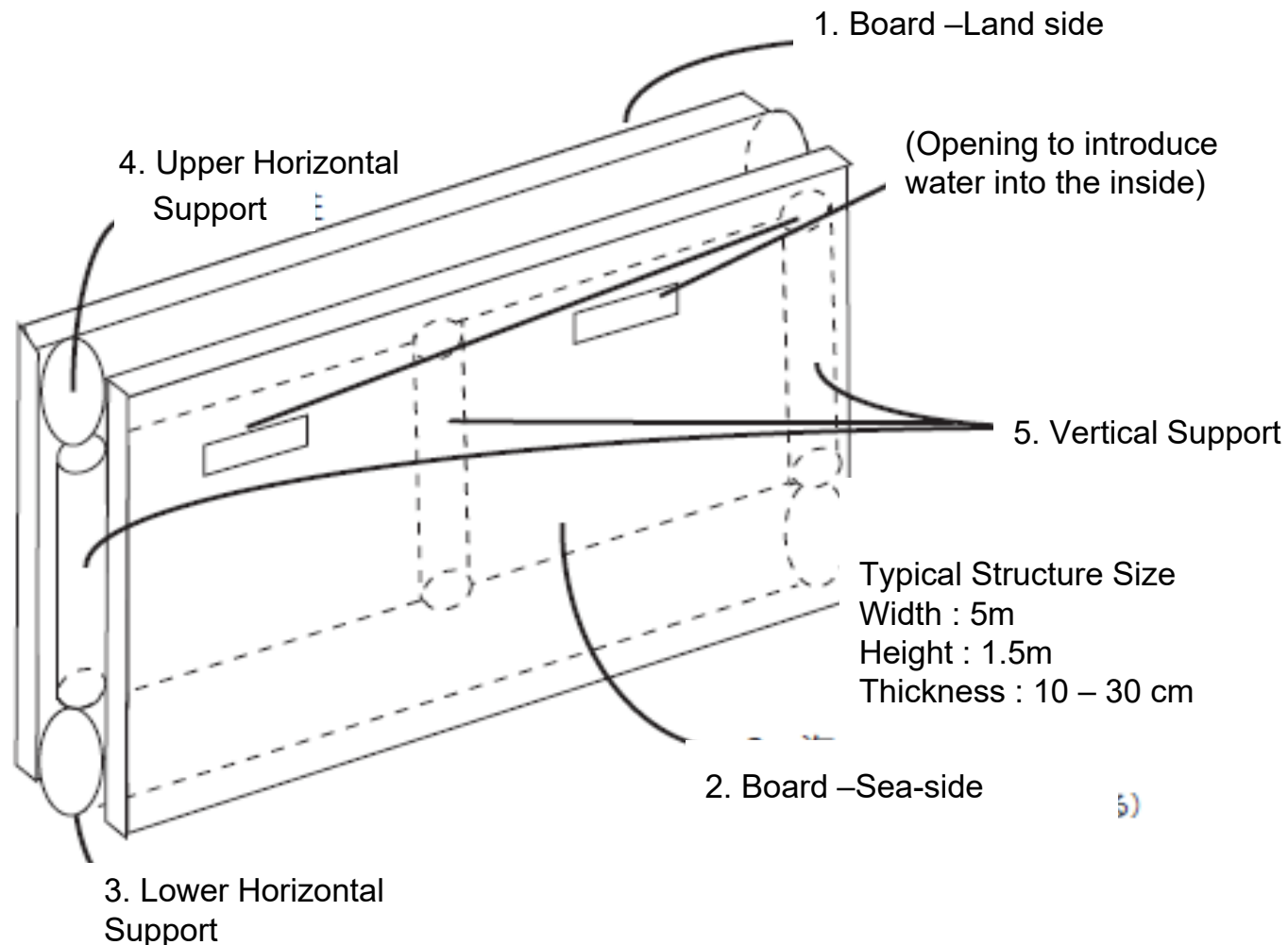
- (1) Anti-Tsunami Door (J-patent 5207091)
- (2) Multi-fold Anti-Tsunami Door (J-patent 5683056)
- (3) Anti-Tsunami Raft (Resubmitted for Japanese Patent)
- (4) Anti-Tsunami Gate (J-patent 5559950)
- (5) Anti-Tsunami Support (J-patent 5668107)
- (6) Automatic Tsunami Alarm System (J-patent 5736494)

1. Anti-Tsunami Door (ATD)

- (1) **New concept.** ATDs stand up in flooded water and function as breakwater to prevent the most of following tsunami from invading to land area. They cannot stop all tsunami of the corresponding level but the most of following tsunami invading.
- (2) For **automatic function** and as per the required strength, wooden made structure is used. So Economical, Environmental Friendly. They are stored within ground or quay, so No disturbing of sight and people (fisherman, tourist) life.
- (3) **Unit structure** for easy construction.

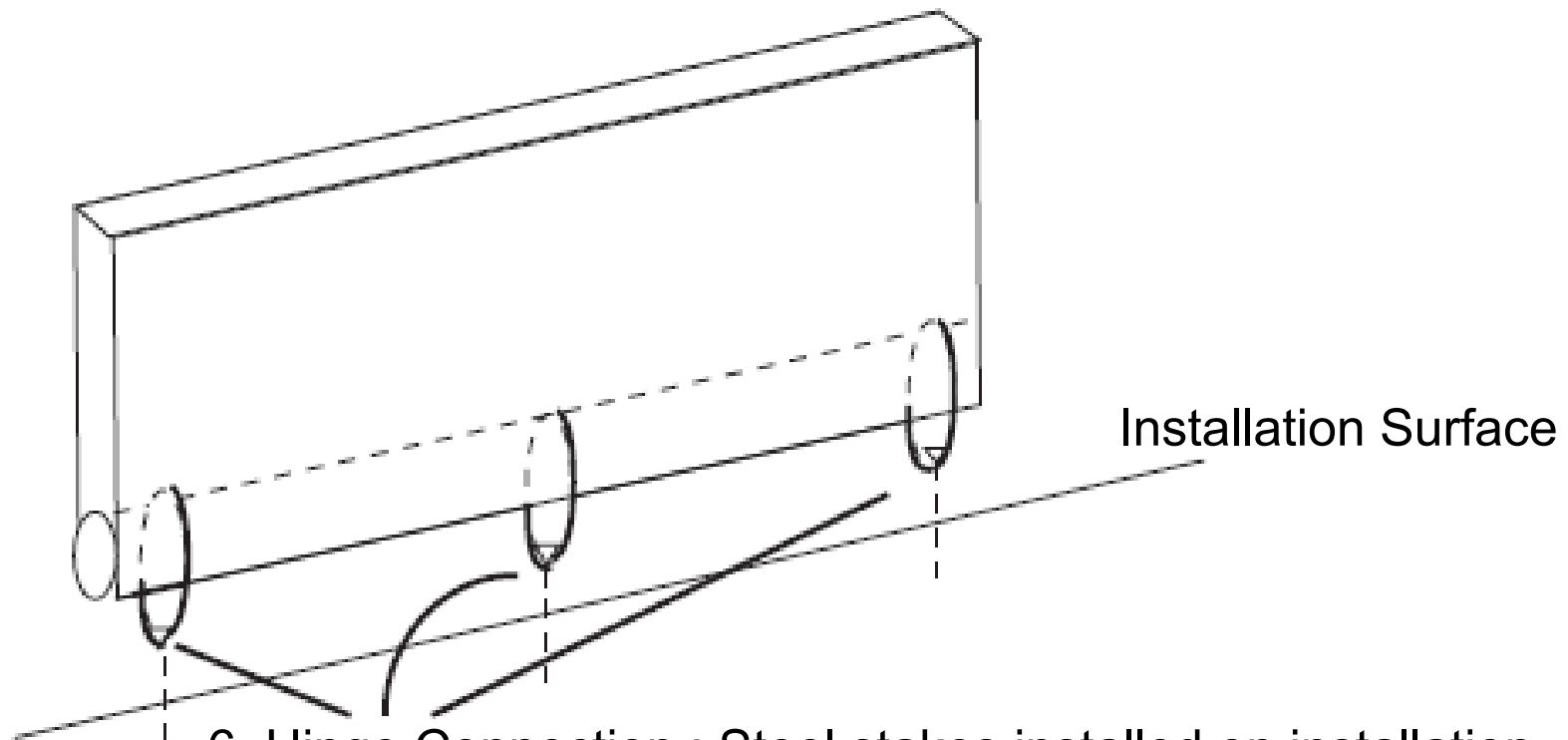
Structure of Anti-Tsunami Door

Structure of Anti-Tsunami Door



Installation of Anti-Tsunami Door

Figure 2 : Installation of Anti-Tsunami Door



6. Hinge Connection : Steel stakes installed on installation surface as balanced with ATSD size are connected with wire which wind around lower horizontal support of ATD.

Action of Anti-Tsunami Door

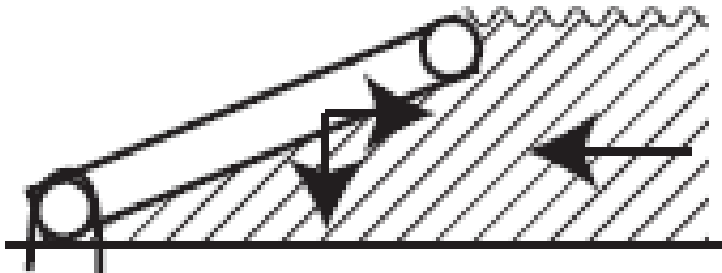
Figure 3 : Action of Anti-Tsunami Door

(1) Normal Condition

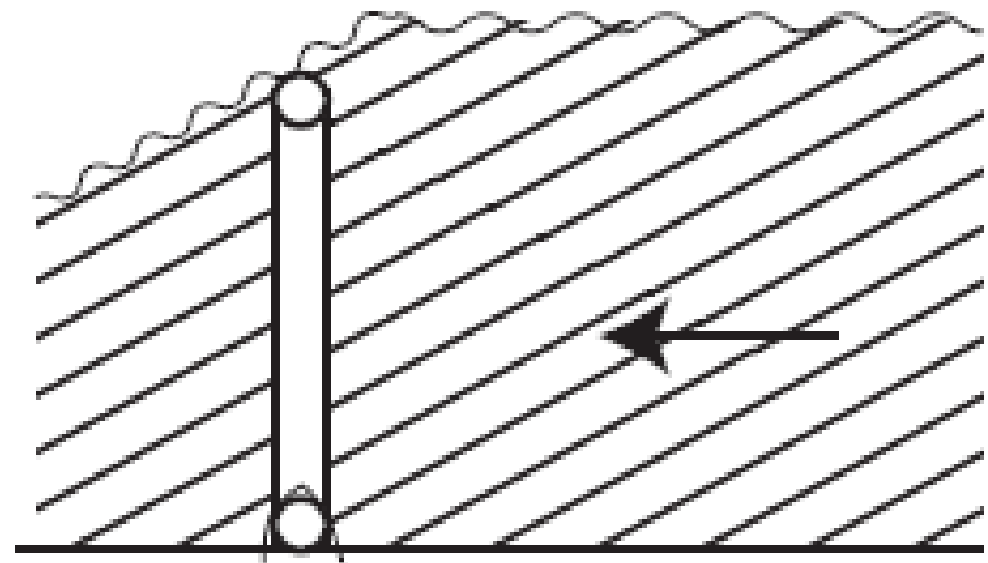
Land Side Sea Side



(2) Period of Low Water Level



(3) Period of High Water Level

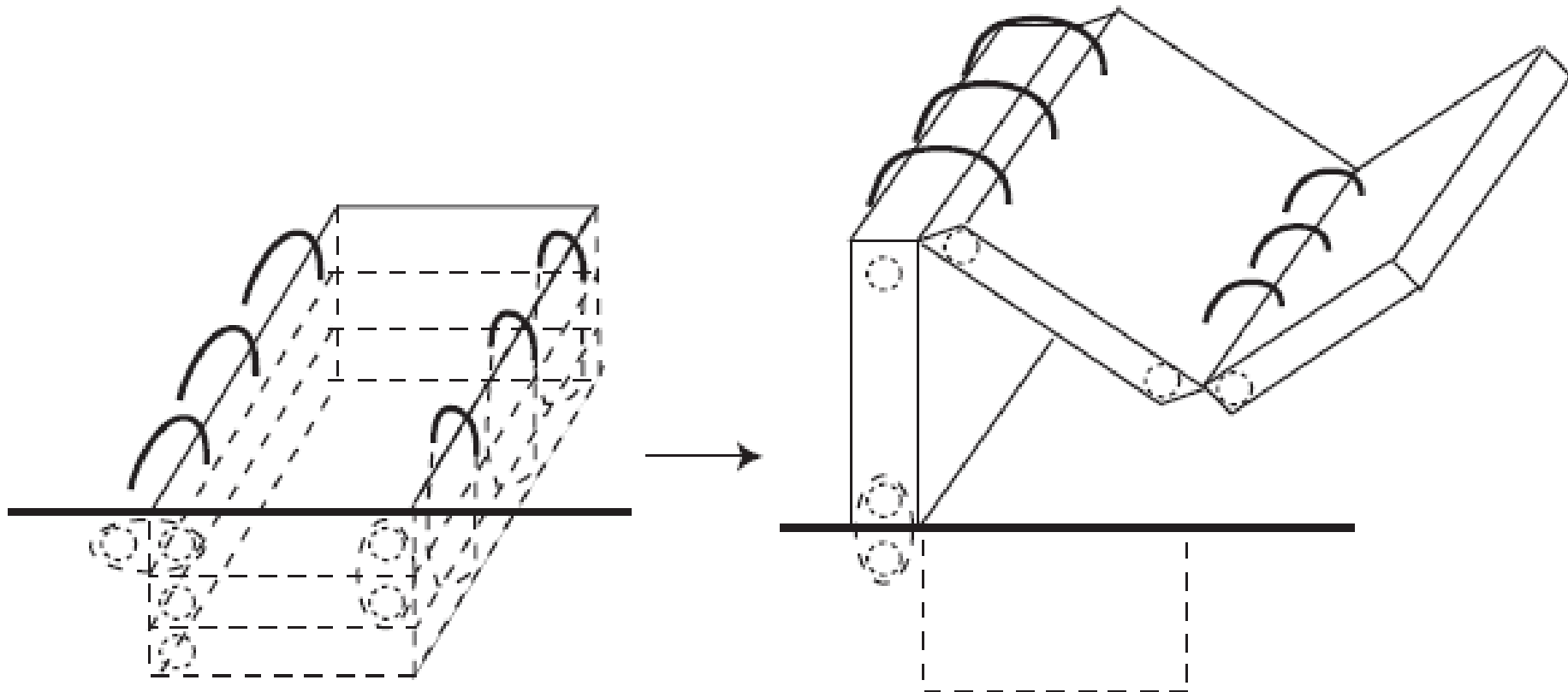


2. Multi-fold Anti-Tsunami Door (MATD)

- (1) Main features are the same with those of Anti-Tsunami Door (ATD).
- (2) While Single ATD has a limitation of size (such as max. 3m height), so the corresponding tsunami height is limited, Multi-fold Anti-Tsunami Door (MATD) can increase the corresponding tsunami height by the number of folds (i.e., 5-fold gives total 15 (3x5)m height . And MATD can be prepared in shop because it has unit structure.

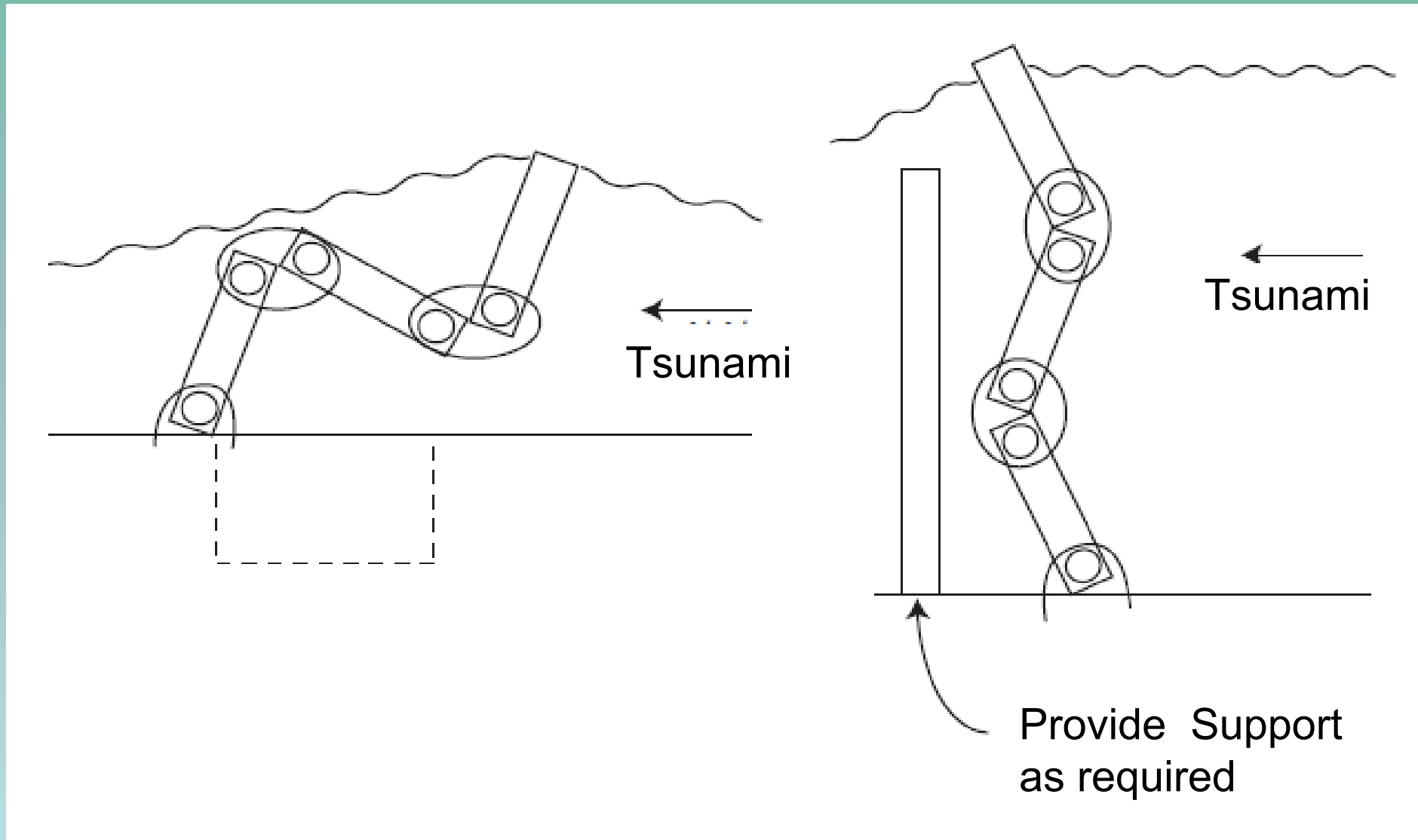
Action of MATD (Multi-fold Anti-Tsunami Door) — 1

Action of MATD



Housed such as under surface of ground

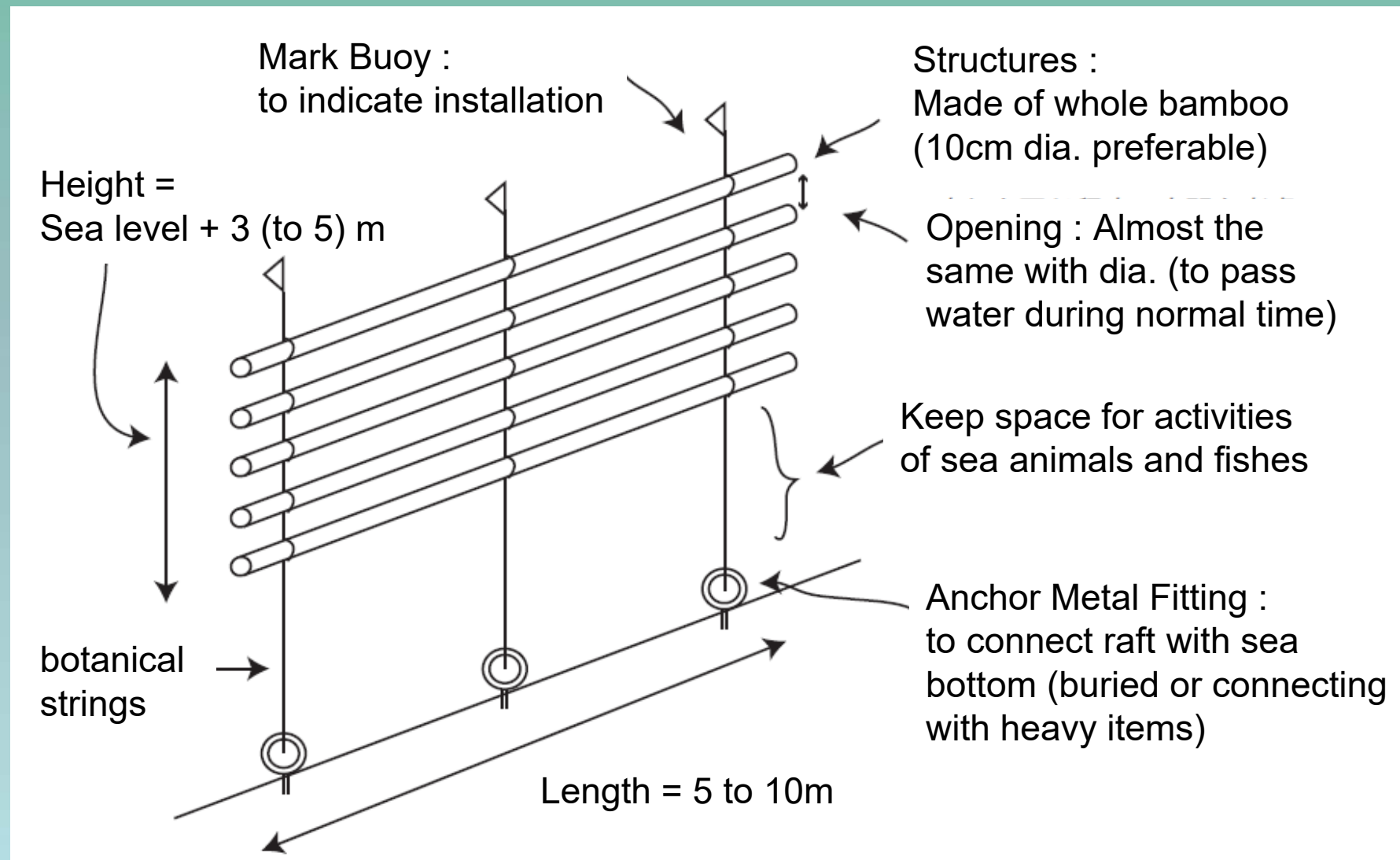
Action of MATD (Multi-fold Anti-Tsunami Door) – 2



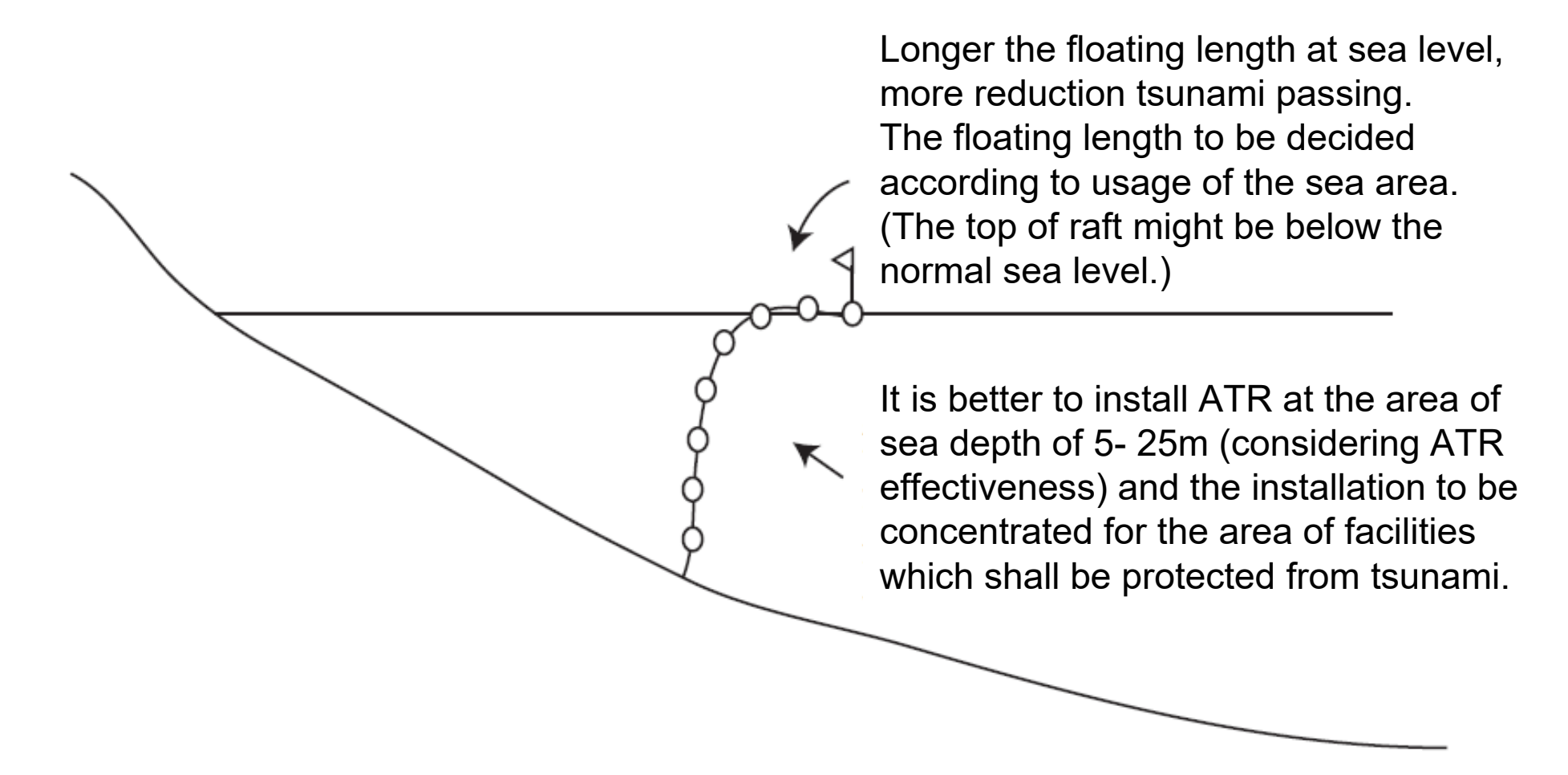
3. Anti-Tsunami Raft

- (1) Install raft of whole bamboo inside sea
- (2) Connect one edge of raft to sea bottom and spread the extra of other end of raft on sea level. The spread parts will be stand up above normal sea level by buoyancy when tsunami comes.
- (3) Economic and Environmental friendly because it is mainly made of bamboo and botanical strings
- (4) Contain water inside the bamboo, which makes structure strong and weaken tsunami
- (5) Unit structure and applicable flexibly for large tsunami by multiple installation.
- (6) It stands up like standing raft and weaken the strength of tsunami although it cannot shut out the tsunami invading.

Structures of Anti-Tsunami Raft



Installation of Anti-Tsunami Raft (ATR)



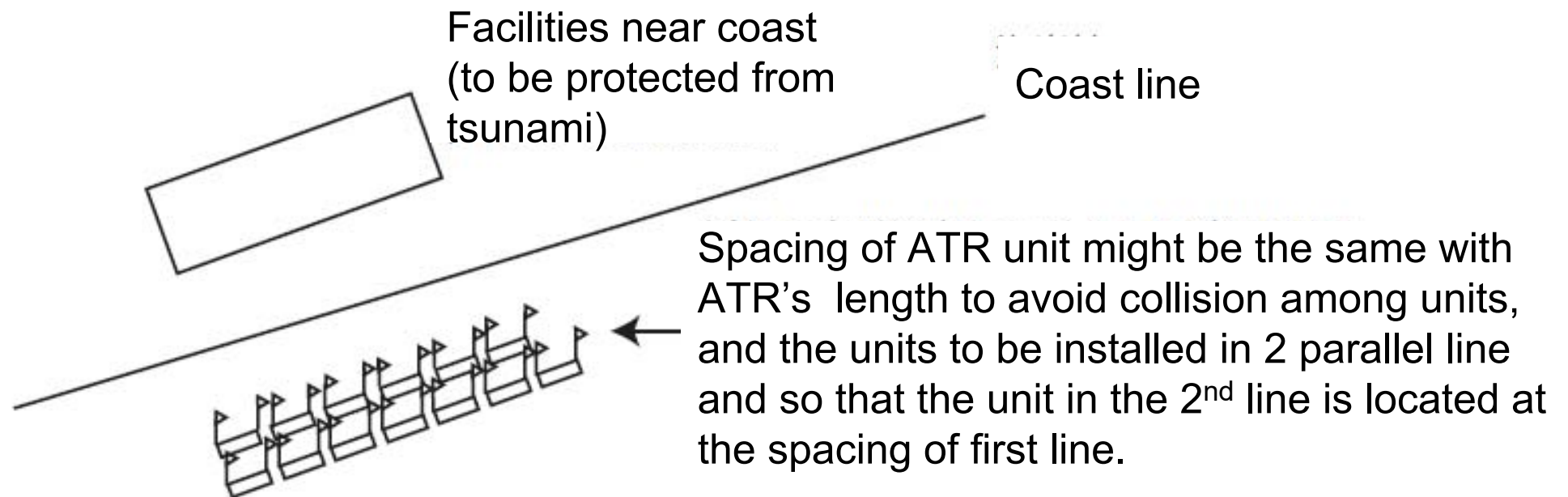
The diagram shows a cross-section of the ocean with a curved seabed. A horizontal line represents the sea level. A series of circles connected by a line represents the ATR. The circles are arranged in a curve that starts at a depth of approximately 5-25 meters and rises to the sea level. An arrow points to the top of the raft at sea level, and another arrow points to the depth of the raft's installation.

Longer the floating length at sea level, more reduction tsunami passing. The floating length to be decided according to usage of the sea area. (The top of raft might be below the normal sea level.)

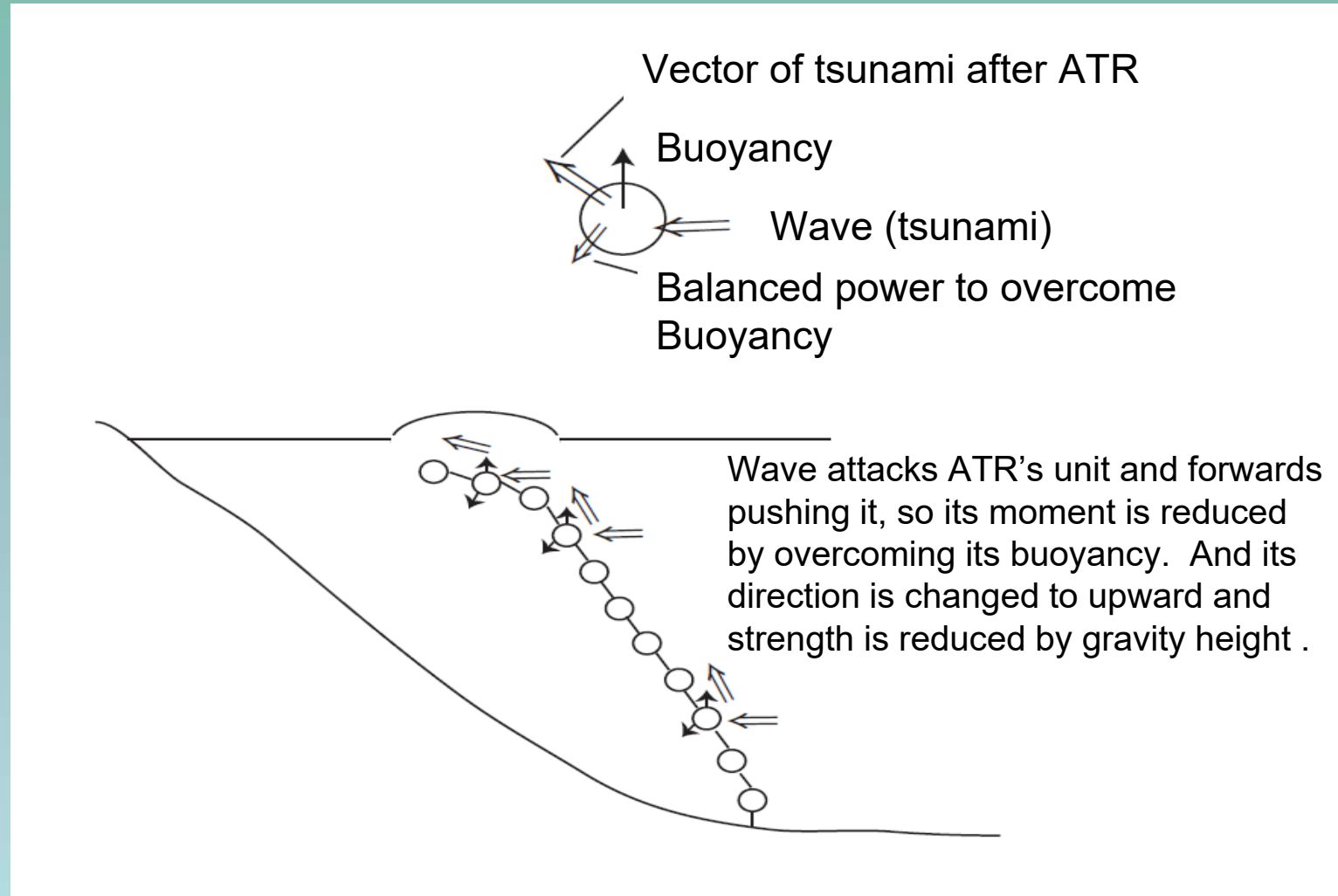
It is better to install ATR at the area of sea depth of 5- 25m (considering ATR effectiveness) and the installation to be concentrated for the area of facilities which shall be protected from tsunami.

Application of Anti-Tsunami Raft (ATR)

Application to protect facilities near coast



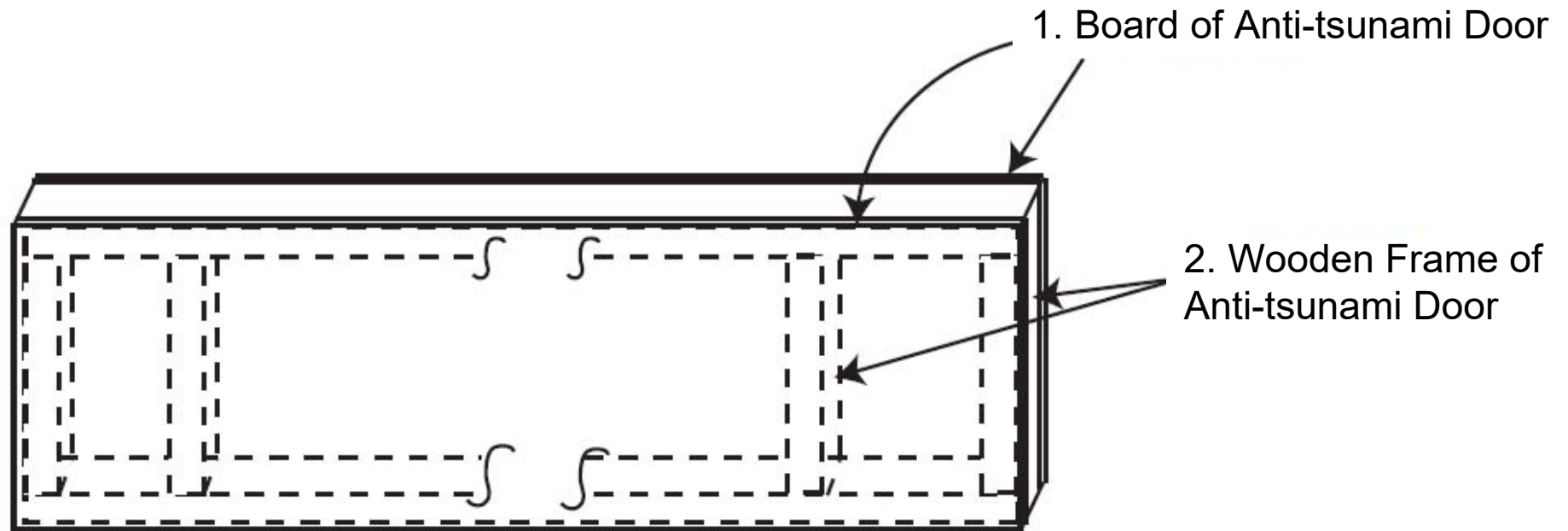
Action of Anti-Tsunami Raft (ATR)



4. Anti-Tsunami Gate

- (1) Wooden gate-shape structure is installed in water flow, like at mouth of river. By tsunami it will be moved like gate and functioned as breakwater.
- (2) The structure is made by wood, so Economical, Environmental Friendly.
- (3) Have inside open space which will contain tsunami and reinforce its strength, and then weaken tsunami.
- (4) One large metal frame containing multiple wooden unit structures may function as large breakwater.
- (5) It cannot shutout tsunami but effectively reduce the force of the most of following tsunami continuously.

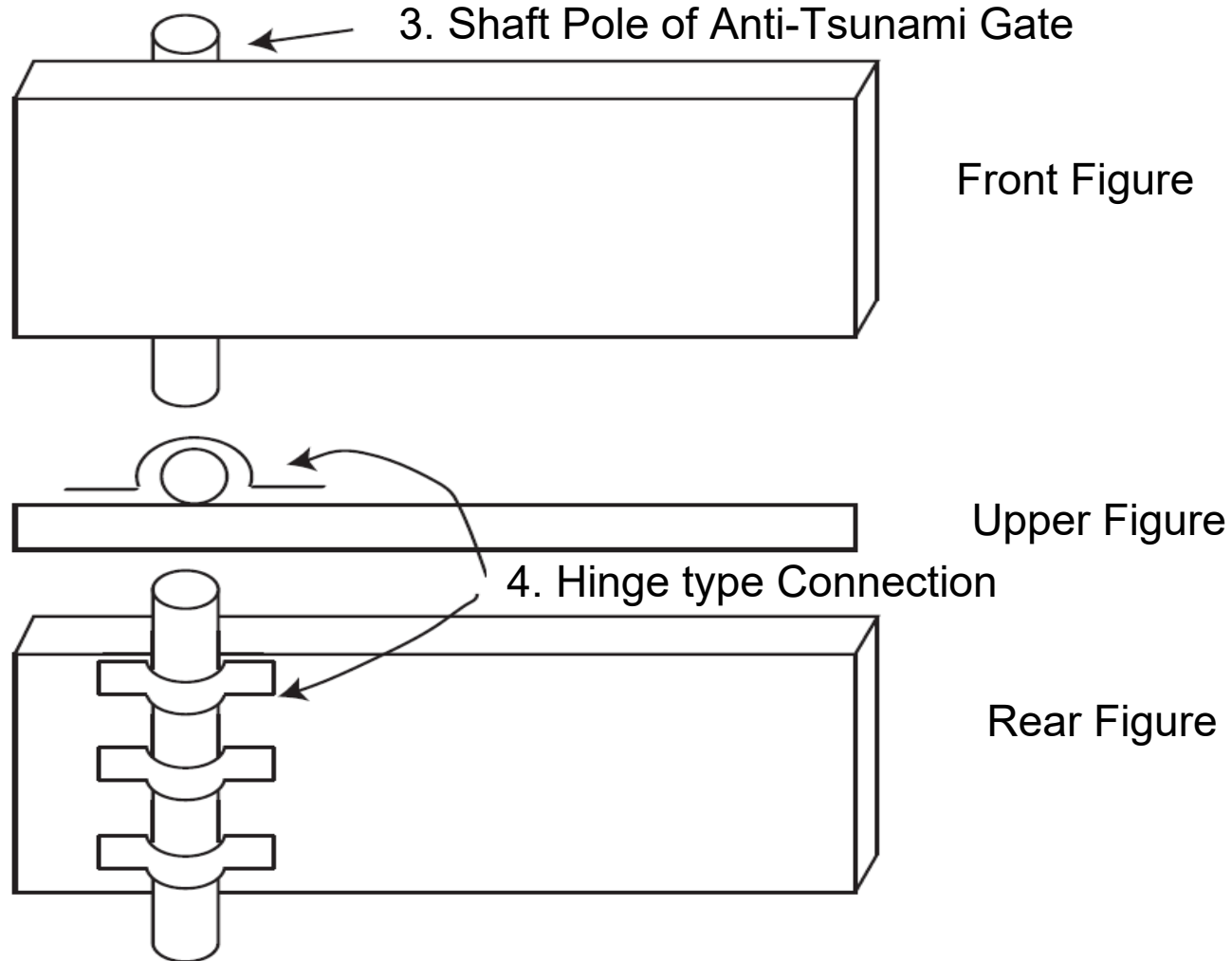
Structure of Anti-Tsunami Gate



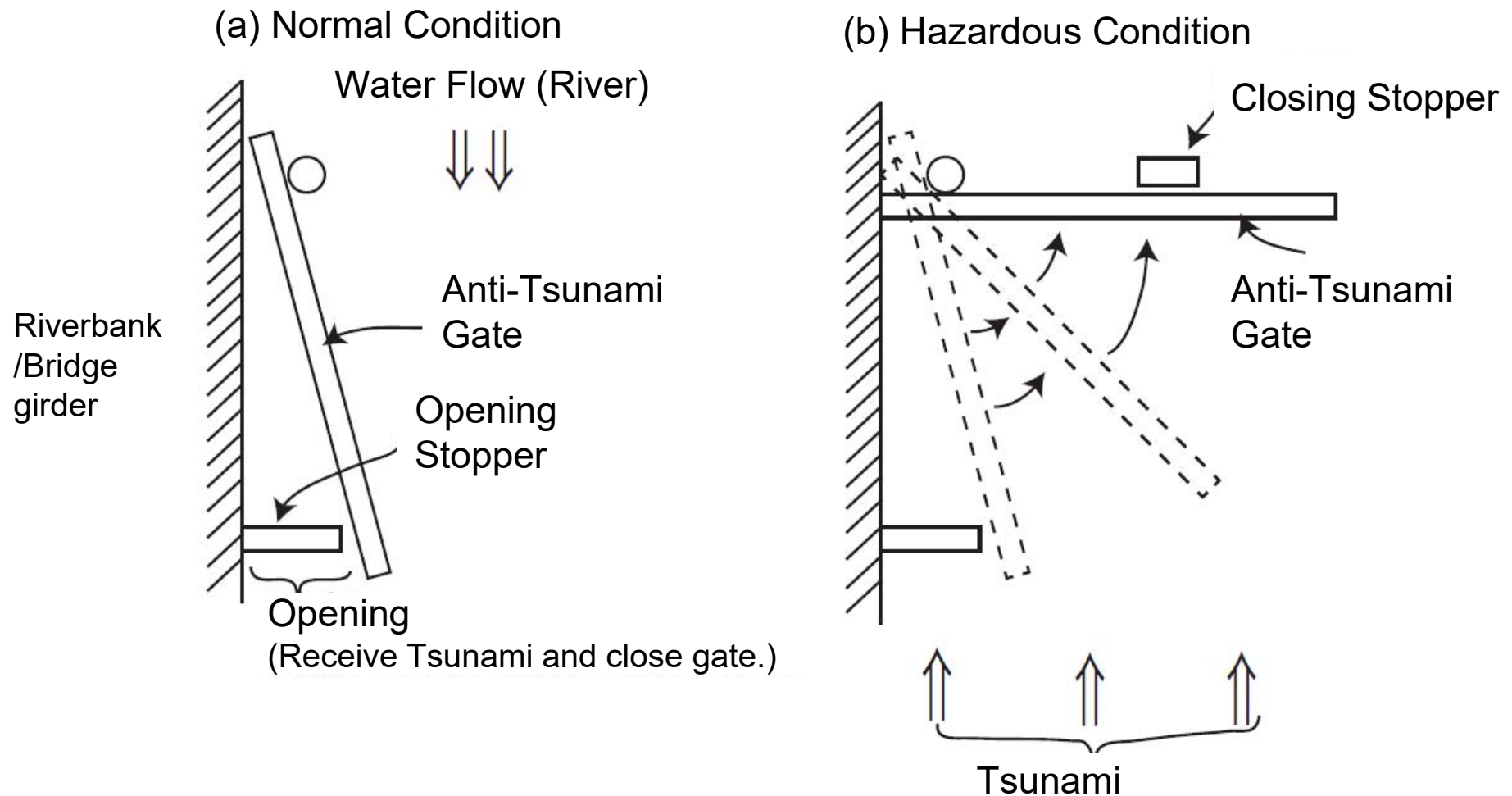
Structure General Size
Width : 5~10m
Height : 2 ~ 6 m
Thickness : 10 ~ 50 cm

Connection of Anti-Tsunami Gate

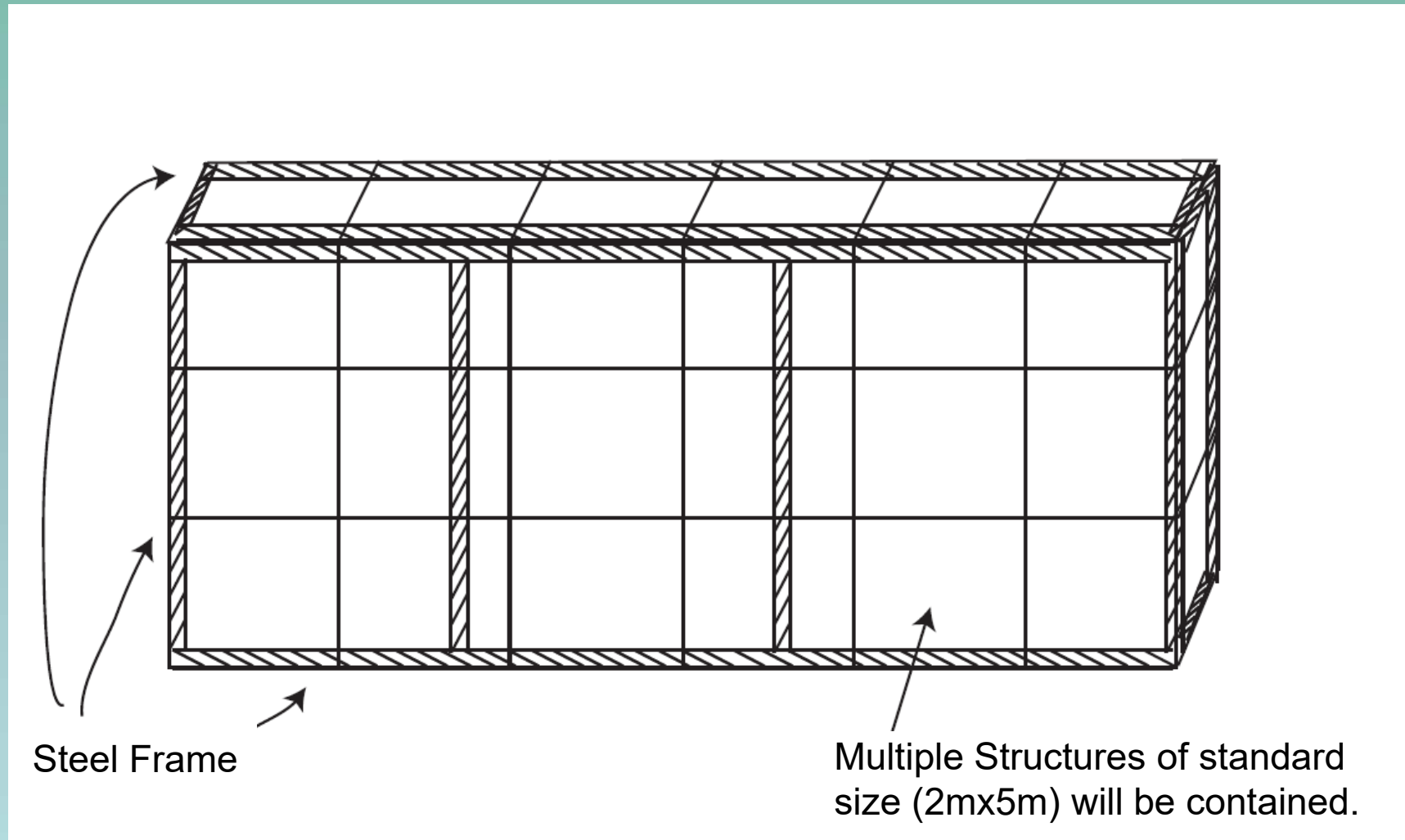
Connection of Structure to Shaft Pole



Action of Anti-Tsunami Gate



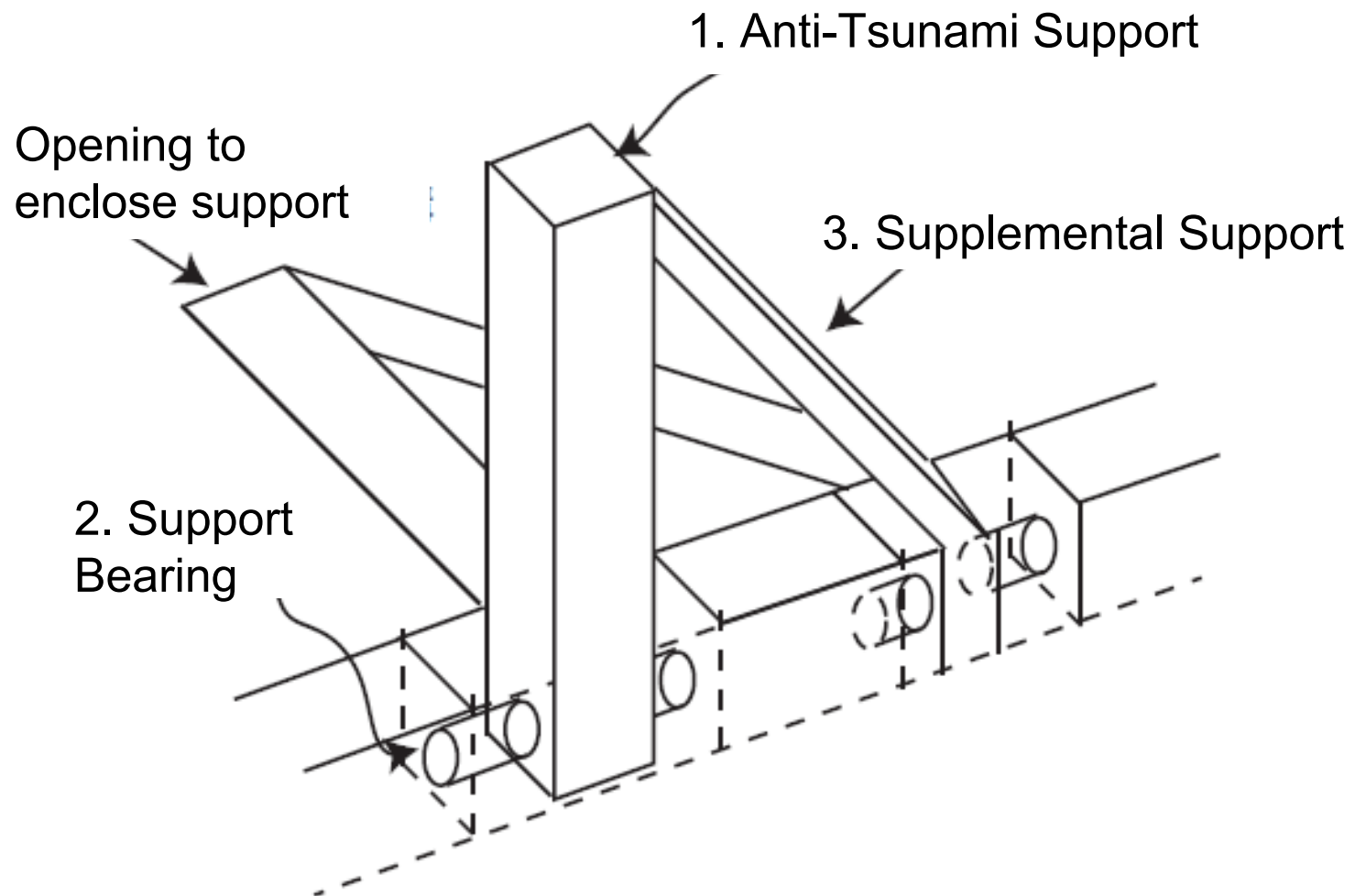
Application of Anti-Tsunami Gate as Large Scale Breakwater



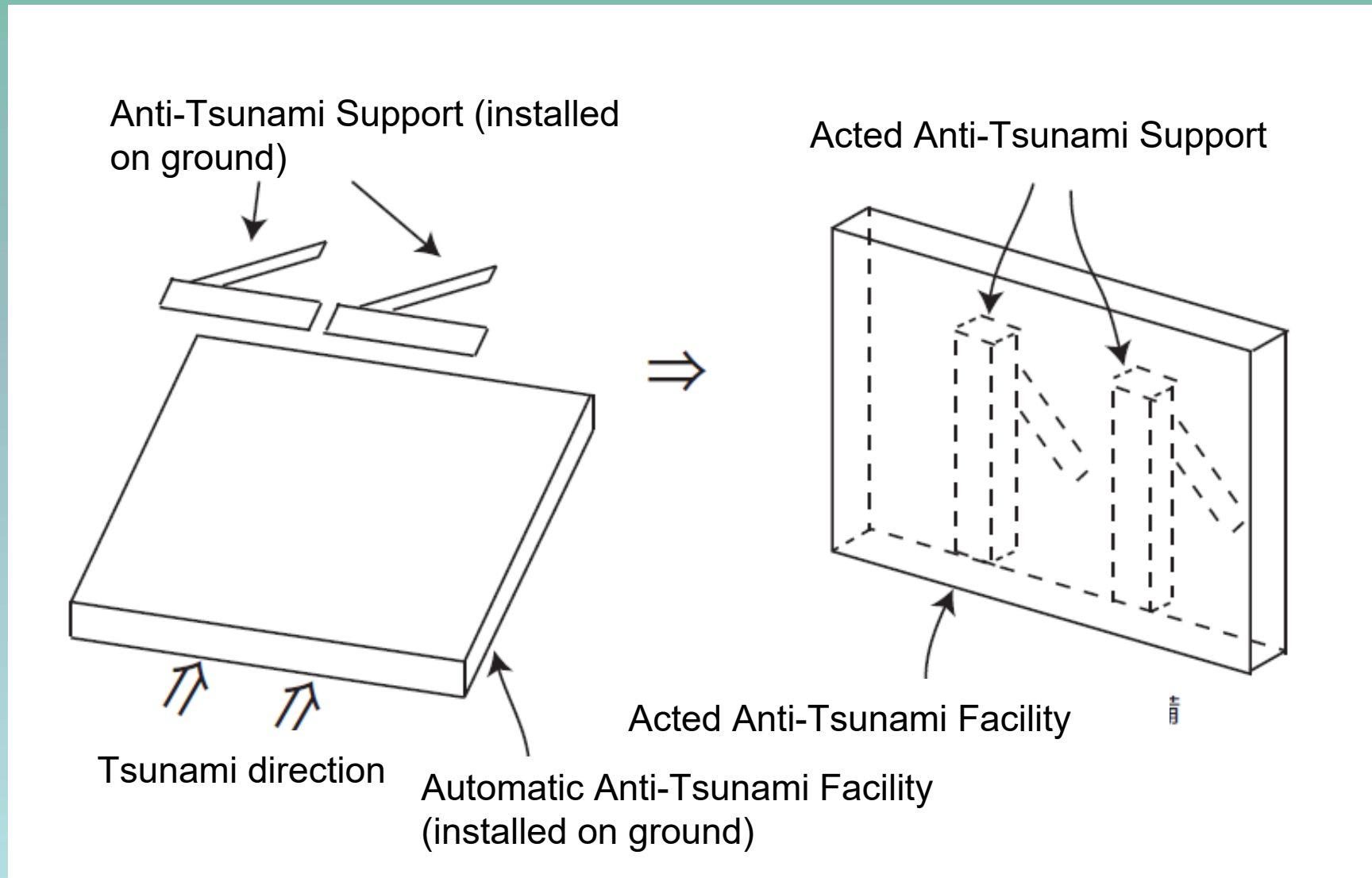
5. Anti-Tsunami Support

- (1) Wooden-made structure will stand up in flooding water. The standing direction is parallel with flooding water so that it has the largest supporting effect.
- (2) Manufactured of wood.
Economical and Environmental friendly.
- (3) Inside open space will be used to contain tsunami water and it will reinforce the structure and reduce tsunami power.
- (4) Unit structure. Apply multiple units to large-scale requirement.

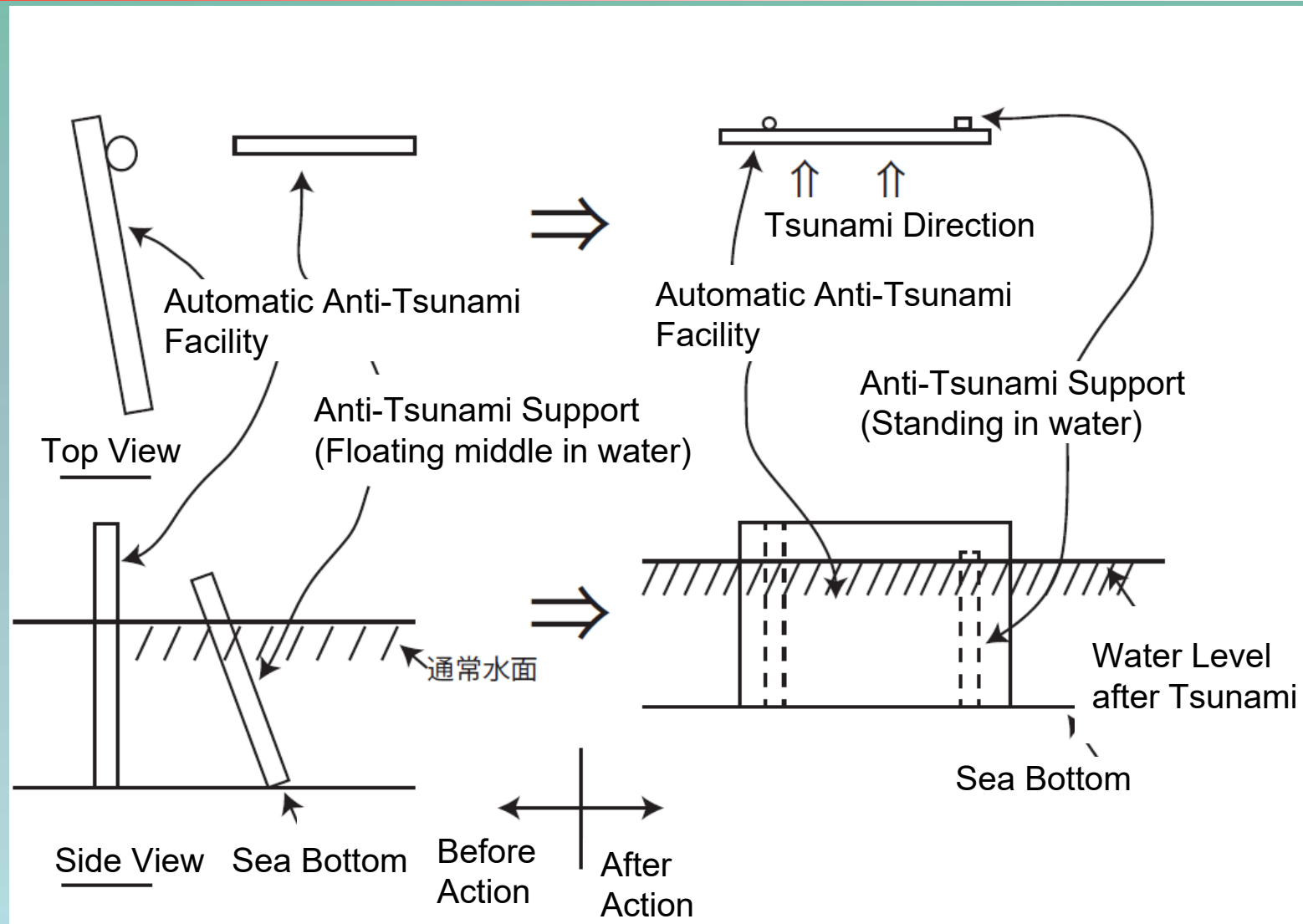
Structure of Anti-Tsunami Support



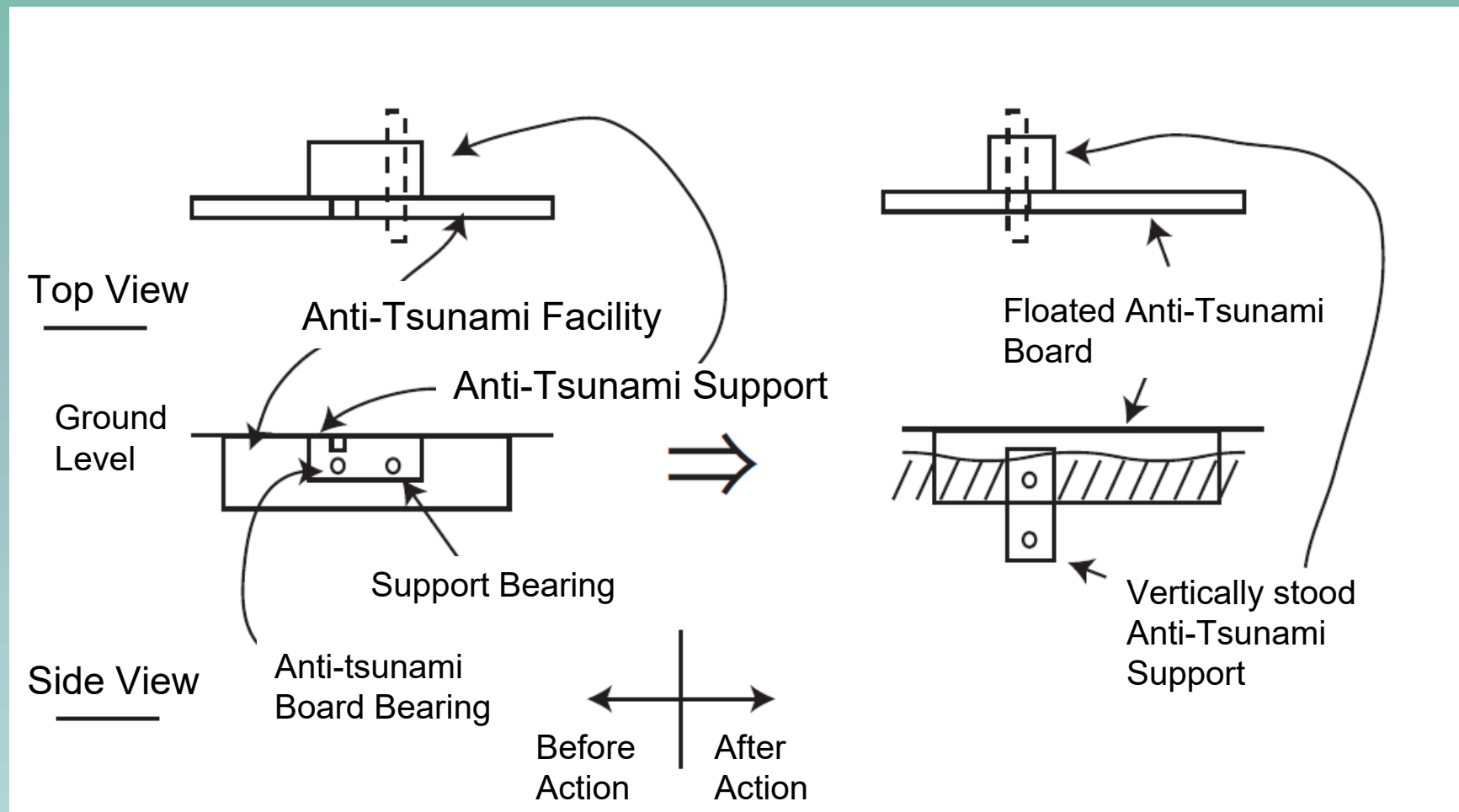
Installation and Action of Anti-Tsunami Support



Installation and Action of Anti-Tsunami Support in Water



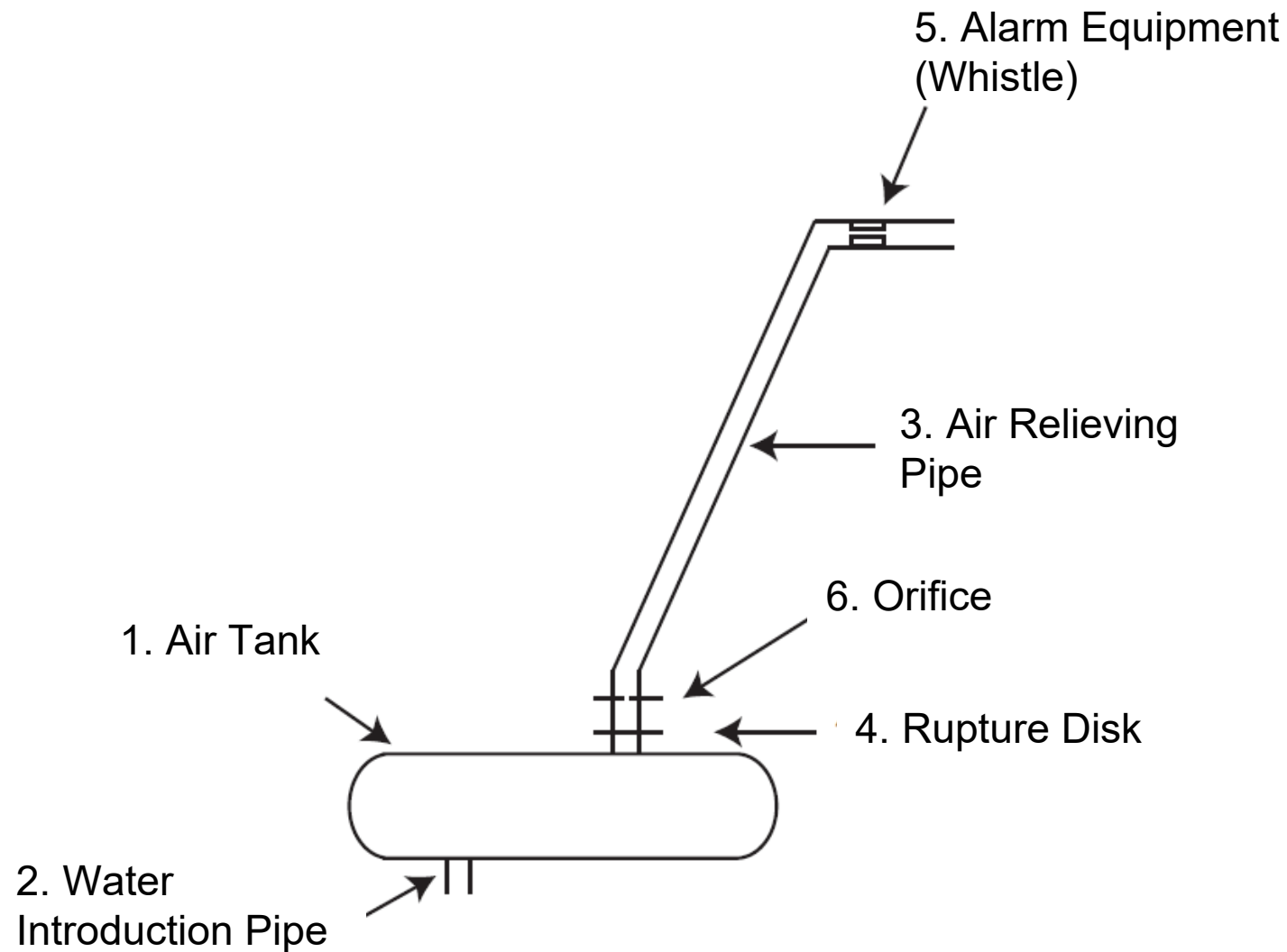
Installation and Action of Anti-Tsunami Support with Breakwater Function



6. Automatic Tsunami Alarm System

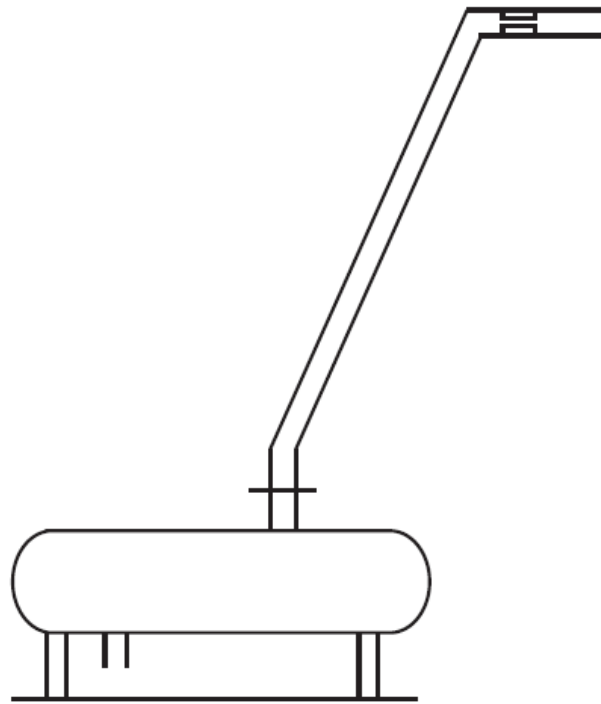
(1) Automatic Tsunami Alarm System detects the flooding status of tsunami by the pressure of flooded water depth and provides the sound alarm directly without transmitting it to electrical signal, etc.

Structure of Automatic Tsunami Alarm System

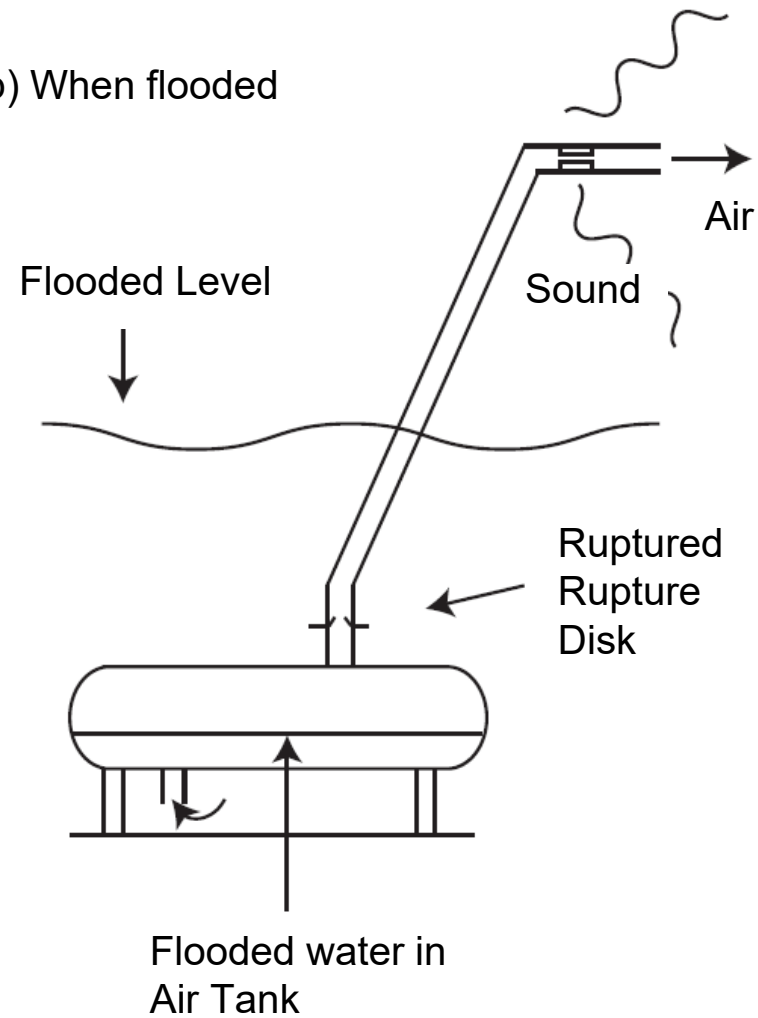


Action of Automatic Tsunami Alarm System

(a) Normal Condition



(b) When flooded



Installation of Automatic Tsunami Alarm System

Installation of Automatic Tsunami Alarm System
(3 step alarming)

Sound system
(whistle)

