## Chapter 37 Management and Operation Scheme

### 37.1 Administration, management and operation of ports

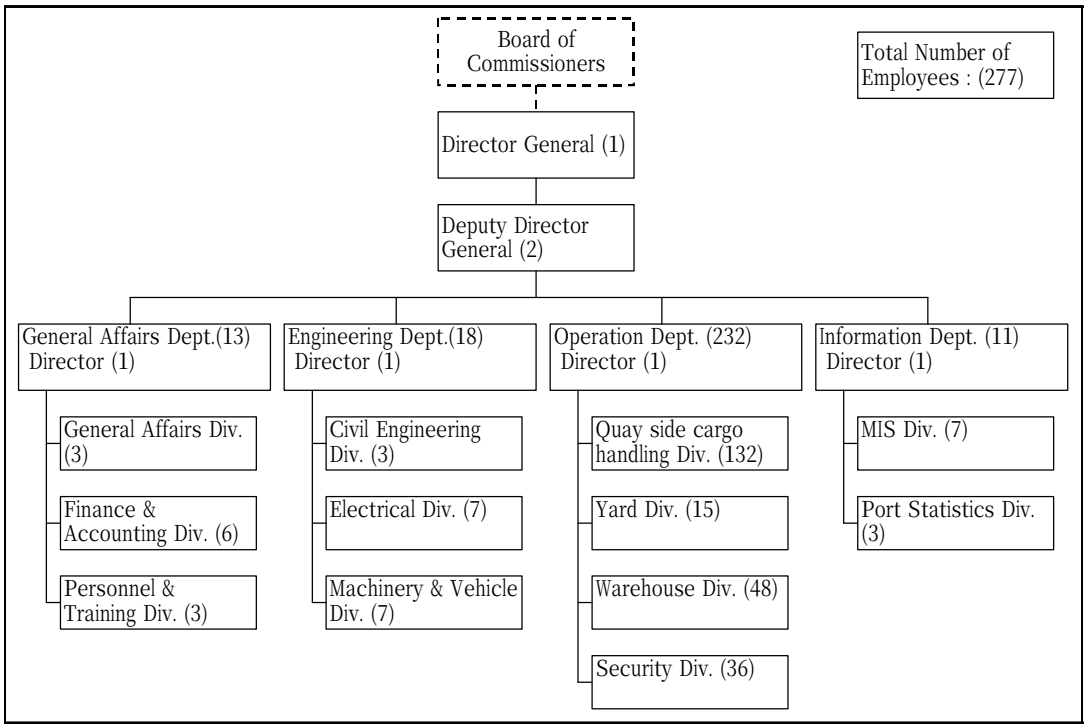
### 37.1.1 Classification of ports - 37.1.8 Setting appropriate port dues / charges

(Refer to Master Plan (28.1.1 – 28.1.8))

### 37.1.9 Organization chart of Major Port operators

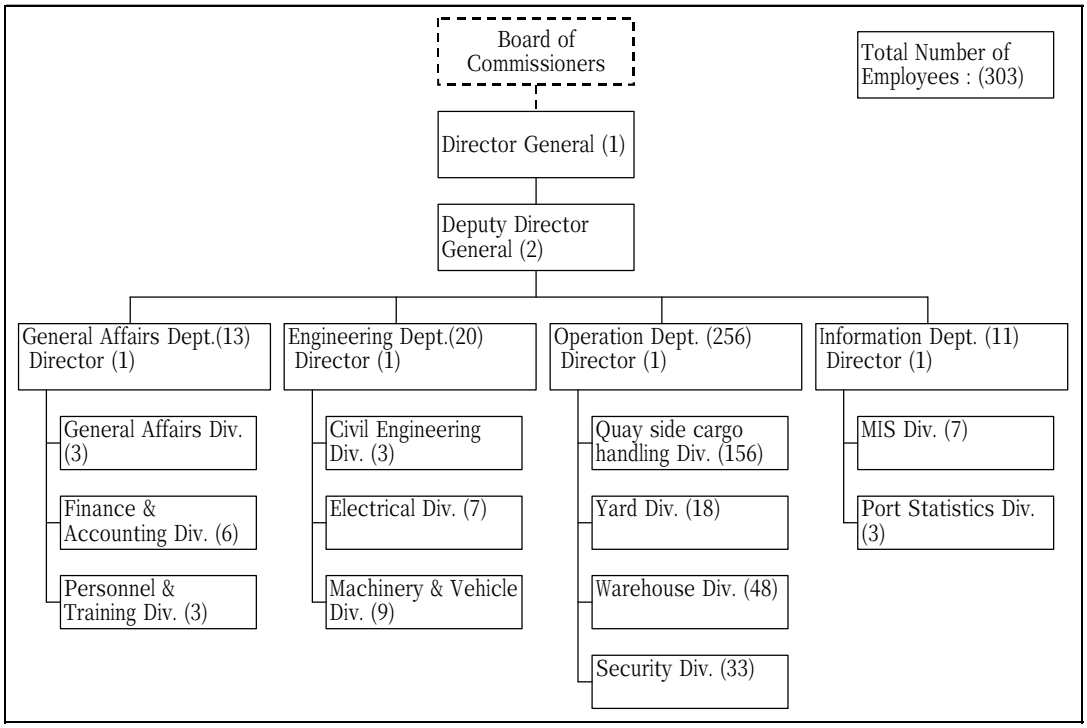
Proposed 4 Major Ports except Chem Berth are invested and owned by MOT and leased to port operators. Although these ports will not be operated by MOT, the Study Team proposes appropriate organization structures and scales of the 4 Major Ports for reference. (Refer to Master Plan (28.1.9).

**Figure 37.1.1 - 37.1.4** shows proposed organization chart of Hanoi Port, Khuyen Luong Port, New North Port and New East Port for the year 2010. Figures in parentheses indicate the number of employees.



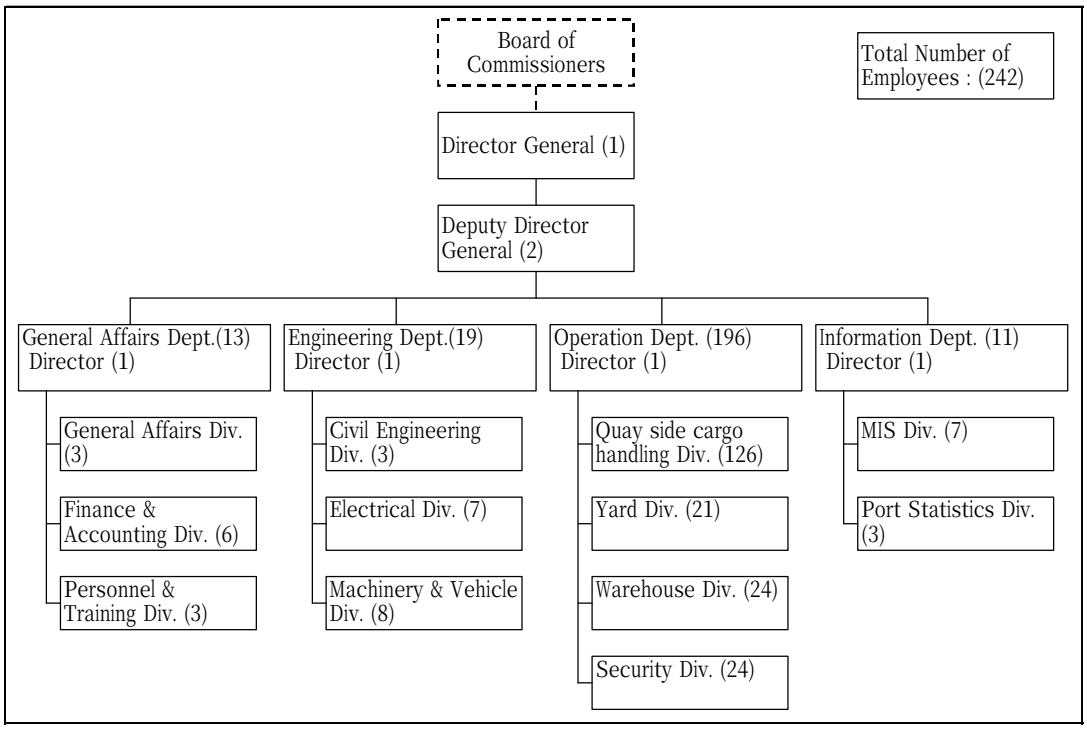

Source) JICA Study Team

**Figure 37.1.1 Organization Chart of Hanoi Port Operator**



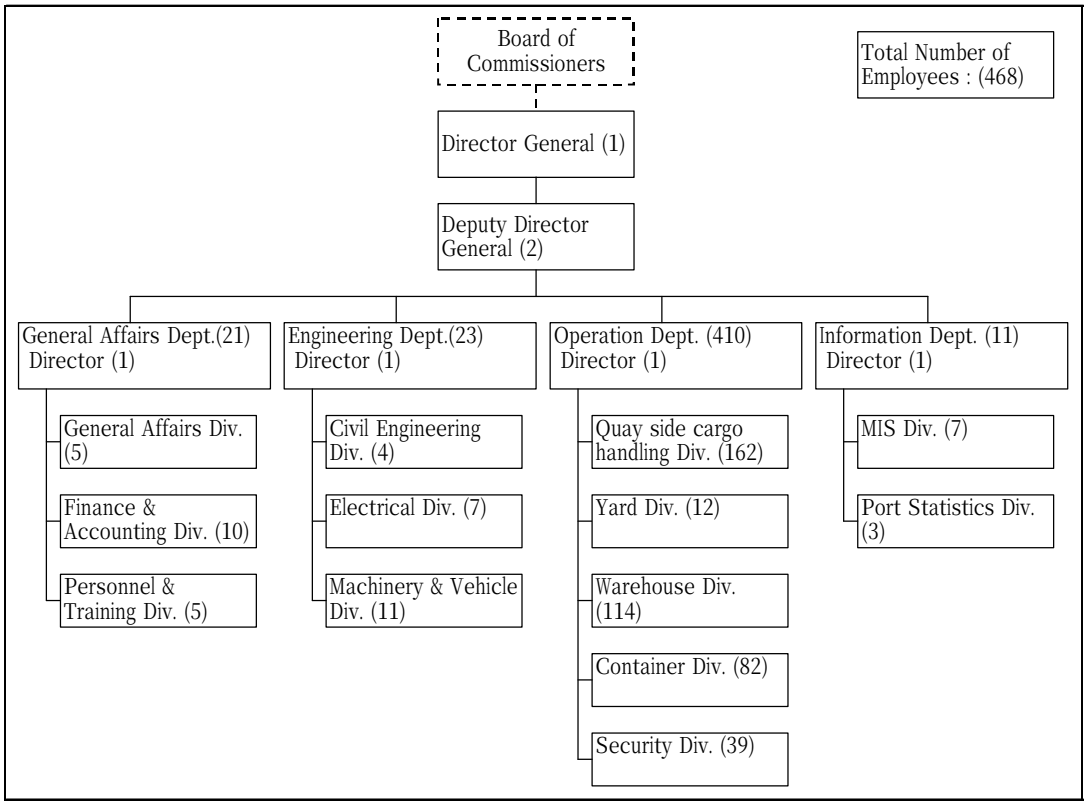

Source) JICA Study Team

**Figure 37.1.2 Organization Chart of Khuyen Luong Port Operator**




Source) JICA Study Team

**Figure 37.1.3 Organization Chart of New North Port Operator**




Source) JICA Study Team

**Figure 37.1.4 Organization Chart of New East Port Operator**

### 37.1.10 Council Meeting of 5 Major Ports

(Refer to Master Plan (28.1.10))

### 37.1.11 Introduction of support system for private company participation in IW sector

(Refer to Master Plan (28.1.11))

## 37.2 Administration and management of Inland Waterway

### 37.2.1 Classification of IW

(Refer to Master Plan (28.2.1))

### 37.2.2 Role sharing for IW management

(Refer to Master Plan (28.2.2))

### 37.2.3 Introduction of appropriate management equipment

The importance of introducing appropriate management equipment has already been mentioned in the Master Plan (28.2.3).

**Table 37.2.1 to 37.2.4** show number of vessels to be required in 2010, number of existing vessels (which can be used in 2010) and number of vessels required to be introduced in 2010 by Sub-stations. Here dredging fleet consists of dredger, barge and tugboat.

**Table 37.2.1 Vessels Required to be Introduced in 2010（Chem Sub-station）**

| Vessel type | Required (2010) | Present (Possible to use in 2010) | Required to be introduced (2010) |
|---|---|---|---|
| Buoy lifting | 2 | 1 | 1 |
| High Speed(patrol&survey) | 1 | 1 | - |

Source) VIWA & JICA Study Team

**Table 37.2.2 Vessels Required to be Introduced in 2010（Hanoi Sub-staion）**

| Vessel type | Required (2010) | Present (Possible to use in 2010) | Required to be introduced (2010) |
|---|---|---|---|
| Dredging fleet | 1 | - | 1 |
| Buoy lifting | 2 | 1 | 1 |
| First Aid | 1 | - | 1 |
| High Speed(patrol&survey) | 3 | 3 | - |

Source) VIWA & JICA Study Team

**Table 37.2.3 Vessels Required to be Introduced in 2010 （Khuyen Luong Sub-station）**

| Vessel type | Required (2010) | Present (Possible to use in 2010) | Required to be introduced (2010) |
|---|---|---|---|
| Buoy lifting | 1 | 1 | - |
| High Speed(patrol&survey) | 1 | - | 1 |

Source) VIWA & JICA Study Team

**Table 37.2.4 Vessels Required to be Introduced in 2010 by Sub-stations**

| Vessel type | Chem | Hanoi | Khuyen Luong | total |
|---|---|---|---|---|
| Dredging fleet | - | 1 | - | 1 |
| Buoy lifting | 1 | 1 | - | 2 |
| First Aid | - | 1 | - | 1 |
| High Speed(patrol&survey) | - | - | 1 | 1 |

Source) JICA Study Team

Moreover depth sounder and GPS shall be installed on high-speed boats and computer system shall be installed at Sub-stations to increase the efficiency of survey activities.

**Table 37.2.5** shows management equipment required to be introduced in Hanoi Segment in 2010.

**Table 37.2.5 Management Equipment Required to be Introduced in Hanoi Segment in 2010**

| Item | Spec | Unit | Number |
|---|---|---|---|
| Dredging fleet | | unit | 1 |
| Dredger | 150m3/h | vessel | 1 |
| Barge | 400DWT | vessel | 2 |
| Tugboat | 150CV | vessel | 1 |
| Buoy lifting vessel | 150CV, crane-5ton | vessel | 2 |
| First Aid vessel | 600CV | vessel | 1 |
| High speed boat | 50CV | vessel | 1 |
| Depth sounder | | Unit | 5 |
| GPS | | Unit | 5 |
| Computer system | | unit | 3 |

Source) JICA Study Team

In addition, in line with the introduction of equipment, personnel of IWMS (including Sub-station) should also be placed properly. Proposed number of staff by Sub-stations is the same as in the master plan. (See **Table 28.2.4** - **Table 28.2.6**).

### 37.2.4 Introduction of Management Information System (MIS)

(Refer to Master Plan (28.2.4))

### 37.2.5 Information Service System

The importance of the Information Service System as well as its contents has already been mentioned in the Master Plan (28.2.5). The Study Team proposes to introduce a part of the system in 2010 as a first stage. (It is mentioned in master plan as 'target year is 2010').

### 37.2.6 Revision of IW cargo transport tariff

(Refer to Master Plan (28.2.6))

### 37.2.7 Strict control for illegal sand exploitation

(Refer to Master Plan (28.2.7))

### 37.2.8 Enactment of legal framework to regulate newly-built bridge clearances

(Refer to Master Plan (28.2.8))

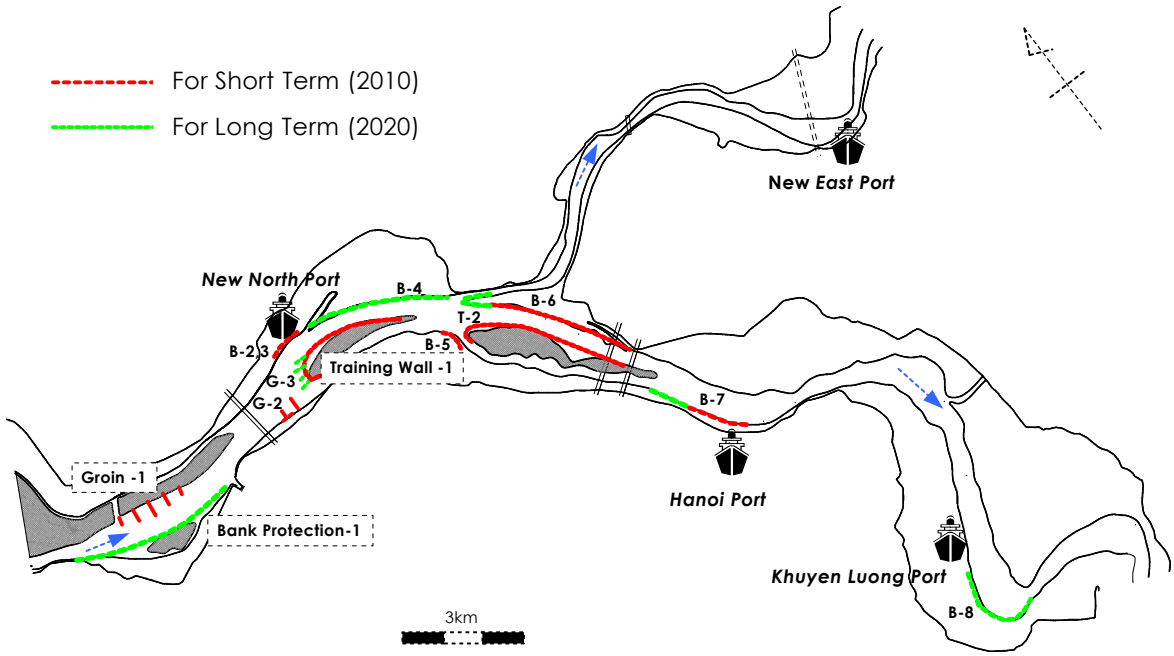
## Chapter 38 Preliminary Design, Cost Estimation and Construction Schedule

This chapter presents the results of Preliminary Design, Cost Estimation and Construction Schedule of the following facilities, which were selected for the implementation of the Project:

- **Channel Stabilization Facilities** (including groin, training wall and bank protection) in the Red River Hanoi segment

- **Port-related Facilities** (including berthing and terminal facility) in the following ports

  - Hanoi Port
  - Khuyen Luong Port
  - New North Port
  - New East Port




Their locations and scales (lengths, crown heights, etc.) are planned and decided based on the functional requirements, which were derived from the demands for the port activity and utilization, the numerical analysis on channel stabilization, and information on the historical river characteristics.

## 38.1 Preliminary design

In the following sections, the above-mentioned facilities are preliminarily designed for the purpose of Feasibility Study of the Project.

In the preliminary design of the structures, critical design conditions to be considered are the seasonal change in water level (variation reaches about 9m between the dry and rainy seasons) as well as capricious riverbed behavior (erosion and accumulation of riverbed materials) as described in the above chapter **V** in detail.

In addition, the Study Team conducted field survey on deterioration of the pier structures in Hanoi Port and Khuyen Luong Port, in order to obtain the information, which should be considered in the structural design of pier structures.

### 38.1.1 Natural design conditions

Following conditions are taken into consideration for preliminary design of both channel stabilization facilities and port-related facilities.

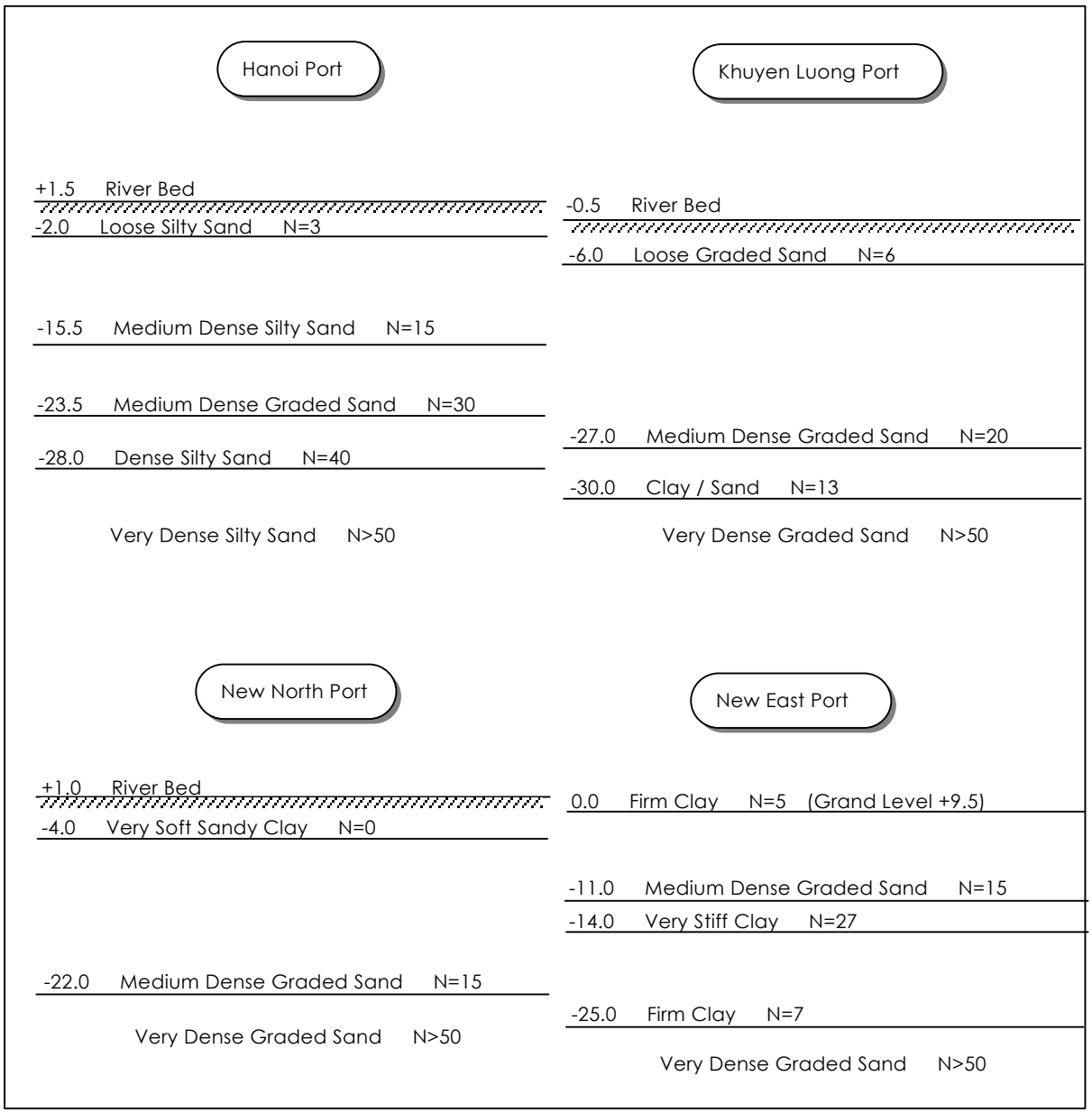
#### (1) Sub-soil conditions

Soil investigations including boring and laboratory tests have been curried out mainly in the existing ports and possible new port construction sites.

According to the result of the investigations, the sub-soil conditions in the Study Area can be described as follows:

- Judging from distribution of particle size of soils, two-layer stratum (Clay and Sand) is prevailing throughout the study area
- The result of laboratory tests of consolidation (pre-consolidation stress) indicate that clay layer can be judged that it has been normally consolidated, reaching more than 5 in N-value
- The bearing stratum for pile structures, which shall keep more than 30 in N-value, lies on the level of about LSD –20 to –30m

As shown in sub-soil structures, **Figure 38.1.1**, clay layer lies throughout the study area. Except a layer beneath riverbed in New North port, the states of clays are stiff or firm.




Source) JICA Study Team

**Figure 38.1.1 Investigated Sub-soil Structures in the Ports**

### (2) River water levels

For the purpose of the preliminary design of the facilities, three basic water levels are defined at each port as shown in **Table 38.1.1**.

All levels in the table have been set based on the records of last seven years (1995 to 2001) at Hanoi, Thuong Cat and Ben Ho observatories and the levels measured by the Study Team in the dry and rainy seasons in 2002.

**Table 38.1.1 Water Levels for the Design Purpose**

(Unit: meter above Land Survey Datum)

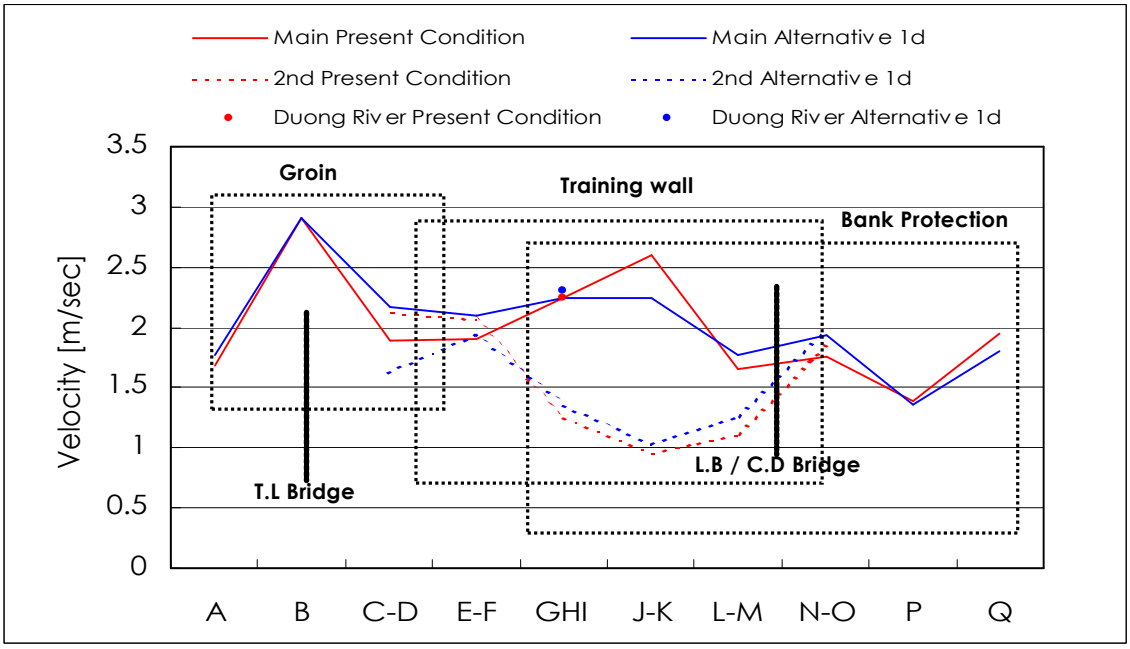
| Water Level | Hanoi | Khuyen Luong | N-North | N-East |
|---|---|---|---|---|
| Warning Water Level (III) | + 10.99 | + 10.59 | + 11.76 | + 10.50 |
| High Water Level (5%) | + 9.01 | + 8.61 | + 9.78 | + 8.50 |
| Low Water Level (95%) | + 1.93 | + 1.77 | + 3.19 | + 2.45 |

Source) JICA Study Team

### (3) River water current

Structures, which are planned to build in or along the river, must be strong enough against attacks of water current. Special attention is paid to rock and concrete block materials, which are placed in expectation of protective role from erosion.

Referring to the result of numerical simulations, curried out by the Study Team as shown in **Figure 38.1.2**, a possibility of the maximum current speed of 3.0m/sec (Water Level = L.S.D +12.5m) is considered in stability analysis of the above materials.




Source) JICA Study Team

**Figure 38.1.2 Simulated Current Velocity (Very High Flood)**

### 38.1.2 Channel stabilization facilities

Reflecting the result of numerical simulations, sectional design of channel stabilization facilities is made as described below.

**(1) Crest levels of groins**

Crest levels of rubble mound and concrete pile top are quite important to determine the effect of groins. To maintain the levels, their strength and stability should be strong enough against river water current.

As a result of numerical simulation, structural level of rubble mound and concrete pile top has been determined as LSD+3.0m to 4.0m and +9.0m, respectively. Details are described in **Chapter 26**.

**(2) Concrete piles of groins**

Neglecting the strength of unstable surface layer and rubble mound, concrete piles should be driven up to the required depth for its stability. The required driving lengths of piles (L) can be calculated by the following equation between L and characteristic value of piles ( $\beta$ ).

$$L = 3 / \beta$$

The tops of the piles should be connected with each other to increase their combined structural strength.

**(3) Steel sheet pile wall of training walls and bank protections**

Steel sheet pile wall is employed as the toe structure to prevent collapse of structures due to unexpected local scouring of riverbed. Driving depth (LSD-6.0m) and type of sheet pile (type III) are determined so that the wall can stand alone under the scouring condition up to LSD-1.0m in front of the walls.

Crest level of sheet piles is determined as LSD+4.0m to keep construction efficiency of cap-concrete casting. This level is about 0.5m higher than the mean water level in the dry season.

Following the Japanese Technical Standard, 2 mm of corrosion thickness are considered for both river and landside of the steel sheet piles.

The possibility of construction by concrete sheet pile was studied. However, the cost is about three times higher and construction efficiency is lower than that of steel sheet pile.

**(4) Slope of facilities**

Materials covering the slopes of facilities consist of two types; natural rock and pre-fabricated concrete plate. In general, natural stone is flexible for deformation (easy maintenance) and friendly for natural environment (habitats of aquatic creatures). On the other hand, concrete plate is rigid in deformation (periodical maintenance is necessary) and beautiful in appearance (easy to clean up).

Considering above characteristics of materials, slopes of groins and training walls are covered by natural stone, and slopes of bank protections are covered by concrete plate.

Regarding stability of natural rocks and concrete blocks placed on the slope, it should be evaluated on the relationship among their weight, size, angle of slope, and velocity of water current.

According to the result of ordinary calculation of their required weight and size on the slope of 1:2, a 30-cm long natural stone and a 50-cm square concrete block with 15-cm thick are stable enough under 3.0-m/sec water current.

**(5) Scour protection mat**

To protect channel stabilization facilities from scouring, scour protection mat and stone for counter weight of the mat are placed in front of the steel sheet pile wall.

The length of mat is determined so that the mat can protect the steel sheet piles from 4.0-m deep erosion with slope of 30 degree. According to the bathymetric map of dry season and rainy season surveyed by the Study Team, in fact, there is no natural riverbed steeper than 30 degree.

The material of scour protection mat can be textile mat with sand, plastic mat with steel net, bamboo mat with stone, or imbricate concrete block, etc. Taking account of cost, availability of local materials, and construction efficiency, textile mat with sand is the most practical and reasonable choice.

Their typical profiles are shown in **Figure 38.1.3,4 and 5**.

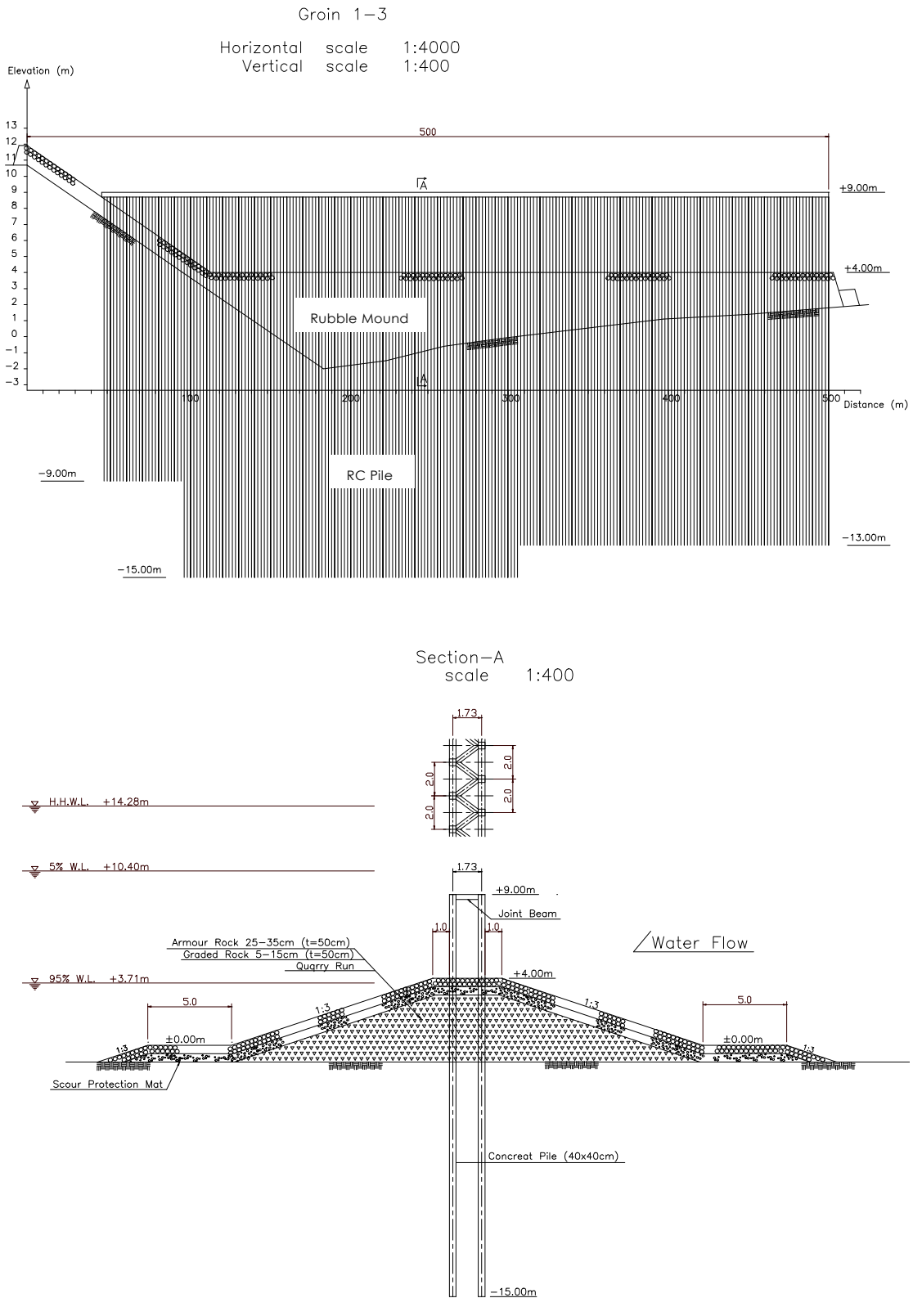



**Figure 38.1.3 Typical Profiles of Groins (Groin-1)**

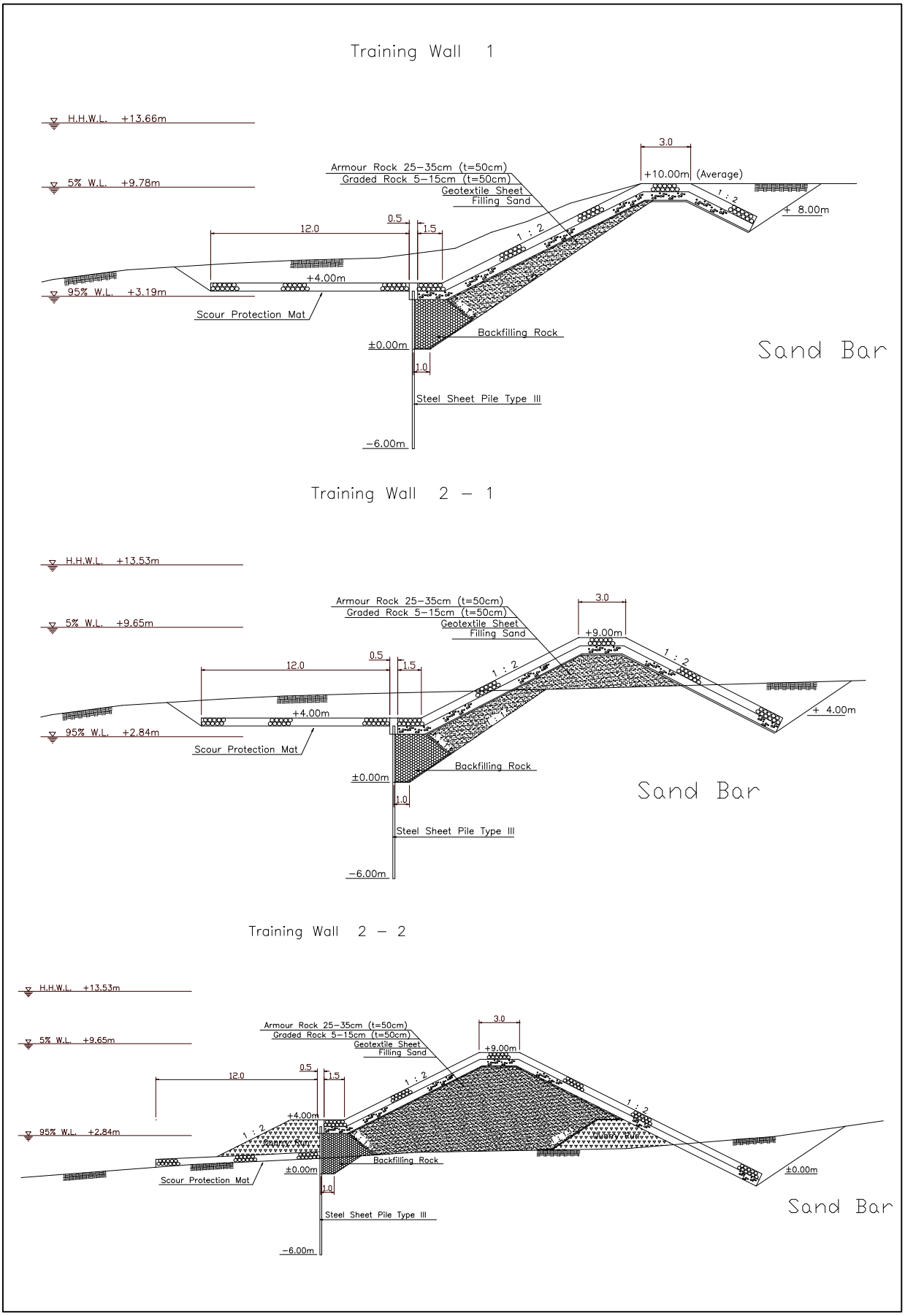



**Figure 38.1.4 Typical Profiles of Training Walls (Training Wall-1 and 2)**

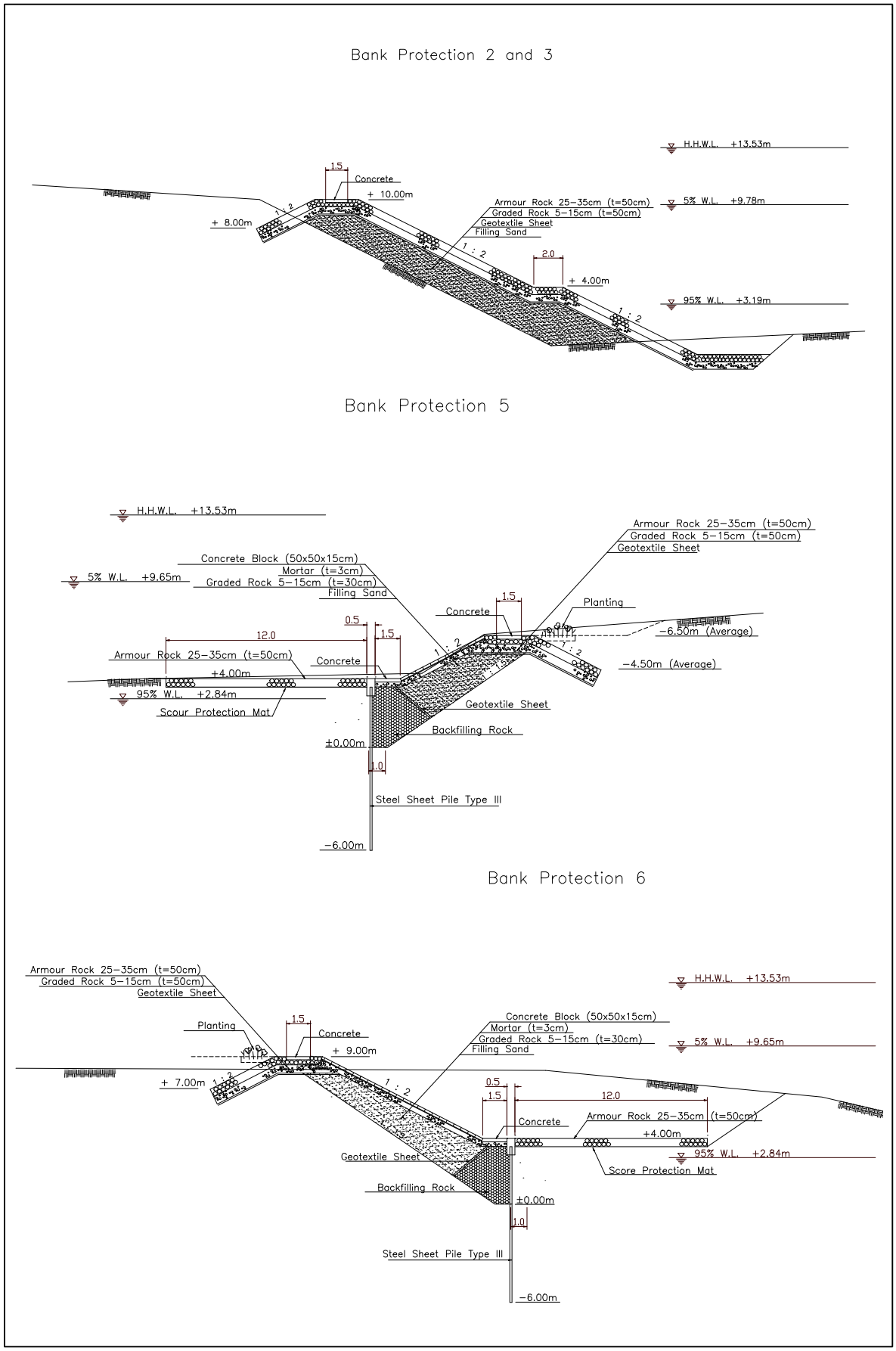



**Figure 38.1.5 (1) Typical Profiles of Bank Protections (Bank Protection 2,3,5,6)**

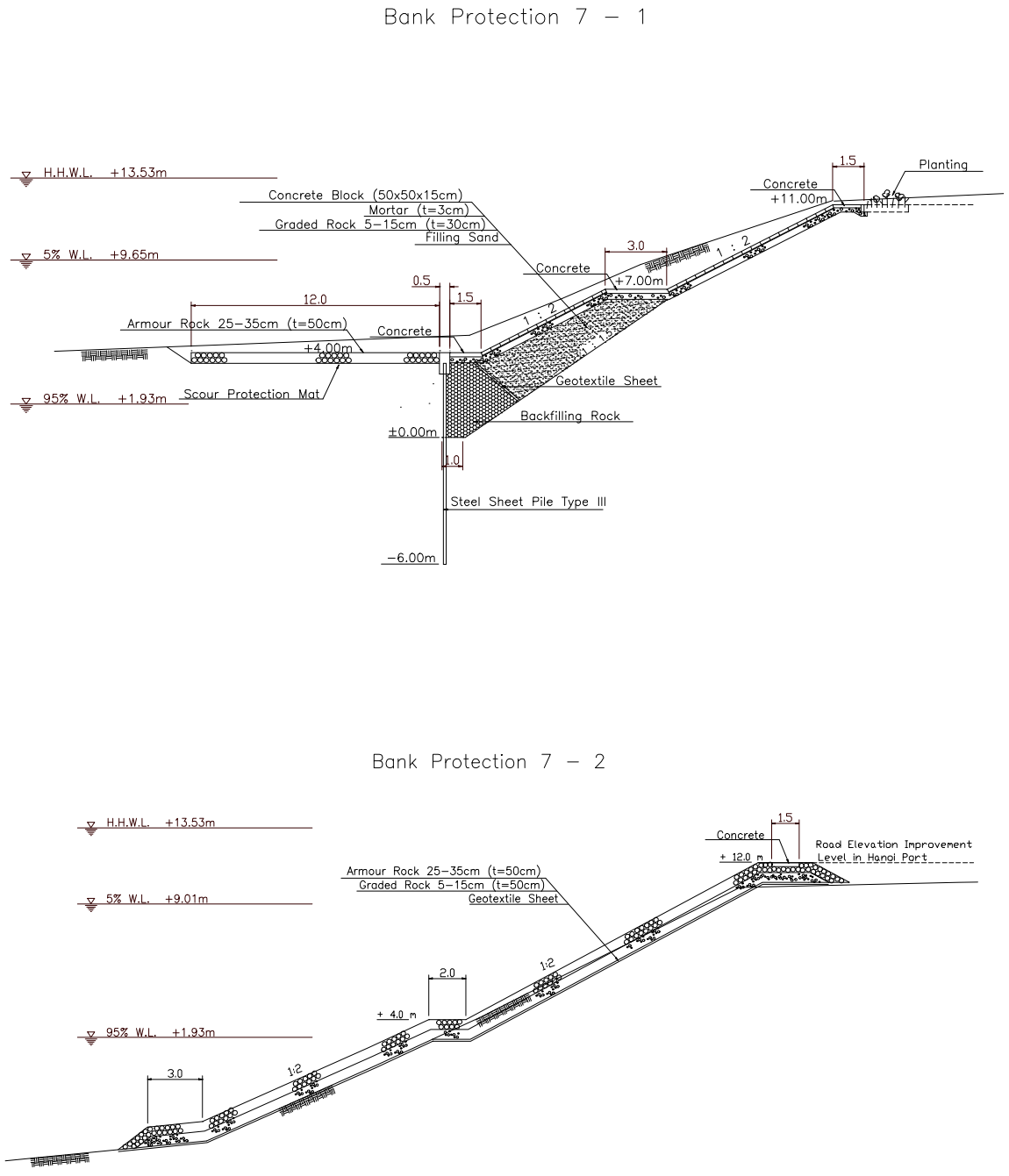



**Figure 38.1.5 (2) Typical Profiles of Bank Protections (Bank Protection 7)**