TECHNICAL STANDARDS
IN
SEA DIKE DESIGN

Hanoi, March 2010

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1. GENERAL STIPULATIONS

1.1. This guideline is applied to designing new sea dikes, rehabilitating and upgrading various types of sea dikes and other concerned structures, such as:

- Dikes protecting populated areas, coastal economic areas (aquaculture, salt fields, tourism etc.)

- Dikes encroaching into the sea for the purpose of land reclamation;

- Retaining dikes for island protection;

- Estuarine dikes under impacts of tides and waves from the sea;

- Dikes built for others purposes;

1.2. General bases and principles of sea dike design

- Master plans for socio-economic development and natural disaster prevention and response in the area;

- Conforming with the investment project setup stages as per current stipulations;

- Active loads are calculated as per current stipulations in Hydraulic works design.

- The elevation system and coordinate system used in sea dike design is the National Elevation System.

- Combination of structural and non-structural solutions;

- Applying other concerned Codes and Technical standards;

- Applying new achievements of science and technology which are suitable for the conditions in Vietnam;

- Appropriate design solutions to the scenarios of climate change impacts on Vietnam must be applied.

2. DATA REQUIRED IN SEA DIKE DESIGN

2.1 Topographic data

- Components and amount of topographic survey for sea dike design are stipulated in Technical Code 14 TCN 165-2006[1] ;

- In addition, the following requirements should also be satisfied:

+ Upon collecting existing data, the measuring time must be less than 5 years in case of stable foreshores, and less than 1 year for the foreshores being accreted or eroded;

+ Topographic surveys must be extended at least 100m from the dike toe to both sides of the design dike route, and up to 200m in case of variable topography;

[1] Applying National Technical Code when 14TCN Code is converted correspondingly

+ For frequently eroded coastlines, the historical data on the coastline evolution for at least 20 years up to the timing of project setup need to be collected;

+ In case of largely-distributed soft soil areas (swamp, for example), the aerial measurement method can be applied in order to obtain the topographic and geomorphic data.

2.2 Geological data

- Components and amount of geological surveys for sea dike design are stipulated in Technical Code 14 TCN 195-2006[1] for the project setup stage and hydraulic works design.

- During the preparation of bidding documents and performing the consulting activities, the determination of detailed geological survey components and amount must be based on the actual conditions and the content of above-mentioned Technical Code, and they must be submitted to the competent authorities for approval.

2.3 Meteorological, hydrological and oceanographical data

- Collecting data on the impacts of typhoons and natural disasters in the territorial waters within the project area;

- Forecast of natural disasters;

- Data on tides, nearshore currents, sediment transport, wave setup, waves, flood current (including collected data and newly-measured data);

2.4 Resident livelihood, economic and environmental data

- Collecting data on existing population and development trend, current economic condition and development orientation, environmental condition and evaluation of impact level in the future.

- Requirements and urgency of the structure construction.

3. SAFETY STANDARD DETERMINATION AND SEA DIKE GRADE CLASSIFICATION

3.1 Determination of safety standards

Safety standard is determined on the basis of calculation results of optimum problem taking the degree of economic risk, the probability of human loss in the protected area and the investment capability into consideration. The safety standard is represented by the frequency of return period (in years), given in Table 3.1.

Table 3.1 *Safety standards*

Characteristics of protected area	Safety standards (return period: years)
Developed industrial urban area: - Protected area > 100.000 ha - Population > 200.000 people	150
Rural areas having developed industry and agriculture: - Protected area : 50.000 ÷ 100.000 ha - Population: 100.000 ÷ 200.000 people	100
Developed rural and agricultural area - Protected area :10.000 -50.000 ha - Population: 50.000 – 100.000 people	50
Medium-developed rural and agricultural area - Protected area : 5.000 – 10.000 ha - Population: 10.000 – 50.000 people	30
Under-developed rural and agricultural area - Protected area : < 5.000 ha - Population : < 10.000 people	10 < SS < 30

Notes:

- Developed industrial and agricultural areas are determined on the basis of the percentage of economic structure in the protected area. If the industrial rate is greater, then it is a developed industrial area and vice versa.

- Upon using Table 3.1, firstly the protected areas must be classified using the given criteria. Then the two criteria are considered in order to determine the safety standard. In case the protected area meet only one criterion, the level is lowered by one. The spatial planning must take the planning for socio-economic development up to 2020 and vision for 2050 into consideration.

3.2 Determination of sea dike grade

- Sea dikes are classified into 5 grades: grade I, grade II, grade III, grade IV and grade V;

- The dike grade depends on the safety standard of the protected area, given in Table 3.2.

Table 3.2 *Criteria for dike classification*

Dike grade	I	II	III	IV	V
SS (return period: year)	150	100	50	30	10 < SS < 30

Note: If the dike route plays an important role concerning security, national defence or is located in an area with specific social characteristics, the dike grade can be increased by one. In case the protected area is a new one formed by the dike built for land reclamation, the dike grade is classified on the basis of the purposes and the stages of operation.

4. DESIGN OF DIKE ROUTE

4.1 General requirements

Sea dike route is selected on the basis of economic-technical comparison of different schemes after considering the following aspects:

- Conforming to the master plan for development of the entire area;

- Topographic and geologic conditions;

- Evolution of the coastlines, beaches and estuaries;

- Location of the existing structures and the structures built as per planning;

- Safety and advantages in sea dike construction, management and operation, and the facilitation of preserving and planting mangrove forests in front of the dike;

- Protection of the cultural, historical remains and administrative land boundaries;

- Conforming to maritime navigation development strategy;

- Conforming to adaptable solutions to the impacts of climate change;

4.2 Requirements of sea dike route location

- Running through the areas of high topography and passable geological conditions of the foundation.

- Smooth and stable connection with existing structures. Pay special attention to the route of border sea-encroaching dike;

- Running through the areas which are favourable for the arrangement of auxiliary structures;

- Less impacts on the flood discharging and river training structures (for estuarine dikes);

- Meeting the requirements of sea ports and lands behind the dike, beaches, tourism areas, historical remains and beauty spots;

- In case the dike route is combined with the transportation system, national security and defence, it must also conform to the other corresponding regulations;

- Making the maximum use of the natural sand dunes, hills, existing structures in order to close the dike route with stable connection;

- Making a comparison of the economic-technical efficiencies among 2-3 locations of dike route in order to select the one which shows the best total efficiency;

- In case of important dike routes, hydraulic model tests need to be conducted.

4.3 Requirement of sea dike route shape

- Dike routes should be designed as straight lines or smooth curves without many zigzags which can cause local concentration of wave energy. Also, the orientation of the design dike routes should be favourable, avoiding the perpendicular direction to the prevailing wind direction. The construction volume and the capital cost should be compared in order to select the most appropriate dike route;

- In case the dike route must be in concave shape, appropriate solutions to wave attenuation or dike resistance strengthening need to be adopted;

- No weak chain link created at the connection with other nearby structures and no impacts on relevant areas;

- In case of rehabilitated and upgraded sea dikes, the aforementioned requirements must be considered in order to adjust locally necessary sections.

4.4 Design of route for each type of sea dike

4.4.1 Design of border dike route for new land reclamation

4.4.1.1. General requirements

- Design dike routes must conform with the planning for irrigation channel system, enclosure dike system and drainage sluices in the protected areas, transportation system serving the construction as well as the permanent operation;

- Border dike route must be determined on the basis of the study on accretion mechanism and other influence factors, such as: hydrodynamic conditions at the connection zone, waves, nearshore sediment flow, imbalance of sand transport in nearby areas, forecast of development trend of the foreshore in the future;

- Border dike route must be convenient for construction, especially in case of dike closure, drainage, new land reclamation, soil improvement (leaching and desalinization), plant structure, operation procedure and environment conservation.

4.4.1.2. Foreshore elevation for land reclamation

Alternatives for the elevation of dike built for land reclamation need to be compared and selected on the economical-technical basis in the following cases:

- The design dike is constructed on the foreshore located above mean sea level. In Northern delta, the foreshore level is from +0,5m to +1,0m with reference to mainland coordinate system (as per 14TCN102-2002)

- The design dike can also be built on lower-elevation foreshores, adopting appropriate technical approaches in order to speed up the accretion process for the

coastal areas behind the dike after the land reclamation has satisfied the operation requirements.

4.4.1.3. Secondary dike routes for zone division

It is necessary to build the secondary dike routes behind the main one, which separates the entire area behind into different zones and sections depending on natural conditions and service requirements.

4.4.2 Dike route at the eroded coasts (ingression)

4.4.2.1 General requirements

- At the eroded coastal areas, the dike route is usually damaged due to the direct impacts of waves on the dike body, failure of outer slope and dike toe. In this case, the evolution of the coastline, mechanism and causes of the coastal erosion and other influence factors need to be studied thoroughly in order to decide the appropriate alternative;

- Consideration of dike route must be related to the solutions for erosion restraining, accretion facilitating and foreshore stabilizing;

When there are no effective solutions to the ingression restraining, the dike route must have appropriate scale and location. Apart from the main dike, the secondary dike route can be built in combination with non-structural approaches in order to minimize the damage in case the main dike route has been destroyed.

4.4.2.2 Main dike route

As per Article 4.1 and 4.2, the following criteria must be taken into consideration in order to locate the route of main dike at the eroded areas:

- The dike route is located behind the first breaker line (at a distance of one design wave length);

- Parallel to the waterline at low tide;

4.4.2.3 Secondary dike route

- Secondary dike is usually located behind the main dike. The distance between them is at least 2 times of the design wave length.

- Enclosure dikes should be arranged between the main dike and secondary dike, with a distance of 3-4 times of the distance between the two dikes.

- Upon designing the enclosure dikes, traffic and rescue requirements must be taken into consideration.

4.4.3. Estuarine dike routes

- Estuarine dike is the connection between river dike and sea dike, under the overall impact of river and marine factors;

- Estuarine dike route must ensure the flood discharging and safety under the impacts of the river and sea;

- For deltaic estuaries with many branches, analysis of the evolution of each branch must be performed in order to obtain the most favourable dike route planning for flood discharging;

- For funnel-shaped estuaries, the curve shape of dike route need to be restrained (by means of calculation or empirical data) in order to control the increase of wave height due to the amplification factor without endangering the river banks.

The boundaries between the river dikes and sea dikes for the rivers in North deltas is given in Table 4.1.

Table 4.1. *Boundary locations between river dikes and sea dikes*

No.	Name of estuaries	Right bank		Left bank	
		Longitude	Latitude	Longitude	Latitude
01	Sông Đáy	$106^0$15’62’’	$20^0$18’89’’	$106^0$16’79’’	$20^0$19’92’’
02	Ninh Cơ	$106^0$21’95’’	$20^0$20’60’’	$106^0$22’49’’	$20^0$22’26’’
03	Ba Lạt	$106^0$41’28’’	$20^0$31’28’’	$106^0$42’69’’	$20^0$32’83’’
04	Trà Lý	$106^0$47’23’’	$20^0$47’05’’	$106^0$47’98’’	$20^0$46’94’’
05	Sông Hóa	$106^0$48’97’’	$20^0$60’65’’	$106^0$48’62’’	$20^0$61’15’’
06	Thái Bình	$106^0$51’07’’	$20^0$70’70’’	$106^0$52’44’’	$20^0$70’40’’
07	Văn Úc	$106^0$54’76’’	$20^0$75’64’’	$106^0$55’47’’	$20^0$76’10’’
08	Lạch Tray	$106^0$57’76’’	$20^0$84’66’’	$106^0$58’28’’	$20^0$85’18’’
09	Sông Cấm	$106^0$59’62’’	$20^0$93’50’’	$106^0$60’27’’	$20^0$64’33’’

5. DESIGN OF SEA DIKE CROSS SECTION AND STRUCTURE

5.1 Design of sea dike cross section performed for each segment

Corresponding design cross sections of the dike and other concerned structures at each segment are selected on the basis of foundation geological conditions, filling material, external force, lay-out condition and operation requirements.

5.2 Types of sea dike cross section

Based on the geometrical characteristics of outer dike slope, the dike cross sections are classified into 3 types**:** sloping dikes, vertical wall-typed dikes and composite dikes (upper slope and lower vertical wall or upper vertical wall and lower slope). Selection of a cross section must be based on the topographical, geologic, hydrological and oceanographic conditions, as well as construction material, construction conditions and operation requirements in order to analyse and decide.

Some types of sea dike cross sections which can be selected are as follows:

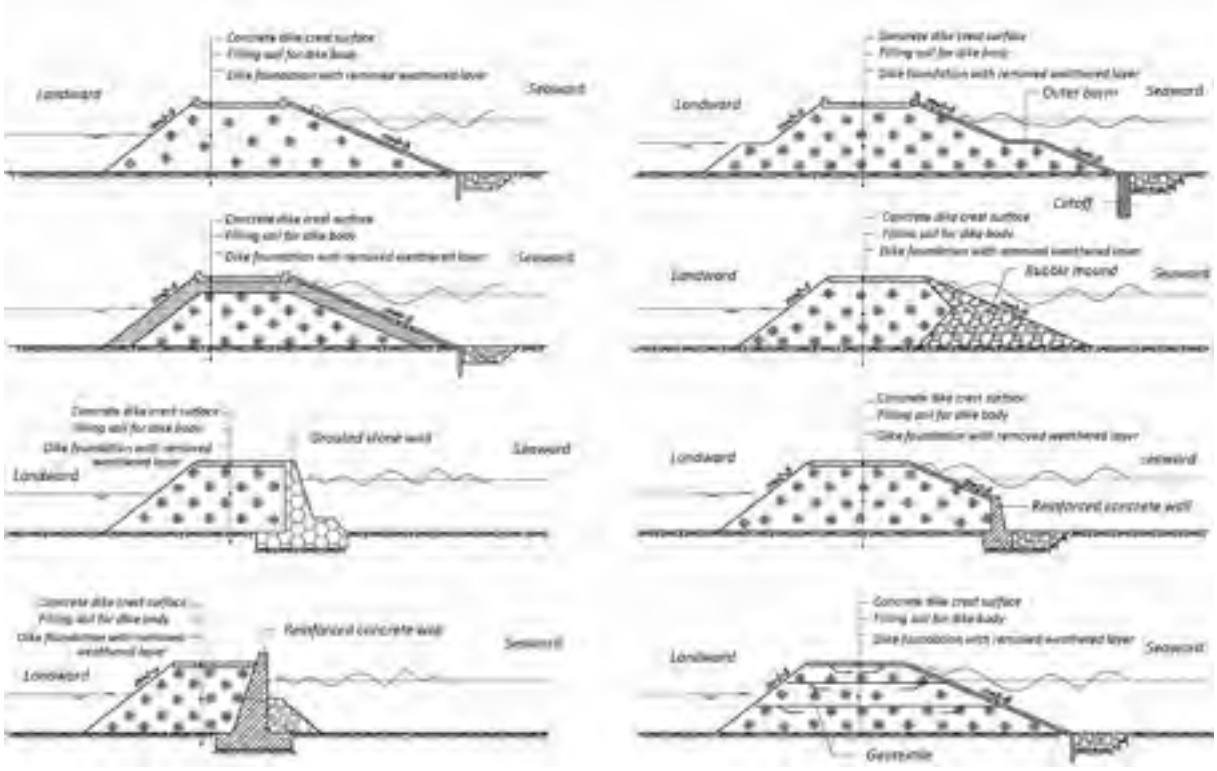


Figure 5.1. *Types of sea dike cross sections and material arrangement alternatives*

- *Sloping homogeneous earth dikes:* Sloping dikes usually have trapezoid shape with the common outer slope coefficient in the order of 3.0÷5.0 and inner slope coefficient in the order of 2.0÷3.0. Dike body is filled up with earth. Homogeneous earth dike structure is applicable at the area with sufficient filling soil reserve for the construction. In case low-elevation dikes (dike height is less than 2m) the shape of dike cross section can be applied as shown in Figure 5.1.a. In case of adverse geologic conditions, great dike height and strong impacts of waves, the inner berm as well as the seaward wave-damping berm can be introduced as shown in Figure 5.1.b;

- *Sloping dikes with mixed material:* Mixed material can be used for the embankment with the following rules: the soil with high permeability is palced inside the dike body, surrounded by the soil with low permeability as shown in Figure 5.1.c or the riprap is laid on seaward slope in order to protect the dike against the wave impacts and the filling soil is placed on the inner slope as shown in Figure 5.1.d;

- *Combined vertical wall-typed and sloping dike:* If the dike routes are built for the purpose of flood protection at high tide in combination with ships and boats anchoring, transportation of goods. For such cases, a traffic road is required at landward side. Riprap wall in combination with earthen dike body can be applied as shown in Figure 5.1.e; concrete wall and earthen dike body as shown in Figure 5.1.f or mixed types of earthen dike body, reinforced concrete wall and un-graded riprap wall footing as shown in Figure 5.1.g.

- *Sloping dikes reinforced by geotextile:* In case the foundation base for the embankment is soft soil (with small cohesive force and internal friction angle, low permeability coefficient), the geotextile can be used as reinforced skeleton of the dike body, as shown in Figure 5.1.h.

5.3. Items of sea dike cross section design

Items of sea dike cross section design include: crest level, cross section dimensions, crest structure, dike body and dike toe, which satisfy technical and economic requirements.

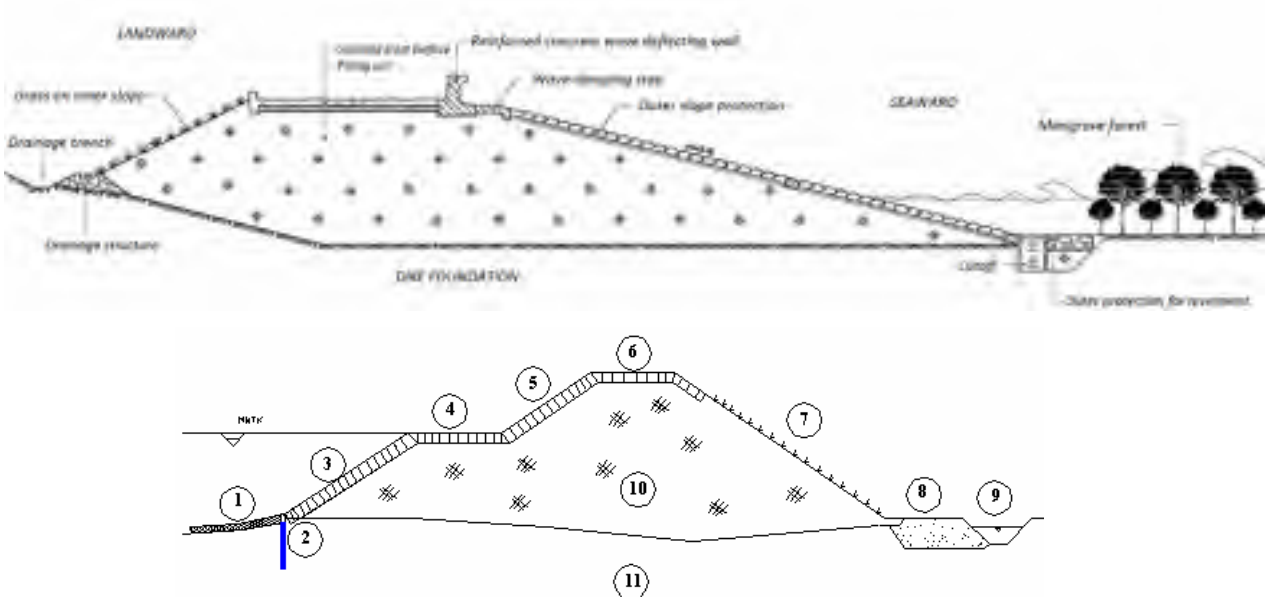


Figure 5.2 *Diagram of a sea dike cross section*

General cross section of a dike consists of: (1) Outer embankment footing protection, (2) Embankment footing, (3) Lower outer slope, (4) Outer dike berm, (5) Upper outer slope, (6) Dike crest, (7) Inner slope, (8) Landward drainage facilities, (9) Inner drainage channel, (10) Dike body, (11) Dike foundation and (12) Transition parts between the dike elements.

Design Items:

1. Design of dike crest level;
2. Design of dike body;
3. Design of filter layers;
4. Design of slope protection layers;
5. Design of toe protection;
6. Design of dike crest;
7. Design of crown wall (if applicable);
8. Design of transition structures;
9. Stability calculation.

5.4. Determination of dike crest level

5.4.1 In case of non-overtopping waves

$$Z_{đp} = Z_{tk} + R_{up} + a \qquad (5.1)$$

Where:

$Z_{đp}$ - Design crest level (m);

Z_{tk} - Design water level, which is the sea water level corresponding to the design frequency (combination of tidal water level frequency and storm surge frequency), determined as per section 5.4.1.1;

R_{slp} - Crest freeboard above design water level, calculated with design wave run-up (m), determined as per section 5.4.1.2;

a - Safety height increment, determined as per section 5.4.1.3;

5.4.1.1 Design water level is already available at the locations along the coast (represented by frequency curves), given in Appendix A.

Notes:

- If there is no available data for the design location, the method of interpolation between the two adjacent locations can be adopted;

- In a segment of design dike route, if many water levels are determined, the highest water level is used for the design;

5.4.1.2 Crest freeboard of dike crest above the design water level is calculated with design wave runup as follows:

$$R_{up} / H_{m0p} = 1,75 \gamma_\beta \gamma_b \gamma_f \xi_0 \quad \text{for} \quad 0,5 < \gamma_b \xi_0 < 1.8 \qquad (5.2)$$

$$R_{up} / H_{m0p} = \gamma_\beta \ \gamma_f (4,3 - \frac{1,6}{\sqrt{\xi_0}}) \quad \text{for} \quad 1,8 < \gamma_b \xi_0 < 8 \div 10 \qquad (5.3)$$

where,

H_{m0p} - Design wave height at the dike toe ($H_{m0p} = H_{sp}$) (m);

H_{sp} - Wave height corresponding to the design frequency;

ξ_0 - Surf similarity index (or breaker parameter);

γ_β - Reduction factor for oblique incident wave;

γ_f - Reduction factor for the slop roughness;

γ_b - Reduction factor for berms;

Above-mentioned factors are determined as follows:

- H_{sp} is determined as per Appendix C or calculated by the empirical formula $H_{sp} = (0.50 \div 0.65)h$, where h is the depth in front of the dike toe:

+ If the difference is greater than 0.5m, field investigation must be conducted for adjustment;

+ If the difference is less than or equal 0.5m, the wave height is the value determined as per Appendix C.

- ξ_0 is calculated by the following formula: $$\xi_0 = \frac{\tan\alpha}{\sqrt{s_0}} \quad (5.4)$$

where α - angle between the dike slope and horizontal line. In case the dike slope has two different angles, an equivalent angle can be calculated as follows:

$$\tan\alpha = \frac{1,5H_{m0p} + R_{up}}{L - B} \quad (5.5)$$

where, L, B - the lengths, determined as per Figure 5.3.

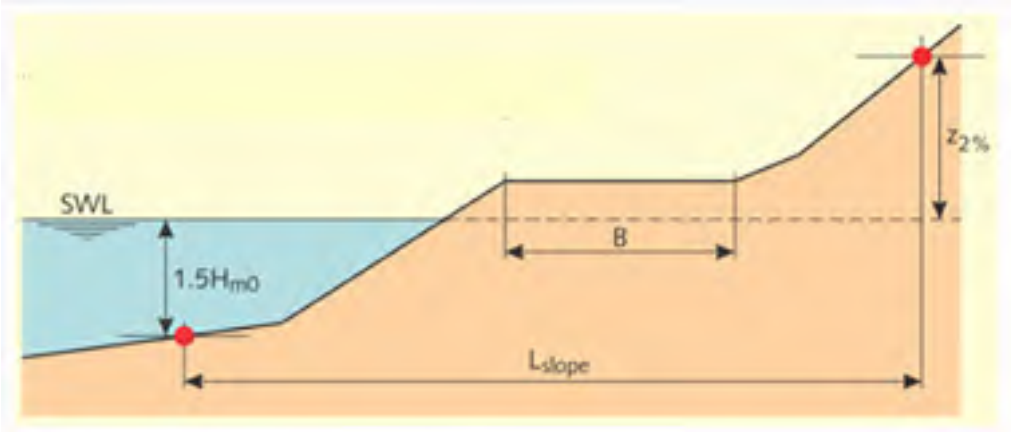


Figure 5.3. *Equivalent slope angle for the calculation of wave setup*

(Courtesy of TAW, 2002: Technical Report – Wave Run-up and Wave Overtopping at Dikes)

s_0 - wave steepness, calculated by the following formula:

$$s_0 = \frac{2\pi H_{m0p}}{g.T_{m-1,0}^2} \quad (5.6)$$

$T_{m-1.0}$ - spectral wave period, calculated by the following formula:

$T_{m-1.0} = T_p/\alpha$, with $\alpha = 1.10 \sim 1.20$

in which T_p - peak wave period;

- γ_β is determined as follows:

$\gamma_\beta = 1 - 0.0022*|\beta|$ $(0^0 \le |\beta| \le 80^0)$

$\gamma_\beta = 1 - 0.0022* 80$ $(|\beta| > 80^0)$

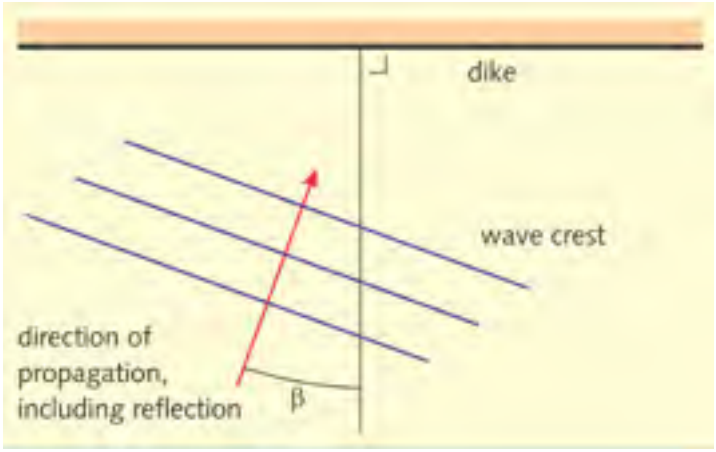


Figure 5.4. *Defining the incoming wave angle corresponding to the coastline orientation.*

(Courtesy of TAW, 2002: Technical Report – Wave Run-up and Wave Overtopping at Dikes)

- γ_b is calculated by the following formula:

$$\gamma_b = 1 - \frac{B}{L_b}\left(0,5 + 0,5.\cos\left(\pi \frac{d_h}{x}\right)\right) \qquad (5.7)$$

with $0,6 \le \gamma_b \le 1,0$

where, B, L_b, d_h are determined as per Figure 5.5.

x is defined as follows:

$x = R_{up}$ if $R_{up} > d_h > 0$ (berm is above SWL)

$x = 2.H_{m0p}$ if $2.H_{m0p} > d_h \ge 0$ (berm is below SWL)

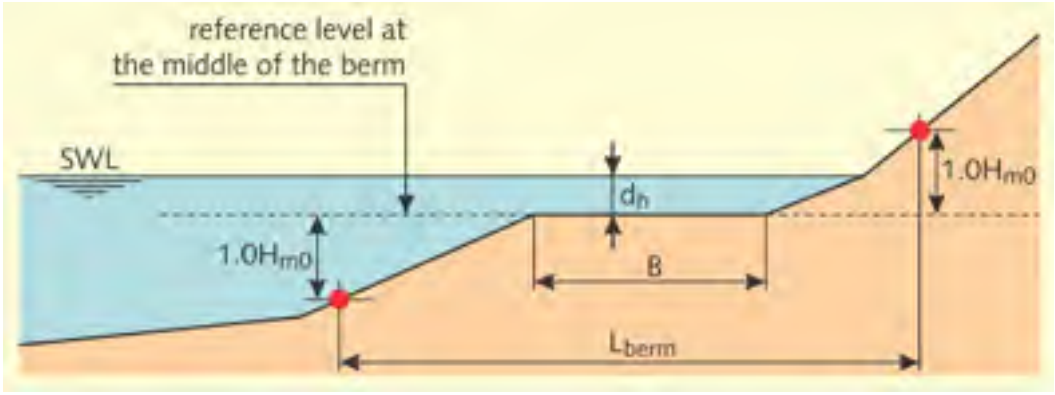


Figure 5.5. *Parameters for defining the dike berm*

(Courtesy of TAW, 2002: Technical Report – Wave Run-up and Wave Overtopping at Dikes)

The optimal berm width is $B_{opt} = 0.4.L_b$. If the berm is laid at SWL, the wave run-up dampening effect is maximum, corresponding to $\gamma_b = 0.60$.

R_{sl} is determined as per **Appendix B.**

- γ_f is determined as per Table 5.1.

Table 5.1. *Influence factor for roughness elements on slope*

Revetment armouring elements	Factor γ_f
Concrete asphalt tar, concrete, plain concrete element, grass, sand-asphalt	1.00
Cross-linking concrete element, grass-covered element	0.95
Special elements: Basalt, Basalton, Hydroblock, Haringman, Fixstone, Armorflex array	0.90
¼ of block revetment 10cm higher	0.90
Lessinische and Vilvoordse, low-roughness elements	0.85
Small wave-dampening blocks over 1/25 of revetment surface	0.85
Tsc element (Vietnam)	0.85
Dry masonary, patterned mortar-filled grouted stone	0.85
Penetrated asphalt riprap revement	0.80
Small wave-dampening blocks over 1/9 of revetment surface	0.80
Armour rock - single layer	0.70
Armour rock - two layers thick	0.55

5.4.1.3. Safety height increment, determined as per Table 5.2

Table 5.2 *Safety height increment (a)*

Structure grade	I	II	III	IV	V
Safety height increment (a)	0,5	0,4	0,4	0,3	0,3

Notes: Above-mentioned safety height increment excludes the provision height for settlement and the sea level rise due to the impacts of climate change.

The following notice must be taken when defining the dike crest level:

- In the same dike route with different dike crest level at different segments, the highest level must be chosen as design level for the entire route.

- In case the strong and stable crown wall is built on seaward side, the dike crest level is the level of the crown wall.

- In case the crown wall is not laid on the dike crest, the road safety beads must be laid on both edges of the dike crest. The road safety beads is 0.2 – 0.3m high, can be interruptedly laid with the length of each segment is 0.5 – 1.0m.

- Apart from the computation as per Formula (5.1), the provision height for permanent settlement of the foundation base, settlement of the dike body and the settlement during the construction must be taken into consideration in the design of dike crest level.

5.4.2 In case of wave overtopping over the dike crest.

- Design cases allowing wave overtopping over the dike crest

+ Wave overtopping over the dike crest is only allowed in the design in the area of protecting dikes where the overtopping is allowed, without causing much damage, with the appropriate plans for water storage and drainage.

+ The design of dikes allowing wave overtopping over the dike crest must be based on the overtopping discharge defined as per Table 5.3 in order to decide the appropriate plan in terms of inner slope protection, water storage and drainage.

- Overtopping discharge can be calculated by the following formulae:

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0,67}{\sqrt{\tan\alpha}}\gamma_b\xi_0.\exp\left(-4,3\frac{R_{cp}}{H_{m0}}\frac{1}{\xi_0\gamma_b\gamma_f\gamma_\beta\gamma_v}\right) \quad \text{if} \quad \gamma_b\xi_0 \le 2 \qquad (5.8)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} = 0,2.\exp\left(-2,3\frac{R_{cp}}{H_{m0}}\frac{1}{\gamma_f\gamma_\beta}\right) \quad \text{if} \quad 2 < \gamma_b\xi_0 < 7 \qquad (5.9)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} = 0,21.\exp\left(-\frac{R_{cp}}{\gamma_f\gamma_\beta H_{m0}\left(0,33+0,022.\xi_0\right)}\right) \quad \text{if} \quad \xi_0 > 7 \qquad (5.10)$$

where,

q - unit overtopping discharge (l/s/m);

R_{cp} - crest freeboard above the design water level computed with wave overtopping (m); determined by the method of iteration through the values of q and R_{cp};

γ_v - Reduction factor for crown wall; determined in Step 2.

- Only the crown wall of sloping dikes with relatively low height is considered here (the crown wall height ≤ 20% of dike height)

<u>Step 1</u>: Determining the equivalent sloping angle in case of crown wall

Determined as per Formula (5.5), in which the crown wall is replaced with a dike slope of 1:1.0 (see Figure 5.6).

<u>Step 2</u>: Determining the wave overtopping reduction factor for vertical wall (γ_v)

- Reduction factor for a crown wall is applied in the following conditions;

+ Inclination of the equivalent dike slope (from the toe of crown wall to the $1.5H_{m0}$ boundary below the design water level) is in the range 1:2.5 to 1:3.5;

+ Total width of the beam does not exceed $3H_{m0}$;

+ Toe of the crown wall is located in the range of $\pm 1.2H_{m0}$ with reference to the design water level;

+ Height of crown wall is from $0.5H_{m0}$ to $3H_{m0}$.

- Determination of wave overtopping reduction factor for vertical wall γ_v

+ If the crown wall is vertical (the sloping angle of wall surface is $\alpha_w = 90^o$) then $\gamma_v = 0,65$;

+ If the crown wall has a sloping angle of 1:1.0 ($\alpha_w = 45^o$), then $\gamma_v = 1.0$;

+ If the crown wall has a sloping angle $\alpha_w = 45^o - 90^o$, γ_v can then be calculated by the following formula: $\gamma_v = 1,35 - 0,0078.\alpha_w$

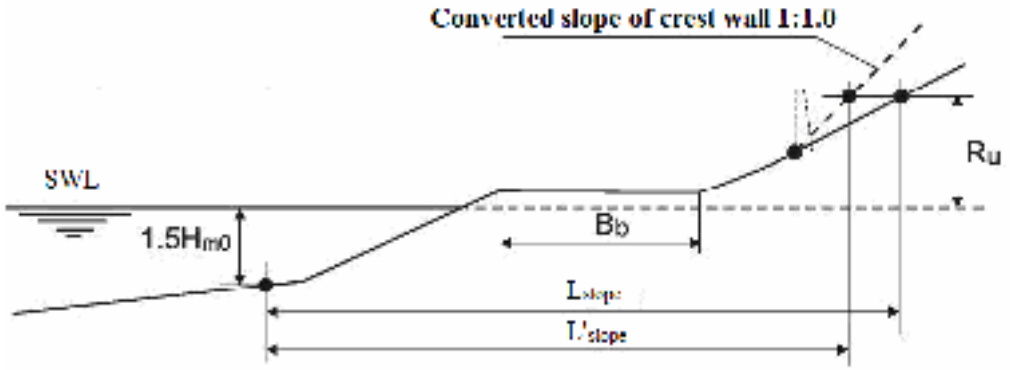


Figure 5.6. *Defining the converted dike slope in case of crown wall*

+ In case the crown wall is combined with the wave-deflecting nose (see Figure 5.7), the reduction factor is determined as follows (used for the wave-deflecting nose on low-elevation crown wall):

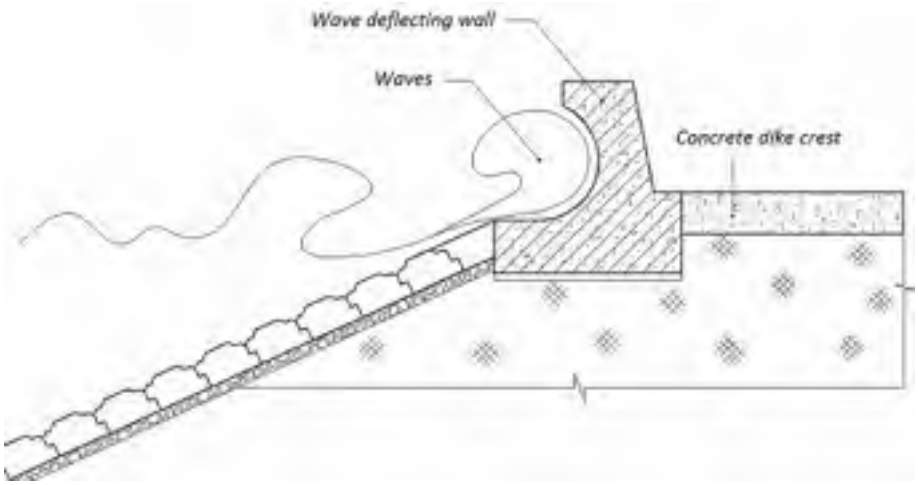


Figure 5.7. *Wave deflecting nose of the crown wall*

When the roughness of dike slope is considerable ($\gamma_f < 0.90$)

$$\gamma_f^* = \gamma_f - 0.05 \quad \text{if } R_{c_p}/H_{w0,d} \geq 0.5$$
$$\gamma_f^* = \gamma_f \quad \text{if } R_{c_p}/H_{w0,d} < 0.5$$

When the dike slope is smooth ($\gamma_f > 0.90$)

$$\gamma_f^* = \gamma_f \quad 0.3 \quad \text{if } R_{c_p}/H_{w0,d} > 1.0$$
$$\gamma_f^* \quad \gamma_f \quad \text{if } R_{c_p}/H_{w0,d} < 0.5$$
$$\gamma_f^* = \gamma_f - 0.6(R_{c_p}/H_{w0,d} - 0.5) \quad \text{if } 0.5 \leq R_{c_p}/H_{w0,d} \leq 1.0$$

<u>Step 3</u>: Selecting the unit overtopping discharge (q)

The unit overtopping discharge (q) is determined on the basis of the protection quality of the dike crest and inner slope as well as the landward submerged areas (see Table 5.3 and Figure 5.8).

Table 5.3. *Criteria for wave overtopping*

Quality of the inner slope	Allowable average overtopping discharge q (l/s/m)
Undefined quality, non-protected slope	< 0.1
Well-grown grass on clay base layer slope	< 1.0 - 10.0
Reinforced slope	< 50.0 - 200.0

<u>Step 4</u>: Calculating the reduction factor for oblique incident waves (γ_β).

The reduction factor for oblique incident waves (γ_β) is calculated by the following formulae:

$$\gamma_\beta = 1 - 0,0033|\beta| \qquad (0^0 \le |\beta| \le 80^0)$$

$$\gamma_\beta = 1 - 0,0033.80 \qquad (|\beta| > 80^0)$$

- If $80^0 < |\beta| \le 110^0$: $H_{m0} = H_{m0} \times \frac{110 - |\beta|}{30}$

$$T_{m-1,0} = T_{m-1,0} \times \sqrt{\frac{110 - |\beta|}{30}}$$

- If $110^0 < |\beta| \le 180^0$ then $H_{m0} = 0$ and the wave run-up $z_{2\%} = 0$ and wave overtopping discharge q =0;

- The other parameters can be determined in the same way as used in the calculation of wave run-up.

Step 5: **Computation procedure for wave overtopping**

- Determine allowable overtopping discharge q_{tc} (as per Table 5.3);
- Assume R_{cp};
- Calculate $tan\alpha$ and reduction factors γ; ;
- Calculate q using the given formulae (5.8), (5.9), (5.10). If the difference between the two successive computation is less than ± 5% then the iteration process can be stopped.

- Determining the dike crest level

$$Z_đ = Z_{tk} + R_{cp} + a \qquad (5.11)$$

Where the design water level (Z_{tk}) and the safety height increment (a) are determined in the same way as per formula (5.1).

+ For the dikes which must satisfy the requirements of major flood discharging from the inland into the sea, the dike crest level is determined as follows:

$$Z_đ = Z_{tk} + a \qquad (5.12)$$

+ The design dike must ensure the overtopping discharge on both sides, and appropriate solutions for the reinforcement and protection of the dike (crest, slope, body, toe, etc..) must be adopted.

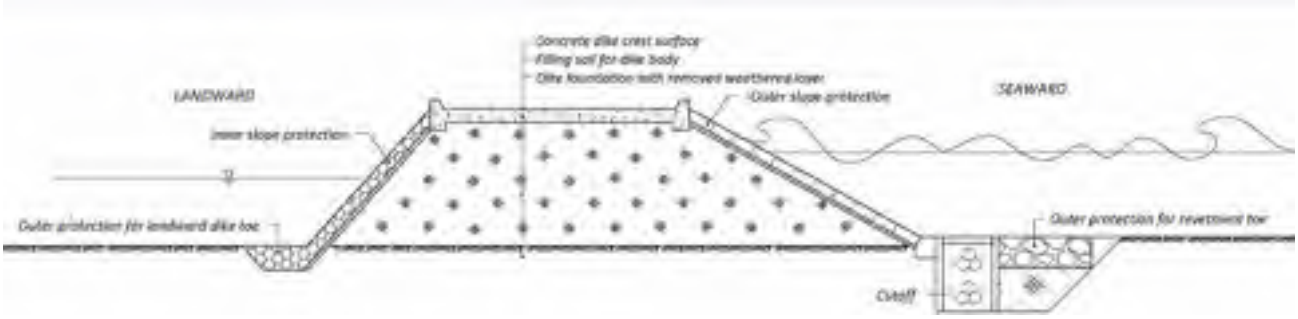


Figure 5.8 - *Dike profile with three-surfaced protection*

5.5 Dike crest width

- Based on the dike grade, the dike crest width can be determined as per Table 5.4.

Table 5.4. *Dike crest width based on dike grade*

Dike grade	I	II	III	IV	V
Dike crest width $B_đ$ (m)	6÷8	6	5	4	3

- In case the dike crest width must also satisfy the requirements of structure, construction, management, etc. it must be approved and decided by competent authorities.

5.6 Dike crest structure

- Structure of dike crest should be determined based on operation requirements, as well as the economical-technical requirements;

- Dike crest surface should slope either to one side or both sides (at a gradient of 2% - 3%), so that water can be gathered to surface drainage trenches.

- In case the crown wall is built on the dike crest, its height should be less than 1m. The expansion joints must be placed every 10-20m. The wall foundation must be isolated from the upper edge of the revetment. Crown wall can only be constructed after the dike has become stable (see Figure 5.9).

- The design of crown wall must satisfy the conditions of load-bearing, stability (in terms of overturning, sliding, foundation stresses, and seepage) as per current Technical standards and Codes.

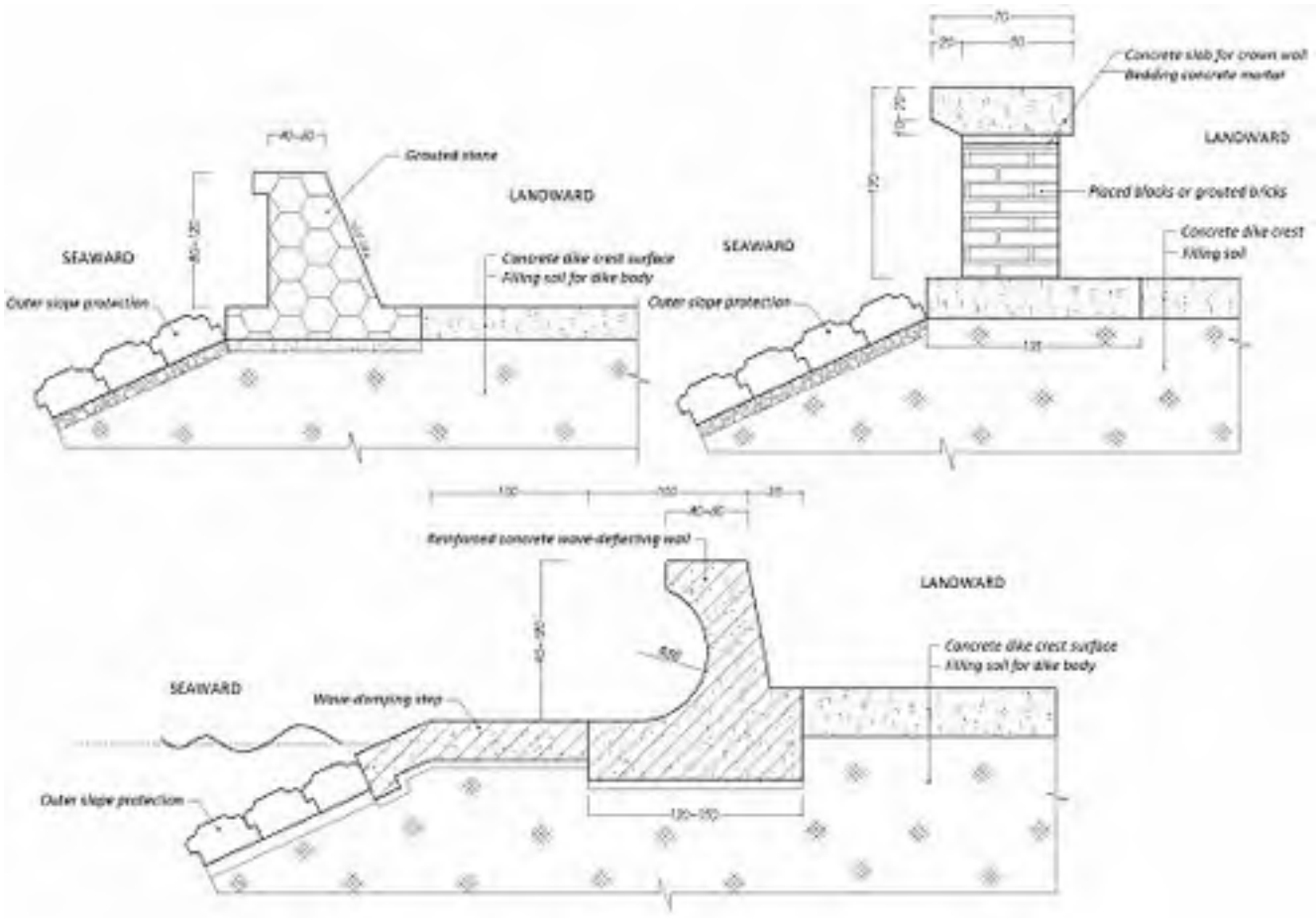


Figure 5.9. *Types of sea dike crown wall structures*

5.7 Design of transition structures

- Transitional parts between the dike elements such as: dike body and the toe; dike foundation and dike body; dike body and the outermost revetment, etc., must be considered in the design (see Figure 5.10);

- Transitional parts must meet the technical and aesthetic requirements.

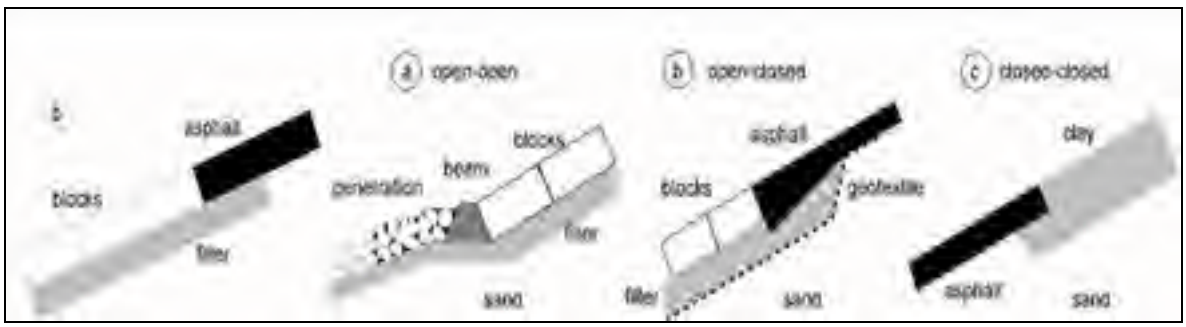


Figure 5.10. *Some types of transition structures*

5.8 Dike slopes

5.8.1 Dike slope angle

Dike slope is represented by the slope coefficient m = cotgα, where α is the angle between dike slope and the horizontal line. It should be determined through the stability calculation, taking the construction methods, slope protection structures and operation requirements into consideration.

The values m = 2.0 ÷ 3.0 are commonly used for the inner slope and m = 3.0 ÷5.0 for the outer slope of earthen dikes.

5.8.2 Inner dike berm

When the dike height is more than 6m, the inner slope coefficient (m) is less than 3 (m < 3) and with traffic demand, the dike berm can be introduced at the level which is 2-3m down from the dike crest. The berm width depends on the traffic requirements but should not be less than 5m. The slope gradients above and below the berm can be different; the lower slope is usually gentler than the upper one.

5.8.3 Outer dike berm

- At the coastal areas with the design wave height of more than 2 m, in order to reduce the wave run-up/overtopping, the outer wave-damping berm should be introduced at the design water level. The outer berm width must be in the order of 1.5 times of the incident wave height and should not be less than 3 m. Detailed calculation of the reduction rate of wave run-up due to the dike berm is given in Appendix B.

- Wave energy is high at the outer berm, the revetment in this area therefore needs to be strengthened, especially at the outer edging areas. Also, sufficient drainage holes must be arranged. In case of important areas protected by sea dike, the elevation and dimensions of the outer berms need to be determined though physical model tests.

5.9 Dike body and foundation base

5.9.1 Embankment material

- Making maximum use of the filling soil from the areas next to the dike. For the homogeneous earth dike, the clayey soil with clayey content of 15% ÷ 30%, the plasticity index of 10 ÷ 20%, without dirt, should be used. The allowable difference between the water content of filling soil and the optimum water content should not exceed ±3%.

- Alluvial silty soil, clay with high natural water content and excessive clay particles, swelling soil and the dissolved soil should not be used for the embankment. In case these types of soil must be used, it is necessary to adopt appropriate technical solutions.

- If only loose sand with the fine grain content of 25% is available, a cover layer of heavy soil with a minimum thickness of 0.5 m must be introduced.

5.9.2 Dike body compaction criteria

+ For cohesive soil: $$K_c = \frac{\gamma'_{ds}}{\gamma'_{d\max}} \qquad (5.17)$$

where,

K_c - Design compaction degree;

γ'_{ds} – Design dry density of the dike body soil;

γ'_{max} – Maximum dry density, determined in the laboratory;

+ For non-cohesive soil: $$K_{ds} = \frac{e_{max} - e_{ds}}{e_{max} - e_{min}} \quad (5.18)$$

where,

K_{ds} – Design relative compaction degree;

e_{ds} – Design compact void ratio;

$e_{max.}$ e_{min} – Maximum and minimum void ratios determined by the standard test.

- Required compaction degree of filling soil is given in Table 5.5.

Table 5.5. *Required compaction degrees of dike body*

Sea dike grade	I	II and III	IV and V
K_c	≥0.94	≥0.92	≥0.90
K_{ds}	≥0.65	≥0.62	≥0.60

5.9.3 Dike foundation and technical solutions

5.9.3.1 General rules

- Dike foundation must ensure the stability (in terms of stresses and deformation, seepage, etc.) under the impacts of active loads.

- In case the natural dike foundation does not meet the design requirements and standards, additional appropriate solutions for treatment must be applied.

5.9.3.2 Some solutions for soft soil treatment

a. Counter-pressure prism method

In case the thickness of the soft soil layer in the dike foundation is great, the counter-pressure prism can be placed at one or two sides of the dike. The width and thickness of the counter-pressure embankment are determined through the stability calculation, meeting the economical-technical requirements

The thickness of counter-pressure prism can be in the order of 1/3 ÷2/5 of the dike height, the width is in the order of 2.5÷3.0 of the dike height.

b. Soft soil foundation replacement method

- This method is suitable for the areas where the thickness of soft soil layers is less than 3m. These layers can be replaced with the materials which have better physico-mechanical properties.

- When the thickness of the soft soil layers is greater than 3m, a mixed approach can be employed such as dredging to an appropriate depth combined with another

methods such as the placement of counter-pressure prisms or the reinforcement of the soft soil layer with geotextiles, etc.

c. Geotextile method

When the soft soil layer thickness is greater than 3m, the geotextile can be placed between the dike body and foundation for the purpose of filtration, drainage, isolation, reinforcement, uniform distribution of stresses, reduction of irregular settlement, reduction of lateral deformation and strengthening the stability of foundation soil.

Based on technical requirements and available conditions, one or more layers of geotextiles can be placed on the abutting surface and in the dike body.

d. Method of filling in stages

In case the dike foundation is soft soil, the construction time can be extended, then the effective method is to place the dike body gradually in layers so that the soft soil can have enough time to consolidate, increasing the bearing capacity. At exposed areas where dikes are subject to direct attack by waves, this method should not be employed.

e. Other treatment methods

+ Drainage sand buffer layer method

This method is usually adopted in case the thickness of soft soil layers is less than 5m. The thickness of the sand buffer layer should be determined based on the load transmission from the dike body to the interface between the buffer layer and the soft soil layer.

If the thickness of soft soil layer is greater than 5m, this method should be combined with the method of foundation soil consolidation with vertical drainage.

+ Foundation soil consolidation with vertical drainage method

This method is applied when the soft soil layer under the dike foundation is relatively thick and thus the consolidation period of subsoil is very long.

The vertical drainage passages can be sand pipes, storage-bag or vertical artificial drain. This method is usually combined with the pre-loading process.

- *Sand pipe*: The diameters of the sand pipes are normally in the order of 20 ÷ 40cm, the distance between the sand pipes is in the range between 2 and 4m. The length should not exceed 20m. The thickness of drainage sand layer on top of the sand pipes is 0.3 ÷ 0.5 m on dry soil and 1.0 m under water .

In case of drainage wells in the form of sand bags (sand tubes): Sand bags are made of geotextiles, about (6÷7)cm in diameter and placed in a lateral equidistance of 1,0~1,5 m, over a depth of 10 ~ 20 m.

- *Vertical artificial drain*: the common cross-section area of the artificial drains is 100x4mm to 100x7mm. The distance between the artificial drains is 1.0 ÷ 1.5m, the length should be less than 20m, with a maximum of 23m.

+ Reinforcement with soil-cement piles method

This method is effective in case of the embankment on the soft soil layer with the thickness greater than 8m, for the dikes combined with traffic roads, sluice foundation under the dike or when the required construction time is very short.

Soil-cement piles are formed by deep mixing equipments, which can be the drills equipped with the top mixing heads (for mechanical mixing) or grouting nozzles (for jet grouting). Cement mixed with foundation soil after solidifying has a diameter of 0.6÷3.0 m (depending on the types of equipment). The foundation after the reinforcement can have a bearing capacity up to 10 kg/cm^2.

5.9.4 Auxiliary structures across dikes

Auxiliary structures crossing a dike must be designed separately. Special attention should be paid to the treatment of adjacent parts between the dike body and other structures in order to ensure the safety and functionality of the dike.

5.10 Surface water drainage system

- Drainage trenches should be placed on the dike crest, on dike slope, at the dike toe and at the transitions between the dike slopes and the earth banks or other structures.

- Drainage trenches parallel to the dike route axis can be placed at the inner edge of dike berm or dike toe. Orthogonal drainage trenches are placed on the dike slope every 50÷100 m and connected to the axial draining trenches along the dike route. These trenches can be built of concrete, grouted brick or grouted stone, etc. The dimensions and bottom slope of these trenches must be determined through calculation or by experience.

5.11 Stability of sea dikes

5.11.1 Calculation items

- Stability of dike slopes against sliding ;

- General stability of dike body and foundation;

- Settlement of dike body and foundation;

- Stability against seepage (for estuarine dikes at the areas with high tidal range and heavy rainfall);

5.11.2 Calculation of stability against slope sliding

- *Calculation sections:* the selected section must be representative based on the dike functionality, dike grade, topographical conditions, geological conditions, dike structure, dike height, embankment material, etc.

- *Calculation cases:*

+ Under normal (working) condition: The inner slope at high tide; the outer slope during rapid falling tide and other base load combinations depending on the detailed conditions;

+ Abnormal (inspecting) conditions: The inner and outer slopes during construction stage; the inner and outer slopes bear the loads at the design water level and other special load combinations depending on the detailed conditions.

Note: In case of dikes built at the areas with heavy rainfall, the stability against sliding of the dike slope during rainy periods needs to be inspected thoroughly.

- *Calculation method:* The calculation is performed as per Technical Codes for rolled earth-filled dam design (14TCN157-2005[1]) and other concerned Technical codes and Standards. GEO-SLOPE/W software package can also be used in the calculation.

- *Stability safety factor against sliding (K):* Required stability safety factor against sliding is shown in Table 5.6.

Table 5.6*: Required safety factor against sliding for dike slope*

Dike / Grade / Load combination	I	II	III	IV	V
Base	1,30	1,25	1,20	1,15	1,10
Special	1,20	1,15	1,10	1,05	1,05

- *Stability safety factor against planar sliding (K):*

+ For concrete or grouted stone structures, the safety factor against planar sliding on the interface with non-lava foundation is described in Table 5.7.

+ For concrete or grouting stone structures, the safety factor against planar sliding on the interface with the lava foundation is described in Table 5.8.

Table 5.7. *Required safety factor against sliding on non-lava foundation*

Structure / Grade / Load combination	I	II	III	IV	V
Base	1,35	1,30	1,25	1,20	1,15
Special	1,20	1,15	1,10	1,05	1,05

Table 5.8. *Required safety factor safety factor against sliding on lava foundation*

Structure / Grade / Load combination	I	II	III	IV	V
Base	1,15	1,10	1,10	1,05	1,05
Special	1,10	1,05	1,05	1,00	1,00

- *Stability safety factors against overturning (K)*: Safety factors against overturning are given in Table 5.9:

Table 5.9. *Stability safety factor against overturning*

Structure / Grade / Load combination	I	II	III	IV	V
Base	1,6	1,5	1,5	1,3	1,3
Special	1,4	1,3	1,3	1,2	1,2

Notes:

- Basic loading is the combination of loads under normal working conditions of the structure;

- Special loading is the combination of loads during the construction stages or seismic activities;

- The calculated actual safety factors should not exceed 20% for basic loading condition and 10% for the special loading condition.

5.11.3. Stability of vertical seawalls

5.11.3.1 Gravity sea wall

For sloping or vertical sea walls, the stability is based on gravity. The stability calculation must be performed according to the following 5 items:

+ Stability against overturning;

+ Stability against general sliding;

+ Stability against planar sliding;

+ Stability of subsoil (in terms of stresses, deformation, seepage, etc.).

5.11.3.2 Non-gravity sea wall

Non-gravity sloping or vertical sea walls, concrete structures, grouted stone structures, pitched-stone structures or cut-stone structrues with mortared coating.

5.11.3.3 Calculation of the stability factors

a. Stability against overturning: the stability factor is determined by formula (5.19)

$$K_o = \frac{M_r}{M_o} \qquad (5.19)$$

where,

K_o - Safety factor of stability against overturning;

M_g - Stability moment against overturning (kN.m);

M_o - Overturning moment (KN.m).

b. Stability against the sliding: the stability factor is determined by the following formula:

$$K_s = \frac{(G+g)tg\varphi_o + C_o A + P_E}{P} \qquad (5.20)$$

where,

K_s - Stability factor against sliding;

φ_o - Internal angle of friction between the wall bottom and the foundation base; when the field measured data is not available, the value $\varphi_o = \varphi$ can be used (φ: internal friction angle of the foundation soil (^{o})).

C_0 - cohesive force on the sliding surface, $C_o = (\frac{1}{4} \div \frac{1}{6})C$ (C: cohesive force of the foundation soil, (kN/m^2), in case of non-cohesive soil C = 0;

A - Area of wall bottom (m^2);

G - Vertical resultant force exerted on the sliding surface (KN or KN/m);

P - Horizontal resultant force exerted on the sliding surface (KN or KN/m);

g - Weight of the material of buffer layer and counter-pressure blocks (kN or kN/m);

P_E - Passive soil pressure (kN or kN/m). For the footing with negative bottom, 30% of the calculated value can be used;

f - Friction coefficient on the design cross section, given in Table 5.10.

Table 5.10. *Friction coefficients*

Interface between	Friction coefficient f
Concrete and concrete	0,55
Grouted stone and Grouted stone	0,65
Quarry stone and Quarry stone	0,70
Concrete and Quarrystone (surface flattened by gravel)	0,60
Grouted stone and Quarrystone (surface flattened by gravel)	0,65
Riprap and coarse sand, fine sand foundation	0,50÷0,60
Riprap and dust sand foundation	0,40
Riprap and clay sand foundation	0,35÷0,50
Riprap and clay, loam foundation	0,30÷0,45

The above-mentioned values of φ and C can be determined by means of consolidating quick shearing criteria from the results of direct shearing test in the laboratory.

- In case the sliding surface of vertical sea walls goes through the bottom or the horizontal joint of the wall body, and the subsoil is non-cohesive, the safety factor K_s is calculated by the following formula:

$$K_s = \frac{G.f}{P} \qquad (5.21)$$

- In case of parapet (non-gravity structure, concrete structures, grouted stone structures, pitched-stone structures or cut-stone structures with mortared coating), sliding surface goes through the bottom of buffer layer:

$$K_s = \frac{(G+g).f + P_E}{P} \qquad (5.22)$$

5.11.4 Settlement calculation

Total settlement of the dike body and dike foundation along the dike crest axis and other necessary locations in the representative cross sections of the dike segments must be determined.

Settlement of dike foundation includes two components: initial settlement and consolidating settlement. The initial settlement occurs right after the foundation soil loading. Consolidating settlement is caused by the acting of external loads chronologically.

5.11.4.1 Calculation of initial settlement

Initial settlement S_i is calculated by the following formula:

$$S_i = \zeta P \frac{B(1-\mu^2)}{E} \qquad (5.23)$$

where,

P - Uniform pressure on the dike foundation (KN/m^2);

B - Short side dimension of the dike foundation (m);

μ - Poisson's ratio of the soil (for saturated soil, $\mu = 0,5$);

E - Elastic modulus of foundation soil (kPa), determined by undrained tri-axial shearing test or mono-axial compression test.

ζ - Influence factor, given in Table 5.11.

Table 5.11. *Influence factors*

Length (L)/ Breadth (B) ratio of the dike foundation	ζ values for plastic foundation soil			
	Middle point	Corner point	Averaged all over the foundation	ζ values averaged all over the foundation for hard foundation soil
2	1,53	0,77	1,30	Rather smaller than the values of plastic foundation soil
3	1,78	0,89	1,52	
5	2,11	1,05	1,83	
10	2,58	1,29	2,25	
100	4,0	2,0	3,70	

When the data on E is not available, initial settlement can be calculated by the following formula:

$$S_i = \left[\frac{1}{4} \div \frac{1}{3}\right] S_o \qquad (5.24)$$

in which S_o - total settlement when the lateral piles do not move outside, after finishing the loading.

5.11.4.2 Calculation of consolidating settlement

Consolidating settlement S_c is calculated by the following formula:

$$S_c = \sum S_j = \sum \frac{e_{1j} - e_{2j}}{1 + e_{1j}} h_j \qquad (5.25)$$

where,

e_{ij} - Void ratio when the compression has become steady under the acting of the gravity load of j^{th} soil layer;

e_{2j} - Void ratio when the compression has become steady under the proportional stresses of the j^{th} soil layer and the stresses of additives;

h_j - Thickness of the j^{th} soil layer (m);

S_i - Compression quantity of the j^{th} soil layer (m).

6. DESIGN OF SLOPE REVETMENT AND DIKE TOE

6.1 Revetment toe

Revetment toe (or cutoff) is the transitional structure between the revetment slope and the foreshore of sea dike. There are usually two types: shallow revetment toe and deep revetment toe.

Types and dimensions of revetment toe is determined on the basis of the analysis of beach erosion status, wave height (H_s), wave length (L_s) and the thickness of slope covering layer (D).

6.1.1 Shallow revetment toe

Shallow revetment toes are applicable at the areas where the beach erosion rate is low; the revetment toes only resist the wave-induced currents at the dike toe.

Applied slope protection materials of shallow revetment toes are: turbulent-dumped rock, concrete element or loose-grained materials etc. Common types of shallow revetment toes are shown in Figure 6.1a, 6.1b, 6.1c, 6.1d and 6.1 e.

Figure 6.1a. *Stable foreshore*

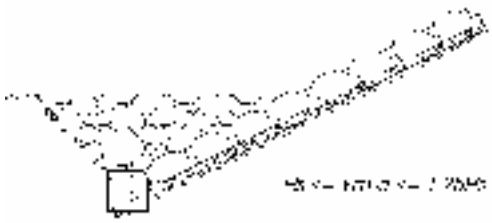


Figure 6.1b*. Stable foreshore*

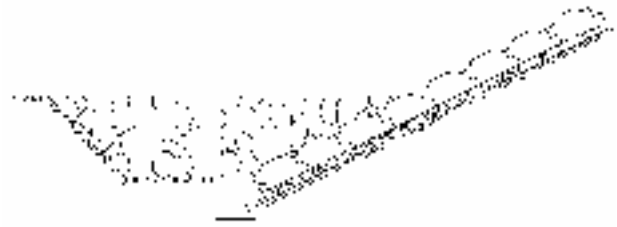


Figure 6.1c. *Stable foreshore*

Figure 6.1d. *Applied at the areas where the foreshore is stable and accretion is likely*

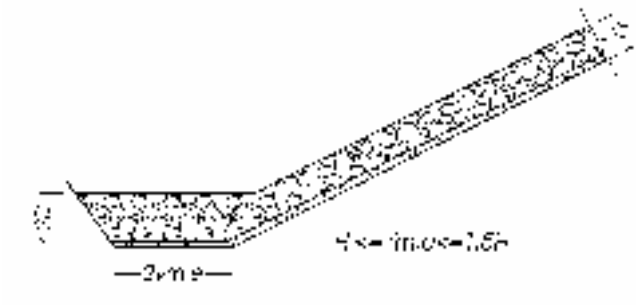


Figure 6.1e. *Stable foreshore*

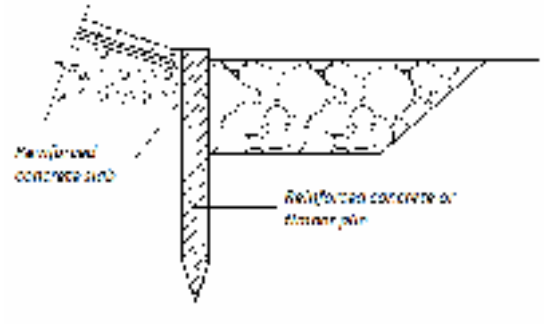


Figure 6.1f. *Applied at the areas where the foreshore is strongly eroded, the foreshore material is cohesive soil*

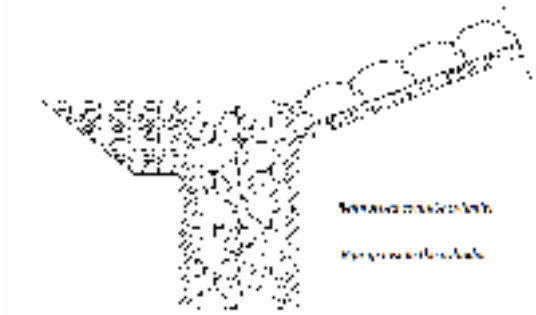


Figure 6.1g*. Applied at the areas where the nearshore currents are strong*

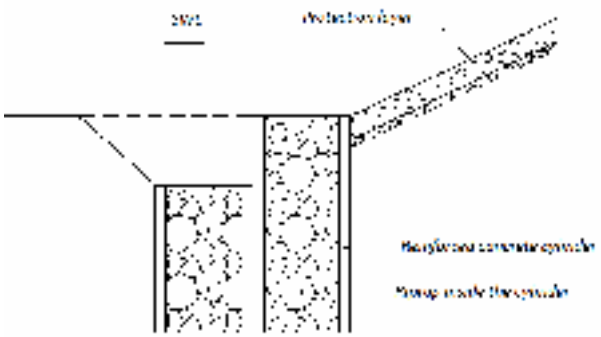


Figure 6.1i. *Applied at the areas where the scour depth is great, the nearshore currents are strong*

Figure 6.1 *Various types, preliminary dimensions and applicable conditions of revetment toes*

6.1.2 Deep revetment toe

Deep revetment toes are applicable at the areas where the foreshore erosion is severe, which ensure the stability in case the foreshore is eroded deeply. Common types of revetment toes formed by reinforced concrete piles, one-layered or two-layered reinforced concrete pipes are presented in Figure 6.1f, 6.1g and 6.1i.

Upon designing the deep revetment toe, the limit of water depth in front of the dike toe and the stability of revetment toe must be determined. If the foreshore is likely to be deeply eroded causing the water depth in front of the dike toe exceeds the limited depth, appropriate solutions must be adopted in order to reduce the water depth in front of the toe, such as groynes or beach nourishment. Revetment toe must be buried in natural subsoil at a minimum depth of 1.0 m.

6.1.3 Critical scour depth at the revetment toe

Critical scour depth of the revetment toe depends on the wave energy and geological conditions. The following formula should be used:

$$\frac{S_{max}}{H_0} = \sqrt{22.72\,h / L_0 + 0.25} \qquad (6.1)$$

where,

S_{max} – equilibrium scour depth (m).

H_o – deep water wave height (m), see Appendix C;

L_o - deep water wave length (m), see Appendix C;

h - water depth in front of the dike toe (m).

Based on the scour depth, the depth of the revetment toe to be strengthened can be determined. By experience, the scour depth can be calculated by the formula: $S_{max} = (1 \div 1{,}67)H_{sp}$. The width of protection layer outside the revetment toe can be 3 – 4 times of the design wave height at the toe (H_{sp}).

6.1.4 Dimensions of revetment toe material

Material of the revetment toe must be stable under the impacts of wave-induced currents at the dike toe.

- In case the material of revetment toe is stone: the stable weight of the stones at the revetment toe (G_d) is determined as per Table 6.1.

Table 6.1. *Stable weight of the stone as per V_{max}*

V_{max} (m/s)	2,0	3,0	4,0	5,0
G_d (kG)	40	80	140	200

in which V_{max} is the maximum wave-induced current velocity at the dike toe, determined by the following formula:

$$V_{max} = \frac{\pi.H_{sp}}{\sqrt{\frac{\pi.L_{sp}}{g}.\sinh.\frac{4\pi h}{L_{sp}}}} \qquad (6.2)$$

where,

V_{max} - Maximum current velocity (m/s);

L_{sp}, H_{sp} - Design wave length and wave height (m);

h - Water depth in front of the dike (m);

g - Gravity acceleration (m/s^2);

6.2 Revetment body

6.2.1 Selection of protection structures

Types of the protection structures for revetment body can be selected on the basis of economical-technical conditions, as shown in Table 6.3.

6.2.2 Thickness of protection layers

6.2.2.1 Protection layer built of dry quarry stone: the stable thickness under the wave impacts, with the slope inclination 1,5 ≤ m ≤ 5, is calculated by the following formula:

$$\delta_d = 0,266.\frac{\gamma}{\gamma_d - \gamma}.\frac{H_{sp}}{\sqrt{m}}.\sqrt[3]{\frac{L_{sp}}{H_{sp}}} \qquad (6.3)$$

where,

δ_d - Thickness of paved quarry stone (one layer) on the dike slope (m);

γ_d, γ - Specific density of rock and water, respectively (kN/m^3);

m - Slope angle coefficient;

L_{sp} - Design wave length (m);

H_{sp} - Design wave height (m);

L_{sp} and H_{sp} are determined as per Appendix C.

Table 6.3. *Types of slope protection structures and applicable conditions*

No.	Slope protection structures	Applicable conditions
1	Grass	- Wave height $H_s \leq 0,5$m, current v < 1m/s or the mangroves are planted on the foreshore; - The dike slope is favourable for grass to grow;
2	Turbulent-dumped quarry stone	- Abundant rock supply; - Gentle dike slope, low aesthetic requirements.
3	Anhydrous-placed quarry stone	- Abundant rock supply, available type of rock meeting the requirements; - Dike foundation with good drainage.
4	Jointed quarry stone	- Rather good dike slope; - High wave Hs > 0,5m, strong current V > 1 m/s, the loose type of rock does not meet the requirements
5	Gabion layer	- The rock supply is limited; - High wave, strong current; - Salinity-proof steel gabions.
6	Precast, loose-joined concrete slabs	- High wave, strong current; - Aesthetic requirements;
7	Precast, array-joined concrete slabs	- High wave, strong current; - Aesthetic requirements. - Dike slope with little subsidence and drainge; - Available conditions for construction and array manufacturing.
8	Combination of many structures	- Large variance of water level, long reinforced slope; - Different service requirements

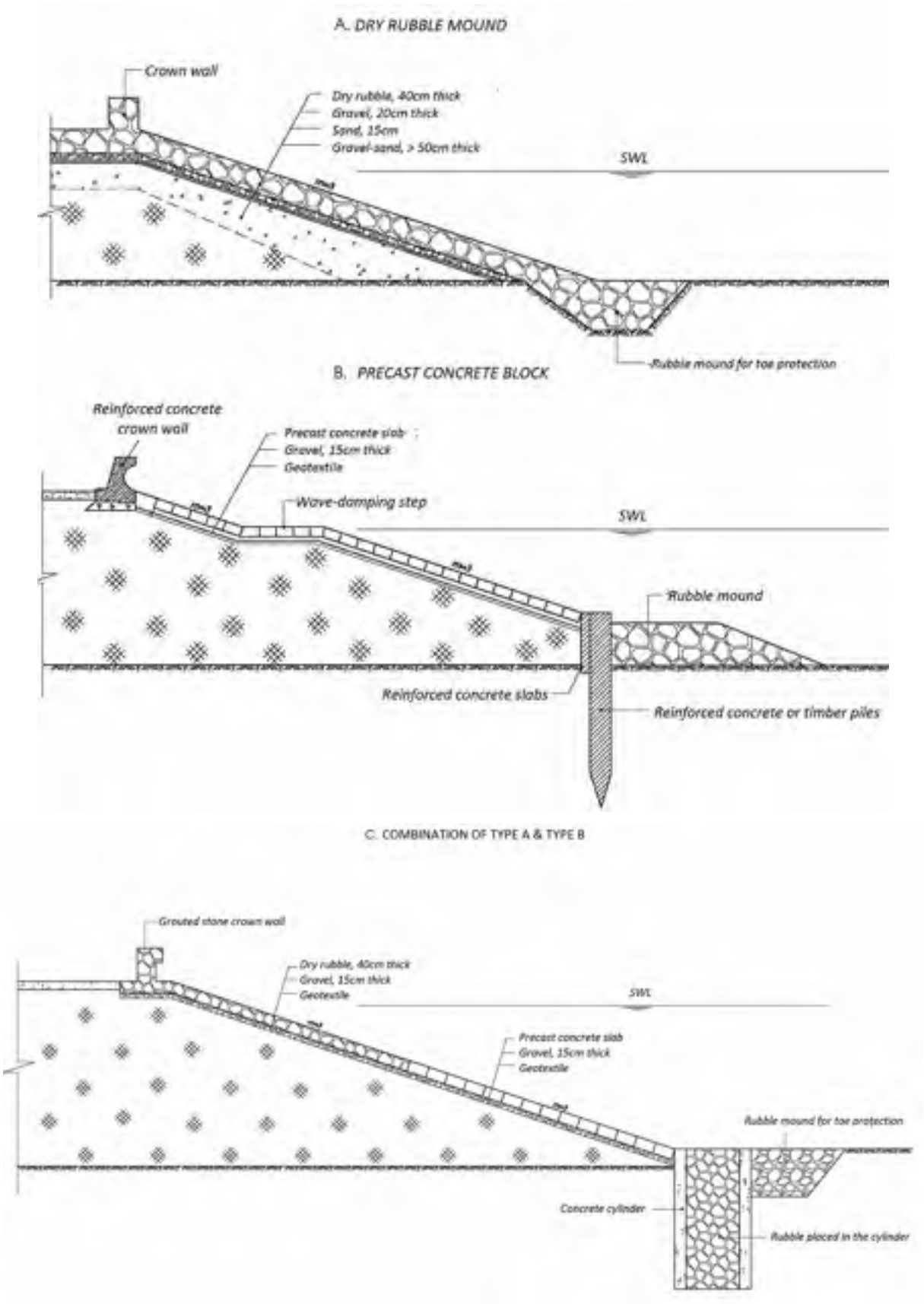


Figure 6.2. *Cross sections of some types of dike slope strengthening structures a) Dry quarry stone; b) Precast concrete block; c) Combination of type (a) and type (b).*

6.2.2.2 Protection layer formed by concrete slabs

Thickness of the protection layer is calculated by the formulae (6.4) and (6.5), the greater value is selected for the design.

- As per Chinese Codes for Dike Design (GB50286-98)

$$\delta_B = \eta.H_{Sp}.\sqrt{\frac{\gamma}{\gamma_B - \gamma}.\frac{L_{S_p}}{l_t.m}} \qquad (6.4)$$

where,

δ_B - Thickness of concrete slab (m);

η - Factor; η = 0,0075 for dry slabs; η = 0,10 for the slabs with upper dry part and lower joint-filled part ;

H_{sp} - Design wave height (m) ;

L_{sp} - Design wave length (m);

l_t - Length of concrete slab side in the direction perpendicular to the water edge (m) ;

m - Slope angle factor;

γ, γ_B - Specific density of water and concrete, respectively (kN/m^3).

- As per Pilarczyk's formula :

$$\delta_B = \frac{H_{Sp}}{\phi}.\frac{\gamma}{\gamma_B - \gamma}.\xi^{\frac{2}{3}} \qquad (6.5)$$

where,

H_{sp} - Design wave height (m) ;

ξ - Breaker index ; $\xi = \dfrac{tg\alpha}{\sqrt{\dfrac{H_s}{L_s}}}$; (6.6)

Φ - Coefficient, depending on the shape and method of placing the structural elements, given in Table 6.4.

The other symbols can be explained in the same way as in Formula (6.4).

Table 6.4. *Φ coefficient for different structural elements and placing methods*

Type of elements and placement methods	Φ
Flat-placed slabs	4÷ 4,5
Slabs placed on geotextile and good clay foundation	5
Self-joined slabs	6
Self-joined slabs on good buffer layer	8

6.2.3 Types of structural precast concrete elements

Some common types in use are listed in Table 6.5.

Table 6.5. *Types of slope covering structural elements made of precast concrete*

Type of structural elements	Shape	Structure of surface exposed to waves	Linking mode	Figure
Independently-placed slabs	- Rectangular - Hexagonal - T-shaped	- Smooth - Concave opening - Convex abutment - Drainage opening - Smooth, with drainage opening	Close joining	6.3a 6.3c
Array-joined slabs	- Rectangular - Hexagonal	- Smooth - Convex abutment - Drainage opening	- Cable-threaded - Gutter, draff - Tongue-and-groove	6.3b

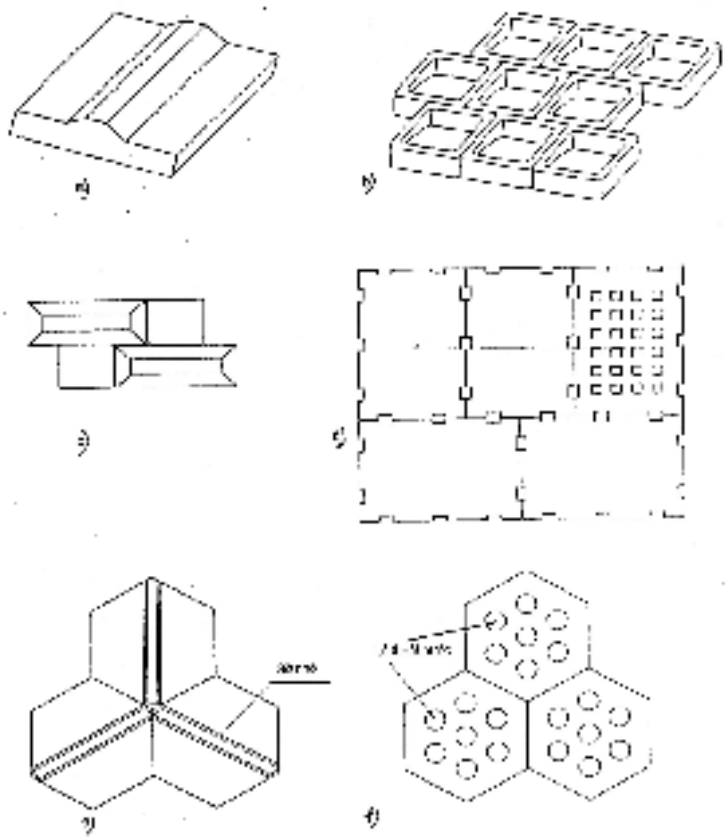


***Figure 6.3a**. Some types of precast concrete slabs paved independently on the sea dike slope*

a. Rectangular slabs with lip;

b. Rectangular slabs with concave opening;

c. T-shaped slabs;

d. Rectangular slabs with lattice openings;

e. Hexagonal slabs with lip;

f. Hexagonal slabs with drainage openings.

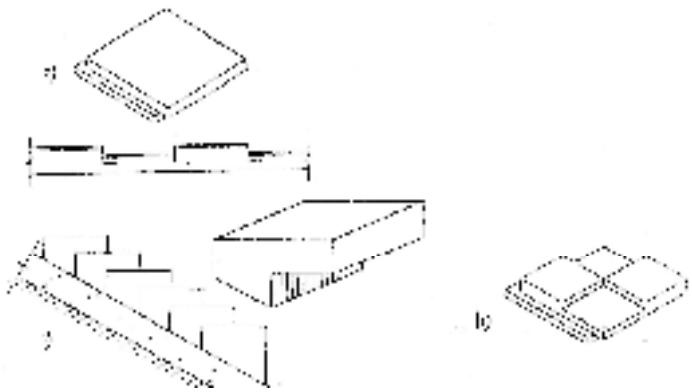
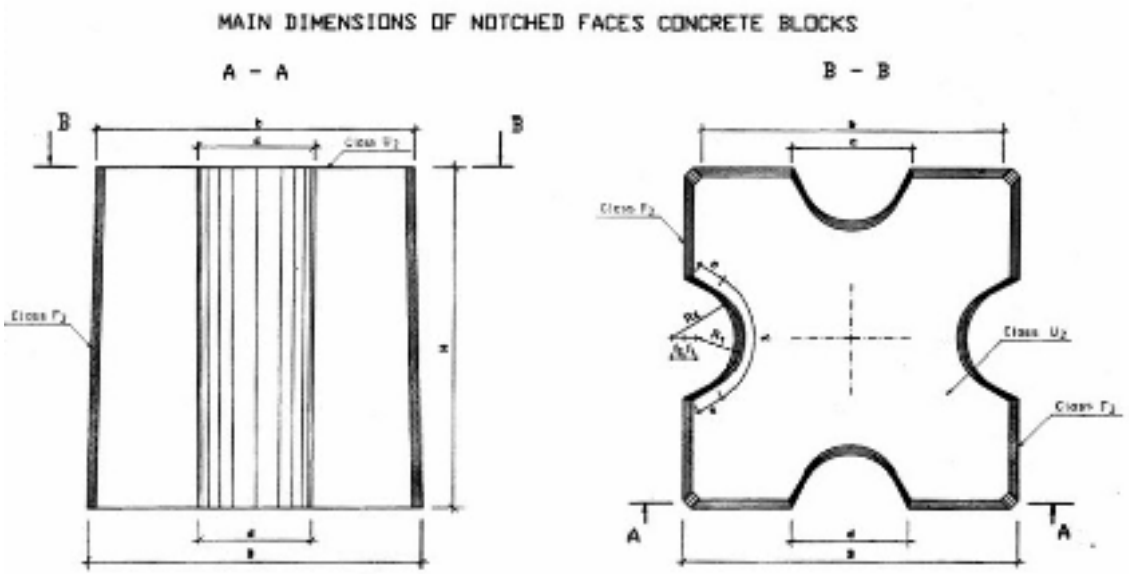


***Figure 6.3b.** Some types of precast concrete slabs with self-joining mechanism, array-linking*

a) Deviate joining, smooth surface;

b) Deviate joining, surface with openings;

c) Step overlapped;



MASS	B	b	H	c	d	e	a	R1	f1	R2	f2	w	CONCRET VOLUME m3	AREA CASING m2
BLOCK 10T	1800	1700	1750	750	750	144.5	50	350	0	250	0	120	4.17	13.60
BLOCK 15T	2000	1900	2000	704	704	156	1800	315	50	315	0	120	6.25	16.00

Figure 6.3c *Some column-typed structrues and their geometrical dimensions.*

Note: Upon calculating the thickness and scale of sea dike slope protection structure, the wave-damping factor due to the effect of wave-damping structures and geometrical structures in front of the dike must be taken into consideration.

Array-linked structural concrete elements for slope covering can have local failure and it is difficult to replace, while column-typed structural elements have high stability level and it is easy to fix, replace in case of foundation settlement. Column-typed structures can be built of concrete or cut-stone (square or triangular cross sections).

6.2.4 Drainage openings and expansion joints

6.2.4.1 Drainage openings

The function of drainage openings is to reduce the uplift pressure on the slope protection structures. Drainage openings are arranged in apricot flower shape with the opening diameter of $5 \div 10$ cm. The distance between the openings of $2 \div 3$ m.

6.2.4.2 Expansion joints

Based on the calculation of stability, appropriate distance between the expansion joints can be determined, normally the required distance is $5 \div 15$ m.

6.3 Dike crest

6.3.1 Dikes without crown wall

In case the dike crest is designed without crown wall, it is necessary to introduce the road beads on the revetment crest in order to ensure the traffic safety, with a height of 0.2 – 0.3m, the road beads can be placed discontinuously.

6.3.2 Dikes with crown wall

Crown wall can have vertical shape or seaward-curved wave-deflecting nose. Upon designing the wall crest, it must be combined with the dike crest structure. The crown wall is placed at the outer edge of dike crest.

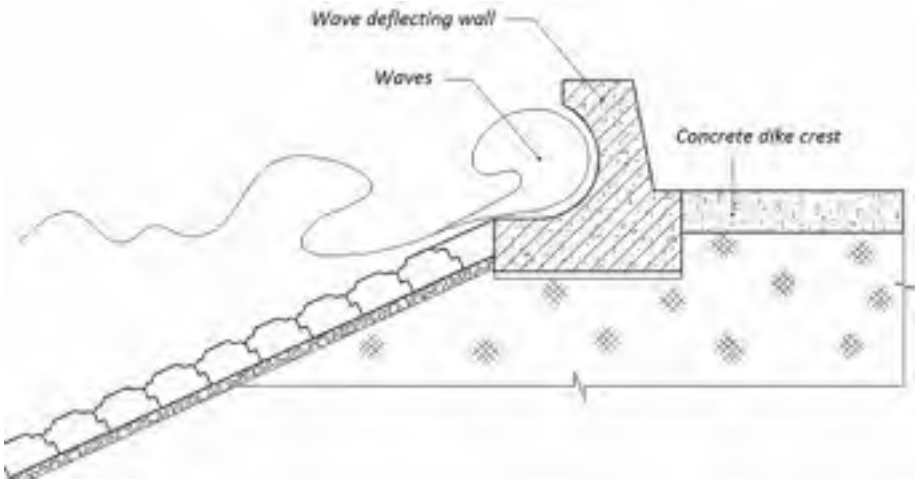


Figure 6.4 *Wave deflecting nose of the crown wall on the dike*

6.4 Buffer layer, filter layer

There must be a buffer layer in the loose strengthening structure between the slope covering layer and the dike body, which also functions as a filter layer (inverted filter layer) made of conventional material (loose aggregate) or geotextile.

Filter layers have many functions: preventing the surface erosion of the base layer, or the formation of uplift pressure in the base layer outward (drainage) or a combination of the two functions.

6.4.1. Filter layer formed by loose aggregate

Some types of filter layers are shown in Figure 6.5.

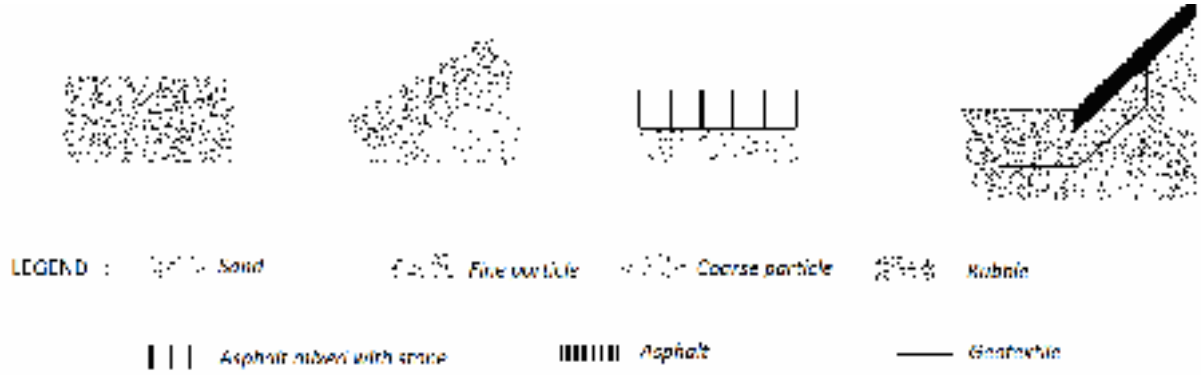


Figure 6.5 *Some types of filter layer*

Material aggregate for the filter layers are shown in Figure 6.6.

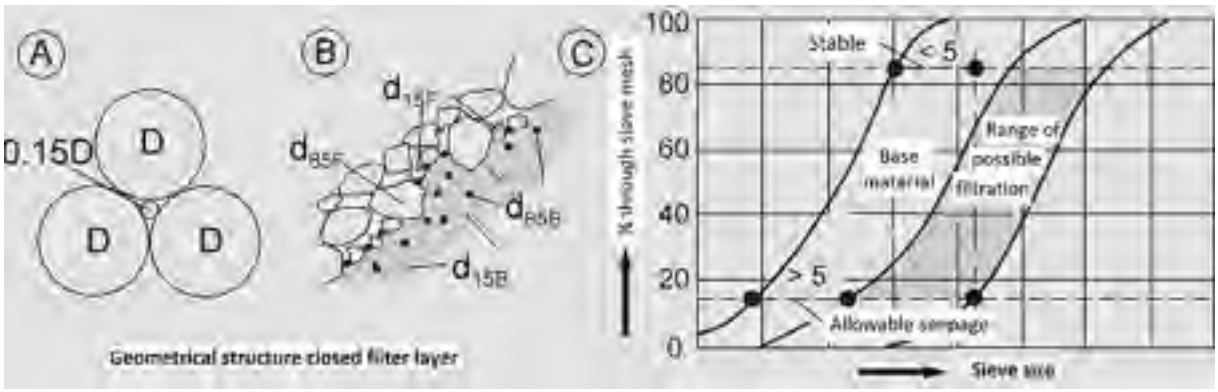


Figure 6.6 *Filling of grains and the grading curve of filter layer*

The design of filter layers must satisfy the following conditions:

$$\text{Stability:} \quad \frac{d_{15F}}{d_{15B}} < 5 ;$$

$$\text{Internal stability:} \quad \frac{d_{60}}{d_{10}} < 10 \qquad (6.7)$$

$$\text{Permeability:} \quad \frac{d_{15F}}{d_{15B}} > 5$$

where,

d_F – diameter of soil particle in filter layer;

d_B – diameter of soil particle in base layer.

- Thickness of each filter layer d_0 is determined by the following formula:

$$d_0 = 50.d_{15} \qquad (6.8)$$

or empirically:

+ Inner layer: $d_{02} = (10 \div 15)$ cm;

+ Outer layer: $d_{01} = (15 \div 20)$ cm; (6.9)

6.4.2 Filter layer formed by geotextile

Main functions of geotextile are: separating, filtering, strengthening, water guiding and drainage. Arrangement of filter layer structure with geotextile is shown in Figure 6.7.

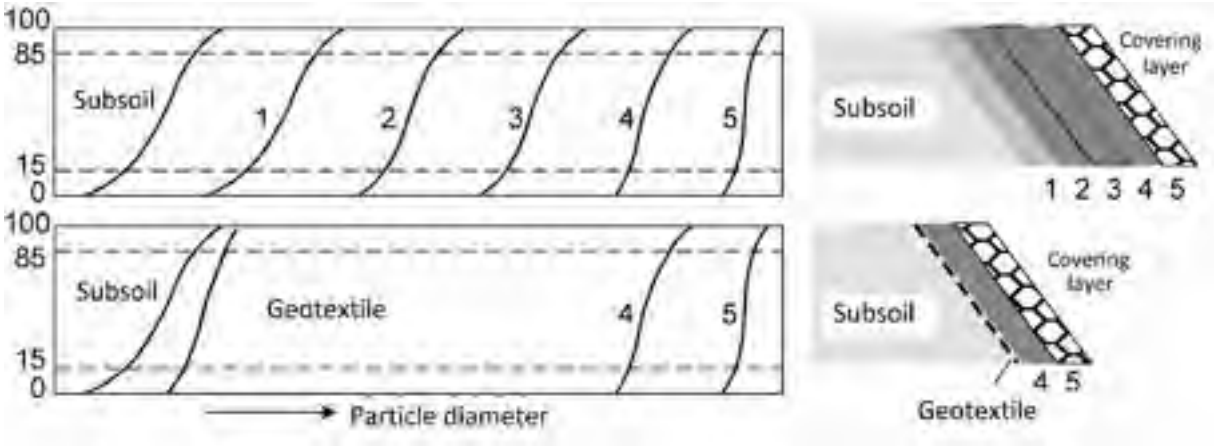


Figure 6.7 *Placing the geotextile layers in the filter layer*

Note: Geotextile can change its shape due to the Ultraviolet (UV),and it can be eroded and pierced by chemical, biological or mechanical processes.

The design of filter layer using geotextile is performed as per "Guideline for design and usage of geotextile for filtering in hydraulic works" 14TCN 110-1996[1].

7. FORESHORE PROTECTION STRUCTURES

Foreshore protection is very important to the safety of sea dikes, especially in case of eroded foreshore. The following methods can be adopted in order to protect the foreshore:

- Planting mangrove forests for the purposes of wave attenuation and foreshore protection;
- Building groynes or breakwater systems, etc.
- Artificial beach nourishment.

7.1 Mangrove forests

7.1.1 Applicable conditions

7.1.1.1 Effects of mangrove forests

The functions of mangrove forests are: to reduce the wave height, to prevent the coastal and estuarine erosion, to improve sediment settling capacity and to protect the marine ecology and environment.

7.1.1.2 Applicable conditions of mangrove forests

Mangrove forests grow in rather gently-sloped mudflats at coastal estuarine areas with many shielding islands. They grow well in the areas of alluvial soil with organic loam and mineral. Appropriate types of halophilic plants can be selected depending on climatic conditions, rainfall, tidal regime, salinity of soil and water, topography and geology.

7.1.2 Design of mangrove forests

7.1.2.1 Density

Mangrove forests are grown in “apricot flower” (triangular tiling) pattern: for short plants (shorter than 10m), the spacing size is 1x1m and the density is 10.000 plants/ hectare; for tall plant (higher than 10 m), the spacing size is 2,5 m x 2,5 m, and the density is 1000 plants/ hectare.

7.1.2.2. Scope of application

Minimum width of mangrove forests must be 2 times larger than the wave length. From experience, it is in the order of 40÷80 m for estuarine dikes and 180 ÷ 240 m for sea dikes. In case of foreshore, the width of mangrove forest can be increased.

7.1.2.3 Wave-damping effect

The reduction factor for mangrove forest is given in Appendix C.

7.2 Sea groynes and Breakwaters

7.2.1 Functions

In case the coast is eroded and mangrove forest cannot be planted, the groyne systems can be applied: conventional groins, T-shaped groins or conventional groins in combination with detached breakwater in order to facilitate the accretion and to prevent the coastal erosion (see Figure 7.1).

7.2.1.1 Sea groins

- Groins are usually applied at the beaches where the nearshore and longshore currents are dominant to reduce those currents.

- Preventing the longshore sediment transport, retaining the sediment for aggrading in the eroded areas.

- Adjusting the coast line, making the direction of nearshore currents adaptive to the incident wave direction, reducing the quantity of drifting sediment.

- Shielding the beach under the impact of oblique waves, creating the tranquil areas where suspended sediments are settled.

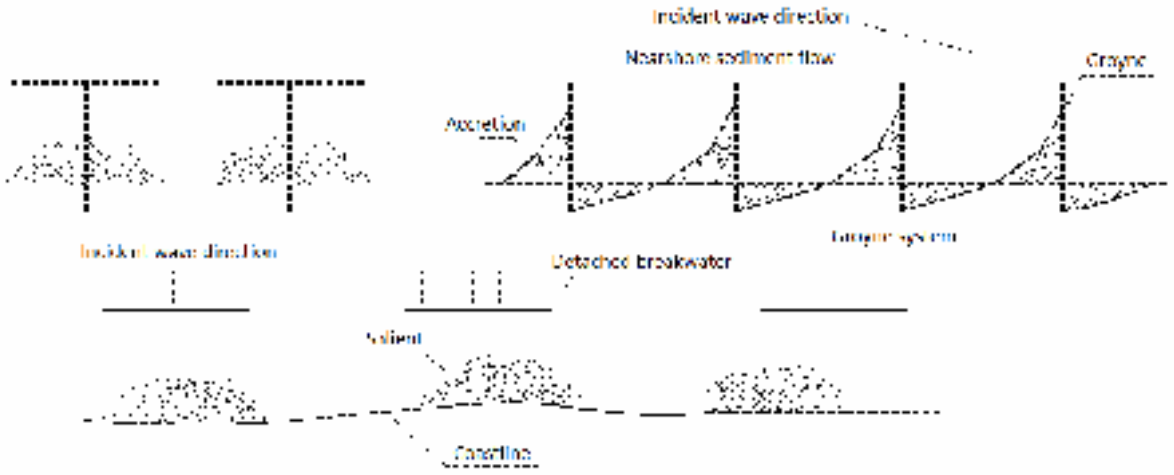


Figure 7.1 *Protective solutions for sea dikes by sand-retaining and wave-damping structures*

7.2.1.2 Seawalls

- Shielding the area behind the wall from waves, reducing the wave impacts on coastal areas, and resisting the erosion.

- Collecting the drifting sediments in order to form the accreted strip between the wall and the coast, reducing the nearshore currents.

7.2.2 Design of groynes and detached breakwaters

7.2.2.1 Groyne system

- Planning for the outer boundary of the groin system needs to be performed, creating a smooth line, well-connected coastline at both sides. The length of a groyne is determined by the breaker zone and the sediment characteristics at the construction site.

- Groyne axis is perpendicular to the coastline, or at an angle of $100^0 \div 110^0$ with reference to the incident wave direction.

- Groyne foot needs to be well-connected to the stable coastal area, at a level with no impacts of waves and currents.

- Average elevation of groyne crest is the same as mean tidal water level, and the crest inclination is the same as foreshore slope.

7.2.2.2 Detached breakwater system

- Depending on the wave-damping requirements, the crest elevation is determined through the relating formula between the wave height and relative height between the wall and the depth.

- Detached breakwaters are usually placed discontinuously with the length in the order of 1,5÷2,5 times of the distance between the wall and the dike toe, the width of the gaps is in the order of 0,4÷0,6 times of the length of a wall segment;

- In complex hydrological and oceanographic conditions, there should be a combination of alongshore and cross shore structures in order to combine the functions of sand-retaining and wave-damping. T-shaped structures are formed by the combination of groin system and detached breakwaters in discontinuous or closely continuous patterns.

7.2.2.3 Configuration and layout of groynes

a. Configuration of a groyne: head, trunk and foot (see Figure 7.2).

The groynes are extended seawards to reduce the impacts of waves and currents on the coastline, to retain the longshore sediment, to aggrade the area between the two groins, to enlarge and build up the foreshore and to improve the groynes and the coast.

b. Arrangement of groyne system for coastal protection and accretion

Layout routing: Planning for the new shoreline need to be made for the protected coastal section. This new coastline should be smooth and well-connected with the coastal section with no groynes. The groyne length should not be too small, extending to the breaker zone and the zone of strong nearshore currents.

Groyne axis: Groyne axis is perpendicular to the shoreline. If the wave direction is stable, the groyne axis should be selected as per that direction, which is the most favourable condition for the accretion between the groynes.

Design angle between the wave direction and the groyne axis should be $\delta = 100^0 \div 110^0$, the value $\delta \geq 120^0$ should not be used. α is chosen so that the area of the triangle ABC (see Figure 7.3) is maximum: α and θ must satisfy the following relation:

$$\alpha = \frac{\pi + \theta}{2} \qquad (7.1)$$

With $\theta = 30^0 \div 35^o$, $\alpha = 110^0$;

With $\theta = 60^0 \div 90^o$, $\alpha = 90^0$;

T-shaped groynes can be used in order to improve the wave-damping and accretion effect, see Figure 7.4.

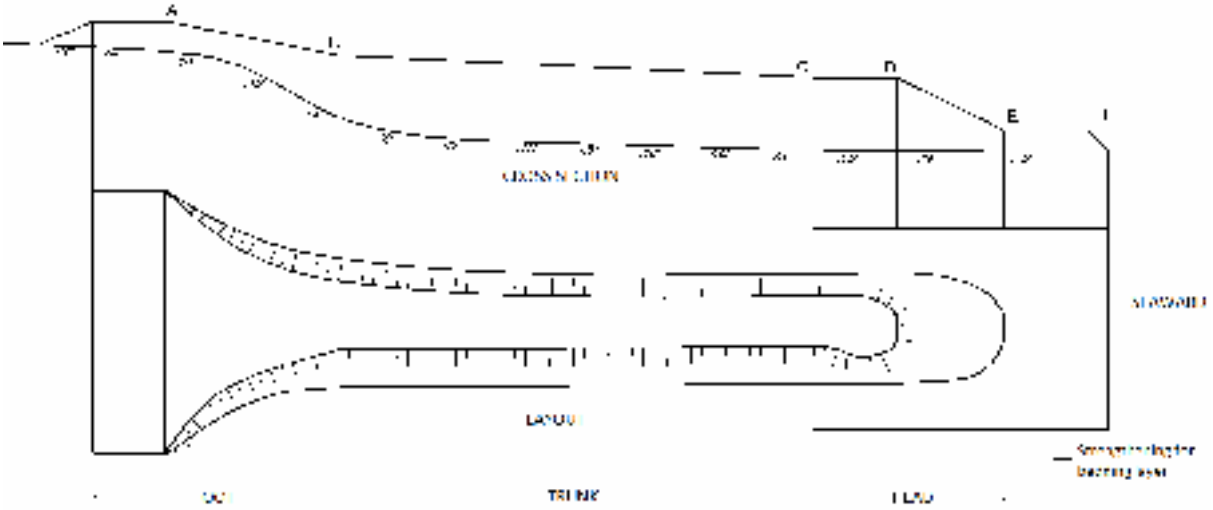


Figure 7.2. *Elements of a groyne*

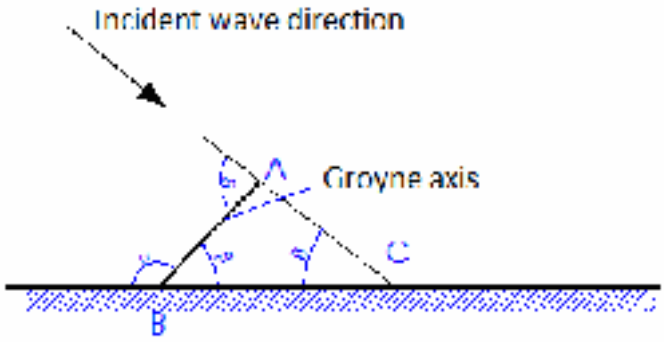


Figure 7.3. *Layout of a groyne*

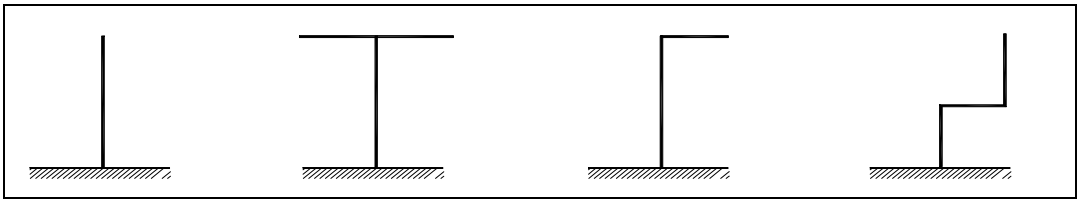


Figure 7.4. *Layout of some types of groyne*

Groyne length: Groynes need to be laid in a system with the length covering the longshore sediment transport zone. The groyne length can be equal to the range of the foreshore to be protected, plus 1/5 of the distance between the two groynes. It is usually 40 ÷ 60m for the small-sized gravel beaches, 100 ÷ 150m for sand beaches.

Groyne height: In general, the higher the groyne is, the more sediment is retained by the groyne system. In fact, however, if the groyne is too high, the wave reflection is greater, which cause more erosion at the toe. For sand beaches, the height of groynes should be 0.5-1.0m larger than the shore surface level. For gravel beaches, the height can be larger.

Distance between the groynes: usually 1,5 ÷ 2,0 times of the groyne length for gravel beaches, and 1,0 ÷ 1,5 times of the groyne length for sand beaches.

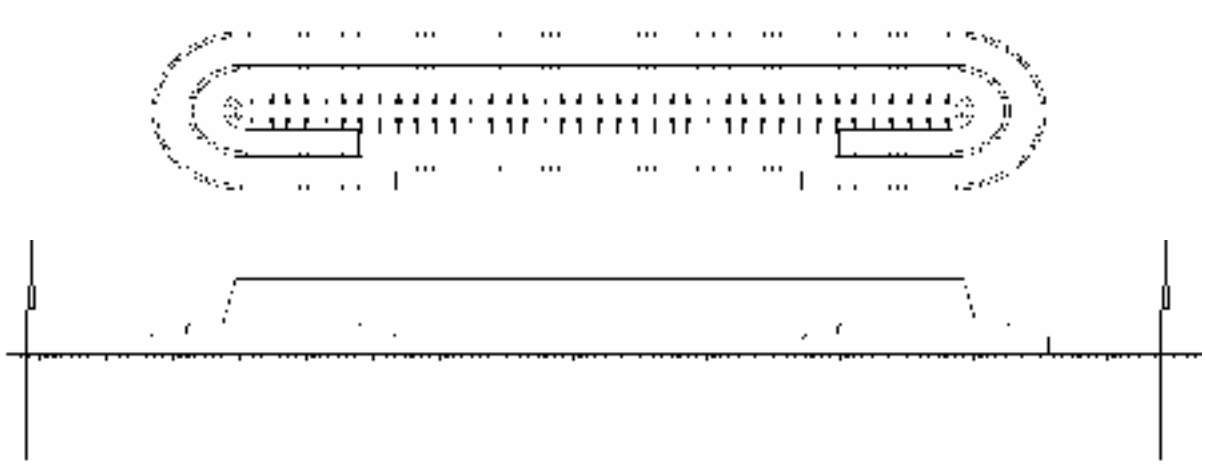
For large-scale projects, testing and surveying must be performed in order to adjust the design appropariately.

7.2.2.4 Layout and configuration of detached breakwaters

a. Configuration of detached breakwaters

Detached breakwaters should be submerged and placed at a certain distance from and usually parallel to the shoreline. Based on the purpose of services, usage of the foreshore area to be protected, compare the economical-technical efficiency of the alternatives in order to decide. The distance between the coast and the walls should be 1,0 ÷ 1,5 times of deep water wave length.

The wall body has uniform cross-section along its length and two sides bearing different loads: seaward side and shoreward side (see Figure 7.5).



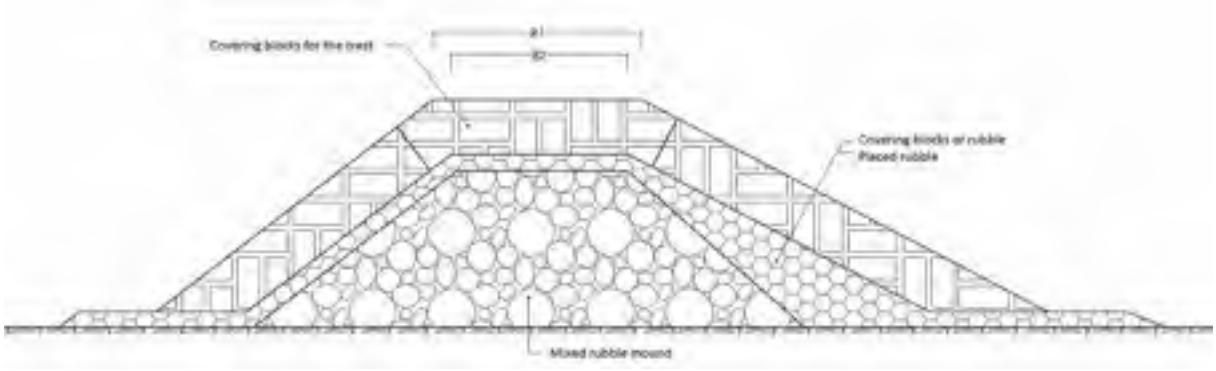


Figure 7.5 *Layout and configuration of detached breakwater*

a) Layout; b) Front view from the shore; c) Cross section

b. Layout of detached breakwater

Detached breakwater can be arranged discontinuously along the protected shoreline, creating the gaps for sediment exchange outside and inside the breakwaters.

Length of the breakwater segment is 1,5 ÷3,0 times of the distance between the breakwater and the shoreline, the gap width is 1/3 ÷1/5 of the length of a breakwater segment and 2 times of the wave length.

Level of emerged breakwater crest is: H_{Tp} + 1/2 $H_{S \text{ at the structure location}}$ + settlement;

Level of the submerged breakwater crest is: H_{Tp} - 1/2 $H_{S \text{ at the structure location}}$ + settlement;

Crest width of detached breakwater: It is determined through the calculation of structure stability, usually larger than the water depth below Z_{tp} at the location of breakwater.

7.2.2.5 Complex system of sand-retaining and wave-damping structures

In complicated hydrological and oceanographical conditions, there should be a combination of alongshore and cross-shore structures in order to combine the effects of longshore sand retaining and wave damping, cross-shore sand retaining. Depending on the detailed requirements, the structures can be arranged in the following 3 schemes:

a. Scheme 1: Combination of groynes and detached breakwaters system, which form a combination of cellular walling (see Figure 7.6).

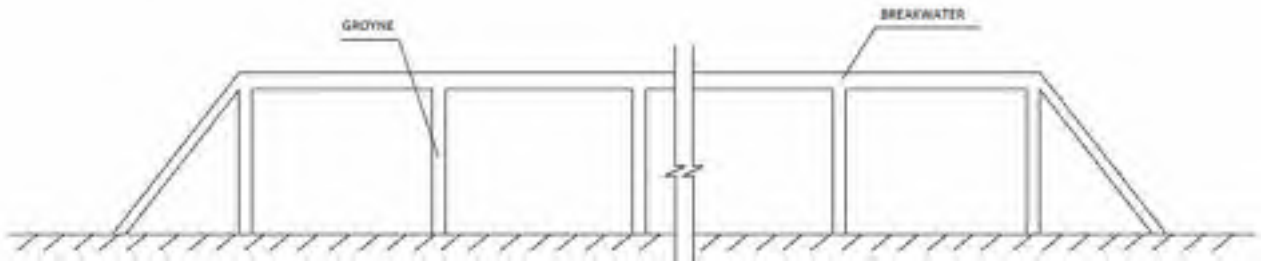


Figure 7.6 Cellular walling

b. Scheme 2: Groyne system (see Figure 7.7).

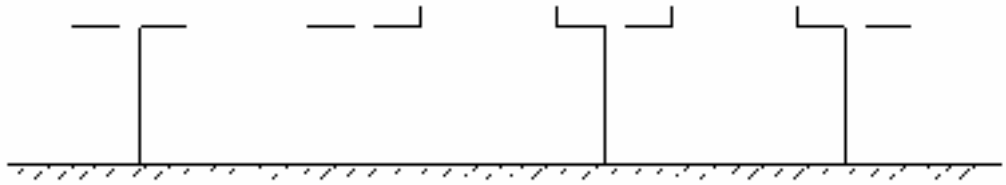


Figure 7.7 *System of T-shaped structures*

c. Scheme 3: complex structure system with horizontal, vertical direction and of different heights (see Figure 7.8).

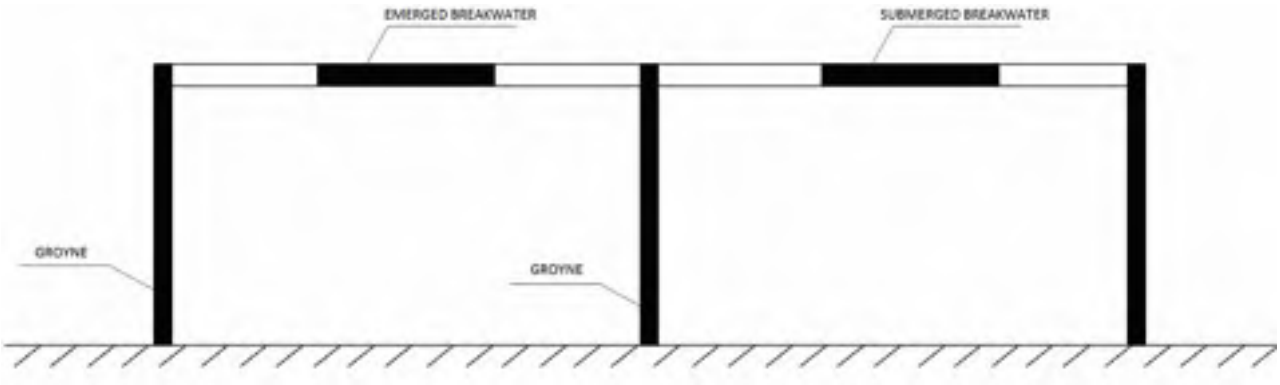


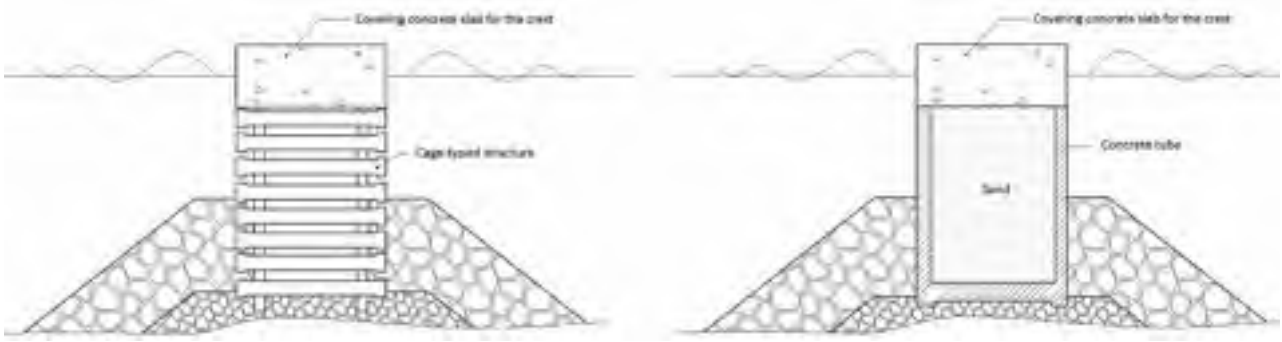
Figure 7.8*: Complex structure system*

7.3 Vertical sand-retaining, wave-attenuating structures

7.3.1 Vertical structures

a) Gravity structures:

Gravity sand-retaining and wave-attenuating structures include: cage-typed (or crib-typed) structures, concrete-tubed structures (see simplified illustration shown in Figure 7.9).



a) Timber cage *b) Concrete tubes*

Figure 7.9 *Constitution scheme of gravity veritcal structures*

b) Pile and sheet pile structures

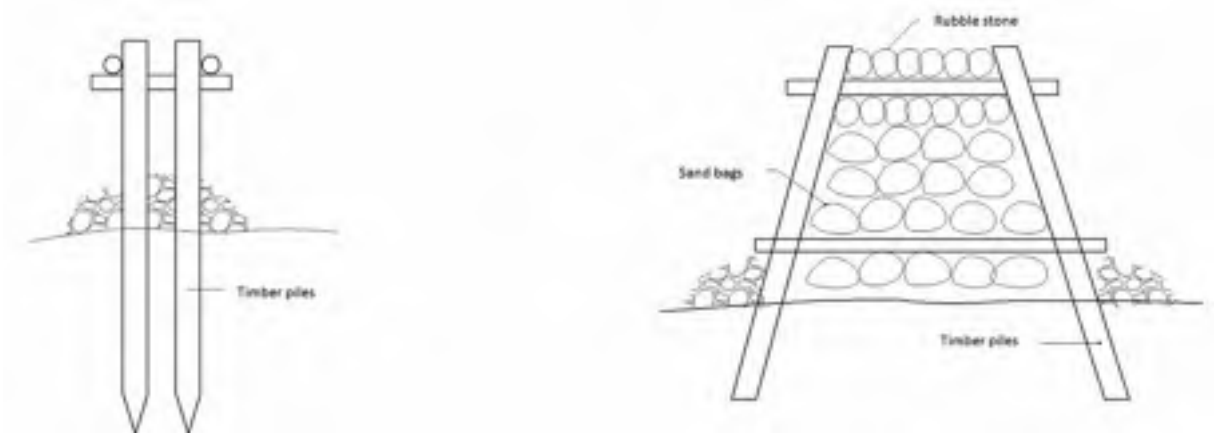
Depending on the actual conditions and the economical-technical calculations, one of the following types can be used:

- One row of single timber pile type: vertically driven, arranged in zigzaged or alternate patterns with tie bars and a height of about 1,5 m (see Figure 7.10a). The quarry-stones are scattered around the piles in order to prevent erosion and nearshore sand transport;

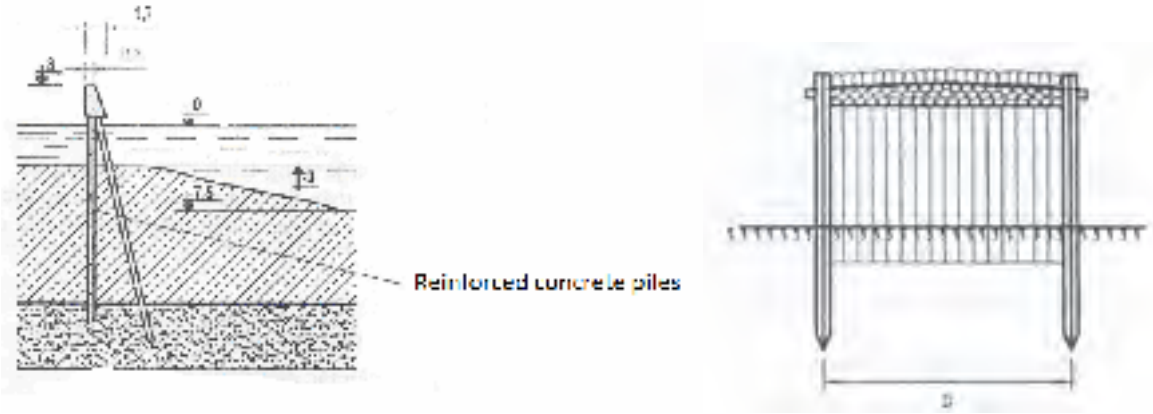
- Two rows of timber piles: forming the fencing wall with horizontal and vertical connection, and the material heaped between the two rows (see Figure 7.10b).

- Single or double reinforced concrete pile: with tie slabs, used for not so large wave-damping structures, convenient driving of reinforced concrete piles (see Figure 7.10c).

- Single or double steel sheet piles: used at the area with high waves, relatively deep shore, great stability is required (see Figure 7.10c).



a) Timber piles *b) Timber cages*



c) Concrete piles or steel sheet piles

Figure 7.10. *Configuration of vertical sheet pile structures*

7.3.2 Configuration of gravity vertical structures

(1) Weight and dimensions of placing blocks

Weight of concrete blocks is not less than the values given in Table 7.1.

Table 7.1 *Weight of placing concrete blocks*

Design wave height (m)	2,6÷3,5	3,6÷4,5	4,6÷5,5	5,6÷6,0	6,1÷6,5	6,6÷7,0
Weight of placing blocks (ton)	30	40	50	60	80	100

The blocks with spare holes can be used in order to pour concrete to increase the weight after the installation.

The variety of the placing blocks should be small. The ratio between the long side length and the height must be less than 3, between the short side length and the height must be less than 1.

Crest concrete blocks must cover all over the width of the cross-section, with a thickness greater than 1,0 m and a close connection with the groin body.

(2) Placing method

- The width of vertical openings between the placing blocks is about 2 cm, placed with a deviation given in Table 7.2.

Table 7.2. *Position deviation of the openings*

Deviation of opening position	Weight of placing blocks (ton)	
	≤ 40	> 40
On the cross-section	≥ 0,8 m	≥ 0,9 m
On axial section or layout	≥ 0,5 m	≥ 0,6 m

In special case: the deviating distance between the expansion joints can be 10 ÷ 30cm, the expansion joints connected from the crest to the bottm of the wall have a width of 2 ÷ 5cm. They should be placed at the area with the various types of structures, height of wall body or the footing thickness, characteristics of foundation soil.

(3) Footing of the structures

Thickness of dumped-rock footing is determined by calculation, should be greater than 1.0 m. The footing needs to be compacted as per technical requirements.

Along the footing base, there should be a strengthening layer made of quarry-stones, with a width in the order of 0.25 times of the design wave height. The thickness is determined according to the velocity of the wave-induced currents at the vertical wall, usually it is greater than 0,5 m.

(4) Head section: the outermost part of the structure with a length of 2 times of the crest width, the strengthening of the bed plate shoulder must be performed using cubic concrete blocks with a weight of 2÷3 times of slope covering blocks. If the footing is high, the slope of its base should be gentler than that in the inner segment.

(5) Toe section: Sloping structures are usually used with smooth connection with the shoreline, with no special treatment and no clear energy concentration.

7.3.3. Calculation of gravity vertical structures

7.3.3.1 Load combination

Design combination is taken into consideration in the following cases:

- Design high water level and design wave height;

- Design low water level and design wave height, determined by the method of calculating the refraction from the wave parameters in deep water at design low water level.

In case of the design high water level where the standing waves occurs in front of the dike, and of design low water level where the waves break, the calculation is performed with reference to the water level causing the greatest wave pressure during the fluctuation from the design low water level to design high water level.

Inspecting combination is taken into consideration in the following cases

- Inspecting high water level and design wave height;

- Inspecting low water level, without taking wave impacts into consideration.

During the design and inspection, the combination of waves at both sides of the groyne may not be taken into consideration, considering the water on lee side is still.

7.3.3.2 Calculation items

- Stability against overturning along the groyne bottom and along the horizontal openings, cogged openings inside the groyne trunk;

- Stability against sliding along the bottom of the structure and along the horizontal openings inside the groyne trunk;

- Stability against sliding along the footing base;

- Bearing capacity of the footing and subsoil;

- General stability of the foundation and the structure;

- Base settlement;

- Stable weight of the stones, structural elements of footing and base strengthening.

7.3.4. Computation of vertical structures of piles and sheet piles

7.3.4.1 Load combination

- Design load combination: wave pressure is dominant;

- Special load combination: mostly are the loads during the construction stage.

7.3.4.2 Calculation items

(1) Earth pressure and base counter-pressure

- For rigid piles: Active and passive pressures are calculated using Coulomn's method.

- For soft piles: Interaction between the earth pressure and the deformation of

the pile wall.

(2) Determination of burying depth, internal forces inside the piles

Using graphic or analytical methods, as per current standards (see Figure 7.11).

- Burying depth of the piles, t (m);
- Moment in the pile web, M (tm);
- Sag of the piles, f (mm).

(3) Calculating the durability of the piles and other structural elements

- Durability of piles: Determining the durability and the requirements of piles in the construction and manufacturing stages. Inspection of cracks and other requirements according to functionalities of piles must be performed.

- Other structural elements: anchor bar, cap beam, slab beam, surface covering blocks, oblique bearing piles, aproning plate, wave-damping blocks or edges at the crest, etc. The internal forces and durability must be calculated.

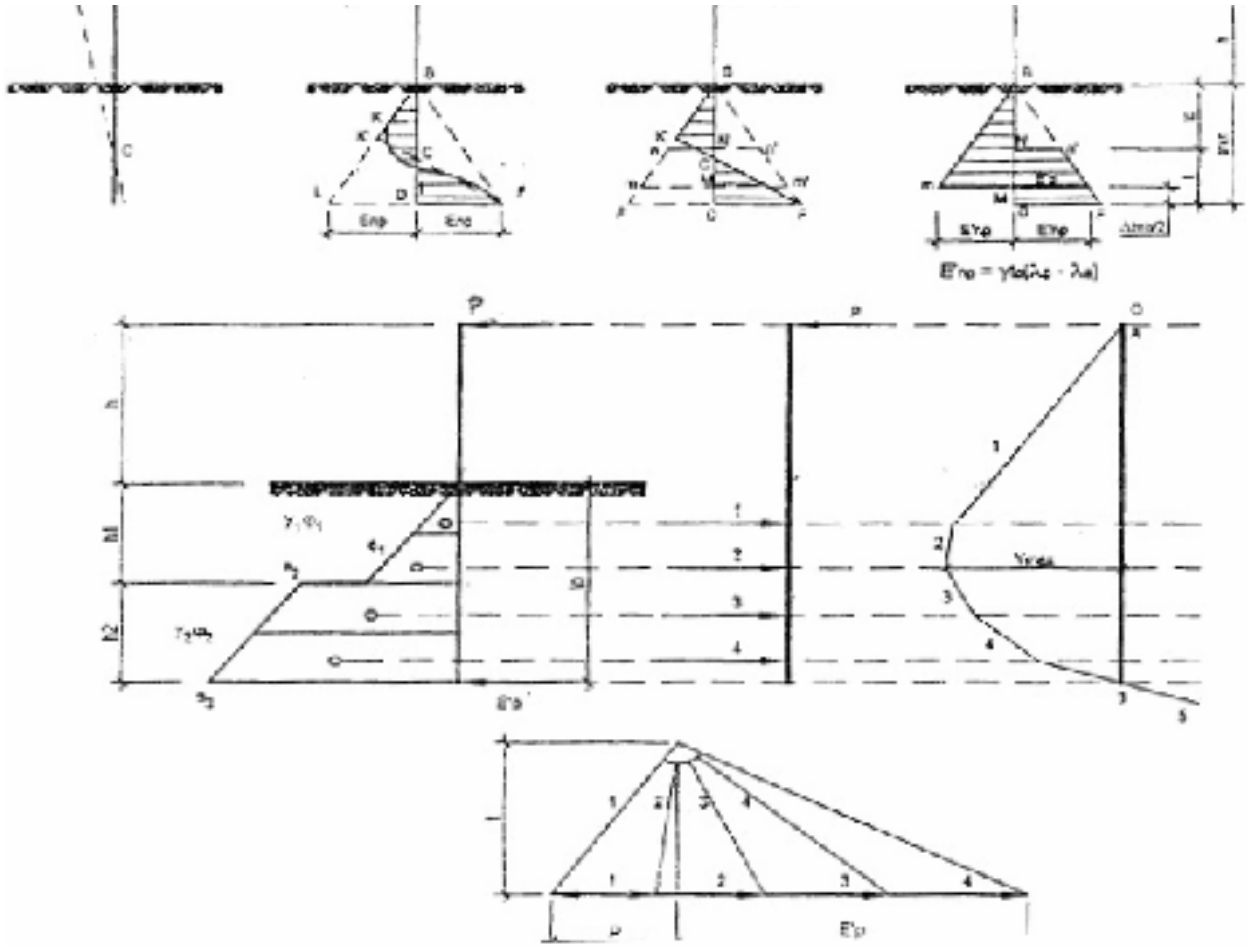


Figure 7.11. *Calculation schemes for single pile (free)*

*4. Strengthening range at the structure toe (*see *Figure 7.12)*

$$l_k = \frac{L_S}{4} \qquad (7.2)$$

where, l_k - Strengthening range at the structure toe;

L_S - Significant wave length at the structure toe;

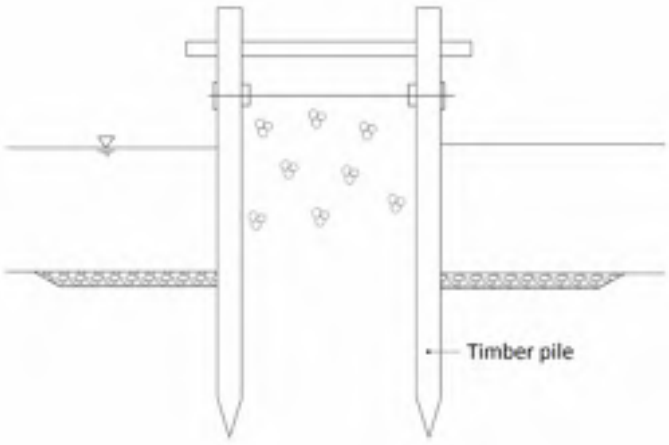


Figure 7.12 *Strengthening range at the structure toe using sheet piles.*

7.3.5 Design of sloping sand-controlling and detached breakwaters

7.3.5.1 Types of cross-section of groins, sloping detached breakwaters

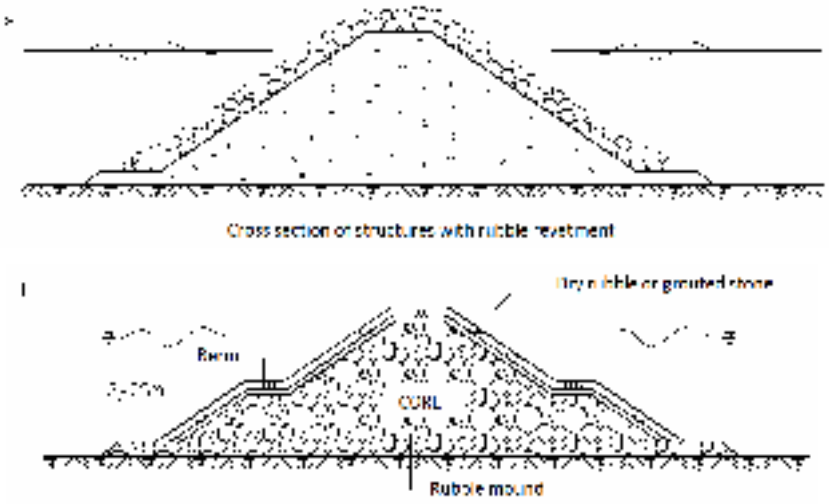
There are usually 4 types of sections (see Figure 7.13):

(1) Type 7.13a: Ungraded dumped rock core structure, covered by one layer of large-sized anhydrous-placed quarry-stones, with the slope covering layer of quarry-stone or concrete blocks;

(2) Type 7.13b: Berm steps are placed at the construction level. The slope on the berm step is covered with anhydrous-placed rocks or ripraps;

(3) Type 7.13c: Cubic concrete blocks is laid directly on the rock bedding layer, which forms the groin trunk;

(4) Type 7.13d: Angle wall-typed concrete blocks are placed on top.



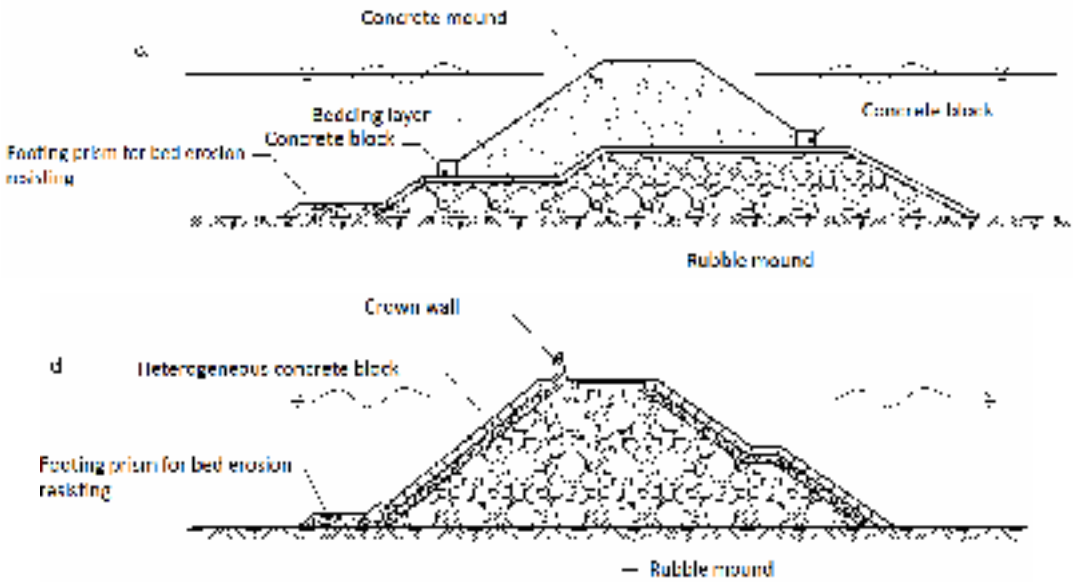


Figure 7.13. *Types of sea groynes and sloping breakwater cross sections*

7.3.5.2 Determination of cross-section dimensions

(1) Crest elevation and width: Based on the technical requirements of sand-retaining, and wave-damping extent for the area behind the structure in order to determine.

If there is only the requirement of sand retaining, the structure crest is at the same level as hourly water level with a frequency of 50%.

If there is also the requirement of wave attenuation, referring to the wave-damping effect in Section 6.3.2.

In addition, it is also necessary to take the following matters into consideration:

+ Waves and currents in overtopping with no impact on the navigation.

+ Demand for traffic on the crest during construction and service stages.

+ Width of the structure crest: it is 1.1 ÷ 1.25 times of design wave height in case of sloping structure, can be equal to the design water depth (at the head), at least 3 times of the width of seaward slope covering blocks.

(2) Crown wall

Crown wall is designed in order to:

- Increase the crest level without enlarging the body of the structure;
- Prevent the damage caused by wave overtopping;
- Make road for traffic.

In order to resist the waves, the crown wall level shoud not be lower than the design high water level by one time of the design wave height. It can be much lower if there is no significant requirement of wave resisting.

If the seaward slope is covered with quarry stones or rectangular concrete blocks, the top edge should be higher than the design water level by 0.6 ÷ 0.7 times of the

design wave height. The crown wall footing must be placed at least 1m from the edge of sloping rock core. The area between the edge of sloping rock core and crown wall footing is called the shoulder, which must be large enough to place at least one row of covering blocks.

If the seaward slope is covered with one layer of Tetrapod or Dolos blocks, the top edge must be higher than the crest level of the crown wall. The shoulder must be large enough to place 2 rows, 2 layers of covering blocks (see Figure 7.14).

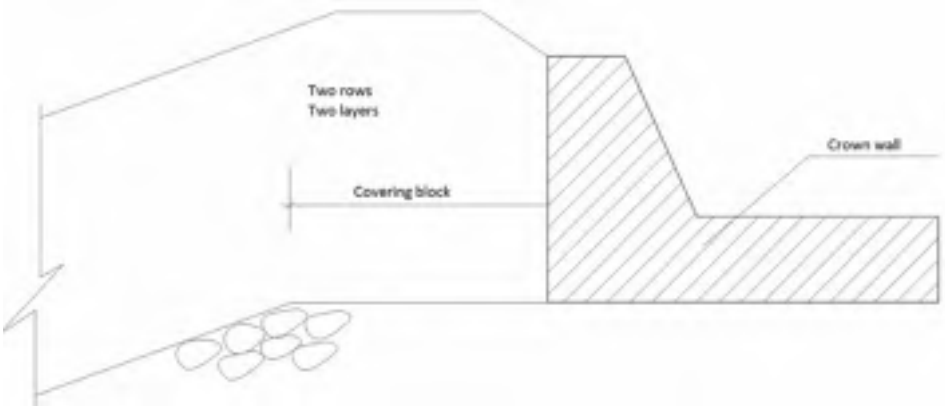


Figure 7.14. *Diagram of the shoulder and crown wall*

(3) Rock-dumped prisms at the seaward slope footing

Crest level of a prism is usually lower than the design low water level by about 1 times of design wave height. The width of the prism crest surface must be greater than 1.0 m.

(4) Slope gradient

Quarry-stone structures are usually designed with a slope coefficient m = 2,0 ÷ 3,0. Artificial concrete blocks can be placed on a slope with the slope coefficient m = 1,5 ÷ 2,0.

Note: *For the cross sections with concrete blocks placed on the rock bedding layer, the width of the groin body at design water level must be greater than 3 times of design wave height..*

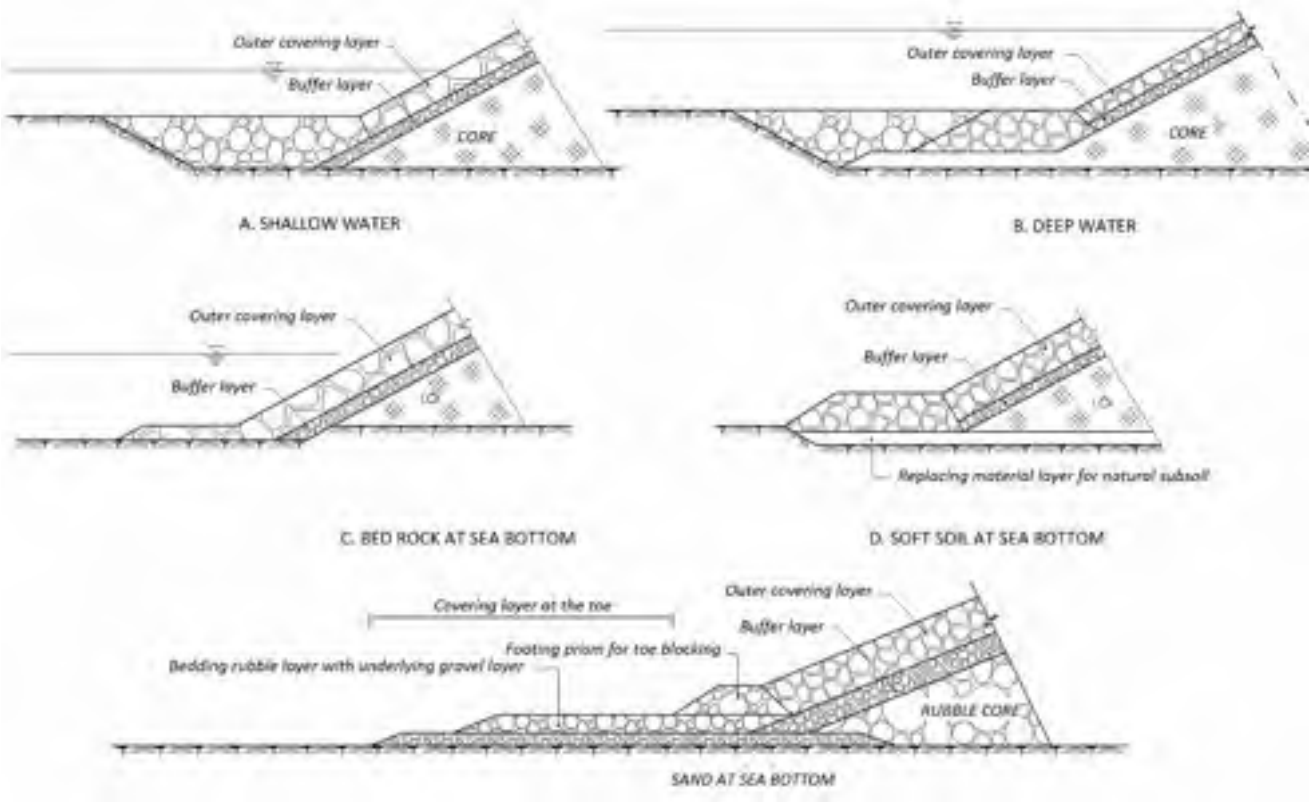


Figure 7.15. *Types of prisms at the footing of the slope*

7.3.5.3 Stable weight of slope covering blocks

(1) Heterogeneous concrete blocks covering the slope

Heterogeneous concrete blocks are used as slope covering blocks for the structures under the impacts of high waves, some common types in use are presented in Figure 6.3a and 6.3b.

Dolos blocks (see Figure 7.17) and Tetrapod blocks (see Figure 7.18) can be widely used for groynes and detached breakwaters in the coastal protection system.

Volume of the Tetrapod block: $\{V\} = 0,28\ H^3$ (7.3)

Volume of the Dolos block: $\{V\} = 0,16\ C^3$ (7.4)

A = 0,020 B = 0,32 C

D = 0,057 E = 0,364 C

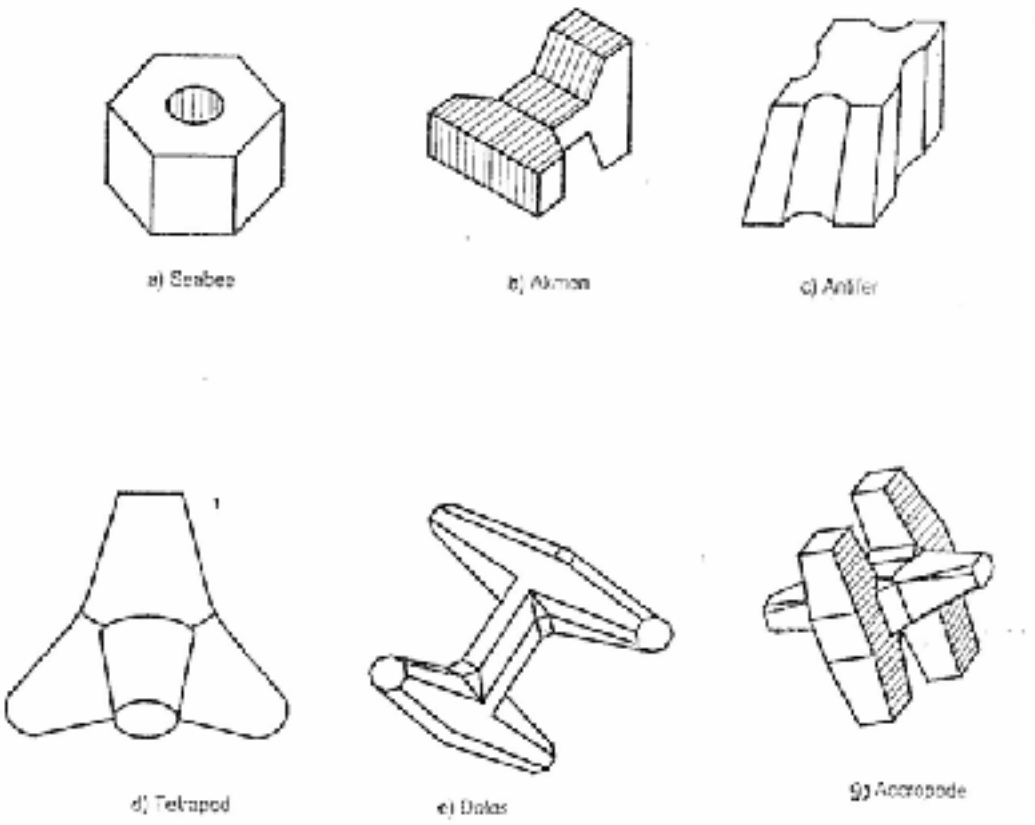


Figure 7.17. *Dolos blocks*

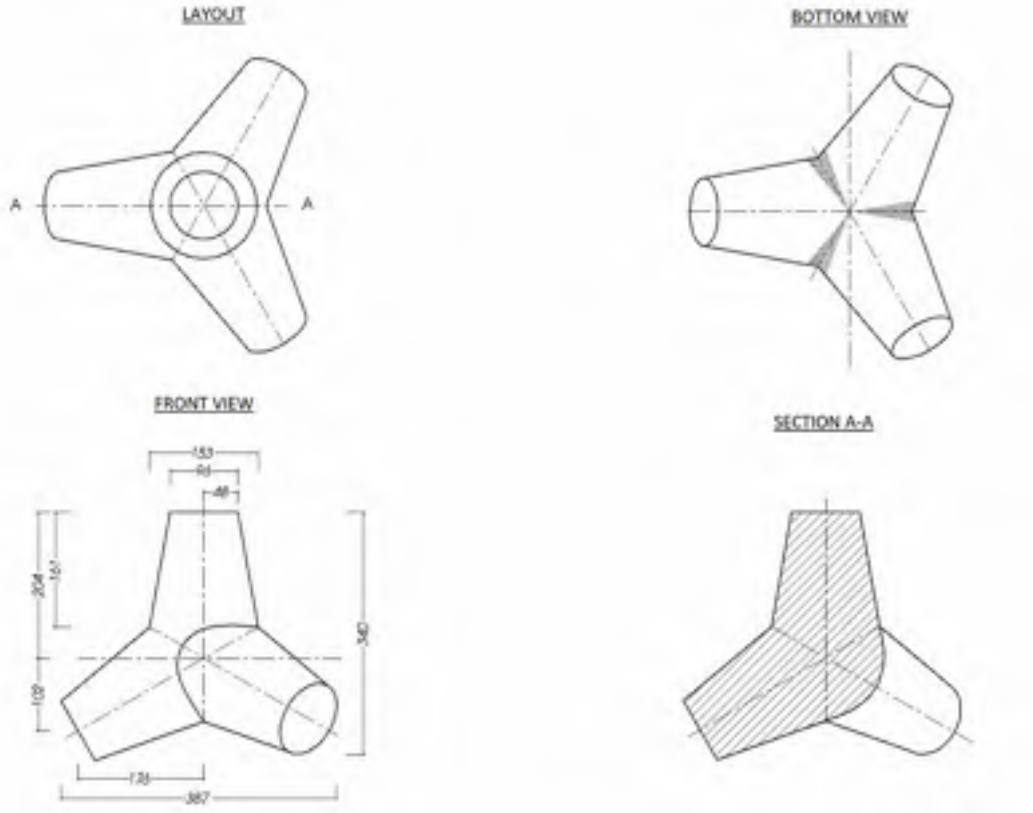


Figure 7.18. *Tetrapod blocks*

Table 7.3. *Determining the dimensions of Tetrapod blocks*

Dimension X	A	B	C	D	E	F	G	I	J	K	L
X/H	0,302	0,151	0,477	0,470	0,235	0,644	0,215	0,606	0,303	1,091	1,200

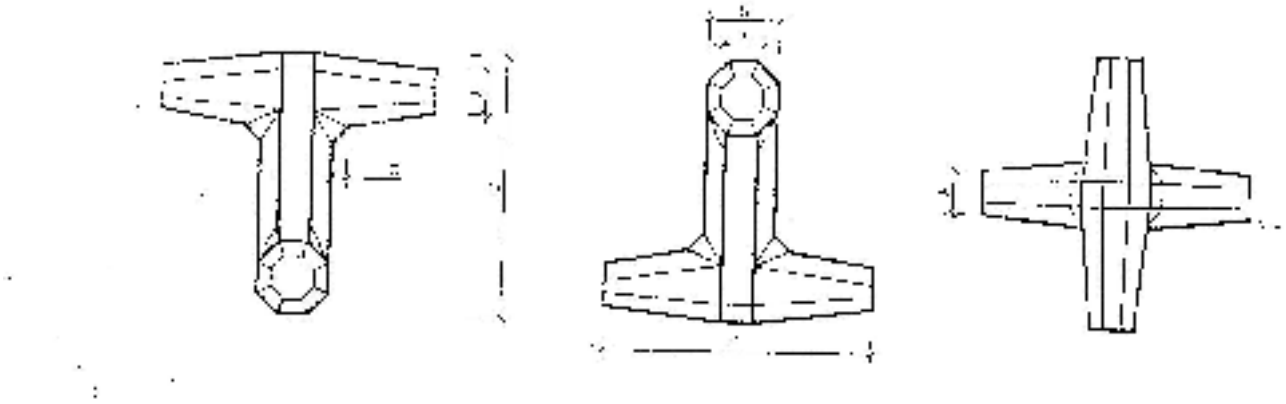


Figure 7.19. *Dolos blocks*

(2) Weight of covering blocks

- Stable weight of covering blocks on the slope of groynes or detached breakwaters is calculated by Hudson formula (7.5). Coefficient for heterogeneous materials or concrete blocks (K_D) is given in Table 7.3 and 7.4.

$$G = \frac{\gamma_B . H_{SD}^3}{K_D . \left(\frac{\gamma_B - \gamma}{\gamma} \right)^3 . cot g\alpha} \qquad (7.5)$$

where,

G - Minimum weight of the slope covering block (T);

γ_B - Specific density of covering material (T/m^3);

γ - Specific density of sea water (T/m^3);

α - Gradient of dike slope with reference to the horizontal line (deg);

H_{SD} - Design wave height, $H_{SD} = H_S$, determined as per Appendix C;

K_D - Stability factor, determined as per Table 7.3

Table 7.3. *Stability factor of concrete blocks*

Type of material	Method of placement	K_D
Quarry stone	Turbulent dumping in two layers	3
Quarry stone	Anhydrous pavement	4
Precast concrete slab	Independently assembled	3,5

Table 7.4. *Coefficient K_D for the heterogeneous concrete blocks*

Elements	Number of layers	K_D
Tetrapod	2	6 ÷ 8
Dolos	2	10 ÷ 12

- Weight of covering block need to be increased in comparison with Hudson's formula in the following cases:

+ Significance, complexity and unreliable source of input data are taken into consideration in order to increase the weight appropriately.

+ In case of the breakwaters located within the surf zone, the weight of covering blocks must be increased by 10 ÷ 25% compared to the non-breaking zone.

+ At the groyne head, the weight of covering blocks must be increased by 20 ÷ 30% compared to the design weight for the groyne trunk.

- Reduction of covering block weight need to be taken into consideration in the following cases:

+ Footing of groyne slope in deep water area: at the level which is lower than the design water level by 1.0 – 1.5 times of design wave height, the landward slope covering blocks have the same weight as the design weight as the covering blocks on seaward slope;

+ For the slope sections under design low water level: rocks with the same weight as that of the bedding rocks under the outer slope covering layer can be used, but not less than 150 ÷ 200 kg, checked with the design waves behind the groyne;

(3) Weight of crest strengthening blocks: Usually equal to the weight of corresponding outer slope covering blocks.

If the crest level is low (less than 0.2 time of design wave height above the design high water level), the weight of crest strengthening blocks (not the crown wall) is usually 1.5 times of the weight of corresponding outer slope covering blocks.

7.3.5.4. Configuration of sloping structures

(1) Thickness of seaward covering layer (d_f)

Thickness of seaward covering layer is calculated by the following formula:

$$\delta_f = n.C_f \frac{G}{\gamma_B} \qquad (7.6)$$

where,

G - Minimum weight of slope covering block (T);

d_t - Covering layer thickness (m);

n - Number of covering layers;

C_f - Coefficient, given in Table 7.5;

Table 7.5. *Coefficient C_f*

Type of blocks	Formation	C_f	P%	P%
Quarry stones	2-layer dumping	1,0	40	
Tetrapod	2-layer placing	1,0	50	
Dolos	2-layer placing	1,2	60	Irregular placement
		1,1	60	Regular placement
Quarry stones	1 layer placing (vertical)	1,3 - 1,4		

(2) Quantity of covering concrete blocks:

The number of covering concrete blocks can be calculated by the following formula:

$$N_K = F.n.C(1-p)\left(\frac{\gamma_B}{G}\right)^{2/3} \quad (7.7)$$

where,

G - Minimum weight of slope covering block (T);

N_K - Number of covering blocks;

F - Average area of slope covering layer (perpendicular to the thickness) (m^2);

n - Number of covering block layer;

p - Void ratio (%), given in Table 7.5.

(3) Weight of covering concrete blocks:

Weight of covering concrete blocks can be calculated by the following formula:

$$A = N_K\left(\frac{G}{\gamma_B}\right) \quad (7\text{-}8)$$

where,

G - Minimum weight of slope covering block (T);

A - Concrete volume, m^3 ;

The other symbols are already explained above.

(4) Bedding rocks under the slope covering layer, the core and buffer layer

- The rock bedding layer right under the slope covering layer must ensure the required dimensions so as not to be digged out through the openings between the covering blocks by the waves which cause the subsidence of the covering layer, and not to be

washed by the waves during the construction stage without the shielding of covering layers.

Weight of the stones in bedding layer is usually in the order of $1/10 \div 1/20$ of the weight of outer covering blocks. The bedding layer thickness is usually 2 times of the diameter of the bedding stones.

- Core of the groyne: quarry-stones with the weight in the order of $10 \div 100$kg is usually used.

Erosion can occur at the bottom zone under the wave impacts. Slope covering blocks and large quarry-stones of the slope footing prism must also be placed on the rock buffer layer (grading 10 -100 kg). The buffer layer should not be less thicker than the bottom erosion resisting layer.

(5) Base strengthening layer

Along the toe of the slope, if the foreshore erosion is likely to occur, the base-strengthening ground must be placed. The strengthening width is 0.25 time of the wave length at the top of the groin and at the slope under significant impacts of big waves, and it is 2.0m at other parts.

7.3.5.5 Stability calculation for sloping structures

(1) Stability of crown wall

- Wave pressure exerting on the crown wall block (or the concrete block covering the crest) is determined by the same method for vertical-walled structures. The following notes must be taken:

+ If the slope is covered with only rocks or square concrete blocks in front of the wall, it is not necessary to take the reduction effect of those blocks on the wall into consideration.

+ When the covering blocks protrude from the wall crest with two rows and two layers of Tetrapod or Dolos blocks placed along the shoulders, and wave pressure on the wall (horizontal and uplifting pressures), a reduction factor of 0.6 must be applied.

- The stability against sliding, overturning of the wall block adopting the same methods for vertical-walled structures must be investigated.

(2) Stability of foundation soil

- For the sloping structures on non-lava foundation, the investigation of general stability applying segment sliding method must be performed. In case of clamped layer of weak soil, the broken sliding surface method must be adopted in the calculation.

- Strengthening the weak soil foundation of sloping structure usually performed applying the method of drainage sand buffer layer. The vertical consolidating drainage distance is usually less than 5m. The thickness of sand buffer layer is usually $1.0 \div 2.0$m. The width of the sand buffer layer must be larger than the bottom width. When the weak soil layer is thick, the strengthening must be performed adopting the method of drainage sand pipe. When the thickness of the weak soil layer is small, the method of quarry-stone dumping for soil extrusion can be applied.

7.3.6 Artificial beach nourishment

7.3.6.1 Definition, forming and developing processes

Artificial beach-nourishing structures are measures that adopt artificial methods in order to transport the sediments from other areas to fill up the coastal sections to be protected to maintain and improve the beach stability or to create a desired beach and to recover the natural state of the landscape.

7.3.6.2 Design procedure

(1). Evaluating the present and historical conditions of the coast;

(2). Determining the wave regimes and influence factors;

(3). Verifying the sources, amount and quality of nourishing material;

(4). Evaluating the present structures and proposing the solutions;

(5). Designing the sections for the purposes of protecting the economic and residential structures under the impact of storms;

(6). Planning the monitoring, supervising, maintaining, repairing and re-nourishing processes after the construction.

7.3.6.3 Main parameters of artificial beach-nourishing structures

The following main parameters of some artificial beach-nourishing structures that need to be determined are as follows (see Figure 7.20):

+ Shape of cross section;

+ Nourishing range;

+ Elevation and slope of sand dunes;

+ Elevation, width and slope of foreshore berms;

+ Shore-nourishing volume and enhancing volume;

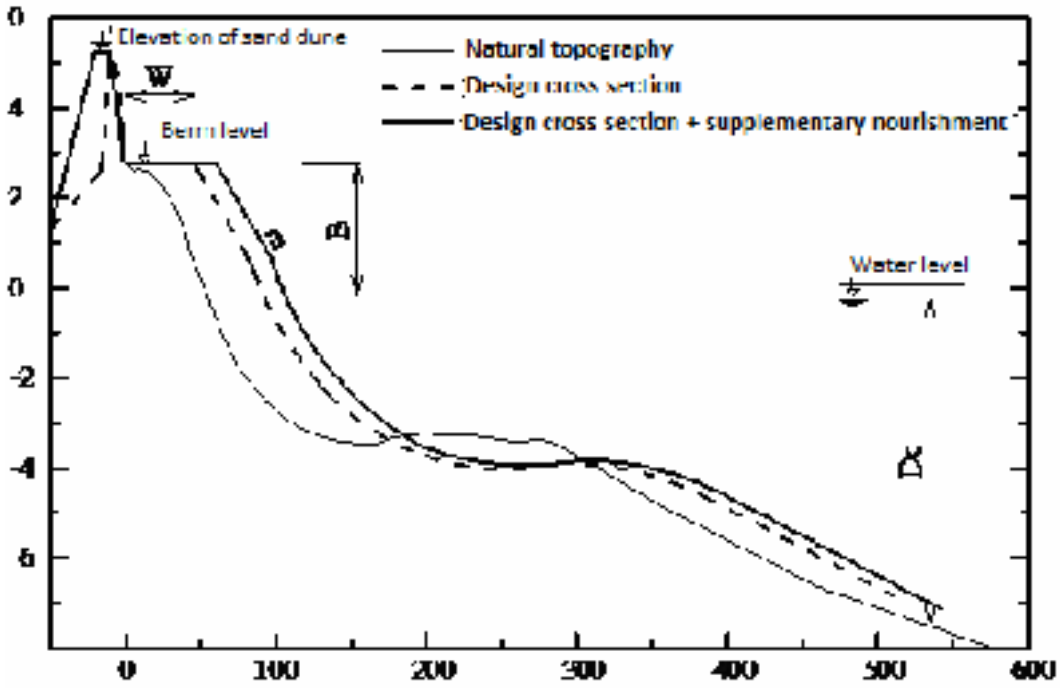


Figure 7.20. *Main parameters of artificial shore-nourishing structures*

8. MANAGEMENT AND PROTECTION OF NATURAL SAND DUNES

8.1 Formation

Natural sand dunes are formed by the wave-induced and wind-induced sand movement. In the areas along the coast, sand dunes are considered natural sea dike routes with the functions of storm shielding, salt intrusion prevention, etc. However, the sand dunes are usually under the impacts of natural factors and human intervention, and therefore they are usually not stable.

8.2 Solutions to protect the sand dunes

- Non-structural solutions: the most effective solution is to grow plants in order to retain the sand. Common types of plants such as Casuarina, Cajuput, and other needle-leaved plants; the soft-trunked plants such as Pandanales, Ipomoea imperati, Rhodomyrtus, Melastoma etc. or the bundles of dry grass can be used in order to prevent or retain the sand. Based on the natural conditions in each area, appropriate plants can be selected.

- Structural solutions: structures built for the purpose of preventing erosion,

However, the construction of these structures must be performed as per the following rules:

+ Preserving the plant system, with the area as large as possible.

+ No construction of the structures by the coast is allowed. The strip in which the construction is permitted is determined based on the wave setup.

9. TECHNICAL REQUIREMENTS IN SEA DIKE CONSTRUCTION

9.1 Construction technology and embankment quality control

9.1.1 Technical requirements of dike embankment

9.1.1.1 Profiling as per design cross section

Profiling piles and strings are used at site as per design dike cross section, at a distance of not more than 50m.

9.1.1.2 Measurement

The volume of dike embankment is determined on the basis of measuring the dike cross section before and after the embankment (entirely or partly). The dimensions and locations of the structures must be measured, ensuring the accuracy as per the approved design documents.

9.1.1.3 Preparation of dike foundation base (newly-built and upgraded dikes)

The dike foundation must be treated well in order to ensure the stability of the dike including the layout cleaning, the removal of cover layer as per the design documents. If case of dike upgrading, the foundation base must be cleaned; also, the cavities and hollows must be filled up; the weathered topsoil layer must be removed; the grading must be performed with the largest height for each grade is twice of compacting layer thickness (about 30 cm).

9.1.1.4 Embankment material

The filling soil must ensure the physico-mechanical properties and reserves as per the design requirements, which have been determined in the design stage of construction drawings; all the roots, rubbish and waste are completely removed prior to the exploitation of soil for the embankment. In case the filling soil is taken at site, apart from the aforementioned requirements, the exploiting location must be at least 20m (beyond the protecting range of the dike) from the dike toe with no impacts on the mangrove forests.

9.1.1.5 Compacting works

The embankment is performed in layers with the inclination of 2% - 5% for the drainage of rain water, getting higher with the dike elevation. The thickness of filling layers must be compatible with the functions of compacting machine, but not greater than 50cm. Compacting equipment must be compatible with the physico-mechanical properties of the filling soil as per the design, ensuring the link between the compacted layers into a homogeneous mass of soil.

The dike sections, which have been divided according to corresponding contractors, must be filled uninterruptedly ensuring the quality of filling soil at the adjoining locations.

In case the construction area is under the impacts of tides, appropriate construction methods and progress should be adopted; the water content of the filling soil must be maintained as per the stipulation, ensuring the design compaction.

9.1.1.6 Embankment of the testing dike

a. For low-cohesive soil:

In order to define the number of compaction to obtain the design dry density of soil, the testing dike must be built as follows:

- Dimensions of testing dike: 6x2x60 (m);

. - Compaction must be performed in layers with a thickness of 15cm.

Using the soil with natural moisture content, divided into 3 parts as follows:

+ Part 1: area 400 cm^2, 6 times of compaction;

+ Part 2: area 400 cm^2, 8 times of compaction;

+ Part 3: area 400 cm^2, 12 times of compaction;

- Some samples must be taken right after the compaction in order to inspect the in situ dry density of soil.

Grading characteristics must be analysed in order to determine the elastic limit and plastic limit of the same type of soil in use.

- Using the best result as a standard for the subsequent quality inspection.

Select the soil samples with maximum dry density determined by the method of embanking the testing dike in order to analyse the permeability.

The dry density of filling material must be equal to 95% of standard dry density after embanking the testing dike.

- For each type of soil, embanking the testing dike, and the corresponding results will be used as technical standards of design, and appropriate type of soil for construction can also be selected.

b. For cohesive soil:

With the above-mentioned compacting method for wet clay as presented in section 9.1.1.6, prepare a dike section for testing, determine the dry soil density at different locations with appropriate methods, using the average value as the standard dry density.

9.1.2 Regulations on quality inspection

9.1.2.1 Inspection of dike cross section

After the construction, the geometrical dimensions of the dike cross section must be inspected every 100m as per the current standards.

9.1.2.2 Inspection of compaction quality

Testing samples must be taken at regular distances (1 sample/300m^3 of filling soil) with dedicated equipments in order to analyze the moisture content and dry density at site and in the laboratory.

(1) Density and moisture content of soil at site:

In case of loose soil, the tests with at least 06 samples should be conducted and avarage results are obtained for each location. In case of cohesive soil, after the compaction presented in Section 9.1.1.6, some samples must be taken in order to

inspect the in situ density using the cutting ring on the cubic clay sample with smooth surface (appropriate length of the perpendicular side is 30 cm or 40 cm).

(2) Analysis of grading characteristics:

Taking an appropriate amount of soil samples in order to analyze the grading characteristics.

(3) Determining the elastic limit and plastic limit as per the current standards.

9.2 Technical requirements of the construction of dike slope protection structures

9.2.1 Rockfill revetment

9.2.1.1 Technical process of rockfill revetment construction

(1) Thickness of revetment

Ensuring the design thickness.

(2) Rock quality

Ensuring the technical standards as per 14TCN 12-2002[1] *"Hydraulic structures - Rock construction - Technical requirements of construction and acceptance"* and other current technical standards and codes; the mortar used in the construction must conform with the Technical Code 14TCN 80-2001[1] *"Hydraulic construction mortar – Technical requirements"*

9.2.1.2 Quality inspection of rockfill revetment after construction

(1) Quality of stones

Visual inspection is necessary and compression strength test in the laboratory must be conducted for rocks with different sizes if there is any difference during the in situ inspection.

(2) Thickness and placing method

The discrepancy of the revetment thickness must not exceed 5% of the design value.

(3) Grading characteristics of revetment rock

- Select an area of 50m^2, then measure the outer diameter of each stone and mark it using paint or chalk.

- Place the stones with the same sizes in a group (as per Table 15), then determine the percentage for each group.

Table 9.1 *Rock classification*

No.	Group	No.	Group
1	0,80÷1,0 m	5	0,30÷0,40 m
2	0,60÷0,70 m	6	0,20÷0,30 m
3	0,50÷0,60 m	7	0,10÷0,20 m
4	0,40÷0,50 m	8	0,05÷0,10 m

From the measured diameters of the stones, the area of each stone is determined, which is then multiplied by the thickness of rockfill revetment and the specific density of the rock in each group. By this way, the distribution of the stones with different sizes on the rockfill revetment surface can be determined. The existence of 50% of the stones having average weight (W50) must be ensured with an allowable error of 10%.

(4) Quality of mortar used for the construction of rock revetment

Ensuring a slump of 3 ÷ 9cm. Six (06) samples must be taken for every 30m^3 of mortar for the purposes of inspection in the laboratory.

9.2.2 Concrete revetment

9.2.2.1 Material requirements

Sand, gravel, water, cement are used for manufacturing the concrete of the revetment as per 14TCN66-2002 to 14TCN 73-2002[1] *"Hydraulic Construction Material – Technical Requirements and Testing Methods"*.

9.2.2.2. Inspection of concrete quality:

As per 14TCN 63-2002, 14TCN 64-2002 and 14TCN 65-2002[1].

9.3 Technical requirements of construction and quality inspection of sand and gravel filter layers

9.3.1 Thickness and placing method

The placement must be performed at the correct location, with correct grading characteristics and thickness as per the design drawings. The compaction of the filter layers is not necessary, however the construction must ensure the design grading characteristics and thickness.

9.3.2 Grading characteristics of fiter layers

Given in Table 9.2 and 9.3

Table 9.2. *Appropriate sand grading for filter layer (as per American standards)*

Sieve mesh size	Sieve N^0	Percentage of weight retained on the sieve
4,67mm	$N^0$4	0
2,83mm	$N^0$8	5÷15
1,19mm	$N^0$16	10÷25
0,59mm	$N^0$30	10÷30
0,297mm	$N^0$50	15÷35
0,149mm	$N^0$100	12÷20
Pan		3÷7

Table 9.3: *Appropriate gravel grading for filter layer*

Sieve mesh size	Sieve N^0	Percentage of weight retained on the sieve
19-38,1	3/4- 11/2	40÷55
9,51-19	3/8- 3/4	30÷35
1,19 mm	$N^0$4- 3/8	15÷25

9.3.3 Inspecting the quality of filter layer

Ensuring the design thickness with allowable discrepancy of 10%:

- Material used for the filter layer must meet the requirements of quality limited in terms of grading as given in Table 9.2 and 9.3.

- Samples of gravel and sand, which used for the filter layers, are taken every 20m along the length of the dike in order to analyze the grading characteristics.

9.4 Technical process of the construction and quality inspection of filtering geotextile

9.4.1 Placement of filter geotextile

- Keep the area where the filtering geotextile is placed dry or perform the placing works at low tides.

- Preparing the layout for filtering geotextile spreading: cleaning, levelling works on the slope.

- At the area with no water, dig the cut-off to the design level and place the filtering geotextile, pinned to the cut-off and slope as per the design guidelines.

- At the area with water, filtering geotextile is placed into the cut-off grove and pinned. The geotextile must be spread from the toe up to the slope in the submerged condition; the pinning at the submerged toe and slope must be performed carefully in order to prevent the uplifting out of the acting point due to water and wave.

- The abutting location between the two overlapped geotextile is 30÷50 cm. If the two geotextile are stitched together, the strength of the joint must be at least 80% of filtering geotextile strength. The top part of the filtering geotextile must be stabilized without water running under and prevent the damage during long period outdoors (not more than 5 days), not exposed to hot sunlight.

9.4.2 Quality inspection of filtering geotextile construction

To be performed at site and at the same time, inspect the cut-off dimensions and rock placement of the revetment. The geotextile quality must meet the design and inspection requirements as per 14 TCN 91- 1996 to 14TCN 99- 1996: *"Geotextile – technical requirements and testing methods"*.

9.5 Technical process and inspection of grass quality on the inner dike slope

9.5.1 Technical process

Pieces of fresh grass with dimensions of about 30x30cm and thickness of 5÷10cm are anchored by bamboo piles on the slope.

9.5.2 Quality control

Visual inspection of quality, ensuring the covering of grass on dike slope as per design requirements.

9.6 Technical process of growing mangrove forest

- Selecting the appropriate types of mangrove forest corresponding to the natural conditions of each area, such as geology, pedology, climatology, hydrology, etc. with good capacity of wave attenuation;

- Reclaiming the soil in order to facilitate the growth of the trees during the initial stage in the areas where the soil is infertile and the alluvial sediment deposition is low, not capable of satisfying the requirements of tree growth.

- Appropriate techniques of growing and facilitate the growth of the trees during the initial stage;

- Selecting the appropriate crops for the growth of the trees.

9.6.1 Technical process

Mangrove plants such as Bruguiera are grown on the foreshore ensuring a distance of 1x1 m between the plants, crossed-planting, with a density of 10.000 trees/ha, about 1m from the dike toe. The width of planting band is equal to 3÷5 times of wave length with wind velocity of 32m/s, which is about 30÷50m on average.

9.6.2 Quality inspection

Visual inspection of quality in terms of extent and density. The inspecting duration is stipulated by the design regulation.

9.7 Technical requirements of the construction of sloping sea groynes

9.7.1 Dumping sand for the treatment of foundation

- The influence factors such as depth, current and wave must be studied in order to overcome the sand drifting phenomenon. Some tests should be conducted to determine the anchoring locations. If the depth is great and current velocity is high, the methods of pouring sand using funnel, injection pumping etc. can be adopted.

- Dumping sand: The division of construction stages is needed, the rock covering must be performed in time after the sand dumping. The division length depends on the natural conditions, construction capacity. The requirements of sand dumping quality are as follows:

+ The top of sand layer must not be lower than 0,2m; not higher than 0,5m with reference to the design elevation.

+ Width of the dumped sand top layer must not be smaller than the design width and not exceed 3m on each side.

9.7.2 Dumping of rock and cubic concrete blocks

9.7.2.1 Division of construction stages

Based on the design, construction capacity and the impact level of tides, waves and currents at different locations on the dike body in order to determine the construction procedure with division and bedding.

9.7.2.2 Dumping location

Based on the depth, current velocity and wave velocity in order to determine the anchoring location of rock-dumping barges.

9.7.2.3 Sequence of rock dumping on soft soil foundation

- In case loading quarry-stone layer is placed, release the loading part and then the dike body rocks;

- In case the foundation extrusion is needed, dump the stones from the middle and gradually to both sides.

9.7.2.4 Dumping of rock covering the slope and buffer layer

Ensuring the design thickness, and the covering rock layer must not be steeper than the design slope.

9.7.2.5 Allowable error

For the dumped rock that forms the outline of the design dike profile, see Table 9.4.

Table 9.4. *Allowable error for dumped rock at the outline of design cross section*

Weight of dumped rock (kg)	10÷100	100÷200	20÷0300	300÷500	500÷700	700÷1000
Allowable difference in level (cm)	±40	±50	±60	±70	±80	±90

9.7.2.6 Levelling the rock-dumping surface and rock placement

The difference in level between the design outline and the actual profile is given in Table 9.5.

Table 9.5. *Allowable level difference between actual and design outline*

Work	Weight of rock (kg)	Allowable difference in level (cm)
Levelling	10÷100	±20
	100÷200	±30
Placing	200÷300	±40
	300÷500	±50
	500÷700	±60
	700÷1000	±70

9.7.2.7 Restraining the boundary line

Prior to the casting the cubic concrete blocks, blocks of ribs should be placed in order to restrain. The discrepancy between the actual outline and design outline must not exceed 30cm.

9.7.3 Fabricating and laying the covering blocks

9.7.3.1 Closed formwork for the fabrication of concrete structural elements.

The formwork for the fabrication of concrete structural elements usually made of steel, ensuring the stiffness, easy to fabricate and dismantle.

Upon pouring the concrete into the mould: if the top surface gets air bubbles, before the concrete set, use the mortar to plaster once, and screed many times in order to ensure smoothing. Dimension errors and surface defects for precast structural elements must not exceed the values given in Table 9.6.

Table 9.6. *Dimension errors and surface defects for precast structural elements*

Items		Allowable error (cm)	Notes
Dimensions	- Length of sides - Diagonal - Height - Location of openings	±1,0 ±2,0 ±1,0 ±2,0	Applied for the structural elements with standard geometrical dimensions
Surface defects	- Chipped side - Blistering depth - Discrepancy at the formwork joining	≤5,0 ≤0,5 ≤2,0	Applied for concrete structureal elements

9.7.3.2. Transportation

The strength of concrete structural elements must meet the requirements of hoisting before being transported.

9.7.3.3 Installation

Impacts of waves and construction progress must be taken into consideration, ensuring closed covering for the underlying rock before being eroded. Prior to the installation, the inspection of additional maintenance of the slope inclination and the actual conditions of underlying rock layer surface must be performed, levelling by means of small-sized stones scattered in order to fill the large openings. Allowable error must not exceed ± 5cm for the construction works above the water, and ± 10cm under water.

9.7.3.4 Covering blocks at the base of the slope

Ensuring the close contact with rock-dumping prism at the dike toe.

9.7.3.5 Using Dolos or Tetrapod blocks for slope covering

Ensuring a uniform density all over the slope.

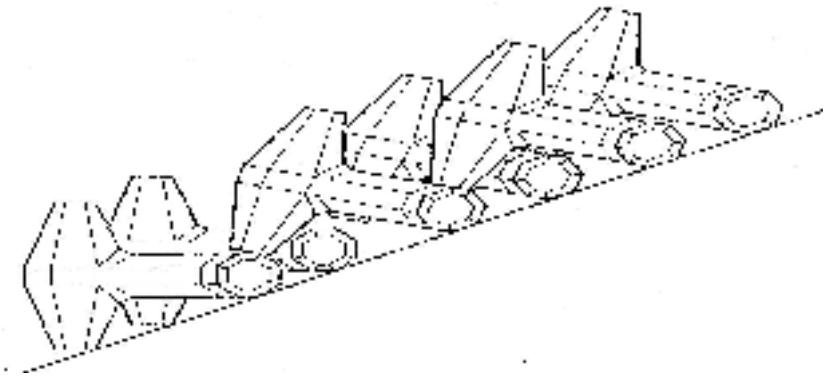


Figure 9.1. *Placing diagram of Dolos blocks on the slope*

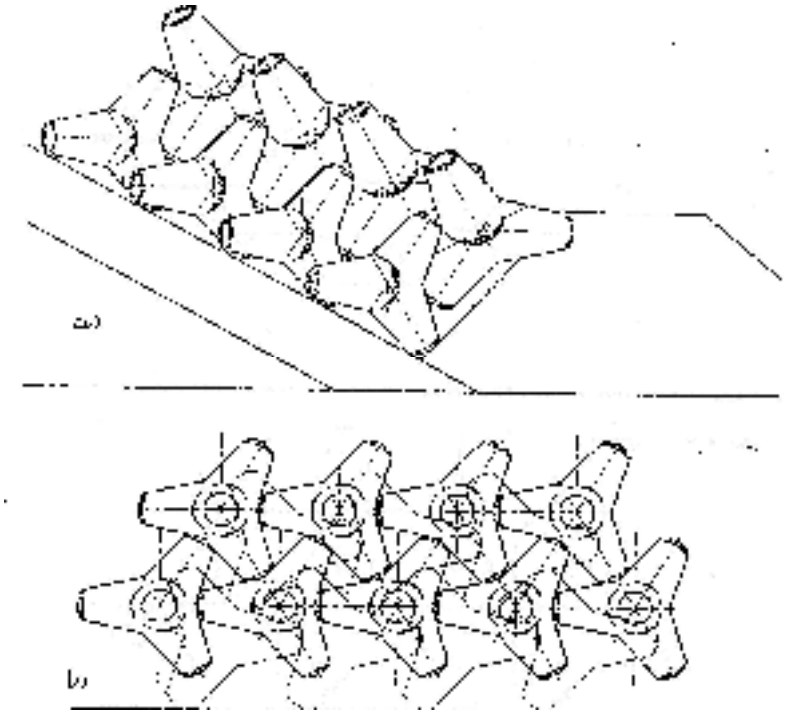


Figure 9.2. *Placing method of tetrapod blocks on the slope*

a. Cross section; b. Layout

- Method of placing Dolos blocks: vertical placement at the lower part of the slope, borne by the horizontal ribs of the underlying blocks; horizontal placement, borne by the rock layer of the dike slope. Connecting bars cross the horizontal rib of the adjacent blocks so that the underlying stones are not exposed (see Figure 9.2).

9.7.3.6 Installation error of structural elements

- For Dolos and Tetrapod blocks: The discrepancy between the actual installation quantity and the design quantity must not exceed ± 5%.

- For square block-typed slabs: the level difference with the adjacent blocks must not exceed 15cm, the jointing opening between the two blocks must not exceed 10cm.

9.7.3.7 In case of the slope covered by anhydrous-placed quarry-stones

The shapes of the stones should be relatively close to the prism, with the length not smaller than the design thickness. The stones are placed vertically, their weight must be greater than the design weight. Covering layer made of quarry-stones must meet the following requirements :

- More than 90% of the area ensuring the design thickness;

- The opening between two paving stones must be less than 2/3 of the smallest diameter of the underlying rock layer, with no inter-connecting openings perpendicular to the surface of covering layer. The dimensions of the openings are defined as follows:

+ Allowable width joining openings: 3 cm;
+ Allowable width of triangular openings: 7 cm;
+ Allowable roughness of slope surface: 3 cm;

- Anhydrous-paving stones must be closely packed with smaller stones locked underneath, using the crowbar to prise a big stone from the slope, then 2 or 3 adjacent stones are also prised up..

9.7.3.8 Slit-pushing mortar, closed jointing

The allowable requirements of rock construction are as follows:

- Joint : 4 cm

- Width of triangular openings: 8 cm

- Raveling: 3 cm

9.8 Environmental aspects

During the construction stage, the environmental impacts must be limited. no damage to the mangrove forests; solutions for reducing noise and dust must be adopted when transporting the material and during the construction; the layout and traffic roads which are under the impacts of the construction must be restored.

10. MANAGEMENT, REPARATION AND MAINTENANCE OF SEA DIKES

10.1 General stipulations

- The protected extent of sea dikes must conform to Dike Code coming into effect since July 1st 2007.

- Sea dikes that have been completely built must be handed over to the dike management authority as per the current stipulations.

10.2 Structural reparation and maintenance

The repairing and maintaining works should be performed periodically in order to ensure the quality of the structure, including the following steps:

10.2.1 Inspecting, monitoring the working state and changing the hydraulic conditions

10.2.1.1 Periodic inspection

To be performed once or twice a year based on the following factors:

- Density and intensity of the storms which may break in the area (seasonal forecast for each area);

- General significance and strategic location of the structure;

- Depending on the location and significance of the structural elements;

+ Concentrating on the areas which are under regular impacts of the loads (such as the body of revetment slope, transitional locations etc.);

+ Inspection of the abrasion, cracks, displacement or the failure of the dike under the impacts of waves and currents.

- Dike and revetment slope should be inspected and monitored in terms of the following factors:

+ Elevation of dike crest, settlement of the dike body;

+ Quality of the dike slope and dike body protection (slope stability, burrows and holes etc.);

+ Geometrical dimensions of the revetment (axial sections, cross sections, thickness);

+ Physico-mechanical properties of revetment slope;

+ Quality of the transitional structures (revetment toe, filter layers…);

+ Development of the scour in front of the dike toe (if applicable);

- In case of the structural elements above the low tidal water level, the duration of periodic inspection is given in Table 10.1.

Table 10.1 *Duration of the periodic inspection*

Item	Longest period
Geometry of the revetment slope	12 months
Position of stones on the revetment slope	12 months
Physico-mechanical properties of the revetment slope	12 months
Scour development	6 months

- In case of the structural elements submerged by the water for a long time, the inspection period should be at least once a year.

10.2.1.2. Situational inspection

According to the situation of the storms, before the strike of the storm (as per forecasting), the actual status of dikes and revetments must be inspected in order to prepare for the likely situations. After the storm, the failure situation of the dike and revetment must be inspected in order to propose the plan for repairing and overcoming timely.

10.2.1.3. Hydraulic conditions impacting on the structure

Equipments to detect the change of hydrological and oceanographic conditions must be used in order to analyse the changing trend (favourable or adverse) of the loads exerted on the structures. Based on these data, the planning for upgrading and improving dikes and revetments in future can be made.

10.2.2. Reparation and replacement the structural elements that are no longer appropriate

Failures are usually easy to recognize on the revetment slope. In case the displacement is very large, the stones must be re-laid to obtain necessary thickness of two-layer rock formation. This type of material can be reused many times; broken or abraded stones must be replaced. If the hollows with large area appears on the dike slope, they indicate the construction quality of filter layers does not meet the requirements, causing the washout of material in the dike body. In this case, the dike body and revetment slope must be repaired timely.

The revetment toe must be maintained regularly, especially in case the scour has developed intensively in front of the dike toe. The scour must not develop unfavourably and it must not approach closely to the revetment toe. The scour at the revetment toe must be supplemented with rocks which have sufficiently large sizes and appropriate width.

APPENDIX A - FREQUENCY CURVES OF NEARSHORE WATER LEVEL FROM QUANG NINH TO QUANG NAM

I. SCIENTIFIC BASES

I.1 Data bases

Data that has been used to build the frequency curves of nearshore water level from Quang Ninh to Quang Nam includes:

- Detailed topographic maps with a scale of 1:25000 for the whole area from the shorelines to 20 meter depth; topographic maps with a scale of 1:500000 and 1:1000000 for East Sea (Gulf of Tonkin).

- All the parameters of the storms that strike on East Sea and have impacts on Vietnam from 1951 to 2007 (including 349 storms) (*source: Hydrometeorology Forecasting Division, Japan Meteorological Agency (JMA), Far Eastern Research Institute of Rusian).*

- Continuous measured data on water level at 29 estuarine hydrological stations (Bến Triều, Đò Tranh, Mũi Chùa, Cửa Cấm, Đông Xuyên, Ba Lạt, Định Cư, Ngô Xá, Hành Thiện, Phú Lễ, Như Tân, Cửa Hội, Hoàng Tân, Lạch Sung, Lèn, Vạn Thắng, Bến Thủy, Cửa Hội, Hộ Độ, Lương Yên, Thanh Khê, Cửa Việt, Hiền Lương, Thạch Hãn, Huế, Sông Hàn, Câu Lâu, Cẩm Nhượng, Hội An) and 8 nearshore hydrological stations (Cửa Ông, Hòn Gai, Hòn Dáu, Cửa Hội, Cửa Gianh, Cửa Việt, Đà Nẵng, Quy Nhơn) (*source: Centre for Marine Hydro-Meteorological).*

- Hourly water level during storm duration (in 5 or 7 days) at above-mentioned stations (*source: Centre for Marine Hydro-meteorological).*

- Data on the storm surge surveys immediately after striking (*source: Centre for Marine Hydro-meteorological and Center for Marine Environment Survey, Research and Consultation).*

All of the bathymetric data is digitized and the bathymetric charts and shore-line maps are drawn for the numerical models. All the storm parameters are aggregated into a single data set. Apart from the usage of these datas in the calibration and vetification of numerical models (problems of storm surge), the statistical analyses have also been performed for the purpose of obtaining the distribution patterns of storm parameters such as speed, intensity, striking location, etc. in order to create a hypothetical storm. Data on hourly measured on water level for many years at nearshore the hydrological and oceanographic stations has been analysed in order to determine the harmonic

constants (amplitude and phase) of the constituent tidal waves. These results are used in the calibration and vetification of numerical models (problems of tide), as well as the description of hourly tidal level for a period of 19 years. Measured data during the storm duration and survey data after the storm are used in the calibration and vetification of numerical models (problems of storm surge).

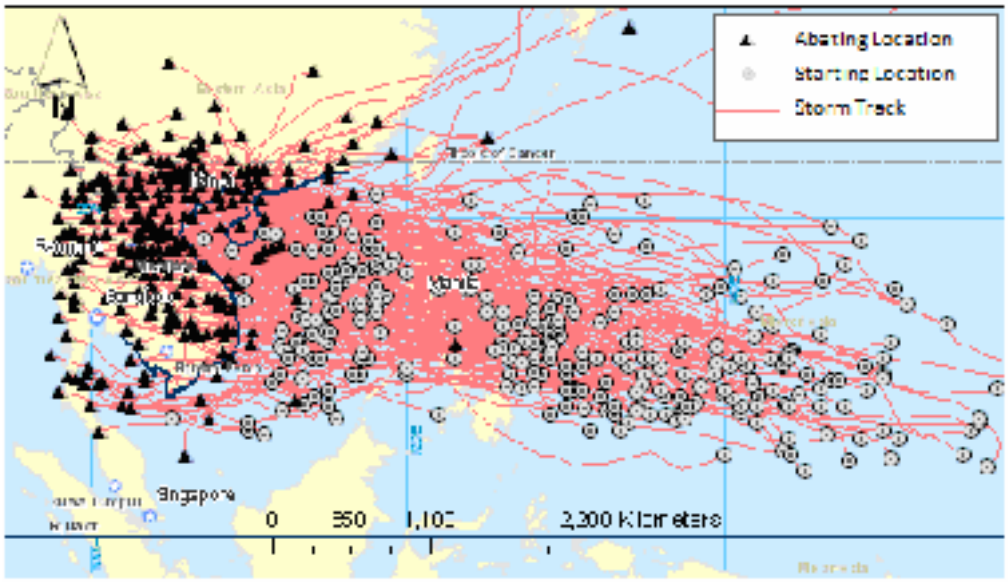


Figure 1.1. *349 historical storms striking on East Sea*

I.2. Data analysis and process

I.2.1 Tidal harmonic constants

According to theory of harmonic tides, astronomical tidal water level can be determined by the combination of the wave levels generated by the constituent tidal waves, using the following formula:

$$z_t = A_0 + \sum_{i=1}^{n} f_i H_i \cos[q_i t + (V_o + u)_i - g_i] \qquad (1)$$

where,

Z_t - tidal level with reference to a certain datum;

n - number of constituent tidal waves;

A_0 - reference constants with reference to the Mean Sea Level;

f_i - reduction factor for tidal amplitude;

$(V_0+u)_i$ - initial phase at Greenwich meridian,

H_i, q_i and g_i - amplitude, angular speed and phase of i^{th} constituent tidal wave, respectively;

Based on the data on hourly water levels for many years and upon applying formula (1) and method of harmonic analyses [4], the harmonic constants Hi and gi of the tidal waves at the stations can be determined. In fact, the results indicate that in the coastal waters of Vietnam, there are 10 tidal waves with significant amplitudes, which are M2, S2, K1, O1, N2, K2, P1, Q1, Sa and Ssa. From these harmonic constants, it is easy to compute the astronomical tidal water level at a certain station at any time. In addition, these harmonic constants are also used to calibrate and verify the numerical models (by means of the module for tidal computation).

I.2.2 Storm surge

Storm surge wave can be separated from the measured data on water level during storm duration time by using the formula: $Z_{nd} = Z_{do} - Z_t$, with Z_{nd} – storm surge, Z_t - measured water level. At the stations where the harmonic constants are available, it is easy to compute the tidal level Z_t by formula (1). At the stations where the harmonic constants are lacked, the method of retrieval [1] can be adopted. From the data on water levels during storm duration, 2200 data series at 23 stations due to the storms from 1960 to 2006 have been collected and analysed due to. These results are used to calibrate and verify the numerical models (by means of the module for storm surge computation).

I.2.3 Storm parameters

Based on the data on historical storms provided by Vietnamese Meteorological Forecasting Bureau, lacking data on storms or the timing when the data on offshore storms are not available from other sources has been added. In the next step, additional computation of storm parameters, which are lacking or not available such as maximum wind velocity W_{max}, storm direction θ, storm speed V_c and storm intensity at each timing of observation (OBS), and location of storm striking (φ latitude, orbit of the storm crossing the shoreline), is performed for each storm by the Geographic al Information System (GIS).

Different ranges of storm impact on the study area are determined:

+ Zone 1 – the storm is still far away, about 500km from the shoreline; in this zone, storm surge has not yet occurred in the study area;

+ Zone 2 – the storm is 200km from the shoreline, the storm surge is significant;

+ Zone 3 – next zone until the storm strike; this is the moment when the storm surge is maximum;

+ Zone 4 - after storm has struck; storm usually abates or change its intensity dramatically (see Figure I.2).

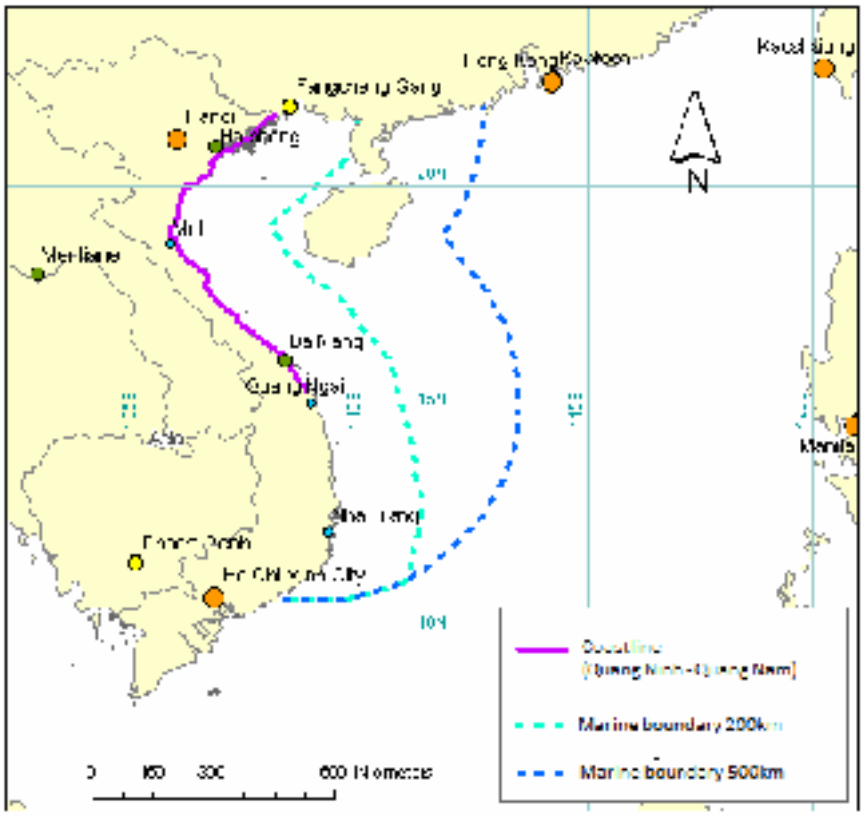


Figure I.2. *Study area and divison of the areas under the impacts of storms*

The statistical distribution of each major storm parameters: P_o, V_f, θ, φ, for each area is determined by the following formula:

$$\overline{Q} = \frac{1}{N}\sum_{i=1}^{N} Q_i \qquad (2)$$

in which: Q - one of these values: P_o (pressure at the storm centre), V_f or θ, (indicates the average value), *i (* the ith OBS) ; *N (*number of corresponding OBS).

The results of correlation analysis between the wave parameters given in Table 1 indicate that the wave parameters are mostly independent of each other. The most remarkable matter is the low average correlation (-0.32) between the striking location φ and the month of striking. This is concordant with the judgement: storms usually strike in the Northern areas at the beginning of the stormy season and move Southwards at the end of the season (Đào, 2002).

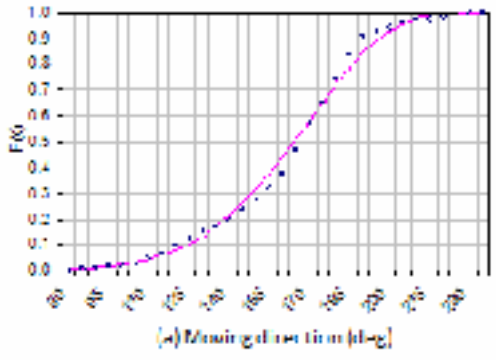
Table 1. *Correlation coefficient (R) between storm parameters (Zone 3)*

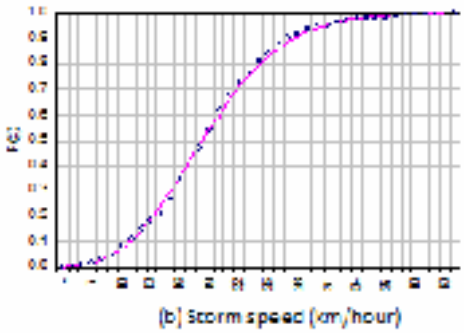
	Moving direction (θ)	Speed (V_f)	Pressure at centre (P_{min})	Striking location (φ)	Striking duration		
					Hour	Day	Month
V_f	**0.15**						
P_{min}	-0.01	**-0.20**					
λ	0.01	0.10	**-0.17**				
Hour	0.08	-0.07	0.01	0.05			
Day	0.07	-0.09	0.06	0.02	0.00		
Month	**0.24**	0.01	0.06	**-0.32**	-0.05	**-0.22**	
Year	**-0.12**	-0.09	-0.08	-0.05	0.09	0.06	-0.05

I.3. Building hypothetical storms

Statistical functions (probabilistic distribution) of 313/349 historical storms that struck the shoreline from 14°N to 22°N (see Figure I.3) have been built for 4 storm parameters (location of storm striking - λ, pressure at centre - P_o, storm direction - θ and storm speed - V_f).

Each hypothetical storm includes 3 sections corresponding to 3 zones (zone 1, zone 2 and zone 3+4); each zone has 4 paramerters (coordinates (latitude) of striking, direction - θ, storm speed - V_f and central pressure - P_o) and these parameters have the same values on each section; they have been built randomly based on their probability distribution functions and corresponding correlation coefficient (see Figure I.3). 5490 hypothetical storms have been built (corresponding to the storm duration of more than 1000 years, with an average density of 5,49 storm/year), including the storms that have struck.





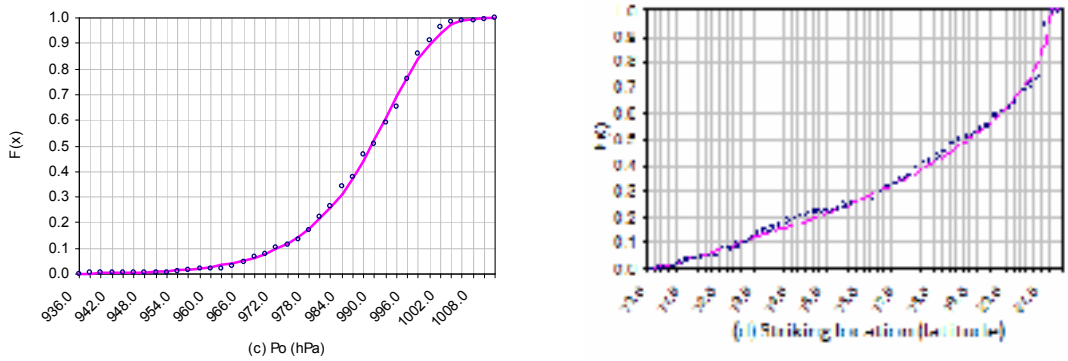


Figure I.3. *Probability distribution function of storm parameters in zone 3*

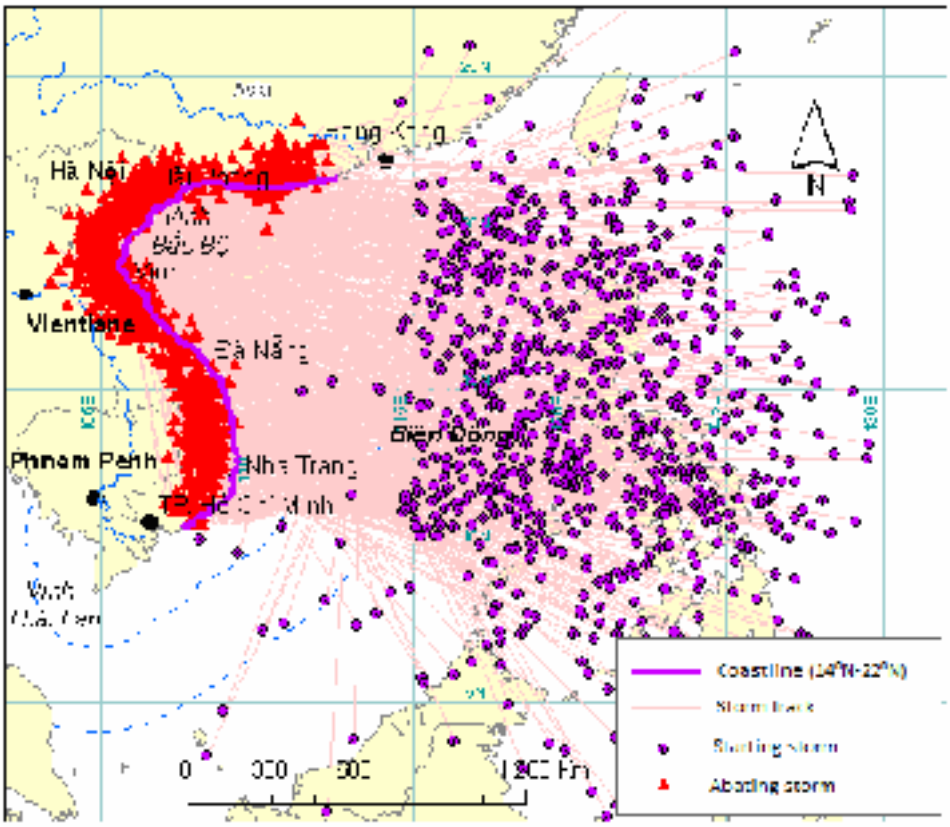


Figure I.4. *5490 hypothetical storms that have been built at the areas of 14°N-22°N (shown in GIS).*

I.4. Building the frequency curve of aggregated water level

I.4.1 Numerical models for the computation of tides and storm surge

It is obvious that the measured data is insufficient to built the frequency curves of water level for all the nearshore points in the study area. In order to overcome this restraint, the numerical models have been applied. These models have been built on the basis of:

- 2D non-linear shallow water system of equations in spherical coordinate system;

- Method of finite differences, difference schemes alternated with multiple sweep direction.
- Wind field models and analytical pressure field models.
- Computational grids covering the entire East Sea with a resolution of 1/12 degree of longitude & latitude.
- This numerical model is the result of the development and perfection of the former programs for tidal and storm surge computation in the territorial waters of Vietnam [1].

I.4.2 Tidal computation

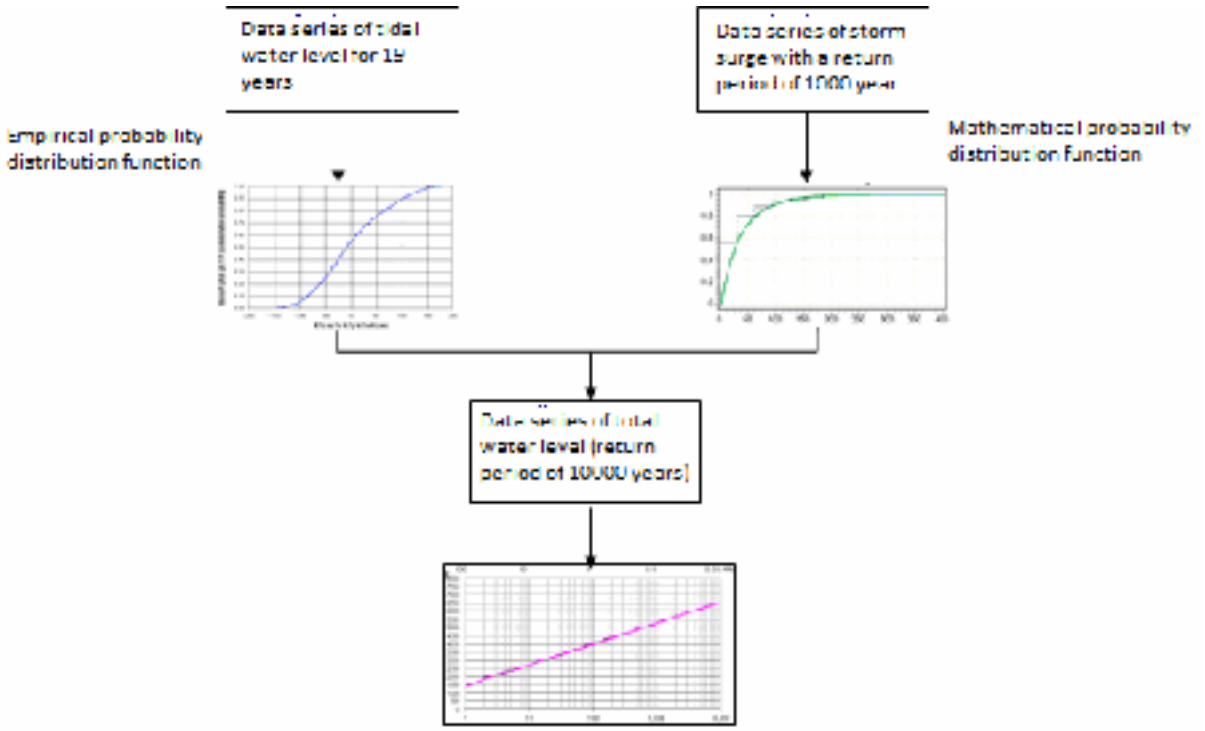
Firstly, numerical model need to be calibrated through the harmonic constants (amplitude, phase) of 10 tidal waves (M_2, S_2, K_1, O_1, N_2, K_2, P_1, Q_1, Sa and Ssa) at all the measuring stations in the study area. After good calibration, the model is used to compute the harmonic constants at the nearshore points. For the next steps, these harmonic constants will be used to compute the hourly tidal water level with a return period of 19 years at the same point by means of formula (1). Finally, these hourly tidal water level is used to build the frequency curve of tidal water level *[2]*.

I.4.3 Storm surge computation

Prior to the usage of the numerical model to compute the maximum storm surge at the nearshore points due to each storm (out of 5490 hypothetical storms), this model has been calibrated and verified by the measurement data on the water level of 66 storms that have generated considerable surges (>50cm). The comparison results between the computed and measured data show that the model has given good description of the storm surge phenomenon in the study area [3]. The computation of the water level surge due to the hypothetical storm has been performed, and at each nearshore points 5490 values of maximum storm surge can be obtained. These values are used to build the frequency curves of storm surge.

I.4.4 Computation of total water level surge (storm and tidal surges)

Storms and tides are considered the two completely independent phenomena. A storm can strike onshore at an arbitrary tidal phase: low tide, high tide, etc. The diagram for the building of frequency curves of total water level at each point is shown in Figure I.5.



Hình I.5. *The flow diagram for the building of frequency curves of total water level*

At each point, the probability distribution functions of storm surge and tidal water level are built (see Figure I.6). The probability distribution function of storm surge is a mathematical distribution function and is selected from 40 conventional distribution functions according to Anderson Darling's best-fitting standard. The probability distribution function of tidal water level is an empirical distribution function. In case of probability distribution functions of storm surge, with the data on storm duration of 1000 years, it is difficult to find out a single mathematical distribution function with adequate description at most of the computing points. Therefore, 3 distribution functions corresponding to 3 sections have been combined in this document (see Figure I.7).

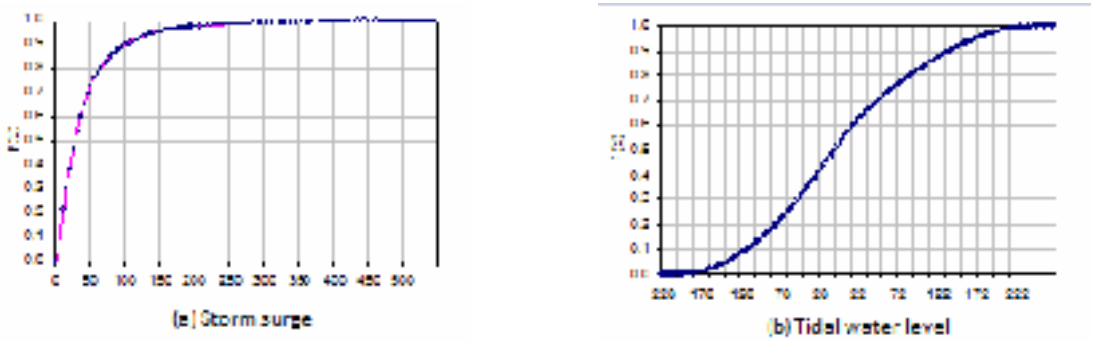
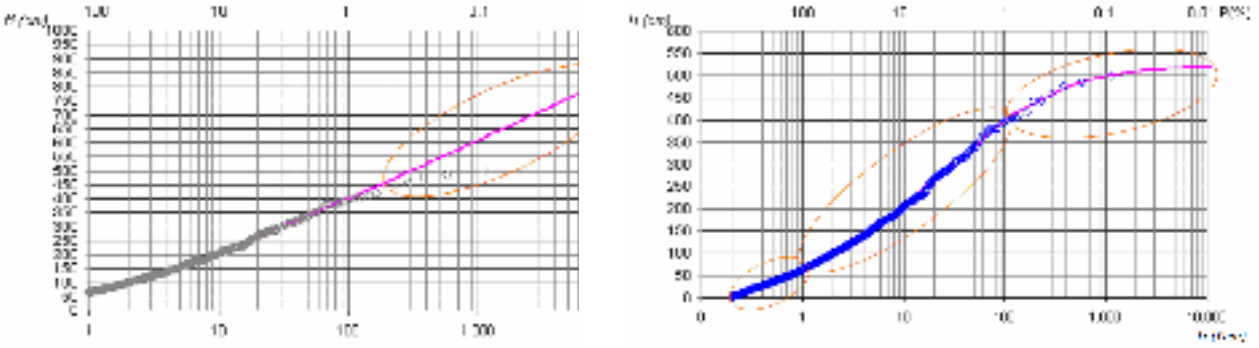


Figure I.6. *Probability distribution functions (a) storm surge, (b) tidal water level at the point (108°10', 21°30')*



(a) (b)

Figure I.7. *Frequency curve of storm surge (a) using one probability distribution function, (b) using a combination of 3 probability distribution functions at the point (108°10', 21°30')*

At each point, in order to obtain the aggregated water level with large return periods (100, 200 years) with high accuracy, 54900 aggregated water levels corresponding to a storm duration of 10000 years have been simulated by formula (3) as follows:

$$\{H_{TH}\}_i = \{H_B\}_j + \{H_{Tr}\}_k \quad (3)$$

where, H_{TH} – aggregated water level;

H_B – storm surge;

H_{Tr} – tidal water level,

$i = 1 \div 54900$; $j = 1 \div 5490$ and $k = 1 \div 55200$.

The storm surge is determined from the corresponding mathematical statistical distribution function as follows *[8, 12]*:

$$H_B = inv(F(P_{H_B})) \quad (7)$$

where: F - probability distribution function;

P_{HB} - cummulative probability of storm surge, which is randomly taken in the range of 0 ÷ 1 with uniform distribution;

Inv – inverse function of F.

The tidal water level is determined directly from the corresponding empirical distribution line by the method of local linearisation (piecewise linear method) with a probability P in the range of 0 ÷ 1 with uniform distribution. For example, the tidal water level corresponding to a probability P = 0,77 is 53cm (see Figure I.8).

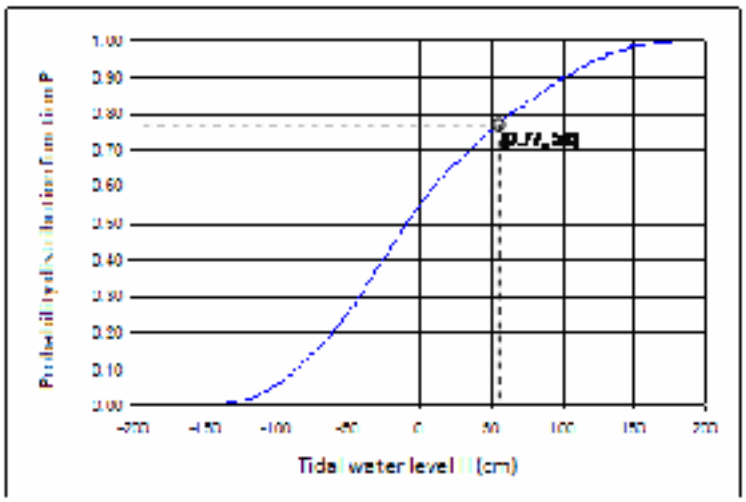


Figure I.8. *Method of local linearisation (piecewise linear method) adopted to determine the tidal water level H_{Tr} from probability distribution function P.*

The frequency curve of aggregated water level is shown in the chart with 2 axises: x and y. Axis y shows the aggregated water level H_{TB} and axis *x* shows the return period T_r (years) and annual exceedance frequency P(%). Axis x has logarithmic scale, $log_{10}(x)$ *[12]*.

Return periods and annual exceedance frequency are determined by the following formula *[10, 12]*:

$$T_{rH_{TB}} = \frac{Rank_{H_{TB}}}{L}, \quad P = \frac{1}{T_{rH_{TB}}} \tag{4}$$

where, T_{rHTB} - return period of the aggregated water level H_{TB};

$Rank_{HTB}$ - rank of the aggregated water level H_{TB} (computed according to the descending water level);

+ $Rank_{HTB}$ = 1 corresponding to Max{H_{TB}};

+ $Rank_{HTB}$ = 48900 corresponding to Min{H_{TB}};

L – length of data series (year);

P - annual exceedance frequency;

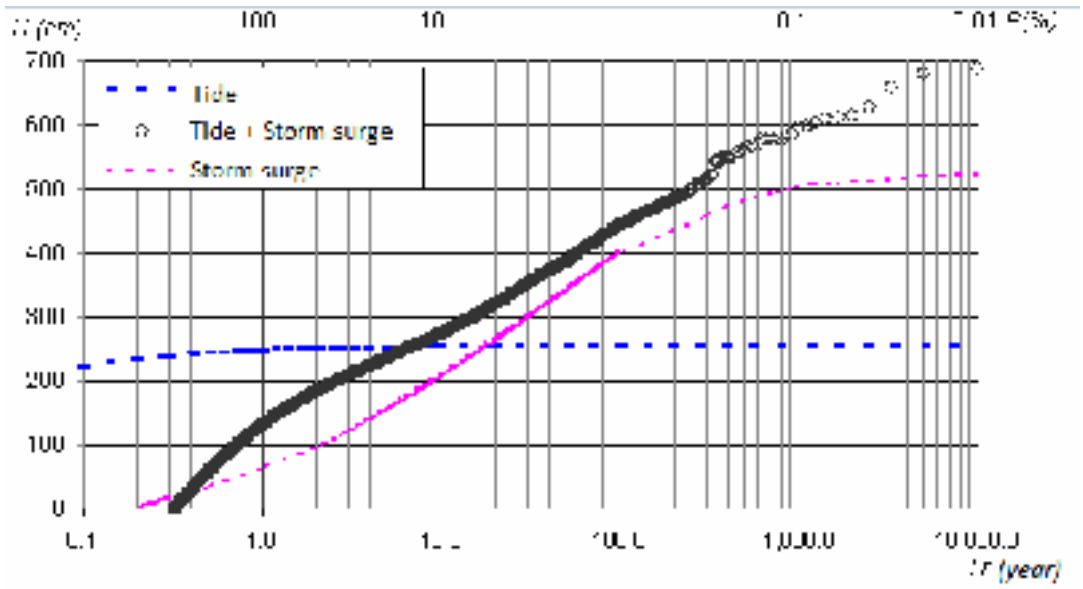


Figure I.9. *Frequency curve of total water level at point (108°10', 21°30')*

I.5. Example of determining the water level with given return periods (or frequencies)

Determining the water level with a return period of 125 years at Do Son, Hai Phong.

- Step 1: Select the most adjacent point to Do Son. According to Table I.1 and Figure II.0, it is point No. 20.

- Step 2: Select the corresponding frequency curve. In this example, tt is Figure II.20.

- Step 3: Determine the water level corresponding to the given return period.

From the horizontal axis (x) at the point with the value of 125, draw a straight line parallel to the vertical axis (y), which intersect the frequency curve at point A. From point A, draw a straight line parallel to the horizontal axis (x), which intersect the vertical axis (y) at point B, giving a value of 435cm (see the figure below)

Note:

- If the given return period is equal to 1 out of 7 values listed in the table under the figure (2nd line), the corresponding water level can be determined immediately (3rd line).

- If the frequency is given in years, a similar method can be adopted, however the yearly frequencies refer to the horizontal axis (x), above the graph.

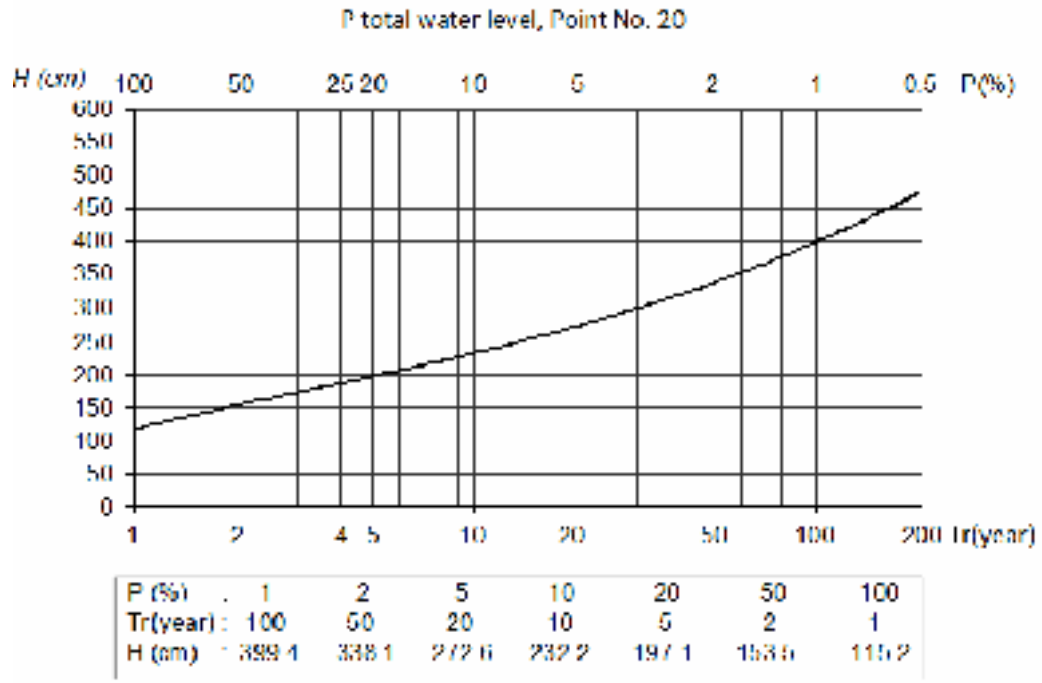


Figure I.10 *Example of determining the total water level with given return periods*

II. Frequency curves of aggregated water level at 50 coastal locations from Quang Ninh to Quang Nam

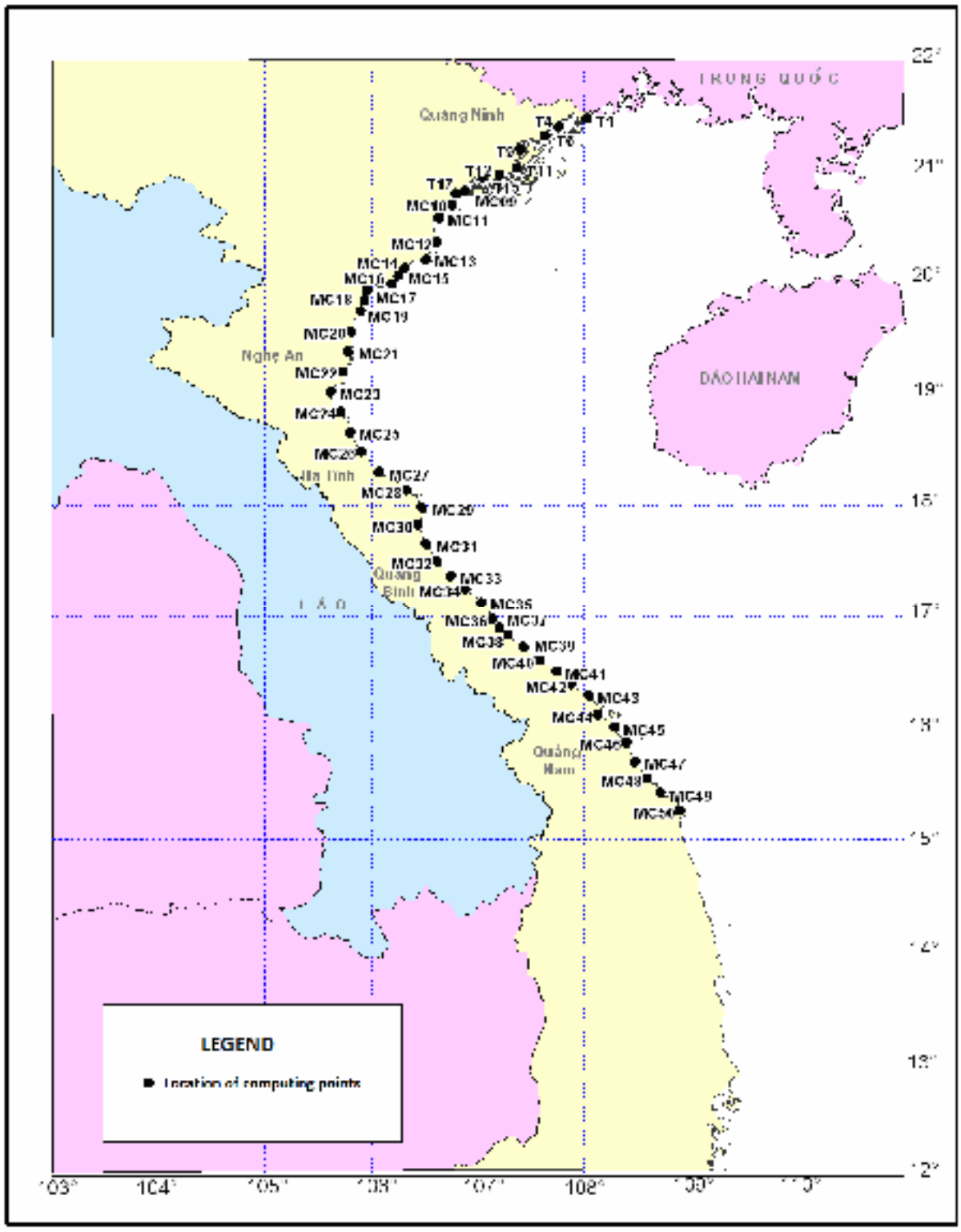


Figure II.0. *Locations of the computing points for the frequency curves of aggregated water level*

Table II.1. *Coordinates of the computing points for the frequency curves of aggregated water level*

Station	Longitude	Lattitude	VN2000_x (m)	VN2000_y (m)	Commune	District	Province
T1	108°02'	21°28'	813250.350	2376575.180	Bình Ngọc	Móng Cái	Quảng Ninh
T4	107°46'	21°24'	786068.700	2368584.290	Quảng Điền	Hải Hà	Quảng Ninh
T6	107°38'	21°19'	773614.090	2359177.180	Đầm Hà	Đầm Hà	Quảng Ninh
T9	107°24'	21°12'	749093.140	2344931.830	Đồng Rui	Tiên Yên	Quảng Ninh
T11	107°22'	21°02'	745969.740	2326658.910	Cửa Ông	Cẩm Phả	Quảng Ninh
T12	107°12'	20°58'	729297.360	2319046.270	Quang Hanh	Cẩm Phả	Quảng Ninh
T15	107°03'	20°57'	712101.630	2317157.560	Bãi Cháy	Hạ Long	Quảng Ninh
T17	106°53'	20°49'	695289.800	2302717.060	Đồng Bài	Cát Hải	TP. Hải Phòng
MC09	106°48'	20°48'	686807.160	2300030.330	Đông Hải	An Hải	TP. Hải Phòng
MC10	106°46'	20°42'	682974.200	2288809.340	Bàng La	Đồ Sơn	TP. Hải Phòng
MC11	106°38'	20°35'	670503.710	2275840.610	Thụy Xuân	Thái Thụy	Thái Bình
MC12	106°37'	20°21'	668977.470	2251035.360	Nam Thịnh	Tiền Hải	Thái Bình
MC13	106°31'	20°12'	658069.660	2234110.830	Giao Xuân	Giao Thủy	Nam Định
MC14	106°19'	20°08'	637772.280	2224974.740	Hải Lý	Hải Hậu	Nam Định
MC15	106°15'	20°04'	631034.470	2217619.970	Hải Hoà	Hải Hậu	Nam Định
MC16	106°12'	19°59'	624922.380	2209719.470	Nghĩa Phúc	Nghĩa Hưng	Nam Định
MC17	105°58'	19°56'	601321.200	2203371.540	Hưng Lộc	Hậu Lộc	Thanh Hoá
MC18	105°56'	19°50'	597715.940	2193172.950	Hoằng Tiến	Hoằng Hoá	Thanh Hoá
MC19	105°54'	19°45'	594945.950	2182647.970	Trung Sơn	Sầm Sơn	Thanh Hoá
MC20	105°49'	19°34'	585302.810	2162133.150	Hải Ninh	Tĩnh Gia	Thanh Hoá
MC21	105°47'	19°23'	582248.450	2142096.060	Tĩnh Hải	Tĩnh Gia	Thanh Hoá
MC22	105°44'	19°12'	576874.120	2122050.300	Quỳnh Liên	Quỳnh Lưu	Nghệ An
MC23	105°37'	19°01'	565490.080	2102095.360	Diễn Kim	Diễn Châu	Nghệ An
MC24	105°43'	18°50'	575250.040	2082111.350	Nghi Thiết	Nghi Lộc	Nghệ An
MC25	105°48'	18°39'	584397.650	2062129.320	Xuân Viên	Nghi Xuân	Hà Tĩnh
MC26	105°54'	18°29'	595674.750	2042161.750	Thạch Bằng	Thạch Hà	Hà Tĩnh
MC27	106°05'	18°18'	613420.610	2022126.410	Cẩm Dương	Cẩm Xuyên	Hà Tĩnh
MC28	106°20'	18°08'	641023.610	2004497.590	Kỳ Ninh	Kỳ Anh	Hà Tĩnh
MC29	106°29'	17°59'	656812.520	1987802.130	Kỳ Nam	Kỳ Anh	Hà Tĩnh
MC30	106°27'	17°50'	652921.800	1970734.500	Quảng Hưng	Quảng Trạch	Quảng Bình

Station	Longitude	Lattitude	VN2000_x (m)	VN2000_y (m)	Commune	District	Province
MC31	106°31'	17°39'	660919.830	1951326.720	Hải Trạch	Bố Trạch	Quảng Bình
MC32	106°37'	17°30'	672094.260	1934603.080	Hải Thành	Đồng Hới	Quảng Bình
MC33	106°45'	17°22'	685816.100	1920119.970	Hải Ninh	Quảng Ninh	Quảng Bình
MC34	106°53'	17°14'	700719.200	1906430.300	Hải Thuỷ	Lệ Thuỷ	Quảng Bình
MC35	107°02'	17°08'	716906.280	1893980.040	Vĩnh Thái	Vĩnh Linh	Quảng Trị
MC36	107°08'	16°58'	727416.300	1876718.860	Trung Giang	Gio Linh	Quảng Trị
MC37	107°13'	16°53'	735076.170	1867950.330	Triệu An	Triệu Phong	Quảng Trị
MC38	107°17'	16°50'	743148.170	1860959.320	Triệu Lăng	Triệu Phong	Quảng Trị
MC39	107°26'	16°43'	759390.730	1848977.910	Điền Môn	Phong Điền	Thừa Thiên - Huế
MC40	107°35'	16°36'	775021.890	1836223.510	Hải Dương	Hương Trà	Thừa Thiên - Huế
MC41	107°44'	16°30'	792355.360	1825382.790	Phú Diên	Phú Vang	Thừa Thiên - Huế
MC42	107°53'	16°23'	807601.960	1812309.180	Vinh Hải	Phú Lộc	Thừa Thiên - Huế
MC43	108°03'	16°17'	825711.270	1802164.870	Lăng Cô	Phú Lộc	Thừa Thiên - Huế
MC44	108°08'	16°07'	834775.500	1782922.830	Hoà Hiệp Nam	Liên Chiểu	TP. Đà Nẵng
MC45	108°17'	16°00'	851024.050	1770992.690	Hoà Hải	Ngũ Hành sơn	TP. Đà Nẵng
MC46	108°24'	15°52'	864235.370	1755808.890	Duy Hải	Duy Xuyên	Quảng Nam
MC47	108°29'	15°41'	873344.330	1736683.830	Bình Hải	Thăng Bình	Quảng Nam
MC48	108°36'	15°32'	885423.920	1720489.480	Tam Tiến	Núi Thành	Quảng Nam
MC49	108°43'	15°25'	899526.490	1706326.980	Tam Nghĩa	Núi Thành	Quảng Nam
MC50	108°54'	15°15'	919184.460	1689276.210	Bình Châu	Bình Sơn	Quảng Ngãi

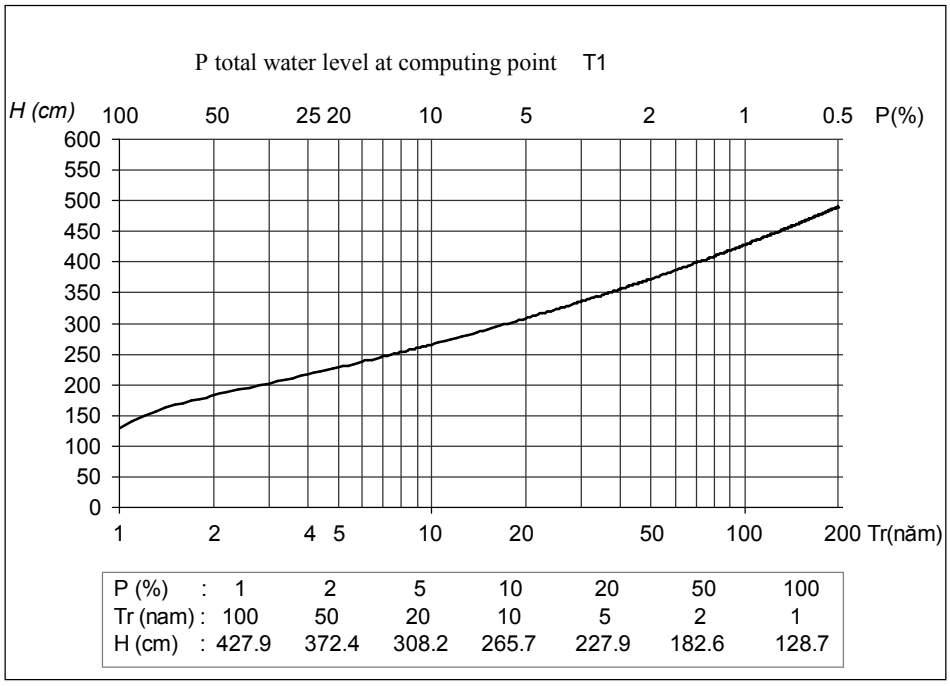


Figure II.1. *Frequency curves of total water level at point T1 (108°02', 21°28') Bình Ngọc, Móng Cái, Quảng Ninh*

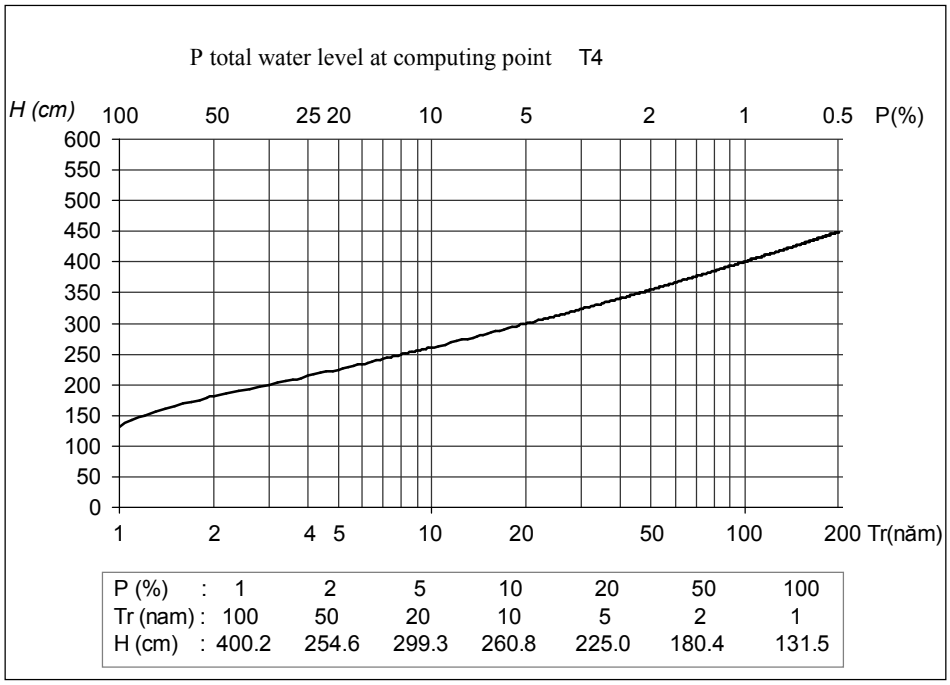


Figure II.2. *Frequency curves of total water level at point T4 (107°46', 21°24') Quảng Điền, Hải Hà, Quảng Ninh*

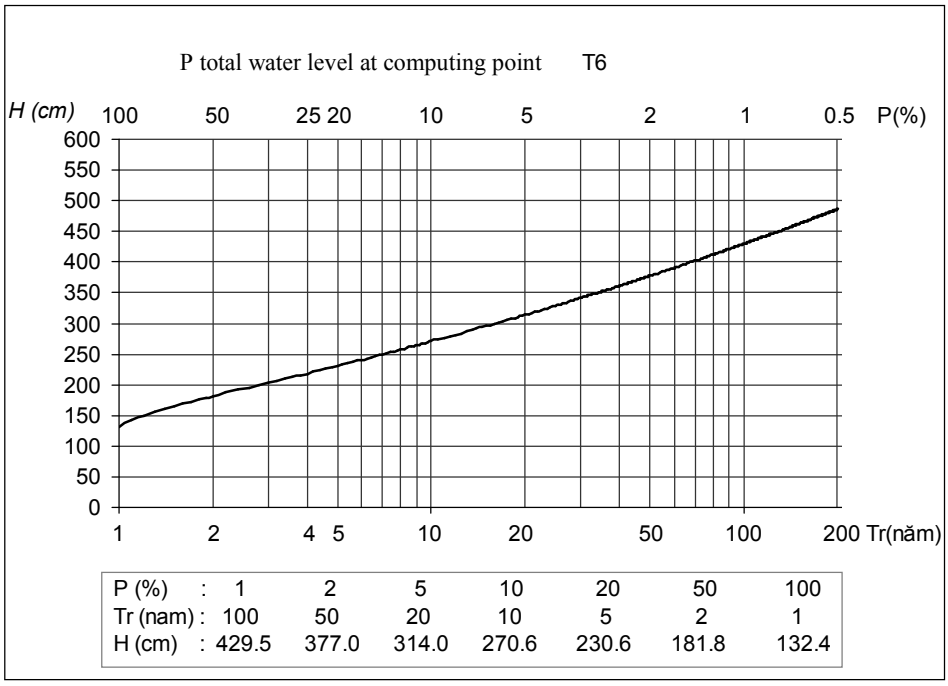


Figure II.3. *Frequency curves of total water level at point T6 (107°38', 21°19') Đầm Hà, Đầm Hà, Quảng Ninh*

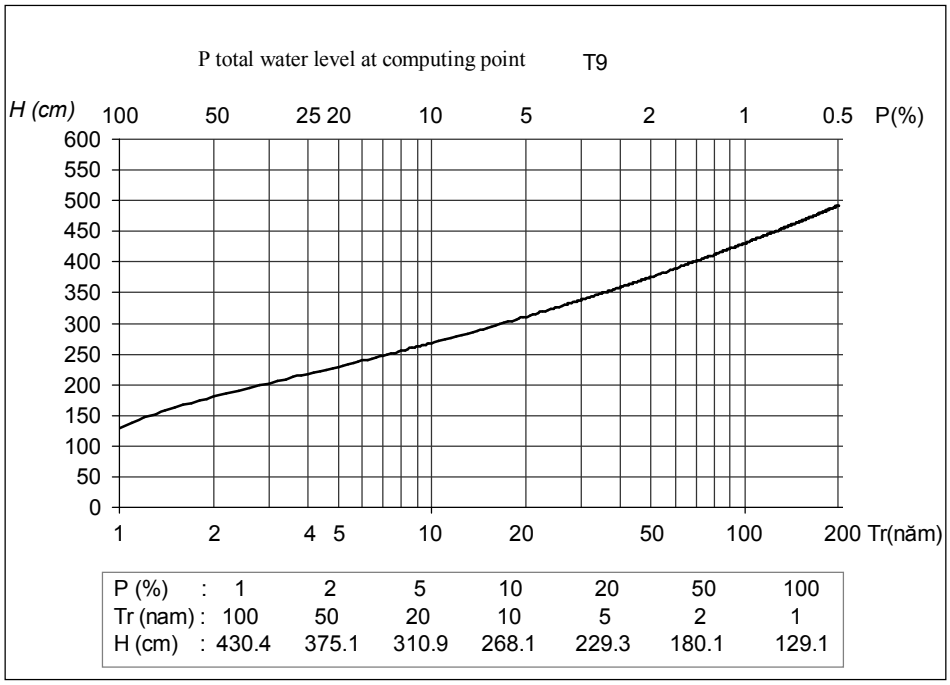


Figure II.4. *Frequency curves of total water level at point T9 (107°24', 21°12') Đồng Rui, Tiên Yên, Quảng Ninh*

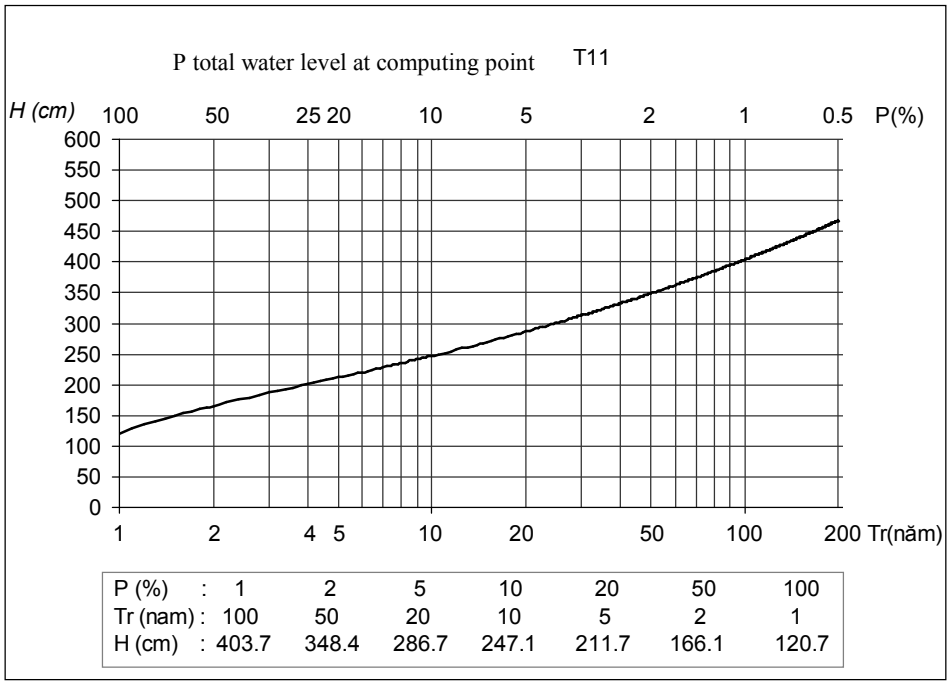


Figure I.5. *Frequency curves of total water level at point T11 (107°22', 21°02') Cửa Ông, Cẩm Phả, Quảng Ninh*

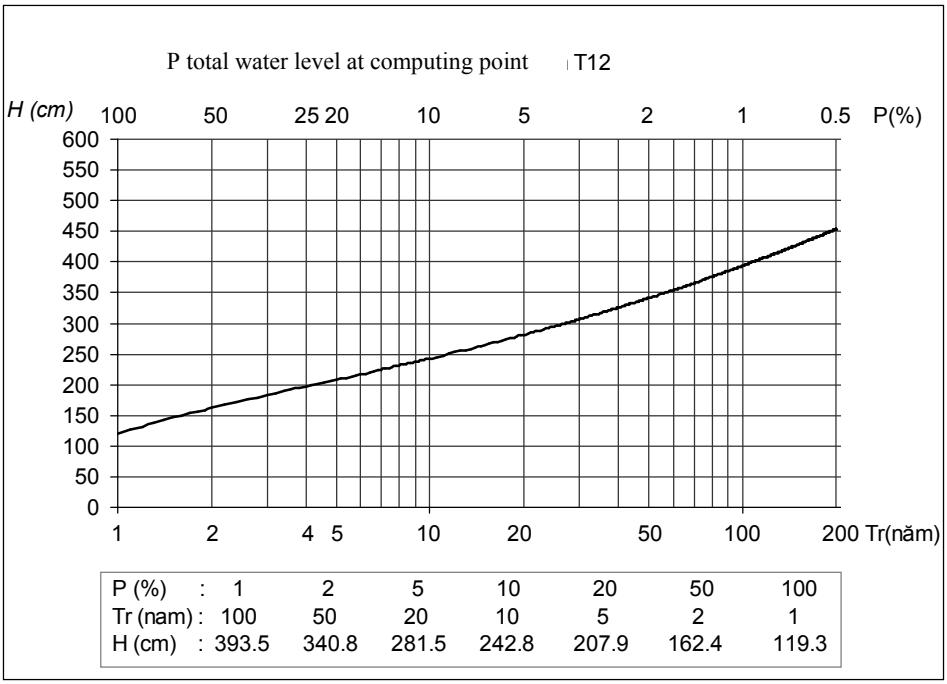


Figure II.6. *Frequency curves of total water level at point T12 (107°12', 20°58') Quang Hanh, Cẩm Phả, Quảng Ninh*

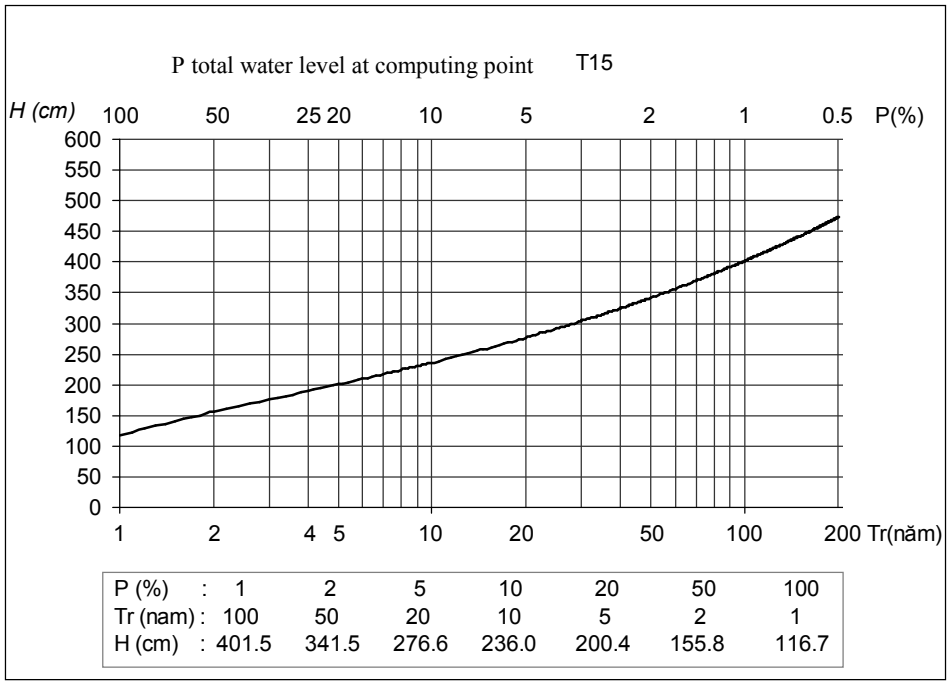


Figure II.7. *Frequency curves of total water level at point T15 (107°03', 20°57') Bãi Cháy, Hạ Long, Quảng Ninh*

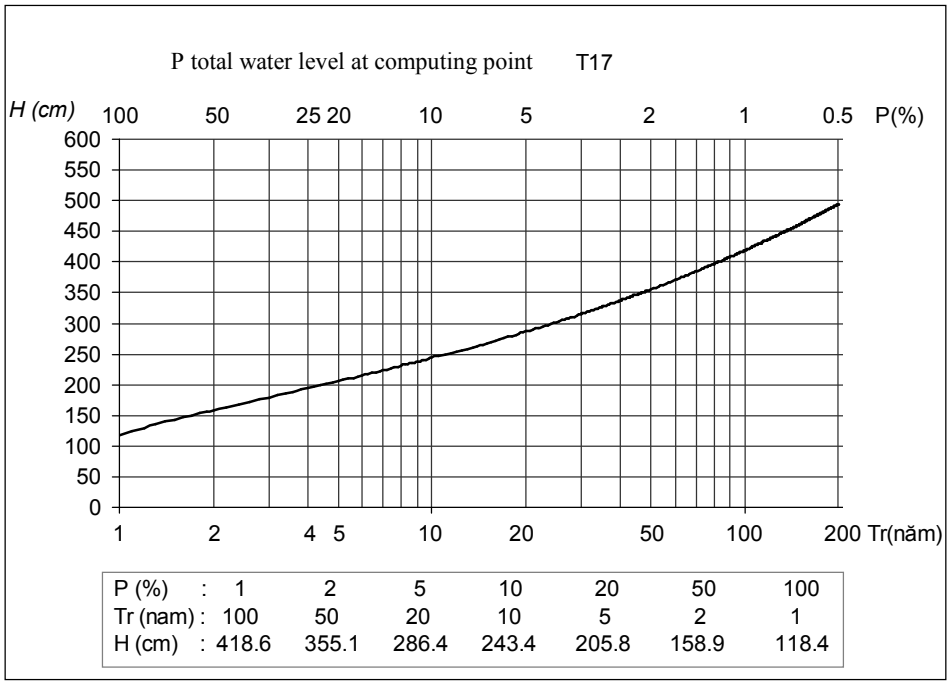


Figure II.8. *Frequency curves of total water level at point T17 (106°53', 20°49') Đồng Bài, Cát Hải, TP. Hải Phòng*

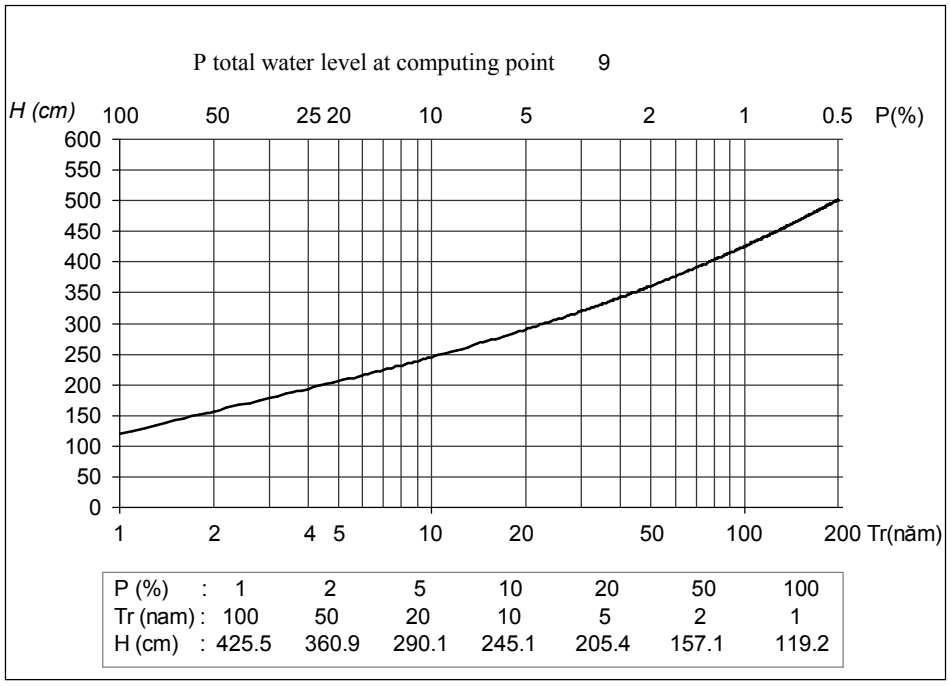


Figure II.9. *Frequency curves of total water level at point MC09 (106°48', 20°48') Đông Hải, An Hải, TP. Hải Phòng*

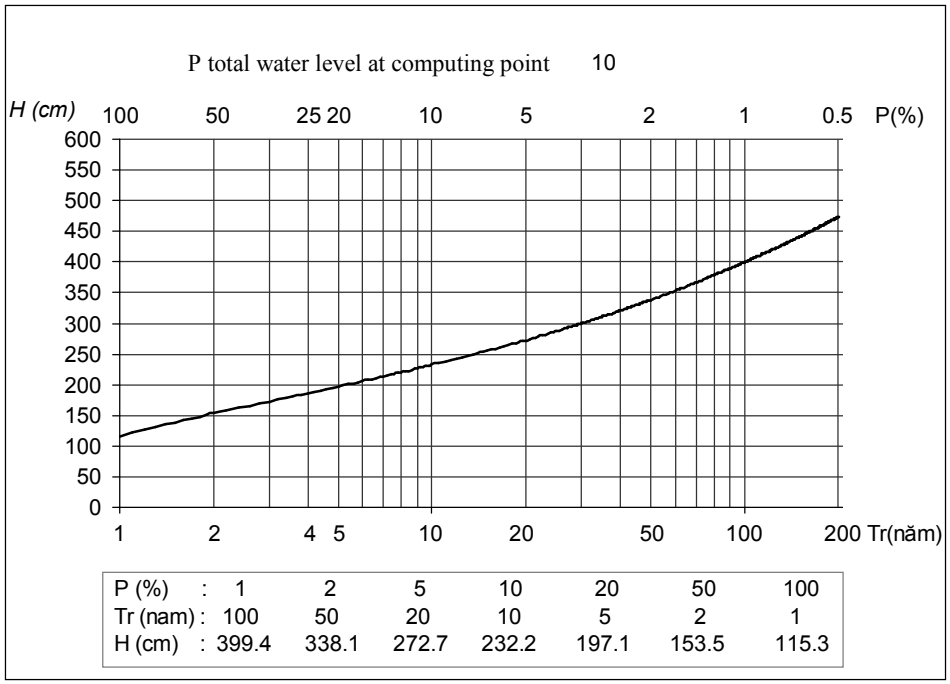


Figure II.10. *Frequency curves of total water level at point MC10 (106°46', 20°42') Bàng La, Đồ Sơn, TP. Hải Phòng*

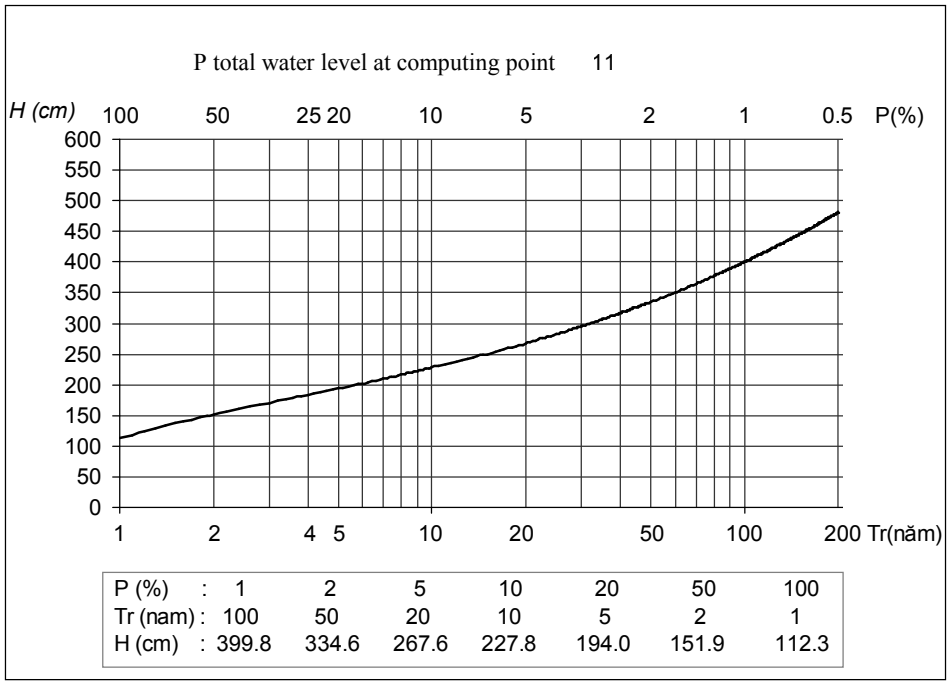


Figure II.11. *Frequency curves of total water level at point MC11 (106°38', 20°35') Thụy Xuân, Thái Thụy, Thái Bình*

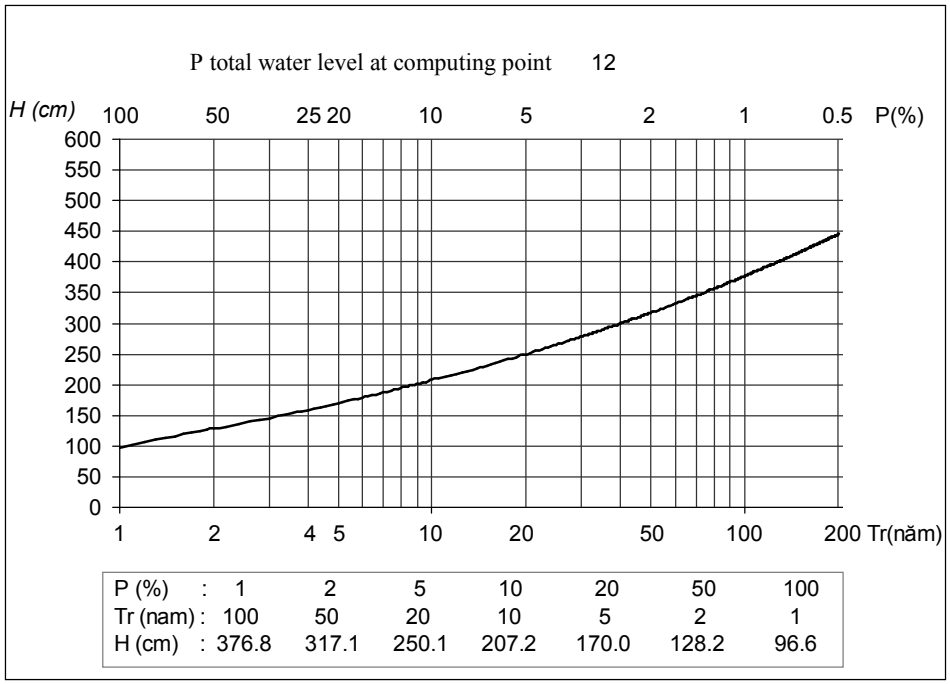


Figure II.12. *Frequency curves of total water level at point MC12 (106°37', 20°21') Nam Thịnh, Tiền Hải, Thái Bình*

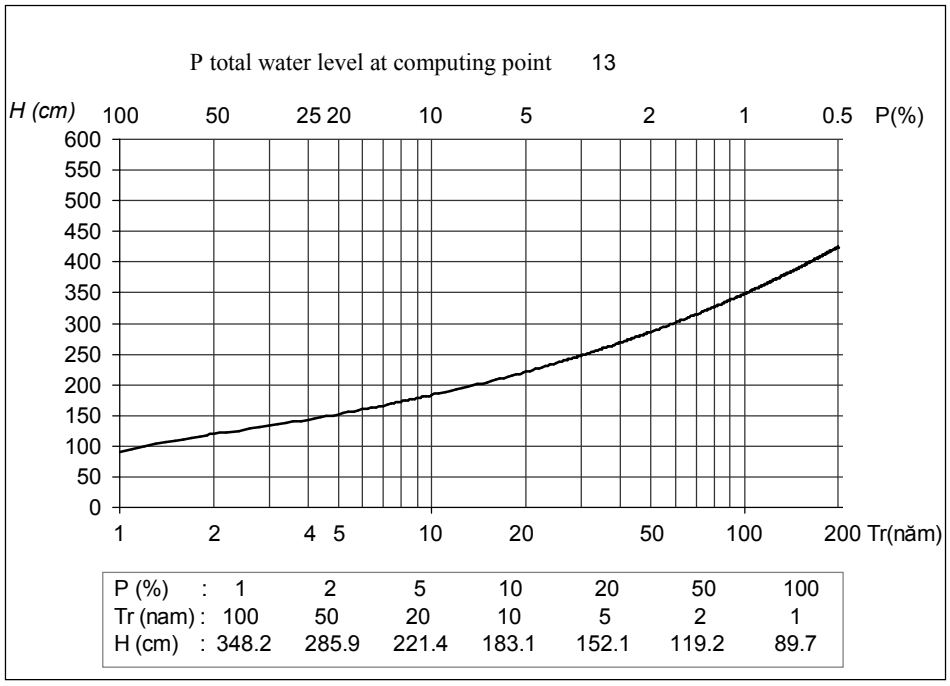


Figure II.13. *Frequency curves of total water level at point MC13 (106°31', 20°12') Giao Xuân, Giao Thủy, Nam Định*

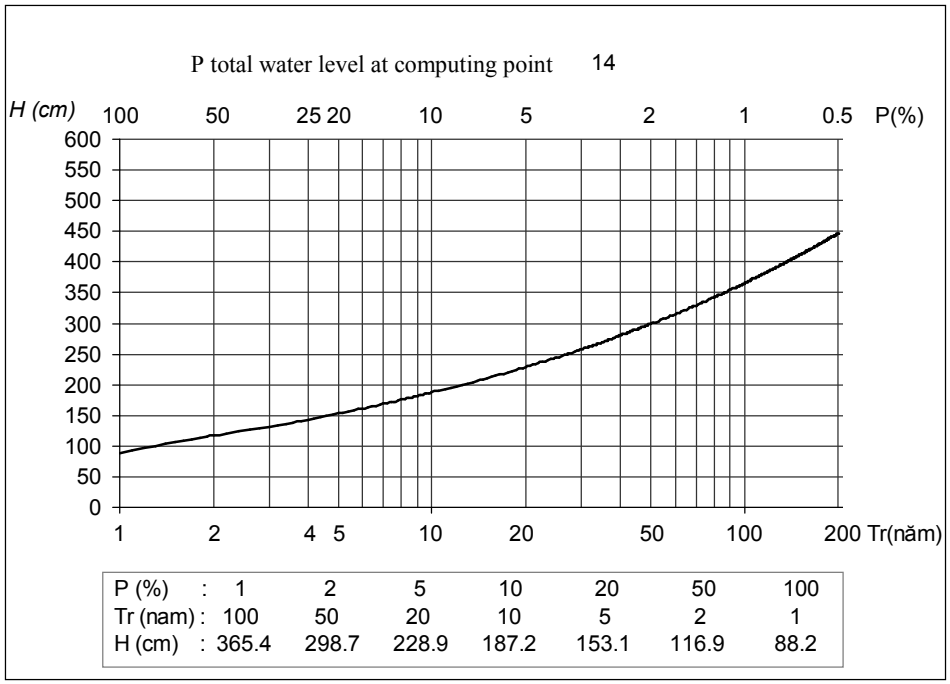


Figure II.14. *Frequency curves of total water level at point MC14 (106°19', 20°08') Hải Lý, Hải Hậu, Nam Định*

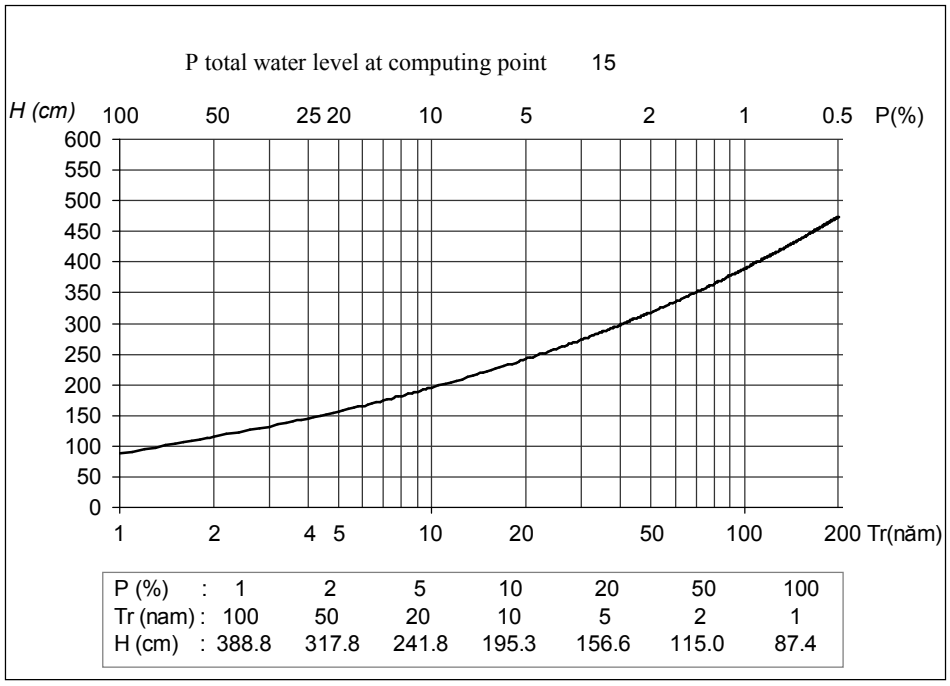


Figure II.15. *Frequency curves of total water level at point MC15 (106°15', 20°04') Hải Hoà, Hải Hậu, Nam Định*

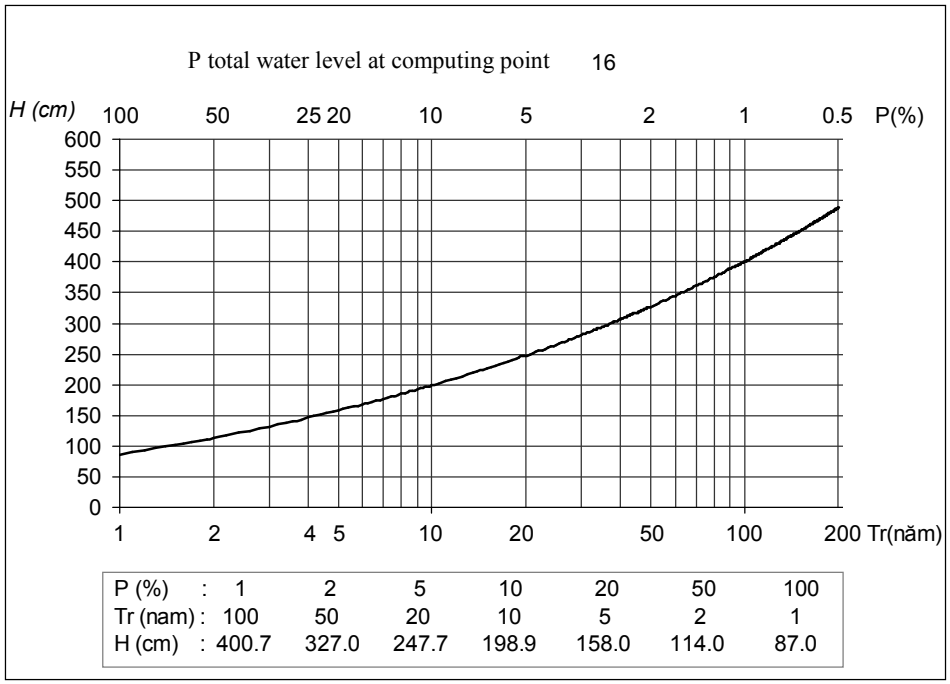


Figure II.16. *Frequency curves of total water level at point MC16 (106°12', 19°59') Nghĩa Phúc, Nghĩa Hưng, Nam Định*

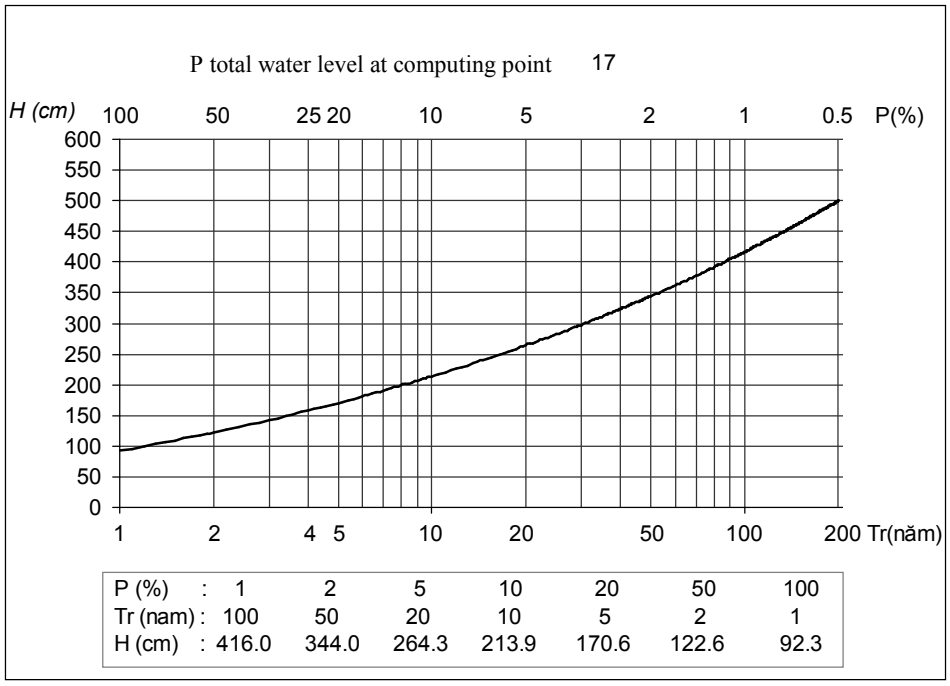


Figure II.17. *Frequency curves of total water level at point MC17 (105°58', 19°56') Hưng Lộc, Hậu Lộc, Thanh Hoá*

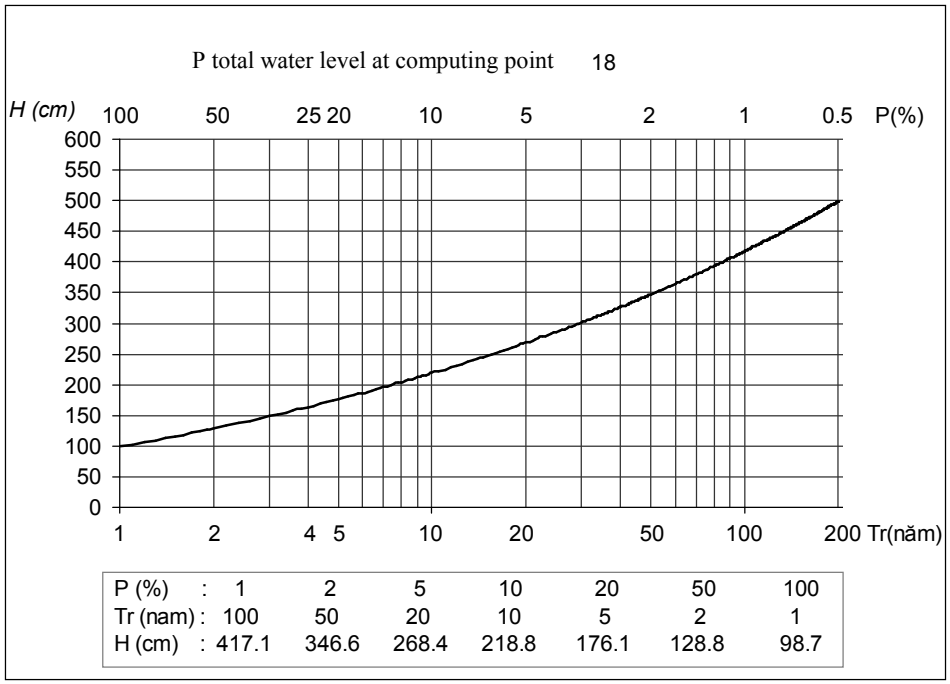


Figure II.18. *Frequency curves of total water level at point MC18 (105°56', 19°50') Hoằng Tiến, Hoằng Hoá, Thanh Hoá*

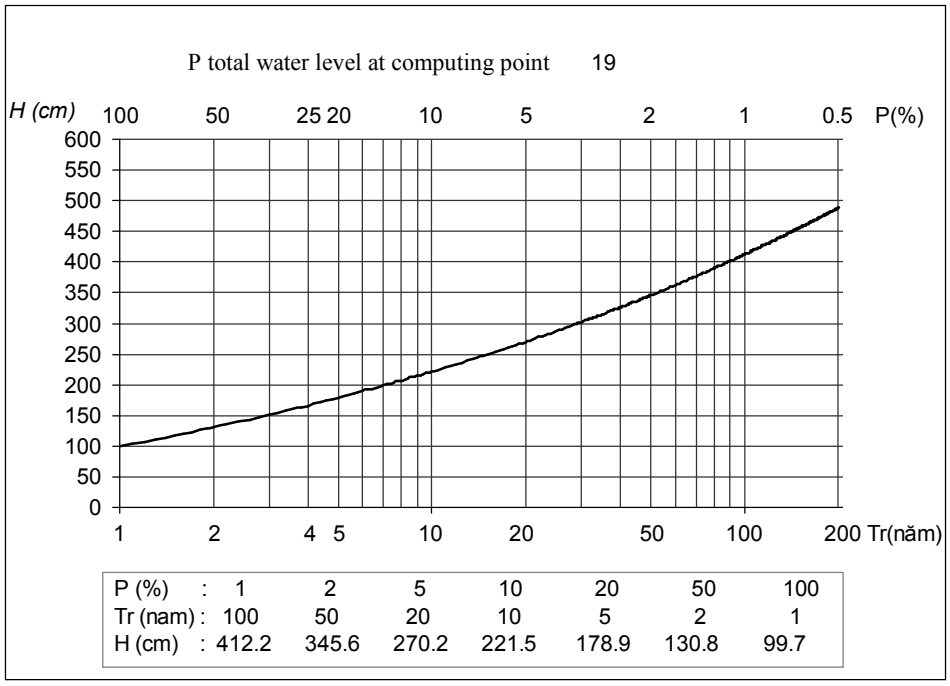


Figure II.19. *Frequency curves of total water level at point MC19 (105°54', 19°45') Trung Sơn, Sầm Sơn, Thanh Hoá*

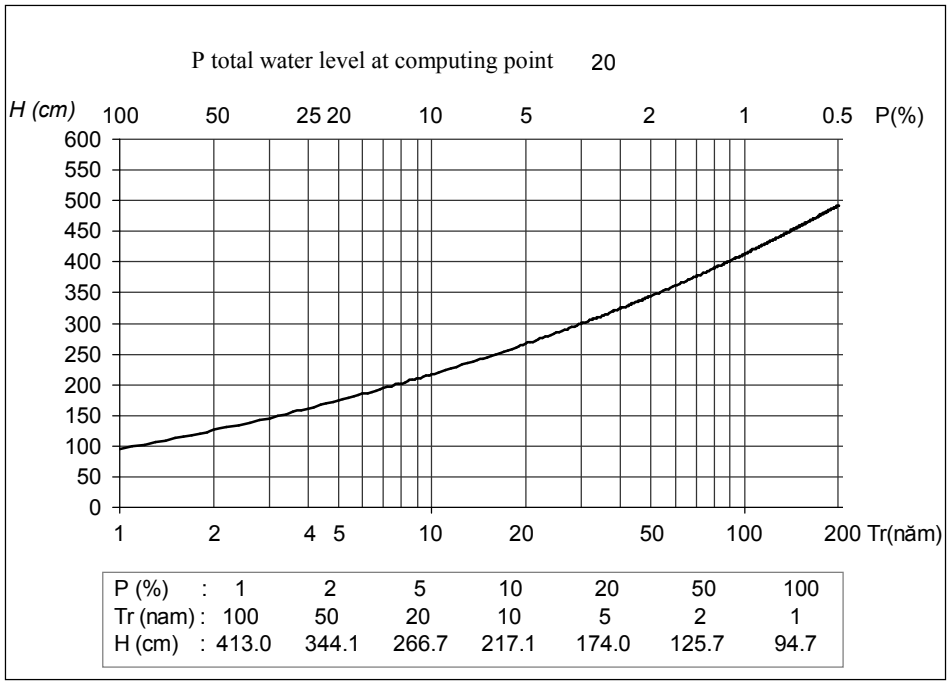


Figure II.20. *Frequency curves of total water level at point MC20 (105°49', 19°34') Hải Ninh, Tĩnh Gia, Thanh Hoá*

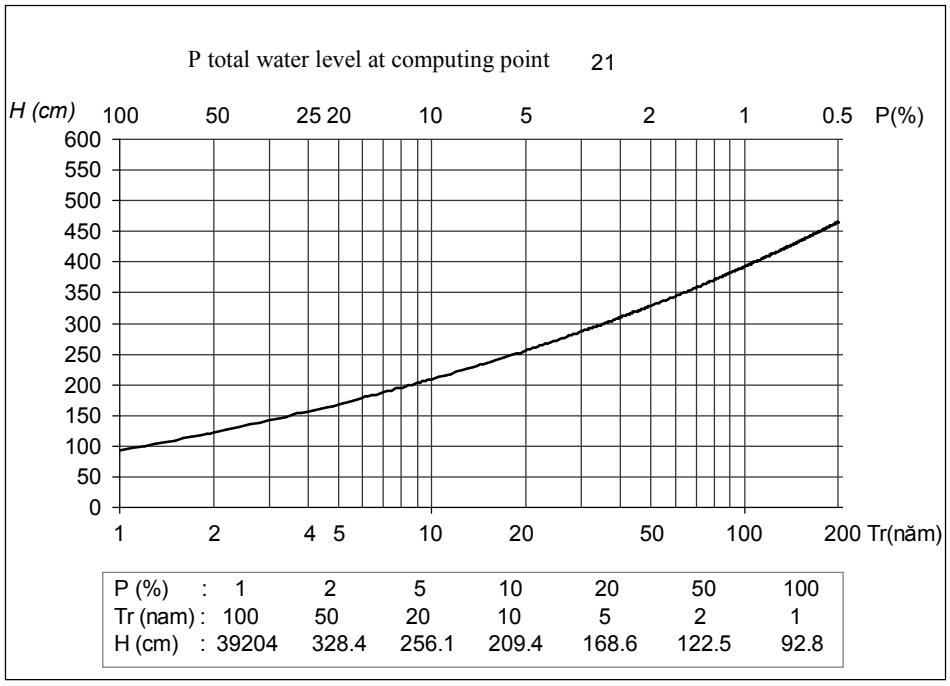


Figure II.21. *Frequency curves of total water level at point MC21 (105°47', 19°23') Tĩnh Hải, Tĩnh Gia, Thanh Hoá*

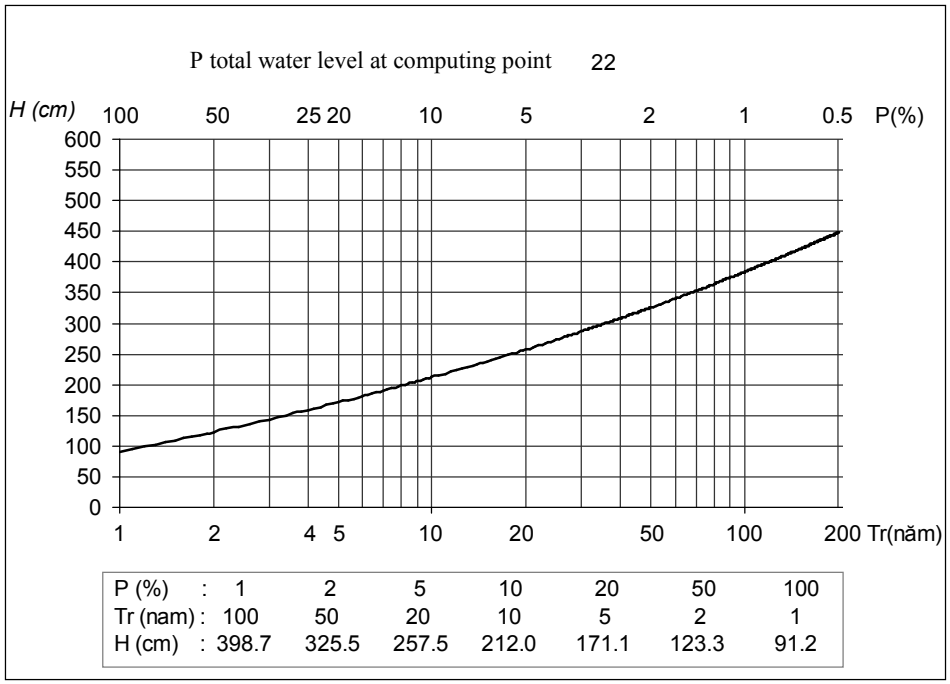


Figure II.22. *Frequency curves of total water level at point MC22 (105°44', 19°12') Quỳnh Liên, Quỳnh Lưu, Nghệ An*

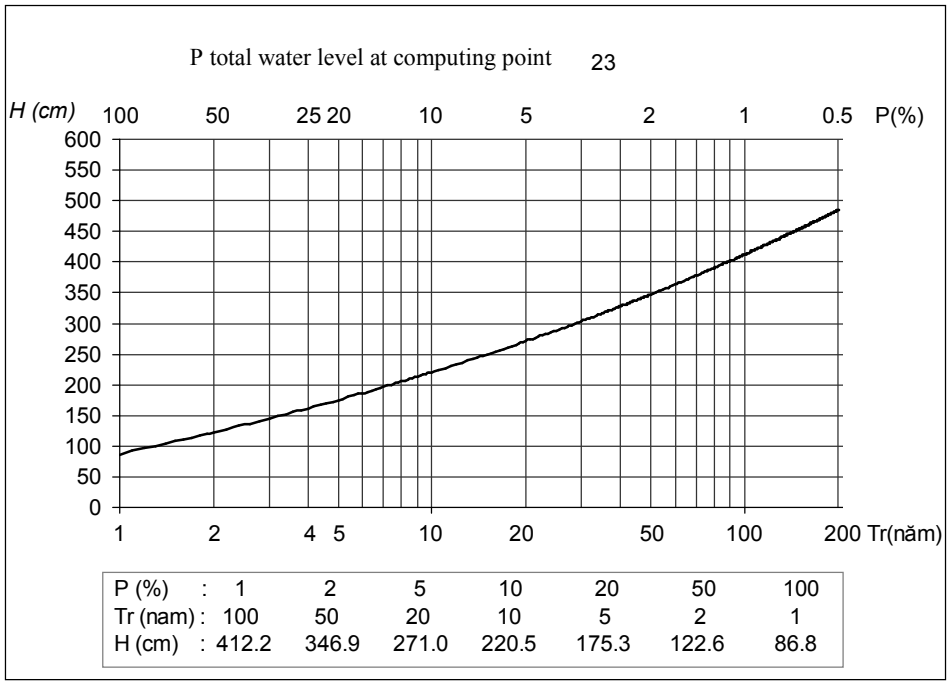


Figure II.23. *Frequency curves of total water level at point MC23 (105°37', 19°01') Diễn Kim, Diễn Châu, Nghệ An*

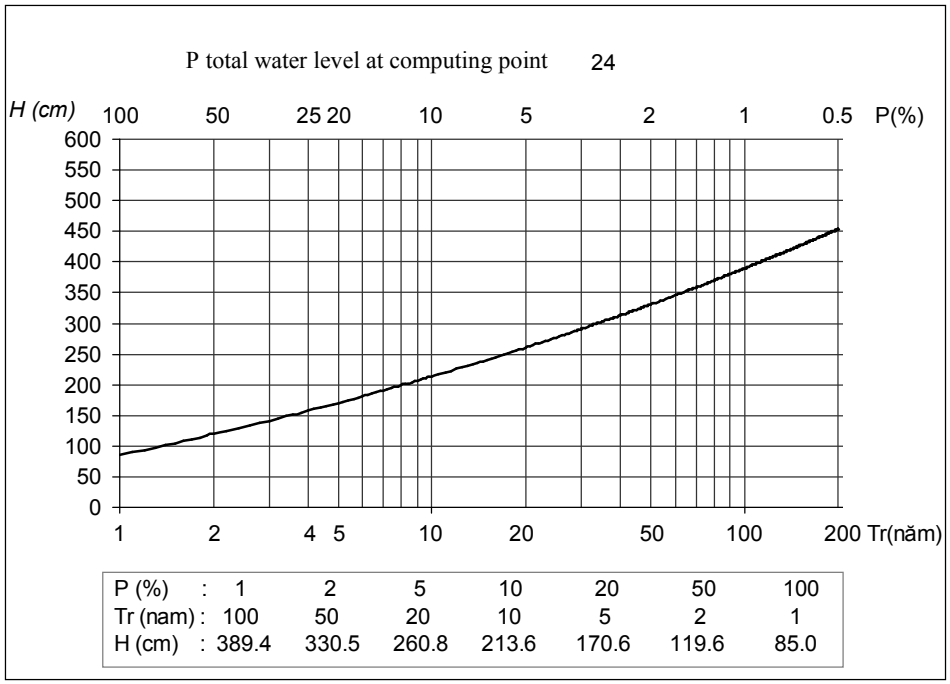


Figure II.24. *Frequency curves of total water level at point MC24 (105°43', 18°50') Nghi Thiết, Nghi Lộc, Nghệ An*

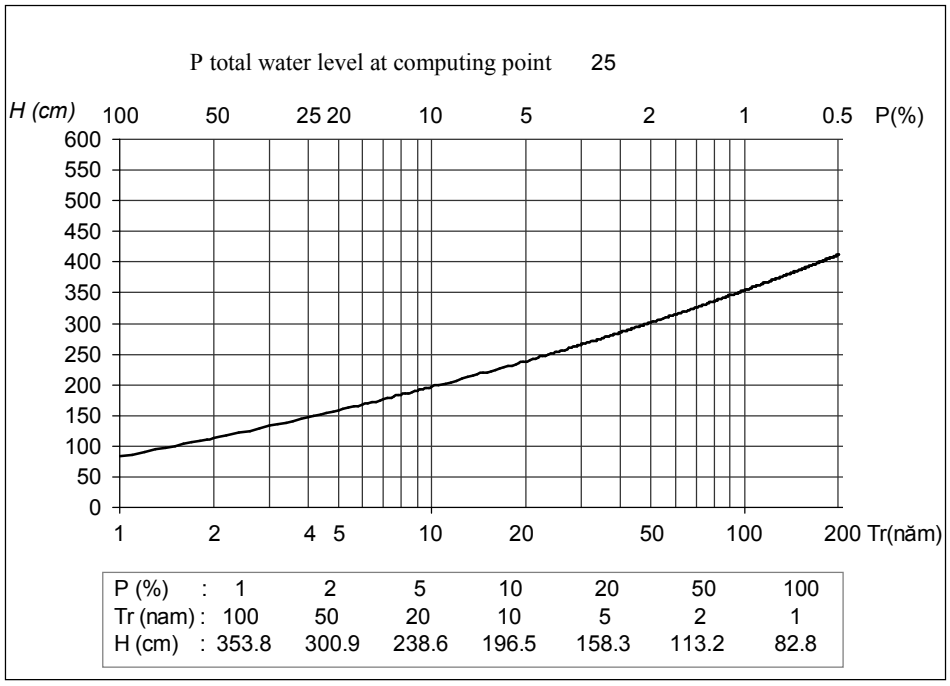


Figure II.25. *Frequency curves of total water level at point MC25 (105°48', 18°39') Xuân Viên, Nghi Xuân, Hà Tĩnh*

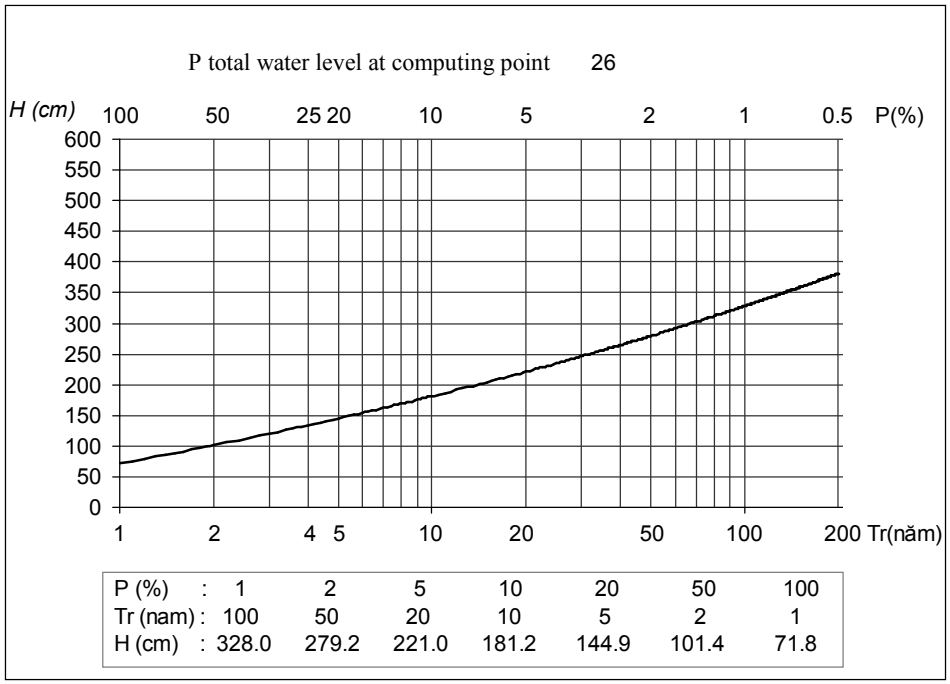


Figure II.26 *Frequency curves of total water level at point MC26 (105°54', 18°29') Thạch Bằng, Thạch Hà, Hà Tĩnh*

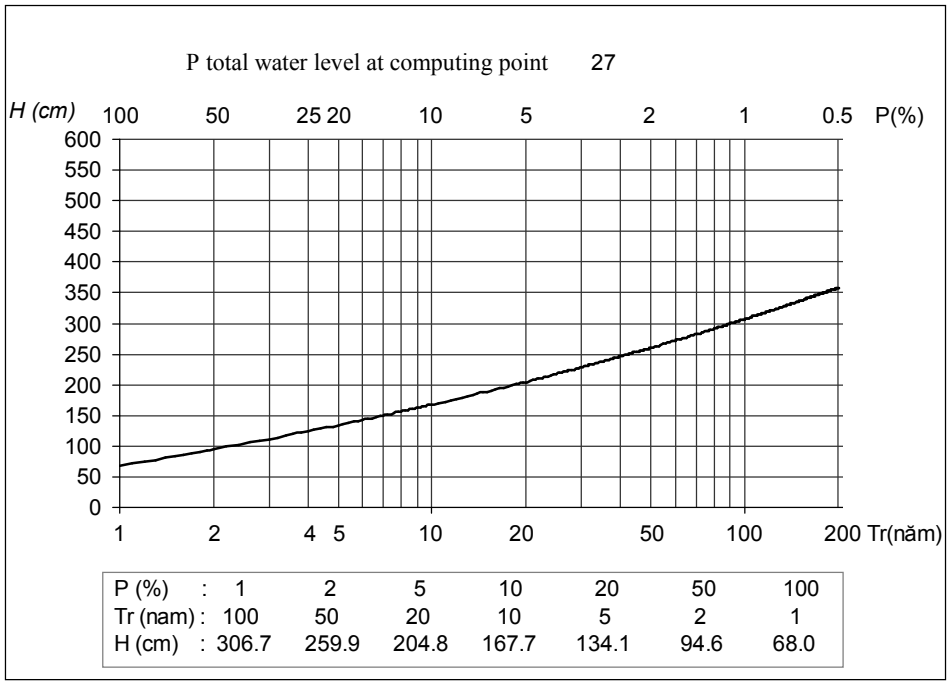


Figure II.27. *Frequency curves of total water level at point MC27 (106°05', 18°18') Cẩm Dương, Cẩm Xuyên, Hà Tĩnh*

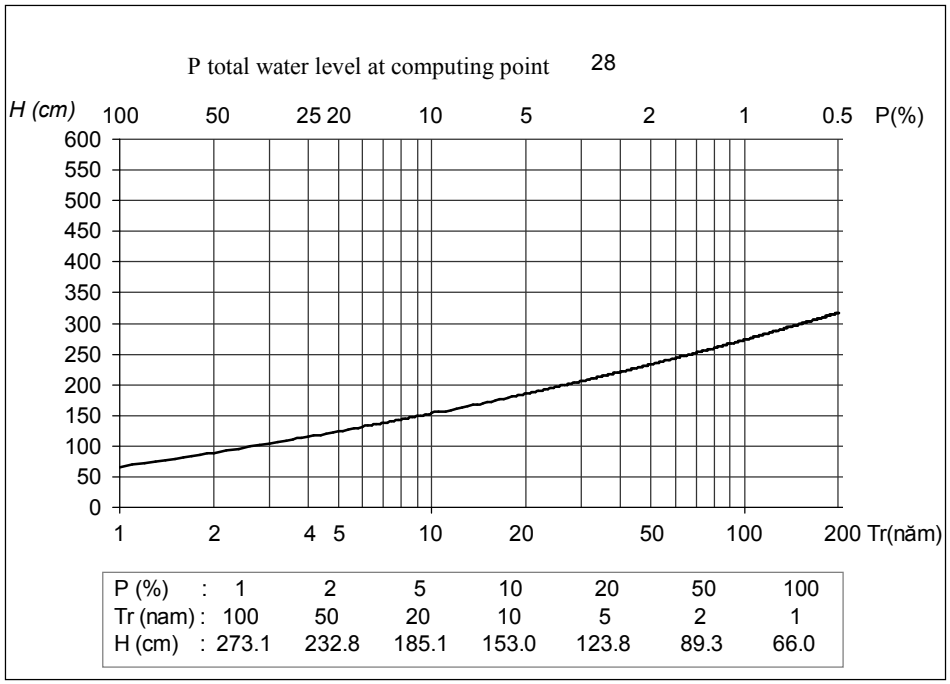


Figure II.28. *Frequency curves of total water level at point MC28 (106°20', 18°08') Kỳ Ninh, Kỳ Anh, Hà Tĩnh*

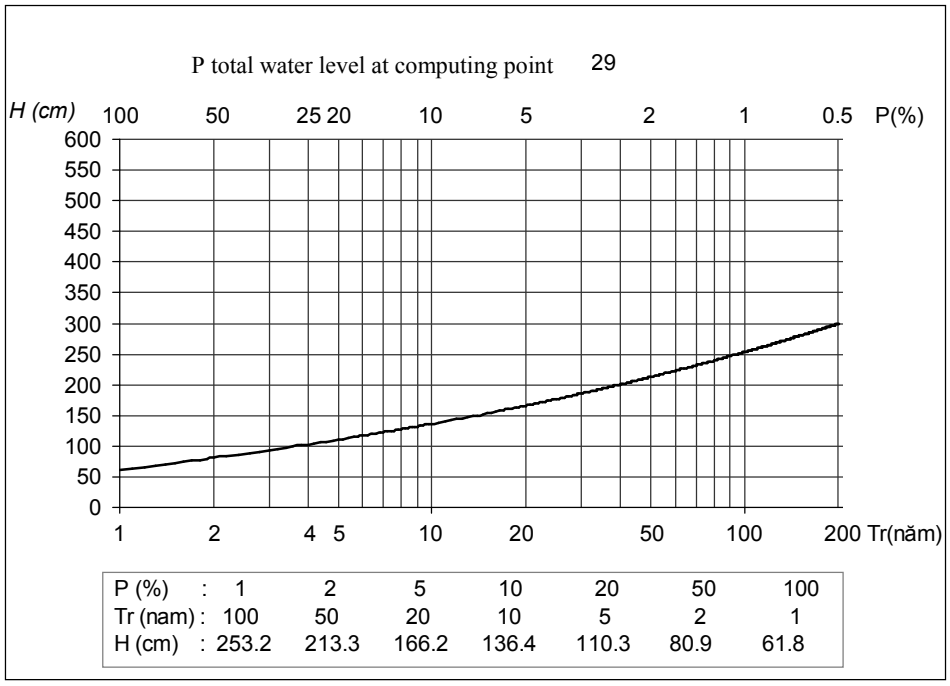


Figure II.29. *Frequency curves of total water level at point MC29 (106°29', 17°59') Kỳ Nam, Kỳ Anh, Hà Tĩnh*

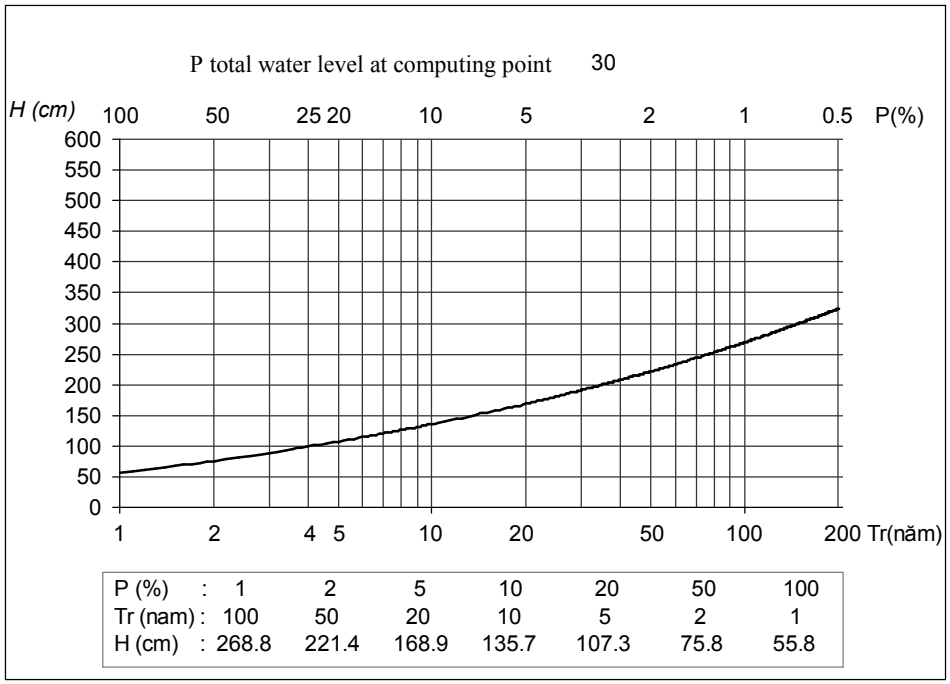


Figure II.30. *Frequency curves of total water level at point MC30 (106°27', 17°50') Quảng Hưng, Quảng Trạch, Quảng Bình*

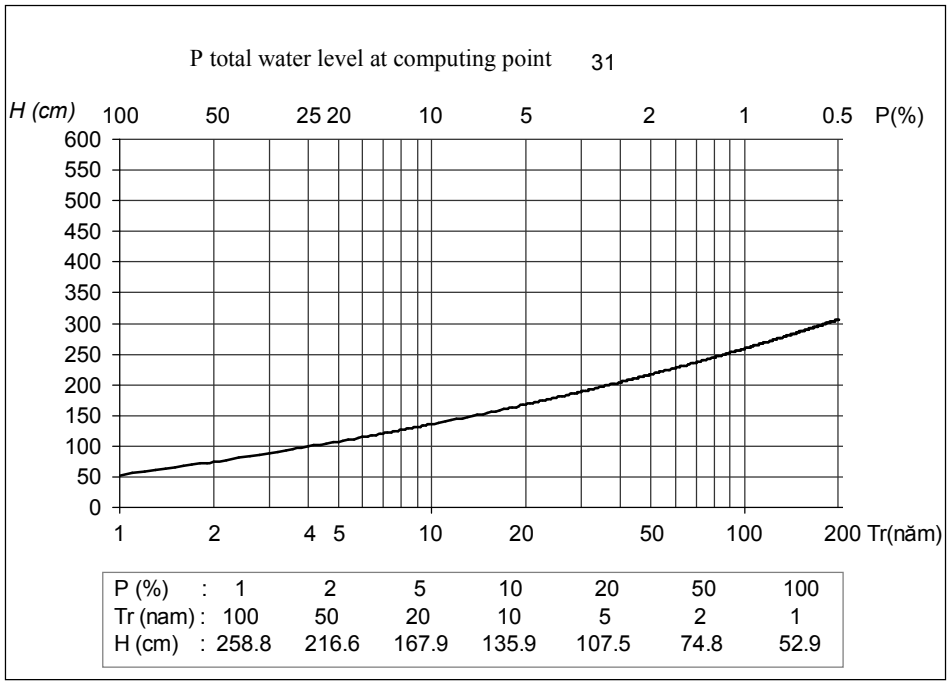


Figure II.31 *Frequency curves of total water level at point MC31 (106°31', 17°39') Hải Trạch, Bố Trạch, Quảng Bình*

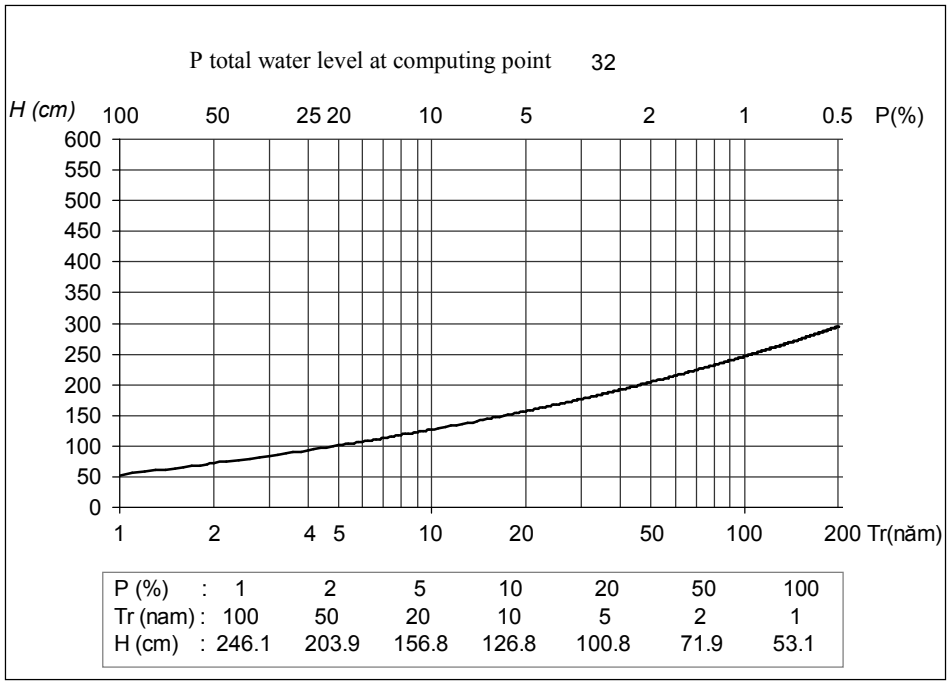


Figure II.32. *Frequency curves of total water level at point MC32 (106°37', 17°30') Hải Thành, Đồng Hới, Quảng Bình*

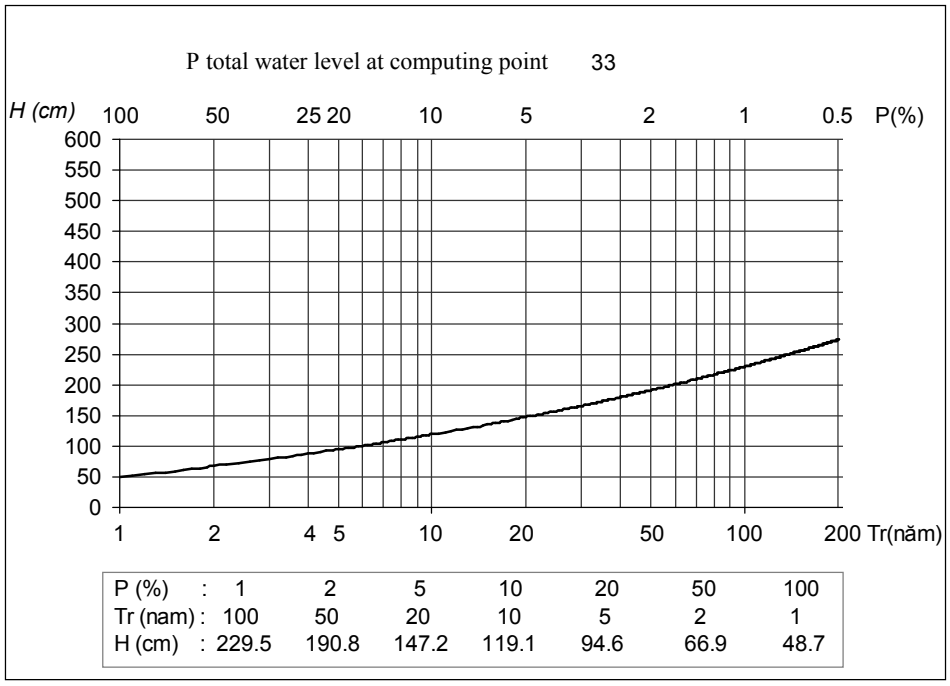


Figure II.33. *Frequency curves of total water level at point MC33 (106°45', 17°22') Hải Ninh, Quảng Ninh, Quảng Bình*

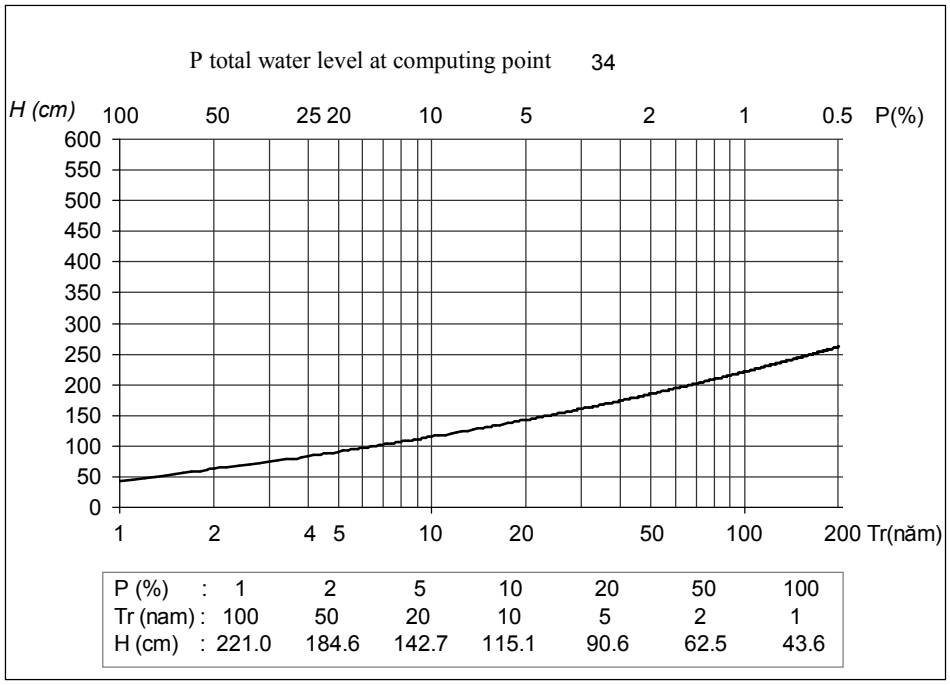


Figure II.34 *Frequency curves of total water level at point MC34 (106°53', 17°14') Hải Thuỷ, Lệ Thuỷ, Quảng Bình*

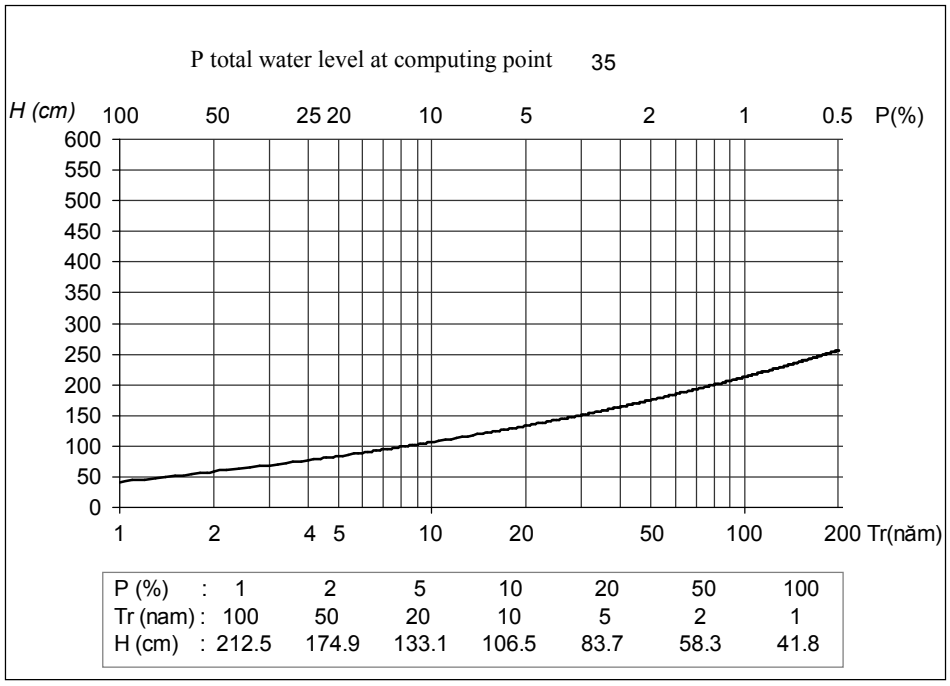


Figure II.35. *Frequency curves of total water level at point MC35 (107°02', 17°08') Vĩnh Thái, Vĩnh Linh, Quảng Trị*

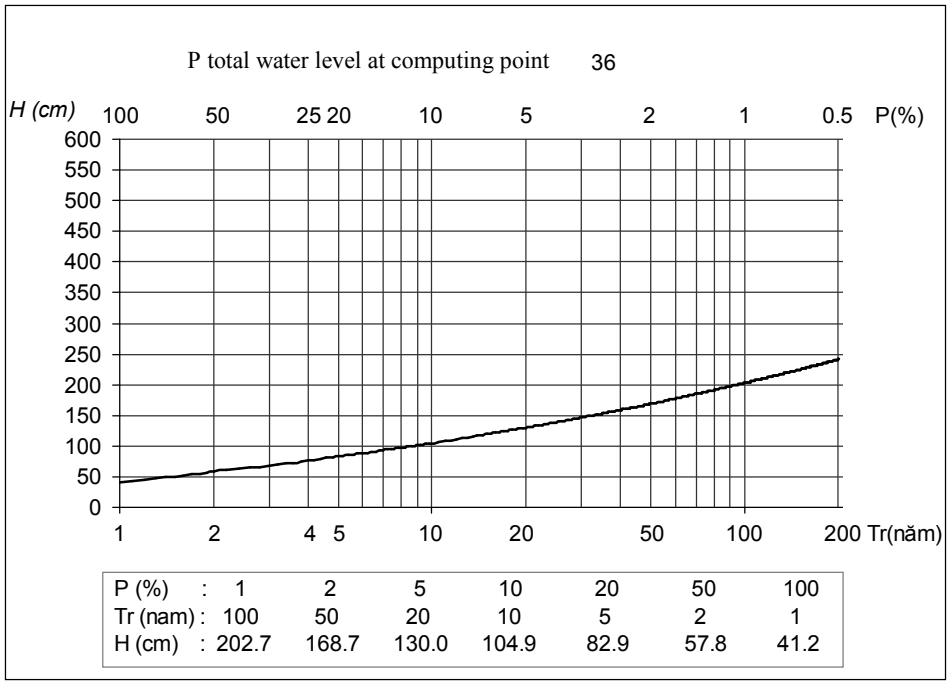


Figure II.36 *Frequency curves of total water level at point MC36 (107°08', 16°58') Trung Giang, Gio Linh, Quảng Trị*

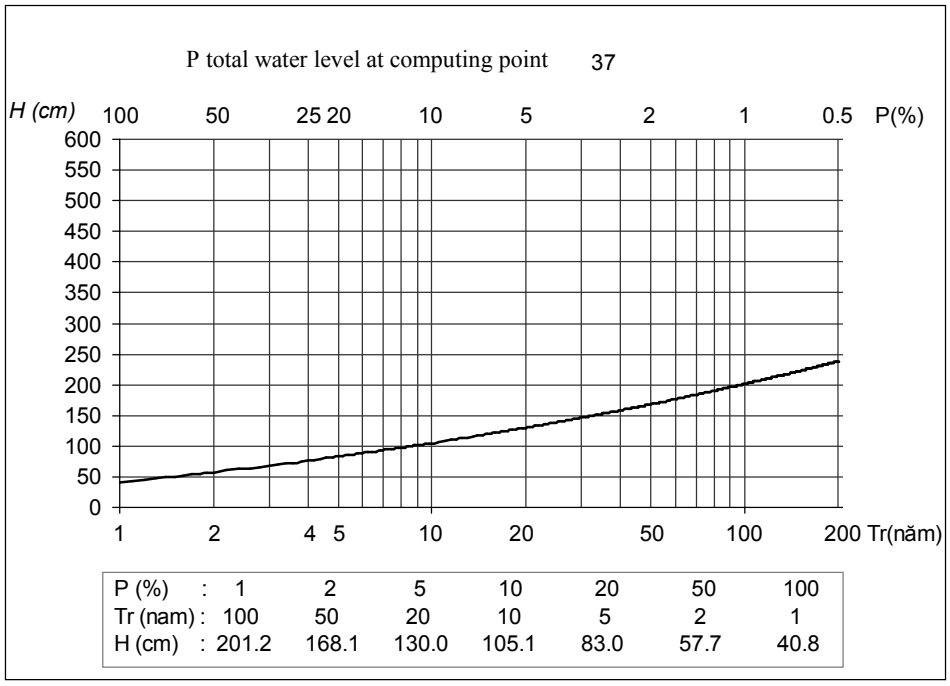


Figure II.37 *Frequency curves of total water level at point MC37 (107°13', 16°53') Triệu An, Triệu Phong, Quảng Trị*

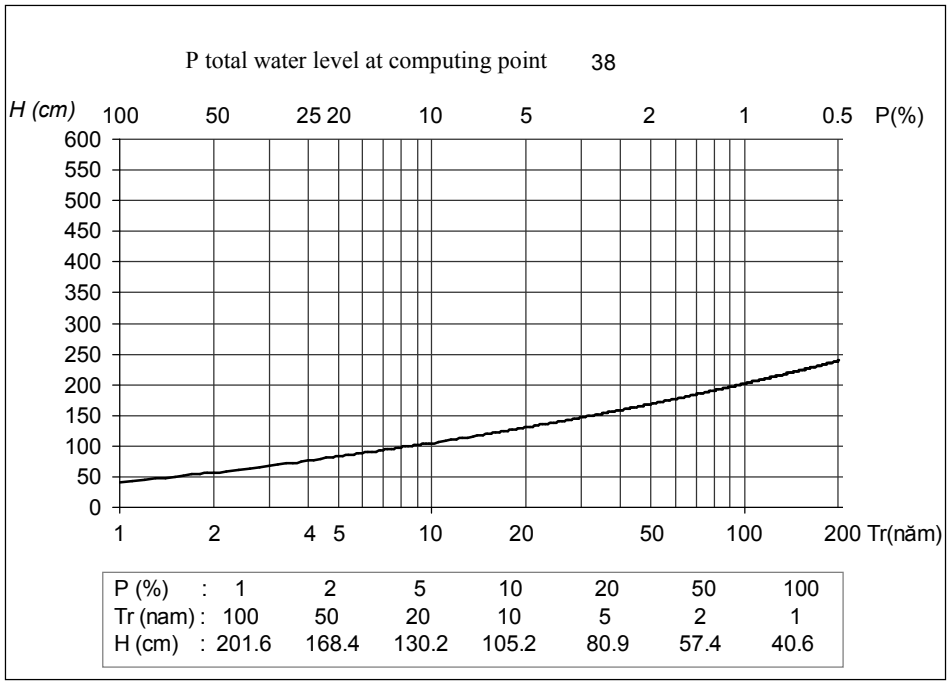


Figure II.38. *Frequency curves of total water level at point MC38 (107°17', 16°50') Triệu Lăng, Triệu Phong, Quảng Trị*

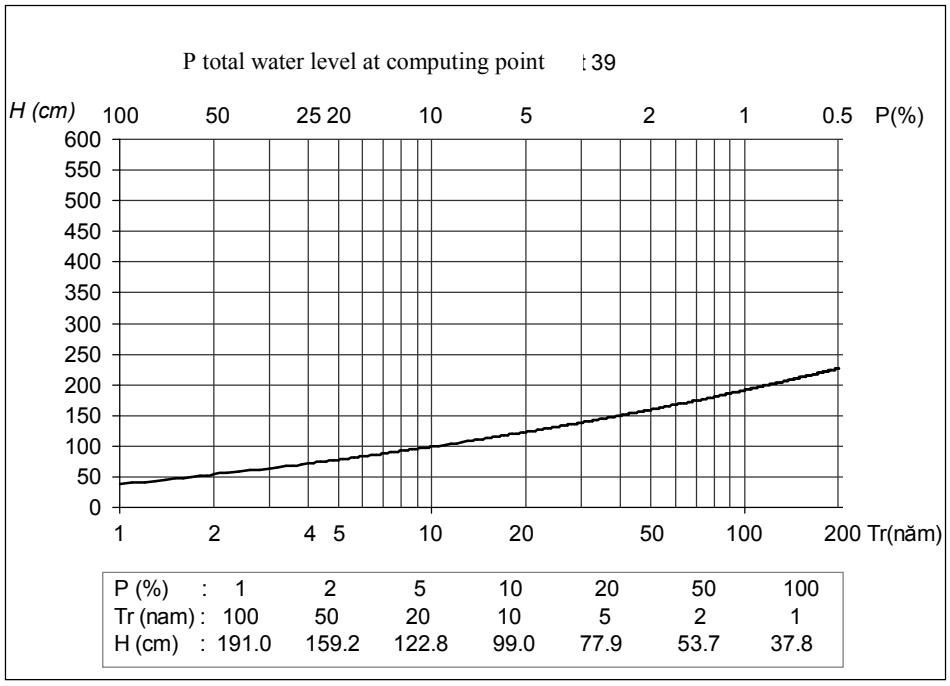


Figure II.39. *Frequency curves of total water level at point MC39 (107°26', 16°43') Điền Môn, Phong Điền, Thừa Thiên - Huế*

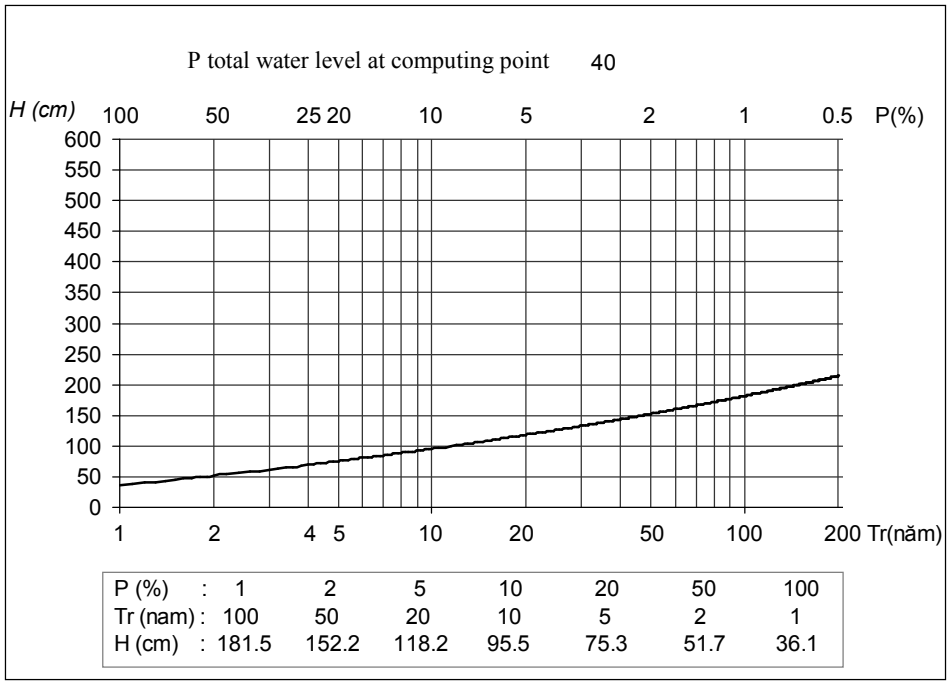


Figure II.40. *Frequency curves of total water level at point MC40 (107°35', 16°36') Hải Dương, Hương Trà, Thừa Thiên - Huế*

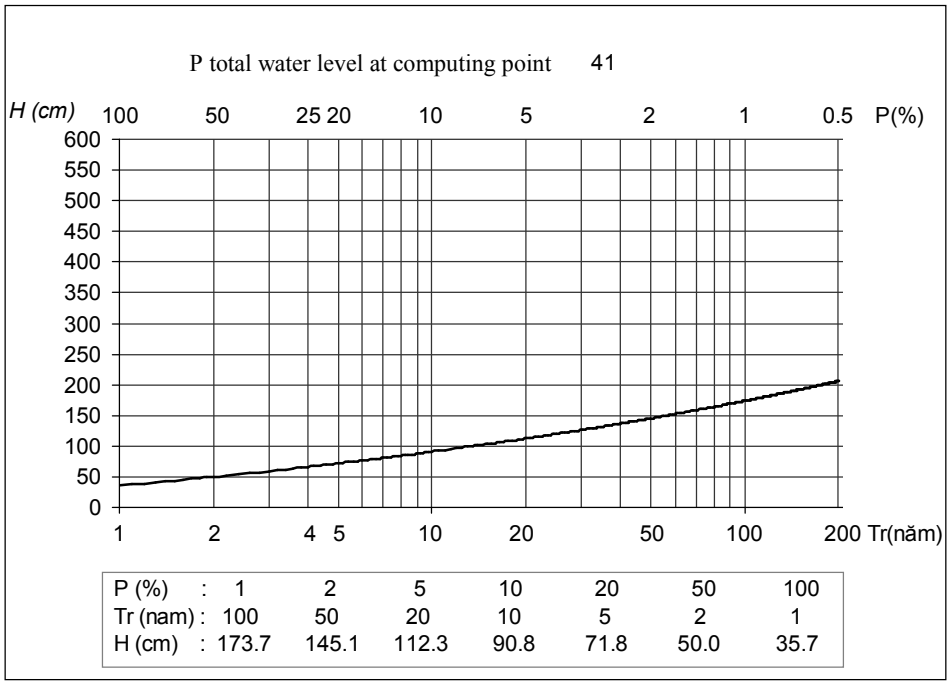


Figure II.41 *Frequency curves of total water level at point MC41 (107°44', 16°30') Phú Diên, Phú Vang, Thừa Thiên - Huế*

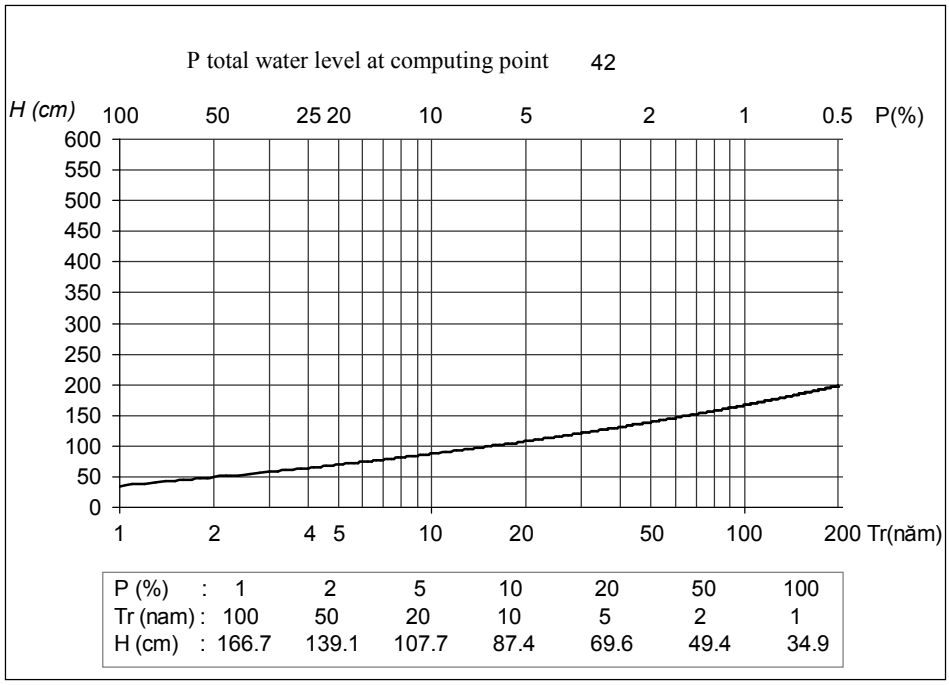


Figure II.42. *Frequency curves of total water level at point MC42 (107°53', 16°23') Vinh Hải, Phú Lộc, Thừa Thiên - Huế*

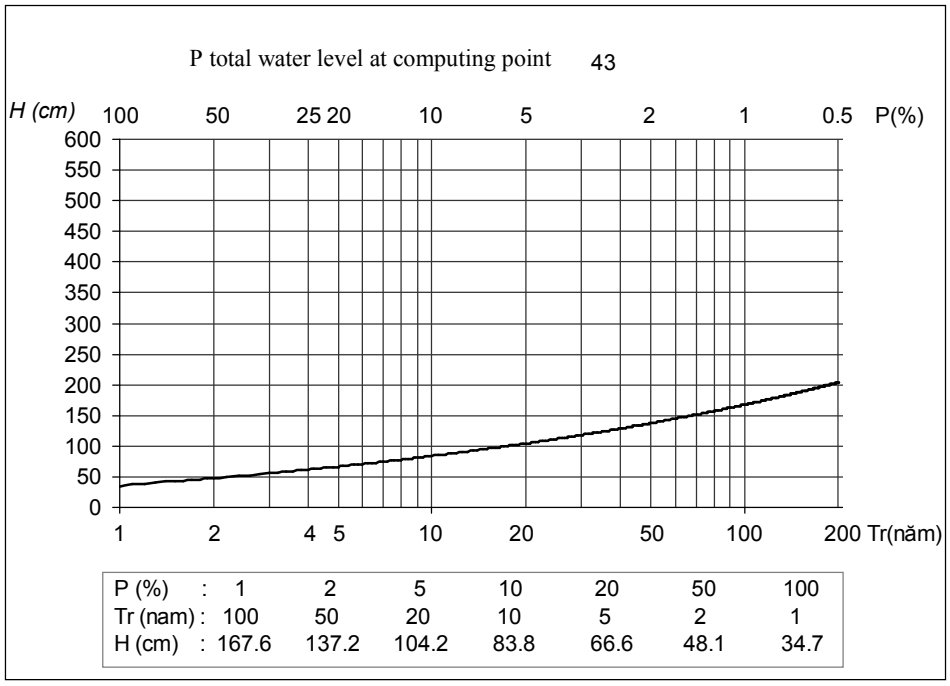


Figure II.43. *Frequency curves of total water level at point MC43 (108°03', 16°17') Lăng Cô, Phú Lộc, Thừa Thiên - Huế*

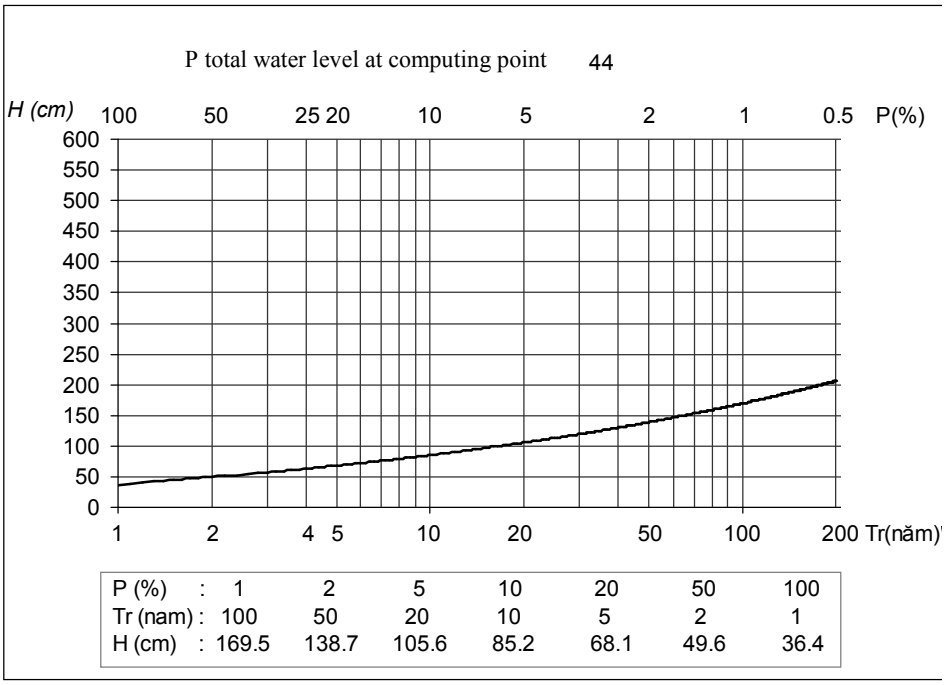


Figure II.44. *Frequency curves of total water level at point MC44 (108°08', 16°07') Hoà Hiệp Nam, Liên Chiểu, TP. Đà Nẵng*

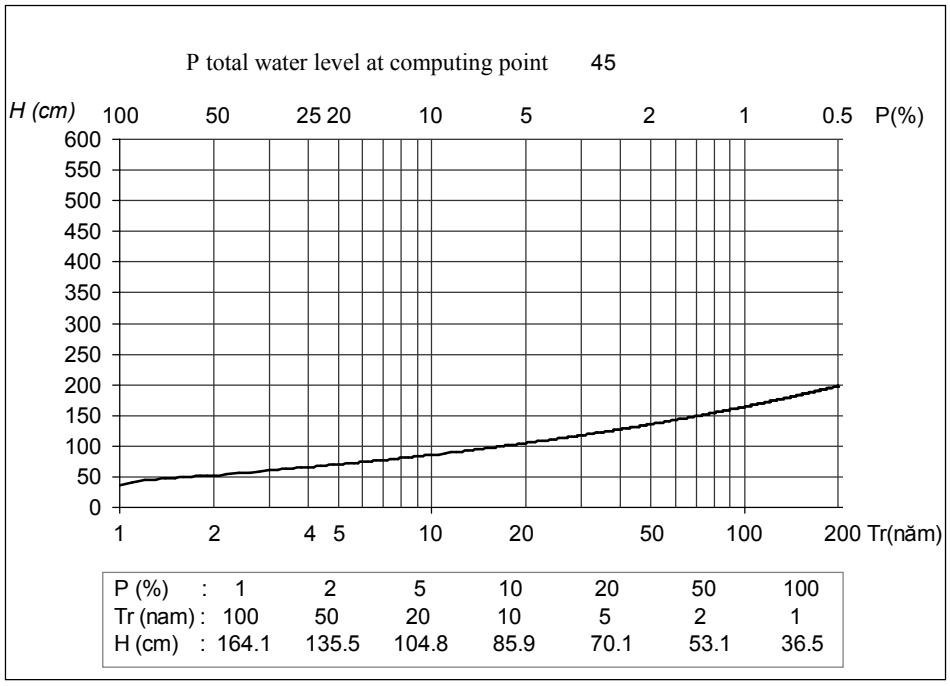


Figure II.45 *Frequency curves of total water level at point MC45 (108°17', 16°00') Hoà Hải, Ngũ Hành sơn, TP. Đà Nẵng*

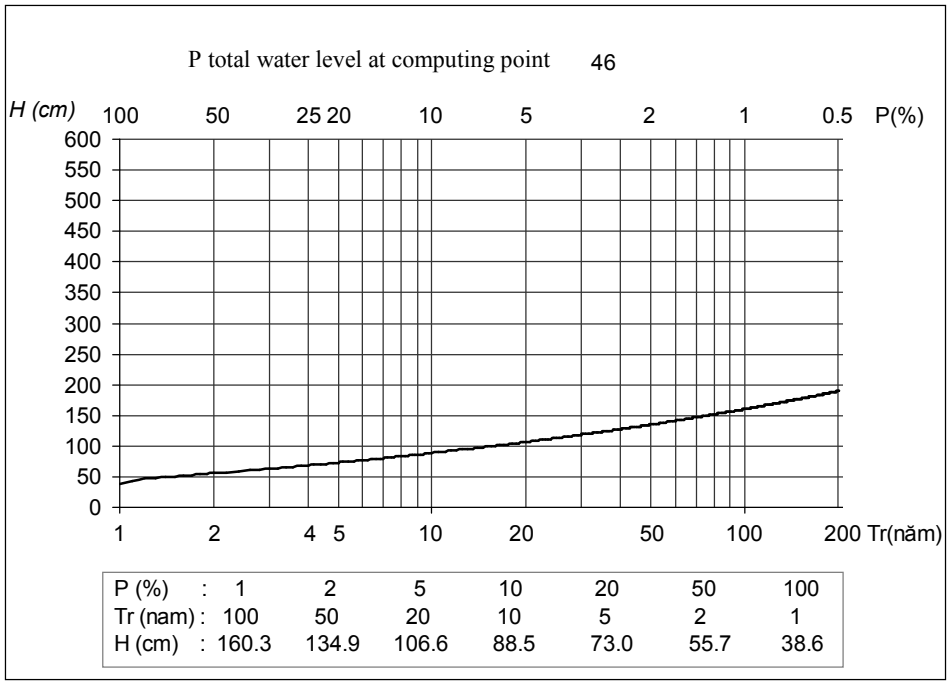


Figure II.46. *Frequency curves of total water level at point MC46 (108°24', 15°52') Duy Hải, Duy Xuyên, Quảng Nam*

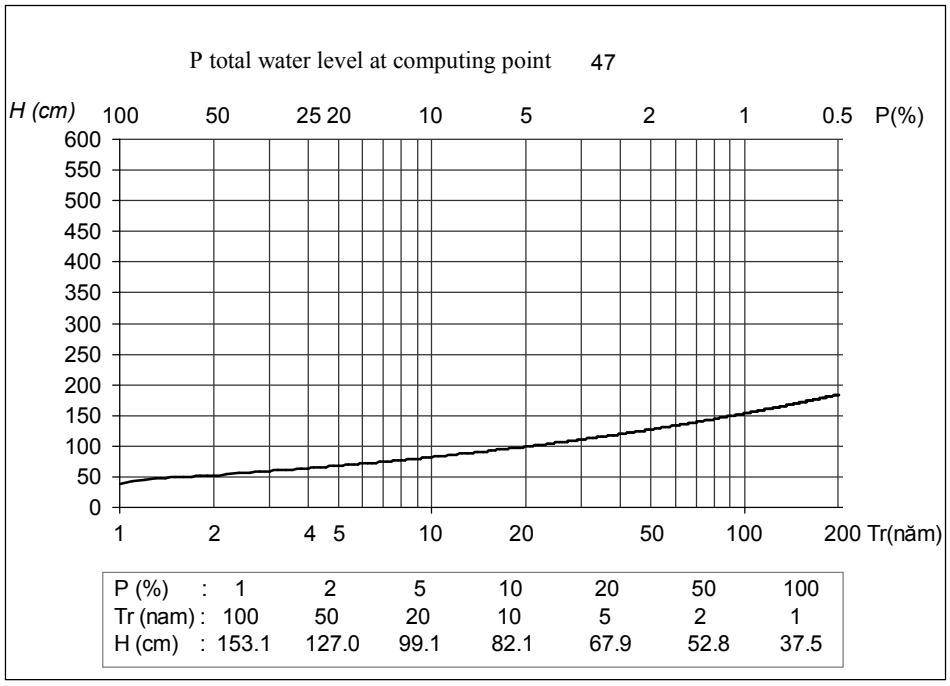


Figure II.47. *Frequency curves of total water level at point MC47 (108°29', 15°41') Bình Hải, Thăng Bình, Quảng Nam*

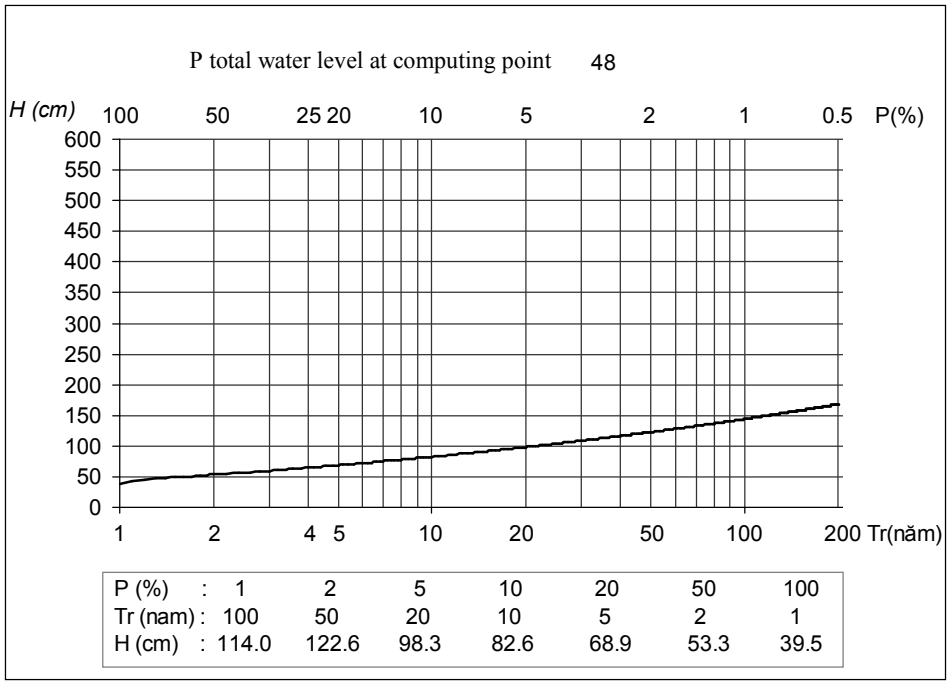


Figure II.48. *Frequency curves of total water level at point MC48 (108°36', 15°32') Tam Tiến, Núi Thành, Quảng Nam*

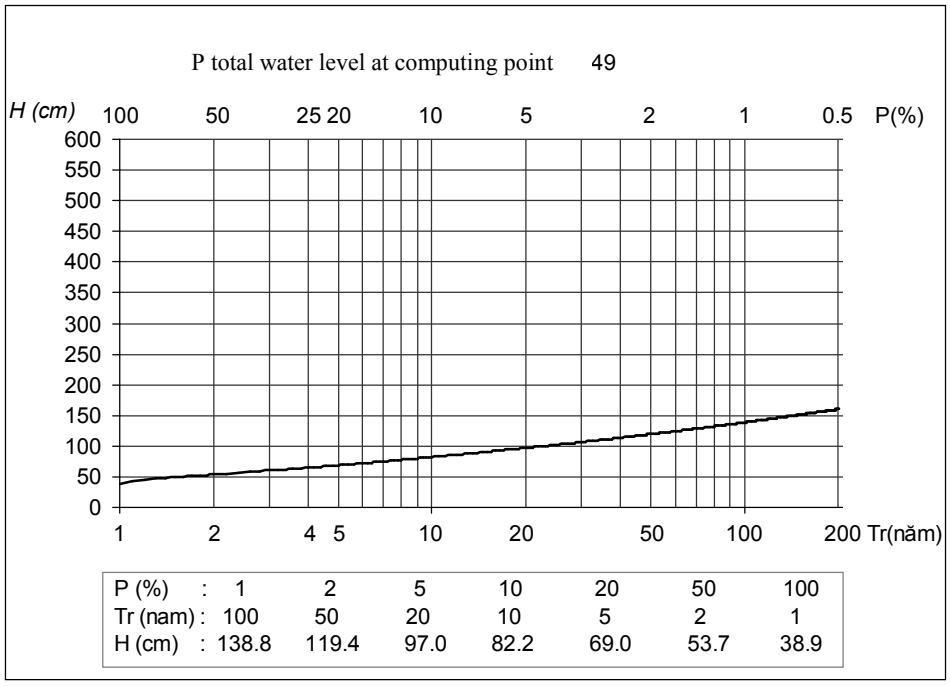


Figure II.49. *Frequency curves of total water level at point MC49 (108°43', 15°25') Tam Nghĩa, Núi Thành, Quảng Nam*

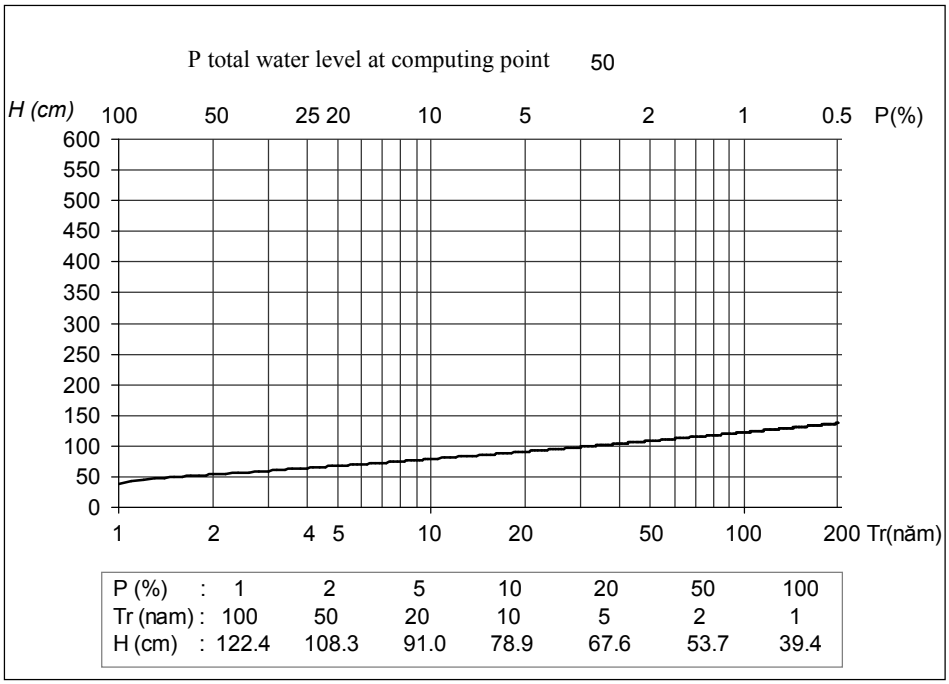


Figure II.50. *Frequency curves of total water level at point MC50 (108°54', 15°15') Bình Châu, Bình Sơn, Quảng Ngãi*

APPENDIX B – COMPUTATION OF DESIGN WAVE RUN-UP/ WAVE OVERTOPPING

I. Computation of Wave Run-up

Wave run-up is calculated by the following formula:

$$R_{up} / H_{m0p} = 1,75 \gamma_\beta \gamma_b \gamma_f \xi_0 \qquad \text{if} \qquad 0,5 < \gamma_b \xi_0 < 1,8 \qquad (1)$$

$$R_{up} / H_{m0p} = \gamma_\beta \ \gamma_f \ (4,3 - \frac{1,6}{\sqrt{\xi_0}}) \qquad \text{if} \qquad 1,8 < \gamma_b \xi_0 < 8 \div 10 \qquad (2)$$

where, R_{slp} - Design wave run-up height (m);

H_{m0p} - Design wave height at the dike toe ($H_{sp} = H_{m0p}$) (m);

H_{sp} - See Appendix C.

I.1 Breaker parameter (ξ_0)

$$\xi_0 = \frac{\tan \alpha}{\sqrt{s_0}} \qquad (3)$$

where, α - inclination of dike slope;

In case the dike slope has two different inclinations, the following conversion formula can be used:

$$\tan \alpha = \frac{1,5 H_{m0p} + R_{up}}{L - B} \qquad (4)$$

where, L, B – lengths, determined as per Figure 1.

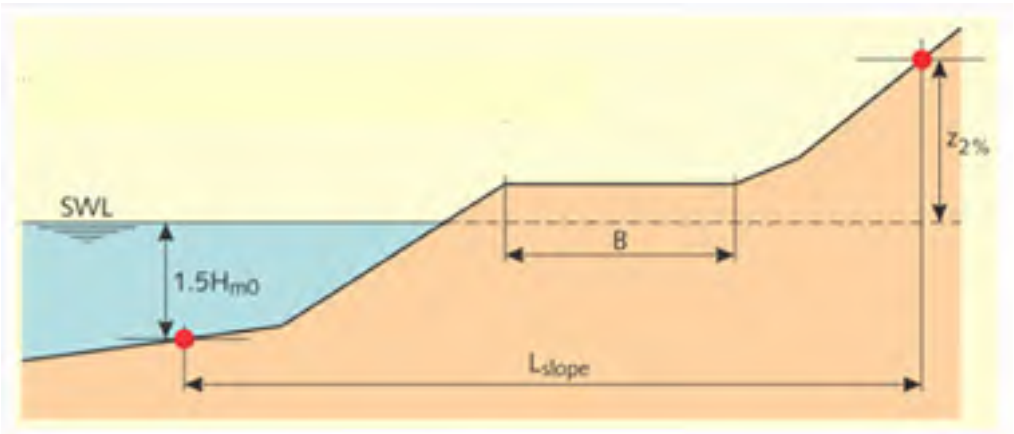


Figure B.1 *Converted slope for the computation of wave run-up*

(Courtesy of TAW, 2002: Technical Report – Wave Run-up and Wave Overtopping at Dikes)

s_0 - wave steepness;

$$s_0 = \frac{2\pi H_{m0p}}{g.T^2_{m-1,0,p}} \qquad (5)$$

Spectral wave period: $T_{m-1.0,p} = T_p/\alpha$, $\alpha = 1{,}10 \sim 1{,}20$;

T_p - Peak period.

I.2 Reduction factor for oblique incident waves (γ_β)

$$\gamma_\beta = 1 - 0{,}0022*|\beta| \qquad (0^0 \le |\beta| \le 80^0) \qquad (6)$$

$$\gamma_\beta = 1 - 0{,}0022* 80 \qquad (|\beta| > 80^0)$$

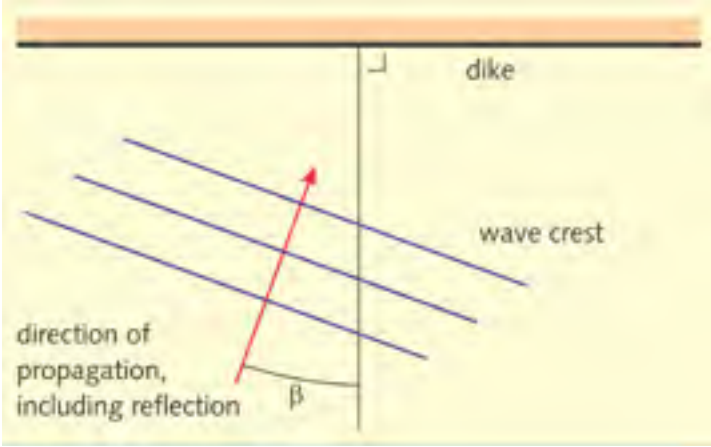


Figure B.2 *Angle of incident waves*

(Courtesy of TAW, 2002: Technical Report – Wave Run-up and Wave Overtopping at Dikes)

I.3 Reduction factor for a berm (γ_b)

$$\gamma_b = 1 - \frac{B}{L_b}\left(0{,}5 + 0{,}5.\cos\left(\pi \frac{d_h}{x}\right)\right) \quad \text{with} \quad 0{,}6 \le \gamma_b \le 1{,}0 \qquad (7)$$

where, B, L_b, d_h is determined as per Figure 3;

x is determined as follows:

$x = R_{up}$ khi $R_{up} > d_h > 0$ (berm located above design water level);

$x = 2.H_{m0p}$ khi $2.H_{m0p} > d_h \ge 0$ (berm located below design water level).

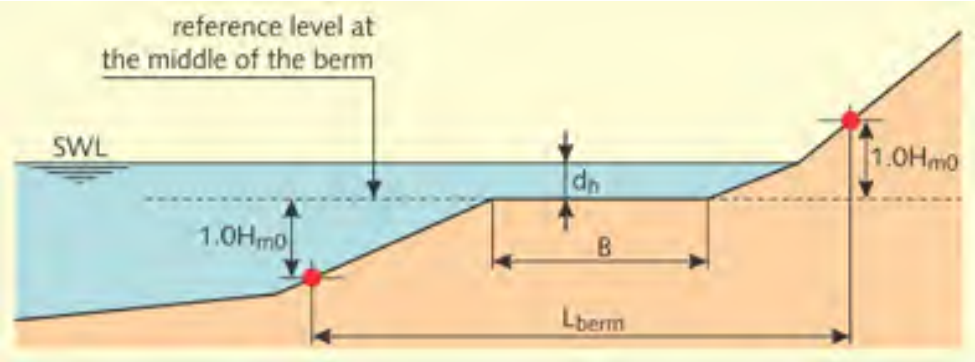


Figure B.3 *Parameters used for the determination of a berm*

(Courtesy of TAW, 2002: Technical Report – Wave Run-up and Wave Overtopping at Dikes)

Optimum width of a berm is $B_{opt} = 0{,}4.L_b$, in case it is introduced at the design water level for the maximum reduction of wave run-up and wave overtopping $\gamma_b = 0{,}60$.

I.4 Reduction factor for roughness elements on slope (γ_f)

The reduction factors are given in Table 1.

Table 1. *Reduction factor for roughness elements on slope*

Types of structural elements on slope	Reduction factor γ_f
Asphaltic concrete, concrete, smooth structural concrete elements, grass, asphaltic sand	1,00
Horizontally joined structural concrete elements, structural elements with grass	0,95
Special structural elements: Basalt, Basalton, Hydroblock, Haringman, Fixstone, Armorflex	0,90
¼ of block revetment 10cm higher	0,90
Lessinische and Vilvoordse, structural elements with low roughness	0,85
Small blocks over 1/25 of surface	0,85
Tsc elements (Vietnam)	0,85
Small blocks over 1/9 of surface	0,80
Armour rock – single layer	0,70
Armour rock – two layers thick	0,55

I.5 Calculation procedure for wave run-up on dike slope

- Assume R_{slp} ;
- Calculate tanα, ξ_0 ;
- Calculate γ_b, γ_f, γ_β ;
- Re-calculate R_{slp};
- Compare the assumed value with the calculated value of R_{slp}

Example 1: Given the design wave height at the dike toe H_{sp} = 2m, wave period T_p= 8s, angle of incident wave $\beta = 10^0$.

Ratio $T_p/T_{m-1,0,p} = 1,1 \rightarrow T_{m-1,0,p} = 7,27s$

Select the geometrical characteristics and the revetment protecting structures for the cross section of a dike as follow:

- A berm is placed on seaward side, with a width of 6m;
- Berm is located at the design water level;
- Inclination of slope sections below a berm: m = 4;
- Inclination of slope sections above a berm: m = 3;
- Outer slope is protected by precast concrete elements TSc.

Answer:

Assume the wave run-up R_{slp}= 3,8m

$$\tan\alpha = \frac{1,5\times 2+3,8}{29,4-6} = 0,29 \; ; \qquad s_0 = \frac{2\times 3,14\times 2}{9,81\times 7,27^2} = 0,0242$$

$$\xi_0 = \frac{\tan\alpha}{\sqrt{s_0}} = 1,86 \; ; \qquad \gamma_b = 1-\frac{B}{L_{berm}} = 1-\frac{6}{20} = 0,7$$

From the given table: γ_f = 0,85

$\gamma_\beta = 1 - 0,0022\times 10 = 0,978$

$\gamma_b\xi_0 = 0,7\times 1,86 = 1,302$, which is in the range $0,5 < \gamma_b\xi_0 < 1,8$; formula (1) is selected then:

$R_{slp} = 1,75\times 0,978\times 0,7\times 0,85\times 1,86\times 2 = 3,79\,(m)$,which approximates to the assumed value R_{up}

Therefore, R_{up} = 3,8m

* In case of no berm, the slope coefficient m = 4:

- $\xi_0 = \frac{\tan\alpha}{\sqrt{s_0}} = 1,61 \; ;$
- Reduction factor for a berm: $\gamma_b = 1$;
- $\gamma_b\xi_0 = 1,0\times 1,61 = 1,61$, which is in the range $0,5 < \gamma_b\xi_0 < 1,8$; formula (1) is used then.
- Wave run-up : $R_{slp} = 1,75\times 0,978\times 1,0\times 0,85\times 1,61\times 2 = 4,68$ (m)

II. Computation of wave overtopping

Formulae used for the computation of wave overtopping are as follows:

$$\frac{q}{\sqrt{gH_{m0p}^3}} = \frac{0,067}{\sqrt{\tan\alpha}}\gamma_b\xi_0.\exp\left(-4,3\frac{R_{cp}}{H_{m0p}}\frac{1}{\xi_0\gamma_b\gamma_f\gamma_\beta}\right) \quad \text{if} \quad \gamma_b\xi_0 \le 2 \qquad (8)$$

$$\frac{q}{\sqrt{gH_{m0p}^3}} = 0,2.\exp\left(-2,3\frac{R_{cp}}{H_{m0p}}\frac{1}{\gamma_f\gamma_\beta}\right) \quad \text{if} \quad \gamma_b\xi_0 > 2 \qquad (9)$$

$$\frac{q}{\sqrt{gH_{m0p}^3}} = 0,21.\exp\left(-\frac{R_{cp}}{\gamma_f\gamma_\beta H_{m0p}(0,33+0,022.\xi_0)}\right) \quad \text{if} \quad \xi_0 > 7 \qquad (10)$$

where, q - Allowable average unit discharge of wave overtopping (l/s/m);
R_{cp} – Crest freeboard above the design water level (m);

II.1 Unit discharge of wave overtopping (q)

The unit discharge of wave overtopping (q) is determined on the basis of the quality of protecting elements of dike crest and inner slope, as well as the requirements of flood control in the area behind the dike (see Table 2 and Figure 4).

Table 2. *Unit discharge of wave overtopping corresponding to requirements of inner slope protection*

Average unit discharge of wave overtopping q (l/s/m)	*Requirements of inner slope protection*
≤ 0,1	Normal grass
1,0 < q < 10,0	Concrete is laid on the surface of dike crest, extended by 1m down the dike slope; for the next sections, normal grass or Vetiver grass is grown reaching the dike toe; methods for protecting against slope sliding and grass on slope are adopted; water intake works, storage area for overtopping water and drainage works are designed if necessary;
q > 10,0	Inner slope is protected by concrete; designed structural elements for the protection of dike toe; designed water intake works, storage area and drainage works for the overtopping water after the storm.

II.2 Reduction factor for oblique incident waves (γ_β)

$$\gamma_\beta = 1 - 0,0033\times|\beta| \qquad (0^0 \le |\beta| \le 80^0) \qquad (11)$$

$$\gamma_\beta = 1 - 0,0033\times 80 \qquad (|\beta| > 80^0)$$

With $80^0 < |\beta| \le 110^0$:

$$H_{m0p} = H_{m0p}\times\frac{110-|\beta|}{30}$$

$$T_{m-1,0,p} = T_{m-1,0,p}\times\sqrt{\frac{110-|\beta|}{30}}$$

With $110^0 < |\beta| \leq 180^0$ then $H_{m0p}=0$ and therefore $R_{up} = 0$ and wave overtopping q = 0.

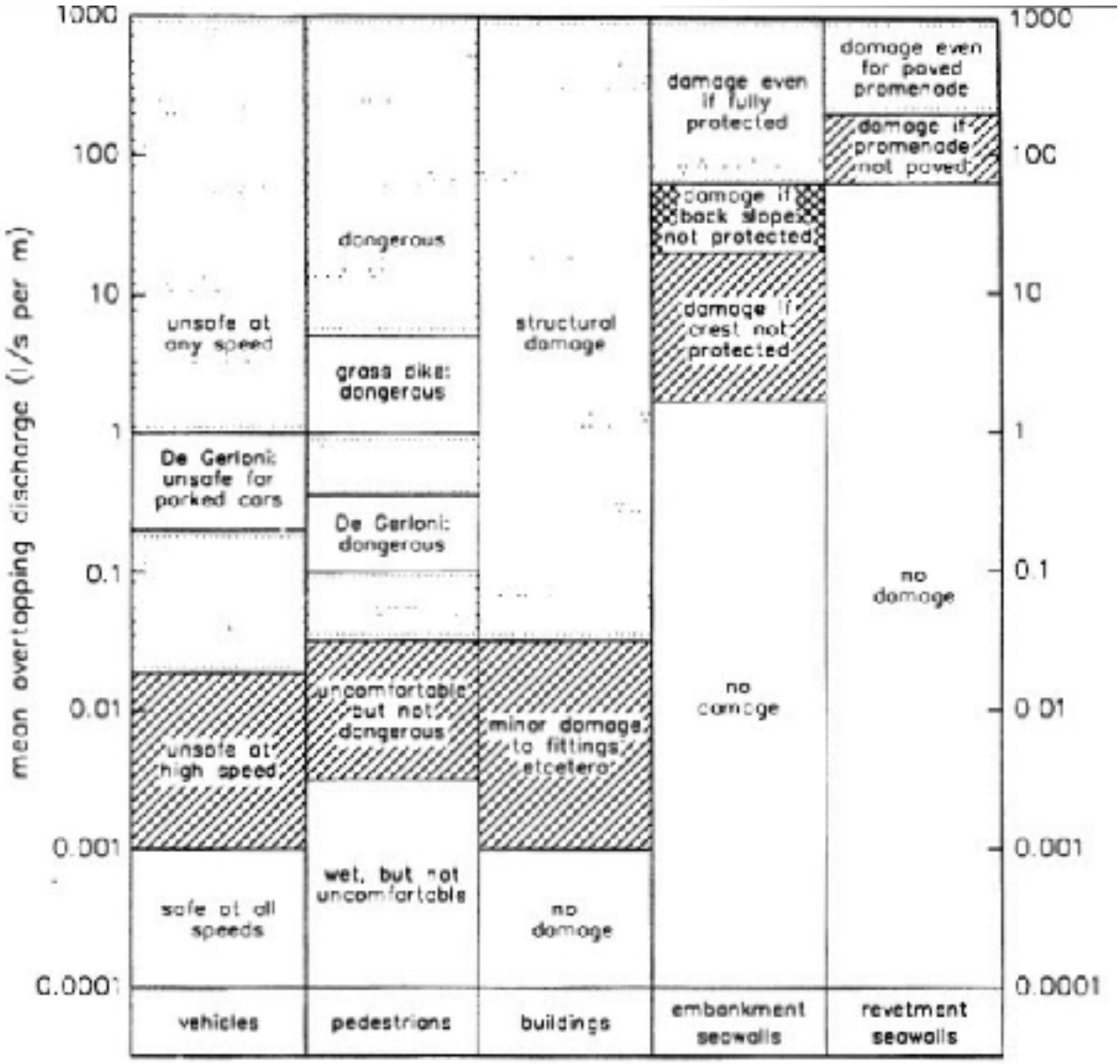


Figure 4. *Allowable average unit discharge of wave overtopping (CEM-2002)*

Other factors are calculated in the same way as done in wave run-up computation section.

Example 2: With the same wave parameters and geometrical characteristics as given in Example 1 in case of berm. Determine the unit discharge of wave overtopping q_{tt} with the crest freeboard above the design water level R_{cp} = 2,5m.

$\gamma_\beta = 1 - 0{,}0033 \times 10 = 0{,}967$

$$\frac{q}{\sqrt{9{,}81 \times 2^3}} = \frac{0{,}067}{\sqrt{0{,}29}} 0{,}7 \times 1{,}86 . \exp\left(-4{,}3 \times \frac{2{,}5}{2} \times \frac{1}{1{,}86 \times 0{,}7 \times 0{,}85 \times 0{,}97} \right)$$

q_{tt} = 9,69 (l/s/m)

Notes:

1. In case of existing sea dikes, it is necessary to check the dike quality and to propose solutions for guaranteeing the safety of sea dikes.

- Dike crest level (or crown wall level), which has been determined;
- Design water level, determined as per the given appendix;
- R_{cp} is determined by subtracting the design water level from the dike crest elevation (or crown wall level);
- By means of the substitution in the formulae for wave overtopping discharge computation, q (l/s/m) can then be determined;
- Compare with the given requirements in Table 2 to check if the quality of sea dike is guaranteed. If it is not guaranteed, it is necessary to take the solutions for strengthening the sea dike and for the drainage of overtopping water into consideration.

2. In case of new sea dike systems

- The design parameters including cross sections, dike berm, dike slope, protection material and allowable wave overtopping discharge (q) are proposed;
- By means of the substitution in the formulae for wave overtopping discharge computation, R_{cp} (m) can then be determined;

3. Crown wall is usually used in sea dike design, however its height is only in the order of 0,5 ÷ 0,7 m (approximately 10% of dike height) with no significant impacts on the wave overtopping discharge; therefore the formulae from (8) to (10) can be used directly.

APPENDIX C – *WAVE COMPUTATION FOR SEA DIKE DESIGN*

C1. Look-up tables of wave parameters for 50 cross sections perpendicular to the coastline seawards from the dike toe

C1.1. Coordinates of the cross sections

The cross sections are selected with high density along the coastline from Quang Ninh to Quang Nam (at a distance of 20km) in such a way that the computation of wave fields can be performed at the areas of highly variable waves. Tables C-2.1 ÷ C-2.50 give the design wave parameters including: significant wave height, wave period corresponding to the peak frequency of the spectrum (T_p), absolute mean period (T_{m01}), absolute mean zero-crossing period (T_{m02}); wave-induced water level rise is given together with the distance from the coastline and the depths (supplemented with wave-induced water level rise). Aforementioned wave parameters are available within the range of 1km seawards from the dike toe with the mesh size of 50m to the point with a distance of 500m from the dike toe and remaining mesh size of 100m. In each cross section, the coordinates (in UTM-VN2000) of the point close to the dike toe are specified, which are important parameters for wave calculation in the design. Table 1.5 gives the coordinates (X [m]; Y[m]) of the cross sections in 5 zones (for more detailed reference of coordinates and place names of the cross sections, refer to the additional section.

Table 1. *Coordinates of the cross sections in zone No.* 1

MC1	MC2	MC3	MC4	MC5	MC6	MC7	MC8	MC9	MC10
816424	802067	782364	772857	763853	749712	721527	700457	686807	682974
2377091	2362858	2356081	2334766	2312804	2298191	2304576	2298749	2300030	2288809

Table 2. *Coordinates of the cross sections in zone No.* 2

MC11	MC12	MC13	MC14	MC15	MC16	MC17	MC18
670504	668977	658070	637772	631034	624922	601321	597716
2275841	2251035	2234111	2224975	2217620	2209719	2203372	2193173

Table 3. *Coordinates of the cross sections in zone No.* 3

MC19	MC20	MC21	MC22	MC23	MC24	MC25	MC26	MC27	MC28	MC29
594946	585303	582248	576874	565490	575250	584398	595675	613421	641024	656813
2182648	2162133	2142096	2122050	2102095	2082111	2062129	2042162	2022126	2004498	1987802

Table 4. *Coordinates of the cross sections in zone No.* 4

MC30	MC31	MC32	MC33	MC34	MC35	MC36
652922	660920	672094	685816	700719	716906	727416
1970735	1951327	1934603	1920120	1906430	1893980	1876719

Table 5. *Coordinates of the cross sections in zone No.* 5

MC37	MC38	MC39	MC40	MC41	MC42	MC43
735076	743148	759391	775022	792355	807602	825711
1867950	1860959	1848978	1836224	1825383	1812309	1802165

Table 6. *Coordinates of the cross sections in zone No.* 5 *(continued)*

MC44	MC45	MC46	MC47	MC48	MC49	MC50
834776	851024	864235	873344	885424	899526	919184
1782923	1770993	1755809	1736684	1720489	1706327	1689276

Necessary steps when using these tables are as follows:

- Determining accurate coordinates of the design dike section;
- Finding the cross section with closest coordinates to the coordinates of the design dike section;
- Obtaining the wave parameters at the cross section together with the distance and depth of the cross section calculated seawards from the dike toe with the following notes:
    - Depths in the second column has included the actual depth and the water level rise due to tides, storms and waves;
    - The actual depth is the charted depth with an 1.86m (approximated for the entire design area);
    - Tide-induced water level rise is obtained corresponding to different return periods for each table (as per the results of the Project No.1);
    - Storm-induced water level rise is obtained corresponding to different return periods for each table (as per the results of the Project No.1);

  Supplemented with above-mentioned water levels at the location with a distance of 0m from the dike toe, the depths are always positive.

C1.2. Instructions for usage (through a detailed example)

Example of using the available computation tables at the cross sections for the design of sea dike in Cat Hai.

Coastal area of Cat Hai – Hai Phong with the approximate latitude limitation of 20^0794 – 20^0805 North. The design dike section in this area will use the cross section with closest coordinates, which is cross section No. 9 – Table C-2.9. Its coordinates are X=686807.160m and Y=2300030.330m corresponding to the geographical coordinates of 106.797 E and 20.799N.

If the sea dike design for the South point of Đo Son and a North point of Ba Lat Estuary (Thai Binh) is necessary, the data on cross section No. 11 - Table C-2.10 and cross section No. 11 - Table C-2.11 must be used. The coordinates of cross section No. 10 are X=682974.200m and 2288809.340m; the coordinates of cross section No. 11 are 670503.710m and 2275840.610m. The computation results of wave height corresponding to the return period of 100 years at the above-mentioned cross sections are shown in Figure 1.

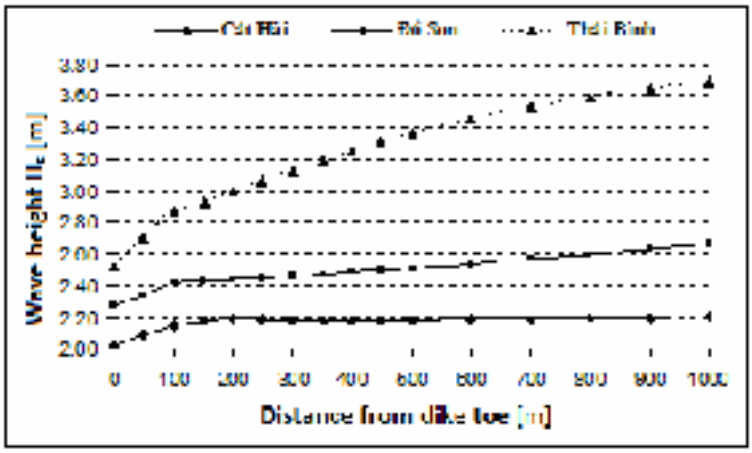


Figure 1. *Look-up results from the tables given in Appendix B at cross section No. 9 – Cat Hai;No. 10 - Do Son and No. 11 - Thai Binh*

From Figure 1, it can be seen that wave heights vary greatly at different cross sections. The above-mentioned example indicates that it is necessary to determine the exact location of the design points and to select the appropriate cross sections.

C1.2.1 Applying the computation results at the given cross sections for the areas with mangrove forests or wave-attenuating structures

Mangrove forests are capable of attenuating the waves, especially high waves with the return periods of many years. The computation of wave fields in this document

do not take the existence of the mangrove forests into consideration, however in each specific case, the correction of wave parameters can be performed depending on the wave-resisting capacity of the mangrove forests. Correction factors – reducing the wave heights due to wave-attenuating effect of mangrove forests – depend on the type of mangrove forest with different densities, which can be applied in each specific case.

C1.2.2 Tables of wave parameters computation according to wave-generating factors for the shielded coastal areas with no impacts of incident deep-water wave field (Appendix C2)

Appendix C2 includes 03 parts as follows:

- Available tables of wave parameters corresponding to different return periods depending on the ranges of depth and fetch for the areas from Quang Ninh to Hai Phong.
- Available tables of wave parameters depending on different wind velocities, the ranges of depth and fetch for the shielded coastal areas with no impacts of incident ocean waves.
- FBASE software used for the accurate computation of wave parameters theo detailed wind velocities, depths and fetches.

The general procedure for using Appendix C is that the available tables (Table $1 \div 6$) are firstly used for the areas from Quang Ninh to Hai Phong, or Table $7 \div 12$ for the others. Accurate wave parameters can then be computed by FBASE software.

TABLE OF COORDINATES AND PLACE NAMES OF CROSS SECTIONS FOR WAVE COMPUTATION FROM QUANG NINH TO QUANG NAM

Cross section	λ -(deg) E	Φ-(deg) N	Coordinate X VN2000 (m)	Coordinate Y VN2000 (m)	Commune	District	Province
MC01	108.056	21.477	816424.050	2377091.160	Bình Ngọc	TX. Móng Cái	Quảng Ninh
MC02	107.915	21.351	802067.330	2362858.420	Vĩnh Trung	TX. Móng Cái	Quảng Ninh
MC03	107.724	21.293	782364.410	2356080.900	Cái Chiên	Hải Hà	Quảng Ninh
MC04	107.629	21.102	772857.300	2334765.860	Minh Châu	Vân Đồn	Quảng Ninh
MC05	107.539	20.905	763853.020	2312803.540	Quan Lạn	Vân Đồn	Quảng Ninh
MC06	107.401	20.775	749711.730	2298191.360	Ngọc Vừng	Vân Đồn	Quảng Ninh
MC07	107.131	20.827	721527.050	2303552.720	Tuần Châu	TP. Hạ Long	Quảng Ninh
MC08	106.928	20.786	700457.480	2298748.940	Phù Long	Cát Hải	TP. Hải Phòng
MC09	106.797	20.799	686807.160	2300030.330	Đông Hải	An Hải	TP. Hải Phòng
MC10	106.759	20.698	682974.200	2288809.340	Bàng La	TX. Đồ Sơn	TP. Hải Phòng
MC11	106.638	20.582	670503.710	2275840.610	Thụy Xuân	Thái Thụy	Thái Bình
MC12	106.621	20.358	668977.470	2251035.360	Nam Thịnh	Tiền Hải	Thái Bình
MC13	106.515	20.206	658069.660	2234110.830	Giao Xuân	Giao Thủy	Nam Định
MC14	106.320	20.125	637772.280	2224974.740	Hải Lý	Hải Hậu	Nam Định
MC15	106.255	20.059	631034.470	2217619.970	Hải Hoà	Hải Hậu	Nam Định

MC16	106.196	19.988	624922.380	2209719.470	Nghĩa Phúc	Nghĩa Hưng	Nam Định
MC17	105.970	19.932	601321.200	2203371.540	Hưng Lộc	Hậu Lộc	Thanh Hoá
MC18	105.935	19.840	597715.940	2193172.950	Hoằng Tiến	Hoằng Hoá	Thanh Hoá
MC19	105.908	19.745	594945.950	2182647.970	P. Trung Sơn	TX. Sầm Sơn	Thanh Hoá
MC20	105.815	19.560	585302.810	2162133.150	Hải Ninh	Tĩnh Gia	Thanh Hoá
MC21	105.785	19.379	582248.450	2142096.060	Tĩnh Hải	Tĩnh Gia	Thanh Hoá
MC22	105.733	19.198	576874.120	2122050.300	Quỳnh Liên	Quỳnh Lưu	Nghệ An
MC23	105.624	19.018	565490.080	2102095.360	Diễn Kim	Diễn Châu	Nghệ An
MC24	105.716	18.837	575250.040	2082111.350	Nghi Thiết	Nghi Lộc	Nghệ An
MC25	105.802	18.656	584397.650	2062129.320	Xuân Viên	Nghi Xuân	Hà Tĩnh
MC26	105.908	18.475	595674.750	2042161.750	Thạch Bằng	Thạch Hà	Hà Tĩnh
MC27	106.075	18.293	613420.610	2022126.410	Cẩm Dương	Cẩm Xuyên	Hà Tĩnh
MC28	106.335	18.132	641023.610	2004497.590	Kỳ Ninh	Kỳ Anh	Hà Tĩnh
MC29	106.483	17.980	656812.520	1987802.130	Kỳ Nam	Kỳ Anh	Hà Tĩnh
MC30	106.445	17.826	652921.800	1970734.500	Quảng Hưng	Quảng Trạch	Quảng Bình
MC31	106.519	17.650	660919.830	1951326.720	Hải Trạch	Bố Trạch	Quảng Bình
MC32	106.623	17.498	672094.260	1934603.080	P. Hải Thành	TP. Đồng Hới	Quảng Bình
MC33	106.751	17.366	685816.100	1920119.970	Hải Ninh	Quảng Ninh	Quảng Bình
MC34	106.890	17.241	700719.200	1906430.300	Hải Thuỷ	Lệ Thuỷ	Quảng Bình
MC35	107.041	17.127	716906.280	1893980.040	Vĩnh Thái	Vĩnh Linh	Quảng Trị
MC36	107.138	16.970	727416.300	1876718.860	Trung Giang	Gio Linh	Quảng Trị
MC37	107.209	16.890	735076.170	1867950.330	Triệu An	Triệu Phong	Quảng Trị
MC38	107.284	16.826	743148.170	1860959.320	Triệu Lăng	Triệu Phong	Quảng Trị

MC39	107.435	16.716	759390.730	1848977.910	Điền Môn	Phong Điền	Thừa Thiên- Huế
MC40	107.580	16.599	775021.890	1836223.510	Hải Dương	Hương Trà	Thừa Thiên- Huế
MC41	107.741	16.499	792355.360	1825382.790	Phú Diên	Phú Vang	Thừa Thiên- Huế
MC42	107.882	16.379	807601.960	1812309.180	Vinh Hải	Phú Lộc	Thừa Thiên- Huế
MC43	108.050	16.285	825711.270	1802164.870	TT. Lăng Cô	Phú Lộc	Thừa Thiên- Huế
MC44	108.132	16.110	834775.500	1782922.830	P. Hoà Hiệp Nam	Liên Chiểu	TP. Đà Nẵng
MC45	108.282	16.000	851024.050	1770992.690	P. Hoà Hải	Ngũ Hành sơn	TP. Đà Nẵng
MC46	108.403	15.861	864235.370	1755808.890	Duy Hải	Duy Xuyên	Quảng Nam
MC47	108.485	15.687	873344.330	1736683.830	Bình Hải	Thăng Bình	Quảng Nam
MC48	108.595	15.539	885423.920	1720489.480	Tam Tiến	Núi Thành	Quảng Nam
MC49	108.724	15.409	899526.490	1706326.980	Tam Nghĩa	Núi Thành	Quảng Nam
MC50	108.904	15.252	919184.460	1689276.210	Bình Châu	Bình Sơn	Quảng Ngãi

Table C-2.1 *Results of wave computation for sea dike design*

Zone 1 Cross section 1 return period 10 years; X=816424 Y=2377091						
Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.13	1.71	11.76	11.01	10.77	0.47
50	3.79	1.80	11.76	10.99	10.75	0.47
100	4.43	1.88	11.76	10.98	10.73	0.46
150	4.49	1.90	11.76	10.98	10.73	0.46
200	4.54	1.92	11.76	10.97	10.72	0.46
250	4.61	1.93	11.76	10.97	10.72	0.46
300	4.67	1.95	11.76	10.97	10.72	0.46
350	4.75	1.97	11.76	10.97	10.71	0.45
400	4.82	1.98	11.76	10.96	10.71	0.45
450	4.89	1.99	11.76	10.96	10.71	0.45
500	4.97	2.00	11.76	10.96	10.70	0.45
600	5.11	2.02	11.76	10.95	10.70	0.45
700	5.24	2.03	11.76	10.95	10.69	0.45
800	5.33	2.04	11.76	10.95	10.69	0.45
900	5.41	2.05	11.76	10.94	10.69	0.45
1000	5.41	2.06	11.76	10.94	10.68	0.45

Zone 1 Cross section 1 return period 20 years; X=816424 Y=2377091						
Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.57	1.91	11.76	11.28	11.03	0.49
50	4.23	1.99	11.76	11.26	11.01	0.48
100	4.86	2.06	11.76	11.24	10.99	0.48
150	4.93	2.08	11.76	11.24	10.98	0.48
200	4.99	2.09	11.76	11.24	10.98	0.48
250	5.05	2.11	11.76	11.23	10.98	0.48
300	5.12	2.13	11.76	11.23	10.97	0.48
350	5.19	2.14	11.76	11.23	10.97	0.47
400	5.27	2.15	11.76	11.23	10.97	0.47
450	5.34	2.16	11.76	11.22	10.96	0.47
500	5.41	2.18	11.76	11.22	10.96	0.47
600	5.55	2.19	11.76	11.22	10.95	0.47
700	5.68	2.20	11.76	11.21	10.95	0.47
800	5.77	2.22	11.76	11.21	10.94	0.47
900	5.86	2.23	11.76	11.21	10.94	0.47
1000	5.86	2.24	11.76	11.20	10.94	0.47

Zone 1 - Cross section 1 - return period 50 years; X=816424 Y=2377091						
Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.24	2.20	12.71	11.63	11.37	0.51
50	4.90	2.28	12.71	11.61	11.35	0.51
100	5.55	2.32	12.71	11.60	11.33	0.51
150	5.60	2.34	12.71	11.59	11.32	0.50
200	5.66	2.36	12.71	11.59	11.32	0.50
250	5.72	2.37	12.71	11.59	11.32	0.50
300	5.79	2.39	12.71	11.59	11.31	0.50
350	5.86	2.40	12.71	11.58	11.31	0.50
400	5.93	2.41	12.71	11.58	11.31	0.50
450	6.01	2.43	12.71	11.58	11.30	0.50
500	6.08	2.44	12.71	11.58	11.30	0.50
600	6.22	2.45	12.71	11.57	11.29	0.50
700	6.35	2.47	12.71	11.57	11.29	0.50
800	6.44	2.48	12.71	11.56	11.28	0.50
900	6.52	2.49	12.71	11.56	11.28	0.50
1000	6.53	2.50	12.71	11.56	11.28	0.50

Zone 1 - Cross section 1 - return period 100 years; X=816424 Y=2377091						
Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.80	2.44	12.71	11.69	11.61	0.52
50	5.47	2.50	12.71	11.66	11.59	0.52
100	6.12	2.55	12.71	11.65	11.57	0.52
150	6.17	2.56	12.71	11.64	11.56	0.52
200	6.23	2.58	12.71	11.64	11.56	0.52
250	6.29	2.59	12.71	11.64	11.56	0.52
300	6.36	2.61	12.71	11.64	11.55	0.52
350	6.43	2.62	12.71	11.63	11.55	0.52
400	6.50	2.64	12.71	11.63	11.54	0.51
450	6.58	2.65	12.71	11.63	11.54	0.51
500	6.65	2.66	12.71	11.62	11.54	0.51
600	6.79	2.67	12.71	11.62	11.53	0.51
700	6.92	2.69	12.71	11.61	11.53	0.51
800	7.01	2.70	12.71	11.61	11.52	0.51
900	7.09	2.71	12.71	11.61	11.52	0.51
1000	7.10	2.73	12.71	11.61	11.52	0.51

Table C-2.1 *Results of wave computation for sea dike design (continued)*

Zone 1 - Cross section 1 - Return period 125 years; X=616424 Y=2377091						
Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.88	2.48	12.71	11.97	11.69	0.53
50	5.55	2.53	12.71	11.95	11.67	0.53
100	6.20	2.58	12.71	11.93	11.65	0.53
150	6.25	2.60	12.71	11.93	11.65	0.53
200	6.31	2.61	12.71	11.93	11.64	0.53
250	6.37	2.63	12.71	11.92	11.64	0.53
300	6.44	2.64	12.71	11.92	11.63	0.53
350	6.51	2.66	12.71	11.92	11.63	0.53
400	6.58	2.67	12.71	11.92	11.63	0.52
450	6.66	2.68	12.71	11.91	11.62	0.52
500	6.73	2.69	12.71	11.91	11.62	0.52
600	6.87	2.71	12.71	11.90	11.61	0.52
700	7.00	2.72	12.71	11.90	11.61	0.52
800	7.09	2.73	12.71	11.90	11.60	0.52
900	7.17	2.75	12.71	11.89	11.60	0.52
1000	7.19	2.76	12.71	11.89	11.60	0.52

Zone 1 - Cross section 1 - Return period 150 years; X=616424 Y=2377091						
Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.13	2.58	12.71	12.06	11.78	0.53
50	5.80	2.63	12.71	12.04	11.75	0.53
100	6.45	2.68	12.71	12.02	11.73	0.53
150	6.50	2.69	12.71	12.02	11.73	0.53
200	6.56	2.71	12.71	12.01	11.73	0.53
250	6.62	2.72	12.71	12.01	11.72	0.53
300	6.69	2.74	12.71	12.01	11.72	0.52
350	6.76	2.75	12.71	12.01	11.71	0.52
400	6.83	2.76	12.71	12.00	11.71	0.52
450	6.91	2.77	12.71	12.00	11.71	0.52
500	6.98	2.79	12.71	12.00	11.70	0.52
600	7.12	2.80	12.71	11.99	11.70	0.52
700	7.25	2.82	12.71	11.99	11.69	0.52
800	7.34	2.83	12.71	11.96	11.69	0.52
900	7.42	2.84	12.71	11.98	11.68	0.52
1000	7.43	2.86	12.71	11.98	11.68	0.52

Zone 1 - Cross section 1 - Return period 200 years; X=616424 Y=2377091						
Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.43	2.71	12.71	12.15	11.87	0.53
50	6.10	2.75	12.71	12.13	11.84	0.53
100	6.75	2.79	12.71	12.11	11.82	0.53
150	6.80	2.81	12.71	12.11	11.81	0.53
200	6.86	2.83	12.71	12.10	11.81	0.53
250	6.92	2.84	12.71	12.10	11.81	0.53
300	6.99	2.86	12.71	12.10	11.80	0.53
350	7.06	2.87	12.71	12.09	11.80	0.53
400	7.14	2.88	12.71	12.09	11.80	0.53
450	7.21	2.89	12.71	12.09	11.79	0.52
500	7.28	2.90	12.71	12.09	11.79	0.52
600	7.42	2.92	12.71	12.08	11.78	0.52
700	7.55	2.93	12.71	12.08	11.78	0.52
800	7.64	2.95	12.71	12.07	11.77	0.52
900	7.72	2.96	12.71	12.07	11.77	0.52
1000	7.73	2.98	12.71	12.07	11.77	0.52

Table C-2.2 *Results of wave computation for sea dike design*

Zone 1 Cross section 2 Return period 10 years; X=802067 Y=2362858

Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.93	2.37	11.76	10.94	10.66	0.32
50	5.78	3.03	11.76	10.64	10.55	0.26
100	8.58	3.56	11.76	10.80	10.50	0.24
150	8.72	3.58	11.76	10.80	10.49	0.24
200	8.85	3.60	11.76	10.79	10.48	0.24
250	8.98	3.62	11.76	10.78	10.47	0.24
300	9.10	3.63	11.76	10.78	10.46	0.23
350	9.20	3.65	11.76	10.77	10.46	0.23
400	9.29	3.66	11.76	10.77	10.45	0.23
450	9.38	3.67	11.76	10.76	10.44	0.23
500	9.46	3.68	11.76	10.76	10.44	0.23
600	9.52	3.71	11.76	10.75	10.43	0.23
700	9.55	3.73	11.76	10.75	10.42	0.23
800	9.58	3.76	11.76	10.74	10.42	0.23
900	9.62	3.79	11.76	10.73	10.41	0.23
1000	9.87	3.81	11.76	10.72	10.39	0.23

Zone 1 Cross section 2 Return period 20 years; X=802067 Y=2362858

Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.32	2.56	11.76	11.19	10.89	0.33
50	6.18	3.20	11.76	11.10	10.80	0.29
100	8.98	3.72	11.76	11.07	10.75	0.25
150	9.12	3.74	11.76	11.06	10.74	0.25
200	9.25	3.76	11.76	11.05	10.73	0.25
250	9.38	3.77	11.76	11.05	10.72	0.25
300	9.50	3.79	11.76	11.04	10.72	0.25
350	9.59	3.80	11.76	11.03	10.71	0.25
400	9.69	3.82	11.76	11.03	10.70	0.25
450	9.78	3.83	11.76	11.02	10.70	0.25
500	9.86	3.84	11.76	11.02	10.69	0.25
600	9.92	3.86	11.76	11.01	10.68	0.25
700	9.95	3.89	11.76	11.01	10.68	0.24
800	9.97	3.92	11.76	11.00	10.67	0.24
900	10.01	3.95	11.76	11.00	10.66	0.24
1000	10.27	3.97	11.76	10.99	10.65	0.24

Zone 1 Cross section 2 Return period 50 years; X=802067 Y=2362858

Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.89	2.83	12.71	11.52	11.21	0.34
50	6.75	3.44	12.71	11.45	11.13	0.31
100	9.55	3.95	12.71	11.42	11.09	0.27
150	9.69	3.97	12.71	11.41	11.08	0.27
200	9.82	3.99	12.71	11.41	11.07	0.27
250	9.95	4.00	12.71	11.40	11.07	0.27
300	10.07	4.02	12.71	11.39	11.06	0.27
350	10.17	4.03	12.71	11.39	11.05	0.27
400	10.26	4.04	12.71	11.38	11.05	0.27
450	10.35	4.05	12.71	11.38	11.04	0.27
500	10.44	4.06	12.71	11.37	11.03	0.27
600	10.49	4.09	12.71	11.37	11.03	0.26
700	10.52	4.11	12.71	11.36	11.02	0.26
800	10.55	4.14	12.71	11.36	11.01	0.26
900	10.59	4.17	12.71	11.35	11.01	0.26
1000	10.84	4.19	12.71	11.34	10.99	0.26

Zone 1 - Cross section 2 - Return period 100 years; X=802067 Y=2362858

Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.33	3.36	12.71	11.85	11.58	0.33
50	7.20	3.77	12.71	11.74	11.43	0.30
100	10.02	4.13	12.71	11.67	11.34	0.28
150	10.16	4.15	12.71	11.67	11.33	0.28
200	10.29	4.17	12.71	11.66	11.32	0.28
250	10.42	4.18	12.71	11.65	11.31	0.28
300	10.54	4.20	12.71	11.65	11.30	0.28
350	10.63	4.21	12.71	11.64	11.30	0.28
400	10.73	4.22	12.71	11.64	11.29	0.28
450	10.82	4.24	12.71	11.63	11.28	0.28
500	10.90	4.25	12.71	11.63	11.28	0.28
600	10.96	4.27	12.71	11.63	11.27	0.28
700	10.99	4.30	12.71	11.62	11.27	0.27
800	11.01	4.32	12.71	11.62	11.26	0.27
900	11.05	4.35	12.71	11.61	11.25	0.27
1000	11.31	4.37	12.71	11.60	11.24	0.27

Table C-2.2 *Results of wave computation for sea dike design (continued)*

Zone 1 Cross section 1 Return period 325 years; X=802067 Y=2362858

Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.48	3.43	12.71	11.94	11.66	0.33
50	7.35	3.83	12.71	11.83	11.51	0.31
100	10.17	4.19	12.71	11.76	11.42	0.29
150	10.31	4.21	12.71	11.75	11.41	0.26
200	10.44	4.23	12.71	11.75	11.40	0.26
250	10.57	4.24	12.71	11.74	11.39	0.26
300	10.69	4.26	12.71	11.73	11.39	0.26
350	10.79	4.27	12.71	11.73	11.38	0.26
400	10.86	4.28	12.71	11.73	11.37	0.26
450	10.97	4.30	12.71	11.72	11.37	0.26
500	11.06	4.31	12.71	11.72	11.36	0.26
600	11.11	4.33	12.71	11.71	11.36	0.26
700	11.14	4.36	12.71	11.71	11.35	0.26
800	11.17	4.38	12.71	11.70	11.34	0.26
900	11.21	4.41	12.71	11.70	11.34	0.26
1000	11.46	4.43	12.71	11.69	11.32	0.26

Zone 1 - Cross section 2 - Return period 150 years; X=802067 Y=2362858

Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.58	3.48	12.71	12.03	11.75	0.33
50	7.46	3.86	12.71	11.92	11.60	0.31
100	10.27	4.23	12.71	11.85	11.50	0.29
150	10.41	4.25	12.71	11.84	11.49	0.29
200	10.55	4.27	12.71	11.83	11.49	0.29
250	10.67	4.29	12.71	11.83	11.48	0.29
300	10.80	4.30	12.71	11.82	11.47	0.29
350	10.89	4.31	12.71	11.82	11.46	0.29
400	10.99	4.33	12.71	11.81	11.46	0.29
450	11.08	4.34	12.71	11.81	11.45	0.29
500	11.16	4.35	12.71	11.80	11.45	0.29
600	11.21	4.37	12.71	11.80	11.44	0.28
700	11.24	4.40	12.71	11.80	11.43	0.28
800	11.27	4.43	12.71	11.79	11.43	0.28
900	11.31	4.45	12.71	11.79	11.42	0.28
1000	11.56	4.47	12.71	11.77	11.41	0.28

Zone 1 - Cross section 2 - Return period 200 years; X=802067 Y=2362858

Distance from coastline [m]	Depth [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.64	3.59	12.71	12.12	11.83	0.34
50	7.71	3.98	12.71	12.01	11.68	0.31
100	10.53	4.33	12.71	11.94	11.59	0.29
150	10.67	4.35	12.71	11.93	11.58	0.29
200	10.80	4.37	12.71	11.92	11.57	0.29
250	10.93	4.38	12.71	11.92	11.56	0.29
300	11.05	4.40	12.71	11.91	11.55	0.29
350	11.14	4.41	12.71	11.91	11.55	0.29
400	11.24	4.42	12.71	11.90	11.54	0.29
450	11.33	4.43	12.71	11.90	11.54	0.29
500	11.41	4.45	12.71	11.89	11.53	0.29
600	11.47	4.47	12.71	11.89	11.52	0.29
700	11.50	4.50	12.71	11.88	11.52	0.29
800	11.52	4.52	12.71	11.88	11.51	0.29
900	11.56	4.55	12.71	11.87	11.50	0.28
1000	11.82	4.57	12.71	11.86	11.49	0.28

Table C-2.3 *Results of wave computation for sea dike design*

Vùng 1- mặt cắt 3 - chu kỳ lặp 10 năm; X=782364 Y=2356080						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.91	2.07	11.76	10.69	10.38	0.02
50	5.88	2.37	11.76	10.57	10.15	0.01
100	8.80	2.64	11.76	10.47	10.01	0.00
150	9.09	2.63	11.76	10.40	10.00	0.00
200	9.38	2.62	11.76	10.39	9.99	0.00
250	9.66	2.62	11.76	10.38	9.98	0.00
300	9.92	2.62	11.76	10.38	9.97	0.00
350	9.92	2.62	11.76	10.38	9.97	0.00
400	9.92	2.62	11.76	10.38	9.97	0.00
450	9.91	2.62	11.76	10.38	9.98	0.00
500	9.91	2.62	11.76	10.38	9.98	0.00
600	9.96	2.62	11.76	10.38	9.97	0.00
700	10.08	2.62	11.76	10.38	9.97	0.00
800	10.30	2.62	11.76	10.37	9.97	0.00
900	10.69	2.63	11.76	10.36	9.96	0.00
1000	10.83	2.64	11.76	10.37	9.96	0.00

Vùng 1- mặt cắt 3 - chu kỳ lặp 20 năm; X=782364 Y=2356080						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.39	2.31	11.76	10.95	10.62	0.01
50	6.36	2.58	11.76	10.79	10.41	0.00
100	9.26	2.81	11.76	10.68	10.27	0.00
150	9.57	2.81	11.76	10.67	10.26	0.00
200	9.87	2.80	11.76	10.66	10.25	0.00
250	10.14	2.80	11.76	10.66	10.25	0.00
300	10.40	2.80	11.76	10.65	10.24	0.00
350	10.40	2.80	11.76	10.65	10.24	0.00
400	10.41	2.80	11.76	10.65	10.24	0.00
450	10.40	2.80	11.76	10.65	10.24	0.00
500	10.39	2.80	11.76	10.65	10.24	0.00
600	10.45	2.80	11.76	10.65	10.24	0.00
700	10.57	2.80	11.76	10.65	10.24	0.00
800	10.87	2.80	11.76	10.64	10.23	0.00
900	11.17	2.81	11.76	10.64	10.23	0.00
1000	11.31	2.82	11.76	10.64	10.23	0.00

Vùng 1- mặt cắt 3 - chu kỳ lặp 50 năm; X=782364 Y=2356080						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.12	2.66	12.71	11.29	10.95	0.01
50	7.09	2.98	12.71	11.14	10.75	0.00
100	10.01	3.08	12.71	11.03	10.61	0.00
150	10.31	3.08	12.71	11.02	10.60	0.00
200	10.60	3.07	12.71	11.02	10.59	0.00
250	10.87	3.07	12.71	11.0'	10.58	0.00
300	1'.13	3.07	12.71	11.00	10.57	0.00
350	1'.14	3.07	12.71	11.00	10.57	0.00
400	1'.14	3.07	12.71	11.00	10.57	0.00
450	1'.13	3.07	12.71	11.00	10.57	0.00
500	1'.12	3.07	12.71	11.00	10.57	0.00
600	1'.18	3.07	12.71	11.00	10.57	0.00
700	1'.30	3.07	12.71	11.00	10.57	0.00
800	1'.60	3.07	12.71	10.99	10.56	0.00
900	1'.90	3.08	12.71	10.99	10.56	0.00
1000	12.05	3.09	12.71	10.99	10.56	0.00

Vùng 1- mặt cắt 3 - chu kỳ lặp 100 năm; X=782364 Y=2356080						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.74	2.95	12.71	11.55	11.19	0.00
50	7.72	3.14	12.71	11.41	11.00	0.00
100	10.64	3.31	12.71	11.30	10.87	0.00
150	10.93	3.31	12.71	11.29	10.86	0.00
200	11.23	3.30	12.71	11.28	10.85	0.00
250	11.50	3.30	12.71	11.28	10.84	0.00
300	11.76	3.30	12.71	11.27	10.83	0.00
350	11.76	3.30	12.71	11.27	10.83	0.00
400	11.77	3.30	12.71	11.27	10.83	0.00
450	11.76	3.30	12.71	11.27	10.84	0.00
500	11.75	3.30	12.71	11.27	10.84	0.00
600	11.81	3.30	12.71	11.27	10.84	0.00
700	11.93	3.30	12.71	11.27	10.83	0.00
800	12.23	3.30	12.71	11.26	10.83	0.00
900	12.53	3.31	12.71	11.26	10.82	0.00
1000	12.67	3.32	12.71	11.25	10.83	0.00

Table C-2.3 *Results of wave computation for sea dike design (continued)*

Vùng 1- mặt cắt 3 - chu kỳ lặp 125 năm; X=782364 Y=2356080						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.95	3.04	12.71	11.63	11.27	0.00
50	7.93	3.22	12.71	11.50	11.09	0.00
100	10.85	3.39	12.71	11.39	10.95	0.00
150	11.15	3.38	12.71	11.38	10.94	0.00
200	11.44	3.38	12.71	11.37	10.94	0.00
250	11.71	3.38	12.71	11.37	10.93	0.00
300	11.97	3.37	12.71	11.36	10.92	0.00
350	11.98	3.37	12.71	11.36	10.92	0.00
400	11.98	3.37	12.71	11.36	10.92	0.00
450	11.97	3.37	12.71	11.36	10.92	0.00
500	11.96	3.37	12.71	11.36	10.92	0.00
600	12.02	3.37	12.71	11.36	10.92	0.00
700	12.14	3.37	12.71	11.36	10.92	0.00
800	12.44	3.38	12.71	11.35	10.92	0.00
900	12.74	3.38	12.71	11.35	10.91	0.00
1000	12.89	3.39	12.71	11.36	10.91	0.00

Vùng 1- mặt cắt 3 - chu kỳ lặp 150 năm; X=782364 Y=2356080						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.15	3.13	12.71	11.72	11.35	0.00
50	8.13	3.30	12.71	11.59	11.18	0.00
100	11.05	3.46	12.71	11.48	11.04	0.00
150	11.34	3.46	12.71	11.47	11.03	0.00
200	11.64	3.45	12.71	11.47	11.03	0.00
250	11.91	3.45	12.71	11.46	11.02	0.00
300	12.17	3.45	12.71	11.45	11.01	0.00
350	12.18	3.45	12.71	11.45	11.01	0.00
400	12.18	3.45	12.71	11.45	11.01	0.00
450	12.17	3.45	12.71	11.45	11.01	0.00
500	12.16	3.45	12.71	11.45	11.01	0.00
600	12.22	3.45	12.71	11.45	11.01	0.00
700	12.34	3.45	12.71	11.45	11.01	0.00
800	12.64	3.45	12.71	11.45	11.00	0.00
900	12.94	3.46	12.71	11.44	11.00	0.00
1000	13.09	3.47	12.71	11.44	11.00	0.00

Vùng 1- mặt cắt 3 - chu kỳ lặp 200 năm; X=782364 Y=2356080						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.50	3.28	12.71	11.81	11.44	0.00
50	8.48	3.44	12.71	11.68	11.27	0.00
100	11.40	3.59	12.71	11.58	11.13	0.00
150	11.69	3.59	12.71	11.57	11.13	0.00
200	11.99	3.58	12.71	11.56	11.12	0.00
250	12.26	3.58	12.71	11.56	11.11	0.00
300	12.52	3.58	12.71	11.55	11.10	0.00
350	12.53	3.58	12.71	11.56	11.10	0.00
400	12.53	3.58	12.71	11.55	11.10	0.00
450	12.52	3.58	12.71	11.56	11.11	0.00
500	12.51	3.58	12.71	11.55	11.11	0.00
600	12.57	3.58	12.71	11.55	11.11	0.00
700	12.69	3.58	12.71	11.55	11.10	0.00
800	12.99	3.58	12.71	11.54	11.10	0.00
900	13.29	3.59	12.71	11.54	11.09	0.00
1000	13.44	3.59	12.71	11.54	11.10	0.00

Table C-2.4 *Results of wave computation for sea dike design*

Vùng 1 mặt cắt 4 chu kỳ lặp 10 năm; X=772857 Y=2334766						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.56	2.17	11.76	10.70	10.36	0.09
50	7.11	2.75	11.76	10.47	10.06	0.06
100	11.58	3.22	11.76	10.37	9.95	0.04
150	11.71	3.22	11.76	10.37	9.95	0.04
200	11.84	3.22	11.76	10.37	9.94	0.04
250	11.93	3.22	11.76	10.36	9.94	0.04
300	12.01	3.22	11.76	10.36	9.94	0.04
350	12.00	3.22	11.76	10.36	9.94	0.04
400	11.98	3.22	11.76	10.36	9.94	0.04
450	11.96	3.22	11.76	10.37	9.94	0.04
500	11.96	3.22	11.76	10.37	9.95	0.04
600	12.36	3.22	11.76	10.36	9.94	0.05
700	12.82	3.22	11.76	10.35	9.93	0.05
800	13.13	3.23	11.76	10.35	9.93	0.05
900	13.39	3.24	11.76	10.35	9.93	0.05
1000	13.32	3.25	11.76	10.35	9.93	0.05

Vùng 1 mặt cắt 4 chu kỳ lặp 20 năm; X=772857 Y=2334766						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.95	2.39	11.76	10.95	10.62	0.09
50	7.51	2.94	11.76	10.74	10.32	0.06
100	11.97	3.40	11.76	10.64	10.21	0.04
150	12.10	3.40	11.76	10.64	10.20	0.04
200	12.23	3.40	11.76	10.63	10.20	0.04
250	12.32	3.39	11.76	10.63	10.20	0.04
300	12.41	3.39	11.76	10.63	10.20	0.04
350	12.39	3.39	11.76	10.63	10.20	0.04
400	12.38	3.39	11.76	10.63	10.20	0.04
450	12.36	3.39	11.76	10.63	10.20	0.04
500	12.35	3.39	11.76	10.63	10.20	0.04
600	12.75	3.39	11.76	10.63	10.19	0.05
700	13.21	3.39	11.76	10.62	10.19	0.05
800	13.52	3.40	11.76	10.61	10.18	0.05
900	13.79	3.42	11.76	10.61	10.18	0.05
1000	13.72	3.42	11.76	10.62	10.19	0.05

Vùng 1 - mặt cắt 4 - chu kỳ lặp 50 năm; X=772857 Y=2334766						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.91	3.09	12.71	11.29	10.96	0.07
50	8.47	3.48	12.71	11.09	10.66	0.05
100	12.95	3.83	12.71	10.97	10.51	0.04
150	13.08	3.83	12.71	10.97	10.50	0.04
200	13.21	3.83	12.71	10.97	10.50	0.04
250	13.30	3.83	12.71	10.97	10.50	0.04
300	13.38	3.83	12.71	10.96	10.50	0.04
350	13.37	3.83	12.71	10.97	10.50	0.04
400	13.36	3.83	12.71	10.97	10.50	0.04
450	13.33	3.83	12.71	10.97	10.50	0.04
500	13.33	3.83	12.71	10.97	10.50	0.04
600	13.73	3.83	12.71	10.96	10.50	0.04
700	14.19	3.83	12.71	10.95	10.49	0.05
800	14.50	3.84	12.71	10.95	10.49	0.05
900	14.76	3.85	12.71	10.95	10.49	0.05
1000	14.70	3.86	12.71	10.95	10.49	0.05

Vùng 1 - mặt cắt 4 - chu kỳ lặp 100 năm; X=772857 Y=2334766						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.10	3.19	12.71	11.57	11.22	0.07
50	8.67	3.58	12.71	11.36	10.94	0.05
100	13.14	3.92	12.71	11.24	10.77	0.04
150	13.27	3.92	12.71	11.23	10.76	0.04
200	13.40	3.92	12.71	11.23	10.76	0.04
250	13.49	3.92	12.71	11.23	10.76	0.04
300	13.58	3.92	12.71	11.23	10.76	0.04
350	13.56	3.92	12.71	11.23	10.76	0.04
400	13.55	3.92	12.71	11.23	10.76	0.04
450	13.53	3.92	12.71	11.23	10.76	0.04
500	13.52	3.92	12.71	11.23	10.76	0.04
600	13.93	3.92	12.71	11.22	10.75	0.05
700	14.39	3.92	12.71	11.22	10.75	0.05
800	14.69	3.93	12.71	11.21	10.72	0.05
900	14.95	3.94	12.71	11.21	10.75	0.05
1000	14.89	3.95	12.71	11.22	10.75	0.05

Table C-2.4 *Results of wave computation for sea dike design (continued)*

Vùng 1 - mặt cắt 4 - chu kỳ lặp 125 năm; X=772857 Y=2334766						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.31	3.30	12.71	11.66	11.31	0.06
50	8.88	3.68	12.71	11.45	11.03	0.05
100	13.36	4.01	12.71	11.32	10.85	0.04
150	13.49	4.01	12.71	11.32	10.85	0.04
200	13.61	4.01	12.71	11.32	10.84	0.04
250	13.70	4.01	12.71	11.32	10.84	0.04
300	13.79	4.01	12.71	11.32	10.84	0.04
350	13.78	4.01	12.71	11.32	10.84	0.04
400	13.76	4.01	12.71	11.32	10.84	0.04
450	13.74	4.01	12.71	11.32	10.84	0.04
500	13.74	4.01	12.71	11.32	10.85	0.04
600	14.14	4.01	12.71	11.31	10.84	0.05
700	14.60	4.01	12.71	11.30	10.83	0.05
800	14.91	4.02	12.71	11.30	10.83	0.05
900	15.17	4.03	12.71	11.30	10.83	0.05
1000	15.10	4.04	12.71	11.30	10.83	0.05

Vùng 1 - mặt cắt 4 - chu kỳ lặp 150 năm; X=772857 Y=2334766						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.46	3.37	12.71	11.75	11.40	0.06
50	9.03	3.75	12.71	11.55	11.11	0.05
100	13.51	4.08	12.71	11.41	10.93	0.04
150	13.64	4.08	12.71	11.41	10.93	0.04
200	13.76	4.08	12.71	11.41	10.93	0.04
250	13.85	4.08	12.71	11.41	10.93	0.04
300	13.94	4.08	12.71	11.40	10.93	0.04
350	13.93	4.08	12.71	11.41	10.93	0.04
400	13.91	4.08	12.71	11.41	10.93	0.04
450	13.89	4.08	12.71	11.41	10.93	0.04
500	13.89	4.08	12.71	11.41	10.93	0.04
600	14.29	4.08	12.71	11.40	10.92	0.05
700	14.75	4.08	12.71	11.39	10.92	0.05
800	15.06	4.08	12.71	11.39	10.91	0.05
900	15.32	4.10	12.71	11.39	10.92	0.05
1000	15.25	4.11	12.71	11.39	10.92	0.05

Vùng 1 - mặt cắt 4 - chu kỳ lặp 200 năm; X=772857 Y=2334766						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.81	3.54	12.71	11.84	11.48	0.06
50	9.38	3.90	12.71	11.64	11.20	0.05
100	13.85	4.23	12.71	11.50	11.02	0.04
150	13.99	4.23	12.71	11.50	11.01	0.04
200	14.11	4.22	12.71	11.50	11.01	0.04
250	14.20	4.22	12.71	11.50	11.01	0.04
300	14.29	4.22	12.71	11.49	11.01	0.04
350	14.26	4.22	12.71	11.50	11.01	0.04
400	14.26	4.22	12.71	11.50	11.01	0.04
450	14.24	4.22	12.71	11.50	11.01	0.04
500	14.24	4.22	12.71	11.50	11.02	0.04
600	14.64	4.22	12.71	11.49	11.01	0.04
700	15.10	4.23	12.71	11.48	11.00	0.05
800	15.41	4.23	12.71	11.48	11.00	0.05
900	15.67	4.25	12.71	11.48	11.00	0.05
1000	15.60	4.25	12.71	11.48	11.00	0.05

Table C-2.5 *Results of wave computation for sea dike design*

Vùng 1 - mặt cắt 5 - chu kỳ lặp 10 năm; X=763853 Y=2312803						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.75	3.04	11.76	11.04	10.78	0.31
50	7.16	4.21	11.76	10.81	10.47	0.23
100	11.50	5.10	11.76	10.73	10.36	0.16
150	11.94	5.14	11.76	10.70	10.33	0.16
200	12.39	5.17	11.76	10.68	10.30	0.16
250	12.82	5.18	11.76	10.66	10.28	0.16
300	13.24	5.19	11.76	10.64	10.25	0.16
350	13.38	5.20	11.76	10.63	10.24	0.16
400	13.53	5.21	11.76	10.62	10.23	0.16
450	13.64	5.22	11.76	10.62	10.22	0.16
500	13.75	5.23	11.76	10.61	10.21	0.16
600	13.87	5.24	11.76	10.60	10.20	0.16
700	13.97	5.26	11.76	10.60	10.19	0.16
800	14.08	5.27	11.76	10.59	10.18	0.16
900	14.18	5.28	11.76	10.58	10.17	0.16
1000	14.31	5.29	11.76	10.57	10.16	0.16

Vùng 1 - mặt cắt 5 - chu kỳ lặp 20 năm; X=763853 Y=2312803						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.17	3.23	11.76	11.31	11.03	0.31
50	7.59	4.38	11.76	11.08	10.74	0.24
100	11.93	5.27	11.76	11.00	10.63	0.17
150	12.37	5.30	11.76	10.98	10.60	0.17
200	12.82	5.34	11.76	10.95	10.57	0.17
250	13.25	5.35	11.76	10.93	10.55	0.17
300	13.67	5.36	11.76	10.92	10.52	0.17
350	13.81	5.37	11.76	10.91	10.51	0.17
400	13.96	5.38	11.76	10.90	10.50	0.17
450	14.07	5.39	11.76	10.90	10.50	0.17
500	14.18	5.39	11.76	10.89	10.49	0.17
600	14.30	5.41	11.76	10.88	10.48	0.17
700	14.40	5.42	11.76	10.87	10.47	0.17
800	14.51	5.43	11.76	10.87	10.46	0.17
900	14.61	5.45	11.76	10.86	10.45	0.17
1000	14.74	5.45	11.76	10.85	10.44	0.17

Vùng 1 - mặt cắt 5 - chu kỳ lặp 50 năm; X=763853 Y=2312803						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.32	3.58	12.71	11.65	11.36	0.32
50	8.24	4.66	12.71	11.45	11.09	0.25
100	12.58	5.53	12.71	11.37	10.99	0.19
150	13.03	5.56	12.71	11.34	10.96	0.19
200	13.48	5.60	12.71	11.32	10.93	0.19
250	13.91	5.60	12.71	11.30	10.91	0.19
300	14.33	5.61	12.71	11.29	10.89	0.19
350	14.47	5.62	12.71	11.28	10.88	0.19
400	14.61	5.63	12.71	11.27	10.87	0.19
450	14.73	5.64	12.71	11.27	10.86	0.19
500	14.84	5.64	12.71	11.26	10.85	0.19
600	14.96	5.66	12.71	11.25	10.84	0.19
700	15.06	5.67	12.71	11.25	10.83	0.19
800	15.16	5.69	12.71	11.24	10.82	0.19
900	15.27	5.70	12.71	11.23	10.82	0.19
1000	15.40	5.71	12.71	11.23	10.81	0.19

Vùng 1 - mặt cắt 5 - chu kỳ lặp 100 năm; X=763853 Y=2312803						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.3952	3.89282	12.7059	11.9167	11.6176	0.32218
50	8.8214	4.92887	12.7059	11.7136	11.3528	0.25843
100	13.1689	5.76682	12.7059	11.625	11.2403	0.19594
150	13.6147	5.79646	12.7059	11.6033	11.2116	0.19589
200	14.06	5.82476	12.7059	11.5827	11.1844	0.19584
250	14.4955	5.83325	12.7059	11.5656	11.1622	0.19698
300	14.9137	5.84172	12.7059	11.5492	11.1409	0.198
350	15.0578	5.85026	12.7059	11.5423	11.1317	0.19806
400	15.1996	5.85886	12.7059	11.5355	11.1227	0.19812
450	15.3154	5.8657	12.7059	11.53	11.1154	0.19815
500	15.4255	5.87281	12.7059	11.5247	11.1084	0.19817
600	15.5402	5.88825	12.7059	11.5174	11.0986	0.19778
700	15.641	5.90296	12.7059	11.5108	11.0896	0.19739
800	15.7494	5.91628	12.7059	11.5043	11.0808	0.1971
900	15.8523	5.92886	12.7059	11.4983	11.0726	0.19683
1000	15.9807	5.93898	12.7059	11.4921	11.0643	0.19676

Table C-2.5 *Results of wave computation for sea dike design (continued)*

Vùng 1 - mặt cắt 5 - chu kỳ lặp 125 năm; X=763853 Y=2312803						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.60	3.98	12.71	12.00	11.69	0.32
50	9.03	5.01	12.71	11.80	11.43	0.26
100	13.38	5.85	12.71	11.71	11.32	0.20
150	13.82	5.89	12.71	11.69	11.29	0.20
200	14.27	5.91	12.71	11.67	11.27	0.20
250	14.71	5.92	12.71	11.65	11.24	0.20
300	15.12	5.92	12.71	11.64	11.22	0.20
350	15.27	5.93	12.71	11.63	11.21	0.20
400	15.41	5.94	12.71	11.62	11.21	0.20
450	15.53	5.95	12.71	11.62	11.20	0.20
500	15.64	5.96	12.71	11.61	11.19	0.20
600	15.75	5.97	12.71	11.60	11.18	0.20
700	15.85	5.99	12.71	11.60	11.17	0.20
800	15.96	6.00	12.71	11.59	11.16	0.20
900	16.06	6.01	12.71	11.59	11.16	0.20
1000	16.19	6.02	12.71	11.58	11.15	0.20

Vùng 1 - mặt cắt 5 - chu kỳ lặp 150 năm; X=763853 Y=2312803						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.75	4.05	12.71	12.09	11.77	0.32
50	9.17	5.08	12.71	11.89	11.52	0.26
100	13.52	5.91	12.71	11.80	11.41	0.20
150	13.97	5.94	12.71	11.78	11.38	0.20
200	14.41	5.96	12.71	11.76	11.35	0.20
250	14.85	5.97	12.71	11.74	11.33	0.20
300	15.27	5.98	12.71	11.73	11.31	0.20
350	15.41	5.99	12.71	11.72	11.30	0.20
400	15.55	6.00	12.71	11.71	11.29	0.20
450	15.67	6.00	12.71	11.71	11.29	0.20
500	15.78	6.01	12.71	11.70	11.28	0.20
600	15.89	6.03	12.71	11.69	11.27	0.20
700	15.99	6.04	12.71	11.69	11.26	0.20
800	16.10	6.06	12.71	11.68	11.25	0.20
900	16.21	6.07	12.71	11.68	11.24	0.20
1000	16.33	6.08	12.71	11.67	11.24	0.20

Vùng 1 - mặt cắt 5 - chu kỳ lặp 200 năm; X=763853 Y=2312803						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.10	4.20	12.71	12.16	11.84	0.32
50	9.53	5.22	12.71	11.97	11.60	0.26
100	13.88	6.05	12.71	11.88	11.49	0.20
150	14.33	6.08	12.71	11.86	11.46	0.20
200	14.77	6.11	12.71	11.84	11.43	0.20
250	15.21	6.11	12.71	11.82	11.41	0.20
300	15.63	6.12	12.71	11.81	11.39	0.21
350	15.77	6.13	12.71	11.80	11.38	0.21
400	15.91	6.14	12.71	11.80	11.37	0.21
450	16.03	6.15	12.71	11.79	11.36	0.21
500	16.14	6.15	12.71	11.79	11.36	0.21
600	16.25	6.17	12.71	11.78	11.35	0.20
700	16.36	6.18	12.71	11.77	11.34	0.20
800	16.46	6.20	12.71	11.77	11.33	0.20
900	16.57	6.21	12.71	11.76	11.32	0.20
1000	16.69	6.22	12.71	11.75	11.32	0.20

Table C-2.6 *Results of wave computation for sea dike design*

Vùng 1 - mặt cắt 6 - chu kỳ lặp 10 năm; X=749712 Y=2296191

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.03	3.09	11.76	11.04	10.78	0.30
50	7.44	4.29	11.76	10.79	10.45	0.22
100	11.76	5.21	11.76	10.71	10.34	0.15
150	12.23	5.25	11.76	10.68	10.31	0.15
200	12.67	5.28	11.76	10.66	10.28	0.15
250	13.11	5.30	11.76	10.64	10.25	0.15
300	13.52	5.31	11.76	10.62	10.23	0.15
350	13.67	5.32	11.76	10.61	10.22	0.15
400	13.81	5.33	11.76	10.61	10.21	0.15
450	13.93	5.33	11.76	10.60	10.20	0.15
500	14.04	5.34	11.76	10.59	10.19	0.15
600	14.15	5.36	11.76	10.59	10.18	0.15
700	14.25	5.37	11.76	10.58	10.17	0.15
800	14.36	5.38	11.76	10.57	10.16	0.15
900	14.46	5.39	11.76	10.56	10.15	0.15
1000	14.59	5.40	11.76	10.56	10.14	0.15

Vùng 1 - mặt cắt 6 - chu kỳ lặp 20 năm; X=749712 Y=2296191

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.10	3.15	11.76	11.33	11.06	0.32
50	7.52	4.33	11.76	11.09	10.74	0.25
100	11.85	5.24	11.76	11.00	10.64	0.17
150	12.30	5.27	11.76	10.98	10.61	0.17
200	12.74	5.31	11.76	10.96	10.58	0.17
250	13.18	5.32	11.76	10.94	10.55	0.17
300	13.60	5.33	11.76	10.92	10.53	0.17
350	13.74	5.34	11.76	10.91	10.52	0.17
400	13.88	5.35	11.76	10.91	10.51	0.17
450	14.00	5.35	11.76	10.90	10.50	0.17
500	14.11	5.36	11.76	10.89	10.49	0.17
600	14.22	5.38	11.76	10.89	10.48	0.17
700	14.32	5.39	11.76	10.88	10.47	0.17
800	14.43	5.40	11.76	10.87	10.46	0.17
900	14.53	5.41	11.76	10.87	10.45	0.17
1000	14.66	5.42	11.76	10.86	10.45	0.17

Vùng 1 - mặt cắt 6 - chu kỳ lặp 50 năm; X=749712 Y=2296191

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.76	3.54	12.71	11.65	11.37	0.33
50	8.18	4.84	12.71	11.45	11.10	0.26
100	12.52	5.51	12.71	11.37	10.99	0.19
150	12.96	5.54	12.71	11.35	10.97	0.19
200	13.41	5.57	12.71	11.32	10.94	0.19
250	13.84	5.58	12.71	11.31	10.91	0.19
300	14.26	5.59	12.71	11.29	10.89	0.19
350	14.41	5.60	12.71	11.28	10.88	0.19
400	14.55	5.60	12.71	11.28	10.87	0.19
450	14.66	5.61	12.71	11.27	10.87	0.19
500	14.77	5.62	12.71	11.26	10.86	0.19
600	14.89	5.63	12.71	11.26	10.85	0.19
700	14.99	5.65	12.71	11.25	10.84	0.19
800	15.10	5.66	12.71	11.24	10.83	0.19
900	15.20	5.67	12.71	11.24	10.82	0.19
1000	15.33	5.68	12.71	11.23	10.81	0.19

Vùng 1 - mặt cắt 6 - chu kỳ lặp 100 năm; X=749712 Y=2296191

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.36	3.88	12.71	11.92	11.62	0.32
50	8.79	4.92	12.71	11.72	11.36	0.26
100	13.13	5.75	12.71	11.63	11.24	0.20
150	13.58	5.78	12.71	11.61	11.21	0.20
200	14.02	5.81	12.71	11.58	11.19	0.20
250	14.46	5.82	12.71	11.57	11.16	0.20
300	14.88	5.83	12.71	11.55	11.14	0.20
350	15.02	5.84	12.71	11.54	11.13	0.20
400	15.16	5.84	12.71	11.54	11.13	0.20
450	15.28	5.85	12.71	11.53	11.12	0.20
500	15.39	5.86	12.71	11.53	11.11	0.20
600	15.51	5.87	12.71	11.52	11.10	0.20
700	15.61	5.89	12.71	11.51	11.09	0.20
800	15.71	5.90	12.71	11.51	11.09	0.20
900	15.82	5.91	12.71	11.50	11.08	0.20
1000	15.95	5.92	12.71	11.49	11.07	0.20

Table C-2.6 *Results of wave computation for sea dike design (continued)*

Vùng 1 - mặt cắt 6 - chu kỳ lặp 125 năm; X=749712 Y=2298191						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.62	3.99	12.71	12.00	11.69	0.32
50	9.05	5.02	12.71	11.90	11.43	0.26
100	13.40	5.86	12.71	11.71	11.32	0.20
150	13.84	5.89	12.71	11.69	11.29	0.20
200	14.29	5.92	12.71	11.67	11.27	0.20
250	14.72	5.92	12.71	11.66	11.24	0.20
300	15.14	5.93	12.71	11.63	11.22	0.20
350	15.29	5.94	12.71	11.63	11.21	0.20
400	15.43	5.95	12.71	11.62	11.20	0.20
450	15.54	5.96	12.71	11.62	11.20	0.20
500	15.65	5.96	12.71	11.61	11.19	0.20
600	15.77	5.98	12.71	11.60	11.18	0.20
700	15.87	5.99	12.71	11.60	11.17	0.20
800	15.98	6.01	12.71	11.59	11.16	0.20
900	16.08	6.02	12.71	11.58	11.15	0.20
1000	16.21	6.03	12.71	11.58	11.15	0.20

Vùng 1 - mặt cắt 6 - chu kỳ lặp 150 năm; X=749712 Y=2298191						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.75	4.06	12.71	12.08	11.77	0.32
50	9.18	5.08	12.71	11.89	11.52	0.26
100	13.53	5.91	12.71	11.80	11.41	0.20
150	13.98	5.94	12.71	11.78	11.38	0.20
200	14.42	5.97	12.71	11.76	11.35	0.20
250	14.86	5.98	12.71	11.74	11.33	0.20
300	15.28	5.96	12.71	11.72	11.31	0.20
350	15.42	5.99	12.71	11.72	11.30	0.20
400	15.58	6.00	12.71	11.71	11.29	0.20
450	15.68	6.01	12.71	11.71	11.29	0.20
500	15.79	6.02	12.71	11.70	11.28	0.20
600	15.90	6.03	12.71	11.69	11.27	0.20
700	16.00	6.05	12.71	11.69	11.26	0.20
800	16.11	6.06	12.71	11.68	11.25	0.20
900	16.21	6.07	12.71	11.68	11.24	0.20
1000	16.34	6.08	12.71	11.67	11.24	0.20

Vùng 1 - mặt cắt 6 - chu kỳ lặp 200 năm; X=749712 Y=2298191						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.11	4.20	12.71	12.16	11.84	0.32
50	9.54	5.22	12.71	11.97	11.60	0.26
100	13.89	6.06	12.71	11.88	11.48	0.20
150	14.34	6.09	12.71	11.86	11.46	0.20
200	14.78	6.11	12.71	11.84	11.43	0.20
250	15.22	6.12	12.71	11.82	11.41	0.20
300	15.64	6.13	12.71	11.81	11.39	0.20
350	15.78	6.13	12.71	11.80	11.38	0.20
400	15.92	6.14	12.71	11.80	11.37	0.20
450	16.04	6.15	12.71	11.79	11.36	0.20
500	16.15	6.16	12.71	11.79	11.36	0.20
600	16.26	6.17	12.71	11.78	11.35	0.20
700	16.36	6.19	12.71	11.77	11.34	0.20
800	16.47	6.20	12.71	11.77	11.33	0.20
900	16.58	6.22	12.71	11.76	11.32	0.20
1000	16.70	6.23	12.71	11.75	11.31	0.20

Table C-2.7 *Results of wave computation for sea dike design*

Vùng 1 - mặt cắt 7 - chu kỳ lặp 10 năm; X=721527 Y=2303553						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.67	2.66	11.76	10.84	10.53	0.06
50	8.51	3.60	11.76	10.44	9.96	0.02
100	14.24	4.32	11.76	10.29	9.77	-0.01
150	14.55	4.31	11.76	10.29	9.76	-0.01
200	14.86	4.31	11.76	10.28	9.76	-0.01
250	15.18	4.31	11.76	10.28	9.75	-0.01
300	15.48	4.31	11.76	10.27	9.75	-0.01
350	15.52	4.31	11.76	10.27	9.75	-0.01
400	15.55	4.31	11.76	10.27	9.75	-0.01
450	15.52	4.31	11.76	10.28	9.75	-0.01
500	15.48	4.31	11.76	10.28	9.76	-0.01
600	15.23	4.31	11.76	10.29	9.77	-0.01
700	14.94	4.31	11.76	10.29	9.78	-0.01
800	14.73	4.31	11.76	10.30	9.79	-0.01
900	14.64	4.31	11.76	10.31	9.80	-0.01
1000	15.69	4.29	11.76	10.29	9.78	-0.01

Vùng 1 - mặt cắt 7 - chu kỳ lặp 20 năm; X=721527 Y=2303553						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.20	2.99	11.76	11.11	10.79	0.05
50	9.05	3.86	11.76	10.73	10.25	0.02
100	14.78	4.55	11.76	10.57	10.05	-0.01
150	15.09	4.54	11.76	10.57	10.04	-0.01
200	15.40	4.54	11.76	10.56	10.04	-0.01
250	15.72	4.54	11.76	10.56	10.03	-0.01
300	16.03	4.53	11.76	10.55	10.03	-0.01
350	16.06	4.53	11.76	10.55	10.03	-0.01
400	16.09	4.54	11.76	10.55	10.03	-0.01
450	16.06	4.54	11.76	10.56	10.03	-0.01
500	16.02	4.54	11.76	10.56	10.04	-0.01
600	15.77	4.54	11.76	10.57	10.05	-0.01
700	15.49	4.54	11.76	10.58	10.06	-0.01
800	15.27	4.54	11.76	10.58	10.07	-0.01
900	15.18	4.53	11.76	10.59	10.08	-0.01
1000	16.23	4.52	11.76	10.57	10.06	-0.01

Vùng 1 - mặt cắt 7 - chu kỳ lặp 50 năm; X=721527 Y=2303553						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.97	3.38	12.71	11.44	11.10	0.05
50	9.82	4.20	12.71	11.11	10.63	0.02
100	15.55	4.87	12.71	10.95	10.43	-0.01
150	15.98	4.86	12.71	10.95	10.42	-0.01
200	16.18	4.86	12.71	10.94	10.41	-0.01
250	16.50	4.86	12.71	10.94	10.41	-0.01
300	16.80	4.86	12.71	10.93	10.41	-0.01
350	16.83	4.86	12.71	10.93	10.41	-0.01
400	16.86	4.86	12.71	10.93	10.41	-0.01
450	16.83	4.86	12.71	10.94	10.41	-0.01
500	16.80	4.86	12.71	10.94	10.42	-0.01
600	16.54	4.86	12.71	10.95	10.43	-0.01
700	16.26	4.86	12.71	10.95	10.44	-0.01
800	16.04	4.86	12.71	10.96	10.45	-0.01
900	15.95	4.86	12.71	10.97	10.45	-0.01
1000	17.00	4.84	12.71	10.95	10.43	-0.01

Vùng 1 - mặt cắt 7 - chu kỳ lặp 100 năm; X=721527 Y=2303553						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.65	3.71	12.71	11.67	11.31	0.04
50	10.50	4.50	12.71	11.37	10.86	0.01
100	16.23	5.15	12.71	11.22	10.68	-0.01
150	16.55	5.15	12.71	11.21	10.68	-0.01
200	16.86	5.14	12.71	11.20	10.67	-0.01
250	17.18	5.14	12.71	11.20	10.67	-0.01
300	17.48	5.14	12.71	11.20	10.66	-0.01
350	17.52	5.14	12.71	11.20	10.66	-0.01
400	17.54	5.14	12.71	11.20	10.67	-0.01
450	17.52	5.14	12.71	11.20	10.67	-0.01
500	17.48	5.14	12.71	11.20	10.67	-0.01
600	17.23	5.14	12.71	11.21	10.68	-0.01
700	16.94	5.14	12.71	11.22	10.69	-0.01
800	16.73	5.14	12.71	11.22	10.70	-0.01
900	16.63	5.14	12.71	11.23	10.71	-0.01
1000	17.69	5.13	12.71	11.21	10.69	-0.01

Table C-2.7 *Results of wave computation for sea dike design (continued)*

Vùng 1 - mặt cắt 7 - chu kỳ lặp 125 năm; X=721527 Y=2303553						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.84	3.80	12.71	11.76	11.38	0.04
50	10.69	4.58	12.71	11.46	10.97	0.01
100	16.43	5.23	12.71	11.31	10.77	-0.01
150	16.74	5.23	12.71	11.30	10.77	-0.01
200	17.05	5.22	12.71	11.30	10.76	-0.01
250	17.37	5.22	12.71	11.29	10.75	-0.01
300	17.67	5.22	12.71	11.29	10.75	-0.01
350	17.71	5.22	12.71	11.29	10.75	-0.01
400	17.74	5.22	12.71	11.29	10.75	-0.01
450	17.71	5.22	12.71	11.29	10.76	-0.01
500	17.67	5.22	12.71	11.29	10.76	-0.01
600	17.42	5.22	12.71	11.30	10.77	-0.01
700	17.14	5.22	12.71	11.31	10.78	-0.01
800	16.92	5.22	12.71	11.31	10.79	-0.01
900	16.85	5.22	12.71	11.32	10.80	-0.01
1000	17.86	5.21	12.71	11.30	10.78	-0.01

Vùng 1 - mặt cắt 7 - chu kỳ lặp 150 năm; X=721527 Y=2303553						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.04	3.90	12.71	11.84	11.45	0.04
50	10.89	4.67	12.71	11.54	11.05	0.01
100	16.63	5.32	12.71	11.40	10.86	-0.01
150	16.94	5.31	12.71	11.39	10.85	-0.01
200	17.25	5.31	12.71	11.39	10.85	-0.01
250	17.57	5.30	12.71	11.39	10.84	-0.01
300	17.87	5.30	12.71	11.38	10.84	-0.01
350	17.91	5.30	12.71	11.39	10.84	-0.01
400	17.94	5.30	12.71	11.38	10.84	-0.01
450	17.91	5.31	12.71	11.39	10.84	-0.01
500	17.87	5.31	12.71	11.38	10.85	-0.01
600	17.62	5.31	12.71	11.39	10.86	-0.01
700	17.34	5.31	12.71	11.40	10.87	-0.01
800	17.12	5.31	12.71	11.40	10.86	-0.01
900	17.03	5.31	12.71	11.41	10.88	-0.01
1000	18.08	5.29	12.71	11.39	10.86	-0.01

Vùng 1 - mặt cắt 7 - chu kỳ lặp 200 năm; X=721527 Y=2303553						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.48	4.70	12.71	11.82	11.47	0.00
50	11.35	5.13	12.71	11.62	11.14	0.00
100	17.11	5.52	12.71	11.47	10.93	-0.01
150	17.42	5.51	12.71	11.47	10.92	-0.01
200	17.73	5.51	12.71	11.46	10.92	-0.01
250	18.05	5.50	12.71	11.46	10.91	-0.01
300	18.35	5.50	12.71	11.45	10.91	-0.01
350	18.39	5.50	12.71	11.45	10.91	-0.01
400	18.42	5.50	12.71	11.46	10.91	-0.01
450	18.39	5.50	12.71	11.46	10.91	-0.01
500	18.35	5.51	12.71	11.46	10.92	-0.01
600	18.10	5.51	12.71	11.47	10.93	-0.01
700	17.81	5.51	12.71	11.47	10.94	-0.01
800	17.60	5.51	12.71	11.48	10.94	-0.01
900	17.51	5.51	12.71	11.48	10.95	-0.01
1000	18.56	5.49	12.71	11.47	10.93	-0.01

Table C-2.8 *Results of wave computation for sea dike design*

Vùng 1 - mặt cắt 8 - chu kỳ lặp 10 năm; X=700457 Y=2298749

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.74	1.45	11.76	10.78	10.50	0.27
50	3.11	1.53	11.76	10.77	10.47	0.27
100	3.48	1.61	11.76	10.75	10.45	0.26
150	3.66	1.64	11.76	10.74	10.44	0.26
200	3.83	1.67	11.76	10.73	10.43	0.26
250	4.01	1.68	11.76	10.73	10.42	0.26
300	4.18	1.69	11.76	10.72	10.41	0.26
350	4.28	1.70	11.76	10.71	10.41	0.26
400	4.39	1.70	11.76	10.71	10.40	0.26
450	4.50	1.70	11.76	10.71	10.40	0.26
500	4.61	1.71	11.76	10.70	10.39	0.26
600	4.74	1.71	11.76	10.70	10.39	0.26
700	4.87	1.70	11.76	10.69	10.38	0.26
800	4.88	1.71	11.76	10.69	10.38	0.26
900	4.88	1.71	11.76	10.69	10.38	0.26
1000	4.84	1.72	11.76	10.69	10.38	0.26

Vùng 1 - mặt cắt 8 - chu kỳ lặp 20 năm; X=700457 Y=2298749

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.22	1.66	11.76	11.05	10.76	0.28
50	3.59	1.73	11.76	11.03	10.73	0.27
100	3.96	1.80	11.76	11.02	10.71	0.27
150	4.14	1.83	11.76	11.01	10.70	0.27
200	4.31	1.85	11.76	11.00	10.69	0.27
250	4.49	1.86	11.76	10.99	10.68	0.27
300	4.66	1.87	11.76	10.99	10.67	0.27
350	4.77	1.88	11.76	10.98	10.67	0.27
400	4.87	1.88	11.76	10.98	10.66	0.27
450	4.98	1.88	11.76	10.97	10.66	0.27
500	5.09	1.88	11.76	10.97	10.65	0.27
600	5.22	1.88	11.76	10.97	10.64	0.27
700	5.36	1.88	11.76	10.96	10.64	0.27
800	5.36	1.89	11.76	10.96	10.64	0.27
900	5.36	1.89	11.76	10.96	10.64	0.27
1000	5.32	1.90	11.76	10.96	10.64	0.27

Vùng 1 - mặt cắt 8 - chu kỳ lặp 50 năm; X=700457 Y=2298749

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.97	1.98	12.71	11.41	11.10	0.28
50	4.35	2.04	12.71	11.40	11.08	0.28
100	4.72	2.09	12.71	11.38	11.06	0.28
150	4.90	2.11	12.71	11.37	11.05	0.28
200	5.07	2.14	12.71	11.36	11.04	0.28
250	5.25	2.14	12.71	11.36	11.03	0.28
300	5.42	2.15	12.71	11.35	11.02	0.28
350	5.53	2.16	12.71	11.35	11.02	0.28
400	5.63	2.16	12.71	11.34	11.01	0.28
450	5.74	2.16	12.71	11.34	11.01	0.28
500	5.85	2.16	12.71	11.34	11.00	0.28
600	5.99	2.16	12.71	11.33	11.00	0.28
700	6.11	2.16	12.71	11.33	10.99	0.28
800	6.12	2.16	12.71	11.33	10.99	0.28
900	6.12	2.17	12.71	11.33	10.99	0.28
1000	6.08	2.18	12.71	11.33	10.99	0.28

Vùng 1 - mặt cắt 8 - chu kỳ lặp 100 năm; X=700457 Y=2298749

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.6635	2.26827	12.7059	11.6678	11.3477	0.29653
50	5.0411	2.31347	12.7059	11.6507	11.3257	0.29406
100	5.4146	2.35694	12.7059	11.6353	11.3058	0.29163
150	5.5909	2.37497	12.7059	11.6272	11.2954	0.29083
200	5.7671	2.3921	12.7059	11.6196	11.2855	0.29007
250	5.942	2.39916	12.7059	11.6128	11.2768	0.29
300	6.1129	2.40601	12.7059	11.6063	11.2685	0.28994
350	6.22	2.40964	12.7059	11.6022	11.2633	0.28995
400	6.3274	2.41302	12.7059	11.5983	11.2582	0.28997
450	6.4374	2.41349	12.7059	11.5945	11.2535	0.29017
500	6.5431	2.41398	12.7059	11.5909	11.249	0.29036
600	6.6781	2.41514	12.7059	11.5864	11.2432	0.29057
700	6.8086	2.41463	12.7059	11.5822	11.2379	0.29067
800	6.8176	2.41905	12.7059	11.5814	11.237	0.29064
900	6.8141	2.42417	12.7059	11.5811	11.2364	0.29035
1000	6.7778	2.43116	12.7059	11.5815	11.237	0.28989

Table C-2.8 *Results of wave computation for sea dike design (continued)*

Vùng 1 - mặt cắt 8 - chu kỳ lặp 125 năm: X=700457 Y=2288749

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.95	2.38	12.71	11.76	11.43	0.30
50	5.32	2.42	12.71	11.74	11.41	0.29
100	5.70	2.46	12.71	11.73	11.39	0.29
150	5.87	2.48	12.71	11.72	11.38	0.29
200	6.05	2.50	12.71	11.71	11.37	0.29
250	6.23	2.50	12.71	11.70	11.36	0.29
300	6.40	2.51	12.71	11.70	11.36	0.29
350	6.50	2.51	12.71	11.69	11.35	0.29
400	6.61	2.52	12.71	11.69	11.35	0.29
450	6.72	2.52	12.71	11.68	11.34	0.29
500	6.83	2.52	12.71	11.68	11.34	0.29
600	6.98	2.52	12.71	11.68	11.33	0.29
700	7.09	2.52	12.71	11.67	11.33	0.29
800	7.10	2.52	12.71	11.67	11.32	0.29
900	7.10	2.53	12.71	11.67	11.32	0.29
1000	7.06	2.53	12.71	11.67	11.32	0.29

Vùng 1 - mặt cắt 8 - chu kỳ lặp 150 năm: X=700457 Y=2288749

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.10	2.44	12.71	11.84	11.52	0.30
50	5.48	2.48	12.71	11.83	11.50	0.30
100	5.85	2.52	12.71	11.81	11.48	0.29
150	6.03	2.54	12.71	11.81	11.47	0.29
200	6.20	2.55	12.71	11.80	11.46	0.29
250	6.38	2.56	12.71	11.79	11.45	0.29
300	6.55	2.57	12.71	11.79	11.44	0.29
350	6.66	2.57	12.71	11.78	11.44	0.29
400	6.76	2.57	12.71	11.78	11.43	0.29
450	6.87	2.57	12.71	11.77	11.43	0.29
500	6.98	2.57	12.71	11.77	11.42	0.29
600	7.11	2.57	12.71	11.77	11.42	0.29
700	7.24	2.57	12.71	11.76	11.41	0.29
800	7.25	2.58	12.71	11.76	11.41	0.29
900	7.25	2.58	12.71	11.76	11.41	0.29
1000	7.21	2.58	12.71	11.76	11.41	0.29

Vùng 1 - mặt cắt 8 - chu kỳ lặp 200 năm: X=700457 Y=2288749

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.50	2.60	12.71	11.94	11.61	0.30
50	5.88	2.64	12.71	11.92	11.59	0.30
100	6.25	2.67	12.71	11.91	11.57	0.29
150	6.43	2.68	12.71	11.90	11.56	0.29
200	6.60	2.70	12.71	11.89	11.55	0.29
250	6.78	2.70	12.71	11.89	11.54	0.29
300	6.95	2.71	12.71	11.88	11.53	0.29
350	7.06	2.71	12.71	11.88	11.53	0.29
400	7.16	2.72	12.71	11.87	11.52	0.29
450	7.27	2.72	12.71	11.87	11.52	0.29
500	7.38	2.72	12.71	11.86	11.51	0.29
600	7.51	2.72	12.71	11.86	11.51	0.29
700	7.64	2.72	12.71	11.86	11.50	0.29
800	7.65	2.72	12.71	11.86	11.50	0.29
900	7.65	2.73	12.71	11.86	11.50	0.29
1000	7.61	2.74	12.71	11.86	11.50	0.29

Table C-2.9 *Results of wave computation for sea dike design*

Vùng 1 - mặt cắt 9 - chu kỳ lặp 10 năm; X=686807 Y=2300030						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.37	1.29	11.76	10.57	10.23	0.04
50	2.70	1.40	11.76	10.54	10.20	0.04
100	3.04	1.49	11.76	10.53	10.18	0.03
150	3.39	1.54	11.76	10.50	10.14	0.02
200	3.75	1.58	11.76	10.48	10.12	0.02
250	4.16	1.58	11.76	10.47	10.09	0.02
300	4.55	1.58	11.76	10.45	10.07	0.02
350	4.60	1.57	11.76	10.44	10.07	0.02
400	4.64	1.57	11.76	10.44	10.06	0.02
450	4.63	1.57	11.76	10.44	10.06	0.02
500	4.63	1.58	11.76	10.44	10.06	0.02
600	4.62	1.58	11.76	10.44	10.06	0.02
700	4.60	1.58	11.76	10.44	10.07	0.02
800	4.58	1.59	11.76	10.44	10.07	0.02
900	4.57	1.59	11.76	10.44	10.07	0.02
1000	4.56	1.59	11.76	10.44	10.07	0.02

Vùng 1 - mặt cắt 9 - chu kỳ lặp 20 năm; X=686807 Y=2300030						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.77	1.48	11.76	10.84	10.49	0.04
50	3.10	1.57	11.76	10.81	10.48	0.03
100	3.44	1.66	11.76	10.79	10.43	0.03
150	3.80	1.70	11.76	10.77	10.40	0.03
200	4.15	1.73	11.76	10.75	10.38	0.02
250	4.56	1.73	11.76	10.73	10.35	0.02
300	4.95	1.72	11.76	10.72	10.33	0.03
350	5.00	1.72	11.76	10.72	10.33	0.03
400	5.05	1.72	11.76	10.71	10.33	0.03
450	5.04	1.72	11.76	10.71	10.33	0.03
500	5.03	1.72	11.76	10.71	10.33	0.03
600	5.02	1.73	11.76	10.71	10.33	0.03
700	5.00	1.73	11.76	10.71	10.33	0.03
800	4.98	1.73	11.76	10.71	10.33	0.02
900	4.97	1.74	11.76	10.71	10.33	0.02
1000	4.96	1.74	11.76	10.71	10.33	0.02

Vùng 1 - mặt cắt 9 - chu kỳ lặp 50 năm; X=686807 Y=2300030						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.42	1.76	12.71	11.19	10.83	0.04
50	3.78	1.84	12.71	11.17	10.80	0.03
100	4.10	1.91	12.71	11.15	10.78	0.03
150	4.45	1.94	12.71	11.13	10.75	0.03
200	4.81	1.97	12.71	11.11	10.72	0.02
250	5.22	1.96	12.71	11.09	10.70	0.03
300	5.61	1.96	12.71	11.08	10.68	0.03
350	5.66	1.96	12.71	11.08	10.68	0.03
400	5.70	1.96	12.71	11.07	10.68	0.03
450	5.70	1.96	12.71	11.07	10.68	0.03
500	5.69	1.96	12.71	11.07	10.68	0.03
600	5.68	1.96	12.71	11.07	10.68	0.03
700	5.66	1.97	12.71	11.07	10.68	0.03
800	5.64	1.97	12.71	11.07	10.68	0.03
900	5.63	1.98	12.71	11.07	10.68	0.03
1000	5.62	1.98	12.71	11.07	10.67	0.03

Vùng 1 - mặt cắt 9 - chu kỳ lặp 100 năm; X=686807 Y=2300030						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.03	2.02	12.71	11.46	11.09	0.04
50	4.37	2.09	12.71	11.44	11.06	0.03
100	4.71	2.15	12.71	11.42	11.04	0.03
150	5.07	2.17	12.71	11.40	11.01	0.03
200	5.42	2.19	12.71	11.39	10.99	0.03
250	5.83	2.19	12.71	11.37	10.97	0.03
300	6.22	2.18	12.71	11.35	10.95	0.03
350	6.27	2.18	12.71	11.35	10.95	0.03
400	6.32	2.18	12.71	11.35	10.94	0.03
450	6.31	2.18	12.71	11.35	10.94	0.03
500	6.30	2.18	12.71	11.35	10.94	0.03
600	6.29	2.18	12.71	11.35	10.94	0.03
700	6.27	2.19	12.71	11.35	10.94	0.03
800	6.25	2.19	12.71	11.35	10.94	0.03
900	6.24	2.20	12.71	11.35	10.94	0.03
1000	6.23	2.20	12.71	11.35	10.94	0.03

Table C-2.9 *Results of wave computation for sea dike design (continued)*

Vùng 1 - mặt cắt 9 - chu kỳ lặp 125 năm; X=686807 Y=2300030						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.28	2.13	12.71	11.55	11.18	0.03
50	4.63	2.19	12.71	11.53	11.15	0.03
100	4.97	2.25	12.71	11.51	11.13	0.03
150	5.32	2.27	12.71	11.49	11.10	0.03
200	5.68	2.29	12.71	11.48	11.08	0.03
250	6.09	2.28	12.71	11.46	11.06	0.03
300	6.48	2.27	12.71	11.45	11.04	0.03
350	6.53	2.27	12.71	11.44	11.04	0.03
400	6.58	2.27	12.71	11.44	11.04	0.03
450	6.57	2.27	12.71	11.44	11.04	0.03
500	6.56	2.27	12.71	11.44	11.04	0.03
600	6.55	2.28	12.71	11.44	11.03	0.03
700	6.53	2.28	12.71	11.44	11.03	0.03
800	6.51	2.29	12.71	11.44	11.03	0.03
900	6.50	2.29	12.71	11.44	11.03	0.03
1000	6.49	2.30	12.71	11.44	11.03	0.03

Vùng 1 - mặt cắt 9 - chu kỳ lặp 150 năm; X=686807 Y=2300030						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.41	2.18	12.71	11.64	11.26	0.03
50	4.76	2.24	12.71	11.62	11.24	0.03
100	5.10	2.30	12.71	11.60	11.21	0.03
150	5.45	2.32	12.71	11.58	11.19	0.03
200	5.81	2.33	12.71	11.57	11.17	0.03
250	6.22	2.33	12.71	11.55	11.15	0.03
300	6.61	2.32	12.71	11.54	11.13	0.03
350	6.66	2.32	12.71	11.53	11.12	0.03
400	6.71	2.32	12.71	11.53	11.12	0.03
450	6.70	2.32	12.71	11.53	11.12	0.03
500	6.69	2.32	12.71	11.53	11.12	0.03
600	6.68	2.32	12.71	11.53	11.12	0.03
700	6.66	2.33	12.71	11.53	11.12	0.03
800	6.64	2.33	12.71	11.53	11.12	0.03
900	6.63	2.34	12.71	11.53	11.12	0.03
1000	6.62	2.35	12.71	11.53	11.12	0.03

Vùng 1 - mặt cắt 9 - chu kỳ lặp 200 năm; X=686807 Y=2300030						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.78	2.33	12.71	11.73	11.35	0.03
50	5.13	2.39	12.71	11.71	11.32	0.03
100	5.47	2.44	12.71	11.69	11.30	0.03
150	5.82	2.45	12.71	11.67	11.27	0.03
200	6.18	2.47	12.71	11.66	11.25	0.03
250	6.59	2.46	12.71	11.64	11.23	0.03
300	6.98	2.45	12.71	11.63	11.21	0.03
350	7.03	2.45	12.71	11.62	11.21	0.03
400	7.08	2.45	12.71	11.62	11.21	0.03
450	7.07	2.45	12.71	11.62	11.21	0.03
500	7.06	2.46	12.71	11.62	11.21	0.03
600	7.05	2.46	12.71	11.62	11.21	0.03
700	7.03	2.46	12.71	11.62	11.21	0.03
800	7.01	2.47	12.71	11.62	11.21	0.03
900	7.00	2.48	12.71	11.62	11.21	0.03
1000	6.99	2.48	12.71	11.62	11.20	0.03

Table C-2.10 *Results of wave computation for sea dike design*

Vùng 1 - mặt cắt 10 - chu kỳ lặp 10 năm; X=682974 Y=2288809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.52	1.52	11.76	11.05	10.82	0.29
50	3.52	1.85	11.76	11.02	10.79	0.28
100	4.49	1.77	11.76	11.00	10.76	0.28
150	4.50	1.78	11.76	11.00	10.76	0.27
200	4.51	1.79	11.76	11.00	10.76	0.27
250	4.51	1.80	11.76	11.00	10.76	0.27
300	4.52	1.81	11.76	11.00	10.76	0.27
350	4.53	1.82	11.76	11.00	10.76	0.27
400	4.53	1.83	11.76	11.00	10.76	0.27
450	4.54	1.84	11.76	11.00	10.76	0.27
500	4.55	1.85	11.76	11.00	10.75	0.27
600	4.59	1.88	11.76	10.99	10.75	0.27
700	4.64	1.91	11.76	10.99	10.75	0.27
800	4.69	1.93	11.76	10.99	10.74	0.26
900	4.74	1.96	11.76	10.98	10.74	0.26
1000	4.78	2.00	11.76	10.98	10.74	0.26

Vùng 1 - mặt cắt 10 - chu kỳ lặp 20 năm; X=682974 Y=2288809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.92	1.71	11.76	11.32	11.09	0.30
50	3.91	1.82	11.76	11.29	11.04	0.29
100	4.88	1.93	11.76	11.27	11.02	0.28
150	4.89	1.94	11.76	11.27	11.01	0.28
200	4.90	1.95	11.76	11.27	11.01	0.28
250	4.91	1.96	11.76	11.26	11.01	0.29
300	4.91	1.97	11.76	11.26	11.01	0.28
350	4.92	1.98	11.76	11.26	11.01	0.28
400	4.93	1.99	11.76	11.26	11.01	0.28
450	4.94	2.00	11.76	11.26	11.01	0.28
500	4.95	2.01	11.76	11.26	11.01	0.29
600	4.99	2.04	11.76	11.25	11.00	0.28
700	5.04	2.07	11.76	11.26	11.00	0.27
800	5.08	2.10	11.76	11.25	11.00	0.27
900	5.13	2.13	11.76	11.25	10.99	0.27
1000	5.18	2.16	11.76	11.25	10.99	0.27

Vùng 1 - mặt cắt 10 - chu kỳ lặp 50 năm; X=682974 Y=2288809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.55	2.01	12.71	11.67	11.42	0.30
50	4.55	2.10	12.71	11.64	11.39	0.30
100	5.52	2.18	12.71	11.62	11.36	0.29
150	5.53	2.19	12.71	11.62	11.36	0.29
200	5.54	2.20	12.71	11.62	11.36	0.29
250	5.55	2.21	12.71	11.62	11.36	0.29
300	5.55	2.22	12.71	11.62	11.35	0.29
350	5.56	2.24	12.71	11.62	11.35	0.29
400	5.57	2.25	12.71	11.62	11.35	0.29
450	5.58	2.26	12.71	11.62	11.35	0.29
500	5.59	2.27	12.71	11.61	11.35	0.29
600	5.63	2.30	12.71	11.61	11.35	0.28
700	5.67	2.33	12.71	11.61	11.34	0.28
800	5.72	2.36	12.71	11.61	11.34	0.28
900	5.77	2.39	12.71	11.60	11.33	0.28
1000	5.82	2.42	12.71	11.60	11.33	0.28

Vùng 1 - mặt cắt 10 - chu kỳ lặp 100 năm; X=682974 Y=2288809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.15	2.27	12.71	11.93	11.67	0.30
50	5.14	2.35	12.71	11.90	11.64	0.30
100	6.12	2.42	12.71	11.88	11.61	0.30
150	6.13	2.43	12.71	11.88	11.61	0.30
200	6.14	2.44	12.71	11.88	11.60	0.29
250	6.14	2.45	12.71	11.88	11.60	0.29
300	6.15	2.46	12.71	11.88	11.60	0.29
350	6.16	2.47	12.71	11.88	11.60	0.29
400	6.17	2.49	12.71	11.87	11.60	0.29
450	6.17	2.50	12.71	11.87	11.60	0.29
500	6.18	2.51	12.71	11.87	11.60	0.29
600	6.22	2.54	12.71	11.87	11.59	0.29
700	6.27	2.57	12.71	11.87	11.59	0.29
800	6.32	2.60	12.71	11.86	11.59	0.28
900	6.37	2.63	12.71	11.86	11.58	0.28
1000	6.41	2.67	12.71	11.86	11.58	0.28

Table C-2.10 *Results of wave computation for sea dike design (continued)*

Vùng 1 - mặt cắt 10 - chu kỳ lặp 125 năm; X=682974 Y=2288809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.41	2.39	12.71	12.01	11.74	0.31
50	5.41	2.46	12.71	11.98	11.71	0.31
100	6.38	2.52	12.71	11.96	11.68	0.30
150	6.39	2.53	12.71	11.96	11.68	0.30
200	6.40	2.54	12.71	11.96	11.68	0.30
250	6.41	2.55	12.71	11.95	11.68	0.30
300	6.41	2.57	12.71	11.95	11.67	0.30
350	6.42	2.58	12.71	11.95	11.67	0.30
400	6.43	2.59	12.71	11.95	11.67	0.30
450	6.44	2.60	12.71	11.95	11.67	0.30
500	6.45	2.62	12.71	11.95	11.67	0.30
600	6.49	2.65	12.71	11.95	11.67	0.29
700	6.53	2.67	12.71	11.94	11.66	0.29
800	6.58	2.71	12.71	11.94	11.66	0.29
900	6.63	2.74	12.71	11.94	11.65	0.29
1000	6.68	2.77	12.71	11.93	11.65	0.29

Vùng 1 - mặt cắt 10 - chu kỳ lặp 150 năm; X=682974 Y=2288809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.51	2.43	12.71	12.10	11.83	0.31
50	5.51	2.50	12.71	12.07	11.79	0.31
100	6.49	2.56	12.71	12.04	11.76	0.31
150	6.49	2.57	12.71	12.04	11.76	0.30
200	6.50	2.58	12.71	12.04	11.76	0.30
250	6.51	2.60	12.71	12.04	11.76	0.30
300	6.51	2.61	12.71	12.04	11.76	0.30
350	6.52	2.62	12.71	12.04	11.76	0.30
400	6.53	2.63	12.71	12.04	11.76	0.30
450	6.54	2.65	12.71	12.04	11.75	0.30
500	6.55	2.66	12.71	12.04	11.75	0.30
600	6.59	2.69	12.71	12.03	11.75	0.30
700	6.64	2.72	12.71	12.03	11.74	0.30
800	6.68	2.75	12.71	12.03	11.74	0.29
900	6.73	2.78	12.71	12.02	11.74	0.29
1000	6.78	2.82	12.71	12.02	11.73	0.29

Vùng 1 - mặt cắt 10 - chu kỳ lặp 200 năm; X=682974 Y=2288809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.82	2.57	12.71	12.19	11.91	0.31
50	5.82	2.63	12.71	12.16	11.88	0.31
100	6.80	2.69	12.71	12.13	11.85	0.31
150	6.81	2.70	12.71	12.13	11.85	0.31
200	6.82	2.71	12.71	12.13	11.85	0.30
250	6.82	2.72	12.71	12.13	11.84	0.30
300	6.82	2.73	12.71	12.13	11.84	0.30
350	6.83	2.74	12.71	12.13	11.84	0.30
400	6.84	2.76	12.71	12.13	11.84	0.30
450	6.85	2.77	12.71	12.13	11.84	0.30
500	6.86	2.78	12.71	12.12	11.84	0.30
600	6.90	2.81	12.71	12.12	11.83	0.30
700	6.95	2.84	12.71	12.12	11.83	0.30
800	6.99	2.87	12.71	12.11	11.83	0.29
900	7.04	2.91	12.71	12.11	11.82	0.29
1000	7.09	2.94	12.71	12.11	11.82	0.29

Table C-2.11 *Results of wave computation for sea dike design*

Vùng 2 - mặt cắt 11 - chu kỳ lặp 10 năm;X=670504 Y=2275841						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.54	1.78	10.89	10.23	10.02	0.32
50	3.51	1.99	10.89	10.20	9.98	0.30
100	4.46	2.17	10.89	10.19	9.95	0.29
150	4.62	2.25	10.89	10.18	9.94	0.26
200	4.78	2.32	10.89	10.18	9.94	0.26
250	4.97	2.39	10.89	10.17	9.93	0.27
300	5.15	2.46	10.89	10.16	9.92	0.27
350	5.34	2.53	10.89	10.16	9.91	0.26
400	5.52	2.60	10.89	10.15	9.91	0.26
450	5.70	2.66	10.89	10.14	9.90	0.25
500	5.87	2.72	10.89	10.14	9.89	0.25
600	6.18	2.83	10.89	10.13	9.87	0.24
700	6.47	2.94	10.89	10.11	9.86	0.23
800	6.73	3.04	10.89	10.10	9.84	0.23
900	6.98	3.15	10.89	10.09	9.82	0.22
1000	7.24	3.25	10.89	10.07	9.80	0.22

Vùng 2 - mặt cắt 11 - chu kỳ lặp 20 năm;X=670504 Y=2275841						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.05	2.02	10.89	10.50	10.28	0.32
50	4.02	2.22	10.89	10.47	10.24	0.31
100	4.97	2.40	10.89	10.45	10.21	0.29
150	5.13	2.48	10.89	10.45	10.20	0.29
200	5.30	2.55	10.89	10.44	10.19	0.26
250	5.48	2.62	10.89	10.44	10.19	0.26
300	5.67	2.69	10.89	10.43	10.18	0.27
350	5.85	2.76	10.89	10.42	10.17	0.27
400	6.04	2.82	10.89	10.42	10.16	0.26
450	6.21	2.88	10.89	10.41	10.15	0.26
500	6.39	2.94	10.89	10.40	10.14	0.26
600	6.69	3.06	10.89	10.39	10.13	0.25
700	6.98	3.16	10.89	10.38	10.11	0.24
800	7.24	3.27	10.89	10.36	10.09	0.24
900	7.49	3.37	10.89	10.35	10.08	0.23
1000	7.75	3.47	10.89	10.34	10.06	0.22

Vùng 2 - mặt cắt 11 - chu kỳ lặp 50 năm;X=670504 Y=2275841						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.87	2.40	11.76	10.77	10.53	0.32
50	4.84	2.60	11.76	10.74	10.50	0.31
100	5.80	2.77	11.76	10.72	10.47	0.30
150	5.96	2.85	11.76	10.72	10.46	0.29
200	6.13	2.92	11.76	10.71	10.45	0.29
250	6.31	2.99	11.76	10.70	10.44	0.28
300	6.50	3.05	11.76	10.70	10.43	0.28
350	6.68	3.12	11.76	10.69	10.42	0.27
400	6.87	3.18	11.76	10.68	10.42	0.27
450	7.04	3.24	11.76	10.67	10.41	0.26
500	7.22	3.30	11.76	10.67	10.40	0.26
600	7.52	3.41	11.76	10.65	10.38	0.25
700	7.81	3.52	11.76	10.64	10.36	0.25
800	8.07	3.62	11.76	10.62	10.34	0.24
900	8.32	3.72	11.76	10.61	10.32	0.24
1000	8.59	3.82	11.76	10.60	10.31	0.23

Vùng 2 - mặt cắt 11 - chu kỳ lặp 100 năm;X=670504 Y=2275841						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.64	2.77	11.76	11.03	10.77	0.32
50	5.61	2.95	11.76	11.00	10.74	0.31
100	6.57	3.12	11.76	10.97	10.71	0.29
150	6.73	3.19	11.76	10.97	10.70	0.29
200	6.89	3.26	11.76	10.96	10.69	0.29
250	7.08	3.32	11.76	10.95	10.68	0.28
300	7.26	3.39	11.76	10.95	10.67	0.28
350	7.45	3.46	11.76	10.94	10.66	0.27
400	7.64	3.52	11.76	10.93	10.65	0.27
450	7.81	3.58	11.76	10.92	10.64	0.26
500	7.99	3.64	11.76	10.91	10.63	0.26
600	8.29	3.74	11.76	10.90	10.61	0.25
700	8.58	3.85	11.76	10.89	10.59	0.25
800	8.84	3.95	11.76	10.87	10.57	0.24
900	9.09	4.05	11.76	10.86	10.56	0.24
1000	9.36	4.15	11.76	10.84	10.54	0.23

Table C-2.11 *Results of wave computation for sea dike design (continued)*

Vùng 2 - mặt cắt 11 - chu kỳ lặp 125 năm;X=670504 Y=2275841						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.94	2.91	11.76	11.11	10.85	0.32
50	5.91	3.08	11.76	11.08	10.81	0.30
100	6.87	3.25	11.76	11.06	10.78	0.29
150	7.03	3.32	11.76	11.05	10.77	0.29
200	7.19	3.39	11.76	11.04	10.77	0.28
250	7.35	3.46	11.76	11.03	10.76	0.28
300	7.55	3.52	11.76	11.03	10.75	0.27
350	7.75	3.59	11.76	11.02	10.74	0.27
400	7.94	3.65	11.76	11.01	10.73	0.27
450	8.11	3.71	11.76	11.00	10.72	0.26
500	8.29	3.76	11.76	10.99	10.71	0.26
600	8.59	3.87	11.76	10.98	10.69	0.25
700	8.88	3.98	11.76	10.96	10.67	0.25
800	9.14	4.08	11.76	10.95	10.65	0.24
900	9.40	4.18	11.76	10.94	10.63	0.23
1000	9.66	4.28	11.76	10.92	10.61	0.23

Vùng 2 - mặt cắt 11 - chu kỳ lặp 150 năm;X=670504 Y=2275841						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.21	3.04	11.76	11.19	10.93	0.31
50	6.19	3.21	11.76	11.16	10.89	0.30
100	7.14	3.37	11.76	11.14	10.86	0.29
150	7.31	3.44	11.76	11.13	10.85	0.29
200	7.47	3.51	11.76	11.12	10.84	0.28
250	7.66	3.58	11.76	11.12	10.83	0.28
300	7.84	3.64	11.76	11.11	10.82	0.27
350	8.03	3.71	11.76	11.10	10.81	0.27
400	8.21	3.77	11.76	11.09	10.80	0.26
450	8.39	3.83	11.76	11.08	10.79	0.26
500	8.56	3.89	11.76	11.08	10.78	0.26
600	8.87	3.99	11.76	11.06	10.76	0.25
700	9.16	4.10	11.76	11.05	10.74	0.24
800	9.42	4.20	11.76	11.03	10.72	0.24
900	9.67	4.30	11.76	11.02	10.70	0.23
1000	9.94	4.40	11.76	11.00	10.68	0.23

Vùng 2 - mặt cắt 11 - chu kỳ lặp 200 năm;X=670504 Y=2275841						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.51	3.18	11.76	11.28	11.01	0.31
50	6.49	3.35	11.76	11.25	10.97	0.30
100	7.44	3.50	11.76	11.22	10.94	0.29
150	7.61	3.57	11.76	11.22	10.93	0.29
200	7.77	3.64	11.76	11.21	10.92	0.28
250	7.96	3.71	11.76	11.20	10.91	0.28
300	8.14	3.77	11.76	11.19	10.90	0.27
350	8.33	3.84	11.76	11.18	10.89	0.27
400	8.51	3.90	11.76	11.18	10.88	0.27
450	8.69	3.96	11.76	11.17	10.87	0.26
500	8.87	4.01	11.76	11.16	10.86	0.26
600	9.17	4.12	11.76	11.14	10.84	0.25
700	9.48	4.23	11.76	11.13	10.82	0.25
800	9.72	4.33	11.76	11.11	10.80	0.24
900	9.97	4.43	11.76	11.10	10.78	0.23
1000	10.24	4.53	11.76	11.08	10.76	0.23

Table C-2.12 *Results of wave computation for sea dike design*

Vùng 2 - mặt cắt 12 - chu kỳ lặp 10 năm; X=668977 Y=2251035						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.65	1.54	10.89	10.22	10.00	0.37
50	3.72	1.65	10.89	10.16	9.96	0.36
100	4.76	1.76	10.89	10.16	9.93	0.36
150	4.75	1.76	10.89	10.16	9.93	0.36
200	4.75	1.77	10.89	10.16	9.93	0.36
250	4.73	1.78	10.89	10.16	9.93	0.36
300	4.71	1.78	10.89	10.16	9.93	0.36
350	4.72	1.79	10.89	10.16	9.93	0.36
400	4.72	1.79	10.89	10.16	9.93	0.36
450	4.73	1.80	10.89	10.16	9.93	0.36
500	4.73	1.81	10.89	10.16	9.93	0.36
600	4.75	1.82	10.89	10.16	9.93	0.35
700	4.77	1.83	10.89	10.15	9.93	0.35
800	4.78	1.85	10.89	10.15	9.92	0.35
900	4.80	1.86	10.89	10.15	9.92	0.35
1000	4.82	1.88	10.89	10.15	9.92	0.35

Vùng 2 - mặt cắt 12 - chu kỳ lặp 20 năm; X=668977 Y=2251035						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.06	1.73	10.89	10.48	10.25	0.38
50	4.13	1.82	10.89	10.45	10.22	0.38
100	5.18	1.92	10.89	10.42	10.19	0.37
150	5.17	1.92	10.89	10.42	10.19	0.37
200	5.16	1.93	10.89	10.42	10.19	0.37
250	5.14	1.93	10.89	10.42	10.19	0.37
300	5.12	1.94	10.89	10.42	10.19	0.37
350	5.13	1.95	10.89	10.42	10.18	0.37
400	5.14	1.95	10.89	10.42	10.18	0.37
450	5.14	1.96	10.89	10.42	10.18	0.37
500	5.15	1.96	10.89	10.42	10.18	0.37
600	5.17	1.96	10.89	10.42	10.18	0.37
700	5.19	1.99	10.89	10.42	10.18	0.37
800	5.20	2.01	10.89	10.42	10.18	0.37
900	5.21	2.02	10.89	10.41	10.17	0.37
1000	5.23	2.04	10.89	10.41	10.17	0.37

Vùng 2 - mặt cắt 12 - chu kỳ lặp 50 năm; X=668977 Y=2251035						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.74	2.03	11.76	10.75	10.52	0.40
50	4.81	2.10	11.76	10.72	10.48	0.39
100	5.86	2.17	11.76	10.69	10.45	0.39
150	5.85	2.18	11.76	10.69	10.45	0.39
200	5.84	2.18	11.76	10.69	10.44	0.39
250	5.82	2.19	11.76	10.69	10.44	0.39
300	5.81	2.20	11.76	10.69	10.44	0.39
350	5.81	2.20	11.76	10.69	10.44	0.39
400	5.82	2.21	11.76	10.69	10.44	0.39
450	5.83	2.22	11.76	10.69	10.44	0.39
500	5.83	2.22	11.76	10.69	10.44	0.39
600	5.85	2.24	11.76	10.69	10.44	0.39
700	5.87	2.25	11.76	10.69	10.44	0.38
800	5.88	2.27	11.76	10.68	10.43	0.38
900	5.90	2.29	11.76	10.68	10.43	0.38
1000	5.92	2.30	11.76	10.68	10.43	0.38

Vùng 2 - mặt cắt 12 - chu kỳ lặp 100 năm; X=668977 Y=2251035						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.40	2.31	11.76	11.01	10.77	0.40
50	5.47	2.37	11.76	10.98	10.73	0.40
100	6.52	2.42	11.76	10.95	10.69	0.39
150	6.51	2.43	11.76	10.95	10.69	0.39
200	6.50	2.43	11.76	10.95	10.69	0.39
250	6.48	2.44	11.76	10.95	10.69	0.39
300	6.48	2.45	11.76	10.95	10.69	0.39
350	6.47	2.45	11.76	10.95	10.69	0.39
400	6.48	2.46	11.76	10.95	10.69	0.39
450	6.48	2.47	11.76	10.95	10.69	0.39
500	6.49	2.47	11.76	10.95	10.69	0.39
600	6.51	2.49	11.76	10.94	10.68	0.39
700	6.53	2.50	11.76	10.94	10.68	0.39
800	6.54	2.52	11.76	10.94	10.68	0.39
900	6.56	2.54	11.76	10.94	10.68	0.39
1000	6.57	2.56	11.76	10.94	10.67	0.39

Table C-2.12 *Results of wave computation for sea dike design (continued)*

Vùng 2 - mặt cắt 12 - chu kỳ lặp 125 năm; X=668977 Y=2251035

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.65	2.42	11.76	11.10	10.85	0.40
50	5.72	2.47	11.76	11.06	10.81	0.40
100	6.77	2.52	11.76	11.03	10.77	0.40
150	6.76	2.52	11.76	11.03	10.77	0.39
200	6.75	2.53	11.76	11.03	10.77	0.39
250	6.73	2.54	11.76	11.03	10.77	0.39
300	6.72	2.54	11.76	11.03	10.77	0.39
350	6.72	2.55	11.76	11.03	10.77	0.39
400	6.73	2.56	11.76	11.03	10.77	0.39
450	6.74	2.56	11.76	11.03	10.77	0.39
500	6.74	2.57	11.76	11.03	10.77	0.39
600	6.76	2.59	11.76	11.03	10.77	0.39
700	6.78	2.60	11.76	11.03	10.76	0.39
800	6.79	2.62	11.76	11.03	10.76	0.39
900	6.81	2.64	11.76	11.02	10.76	0.39
1000	6.83	2.65	11.76	11.02	10.76	0.39

Vùng 2 - mặt cắt 12 - chu kỳ lặp 150 năm; X=668977 Y=2251035

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.60	2.48	11.76	11.18	10.93	0.40
50	5.87	2.53	11.76	11.15	10.89	0.40
100	6.92	2.57	11.76	11.12	10.86	0.40
150	6.92	2.58	11.76	11.12	10.86	0.40
200	6.91	2.59	11.76	11.12	10.86	0.40
250	6.89	2.59	11.76	11.12	10.85	0.40
300	6.87	2.60	11.76	11.12	10.85	0.40
350	6.88	2.61	11.76	11.12	10.85	0.40
400	6.89	2.62	11.76	11.12	10.85	0.40
450	6.89	2.62	11.76	11.12	10.85	0.40
500	6.90	2.63	11.76	11.12	10.85	0.39
600	6.91	2.64	11.76	11.12	10.85	0.39
700	6.93	2.66	11.76	11.11	10.85	0.39
800	6.94	2.68	11.76	11.11	10.84	0.39
900	6.96	2.70	11.76	11.11	10.84	0.39
1000	6.98	2.71	11.76	11.11	10.84	0.39

Vùng 2 - mặt cắt 12 - chu kỳ lặp 200 năm; X=668977 Y=2251035

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.15	2.62	11.76	11.27	11.01	0.40
50	6.22	2.66	11.76	11.24	10.97	0.40
100	7.27	2.70	11.76	11.21	10.94	0.40
150	7.27	2.71	11.76	11.21	10.94	0.40
200	7.26	2.72	11.76	11.21	10.94	0.40
250	7.24	2.73	11.76	11.21	10.94	0.40
300	7.22	2.73	11.76	11.21	10.94	0.40
350	7.23	2.74	11.76	11.21	10.94	0.40
400	7.23	2.75	11.76	11.21	10.93	0.39
450	7.24	2.75	11.76	11.20	10.93	0.39
500	7.24	2.76	11.76	11.20	10.93	0.39
600	7.26	2.78	11.76	11.20	10.93	0.39
700	7.28	2.79	11.76	11.20	10.93	0.39
800	7.29	2.81	11.76	11.20	10.93	0.39
900	7.31	2.83	11.76	11.20	10.92	0.39
1000	7.33	2.85	11.76	11.19	10.92	0.39

Table C-2.13 *Results of wave computation for sea dike design*

Vùng 2 - mặt cắt 13 - chu kỳ lặp 10 năm;X=858070 Y=2234111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.45	1.70	10.89	10.31	10.10	0.31
50	3.49	1.92	10.89	10.27	10.03	0.30
100	4.52	2.11	10.89	10.24	9.98	0.28
150	4.54	2.18	10.89	10.24	9.98	0.28
200	4.57	2.24	10.89	10.24	9.98	0.27
250	4.81	2.31	10.89	10.23	9.98	0.27
300	5.03	2.38	10.89	10.22	9.97	0.26
350	5.16	2.45	10.89	10.21	9.96	0.26
400	5.29	2.51	10.89	10.21	9.95	0.25
450	5.50	2.57	10.89	10.20	9.94	0.25
500	5.70	2.64	10.89	10.19	9.93	0.24
600	6.11	2.74	10.89	10.17	9.90	0.24
700	6.46	2.91	10.89	10.15	9.88	0.23
800	6.80	2.97	10.89	10.14	9.86	0.23
900	6.99	2.92	10.89	10.13	9.85	0.23
1000	7.15	2.96	10.89	10.12	9.83	0.22

Vùng 2 - mặt cắt 13 - chu kỳ lặp 20 năm;X=858070 Y=2234111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.83	1.89	10.89	10.58	10.35	0.32
50	3.88	2.10	10.89	10.54	10.30	0.31
100	4.91	2.29	10.89	10.51	10.25	0.29
150	4.93	2.35	10.89	10.51	10.25	0.28
200	4.96	2.41	10.89	10.51	10.25	0.28
250	5.19	2.49	10.89	10.50	10.24	0.27
300	5.42	2.56	10.89	10.49	10.23	0.27
350	5.55	2.62	10.89	10.48	10.22	0.27
400	5.68	2.68	10.89	10.48	10.22	0.26
450	5.88	2.75	10.89	10.47	10.20	0.26
500	6.09	2.80	10.89	10.46	10.19	0.25
600	6.50	2.90	10.89	10.44	10.17	0.25
700	6.85	2.98	10.89	10.42	10.14	0.24
800	7.19	3.03	10.89	10.41	10.12	0.24
900	7.38	3.00	10.89	10.40	10.11	0.24
1000	7.54	3.13	10.89	10.39	10.10	0.23

Vùng 2 - mặt cắt 13 - chu kỳ lặp 50 năm;X=858070 Y=2234111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.48	2.23	11.76	10.83	10.58	0.33
50	4.53	2.42	11.76	10.79	10.54	0.31
100	5.56	2.59	11.76	10.77	10.51	0.30
150	5.58	2.65	11.76	10.77	10.50	0.30
200	5.61	2.71	11.76	10.76	10.50	0.29
250	5.85	2.78	11.76	10.76	10.49	0.29
300	6.07	2.85	11.76	10.75	10.48	0.28
350	6.20	2.92	11.76	10.74	10.47	0.28
400	6.33	2.98	11.76	10.74	10.46	0.27
450	6.54	3.04	11.76	10.73	10.45	0.27
500	6.74	3.10	11.76	10.72	10.44	0.26
600	7.15	3.19	11.76	10.70	10.41	0.26
700	7.50	3.27	11.76	10.68	10.39	0.25
800	7.84	3.33	11.76	10.67	10.37	0.25
900	8.03	3.38	11.76	10.66	10.36	0.25
1000	8.19	3.42	11.76	10.65	10.34	0.25

Vùng 2 - mặt cắt 13 - chu kỳ lặp 100 năm;X=858070 Y=2234111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.10	2.53	11.76	11.09	10.84	0.33
50	5.16	2.70	11.76	11.06	10.79	0.31
100	6.19	2.87	11.76	11.03	10.76	0.30
150	6.21	2.93	11.76	11.03	10.76	0.30
200	6.24	2.99	11.76	11.03	10.75	0.29
250	6.47	3.06	11.76	11.02	10.74	0.29
300	6.70	3.13	11.76	11.01	10.73	0.29
350	6.83	3.19	11.76	11.00	10.72	0.28
400	6.96	3.25	11.76	11.00	10.71	0.27
450	7.17	3.31	11.76	10.99	10.70	0.27
500	7.37	3.37	11.76	10.98	10.69	0.27
600	7.78	3.48	11.76	10.96	10.66	0.26
700	8.13	3.58	11.76	10.94	10.64	0.26
800	8.47	3.59	11.76	10.93	10.62	0.26
900	8.66	3.64	11.76	10.92	10.61	0.25
1000	8.82	3.69	11.76	10.91	10.59	0.25

Table C-2.13 *Results of wave computation for sea dike design (continued)*

Vùng 2 - mặt cắt 13 - chu kỳ lặp 125 năm;X=658070 Y=2234111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.42	2.68	11.76	11.17	10.92	0.32
50	5.48	2.85	11.76	11.14	10.87	0.31
100	6.51	3.01	11.76	11.12	10.84	0.30
150	6.53	3.07	11.76	11.11	10.84	0.29
200	6.56	3.14	11.76	11.11	10.83	0.29
250	6.79	3.20	11.76	11.10	10.82	0.29
300	7.02	3.27	11.76	11.09	10.81	0.28
350	7.15	3.33	11.76	11.09	10.80	0.28
400	7.28	3.39	11.76	11.08	10.79	0.27
450	7.49	3.45	11.76	11.07	10.78	0.27
500	7.69	3.50	11.76	11.06	10.77	0.27
600	8.11	3.59	11.76	11.04	10.74	0.26
700	8.46	3.67	11.76	11.03	10.72	0.26
800	8.79	3.73	11.76	11.01	10.70	0.25
900	8.96	3.78	11.76	11.00	10.69	0.25
1000	9.15	3.83	11.76	10.99	10.67	0.25

Vùng 2 - mặt cắt 13 - chu kỳ lặp 150 năm;X=658070 Y=2234111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.53	2.73	11.76	11.26	11.00	0.32
50	5.59	2.90	11.76	11.23	10.96	0.31
100	6.62	3.06	11.76	11.21	10.93	0.30
150	6.64	3.13	11.76	11.20	10.92	0.30
200	6.67	3.19	11.76	11.20	10.92	0.29
250	6.91	3.25	11.76	11.19	10.91	0.29
300	7.14	3.32	11.76	11.18	10.89	0.28
350	7.26	3.38	11.76	11.17	10.88	0.28
400	7.39	3.44	11.76	11.17	10.88	0.28
450	7.60	3.50	11.76	11.16	10.86	0.27
500	7.81	3.55	11.76	11.15	10.85	0.27
600	8.22	3.64	11.76	11.13	10.83	0.26
700	8.57	3.72	11.76	11.11	10.81	0.26
800	8.90	3.78	11.76	11.10	10.79	0.26
900	9.09	3.83	11.76	11.09	10.77	0.25
1000	9.28	3.88	11.76	11.08	10.76	0.25

Vùng 2 - mặt cắt 13 - chu kỳ lặp 200 năm;X=658070 Y=2234111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.84	2.88	11.76	11.35	11.08	0.32
50	5.90	3.04	11.76	11.32	11.04	0.31
100	6.93	3.20	11.76	11.29	11.01	0.30
150	6.95	3.26	11.76	11.29	11.01	0.30
200	6.98	3.32	11.76	11.29	11.00	0.29
250	7.22	3.39	11.76	11.28	10.99	0.29
300	7.45	3.45	11.76	11.27	10.98	0.28
350	7.57	3.51	11.76	11.26	10.97	0.28
400	7.70	3.57	11.76	11.26	10.96	0.27
450	7.91	3.63	11.76	11.25	10.95	0.27
500	8.12	3.68	11.76	11.24	10.94	0.27
600	8.53	3.77	11.76	11.22	10.91	0.26
700	8.88	3.85	11.76	11.20	10.89	0.26
800	9.21	3.91	11.76	11.19	10.87	0.26
900	9.40	3.96	11.76	11.18	10.85	0.25
1000	9.57	4.01	11.76	11.17	10.84	0.25

Table C-2.14 *Results of wave computation for sea dike design*

Vùng 2 - mặt cắt 14 - chu kỳ lặp 10 năm;X=637772 Y=2224975						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.37	1.63	10.89	10.32	10.11	0.31
50	3.42	1.83	10.89	10.28	10.06	0.30
100	4.45	2.00	10.89	10.26	10.03	0.26
150	4.51	2.04	10.89	10.26	10.03	0.26
200	4.57	2.08	10.89	10.26	10.03	0.26
250	4.67	2.12	10.89	10.25	10.02	0.26
300	4.78	2.16	10.89	10.25	10.01	0.27
350	4.89	2.20	10.89	10.24	10.01	0.27
400	4.99	2.24	10.89	10.24	10.00	0.27
450	5.09	2.28	10.89	10.24	10.00	0.26
500	5.16	2.32	10.89	10.23	9.99	0.26
600	5.33	2.40	10.89	10.22	9.98	0.26
700	5.50	2.48	10.89	10.22	9.97	0.25
800	5.68	2.57	10.89	10.21	9.96	0.25
900	5.86	2.65	10.89	10.19	9.94	0.24
1000	6.22	2.73	10.89	10.18	9.93	0.23

Vùng 2 - mặt cắt 14 - chu kỳ lặp 20 năm;X=637772 Y=2224975						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.80	1.83	10.89	10.59	10.37	0.32
50	3.85	2.02	10.89	10.56	10.33	0.31
100	4.88	2.19	10.89	10.53	10.30	0.29
150	4.94	2.23	10.89	10.53	10.29	0.29
200	5.00	2.27	10.89	10.53	10.29	0.29
250	5.11	2.31	10.89	10.52	10.28	0.28
300	5.21	2.35	10.89	10.52	10.28	0.28
350	5.32	2.39	10.89	10.51	10.27	0.28
400	5.43	2.43	10.89	10.51	10.27	0.28
450	5.51	2.47	10.89	10.51	10.26	0.27
500	5.59	2.51	10.89	10.50	10.25	0.27
600	5.77	2.59	10.89	10.49	10.24	0.27
700	5.93	2.67	10.89	10.48	10.23	0.26
800	6.12	2.75	10.89	10.48	10.22	0.25
900	6.38	2.84	10.89	10.46	10.20	0.25
1000	6.66	2.91	10.89	10.45	10.19	0.24

Vùng 2 - mặt cắt 14 - chu kỳ lặp 50 năm;X=637772 Y=2224975						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.47	2.15	11.76	10.86	10.63	0.32
50	4.53	2.32	11.76	10.83	10.59	0.31
100	5.56	2.48	11.76	10.81	10.56	0.30
150	5.62	2.52	11.76	10.80	10.56	0.30
200	5.68	2.56	11.76	10.80	10.55	0.29
250	5.78	2.60	11.76	10.80	10.55	0.29
300	5.89	2.64	11.76	10.79	10.54	0.29
350	6.00	2.68	11.76	10.79	10.54	0.29
400	6.10	2.72	11.76	10.78	10.53	0.28
450	6.19	2.75	11.76	10.78	10.53	0.28
500	6.27	2.79	11.76	10.77	10.52	0.28
600	6.44	2.87	11.76	10.77	10.51	0.27
700	6.61	2.95	11.76	10.76	10.50	0.27
800	6.79	3.04	11.76	10.75	10.48	0.26
900	7.07	3.12	11.76	10.73	10.47	0.26
1000	7.33	3.19	11.76	10.72	10.45	0.25

Vùng 2 - mặt cắt 14 - chu kỳ lặp 100 năm;X=637772 Y=2224975						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.07	2.43	11.76	11.12	10.88	0.32
50	5.12	2.59	11.76	11.09	10.84	0.31
100	6.16	2.74	11.76	11.07	10.81	0.30
150	6.22	2.76	11.76	11.06	10.81	0.30
200	6.28	2.82	11.76	11.06	10.81	0.30
250	6.38	2.86	11.76	11.06	10.80	0.30
300	6.49	2.90	11.76	11.05	10.79	0.29
350	6.60	2.93	11.76	11.05	10.79	0.29
400	6.70	2.97	11.76	11.04	10.78	0.29
450	6.79	3.01	11.76	11.04	10.77	0.29
500	6.87	3.05	11.76	11.03	10.77	0.29
600	7.04	3.13	11.76	11.02	10.76	0.28
700	7.21	3.21	11.76	11.02	10.75	0.27
800	7.39	3.29	11.76	11.01	10.73	0.27
900	7.67	3.37	11.76	10.99	10.72	0.26
1000	7.93	3.45	11.76	10.98	10.70	0.26

Table C-2.14 *Results of wave computation for sea dike design (continued)*

Vùng 2 - mặt cắt 14 - chu kỳ lặp 125 năm;X=637772 Y=2224975						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.27	2.52	11.76	11.21	10.97	0.33
50	5.32	2.68	11.76	11.18	10.93	0.32
100	6.35	2.82	11.76	11.15	10.90	0.31
150	6.41	2.86	11.76	11.15	10.89	0.30
200	6.47	2.90	11.76	11.15	10.89	0.30
250	6.58	2.94	11.76	11.14	10.88	0.30
300	6.68	2.98	11.76	11.14	10.88	0.29
350	6.79	3.02	11.76	11.13	10.87	0.29
400	6.90	3.06	11.76	11.13	10.86	0.29
450	6.99	3.09	11.76	11.12	10.86	0.29
500	7.07	3.13	11.76	11.12	10.85	0.28
600	7.24	3.21	11.76	11.11	10.84	0.28
700	7.40	3.29	11.76	11.10	10.83	0.27
800	7.59	3.38	11.76	11.09	10.81	0.27
900	7.86	3.46	11.76	11.08	10.80	0.26
1000	8.13	3.53	11.76	11.07	10.78	0.26

Vùng 2 - mặt cắt 14 - chu kỳ lặp 150 năm;X=637772 Y=2224975						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.47	2.62	11.76	11.30	11.05	0.32
50	5.53	2.77	11.76	11.26	11.01	0.31
100	6.56	2.91	11.76	11.24	10.99	0.31
150	6.62	2.95	11.76	11.24	10.97	0.30
200	6.68	2.99	11.76	11.23	10.97	0.30
250	6.79	3.03	11.76	11.23	10.96	0.30
300	6.89	3.07	11.76	11.22	10.96	0.29
350	7.00	3.11	11.76	11.22	10.95	0.29
400	7.11	3.15	11.76	11.21	10.95	0.29
450	7.19	3.18	11.76	11.21	10.94	0.29
500	7.28	3.22	11.76	11.21	10.93	0.28
600	7.45	3.30	11.76	11.20	10.92	0.28
700	7.62	3.38	11.76	11.19	10.91	0.27
800	7.80	3.47	11.76	11.18	10.90	0.27
900	8.07	3.55	11.76	11.16	10.88	0.26
1000	8.34	3.62	11.76	11.15	10.86	0.26

Vùng 2 - mặt cắt 14 - chu kỳ lặp 200 năm;X=637772 Y=2224975						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.77	2.76	11.76	11.38	11.13	0.32
50	5.83	2.90	11.76	11.35	11.09	0.31
100	6.86	3.04	11.76	11.33	11.08	0.31
150	6.92	3.08	11.76	11.32	11.06	0.30
200	6.99	3.12	11.76	11.32	11.05	0.30
250	7.09	3.16	11.76	11.32	11.05	0.30
300	7.19	3.20	11.76	11.31	11.04	0.29
350	7.30	3.23	11.76	11.31	11.03	0.29
400	7.41	3.27	11.76	11.30	11.03	0.29
450	7.49	3.31	11.76	11.30	11.02	0.29
500	7.58	3.35	11.76	11.29	11.02	0.28
600	7.75	3.43	11.76	11.28	11.00	0.28
700	7.92	3.51	11.76	11.27	10.99	0.27
800	8.10	3.59	11.76	11.26	10.98	0.27
900	8.37	3.67	11.76	11.25	10.96	0.26
1000	8.64	3.74	11.76	11.24	10.94	0.26

Table C-2.15 *Results of wave computation for sea dike design*

Vùng 2 - mặt cắt 15 - chu kỳ lặp 10 năm;X=631034 Y=2217620						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.14	1.42	10.89	10.28	10.02	0.34
50	3.48	1.93	10.89	10.25	10.01	0.30
100	4.80	2.32	10.89	10.24	10.01	0.26
150	5.05	2.39	10.89	10.23	9.99	0.26
200	5.31	2.46	10.89	10.22	9.98	0.25
250	5.61	2.50	10.89	10.21	9.97	0.25
300	5.88	2.54	10.89	10.20	9.96	0.25
350	6.00	2.57	10.89	10.19	9.95	0.25
400	6.11	2.59	10.89	10.19	9.95	0.25
450	6.17	2.62	10.89	10.18	9.94	0.25
500	6.23	2.64	10.89	10.18	9.94	0.24
600	6.35	2.70	10.89	10.17	9.93	0.24
700	6.47	2.75	10.89	10.17	9.92	0.24
800	6.59	2.80	10.89	10.16	9.91	0.23
900	6.71	2.86	10.89	10.15	9.90	0.23
1000	6.81	2.92	10.89	10.14	9.89	0.23

Vùng 2 - mặt cắt 15 - chu kỳ lặp 20 năm;X=631034 Y=2217620						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.50	1.57	10.89	10.54	10.27	0.35
50	3.84	2.08	10.89	10.52	10.27	0.31
100	5.16	2.49	10.89	10.50	10.27	0.27
150	5.42	2.55	10.89	10.49	10.26	0.27
200	5.68	2.61	10.89	10.49	10.24	0.27
250	5.97	2.65	10.89	10.46	10.23	0.26
300	6.26	2.68	10.89	10.47	10.22	0.26
350	6.37	2.72	10.89	10.46	10.21	0.26
400	6.47	2.75	10.89	10.46	10.21	0.26
450	6.53	2.77	10.89	10.45	10.20	0.26
500	6.59	2.80	10.89	10.45	10.20	0.26
600	6.71	2.85	10.89	10.44	10.19	0.25
700	6.84	2.90	10.89	10.43	10.18	0.25
800	6.95	2.96	10.89	10.43	10.17	0.25
900	7.08	3.01	10.89	10.42	10.16	0.24
1000	7.18	3.07	10.89	10.41	10.15	0.24

Vùng 2 - mặt cắt 15 - chu kỳ lặp 50 năm;X=631034 Y=2217620						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.08	2.26	11.76	10.83	10.62	0.33
50	4.42	2.51	11.76	10.80	10.57	0.31
100	5.76	2.75	11.76	10.78	10.53	0.29
150	6.02	2.81	11.76	10.77	10.52	0.28
200	6.29	2.87	11.76	10.76	10.51	0.28
250	6.57	2.91	11.76	10.75	10.50	0.28
300	6.88	2.94	11.76	10.74	10.49	0.27
350	6.97	2.97	11.76	10.73	10.49	0.27
400	7.08	2.99	11.76	10.73	10.47	0.27
450	7.14	3.02	11.76	10.72	10.47	0.27
500	7.20	3.05	11.76	10.72	10.46	0.27
600	7.31	3.10	11.76	10.71	10.45	0.26
700	7.44	3.15	11.76	10.71	10.44	0.26
800	7.56	3.21	11.76	10.70	10.43	0.26
900	7.69	3.26	11.76	10.69	10.42	0.25
1000	7.78	3.32	11.76	10.68	10.41	0.25

Vùng 2 - mặt cắt 15 - chu kỳ lặp 100 năm;X=631034 Y=2217620						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.63	2.52	11.76	11.10	10.87	0.33
50	5.00	2.77	11.76	11.06	10.82	0.31
100	6.33	2.99	11.76	11.03	10.78	0.29
150	6.59	3.05	11.76	11.02	10.77	0.29
200	6.85	3.11	11.76	11.01	10.76	0.29
250	7.15	3.15	11.76	11.00	10.74	0.28
300	7.43	3.18	11.76	10.99	10.73	0.28
350	7.54	3.21	11.76	10.99	10.72	0.28
400	7.65	3.23	11.76	10.98	10.72	0.28
450	7.71	3.26	11.76	10.98	10.71	0.28
500	7.77	3.29	11.76	10.98	10.71	0.27
600	7.89	3.34	11.76	10.97	10.70	0.27
700	8.01	3.39	11.76	10.96	10.69	0.27
800	8.13	3.45	11.76	10.96	10.68	0.26
900	8.25	3.50	11.76	10.95	10.67	0.26
1000	8.35	3.56	11.76	10.94	10.66	0.26

Table C-2.15 *Results of wave computation for sea dike design (continued)*

Vùng 2 - mặt cắt 15 - chu kỳ lặp 125 năm;X=631034 Y=2217620						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.81	2.60	11.76	11.18	10.95	0.33
50	5.17	2.85	11.76	11.15	10.90	0.31
100	6.51	3.07	11.76	11.12	10.86	0.29
150	6.77	3.13	11.76	11.11	10.85	0.29
200	7.03	3.18	11.76	11.10	10.84	0.29
250	7.33	3.22	11.76	11.09	10.83	0.28
300	7.61	3.25	11.76	11.08	10.81	0.28
350	7.72	3.28	11.76	11.08	10.81	0.28
400	7.83	3.31	11.76	11.07	10.80	0.28
450	7.89	3.33	11.76	11.07	10.80	0.28
500	7.95	3.36	11.76	11.06	10.79	0.28
600	8.06	3.41	11.76	11.06	10.78	0.27
700	8.19	3.47	11.76	11.05	10.77	0.27
800	8.31	3.52	11.76	11.04	10.76	0.27
900	8.43	3.58	11.76	11.03	10.75	0.26
1000	8.53	3.64	11.76	11.03	10.74	0.26

Vùng 2 - mặt cắt 15 - chu kỳ lặp 150 năm;X=631034 Y=2217620						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.98	2.68	11.76	11.27	11.03	0.33
50	5.34	2.92	11.76	11.23	10.98	0.31
100	6.68	3.14	11.76	11.21	10.94	0.29
150	6.94	3.20	11.76	11.20	10.93	0.29
200	7.20	3.26	11.76	11.19	10.92	0.29
250	7.50	3.29	11.76	11.18	10.91	0.29
300	7.78	3.33	11.76	11.17	10.90	0.28
350	7.89	3.35	11.76	11.16	10.89	0.28
400	8.00	3.38	11.76	11.16	10.88	0.28
450	8.06	3.40	11.76	11.15	10.88	0.28
500	8.12	3.43	11.76	11.15	10.87	0.28
600	8.24	3.48	11.76	11.14	10.86	0.28
700	8.36	3.54	11.76	11.14	10.85	0.27
800	8.48	3.59	11.76	11.13	10.84	0.27
900	8.60	3.65	11.76	11.12	10.83	0.27
1000	8.70	3.71	11.76	11.11	10.82	0.26

Vùng 2 - mặt cắt 15 - chu kỳ lặp 200 năm;X=631034 Y=2217620						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.37	2.85	11.76	11.40	11.17	0.37
50	5.73	3.09	11.76	11.37	11.12	0.35
100	7.07	3.31	11.76	11.34	11.09	0.34
150	7.33	3.36	11.76	11.33	11.07	0.33
200	7.59	3.41	11.76	11.32	11.06	0.33
250	7.89	3.45	11.76	11.31	11.05	0.33
300	8.17	3.48	11.76	11.30	11.04	0.33
350	8.28	3.51	11.76	11.30	11.03	0.33
400	8.39	3.54	11.76	11.29	11.03	0.32
450	8.45	3.56	11.76	11.29	11.02	0.32
500	8.51	3.59	11.76	11.29	11.02	0.32
600	8.63	3.64	11.76	11.28	11.01	0.32
700	8.75	3.69	11.76	11.27	11.00	0.31
800	8.87	3.75	11.76	11.27	10.99	0.31
900	9.00	3.81	11.76	11.26	10.98	0.31
1000	9.09	3.87	11.76	11.25	10.97	0.30

Table C-2.16 *Results of wave computation for sea dike design*

Vùng 2 - mặt cắt 16 - chu kỳ lặp 10 năm;X=624922 Y=2209719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.16	1.29	10.89	10.23	9.95	0.35
50	3.16	1.70	10.89	10.23	9.98	0.32
100	4.14	2.02	10.89	10.23	10.00	0.29
150	4.30	2.09	10.89	10.22	9.99	0.28
200	4.46	2.16	10.89	10.22	9.99	0.28
250	4.61	2.23	10.89	10.22	9.98	0.27
300	4.76	2.30	10.89	10.21	9.97	0.27
350	4.91	2.38	10.89	10.21	9.97	0.26
400	5.06	2.45	10.89	10.20	9.96	0.26
450	5.20	2.53	10.89	10.20	9.96	0.25
500	5.36	2.60	10.89	10.19	9.95	0.25
600	5.84	2.75	10.89	10.17	9.93	0.24
700	6.33	2.87	10.89	10.16	9.90	0.23
800	6.63	2.97	10.89	10.14	9.88	0.22
900	6.90	3.05	10.89	10.13	9.87	0.22
1000	7.14	3.14	10.89	10.11	9.85	0.21

Vùng 2 - mặt cắt 16 - chu kỳ lặp 20 năm;X=624922 Y=2209719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.53	1.81	10.89	10.55	10.33	0.33
50	3.54	2.02	10.89	10.52	10.29	0.32
100	4.54	2.21	10.89	10.50	10.26	0.30
150	4.70	2.28	10.89	10.50	10.25	0.29
200	4.86	2.35	10.89	10.49	10.25	0.29
250	5.01	2.42	10.89	10.49	10.24	0.28
300	5.16	2.49	10.89	10.48	10.24	0.28
350	5.31	2.56	10.89	10.48	10.23	0.27
400	5.46	2.63	10.89	10.47	10.22	0.27
450	5.60	2.71	10.89	10.47	10.22	0.26
500	5.76	2.78	10.89	10.46	10.21	0.26
600	6.24	2.93	10.89	10.44	10.19	0.25
700	6.73	3.04	10.89	10.42	10.16	0.24
800	7.03	3.14	10.89	10.41	10.14	0.23
900	7.30	3.23	10.89	10.40	10.13	0.23
1000	7.54	3.31	10.89	10.38	10.11	0.22

Vùng 2 - mặt cắt 16 - chu kỳ lặp 50 năm;X=624922 Y=2209719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.20	2.12	11.76	10.83	10.60	0.34
50	4.22	2.33	11.76	10.80	10.56	0.32
100	5.21	2.51	11.76	10.78	10.53	0.30
150	5.37	2.58	11.76	10.77	10.52	0.30
200	5.53	2.65	11.76	10.77	10.52	0.29
250	5.68	2.72	11.76	10.76	10.51	0.29
300	5.83	2.79	11.76	10.76	10.50	0.28
350	5.98	2.86	11.76	10.75	10.50	0.28
400	6.13	2.93	11.76	10.74	10.49	0.27
450	6.28	3.00	11.76	10.74	10.48	0.27
500	6.43	3.08	11.76	10.73	10.47	0.26
600	6.91	3.22	11.76	10.71	10.45	0.25
700	7.41	3.33	11.76	10.69	10.42	0.25
800	7.71	3.42	11.76	10.68	10.40	0.24
900	7.98	3.51	11.76	10.66	10.39	0.24
1000	8.22	3.59	11.76	10.65	10.37	0.23

Vùng 2 - mặt cắt 16 - chu kỳ lặp 100 năm;X=624922 Y=2209719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.86	2.43	11.76	11.09	10.85	0.33
50	4.87	2.63	11.76	11.06	10.81	0.32
100	5.87	2.81	11.76	11.03	10.78	0.31
150	6.03	2.88	11.76	11.03	10.77	0.30
200	6.19	2.94	11.76	11.02	10.76	0.30
250	6.34	3.01	11.76	11.02	10.76	0.29
300	6.49	3.08	11.76	11.01	10.75	0.29
350	6.64	3.15	11.76	11.01	10.74	0.28
400	6.79	3.22	11.76	11.00	10.73	0.28
450	6.93	3.29	11.76	10.99	10.72	0.27
500	7.09	3.37	11.76	10.99	10.72	0.27
600	7.57	3.50	11.76	10.97	10.69	0.26
700	8.07	3.61	11.76	10.95	10.67	0.25
800	8.37	3.70	11.76	10.93	10.65	0.25
900	8.64	3.78	11.76	10.92	10.63	0.24
1000	8.88	3.86	11.76	10.90	10.61	0.24

Table C-2.16 *Results of wave computation for sea dike design (continued)*

Vùng 2 - mặt cắt 16 - chu kỳ lặp 125 năm;X=624922 Y=2209719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.11	2.55	11.76	11.17	10.93	0.33
50	5.13	2.74	11.76	11.14	10.89	0.32
100	6.13	2.92	11.76	11.12	10.86	0.31
150	6.29	2.99	11.76	11.11	10.85	0.30
200	6.45	3.06	11.76	11.11	10.84	0.30
250	6.60	3.13	11.76	11.10	10.84	0.29
300	6.75	3.20	11.76	11.10	10.83	0.29
350	6.90	3.27	11.76	11.09	10.82	0.28
400	7.05	3.33	11.76	11.08	10.81	0.28
450	7.19	3.41	11.76	11.08	10.80	0.27
500	7.35	3.48	11.76	11.07	10.79	0.27
600	7.83	3.61	11.76	11.05	10.77	0.26
700	8.33	3.72	11.76	11.03	10.74	0.25
800	8.63	3.81	11.76	11.01	10.72	0.25
900	8.90	3.89	11.76	11.00	10.71	0.24
1000	9.14	3.97	11.76	10.99	10.69	0.24

Vùng 2 - mặt cắt 16 - chu kỳ lặp 150 năm;X=624922 Y=2209719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.34	2.66	11.76	11.26	11.01	0.33
50	5.36	2.85	11.76	11.23	10.97	0.32
100	6.36	3.03	11.76	11.20	10.94	0.30
150	6.52	3.09	11.76	11.20	10.93	0.30
200	6.67	3.16	11.76	11.19	10.92	0.29
250	6.82	3.23	11.76	11.19	10.92	0.29
300	6.98	3.30	11.76	11.18	10.91	0.29
350	7.13	3.37	11.76	11.17	10.90	0.28
400	7.28	3.44	11.76	11.17	10.89	0.28
450	7.42	3.51	11.76	11.16	10.88	0.27
500	7.58	3.58	11.76	11.15	10.87	0.27
600	8.06	3.71	11.76	11.13	10.85	0.26
700	8.56	3.82	11.76	11.11	10.82	0.25
800	8.86	3.91	11.76	11.10	10.80	0.25
900	9.13	3.99	11.76	11.08	10.78	0.24
1000	9.37	4.07	11.76	11.07	10.77	0.24

Vùng 2 - mặt cắt 16 - chu kỳ lặp 200 năm;X=624922 Y=2209719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.73	2.85	11.76	11.34	11.09	0.33
50	5.74	3.03	11.76	11.31	11.05	0.31
100	6.74	3.20	11.76	11.29	11.02	0.30
150	6.90	3.26	11.76	11.28	11.01	0.30
200	7.06	3.33	11.76	11.28	11.00	0.29
250	7.21	3.40	11.76	11.27	10.99	0.29
300	7.36	3.47	11.76	11.26	10.99	0.28
350	7.51	3.54	11.76	11.26	10.98	0.28
400	7.66	3.60	11.76	11.25	10.97	0.27
450	7.81	3.67	11.76	11.24	10.96	0.27
500	7.96	3.74	11.76	11.24	10.95	0.26
600	8.45	3.87	11.76	11.22	10.92	0.26
700	8.94	3.98	11.76	11.19	10.90	0.25
800	9.24	4.07	11.76	11.18	10.88	0.24
900	9.52	4.15	11.76	11.16	10.86	0.24
1000	9.76	4.23	11.76	11.15	10.84	0.24

Table C-2.17 *Results of wave computation for sea dike design*

Vùng 2 - mặt cắt 17 - chu kỳ lặp 10 năm;X=601321 Y=2203372						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.32	1.46	10.89	10.25	9.98	0.33
50	3.53	1.93	10.89	10.23	9.98	0.30
100	4.71	2.30	10.89	10.22	9.98	0.26
150	4.89	2.38	10.89	10.22	9.98	0.26
200	5.08	2.45	10.89	10.21	9.97	0.25
250	5.26	2.52	10.89	10.21	9.96	0.24
300	5.44	2.59	10.89	10.20	9.95	0.24
350	5.60	2.66	10.89	10.20	9.95	0.24
400	5.76	2.73	10.89	10.19	9.94	0.23
450	5.92	2.79	10.89	10.18	9.93	0.23
500	6.06	2.86	10.89	10.18	9.92	0.22
600	6.44	2.98	10.89	10.16	9.90	0.21
700	6.80	3.10	10.89	10.14	9.88	0.21
800	7.11	3.20	10.89	10.13	9.86	0.20
900	7.40	3.29	10.89	10.12	9.84	0.19
1000	7.61	3.39	10.89	10.10	9.83	0.19

Vùng 2 - mặt cắt 17 - chu kỳ lặp 20 năm;X=601321 Y=2203372						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.78	2.08	10.89	10.54	10.32	0.30
50	4.00	2.32	10.89	10.51	10.28	0.29
100	5.20	2.53	10.89	10.49	10.25	0.27
150	5.39	2.60	10.89	10.49	10.24	0.26
200	5.57	2.67	10.89	10.48	10.23	0.25
250	5.75	2.74	10.89	10.47	10.22	0.25
300	5.93	2.81	10.89	10.47	10.21	0.25
350	6.09	2.89	10.89	10.46	10.20	0.24
400	6.25	2.95	10.89	10.46	10.20	0.24
450	6.41	3.01	10.89	10.45	10.19	0.23
500	6.56	3.08	10.89	10.44	10.18	0.23
600	6.93	3.20	10.89	10.43	10.16	0.22
700	7.29	3.31	10.89	10.41	10.14	0.21
800	7.60	3.41	10.89	10.40	10.12	0.21
900	7.90	3.51	10.89	10.38	10.10	0.20
1000	8.10	3.60	10.89	10.37	10.09	0.19

Vùng 2 - mặt cắt 17 - chu kỳ lặp 50 năm;X=601321 Y=2203372						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.60	2.46	11.76	10.82	10.58	0.30
50	4.82	2.69	11.76	10.78	10.54	0.28
100	6.02	2.89	11.76	10.76	10.50	0.27
150	6.21	2.97	11.76	10.75	10.50	0.26
200	6.39	3.04	11.76	10.75	10.49	0.26
250	6.57	3.11	11.76	10.74	10.48	0.25
300	6.75	3.18	11.76	10.73	10.47	0.25
350	6.91	3.24	11.76	10.73	10.46	0.24
400	7.07	3.31	11.76	10.72	10.45	0.24
450	7.23	3.37	11.76	10.71	10.44	0.23
500	7.40	3.44	11.76	10.71	10.43	0.23
600	7.76	3.56	11.76	10.69	10.41	0.22
700	8.12	3.67	11.76	10.67	10.39	0.21
800	8.42	3.77	11.76	10.66	10.37	0.21
900	8.72	3.86	11.76	10.64	10.35	0.20
1000	8.92	3.95	11.76	10.63	10.33	0.20

Vùng 2 - mặt cắt 17 - chu kỳ lặp 100 năm;X=601321 Y=2203372						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.38	2.83	11.76	11.07	10.83	0.29
50	5.60	3.05	11.76	11.04	10.78	0.28
100	6.81	3.25	11.76	11.01	10.75	0.26
150	6.99	3.32	11.76	11.01	10.74	0.26
200	7.18	3.39	11.76	11.00	10.73	0.25
250	7.36	3.46	11.76	10.99	10.72	0.25
300	7.54	3.52	11.76	10.99	10.71	0.24
350	7.70	3.59	11.76	10.98	10.70	0.24
400	7.86	3.65	11.76	10.97	10.69	0.24
450	8.02	3.72	11.76	10.96	10.68	0.23
500	8.18	3.78	11.76	10.96	10.67	0.23
600	8.55	3.90	11.76	10.94	10.65	0.22
700	8.91	4.01	11.76	10.92	10.62	0.21
800	9.21	4.11	11.76	10.90	10.60	0.21
900	9.51	4.20	11.76	10.89	10.58	0.20
1000	9.71	4.29	11.76	10.88	10.56	0.20

Table C-2.17 *Results of wave computation for sea dike design (continued)*

Vùng 2 - mặt cắt 17 - chu kỳ lặp 125 năm;X=601321 Y=2203372						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.66	2.97	11.76	11.16	10.91	0.29
50	5.89	3.18	11.76	11.12	10.86	0.28
100	7.09	3.37	11.76	11.10	10.82	0.26
150	7.27	3.44	11.76	11.09	10.81	0.26
200	7.46	3.51	11.76	11.08	10.80	0.25
250	7.64	3.58	11.76	11.08	10.79	0.25
300	7.82	3.65	11.76	11.07	10.78	0.24
350	7.98	3.71	11.76	11.06	10.77	0.24
400	8.14	3.78	11.76	11.05	10.77	0.23
450	8.30	3.84	11.76	11.04	10.75	0.23
500	8.47	3.90	11.76	11.04	10.74	0.23
600	8.83	4.02	11.76	11.02	10.72	0.22
700	9.19	4.13	11.76	11.00	10.70	0.21
800	9.50	4.23	11.76	10.99	10.68	0.21
900	9.79	4.32	11.76	10.97	10.66	0.20
1000	10.00	4.41	11.76	10.96	10.64	0.20

Vùng 2 - mặt cắt 17 - chu kỳ lặp 150 năm;X=601321 Y=2203372						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.88	3.07	11.76	11.24	10.99	0.29
50	6.10	3.28	11.76	11.21	10.94	0.27
100	7.31	3.47	11.76	11.18	10.90	0.26
150	7.49	3.54	11.76	11.17	10.89	0.26
200	7.68	3.61	11.76	11.17	10.88	0.25
250	7.86	3.68	11.76	11.16	10.87	0.25
300	8.04	3.75	11.76	11.15	10.86	0.24
350	8.20	3.81	11.76	11.14	10.85	0.24
400	8.36	3.87	11.76	11.14	10.84	0.23
450	8.52	3.94	11.76	11.13	10.83	0.23
500	8.69	4.00	11.76	11.12	10.82	0.23
600	9.05	4.12	11.76	11.10	10.80	0.22
700	9.41	4.23	11.76	11.09	10.78	0.21
800	9.72	4.33	11.76	11.07	10.76	0.21
900	10.01	4.42	11.76	11.05	10.74	0.20
1000	10.22	4.51	11.76	11.04	10.72	0.20

Vùng 2 - mặt cắt 17 - chu kỳ lặp 200 năm;X=601321 Y=2203372						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.38	3.31	11.76	11.32	11.06	0.28
50	6.61	3.51	11.76	11.29	11.01	0.27
100	7.81	3.69	11.76	11.26	10.97	0.25
150	8.00	3.76	11.76	11.25	10.96	0.25
200	8.18	3.83	11.76	11.24	10.95	0.24
250	8.37	3.90	11.76	11.24	10.94	0.24
300	8.54	3.97	11.76	11.23	10.93	0.24
350	8.71	4.03	11.76	11.22	10.92	0.23
400	8.87	4.09	11.76	11.21	10.91	0.23
450	9.03	4.16	11.76	11.20	10.90	0.22
500	9.19	4.22	11.76	11.20	10.89	0.22
600	9.55	4.34	11.76	11.18	10.87	0.21
700	9.91	4.44	11.76	11.16	10.84	0.21
800	10.22	4.54	11.76	11.14	10.82	0.20
900	10.52	4.63	11.76	11.13	10.80	0.20
1000	10.72	4.72	11.76	11.11	10.78	0.19

Table C-2.18 *Results of wave computation for sea dike design*

Vùng 2 - mặt cắt 18 - chu kỳ lặp 10 năm;X=597715 Y=2193173						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.65	2.14	12.71	11.75	11.48	0.44
50	4.98	2.80	12.71	11.68	11.41	0.39
100	7.26	3.33	12.71	11.65	11.39	0.34
150	7.44	3.37	12.71	11.65	11.38	0.34
200	7.61	3.42	12.71	11.64	11.37	0.34
250	7.77	3.46	12.71	11.63	11.36	0.33
300	7.93	3.50	12.71	11.63	11.35	0.33
350	8.06	3.54	12.71	11.62	11.35	0.33
400	8.19	3.58	12.71	11.62	11.34	0.33
450	8.33	3.61	12.71	11.61	11.33	0.33
500	8.45	3.64	12.71	11.60	11.32	0.32
600	8.63	3.71	12.71	11.60	11.31	0.32
700	8.81	3.77	12.71	11.59	11.30	0.32
800	8.96	3.83	12.71	11.58	11.29	0.31
900	9.14	3.89	12.71	11.57	11.28	0.31
1000	9.31	3.94	12.71	11.56	11.27	0.31

Vùng 2 - mặt cắt 18 - chu kỳ lặp 20 năm;X=597715 Y=2193173						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.18	2.37	12.71	12.09	11.80	0.45
50	5.51	3.03	12.71	12.02	11.74	0.41
100	7.80	3.58	12.71	12.00	11.72	0.38
150	7.97	3.61	12.71	11.99	11.71	0.38
200	8.15	3.65	12.71	11.98	11.70	0.35
250	8.31	3.69	12.71	11.98	11.69	0.35
300	8.47	3.74	12.71	11.97	11.68	0.35
350	8.60	3.77	12.71	11.97	11.68	0.35
400	8.73	3.81	12.71	11.96	11.67	0.34
450	8.86	3.84	12.71	11.95	11.66	0.34
500	8.99	3.87	12.71	11.95	11.66	0.34
600	9.17	3.94	12.71	11.94	11.64	0.34
700	9.35	4.00	12.71	11.93	11.63	0.33
800	9.51	4.06	12.71	11.92	11.62	0.33
900	9.68	4.11	12.71	11.91	11.61	0.33
1000	9.85	4.17	12.71	11.90	11.60	0.32

Vùng 2 - mặt cắt 18 - chu kỳ lặp 50 năm;X=597715 Y=2193173						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.03	2.73	13.72	12.44	12.13	0.47
50	6.37	3.38	13.72	12.38	12.08	0.42
100	8.66	3.92	13.72	12.35	12.06	0.37
150	8.83	3.97	13.72	12.34	12.05	0.37
200	9.01	4.02	13.72	12.34	12.04	0.37
250	9.17	4.05	13.72	12.33	12.03	0.37
300	9.33	4.09	13.72	12.32	12.02	0.36
350	9.46	4.13	13.72	12.32	12.02	0.36
400	9.59	4.17	13.72	12.31	12.01	0.36
450	9.72	4.20	13.72	12.31	12.00	0.36
500	9.85	4.23	13.72	12.30	11.99	0.36
600	10.03	4.29	13.72	12.29	11.98	0.35
700	10.21	4.35	13.72	12.28	11.97	0.35
800	10.37	4.41	13.72	12.27	11.96	0.35
900	10.54	4.47	13.72	12.27	11.95	0.34
1000	10.71	4.53	13.72	12.26	11.94	0.34

Vùng 2 - mặt cắt 18 - chu kỳ lặp 100 năm;X=597715 Y=2193173						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.77	3.60	13.72	12.70	12.43	0.43
50	7.13	3.94	13.72	12.65	12.35	0.41
100	9.44	4.25	13.72	12.61	12.30	0.39
150	9.61	4.30	13.72	12.60	12.29	0.39
200	9.79	4.34	13.72	12.59	12.29	0.39
250	9.95	4.38	13.72	12.59	12.25	0.38
300	10.11	4.42	13.72	12.58	12.27	0.37
350	10.24	4.45	13.72	12.58	12.26	0.37
400	10.37	4.48	13.72	12.57	12.25	0.37
450	10.50	4.52	13.72	12.56	12.25	0.37
500	10.63	4.55	13.72	12.56	12.24	0.37
600	10.81	4.61	13.72	12.55	12.23	0.36
700	10.99	4.67	13.72	12.54	12.22	0.36
800	11.16	4.73	13.72	12.53	12.20	0.36
900	11.32	4.79	13.72	12.52	12.19	0.35
1000	11.49	4.85	13.72	12.51	12.18	0.35

Table C-2.18 *Results of wave computation for sea dike design (continued)*

Vùng 2 - mặt cắt 18 - chu kỳ lặp 125 năm;X=597715 Y=2193173						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.08	3.74	13.72	12.79	12.51	0.43
50	7.43	4.08	13.72	12.73	12.43	0.40
100	9.75	4.38	13.72	12.69	12.38	0.38
150	9.92	4.43	13.72	12.68	12.37	0.38
200	10.10	4.47	13.72	12.68	12.36	0.38
250	10.26	4.51	13.72	12.67	12.35	0.38
300	10.42	4.55	13.72	12.66	12.35	0.37
350	10.55	4.58	13.72	12.66	12.34	0.37
400	10.68	4.62	13.72	12.65	12.33	0.37
450	10.81	4.65	13.72	12.65	12.32	0.37
500	10.94	4.68	13.72	12.64	12.32	0.37
600	11.12	4.74	13.72	12.63	12.30	0.36
700	11.30	4.80	13.72	12.62	12.29	0.36
800	11.47	4.86	13.72	12.61	12.28	0.36
900	11.63	4.92	13.72	12.60	12.27	0.35
1000	11.80	4.98	13.72	12.59	12.26	0.35

Vùng 2 - mặt cắt 18 - chu kỳ lặp 150 năm;X=597715 Y=2193173						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.34	3.87	13.72	12.87	12.59	0.42
50	7.70	4.20	13.72	12.81	12.51	0.40
100	10.02	4.49	13.72	12.77	12.46	0.38
150	10.19	4.54	13.72	12.76	12.45	0.38
200	10.37	4.58	13.72	12.76	12.44	0.38
250	10.53	4.62	13.72	12.75	12.43	0.37
300	10.69	4.66	13.72	12.74	12.42	0.37
350	10.82	4.69	13.72	12.74	12.41	0.37
400	10.95	4.73	13.72	12.73	12.41	0.37
450	11.08	4.76	13.72	12.73	12.40	0.37
500	11.21	4.79	13.72	12.72	12.39	0.37
600	11.39	4.85	13.72	12.71	12.38	0.36
700	11.57	4.91	13.72	12.70	12.37	0.36
800	11.74	4.97	13.72	12.69	12.36	0.36
900	11.90	5.03	13.72	12.68	12.34	0.35
1000	12.07	5.09	13.72	12.67	12.33	0.35

Vùng 2 - mặt cắt 18 - chu kỳ lặp 200 năm;X=597715 Y=2193173						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.67	4.02	13.72	12.96	12.67	0.42
50	8.03	4.34	13.72	12.90	12.59	0.40
100	10.35	4.63	13.72	12.85	12.54	0.38
150	10.53	4.68	13.72	12.85	12.53	0.38
200	10.70	4.72	13.72	12.84	12.52	0.38
250	10.86	4.76	13.72	12.83	12.51	0.38
300	11.02	4.79	13.72	12.83	12.50	0.38
350	11.15	4.83	13.72	12.82	12.49	0.37
400	11.28	4.86	13.72	12.82	12.49	0.37
450	11.42	4.90	13.72	12.81	12.48	0.37
500	11.54	4.93	13.72	12.80	12.47	0.37
600	11.73	4.99	13.72	12.79	12.46	0.37
700	11.90	5.05	13.72	12.79	12.45	0.36
800	12.07	5.11	13.72	12.78	12.44	0.36
900	12.24	5.17	13.72	12.77	12.42	0.36
1000	12.40	5.22	13.72	12.76	12.41	0.35

Table C-2.19 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 19 - chu kỳ lặp 10 năm;X=594945 Y=2182647						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.14	1.31	10.89	9.90	9.62	0.06
50	3.06	1.47	10.89	9.84	9.55	0.05
100	3.97	1.62	10.89	9.81	9.50	0.04
150	4.00	1.63	10.89	9.81	9.50	0.04
200	4.04	1.64	10.89	9.80	9.49	0.04
250	4.07	1.66	10.89	9.80	9.49	0.04
300	4.10	1.67	10.89	9.80	9.49	0.04
350	4.13	1.69	10.89	9.79	9.48	0.04
400	4.16	1.70	10.89	9.79	9.48	0.04
450	4.20	1.71	10.89	9.78	9.47	0.04
500	4.24	1.73	10.89	9.78	9.47	0.04
600	4.31	1.76	10.89	9.77	9.46	0.04
700	4.39	1.78	10.89	9.76	9.44	0.03
800	4.50	1.81	10.89	9.76	9.43	0.03
900	4.61	1.83	10.88	9.75	9.42	0.03
1000	4.70	1.85	10.88	9.74	9.41	0.03

Vùng 3 - mặt cắt 19 - chu kỳ lặp 20 năm;X=594945 Y=2182647						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.64	1.55	10.89	10.15	9.86	0.06
50	3.56	1.69	10.89	10.10	9.79	0.05
100	4.47	1.81	10.89	10.06	9.75	0.04
150	4.50	1.83	10.89	10.06	9.74	0.04
200	4.54	1.84	10.89	10.06	9.74	0.04
250	4.57	1.85	10.89	10.05	9.73	0.04
300	4.60	1.87	10.89	10.05	9.73	0.04
350	4.63	1.88	10.89	10.05	9.72	0.04
400	4.66	1.89	10.89	10.04	9.72	0.04
450	4.70	1.91	10.89	10.04	9.71	0.04
500	4.74	1.92	10.89	10.04	9.71	0.04
600	4.81	1.95	10.89	10.03	9.70	0.04
700	4.89	1.98	10.89	10.02	9.69	0.03
800	5.00	2.00	10.89	10.01	9.67	0.03
900	5.12	2.02	10.88	10.00	9.66	0.03
1000	5.21	2.04	10.88	9.99	9.65	0.03

Vùng 3 - mặt cắt 19 - chu kỳ lặp 50 năm;X=594945 Y=2182647						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.47	1.92	11.76	10.43	10.12	0.05
50	4.40	2.03	11.76	10.38	10.06	0.05
100	5.31	2.13	11.76	10.34	10.01	0.04
150	5.35	2.15	11.76	10.34	10.01	0.04
200	5.38	2.16	11.76	10.34	10.00	0.04
250	5.41	2.17	11.76	10.33	10.00	0.04
300	5.44	2.19	11.76	10.33	10.00	0.04
350	5.47	2.20	11.76	10.33	9.99	0.04
400	5.51	2.21	11.76	10.32	9.99	0.04
450	5.55	2.22	11.76	10.32	9.98	0.04
500	5.59	2.24	11.76	10.31	9.98	0.04
600	5.65	2.26	11.76	10.31	9.97	0.04
700	5.73	2.29	11.76	10.30	9.95	0.03
800	5.84	2.31	11.76	10.29	9.94	0.03
900	5.96	2.33	11.76	10.28	9.93	0.03
1000	6.05	2.35	11.76	10.27	9.92	0.03

Vùng 3 - mặt cắt 19 - chu kỳ lặp 100 năm;X=594945 Y=2182647						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.27	2.27	11.76	10.69	10.38	0.05
50	5.21	2.36	11.76	10.65	10.32	0.05
100	6.12	2.44	11.76	10.61	10.27	0.04
150	6.15	2.45	11.76	10.60	10.26	0.04
200	6.19	2.46	11.76	10.60	10.26	0.04
250	6.21	2.48	11.76	10.60	10.25	0.04
300	6.24	2.49	11.76	10.59	10.25	0.04
350	6.28	2.50	11.76	10.59	10.25	0.04
400	6.31	2.51	11.76	10.59	10.24	0.04
450	6.35	2.53	11.76	10.58	10.23	0.04
500	6.39	2.54	11.76	10.58	10.23	0.04
600	6.46	2.56	11.76	10.57	10.22	0.04
700	6.54	2.59	11.76	10.56	10.21	0.03
800	6.65	2.61	11.76	10.56	10.20	0.03
900	6.76	2.63	11.76	10.55	10.18	0.03
1000	6.86	2.64	11.76	10.54	10.17	0.03

Table C-2.19 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 19 - chu kỳ lặp 125 năm;X=594945 Y=2182647						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.61	2.41	11.76	10.79	10.47	0.05
50	5.54	2.50	11.76	10.74	10.42	0.05
100	6.45	2.57	11.76	10.71	10.37	0.04
150	6.49	2.59	11.76	10.70	10.36	0.04
200	6.52	2.60	11.76	10.70	10.36	0.04
250	6.55	2.61	11.76	10.69	10.36	0.04
300	6.58	2.62	11.76	10.69	10.35	0.04
350	6.62	2.64	11.76	10.69	10.35	0.04
400	6.65	2.65	11.76	10.68	10.34	0.04
450	6.69	2.66	11.76	10.68	10.34	0.04
500	6.73	2.67	11.76	10.68	10.33	0.04
600	6.80	2.70	11.76	10.67	10.32	0.04
700	6.85	2.72	11.76	10.66	10.31	0.04
800	6.99	2.74	11.76	10.65	10.30	0.04
900	7.10	2.76	11.76	10.64	10.29	0.03
1000	7.19	2.78	11.76	10.64	10.28	0.03

Vùng 3 - mặt cắt 19 - chu kỳ lặp 150 năm;X=594945 Y=2182647						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.87	2.52	11.76	10.88	10.56	0.05
50	5.80	2.60	11.76	10.83	10.50	0.05
100	6.71	2.67	11.76	10.79	10.45	0.04
150	6.75	2.68	11.76	10.79	10.45	0.04
200	6.78	2.70	11.76	10.79	10.44	0.04
250	6.81	2.71	11.76	10.78	10.44	0.04
300	6.84	2.72	11.76	10.78	10.43	0.04
350	6.88	2.73	11.76	10.78	10.43	0.04
400	6.91	2.75	11.76	10.77	10.43	0.04
450	6.95	2.76	11.76	10.77	10.42	0.04
500	6.99	2.77	11.76	10.76	10.42	0.04
600	7.06	2.79	11.76	10.76	10.41	0.04
700	7.14	2.82	11.76	10.75	10.40	0.04
800	7.25	2.84	11.76	10.74	10.38	0.04
900	7.36	2.85	11.76	10.73	10.37	0.04
1000	7.45	2.87	11.76	10.73	10.37	0.03

Vùng 3 - mặt cắt 19 - chu kỳ lặp 200 năm;X=594945 Y=2182647						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.35	2.72	11.76	10.97	10.64	0.05
50	6.26	2.79	11.76	10.92	10.59	0.05
100	7.19	2.85	11.76	10.89	10.54	0.04
150	7.23	2.86	11.76	10.88	10.54	0.04
200	7.26	2.87	11.76	10.88	10.53	0.04
250	7.29	2.89	11.76	10.88	10.53	0.04
300	7.32	2.90	11.76	10.87	10.52	0.04
350	7.36	2.91	11.76	10.87	10.52	0.04
400	7.39	2.92	11.76	10.86	10.51	0.04
450	7.43	2.93	11.76	10.86	10.51	0.04
500	7.47	2.94	11.76	10.86	10.50	0.04
600	7.54	2.97	11.76	10.85	10.49	0.04
700	7.82	2.99	11.76	10.84	10.48	0.04
800	7.73	3.01	11.76	10.83	10.47	0.04
900	7.84	3.03	11.76	10.83	10.46	0.04
1000	7.93	3.04	11.76	10.82	10.45	0.04

Table C-2.20 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 20 - chu kỳ lặp 10 năm;X=585303 Y=2162133						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.70	1.95	12.71	11.55	11.36	0.48
50	4.52	2.49	12.71	11.53	11.35	0.44
100	6.31	2.81	12.71	11.52	11.35	0.40
150	6.37	2.87	12.71	11.52	11.35	0.40
200	6.43	3.03	12.71	11.52	11.34	0.39
250	6.46	3.10	12.71	11.52	11.34	0.39
300	6.49	3.17	12.71	11.52	11.34	0.38
350	6.66	3.26	12.71	11.51	11.33	0.38
400	6.84	3.35	12.71	11.50	11.33	0.37
450	7.02	3.44	12.71	11.50	11.32	0.36
500	7.21	3.53	12.71	11.59	11.31	0.36
600	7.62	3.71	12.71	11.58	11.29	0.34
700	8.05	3.89	12.71	11.56	11.27	0.33
800	8.51	4.07	12.71	11.54	11.24	0.32
900	8.97	4.24	12.71	11.52	11.21	0.31
1000	9.45	4.40	12.71	11.49	11.18	0.30

Vùng 3 - mặt cắt 20 - chu kỳ lặp 20 năm;X=585303 Y=2162133						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.28	2.22	12.71	11.99	11.68	0.49
50	5.09	2.74	12.71	11.96	11.68	0.45
100	6.87	3.17	12.71	11.97	11.68	0.42
150	6.93	3.23	12.71	11.97	11.68	0.41
200	6.99	3.29	12.71	11.96	11.68	0.41
250	7.02	3.36	12.71	11.96	11.67	0.40
300	7.05	3.44	12.71	11.96	11.67	0.40
350	7.22	3.52	12.71	11.95	11.66	0.39
400	7.40	3.61	12.71	11.95	11.66	0.38
450	7.58	3.70	12.71	11.94	11.65	0.38
500	7.77	3.79	12.71	11.93	11.64	0.37
600	8.18	3.97	12.71	11.92	11.62	0.36
700	8.61	4.15	12.71	11.90	11.59	0.35
800	9.07	4.33	12.71	11.88	11.57	0.33
900	9.53	4.50	12.71	11.86	11.54	0.32
1000	10.01	4.65	12.71	11.83	11.51	0.31

Vùng 3 - mặt cắt 20 - chu kỳ lặp 50 năm;X=585303 Y=2162133						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.14	2.96	13.72	12.42	12.15	0.48
50	5.97	3.29	13.72	12.36	12.08	0.45
100	7.77	3.58	13.72	12.33	12.03	0.43
150	7.84	3.65	13.72	12.32	12.02	0.42
200	7.90	3.70	13.72	12.32	12.02	0.42
250	7.92	3.78	13.72	12.32	12.02	0.41
300	7.98	3.85	13.72	12.32	12.01	0.41
350	8.13	3.94	13.72	12.31	12.00	0.40
400	8.31	4.02	13.72	12.30	12.00	0.40
450	8.49	4.11	13.72	12.29	11.99	0.39
500	8.68	4.20	13.72	12.29	11.98	0.38
600	9.09	4.38	13.72	12.27	11.95	0.37
700	9.52	4.56	13.72	12.25	11.93	0.36
800	9.98	4.73	13.72	12.23	11.90	0.35
900	10.44	4.89	13.72	12.20	11.87	0.34
1000	10.92	5.04	13.72	12.18	11.84	0.33

Vùng 3 - mặt cắt 20 - chu kỳ lặp 100 năm;X=585303 Y=2162133						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.97	3.39	13.72	12.68	12.40	0.47
50	6.81	3.69	13.72	12.62	12.33	0.45
100	8.61	3.96	13.72	12.59	12.28	0.43
150	8.68	4.02	13.72	12.58	12.27	0.43
200	8.74	4.08	13.72	12.58	12.27	0.42
250	8.76	4.16	13.72	12.58	12.26	0.42
300	8.80	4.23	13.72	12.57	12.26	0.41
350	8.97	4.32	13.72	12.57	12.25	0.41
400	9.15	4.40	13.72	12.56	12.24	0.40
450	9.33	4.49	13.72	12.55	12.23	0.39
500	9.52	4.58	13.72	12.54	12.22	0.39
600	9.93	4.75	13.72	12.52	12.20	0.38
700	10.36	4.92	13.72	12.50	12.17	0.37
800	10.82	5.09	13.72	12.48	12.14	0.35
900	11.28	5.25	13.72	12.46	12.11	0.35
1000	11.77	5.39	13.72	12.43	12.07	0.34

Table C-2.20 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 20 - chu kỳ lặp 125 năm;X=585303 Y=2162193

Khoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	5.28	3.54	13.72	12.76	12.48	0.47
50	7.12	3.83	13.72	12.73	12.41	0.45
100	8.93	4.10	13.72	12.67	12.36	0.43
150	8.99	4.16	13.72	12.67	12.35	0.43
200	9.05	4.22	13.72	12.66	12.35	0.42
250	9.08	4.30	13.72	12.66	12.34	0.42
300	9.11	4.37	13.72	12.66	12.34	0.41
350	9.28	4.46	13.72	12.65	12.33	0.41
400	9.46	4.54	13.72	12.64	12.32	0.40
450	9.64	4.63	13.72	12.63	12.31	0.39
500	9.83	4.71	13.72	12.62	12.30	0.39
600	10.25	4.89	13.72	12.60	12.27	0.38
700	10.66	5.06	13.72	12.58	12.25	0.37
800	11.14	5.22	13.72	12.56	12.22	0.36
900	11.60	5.38	13.72	12.54	12.18	0.35
1000	12.08	5.52	13.72	12.51	12.15	0.34

Vùng 3 - mặt cắt 20 - chu kỳ lặp 150 năm;X=585303 Y=2162193

Khoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	5.47	3.64	13.72	12.85	12.56	0.47
50	7.31	3.92	13.72	12.79	12.49	0.45
100	9.12	4.19	13.72	12.75	12.44	0.43
150	9.18	4.25	13.72	12.75	12.43	0.43
200	9.24	4.31	13.72	12.75	12.43	0.42
250	9.27	4.39	13.72	12.74	12.42	0.42
300	9.30	4.46	13.72	12.74	12.42	0.41
350	9.46	4.54	13.72	12.73	12.41	0.41
400	9.65	4.63	13.72	12.72	12.40	0.40
450	9.84	4.72	13.72	12.71	12.39	0.39
500	10.02	4.80	13.72	12.71	12.38	0.39
600	10.44	4.97	13.72	12.69	12.35	0.38
700	10.87	5.14	13.72	12.67	12.32	0.37
800	11.33	5.31	13.72	12.64	12.29	0.36
900	11.79	5.46	13.72	12.62	12.26	0.35
1000	12.27	5.60	13.72	12.59	12.23	0.34

Vùng 3 - mặt cắt 20 - chu kỳ lặp 200 năm;X=585303 Y=2162193

Khoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	5.56	3.68	13.72	12.93	12.63	0.48
50	7.80	4.15	13.72	12.88	12.56	0.44
100	9.61	4.40	13.72	12.83	12.51	0.43
150	9.68	4.47	13.72	12.83	12.51	0.42
200	9.74	4.53	13.72	12.83	12.50	0.42
250	9.76	4.60	13.72	12.82	12.50	0.41
300	9.80	4.66	13.72	12.82	12.49	0.41
350	9.97	4.76	13.72	12.81	12.48	0.40
400	10.15	4.84	13.72	12.80	12.47	0.40
450	10.33	4.93	13.72	12.79	12.46	0.39
500	10.52	5.02	13.72	12.79	12.45	0.39
600	10.90	5.19	13.72	12.77	12.42	0.37
700	11.37	5.35	13.72	12.74	12.39	0.36
800	11.82	5.52	13.72	12.72	12.36	0.35
900	12.29	5.67	13.72	12.69	12.33	0.34
1000	12.77	5.80	13.72	12.67	12.30	0.34

Table C-2.21 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 21 - chu kỳ lặp 10 năm;X=582248 Y=2142096						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.59	2.06	12.71	11.72	11.46	0.46
50	4.56	2.72	12.71	11.87	11.40	0.41
100	6.49	3.24	12.71	11.85	11.38	0.36
150	6.76	3.34	12.71	11.84	11.37	0.35
200	7.03	3.43	12.71	11.83	11.36	0.34
250	7.30	3.51	12.71	11.82	11.35	0.34
300	7.56	3.59	12.71	11.82	11.34	0.33
350	7.78	3.66	12.71	11.81	11.33	0.33
400	7.99	3.73	12.71	11.80	11.32	0.32
450	8.21	3.79	12.71	11.59	11.31	0.32
500	8.42	3.85	12.71	11.58	11.30	0.31
600	8.76	3.96	12.71	11.57	11.28	0.31
700	9.09	4.06	12.71	11.55	11.26	0.30
800	9.40	4.15	12.71	11.54	11.24	0.30
900	9.71	4.24	12.71	11.52	11.22	0.29
1000	10.01	4.31	12.71	11.51	11.20	0.29

Vùng 3 - mặt cắt 21 - chu kỳ lặp 20 năm;X=582248 Y=2142096						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.08	2.32	12.71	12.06	11.77	0.47
50	5.05	2.95	12.71	12.03	11.75	0.42
100	6.96	3.48	12.71	12.02	11.74	0.37
150	7.25	3.58	12.71	12.01	11.73	0.36
200	7.52	3.65	12.71	12.00	11.72	0.36
250	7.79	3.73	12.71	11.99	11.70	0.35
300	8.05	3.80	12.71	11.98	11.69	0.35
350	8.27	3.87	12.71	11.97	11.68	0.34
400	8.48	3.94	12.71	11.96	11.67	0.34
450	8.70	4.00	12.71	11.95	11.66	0.33
500	8.91	4.06	12.71	11.94	11.65	0.33
600	9.25	4.17	12.71	11.93	11.63	0.32
700	9.58	4.28	12.71	11.91	11.60	0.32
800	9.89	4.35	12.71	11.89	11.58	0.31
900	10.20	4.43	12.71	11.88	11.56	0.31
1000	10.50	4.51	12.71	11.86	11.55	0.31

Vùng 3 - mặt cắt 21 - chu kỳ lặp 50 năm;X=582248 Y=2142096						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.82	2.67	13.72	12.41	12.10	0.48
50	5.79	3.29	13.72	12.39	12.09	0.44
100	7.73	3.80	13.72	12.37	12.08	0.39
150	8.00	3.89	13.72	12.36	12.07	0.38
200	8.27	3.98	13.72	12.35	12.06	0.38
250	8.54	4.06	13.72	12.34	12.05	0.37
300	8.80	4.13	13.72	12.33	12.03	0.37
350	9.02	4.20	13.72	12.32	12.02	0.36
400	9.23	4.27	13.72	12.32	12.01	0.36
450	9.45	4.32	13.72	12.31	12.00	0.35
500	9.66	4.38	13.72	12.30	11.99	0.35
600	10.00	4.49	13.72	12.28	11.97	0.34
700	10.33	4.58	13.72	12.27	11.95	0.34
800	10.64	4.67	13.72	12.25	11.93	0.33
900	10.95	4.75	13.72	12.23	11.91	0.33
1000	11.25	4.82	13.72	12.22	11.89	0.33

Vùng 3 - mặt cắt 21 - chu kỳ lặp 100 năm;X=582248 Y=2142096						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.44	3.37	13.72	12.73	12.47	0.46
50	6.43	3.75	13.72	12.67	12.39	0.43
100	8.38	4.10	13.72	12.63	12.34	0.40
150	8.65	4.18	13.72	12.62	12.32	0.39
200	8.92	4.27	13.72	12.61	12.31	0.39
250	9.19	4.34	13.72	12.60	12.30	0.38
300	9.45	4.42	13.72	12.59	12.28	0.38
350	9.67	4.49	13.72	12.58	12.27	0.37
400	9.89	4.55	13.72	12.58	12.26	0.37
450	10.10	4.60	13.72	12.57	12.25	0.37
500	10.32	4.66	13.72	12.56	12.24	0.36
600	10.65	4.76	13.72	12.54	12.22	0.36
700	10.99	4.85	13.72	12.53	12.20	0.35
800	11.30	4.94	13.72	12.51	12.18	0.35
900	11.61	5.02	13.72	12.49	12.16	0.34
1000	11.91	5.09	13.72	12.48	12.14	0.34

Table C-2.21 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 21 - chu kỳ lặp 125 năm;X=582248 Y=2142098

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.67	3.48	13.72	12.82	12.55	0.46
50	6.66	3.86	13.72	12.76	12.47	0.43
100	8.62	4.20	13.72	12.72	12.42	0.40
150	8.89	4.29	13.72	12.71	12.40	0.40
200	9.16	4.37	13.72	12.70	12.39	0.39
250	9.43	4.45	13.72	12.69	12.38	0.39
300	9.69	4.52	13.72	12.68	12.36	0.38
350	9.91	4.58	13.72	12.67	12.35	0.38
400	10.12	4.65	13.72	12.66	12.34	0.37
450	10.34	4.70	13.72	12.65	12.33	0.37
500	10.55	4.76	13.72	12.64	12.32	0.37
600	10.89	4.86	13.72	12.62	12.30	0.36
700	11.22	4.95	13.72	12.61	12.28	0.36
800	11.53	5.04	13.72	12.59	12.26	0.35
900	11.85	5.11	13.72	12.58	12.24	0.35
1000	12.15	5.19	13.72	12.56	12.22	0.34

Vùng 3 - mặt cắt 21 - chu kỳ lặp 150 năm;X=582248 Y=2142098

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.83	3.56	13.72	12.90	12.63	0.46
50	6.82	3.94	13.72	12.84	12.55	0.43
100	8.78	4.27	13.72	12.80	12.50	0.40
150	9.05	4.36	13.72	12.79	12.48	0.40
200	9.32	4.45	13.72	12.78	12.47	0.38
250	9.58	4.52	13.72	12.77	12.46	0.39
300	9.85	4.59	13.72	12.76	12.44	0.38
350	10.07	4.65	13.72	12.75	12.43	0.38
400	10.29	4.72	13.72	12.74	12.42	0.38
450	10.50	4.77	13.72	12.73	12.41	0.37
500	10.72	4.83	13.72	12.72	12.40	0.37
600	11.05	4.93	13.72	12.71	12.38	0.36
700	11.39	5.02	13.72	12.69	12.36	0.36
800	11.70	5.11	13.72	12.68	12.34	0.35
900	12.01	5.18	13.72	12.66	12.32	0.35
1000	12.31	5.26	13.72	12.65	12.30	0.35

Vùng 3 - mặt cắt 21 - chu kỳ lặp 100 năm;X=582248 Y=2142098

Vùng 3 - mặt cắt 21 - chu kỳ lặp 200 năm;X=582248 Y=2142098

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.21	3.75	13.72	12.99	12.71	0.46
50	7.20	4.11	13.72	12.93	12.63	0.43
100	9.16	4.44	13.72	12.89	12.57	0.40
150	9.43	4.53	13.72	12.87	12.56	0.40
200	9.70	4.61	13.72	12.86	12.55	0.39
250	9.97	4.68	13.72	12.85	12.53	0.39
300	10.23	4.75	13.72	12.84	12.52	0.39
350	10.45	4.81	13.72	12.83	12.51	0.38
400	10.67	4.88	13.72	12.82	12.50	0.38
450	10.88	4.93	13.72	12.82	12.49	0.37
500	11.10	4.99	13.72	12.81	12.47	0.37
600	11.44	5.09	13.72	12.79	12.45	0.37
700	11.77	5.18	13.72	12.77	12.43	0.36
800	12.08	5.26	13.72	12.76	12.41	0.36
900	12.39	5.34	13.72	12.74	12.39	0.35
1000	12.69	5.40	13.72	12.73	12.37	0.35

Table C-2.22 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 22 - chu kỳ lặp 10 năm: X=576874 Y=2122050

K.hoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	2.64	1.90	12.71	11.64	11.35	0.31
50	4.97	2.39	12.71	11.63	11.36	0.47
100	6.26	2.59	12.71	11.63	11.36	0.48
150	6.36	2.63	12.71	11.63	11.36	0.48
200	6.31	2.67	12.71	11.62	11.35	0.48
250	6.42	2.82	12.71	11.62	11.35	0.49
300	6.54	2.96	12.71	11.61	11.34	0.49
350	6.60	3.01	12.71	11.61	11.34	0.49
400	6.67	3.06	12.71	11.61	11.33	0.49
450	6.79	3.11	12.71	11.60	11.33	0.47
500	6.91	3.16	12.71	11.60	11.32	0.47
600	7.17	3.26	12.71	11.59	11.31	0.48
700	7.46	3.38	12.71	11.57	11.29	0.48
800	7.74	3.45	12.71	11.56	11.28	0.39
900	7.91	3.53	12.71	11.55	11.26	0.39
1000	8.06	3.63	12.71	11.54	11.25	0.39

Vùng 3 - mặt cắt 22 - chu kỳ lặp 20 năm: X=576874 Y=2122050

K.hoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	3.15	2.14	12.71	11.98	11.66	0.52
50	4.97	2.62	12.71	11.97	11.68	0.49
100	6.76	2.81	12.71	11.97	11.69	0.49
150	6.79	3.06	12.71	11.97	11.69	0.45
200	6.82	3.10	12.71	11.97	11.68	0.45
250	6.93	3.15	12.71	11.96	11.68	0.44
300	7.05	3.19	12.71	11.96	11.67	0.44
350	7.11	3.24	12.71	11.95	11.67	0.44
400	7.18	3.29	12.71	11.95	11.66	0.43
450	7.30	3.34	12.71	11.94	11.66	0.43
500	7.42	3.39	12.71	11.94	11.65	0.43
600	7.68	3.49	12.71	11.93	11.63	0.42
700	7.97	3.58	12.71	11.91	11.62	0.42
800	8.25	3.67	12.71	11.90	11.60	0.41
900	8.42	3.76	12.71	11.89	11.59	0.40
1000	8.57	3.85	12.71	11.88	11.58	0.40

Vùng 3 - mặt cắt 22 - chu kỳ lặp 50 năm: X=576874 Y=2122050

K.hoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	3.90	2.75	13.72	12.42	12.15	0.52
50	5.74	3.07	13.72	12.36	12.08	0.50
100	7.54	3.35	13.72	12.32	12.03	0.48
150	7.56	3.40	13.72	12.32	12.03	0.47
200	7.59	3.44	13.72	12.32	12.02	0.47
250	7.71	3.48	13.72	12.32	12.02	0.47
300	7.82	3.53	13.72	12.31	12.01	0.46
350	7.88	3.58	13.72	12.31	12.01	0.46
400	7.96	3.63	13.72	12.30	12.00	0.46
450	8.07	3.68	13.72	12.30	12.00	0.45
500	8.19	3.73	13.72	12.29	11.99	0.45
600	8.46	3.83	13.72	12.28	11.97	0.44
700	8.75	3.92	13.72	12.27	11.96	0.44
800	9.02	4.01	13.72	12.25	11.94	0.43
900	9.20	4.10	13.72	12.24	11.93	0.43
1000	9.35	4.19	13.72	12.23	11.91	0.42

Vùng 3 - mặt cắt 22 - chu kỳ lặp 100 năm: X=576874 Y=2122050

K.hoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	4.87	3.09	13.72	12.88	12.40	0.53
50	6.41	3.38	13.72	12.63	12.33	0.51
100	8.21	3.64	13.72	12.59	12.28	0.49
150	8.24	3.69	13.72	12.58	12.28	0.48
200	8.27	3.73	13.72	12.58	12.27	0.48
250	8.38	3.78	13.72	12.58	12.27	0.48
300	8.49	3.82	13.72	12.57	12.26	0.48
350	8.56	3.87	13.72	12.57	12.26	0.47
400	8.63	3.92	13.72	12.56	12.25	0.47
450	8.75	3.97	13.72	12.56	12.24	0.47
500	8.87	4.02	13.72	12.55	12.24	0.46
600	9.13	4.12	13.72	12.54	12.22	0.46
700	9.42	4.21	13.72	12.53	12.20	0.45
800	9.70	4.30	13.72	12.51	12.19	0.45
900	9.87	4.38	13.72	12.50	12.17	0.44
1000	10.02	4.46	13.72	12.49	12.16	0.43

Table C-2.22 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 22 - chu kỳ lặp 125 năm;X=576874 Y=2122050						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.78	3.19	13.72	12.77	12.48	0.53
50	6.62	3.48	13.72	12.71	12.41	0.51
100	8.43	3.74	13.72	12.67	12.36	0.49
150	8.45	3.78	13.72	12.67	12.36	0.49
200	8.48	3.82	13.72	12.67	12.36	0.49
250	8.59	3.87	13.72	12.66	12.35	0.48
300	8.71	3.91	13.72	12.66	12.34	0.48
350	8.77	3.96	13.72	12.65	12.34	0.48
400	8.84	4.01	13.72	12.65	12.33	0.47
450	8.96	4.06	13.72	12.64	12.33	0.47
500	9.08	4.11	13.72	12.64	12.32	0.47
600	9.34	4.21	13.72	12.62	12.30	0.46
700	9.63	4.30	13.72	12.61	12.28	0.46
800	9.91	4.39	13.72	12.60	12.27	0.45
900	10.08	4.47	13.72	12.59	12.25	0.44
1000	10.23	4.57	13.72	12.57	12.24	0.44

Vùng 3 - mặt cắt 22 - chu kỳ lặp 150 năm;X=576874 Y=2122050						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.93	3.27	13.72	12.85	12.56	0.53
50	6.77	3.55	13.72	12.80	12.49	0.51
100	8.59	3.80	13.72	12.76	12.44	0.50
150	8.60	3.85	13.72	12.75	12.44	0.49
200	8.63	3.89	13.72	12.75	12.44	0.49
250	8.75	3.94	13.72	12.74	12.43	0.49
300	8.86	3.98	13.72	12.74	12.42	0.49
350	8.92	4.03	13.72	12.74	12.42	0.49
400	8.99	4.08	13.72	12.73	12.41	0.48
450	9.11	4.13	13.72	12.73	12.41	0.47
500	9.23	4.18	13.72	12.72	12.40	0.47
600	9.50	4.27	13.72	12.71	12.39	0.46
700	9.79	4.37	13.72	12.68	12.35	0.46
800	10.06	4.45	13.72	12.68	12.35	0.45
900	10.24	4.54	13.72	12.67	12.33	0.45
1000	10.39	4.63	13.72	12.66	12.32	0.44

Vùng 3 - mặt cắt 22 - chu kỳ lặp 200 năm;X=576874 Y=2122050						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.20	3.44	13.72	12.94	12.64	0.53
50	7.12	3.71	13.72	12.88	12.58	0.51
100	8.93	3.95	13.72	12.84	12.53	0.50
150	8.98	4.00	13.72	12.84	12.52	0.49
200	8.98	4.04	13.72	12.84	12.52	0.49
250	9.10	4.09	13.72	12.83	12.51	0.49
300	9.21	4.13	13.72	12.82	12.50	0.48
350	9.27	4.18	13.72	12.82	12.50	0.48
400	9.34	4.23	13.72	12.82	12.49	0.48
450	9.46	4.28	13.72	12.81	12.49	0.47
500	9.58	4.33	13.72	12.80	12.48	0.47
600	9.85	4.42	13.72	12.79	12.46	0.47
700	10.14	4.51	13.72	12.78	12.44	0.46
800	10.42	4.60	13.72	12.76	12.43	0.46
900	10.59	4.69	13.72	12.75	12.41	0.45
1000	10.74	4.78	13.72	12.74	12.40	0.44

Table C-2.23 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 23 - chu kỳ lặp 10 năm;X=565490 Y=2102095						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.59	2.34	12.71	11.66	11.39	0.48
50	4.66	3.13	12.71	11.59	11.31	0.41
100	7.13	3.75	12.71	11.57	11.28	0.34
150	7.47	3.90	12.71	11.55	11.26	0.33
200	7.80	4.05	12.71	11.54	11.24	0.32
250	8.15	4.21	12.71	11.52	11.22	0.31
300	8.51	4.35	12.71	11.51	11.20	0.30
350	8.87	4.49	12.71	11.48	11.17	0.29
400	9.83	4.61	12.71	11.46	11.13	0.28
450	10.20	4.69	12.71	11.43	11.10	0.28
500	10.74	4.77	12.71	11.41	11.07	0.28
600	11.29	4.86	12.71	11.37	11.03	0.27
700	11.75	4.93	12.71	11.35	10.99	0.27
800	12.10	4.99	12.71	11.32	10.96	0.27
900	12.43	5.03	12.71	11.30	10.93	0.27
1000	12.66	5.08	12.71	11.29	10.91	0.27

Vùng 3 - mặt cắt 23 - chu kỳ lặp 20 năm;X=565490 Y=2102095						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.05	2.59	12.71	11.98	11.69	0.49
50	5.34	3.36	12.71	11.93	11.64	0.42
100	7.59	3.97	12.71	11.91	11.61	0.36
150	7.93	4.13	12.71	11.90	11.59	0.35
200	8.27	4.28	12.71	11.89	11.58	0.34
250	8.62	4.43	12.71	11.87	11.55	0.33
300	8.96	4.57	12.71	11.85	11.53	0.32
350	9.54	4.70	12.71	11.83	11.50	0.31
400	10.09	4.82	12.71	11.80	11.46	0.30
450	10.67	4.89	12.71	11.77	11.43	0.30
500	11.21	4.96	12.71	11.75	11.40	0.30
600	11.76	5.05	12.71	11.72	11.36	0.29
700	12.22	5.12	12.71	11.69	11.32	0.29
800	12.57	5.18	12.71	11.67	11.30	0.29
900	12.90	5.22	12.71	11.65	11.27	0.29
1000	13.13	5.26	12.71	11.64	11.25	0.29

Vùng 3 - mặt cắt 23 - chu kỳ lặp 50 năm;X=565490 Y=2102095						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.71	2.94	13.72	12.34	12.04	0.50
50	6.01	3.69	13.72	12.29	11.98	0.44
100	8.26	4.29	13.72	12.27	11.96	0.38
150	8.50	4.45	13.72	12.26	11.94	0.37
200	8.94	4.59	13.72	12.24	11.92	0.36
250	9.29	4.73	13.72	12.23	11.90	0.35
300	9.65	4.87	13.72	12.21	11.87	0.34
350	10.21	4.99	13.72	12.18	11.84	0.34
400	10.77	5.10	13.72	12.16	11.81	0.33
450	11.34	5.17	13.72	12.13	11.77	0.33
500	11.89	5.24	13.72	12.11	11.74	0.32
600	12.44	5.33	13.72	12.08	11.71	0.32
700	12.99	5.39	13.72	12.05	11.67	0.32
800	13.25	5.45	13.72	12.03	11.65	0.32
900	13.58	5.49	13.72	12.02	11.62	0.32
1000	13.80	5.53	13.72	12.00	11.60	0.31

Vùng 3 - mặt cắt 23 - chu kỳ lặp 100 năm;X=565490 Y=2102095						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.27	3.21	13.72	12.60	12.27	0.52
50	6.56	3.95	13.72	12.56	12.23	0.46
100	8.82	4.56	13.72	12.54	12.21	0.40
150	9.16	4.70	13.72	12.52	12.19	0.39
200	9.50	4.84	13.72	12.51	12.17	0.38
250	9.85	4.98	13.72	12.49	12.15	0.37
300	10.21	5.12	13.72	12.47	12.13	0.36
350	10.77	5.23	13.72	12.44	12.09	0.35
400	11.33	5.34	13.72	12.42	12.06	0.35
450	11.90	5.41	13.72	12.39	12.03	0.35
500	12.45	5.47	13.72	12.37	12.00	0.34
600	13.00	5.55	13.72	12.34	11.96	0.34
700	13.45	5.62	13.72	12.32	11.93	0.34
800	13.81	5.67	13.72	12.30	11.90	0.34
900	14.14	5.71	13.72	12.28	11.88	0.33
1000	14.37	5.75	13.72	12.27	11.86	0.33

Table C-2.23 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 23 - chu kỳ lặp 125 năm;X=565473 Y=2103045						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.38	3.27	13.72	12.68	12.36	0.52
50	6.88	4.00	13.72	12.64	12.32	0.46
100	8.94	4.61	13.72	12.62	12.30	0.41
150	9.28	4.76	13.72	12.61	12.28	0.40
200	9.62	4.90	13.72	12.59	12.26	0.39
250	9.97	5.04	13.72	12.57	12.23	0.38
300	10.33	5.17	13.72	12.56	12.21	0.37
350	10.69	5.28	13.72	12.53	12.18	0.36
400	11.45	5.39	13.72	12.51	12.14	0.36
450	12.02	5.46	13.72	12.48	12.11	0.35
500	12.56	5.52	13.72	12.46	12.08	0.35
600	13.11	5.60	13.72	12.43	12.05	0.35
700	13.57	5.66	13.72	12.41	12.01	0.35
800	13.92	5.71	13.72	12.39	11.99	0.34
900	14.25	5.75	13.72	12.37	11.96	0.34
1000	14.48	5.79	13.72	12.36	11.94	0.34

Vùng 3 - mặt cắt 23 - chu kỳ lặp 150 năm;X=565473 Y=2103045						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.64	3.39	13.72	12.76	12.43	0.52
50	6.94	4.12	13.72	12.72	12.39	0.46
100	9.19	4.73	13.72	12.70	12.37	0.40
150	9.53	4.88	13.72	12.69	12.35	0.39
200	9.88	5.01	13.72	12.67	12.33	0.38
250	10.23	5.15	13.72	12.65	12.31	0.38
300	10.59	5.28	13.72	12.64	12.28	0.37
350	11.15	5.39	13.72	12.61	12.25	0.36
400	11.71	5.50	13.72	12.59	12.22	0.36
450	12.28	5.56	13.72	12.56	12.19	0.35
500	12.82	5.62	13.72	12.54	12.16	0.35
600	13.37	5.70	13.72	12.51	12.12	0.35
700	13.83	5.76	13.72	12.49	12.09	0.35
800	14.18	5.81	13.72	12.47	12.06	0.34
900	14.51	5.85	13.72	12.45	12.04	0.34
1000	14.74	5.89	13.72	12.44	12.02	0.34

Vùng 3 - mặt cắt 23 - chu kỳ lặp 200 năm;X=565473 Y=2103045						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.92	3.52	13.72	12.65	12.51	0.52
50	7.22	4.25	13.72	12.81	12.47	0.46
100	9.48	4.86	13.72	12.79	12.45	0.41
150	9.82	5.00	13.72	12.77	12.43	0.40
200	10.16	5.14	13.72	12.76	12.41	0.39
250	10.51	5.27	13.72	12.74	12.39	0.38
300	10.87	5.40	13.72	12.72	12.37	0.37
350	11.43	5.51	13.72	12.70	12.33	0.37
400	11.98	5.61	13.72	12.67	12.30	0.36
450	12.56	5.67	13.72	12.65	12.27	0.36
500	13.11	5.74	13.72	12.62	12.24	0.36
600	13.68	5.81	13.72	12.60	12.20	0.35
700	14.11	5.87	13.72	12.57	12.17	0.35
800	14.47	5.92	13.72	12.55	12.14	0.35
900	14.80	5.96	13.72	12.54	12.12	0.35
1000	15.03	6.00	13.72	12.52	12.10	0.35

Table C-2.24 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 24 - chu kỳ lặp 10 năm;X=575250 Y=2082111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.72	1.97	12.71	11.59	11.29	0.54
50	4.72	2.46	12.71	11.57	11.29	0.50
100	6.88	2.90	12.71	11.56	11.28	0.47
150	6.70	2.93	12.71	11.56	11.28	0.47
200	6.72	2.97	12.71	11.56	11.28	0.46
250	6.72	3.01	12.71	11.55	11.27	0.46
300	6.72	3.05	12.71	11.55	11.27	0.46
350	6.87	3.10	12.71	11.54	11.26	0.45
400	7.02	3.14	12.71	11.54	11.25	0.45
450	7.17	3.18	12.71	11.53	11.24	0.45
500	7.32	3.22	12.71	11.52	11.23	0.45
600	7.62	3.28	12.71	11.51	11.21	0.44
700	7.91	3.33	12.71	11.49	11.19	0.44
800	8.17	3.37	12.71	11.48	11.18	0.44
900	8.40	3.40	12.71	11.47	11.16	0.44
1000	8.51	3.44	12.71	11.46	11.16	0.44

Vùng 3 - mặt cắt 24 - chu kỳ lặp 20 năm;X=575250 Y=2082111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.22	2.22	12.71	11.92	11.60	0.56
50	5.23	2.71	12.71	11.91	11.60	0.52
100	7.20	3.12	12.71	11.90	11.61	0.49
150	7.21	3.15	12.71	11.90	11.60	0.49
200	7.23	3.19	12.71	11.89	11.60	0.48
250	7.23	3.23	12.71	11.89	11.60	0.48
300	7.23	3.27	12.71	11.89	11.59	0.48
350	7.38	3.31	12.71	11.88	11.58	0.48
400	7.53	3.35	12.71	11.87	11.57	0.47
450	7.68	3.39	12.71	11.87	11.56	0.47
500	7.84	3.43	12.71	11.86	11.55	0.47
600	8.13	3.49	12.71	11.84	11.53	0.47
700	8.43	3.54	12.71	11.83	11.52	0.46
800	8.66	3.58	12.71	11.82	11.50	0.46
900	8.91	3.61	12.71	11.81	11.49	0.46
1000	9.03	3.64	12.71	11.80	11.48	0.46

Vùng 3 - mặt cắt 24 - chu kỳ lặp 50 năm;X=575250 Y=2082111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.96	2.81	13.72	12.37	12.09	0.55
50	5.98	3.14	13.72	12.30	12.00	0.54
100	7.96	3.44	13.72	12.25	11.94	0.51
150	7.98	3.47	13.72	12.25	11.94	0.51
200	7.99	3.50	13.72	12.24	11.93	0.51
250	7.99	3.55	13.72	12.24	11.93	0.51
300	8.00	3.59	13.72	12.24	11.93	0.50
350	8.14	3.63	13.72	12.23	11.92	0.50
400	8.29	3.67	13.72	12.22	11.91	0.50
450	8.45	3.70	13.72	12.22	11.90	0.50
500	8.60	3.74	13.72	12.21	11.89	0.50
600	8.90	3.80	13.72	12.19	11.87	0.49
700	9.19	3.84	13.72	12.18	11.85	0.49
800	9.44	3.88	13.72	12.17	11.84	0.49
900	9.68	3.91	13.72	12.16	11.82	0.49
1000	9.79	3.94	13.72	12.15	11.82	0.49

Vùng 3 - mặt cắt 24 - chu kỳ lặp 100 năm;X=575250 Y=2082111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.60	3.13	13.72	12.62	12.33	0.57
50	6.62	3.43	13.72	12.56	12.25	0.55
100	8.61	3.70	13.72	12.51	12.19	0.53
150	8.62	3.74	13.72	12.51	12.19	0.53
200	8.64	3.77	13.72	12.50	12.19	0.53
250	8.64	3.81	13.72	12.50	12.18	0.52
300	8.64	3.85	13.72	12.50	12.17	0.52
350	8.79	3.89	13.72	12.49	12.16	0.52
400	8.94	3.93	13.72	12.48	12.15	0.52
450	9.09	3.96	13.72	12.47	12.14	0.51
500	9.25	4.00	13.72	12.47	12.13	0.51
600	9.54	4.05	13.72	12.45	12.12	0.51
700	9.84	4.10	13.72	12.44	12.10	0.51
800	10.09	4.14	13.72	12.43	12.09	0.51
900	10.33	4.17	13.72	12.42	12.07	0.50
1000	10.44	4.20	13.72	12.41	12.06	0.50

Table C-2.24 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 24 - chu kỳ lặp 125 năm;X=575250 Y=2082111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.79	3.23	13.72	12.71	12.41	0.57
50	6.81	3.52	13.72	12.84	12.53	0.55
100	6.80	3.76	13.72	12.59	12.27	0.54
150	6.81	3.82	13.72	12.59	12.27	0.53
200	6.83	3.85	13.72	12.59	12.26	0.53
250	6.83	3.89	13.72	12.58	12.26	0.53
300	6.83	3.93	13.72	12.58	12.25	0.53
350	6.98	3.97	13.72	12.57	12.24	0.52
400	9.13	4.01	13.72	12.57	12.23	0.52
450	9.28	4.04	13.72	12.56	12.22	0.52
500	9.44	4.07	13.72	12.55	12.21	0.52
600	9.73	4.13	13.72	12.54	12.20	0.51
700	10.03	4.17	13.72	12.52	12.18	0.51
800	10.28	4.21	13.72	12.51	12.17	0.51
900	10.52	4.24	13.72	12.50	12.15	0.51
1000	10.83	4.27	13.72	12.50	12.14	0.51

Vùng 3 - mặt cắt 24 - chu kỳ lặp 150 năm;X=575250 Y=2082111						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.95	3.31	13.72	12.79	12.49	0.57
50	6.98	3.59	13.72	12.72	12.41	0.56
100	8.98	3.85	13.72	12.66	12.35	0.54
150	8.98	3.89	13.72	12.67	12.35	0.54
200	8.99	3.92	13.72	12.67	12.34	0.53
250	8.99	3.96	13.72	12.67	12.34	0.53
300	9.00	4.00	13.72	12.66	12.33	0.53
350	9.15	4.04	13.72	12.66	12.32	0.53
400	9.29	4.07	13.72	12.65	12.31	0.52
450	9.45	4.11	13.72	12.64	12.30	0.52
500	9.60	4.14	13.72	12.63	12.29	0.52
600	9.90	4.19	13.72	12.62	12.28	0.52
700	10.19	4.24	13.72	12.61	12.26	0.52
800	10.44	4.29	13.72	12.60	12.24	0.51
900	10.68	4.31	13.72	12.59	12.23	0.51
1000	10.79	4.34	13.72	12.58	12.22	0.51

Vùng 3 - mặt cắt 24 - chu kỳ lặp 200 năm;X=575250 Y=2082111						
Khoảng cách từ bờ [m]	Độ sâu [m]	He [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	5.32	3.49	13.72	12.89	12.57	0.57
50	7.34	3.75	13.72	12.81	12.49	0.55
100	9.33	4.00	13.72	12.76	12.43	0.54
150	9.35	4.03	13.72	12.76	12.43	0.54
200	9.36	4.07	13.72	12.76	12.42	0.53
250	9.36	4.11	13.72	12.75	12.42	0.53
300	9.37	4.15	13.72	12.75	12.41	0.53
350	9.52	4.18	13.72	12.74	12.40	0.53
400	9.67	4.22	13.72	12.73	12.39	0.53
450	9.82	4.25	13.72	12.73	12.38	0.52
500	9.97	4.28	13.72	12.72	12.37	0.52
600	10.27	4.34	13.72	12.71	12.36	0.52
700	10.56	4.38	13.72	12.69	12.34	0.52
800	10.82	4.42	13.72	12.68	12.32	0.52
900	11.05	4.45	13.72	12.67	12.31	0.51
1000	11.16	4.48	13.72	12.66	12.30	0.51

Table C-2.25 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 25 - chu kỳ lặp 10 năm;X=584398 Y=2062129						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.45	2.14	12.71	11.68	11.41	0.49
50	4.30	2.86	12.71	11.65	11.38	0.42
100	6.11	3.42	12.71	11.63	11.36	0.36
150	6.57	3.62	12.71	11.62	11.34	0.34
200	7.02	3.81	12.71	11.61	11.33	0.33
250	7.48	3.98	12.71	11.59	11.30	0.31
300	7.94	4.15	12.71	11.57	11.28	0.30
350	8.48	4.30	12.71	11.55	11.25	0.29
400	9.02	4.44	12.71	11.53	11.22	0.28
450	9.57	4.54	12.71	11.50	11.19	0.28
500	10.09	4.63	12.71	11.48	11.17	0.27
600	10.73	4.75	12.71	11.45	11.13	0.27
700	11.31	4.84	12.71	11.42	11.09	0.26
800	11.61	4.91	12.71	11.41	11.07	0.26
900	11.89	4.97	12.71	11.39	11.04	0.26
1000	12.12	5.03	12.71	11.37	11.02	0.25

Vùng 3 - mặt cắt 25 - chu kỳ lặp 20 năm;X=584398 Y=2062129						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.88	2.38	12.71	12.03	11.75	0.50
50	4.73	3.08	12.71	11.99	11.71	0.44
100	6.55	3.64	12.71	11.98	11.70	0.37
150	7.01	3.84	12.71	11.97	11.68	0.36
200	7.46	4.02	12.71	11.95	11.66	0.34
250	7.92	4.20	12.71	11.93	11.64	0.33
300	8.38	4.36	12.71	11.92	11.62	0.32
350	8.92	4.51	12.71	11.89	11.59	0.31
400	9.46	4.64	12.71	11.87	11.56	0.30
450	10.01	4.74	12.71	11.85	11.53	0.30
500	10.53	4.82	12.71	11.83	11.50	0.29
600	11.17	4.94	12.71	11.80	11.46	0.29
700	11.75	5.03	12.71	11.77	11.43	0.28
800	12.05	5.10	12.71	11.75	11.40	0.28
900	12.33	5.16	12.71	11.74	11.38	0.28
1000	12.56	5.22	12.71	11.72	11.36	0.27

Vùng 3 - mặt cắt 25 - chu kỳ lặp 50 năm;X=584398 Y=2062129						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.52	2.70	13.72	12.37	12.07	0.51
50	5.37	3.39	13.72	12.35	12.05	0.45
100	7.20	3.96	13.72	12.34	12.05	0.39
150	7.65	4.15	13.72	12.33	12.02	0.38
200	8.11	4.33	13.72	12.31	12.01	0.37
250	8.56	4.50	13.72	12.29	11.98	0.35
300	9.03	4.66	13.72	12.28	11.96	0.34
350	9.56	4.80	13.72	12.25	11.93	0.33
400	10.10	4.93	13.72	12.23	11.90	0.32
450	10.65	5.02	13.72	12.21	11.87	0.32
500	11.18	5.10	13.72	12.19	11.85	0.32
600	11.82	5.21	13.72	12.16	11.81	0.31
700	12.40	5.29	13.72	12.13	11.78	0.31
800	12.70	5.36	13.72	12.11	11.75	0.30
900	12.98	5.42	13.72	12.10	11.73	0.30
1000	13.21	5.48	13.72	12.08	11.71	0.30

Vùng 3 - mặt cắt 25 - chu kỳ lặp 100 năm;X=584398 Y=2062129						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.06	2.96	13.72	12.63	12.31	0.53
50	5.92	3.65	13.72	12.61	12.30	0.47
100	7.74	4.22	13.72	12.61	12.30	0.41
150	8.19	4.41	13.72	12.59	12.28	0.39
200	8.65	4.59	13.72	12.57	12.26	0.38
250	9.11	4.75	13.72	12.56	12.24	0.37
300	9.57	4.91	13.72	12.54	12.21	0.36
350	10.11	5.04	13.72	12.51	12.18	0.35
400	10.65	5.16	13.72	12.49	12.16	0.34
450	11.20	5.25	13.72	12.47	12.13	0.34
500	11.73	5.33	13.72	12.45	12.10	0.33
600	12.37	5.44	13.72	12.42	12.06	0.33
700	12.94	5.52	13.72	12.40	12.03	0.33
800	13.25	5.58	13.72	12.38	12.01	0.32
900	13.52	5.64	13.72	12.36	11.99	0.32
1000	13.76	5.70	13.72	12.35	11.97	0.32

Table C-2.25 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 25 - chu kỳ lặp 125 năm;X=584398 Y=2062129						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.28	3.06	13.72	12.72	12.39	0.53
50	8.13	3.75	13.72	12.70	12.38	0.47
100	7.95	4.33	13.72	12.69	12.38	0.41
150	8.41	4.51	13.72	12.67	12.36	0.40
200	8.86	4.69	13.72	12.66	12.34	0.38
250	9.32	4.85	13.72	12.64	12.32	0.37
300	9.79	5.00	13.72	12.62	12.29	0.36
350	10.33	5.13	13.72	12.60	12.26	0.35
400	10.87	5.26	13.72	12.58	12.24	0.35
450	11.42	5.34	13.72	12.55	12.21	0.34
500	11.95	5.42	13.72	12.53	12.18	0.34
600	12.58	5.53	13.72	12.50	12.14	0.33
700	13.18	5.61	13.72	12.48	12.11	0.33
800	13.47	5.67	13.72	12.46	12.09	0.33
900	13.74	5.73	13.72	12.45	12.07	0.33
1000	13.97	5.79	13.72	12.43	12.05	0.32

Vùng 3 - mặt cắt 25 - chu kỳ lặp 150 năm;X=584398 Y=2062129						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.42	3.13	13.72	12.80	12.47	0.53
50	8.27	3.82	13.72	12.78	12.46	0.47
100	8.10	4.40	13.72	12.77	12.46	0.41
150	8.55	4.58	13.72	12.76	12.44	0.40
200	9.01	4.76	13.72	12.74	12.42	0.39
250	9.47	4.92	13.72	12.72	12.40	0.38
300	9.93	5.07	13.72	12.71	12.37	0.36
350	10.47	5.20	13.72	12.68	12.34	0.36
400	11.01	5.32	13.72	12.66	12.32	0.35
450	11.56	5.40	13.72	12.64	12.29	0.35
500	12.09	5.48	13.72	12.62	12.26	0.34
600	12.73	5.59	13.72	12.59	12.22	0.34
700	13.30	5.67	13.72	12.56	12.19	0.33
800	13.61	5.73	13.72	12.55	12.17	0.33
900	13.89	5.79	13.72	12.53	12.15	0.33
1000	14.12	5.85	13.72	12.52	12.13	0.33

Vùng 3 - mặt cắt 25 - chu kỳ lặp 200 năm;X=584398 Y=2062129						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.73	3.28	13.72	12.88	12.54	0.53
50	8.58	3.97	13.72	12.87	12.54	0.47
100	8.41	4.54	13.72	12.86	12.54	0.42
150	8.86	4.73	13.72	12.84	12.52	0.40
200	9.32	4.90	13.72	12.83	12.50	0.39
250	9.78	5.06	13.72	12.81	12.48	0.38
300	10.24	5.21	13.72	12.79	12.45	0.37
350	10.78	5.33	13.72	12.77	12.42	0.36
400	11.32	5.45	13.72	12.74	12.39	0.35
450	11.88	5.53	13.72	12.72	12.37	0.35
500	12.40	5.61	13.72	12.70	12.34	0.35
600	13.04	5.71	13.72	12.67	12.30	0.34
700	13.62	5.79	13.72	12.65	12.27	0.34
800	13.93	5.86	13.72	12.63	12.25	0.34
900	14.20	5.91	13.72	12.62	12.23	0.33
1000	14.43	5.97	13.72	12.60	12.21	0.33

Table C-2.26 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 26 - chu kỳ lặp 10 năm;X=595675 Y=2042162						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.22	1.81	12.71	11.70	11.43	0.40
50	4.20	2.38	12.71	11.65	11.38	0.36
100	6.14	2.82	12.71	11.64	11.37	0.32
150	6.28	2.87	12.71	11.63	11.36	0.31
200	6.42	2.91	12.71	11.63	11.35	0.31
250	6.54	2.95	12.71	11.62	11.34	0.31
300	6.66	3.00	12.71	11.61	11.34	0.30
350	6.80	3.04	12.71	11.61	11.33	0.30
400	6.93	3.07	12.71	11.60	11.32	0.30
450	7.06	3.11	12.71	11.60	11.32	0.30
500	7.19	3.14	12.71	11.59	11.31	0.30
600	7.45	3.20	12.71	11.58	11.29	0.29
700	7.70	3.25	12.71	11.57	11.28	0.29
800	7.86	3.30	12.71	11.56	11.27	0.29
900	8.01	3.34	12.71	11.56	11.26	0.28
1000	8.18	3.38	12.71	11.55	11.25	0.28

Vùng 3 - mặt cắt 26 - chu kỳ lặp 20 năm;X=595675 Y=2042162						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.63	2.01	12.71	12.04	11.75	0.41
50	4.60	2.56	12.71	12.00	11.72	0.37
100	6.55	3.00	12.71	11.99	11.71	0.33
150	6.69	3.05	12.71	11.98	11.70	0.32
200	6.83	3.09	12.71	11.98	11.69	0.32
250	6.95	3.13	12.71	11.97	11.69	0.32
300	7.07	3.17	12.71	11.96	11.68	0.32
350	7.21	3.21	12.71	11.96	11.67	0.31
400	7.34	3.25	12.71	11.95	11.66	0.31
450	7.47	3.29	12.71	11.95	11.66	0.31
500	7.60	3.32	12.71	11.94	11.65	0.31
600	7.86	3.38	12.71	11.93	11.63	0.30
700	8.11	3.43	12.71	11.92	11.62	0.30
800	8.26	3.47	12.71	11.91	11.61	0.30
900	8.41	3.52	12.71	11.91	11.60	0.30
1000	8.59	3.56	12.71	11.90	11.60	0.29

Vùng 3 - mặt cắt 26 - chu kỳ lặp 50 năm;X=595675 Y=2042162						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.21	2.28	13.72	12.39	12.08	0.42
50	5.19	2.82	13.72	12.36	12.06	0.38
100	7.14	3.26	13.72	12.35	12.06	0.34
150	7.28	3.30	13.72	12.34	12.05	0.34
200	7.42	3.35	13.72	12.34	12.04	0.33
250	7.54	3.39	13.72	12.33	12.04	0.33
300	7.67	3.43	13.72	12.33	12.03	0.33
350	7.80	3.47	13.72	12.32	12.02	0.33
400	7.93	3.50	13.72	12.32	12.02	0.32
450	8.06	3.54	13.72	12.31	12.01	0.32
500	8.20	3.57	13.72	12.31	12.00	0.32
600	8.45	3.63	13.72	12.30	11.99	0.32
700	8.70	3.68	13.72	12.29	11.98	0.31
800	8.86	3.72	13.72	12.28	11.97	0.31
900	9.01	3.77	13.72	12.27	11.96	0.31
1000	9.18	3.81	13.72	12.27	11.95	0.31

Vùng 3 - mặt cắt 26 - chu kỳ lặp 100 năm;X=595675 Y=2042162						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.68	2.81	13.72	12.75	12.46	0.40
50	5.67	3.16	13.72	12.66	12.37	0.37
100	7.63	3.47	13.72	12.62	12.32	0.35
150	7.77	3.52	13.72	12.61	12.31	0.34
200	7.91	3.56	13.72	12.61	12.30	0.34
250	8.04	3.60	13.72	12.60	12.30	0.34
300	8.16	3.64	13.72	12.60	12.29	0.34
350	8.29	3.68	13.72	12.59	12.29	0.33
400	8.42	3.71	13.72	12.59	12.29	0.33
450	8.56	3.75	13.72	12.58	12.27	0.33
500	8.69	3.78	13.72	12.57	12.28	0.33
600	8.95	3.84	13.72	12.56	12.25	0.32
700	9.20	3.89	13.72	12.56	12.24	0.32
800	9.35	3.93	13.72	12.55	12.23	0.32
900	9.50	3.98	13.72	12.54	12.22	0.32
1000	9.66	4.02	13.72	12.54	12.21	0.31

Table C-2.26 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 26 - chu kỳ lặp 125 năm;X=595675 Y=2042162						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.87	2.91	13.72	12.81	12.54	0.40
50	5.86	3.25	13.72	12.75	12.46	0.37
100	7.82	3.55	13.72	12.71	12.40	0.35
150	7.96	3.60	13.72	12.70	12.40	0.35
200	8.10	3.64	13.72	12.69	12.39	0.34
250	8.23	3.68	13.72	12.69	12.38	0.34
300	8.35	3.72	13.72	12.68	12.37	0.34
350	8.48	3.76	13.72	12.68	12.37	0.34
400	8.61	3.79	13.72	12.67	12.36	0.33
450	8.75	3.83	13.72	12.67	12.35	0.33
500	8.88	3.86	13.72	12.66	12.35	0.33
600	9.14	3.92	13.72	12.65	12.33	0.33
700	9.39	3.97	13.72	12.64	12.32	0.32
800	9.54	4.01	13.72	12.64	12.31	0.32
900	9.69	4.06	13.72	12.63	12.31	0.32
1000	9.87	4.10	13.72	12.62	12.30	0.32

Vùng 3 - mặt cắt 26 - chu kỳ lặp 150 năm;X=595675 Y=2042162						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.05	3.00	13.72	12.90	12.62	0.40
50	6.04	3.33	13.72	12.83	12.54	0.37
100	8.00	3.63	13.72	12.79	12.48	0.35
150	8.14	3.67	13.72	12.78	12.48	0.35
200	8.29	3.72	13.72	12.78	12.47	0.35
250	8.41	3.76	13.72	12.77	12.46	0.34
300	8.53	3.80	13.72	12.77	12.46	0.34
350	8.66	3.83	13.72	12.76	12.45	0.34
400	8.80	3.87	13.72	12.76	12.44	0.34
450	8.93	3.90	13.72	12.75	12.43	0.33
500	9.06	3.93	13.72	12.75	12.43	0.33
600	9.32	3.99	13.72	12.74	12.41	0.33
700	9.57	4.04	13.72	12.73	12.40	0.33
800	9.72	4.09	13.72	12.72	12.39	0.32
900	9.87	4.14	13.72	12.71	12.39	0.32
1000	10.05	4.18	13.72	12.71	12.38	0.32

Vùng 3 - mặt cắt 26 - chu kỳ lặp 200 năm;X=595675 Y=2042162						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.20	3.07	13.72	12.99	12.71	0.40
50	6.20	3.40	13.72	12.92	12.63	0.38
100	8.16	3.70	13.72	12.88	12.57	0.35
150	8.30	3.74	13.72	12.87	12.56	0.35
200	8.44	3.78	13.72	12.87	12.56	0.35
250	8.56	3.82	13.72	12.86	12.55	0.35
300	8.68	3.86	13.72	12.86	12.54	0.34
350	8.82	3.90	13.72	12.85	12.54	0.34
400	8.95	3.94	13.72	12.85	12.53	0.34
450	9.08	3.97	13.72	12.84	12.52	0.34
500	9.22	4.00	13.72	12.84	12.52	0.34
600	9.47	4.06	13.72	12.83	12.50	0.33
700	9.72	4.11	13.72	12.82	12.49	0.33
800	9.88	4.16	13.72	12.81	12.48	0.33
900	10.03	4.20	13.72	12.80	12.47	0.32
1000	10.20	4.25	13.72	12.80	12.46	0.32

Table C-2.27 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 27 - chu kỳ lặp 10 năm;X=613421 Y=2022126

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.21	1.78	12.71	11.70	11.42	0.46
50	4.02	2.38	12.71	11.67	11.40	0.41
100	5.79	2.86	12.71	11.65	11.38	0.36
150	5.93	2.94	12.71	11.65	11.38	0.36
200	6.07	3.03	12.71	11.65	11.38	0.35
250	6.16	3.13	12.71	11.65	11.37	0.34
300	6.25	3.23	12.71	11.64	11.37	0.33
350	6.48	3.35	12.71	11.64	11.36	0.32
400	6.71	3.46	12.71	11.63	11.36	0.31
450	6.97	3.59	12.71	11.62	11.35	0.31
500	7.24	3.71	12.71	11.61	11.33	0.30
600	7.94	3.95	12.71	11.59	11.30	0.28
700	8.66	4.14	12.71	11.56	11.27	0.27
800	9.42	4.29	12.71	11.53	11.23	0.26
900	10.14	4.38	12.71	11.51	11.20	0.25
1000	10.49	4.44	12.71	11.49	11.18	0.25

Vùng 3 - mặt cắt 27 - chu kỳ lặp 20 năm;X=613421 Y=2022126

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.62	2.00	12.71	12.06	11.77	0.47
50	4.43	2.59	12.71	12.02	11.74	0.42
100	6.21	3.06	12.71	12.00	11.72	0.38
150	6.35	3.14	12.71	12.00	11.72	0.37
200	6.49	3.23	12.71	12.00	11.71	0.36
250	6.57	3.33	12.71	11.99	11.71	0.36
300	6.66	3.43	12.71	11.99	11.71	0.35
350	6.89	3.55	12.71	11.98	11.70	0.34
400	7.13	3.66	12.71	11.98	11.69	0.33
450	7.39	3.79	12.71	11.97	11.68	0.32
500	7.65	3.91	12.71	11.96	11.67	0.31
600	8.35	4.14	12.71	11.94	11.64	0.29
700	9.08	4.33	12.71	11.91	11.60	0.28
800	9.84	4.47	12.71	11.88	11.57	0.27
900	10.56	4.58	12.71	11.85	11.53	0.27
1000	10.91	4.62	12.71	11.84	11.51	0.27

Vùng 3 - mặt cắt 27 - chu kỳ lặp 50 năm;X=613421 Y=2022126

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.23	2.28	13.72	12.42	12.11	0.48
50	5.01	2.87	13.72	12.38	12.09	0.44
100	6.82	3.35	13.72	12.37	12.08	0.39
150	6.96	3.44	13.72	12.36	12.07	0.39
200	7.10	3.52	13.72	12.36	12.07	0.38
250	7.19	3.62	13.72	12.36	12.06	0.37
300	7.28	3.72	13.72	12.35	12.06	0.36
350	7.51	3.84	13.72	12.35	12.05	0.35
400	7.74	3.96	13.72	12.34	12.04	0.35
450	8.00	4.08	13.72	12.33	12.03	0.34
500	8.27	4.19	13.72	12.32	12.02	0.33
600	8.97	4.42	13.72	12.30	11.99	0.31
700	9.70	4.60	13.72	12.27	11.95	0.30
800	10.46	4.73	13.72	12.24	11.91	0.29
900	11.18	4.82	13.72	12.21	11.88	0.29
1000	11.53	4.86	13.72	12.20	11.86	0.29

Vùng 3 - mặt cắt 27 - chu kỳ lặp 100 năm;X=613421 Y=2022126

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.75	2.56	13.72	12.68	12.35	0.48
50	5.56	3.12	13.72	12.66	12.36	0.44
100	7.35	3.58	13.72	12.66	12.36	0.40
150	7.49	3.67	13.72	12.65	12.36	0.39
200	7.62	3.75	13.72	12.65	12.35	0.39
250	7.71	3.85	13.72	12.64	12.35	0.38
300	7.80	3.95	13.72	12.64	12.34	0.37
350	8.03	4.07	13.72	12.63	12.33	0.36
400	8.27	4.19	13.72	12.62	12.32	0.35
450	8.53	4.30	13.72	12.61	12.31	0.34
500	8.79	4.42	13.72	12.60	12.29	0.34
600	9.49	4.63	13.72	12.57	12.26	0.32
700	10.22	4.81	13.72	12.54	12.22	0.31
800	10.98	4.94	13.72	12.51	12.18	0.30
900	11.71	5.01	13.72	12.49	12.15	0.30
1000	12.05	5.07	13.72	12.47	12.13	0.30

Table C-2.27 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 27 - chu kỳ lặp 125 năm;X=613421 Y=2022126						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.93	2.85	13.72	12.76	12.43	0.49
50	5.74	3.20	13.72	12.75	12.44	0.44
100	7.53	3.87	13.72	12.74	12.45	0.40
150	7.67	3.76	13.72	12.74	12.44	0.39
200	7.81	3.84	13.72	12.74	12.44	0.39
250	7.89	3.94	13.72	12.73	12.43	0.38
300	7.98	4.04	13.72	12.73	12.43	0.37
350	8.21	4.15	13.72	12.72	12.41	0.36
400	8.45	4.27	13.72	12.71	12.40	0.35
450	8.71	4.38	13.72	12.70	12.39	0.35
500	8.98	4.50	13.72	12.69	12.38	0.34
600	9.68	4.71	13.72	12.66	12.34	0.32
700	10.41	4.89	13.72	12.63	12.30	0.31
800	11.17	5.01	13.72	12.60	12.26	0.31
900	11.88	5.09	13.72	12.57	12.23	0.30
1000	12.24	5.15	13.72	12.56	12.21	0.30

Vùng 3 - mặt cắt 27 - chu kỳ lặp 160 năm;X=613421 Y=2022126						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.09	3.09	13.72	12.92	12.65	0.46
50	5.92	3.44	13.72	12.86	12.58	0.43
100	7.72	3.76	13.72	12.83	12.53	0.40
150	7.86	3.84	13.72	12.82	12.52	0.40
200	8.00	3.93	13.72	12.82	12.52	0.39
250	8.08	4.03	13.72	12.81	12.51	0.38
300	8.17	4.13	13.72	12.81	12.51	0.37
350	8.40	4.24	13.72	12.80	12.49	0.36
400	8.64	4.36	13.72	12.79	12.48	0.36
450	8.90	4.47	13.72	12.78	12.47	0.35
500	9.17	4.58	13.72	12.77	12.45	0.34
600	9.87	4.80	13.72	12.74	12.42	0.33
700	10.60	4.97	13.72	12.71	12.38	0.32
800	11.36	5.09	13.72	12.68	12.34	0.31
900	12.08	5.17	13.72	12.66	12.31	0.31
1000	12.43	5.23	13.72	12.64	12.29	0.30

Vùng 3 - mặt cắt 27 - chu kỳ lặp 200 năm;X=613421 Y=2022126						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	4.26	3.18	13.72	13.01	12.74	0.46
50	6.09	3.53	13.72	12.95	12.66	0.43
100	7.89	3.84	13.72	12.92	12.61	0.41
150	8.03	3.93	13.72	12.91	12.61	0.40
200	8.17	4.01	13.72	12.91	12.60	0.39
250	8.26	4.11	13.72	12.90	12.60	0.39
300	8.35	4.21	13.72	12.90	12.59	0.38
350	8.58	4.32	13.72	12.89	12.58	0.37
400	8.81	4.44	13.72	12.88	12.57	0.36
450	9.07	4.55	13.72	12.87	12.55	0.35
500	9.34	4.66	13.72	12.86	12.54	0.35
600	10.04	4.87	13.72	12.83	12.50	0.33
700	10.77	5.04	13.72	12.80	12.47	0.32
800	11.53	5.17	13.72	12.77	12.43	0.32
900	12.26	5.24	13.72	12.74	12.39	0.31
1000	12.60	5.30	13.72	12.73	12.37	0.31

Table C-2.28 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 28 - chu kỳ lặp 10 năm;X=641024 Y=2004498						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.04	1.63	12.71	11.73	11.46	0.47
50	3.85	2.27	12.71	11.68	11.40	0.42
100	5.63	2.75	12.71	11.66	11.38	0.37
150	5.89	2.82	12.71	11.65	11.37	0.37
200	6.16	2.88	12.71	11.64	11.36	0.36
250	6.42	2.93	12.71	11.64	11.35	0.36
300	6.67	2.97	12.71	11.63	11.34	0.36
350	6.61	3.01	12.71	11.63	11.34	0.36
400	6.56	3.06	12.71	11.63	11.33	0.35
450	6.52	3.12	12.71	11.63	11.33	0.35
500	6.49	3.19	12.71	11.63	11.33	0.34
600	6.71	3.35	12.71	11.62	11.32	0.33
700	6.96	3.53	12.71	11.61	11.31	0.32
800	7.36	3.73	12.71	11.59	11.29	0.30
900	7.77	3.93	12.71	11.58	11.27	0.29
1000	8.33	4.13	12.71	11.56	11.24	0.27

Vùng 3 - mặt cắt 28 - chu kỳ lặp 20 năm;X=641024 Y=2004498						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.38	1.84	12.71	12.12	11.84	0.49
50	4.20	2.45	12.71	12.05	11.76	0.44
100	5.98	2.92	12.71	12.02	11.73	0.39
150	6.24	2.99	12.71	12.01	11.72	0.38
200	6.51	3.05	12.71	12.00	11.71	0.38
250	6.77	3.09	12.71	12.00	11.70	0.38
300	7.02	3.13	12.71	11.99	11.69	0.38
350	6.96	3.18	12.71	11.99	11.69	0.37
400	6.91	3.22	12.71	11.99	11.69	0.37
450	6.87	3.28	12.71	11.99	11.68	0.36
500	6.84	3.35	12.71	11.98	11.68	0.36
600	7.08	3.52	12.71	11.98	11.67	0.35
700	7.31	3.70	12.71	11.97	11.66	0.33
800	7.71	3.90	12.71	11.95	11.64	0.32
900	8.12	4.10	12.71	11.94	11.62	0.30
1000	8.69	4.30	12.71	11.92	11.59	0.28

Vùng 3 - mặt cắt 28 - chu kỳ lặp 50 năm;X=641024 Y=2004498						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.90	2.06	13.72	12.49	12.19	0.50
50	4.71	2.67	13.72	12.42	12.12	0.45
100	5.49	3.16	13.72	12.39	12.10	0.41
150	5.76	3.22	13.72	12.39	12.09	0.40
200	7.02	3.28	13.72	12.38	12.08	0.40
250	7.28	3.33	13.72	12.37	12.07	0.40
300	7.53	3.37	13.72	12.36	12.06	0.39
350	7.47	3.42	13.72	12.36	12.06	0.39
400	7.42	3.46	13.72	12.36	12.05	0.39
450	7.38	3.53	13.72	12.36	12.05	0.38
500	7.35	3.60	13.72	12.36	12.05	0.38
600	7.58	3.76	13.72	12.35	12.04	0.36
700	7.82	3.94	13.72	12.34	12.03	0.35
800	8.22	4.14	13.72	12.33	12.01	0.33
900	8.64	4.34	13.72	12.31	11.99	0.32
1000	9.19	4.53	13.72	12.29	11.96	0.31

Vùng 3 - mặt cắt 28 - chu kỳ lặp 100 năm;X=641024 Y=2004498						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.33	2.23	13.72	12.76	12.45	0.52
50	5.14	2.86	13.72	12.70	12.39	0.47
100	6.92	3.36	13.72	12.67	12.37	0.42
150	7.19	3.42	13.72	12.66	12.36	0.42
200	7.45	3.48	13.72	12.65	12.35	0.41
250	7.72	3.52	13.72	12.64	12.34	0.41
300	7.96	3.57	13.72	12.64	12.33	0.41
350	7.90	3.62	13.72	12.64	12.32	0.40
400	7.85	3.67	13.72	12.64	12.32	0.40
450	7.81	3.73	13.72	12.63	12.32	0.39
500	7.78	3.80	13.72	12.63	12.32	0.39
600	8.01	3.98	13.72	12.62	12.31	0.38
700	8.25	4.15	13.72	12.61	12.29	0.36
800	8.65	4.34	13.72	12.60	12.26	0.35
900	9.07	4.54	13.72	12.58	12.26	0.33
1000	9.62	4.73	13.72	12.58	12.23	0.32

Table C-2.28 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 28 - chu kỳ lặp 125 năm;X=641024 Y=2004498						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.48	2.30	13.72	12.85	12.54	0.52
50	5.29	2.92	13.72	12.79	12.48	0.47
100	7.07	3.43	13.72	12.76	12.45	0.42
150	7.34	3.49	13.72	12.75	12.44	0.42
200	7.61	3.55	13.72	12.74	12.43	0.42
250	7.87	3.59	13.72	12.73	12.42	0.41
300	8.11	3.64	13.72	12.73	12.41	0.41
350	8.06	3.69	13.72	12.72	12.41	0.41
400	8.00	3.74	13.72	12.72	12.41	0.40
450	7.96	3.80	13.72	12.72	12.41	0.40
500	7.94	3.87	13.72	12.72	12.41	0.39
600	8.16	4.04	13.72	12.71	12.39	0.38
700	8.41	4.22	13.72	12.70	12.38	0.37
800	8.80	4.41	13.72	12.69	12.36	0.35
900	9.22	4.61	13.72	12.67	12.34	0.34
1000	9.78	4.80	13.72	12.65	12.32	0.32

Vùng 3 - mặt cắt 28 - chu kỳ lặp 150 năm;X=641024 Y=2004498						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.61	2.43	13.72	12.91	12.59	0.51
50	5.42	3.00	13.72	12.85	12.57	0.46
100	7.21	3.48	13.72	12.88	12.58	0.42
150	7.47	3.53	13.72	12.85	12.55	0.41
200	7.74	3.58	13.72	12.85	12.54	0.41
250	8.00	3.62	13.72	12.84	12.53	0.41
300	8.25	3.66	13.72	12.83	12.52	0.41
350	8.19	3.71	13.72	12.83	12.52	0.40
400	8.14	3.76	13.72	12.83	12.52	0.40
450	8.10	3.82	13.72	12.83	12.52	0.39
500	8.07	3.89	13.72	12.83	12.52	0.39
600	8.30	4.05	13.72	12.82	12.51	0.38
700	8.54	4.23	13.72	12.81	12.49	0.36
800	8.94	4.42	13.72	12.80	12.48	0.35
900	9.36	4.61	13.72	12.78	12.46	0.33
1000	9.91	4.80	13.72	12.76	12.43	0.32

Vùng 3 - mặt cắt 28 - chu kỳ lặp 200 năm;X=641024 Y=2004498						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.87	2.98	13.72	13.03	12.75	0.47
50	5.70	3.31	13.72	12.98	12.89	0.44
100	7.51	3.60	13.72	12.95	12.85	0.42
150	7.77	3.66	13.72	12.94	12.83	0.41
200	8.04	3.72	13.72	12.93	12.82	0.41
250	8.30	3.76	13.72	12.93	12.81	0.41
300	8.55	3.80	13.72	12.92	12.81	0.41
350	8.49	3.85	13.72	12.92	12.81	0.40
400	8.44	3.90	13.72	12.92	12.81	0.40
450	8.40	3.96	13.72	12.92	12.80	0.39
500	8.37	4.03	13.72	12.92	12.80	0.39
600	8.60	4.19	13.72	12.91	12.59	0.38
700	8.84	4.36	13.72	12.90	12.58	0.36
800	9.24	4.56	13.72	12.88	12.56	0.35
900	9.66	4.75	13.72	12.87	12.54	0.34
1000	10.22	4.94	13.72	12.85	12.51	0.32

Table C-2.29 *Results of wave computation for sea dike design*

Vùng 3 - mặt cắt 29 - chu kỳ lặp 10 năm;X=656812 Y=1987802						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.01	1.92	12.71	11.62	11.31	0.54
50	3.77	2.87	12.71	11.54	11.21	0.44
100	5.51	3.56	12.71	11.51	11.18	0.35
150	6.07	3.79	12.71	11.50	11.17	0.33
200	6.62	4.01	12.71	11.49	11.15	0.31
250	6.95	4.23	12.71	11.48	11.14	0.29
300	7.29	4.45	12.71	11.47	11.13	0.27
350	7.91	4.68	12.71	11.46	11.11	0.25
400	8.52	4.89	12.71	11.45	11.09	0.23
450	9.16	5.09	12.71	11.43	11.06	0.22
500	9.78	5.27	12.71	11.41	11.04	0.20
600	10.87	5.58	12.71	11.38	11.00	0.19
700	11.50	5.86	12.71	11.35	10.95	0.17
800	12.25	6.11	12.71	11.31	10.91	0.15
900	12.98	6.33	12.71	11.28	10.86	0.14
1000	13.75	6.51	12.71	11.24	10.81	0.13

Vùng 3 - mặt cắt 29 - chu kỳ lặp 20 năm;X=656812 Y=1987802						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.31	2.19	12.71	11.99	11.69	0.54
50	4.08	3.08	12.71	11.91	11.55	0.45
100	5.83	3.72	12.71	11.88	11.55	0.37
150	6.39	3.95	12.71	11.87	11.53	0.35
200	6.93	4.17	12.71	11.86	11.52	0.32
250	7.26	4.40	12.71	11.85	11.51	0.31
300	7.61	4.61	12.71	11.84	11.50	0.29
350	8.22	4.84	12.71	11.83	11.47	0.27
400	8.84	5.05	12.71	11.82	11.45	0.25
450	9.46	5.25	12.71	11.80	11.43	0.24
500	10.10	5.43	12.71	11.78	11.41	0.22
600	10.99	5.74	12.71	11.75	11.37	0.20
700	11.82	6.02	12.71	11.72	11.32	0.18
800	12.57	6.28	12.71	11.68	11.26	0.17
900	13.30	6.48	12.71	11.65	11.23	0.16
1000	14.07	6.68	12.71	11.61	11.18	0.15

Vùng 3 - mặt cắt 29 - chu kỳ lặp 50 năm;X=656812 Y=1987802						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.77	2.40	13.72	12.36	12.05	0.56
50	4.54	3.27	13.72	12.29	11.86	0.47
100	6.29	3.95	13.72	12.27	11.93	0.39
150	6.85	4.18	13.72	12.26	11.92	0.37
200	7.40	4.40	13.72	12.25	11.90	0.35
250	7.73	4.63	13.72	12.24	11.89	0.33
300	8.08	4.84	13.72	12.23	11.88	0.31
350	8.69	5.06	13.72	12.22	11.86	0.29
400	9.30	5.28	13.72	12.20	11.84	0.27
450	9.95	5.47	13.72	12.18	11.82	0.26
500	10.57	5.65	13.72	12.17	11.79	0.24
600	11.45	5.96	13.72	12.13	11.75	0.22
700	12.28	6.23	13.72	12.10	11.71	0.21
800	13.03	6.47	13.72	12.07	11.66	0.19
900	13.77	6.68	13.72	12.03	11.62	0.18
1000	14.53	6.86	13.72	12.00	11.57	0.17

Vùng 3 - mặt cắt 29 - chu kỳ lặp 100 năm;X=656812 Y=1987802						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.16	2.57	13.72	12.63	12.31	0.57
50	4.93	3.46	13.72	12.57	12.24	0.48
100	6.69	4.14	13.72	12.55	12.21	0.40
150	7.24	4.39	13.72	12.54	12.20	0.38
200	7.79	4.60	13.72	12.53	12.18	0.36
250	8.12	4.82	13.72	12.52	12.17	0.34
300	8.47	5.03	13.72	12.51	12.15	0.32
350	9.08	5.28	13.72	12.50	12.14	0.30
400	9.70	5.47	13.72	12.48	12.12	0.28
450	10.34	5.68	13.72	12.46	12.10	0.27
500	10.96	5.84	13.72	12.45	12.07	0.26
600	11.85	6.14	13.72	12.42	12.03	0.24
700	12.65	6.41	13.72	12.38	11.99	0.22
800	13.43	6.65	13.72	12.35	11.95	0.21
900	14.16	6.86	13.72	12.32	11.90	0.20
1000	14.93	7.03	13.72	12.28	11.85	0.19

Table C-2.29 *Results of wave computation for sea dike design (continued)*

Vùng 3 - mặt cắt 29 - chu kỳ lặp 125 năm;X=656812 Y=1987802						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.29	2.83	13.72	12.72	12.40	0.57
50	5.07	3.52	13.72	12.87	12.33	0.49
100	6.82	4.21	13.72	12.84	12.30	0.41
150	7.38	4.45	13.72	12.83	12.29	0.39
200	7.93	4.67	13.72	12.82	12.27	0.37
250	8.26	4.89	13.72	12.81	12.26	0.35
300	8.80	5.10	13.72	12.80	12.25	0.33
350	9.22	5.32	13.72	12.59	12.23	0.31
400	9.83	5.54	13.72	12.57	12.21	0.29
450	10.47	5.72	13.72	12.56	12.19	0.28
500	11.10	5.90	13.72	12.54	12.16	0.27
600	11.98	6.21	13.72	12.51	12.12	0.25
700	12.81	6.47	13.72	12.47	12.08	0.23
800	13.58	6.71	13.72	12.44	12.04	0.21
900	14.30	6.92	13.72	12.41	11.99	0.20
Vùng 3 -	15.06	7.09	13.72	12.37	11.95	0.19

Vùng 3 - mặt cắt 29 - chu kỳ lặp 150 năm;X=656812 Y=1987802						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.39	2.79	13.72	12.85	12.54	0.57
50	5.18	3.61	13.72	12.77	12.43	0.49
100	6.91	4.28	13.72	12.73	12.39	0.41
150	7.47	4.49	13.72	12.72	12.37	0.39
200	8.02	4.71	13.72	12.71	12.36	0.37
250	8.35	4.93	13.72	12.70	12.35	0.35
300	8.70	5.15	13.72	12.69	12.34	0.33
350	9.31	5.37	13.72	12.68	12.32	0.31
400	9.93	5.58	13.72	12.66	12.30	0.30
450	10.57	5.77	13.72	12.64	12.27	0.28
500	11.19	5.95	13.72	12.63	12.25	0.27
600	12.08	6.25	13.72	12.60	12.21	0.25
700	12.91	6.52	13.72	12.56	12.17	0.23
800	13.66	6.75	13.72	12.53	12.12	0.22
900	14.39	6.98	13.72	12.50	12.08	0.21
1000	15.16	7.13	13.72	12.46	12.03	0.20

Vùng 3 - mặt cắt 29 - chu kỳ lặp 200 năm;X=656812 Y=1987802						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.57	2.87	13.72	12.94	12.62	0.57
50	5.35	3.70	13.72	12.86	12.52	0.49
100	7.11	4.36	13.72	12.83	12.48	0.41
150	7.67	4.59	13.72	12.81	12.47	0.39
200	8.22	4.81	13.72	12.80	12.45	0.37
250	8.55	5.03	13.72	12.79	12.44	0.35
300	8.89	5.24	13.72	12.78	12.43	0.34
350	9.51	5.46	13.72	12.77	12.41	0.32
400	10.12	5.68	13.72	12.75	12.39	0.30
450	10.76	5.86	13.72	12.74	12.36	0.29
500	11.39	6.04	13.72	12.72	12.34	0.28
600	12.27	6.34	13.72	12.69	12.30	0.26
700	13.10	6.61	13.72	12.65	12.26	0.24
800	13.85	6.84	13.72	12.62	12.21	0.22
900	14.59	7.04	13.72	12.59	12.17	0.21
1000	15.36	7.22	13.72	12.55	12.13	0.21

Table C-2.30 *Results of wave computation for sea dike design*

Vùng 4 - mặt cắt 30 - chu kỳ lặp 10 năm:X=652922 Y=1970734

Khoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Sới lở (m)
0	1.68	1.59	11.76	10.98	10.13	0.31
50	4.15	2.18	11.76	10.88	10.61	0.27
100	6.57	2.64	11.76	10.55	10.57	0.23
150	6.59	2.65	11.76	10.85	10.57	0.23
200	6.62	2.66	11.76	10.85	10.56	0.23
250	6.65	2.68	11.76	10.84	10.56	0.23
300	6.67	2.69	11.76	10.84	10.56	0.23
350	6.69	2.71	11.76	10.84	10.56	0.23
400	6.70	2.72	11.76	10.84	10.55	0.23
450	6.73	2.74	11.76	10.84	10.55	0.23
500	6.75	2.75	11.76	10.83	10.55	0.23
600	6.85	2.79	11.76	10.83	10.54	0.22
700	6.89	2.82	11.76	10.82	10.54	0.22
800	6.94	2.86	11.76	10.82	10.53	0.22
900	7.01	2.90	11.76	10.81	10.52	0.22
1000	7.08	2.94	11.76	10.81	10.51	0.22

Vùng 4 - mặt cắt 30 - chu kỳ lặp 20 năm:X=652922 Y=1970734

Khoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Sới lở (m)
0	1.96	1.76	11.76	11.22	10.95	0.32
50	4.45	2.32	11.76	11.14	10.86	0.28
100	6.86	2.76	11.76	11.11	10.82	0.24
150	6.90	2.78	11.76	11.11	10.82	0.24
200	6.93	2.79	11.76	11.11	10.82	0.24
250	6.95	2.81	11.76	11.10	10.81	0.24
300	6.98	2.82	11.76	11.10	10.81	0.24
350	7.00	2.84	11.76	11.10	10.81	0.24
400	7.01	2.85	11.76	11.10	10.80	0.24
450	7.04	2.87	11.76	11.10	10.80	0.24
500	7.07	2.89	11.76	11.09	10.80	0.24
600	7.14	2.92	11.76	11.09	10.79	0.23
700	7.19	2.96	11.76	11.08	10.79	0.23
800	7.25	2.99	11.76	11.08	10.78	0.23
900	7.32	3.03	11.76	11.07	10.77	0.23
1000	7.39	3.07	11.76	11.07	10.76	0.23

Vùng 4 - mặt cắt 30 - chu kỳ lặp 50 năm:X=652922 Y=1970734

Khoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Sới lở (m)
0	2.45	2.02	12.71	11.68	11.35	0.33
50	4.93	2.54	12.71	11.57	11.27	0.28
100	7.35	2.96	12.71	11.55	11.24	0.26
150	7.38	2.98	12.71	11.54	11.24	0.26
200	7.40	2.99	12.71	11.54	11.23	0.26
250	7.43	3.01	12.71	11.54	11.23	0.26
300	7.46	3.02	12.71	11.54	11.23	0.26
350	7.47	3.04	12.71	11.54	11.23	0.26
400	7.49	3.05	12.71	11.53	11.22	0.25
450	7.52	3.07	12.71	11.53	11.22	0.25
500	7.55	3.09	12.71	11.53	11.22	0.25
600	7.61	3.12	12.71	11.52	11.21	0.25
700	7.67	3.16	12.71	11.52	11.20	0.25
800	7.73	3.19	12.71	11.51	11.20	0.25
900	7.80	3.23	12.71	11.51	11.19	0.24
1000	7.87	3.27	12.71	11.50	11.18	0.24

Vùng 4 - mặt cắt 30 - chu kỳ lặp 100 năm:X=652922 Y=1970734

Khoảng cách từ bờ (m)	Độ sâu (m)	Hs (m)	Tp (s)	Tm01 (s)	Tm02 (s)	Sới lở (m)
0	2.86	2.23	12.71	11.88	11.57	0.35
50	5.34	2.72	12.71	11.82	11.51	0.30
100	7.71	3.13	12.71	11.80	11.48	0.27
150	7.80	3.15	12.71	11.80	11.48	0.27
200	7.82	3.16	12.71	11.80	11.48	0.27
250	7.85	3.18	12.71	11.79	11.48	0.27
300	7.88	3.19	12.71	11.79	11.47	0.27
350	7.89	3.21	12.71	11.79	11.47	0.26
400	7.91	3.22	12.71	11.79	11.47	0.26
450	7.93	3.24	12.71	11.79	11.46	0.26
500	7.96	3.26	12.71	11.78	11.46	0.26
600	8.03	3.29	12.71	11.78	11.45	0.26
700	8.09	3.33	12.71	11.77	11.45	0.26
800	8.15	3.36	12.71	11.77	11.44	0.26
900	8.21	3.40	12.71	11.76	11.43	0.25
1000	8.28	3.45	12.71	11.76	11.42	0.25

Table C-2.30 *Results of wave computation for sea dike design (continued)*

Vùng 4 - mặt cắt 30 - chu kỳ lặp 125 năm;X=652922 Y=1970734						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.04	2.31	12.71	11.88	11.56	0.33
50	5.52	2.80	12.71	11.83	11.51	0.30
100	7.95	3.20	12.71	11.80	11.49	0.27
150	7.98	3.22	12.71	11.80	11.48	0.27
200	8.00	3.23	12.71	11.80	11.48	0.27
250	8.03	3.25	12.71	11.80	11.48	0.27
300	8.06	3.26	12.71	11.80	11.48	0.27
350	8.07	3.28	12.71	11.79	11.47	0.27
400	8.09	3.29	12.71	11.79	11.47	0.26
450	8.11	3.31	12.71	11.79	11.47	0.26
500	8.14	3.33	12.71	11.79	11.46	0.26
600	8.21	3.36	12.71	11.78	11.46	0.26
700	8.27	3.40	12.71	11.78	11.45	0.26
800	8.33	3.43	12.71	11.77	11.44	0.26
900	8.39	3.47	12.71	11.77	11.43	0.25
1000	8.46	3.52	12.71	11.76	11.43	0.25

Vùng 4 - mặt cắt 30 - chu kỳ lặp 150 năm;X=652922 Y=1970734						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.13	2.38	12.71	11.96	11.64	0.33
50	5.61	2.84	12.71	11.91	11.59	0.30
100	8.04	3.24	12.71	11.89	11.57	0.27
150	8.07	3.26	12.71	11.89	11.57	0.27
200	8.09	3.27	12.71	11.89	11.56	0.27
250	8.12	3.28	12.71	11.88	11.56	0.27
300	8.15	3.30	12.71	11.88	11.56	0.27
350	8.16	3.32	12.71	11.88	11.56	0.27
400	8.18	3.33	12.71	11.88	11.55	0.27
450	8.21	3.35	12.71	11.88	11.55	0.27
500	8.24	3.37	12.71	11.87	11.55	0.27
600	8.30	3.40	12.71	11.87	11.54	0.26
700	8.36	3.44	12.71	11.86	11.53	0.26
800	8.42	3.47	12.71	11.86	11.53	0.26
900	8.49	3.51	12.71	11.85	11.52	0.26
1000	8.56	3.56	12.71	11.85	11.51	0.25

Vùng 4 - mặt cắt 30 - chu kỳ lặp 200 năm;X=652922 Y=1970734						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.34	2.45	12.71	12.04	11.72	0.34
50	5.82	2.92	12.71	12.00	11.68	0.31
100	8.25	3.32	12.71	11.98	11.65	0.28
150	8.27	3.34	12.71	11.98	11.65	0.28
200	8.30	3.35	12.71	11.98	11.65	0.28
250	8.32	3.37	12.71	11.97	11.65	0.27
300	8.35	3.38	12.71	11.97	11.64	0.27
350	8.37	3.40	12.71	11.97	11.64	0.27
400	8.38	3.41	12.71	11.97	11.64	0.27
450	8.41	3.43	12.71	11.96	11.64	0.27
500	8.44	3.45	12.71	11.96	11.63	0.27
600	8.51	3.48	12.71	11.96	11.63	0.27
700	8.57	3.52	12.71	11.95	11.62	0.27
800	8.62	3.56	12.71	11.95	11.61	0.26
900	8.69	3.60	12.71	11.94	11.60	0.26
1000	8.76	3.64	12.71	11.93	11.59	0.26

Table C-2.31 *Results of wave computation for sea dike design*

Vùng 4 - mặt cắt 31 - chu kỳ lặp 10 năm;X=660920 Y=1951327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.79	1.06	11.76	10.96	10.66	0.45
50	2.11	1.19	11.76	10.93	10.63	0.44
100	2.41	1.30	11.76	10.90	10.60	0.43
150	2.41	1.43	11.76	10.87	10.55	0.42
200	2.44	1.56	11.76	10.84	10.53	0.41
250	2.92	2.05	11.76	10.86	10.58	0.36
300	3.41	2.44	11.76	10.87	10.60	0.31
350	3.94	2.69	11.76	10.86	10.59	0.29
400	4.47	2.89	11.76	10.86	10.57	0.26
450	4.98	3.12	11.76	10.85	10.56	0.24
500	5.50	3.33	11.76	10.84	10.55	0.22
600	6.55	3.75	11.76	10.82	10.52	0.19
700	7.70	4.12	11.76	10.79	10.47	0.16
800	8.95	4.42	11.76	10.75	10.41	0.14
900	9.67	4.64	11.76	10.71	10.36	0.13
1000	10.45	4.80	11.76	10.67	10.31	0.12

Vùng 4 - mặt cắt 31 - chu kỳ lặp 20 năm;X=660920 Y=1951327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.09	1.21	11.76	11.22	10.93	0.44
50	2.41	1.33	11.76	11.18	10.88	0.43
100	2.72	1.45	11.76	11.16	10.84	0.42
150	2.72	1.59	11.76	11.13	10.81	0.41
200	2.74	1.71	11.76	11.12	10.80	0.39
250	3.23	2.15	11.76	11.17	10.90	0.35
300	3.73	2.50	11.76	11.20	10.94	0.31
350	4.26	2.74	11.76	11.19	10.92	0.29
400	4.75	2.96	11.76	11.19	10.91	0.26
450	5.30	3.19	11.76	11.18	10.90	0.24
500	5.81	3.41	11.76	11.17	10.89	0.22
600	6.87	3.84	11.76	11.15	10.85	0.19
700	8.02	4.22	11.76	11.10	10.79	0.16
800	9.15	4.51	11.76	11.06	10.72	0.14
900	9.89	4.73	11.76	11.01	10.67	0.13
1000	10.77	4.89	11.76	10.97	10.62	0.12

Vùng 4 - mặt cắt 31 - chu kỳ lặp 50 năm;X=660920 Y=1951327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.58	1.61	12.71	11.67	11.39	0.43
50	2.89	1.77	12.71	11.67	11.39	0.42
100	3.19	1.92	12.71	11.67	11.39	0.40
150	3.19	2.10	12.71	11.67	11.41	0.38
200	3.20	2.28	12.71	11.68	11.41	0.36
250	3.71	2.52	12.71	11.67	11.40	0.34
300	4.23	2.75	12.71	11.67	11.39	0.31
350	4.76	2.99	12.71	11.66	11.38	0.29
400	5.28	3.21	12.71	11.65	11.36	0.27
450	5.80	3.45	12.71	11.64	11.35	0.25
500	6.31	3.66	12.71	11.63	11.33	0.23
600	7.36	4.09	12.71	11.60	11.29	0.19
700	8.52	4.46	12.71	11.56	11.23	0.16
800	9.67	4.75	12.71	11.51	11.17	0.14
900	10.49	4.96	12.71	11.47	11.12	0.13
1000	11.27	5.12	12.71	11.43	11.07	0.13

Vùng 4 - mặt cắt 31 - chu kỳ lặp 100 năm;X=660920 Y=1951327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.98	1.79	12.71	11.94	11.65	0.43
50	3.27	1.95	12.71	11.94	11.65	0.41
100	3.55	2.10	12.71	11.94	11.65	0.40
150	3.57	2.29	12.71	11.94	11.67	0.38
200	3.58	2.48	12.71	11.95	11.69	0.36
250	4.10	2.71	12.71	11.94	11.66	0.34
300	4.61	2.94	12.71	11.94	11.65	0.31
350	5.14	3.18	12.71	11.93	11.64	0.29
400	5.67	3.41	12.71	11.92	11.63	0.27
450	6.19	3.64	12.71	11.91	11.61	0.25
500	6.70	3.86	12.71	11.90	11.59	0.23
600	7.75	4.28	12.71	11.87	11.55	0.19
700	8.91	4.65	12.71	11.82	11.49	0.17
800	10.05	4.93	12.71	11.78	11.43	0.15
900	10.88	5.14	12.71	11.74	11.38	0.14
1000	11.66	5.29	12.71	11.70	11.33	0.13

Table C-2.31 *Results of wave computation for sea dike design (continued)*

Vùng 4 - mặt cắt 31 - chu kỳ lặp 125 năm;X=660920 Y=1951327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.18	1.90	12.71	11.94	11.65	0.42
50	3.49	2.06	12.71	11.94	11.66	0.41
100	3.80	2.20	12.71	11.94	11.66	0.39
150	3.79	2.39	12.71	11.95	11.67	0.37
200	3.81	2.57	12.71	11.95	11.68	0.36
250	4.32	2.82	12.71	11.95	11.67	0.33
300	4.64	3.05	12.71	11.94	11.66	0.31
350	5.36	3.29	12.71	11.93	11.64	0.28
400	5.89	3.51	12.71	11.93	11.63	0.26
450	6.41	3.74	12.71	11.91	11.61	0.24
500	6.92	3.96	12.71	11.90	11.59	0.22
600	7.98	4.38	12.71	11.87	11.55	0.19
700	9.13	4.75	12.71	11.82	11.49	0.16
800	10.28	5.03	12.71	11.78	11.43	0.15
900	11.11	5.23	12.71	11.74	11.38	0.14
1000	11.99	5.38	12.71	11.70	11.33	0.13

Vùng 4 - mặt cắt 31 - chu kỳ lặp 150 năm;X=660920 Y=1951327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.32	1.97	12.71	12.03	11.74	0.42
50	3.63	2.13	12.71	12.03	11.74	0.41
100	3.94	2.27	12.71	12.03	11.74	0.39
150	3.93	2.46	12.71	12.04	11.76	0.37
200	3.95	2.64	12.71	12.04	11.77	0.35
250	4.48	2.88	12.71	12.04	11.75	0.33
300	4.99	3.12	12.71	12.03	11.74	0.31
350	5.50	3.36	12.71	12.02	11.73	0.28
400	6.03	3.58	12.71	12.02	11.72	0.26
450	6.55	3.81	12.71	12.00	11.70	0.24
500	7.06	4.03	12.71	11.99	11.68	0.22
600	8.12	4.45	12.71	11.96	11.64	0.19
700	9.27	4.81	12.71	11.91	11.59	0.16
800	10.42	5.09	12.71	11.86	11.51	0.15
900	11.25	5.29	12.71	11.83	11.48	0.14
1000	12.03	5.45	12.71	11.79	11.41	0.13

Vùng 4 - mặt cắt 31 - chu kỳ lặp 200 năm;X=660920 Y=1951327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.52	2.06	12.71	12.12	11.83	0.42
50	3.83	2.22	12.71	12.12	11.83	0.41
100	4.13	2.37	12.71	12.12	11.83	0.39
150	4.13	2.56	12.71	12.13	11.85	0.37
200	4.14	2.73	12.71	12.14	11.86	0.35
250	4.66	2.98	12.71	12.13	11.84	0.33
300	5.17	3.21	12.71	12.13	11.83	0.30
350	5.70	3.46	12.71	12.12	11.82	0.28
400	6.23	3.68	12.71	12.11	11.81	0.26
450	6.75	3.91	12.71	12.09	11.79	0.24
500	7.26	4.13	12.71	12.08	11.77	0.22
600	8.32	4.55	12.71	12.05	11.72	0.19
700	9.47	4.91	12.71	12.00	11.66	0.16
800	10.62	5.18	12.71	11.96	11.60	0.15
900	11.45	5.38	12.71	11.92	11.55	0.14
1000	12.23	5.54	12.71	11.88	11.50	0.13

Table C-2.32 *Results of wave computation for sea dike design*

Vùng 4 - mặt cắt 32 - chu kỳ lặp 10 năm;X=672094 Y=1934603						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.82	1.92	12.71	12.13	11.81	0.45
50	4.41	2.81	12.71	12.04	11.69	0.37
100	6.96	3.47	12.71	12.01	11.65	0.30
150	7.17	3.56	12.71	12.00	11.64	0.29
200	7.38	3.65	12.71	11.99	11.63	0.29
250	7.56	3.74	12.71	11.99	11.62	0.28
300	7.75	3.83	12.71	11.98	11.61	0.28
350	7.93	3.92	12.71	11.97	11.60	0.27
400	8.12	4.01	12.71	11.96	11.59	0.26
450	8.31	4.10	12.71	11.95	11.58	0.26
500	8.49	4.20	12.71	11.95	11.57	0.25
600	8.88	4.39	12.71	11.93	11.54	0.24
700	9.27	4.58	12.71	11.91	11.52	0.22
800	9.66	4.78	12.71	11.89	11.49	0.21
900	10.06	4.98	12.71	11.87	11.46	0.19
1000	10.47	5.19	12.71	11.84	11.43	0.18

Vùng 4 - mặt cắt 32 - chu kỳ lặp 20 năm;X=672094 Y=1934603						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.12	2.13	11.76	11.31	11.04	0.43
50	4.73	2.99	11.76	11.18	10.87	0.36
100	7.28	3.63	11.76	11.14	10.81	0.29
150	7.49	3.73	11.76	11.13	10.80	0.29
200	7.69	3.82	11.76	11.12	10.79	0.28
250	7.88	3.91	11.76	11.11	10.78	0.27
300	8.06	4.00	11.76	11.11	10.77	0.27
350	8.25	4.09	11.76	11.10	10.75	0.26
400	8.44	4.18	11.76	11.09	10.74	0.25
450	8.62	4.28	11.76	11.08	10.73	0.25
500	8.81	4.37	11.76	11.07	10.72	0.24
600	9.19	4.56	11.76	11.05	10.69	0.23
700	9.59	4.75	11.76	11.03	10.66	0.22
800	9.98	4.95	11.76	11.00	10.63	0.20
900	10.39	5.15	11.76	10.98	10.60	0.19
1000	10.79	5.36	11.76	10.95	10.56	0.18

Vùng 4 - mặt cắt 32 - chu kỳ lặp 50 năm;X=672094 Y=1934603						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.63	2.37	12.71	11.75	11.47	0.45
50	5.24	3.22	12.71	11.64	11.32	0.38
100	7.79	3.88	12.71	11.60	11.27	0.31
150	8.00	3.97	12.71	11.59	11.26	0.31
200	8.21	4.06	12.71	11.59	11.25	0.30
250	8.39	4.15	12.71	11.58	11.24	0.29
300	8.57	4.24	12.71	11.57	11.22	0.29
350	8.76	4.34	12.71	11.56	11.21	0.28
400	8.95	4.43	12.71	11.55	11.20	0.27
450	9.13	4.52	12.71	11.54	11.19	0.27
500	9.32	4.61	12.71	11.53	11.17	0.26
600	9.71	4.81	12.71	11.51	11.15	0.25
700	10.10	5.00	12.71	11.49	11.12	0.24
800	10.49	5.20	12.71	11.47	11.09	0.22
900	10.90	5.40	12.71	11.45	11.06	0.21
1000	11.30	5.60	12.71	11.42	11.03	0.20

Vùng 4 - mặt cắt 32 - chu kỳ lặp 100 năm;X=672094 Y=1934603						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.07	2.55	12.71	12.01	11.71	0.46
50	5.67	3.41	12.71	11.91	11.58	0.39
100	8.23	4.09	12.71	11.87	11.53	0.32
150	8.44	4.18	12.71	11.86	11.52	0.32
200	8.65	4.27	12.71	11.86	11.51	0.31
250	8.83	4.36	12.71	11.85	11.50	0.30
300	9.01	4.45	12.71	11.84	11.49	0.30
350	9.20	4.54	12.71	11.83	11.48	0.29
400	9.39	4.63	12.71	11.82	11.46	0.29
450	9.57	4.73	12.71	11.81	11.45	0.28
500	9.76	4.82	12.71	11.80	11.44	0.27
600	10.15	5.01	12.71	11.78	11.41	0.26
700	10.54	5.20	12.71	11.76	11.38	0.25
800	10.93	5.40	12.71	11.74	11.35	0.23
900	11.34	5.60	12.71	11.71	11.32	0.22
1000	11.74	5.81	12.71	11.69	11.29	0.21

Table C-2.32 *Results of wave computation for sea dike design (continued)*

Vùng 4 - mặt cắt 32 - chu kỳ lặp 125 năm;X=672094 Y=1934603						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.24	2.72	12.71	12.05	11.76	0.45
50	5.85	3.52	12.71	11.93	11.60	0.39
100	8.41	4.16	12.71	11.88	11.54	0.32
150	8.61	4.26	12.71	11.87	11.53	0.32
200	8.82	4.35	12.71	11.86	11.52	0.31
250	9.01	4.44	12.71	11.85	11.50	0.30
300	9.19	4.53	12.71	11.84	11.49	0.30
350	9.38	4.62	12.71	11.83	11.48	0.29
400	9.57	4.71	12.71	11.82	11.47	0.29
450	9.75	4.81	12.71	11.81	11.45	0.28
500	9.93	4.90	12.71	11.80	11.44	0.27
600	10.32	5.09	12.71	11.78	11.42	0.26
700	10.72	5.28	12.71	11.76	11.39	0.25
800	11.11	5.48	12.71	11.74	11.36	0.24
900	11.51	5.68	12.71	11.72	11.33	0.22
1000	11.92	5.88	12.71	11.69	11.29	0.21

Vùng 4 - mặt cắt 32 - chu kỳ lặp 150 năm;X=672094 Y=1934603						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.37	2.77	12.71	12.14	11.84	0.45
50	5.98	3.58	12.71	12.02	11.69	0.39
100	8.54	4.23	12.71	11.97	11.63	0.33
150	8.75	4.32	12.71	11.96	11.61	0.32
200	8.95	4.41	12.71	11.95	11.60	0.31
250	9.14	4.50	12.71	11.94	11.59	0.31
300	9.32	4.59	12.71	11.93	11.58	0.30
350	9.51	4.68	12.71	11.92	11.57	0.30
400	9.70	4.77	12.71	11.91	11.56	0.29
450	9.88	4.87	12.71	11.90	11.54	0.28
500	10.07	4.96	12.71	11.89	11.53	0.28
600	10.45	5.15	12.71	11.87	11.50	0.26
700	10.85	5.34	12.71	11.85	11.47	0.25
800	11.24	5.54	12.71	11.83	11.45	0.24
900	11.65	5.74	12.71	11.81	11.42	0.23
1000	12.05	5.95	12.71	11.78	11.38	0.21

Vùng 4 - mặt cắt 32 - chu kỳ lặp 200 năm;X=672094 Y=1934603						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.60	2.87	12.71	12.23	11.93	0.45
50	6.21	3.68	12.71	12.11	11.78	0.39
100	8.77	4.34	12.71	12.06	11.72	0.33
150	8.98	4.43	12.71	12.05	11.70	0.32
200	9.19	4.52	12.71	12.04	11.69	0.32
250	9.37	4.61	12.71	12.03	11.68	0.31
300	9.56	4.70	12.71	12.02	11.67	0.30
350	9.74	4.79	12.71	12.01	11.66	0.30
400	9.93	4.88	12.71	12.00	11.64	0.29
450	10.12	4.98	12.71	11.99	11.63	0.29
500	10.30	5.07	12.71	11.99	11.62	0.28
600	10.69	5.26	12.71	11.96	11.59	0.27
700	11.08	5.45	12.71	11.94	11.56	0.25
800	11.47	5.65	12.71	11.92	11.53	0.24
900	11.88	5.85	12.71	11.90	11.50	0.23
1000	12.29	6.05	12.71	11.87	11.47	0.22

Table C-2.33 *Results of wave computation for sea dike design*

Vùng 4 - mặt cắt 33 - chu kỳ lặp 10 năm;X=685816 Y=1920120

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.77	2.57	12.71	12.04	11.58	0.50
50	6.23	4.85	12.71	11.74	11.26	0.31
100	10.61	6.33	12.71	11.70	11.21	0.11
150	11.38	6.62	12.71	11.67	11.16	0.09
200	12.15	6.89	12.71	11.65	11.13	0.07
250	12.89	7.12	12.71	11.61	11.08	0.06
300	13.65	7.34	12.71	11.58	11.03	0.04
350	14.74	7.51	12.71	11.53	10.95	0.04
400	15.83	7.67	12.71	11.48	10.88	0.03
450	16.94	7.74	12.71	11.42	10.81	0.03
500	18.00	7.81	12.71	11.37	10.74	0.04
600	19.07	7.88	12.71	11.32	10.66	0.04
700	20.04	7.88	12.71	11.28	10.60	0.04
800	20.69	7.89	12.71	11.26	10.58	0.04
900	21.25	7.90	12.71	11.25	10.58	0.05
1000	21.25	7.91	12.71	11.25	10.56	0.04

Vùng 4 - mặt cắt 33 - chu kỳ lặp 20 năm;X=685816 Y=1920120

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.06	2.51	11.76	11.19	10.78	0.49
50	6.52	4.98	11.76	10.81	10.32	0.30
100	10.91	6.52	11.76	10.75	10.28	0.11
150	11.68	6.79	11.76	10.72	10.21	0.09
200	12.45	7.04	11.76	10.70	10.19	0.07
250	13.20	7.26	11.76	10.67	10.13	0.06
300	13.96	7.48	11.76	10.64	10.08	0.05
350	15.05	7.65	11.76	10.60	10.01	0.04
400	16.14	7.57	11.76	10.56	9.99	0.04
450	17.25	7.68	11.76	10.52	9.93	0.04
500	18.30	7.97	11.76	10.49	9.88	0.04
600	19.37	8.04	11.76	10.45	9.84	0.04
700	20.35	8.08	11.76	10.42	9.80	0.05
800	21.00	8.10	11.76	10.40	9.78	0.05
900	21.55	8.11	11.76	10.39	9.77	0.05
1000	21.56	8.13	11.76	10.39	9.76	0.05

Vùng 4 - mặt cắt 33 - chu kỳ lặp 50 năm;X=685816 Y=1920120

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.53	3.05	12.71	11.62	11.22	0.49
50	7.00	5.27	12.71	11.29	10.81	0.30
100	11.40	6.79	12.71	11.23	10.74	0.12
150	12.17	7.04	12.71	11.20	10.70	0.11
200	12.94	7.30	12.71	11.18	10.66	0.09
250	13.68	7.52	12.71	11.15	10.62	0.08
300	14.44	7.74	12.71	11.12	10.58	0.07
350	15.53	7.81	12.71	11.08	10.52	0.06
400	16.62	8.07	12.71	11.04	10.47	0.06
450	17.74	8.15	12.71	11.00	10.42	0.06
500	18.79	8.22	12.71	10.96	10.37	0.06
600	19.86	8.29	12.71	10.92	10.31	0.06
700	20.84	8.33	12.71	10.89	10.28	0.06
800	21.48	8.35	12.71	10.87	10.25	0.06
900	22.04	8.37	12.71	10.86	10.24	0.06
1000	22.04	8.39	12.71	10.86	10.24	0.06

Vùng 4 - mặt cắt 33 - chu kỳ lặp 100 năm;X=685816 Y=1920120

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.93	3.48	12.71	11.87	11.48	0.47
50	7.42	5.54	12.71	11.58	11.10	0.30
100	11.83	6.99	12.71	11.51	11.01	0.13
150	12.60	7.25	12.71	11.48	10.97	0.12
200	13.37	7.51	12.71	11.45	10.94	0.10
250	14.11	7.73	12.71	11.42	10.89	0.09
300	14.86	7.94	12.71	11.39	10.85	0.08
350	15.96	8.11	12.71	11.35	10.80	0.07
400	17.06	8.27	12.71	11.31	10.75	0.07
450	18.17	8.35	12.71	11.27	10.69	0.07
500	19.22	8.42	12.71	11.24	10.64	0.07
600	20.29	8.48	12.71	11.20	10.58	0.07
700	21.27	8.53	12.71	11.17	10.55	0.07
800	21.91	8.55	12.71	11.15	10.53	0.07
900	22.47	8.57	12.71	11.13	10.51	0.07
1000	22.47	8.58	12.71	11.13	10.51	0.07

Table C-2.33 *Results of wave computation for sea dike design (continued)*

Vùng 4 - mặt cắt 33 - chu kỳ lặp 125 năm;X=685816 Y=1920120

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.20	3.75	12.71	11.86	11.46	0.45
50	7.70	5.70	12.71	11.58	11.16	0.29
100	12.12	7.11	12.71	11.50	11.01	0.13
150	12.69	7.38	12.71	11.47	10.96	0.12
200	13.66	7.63	12.71	11.45	10.93	0.10
250	14.40	7.85	12.71	11.42	10.89	0.09
300	15.17	8.06	12.71	11.39	10.85	0.08
350	16.25	8.22	12.71	11.35	10.79	0.07
400	17.35	8.38	12.71	11.31	10.74	0.07
450	18.46	8.46	12.71	11.27	10.69	0.07
500	19.51	8.53	12.71	11.23	10.64	0.07
600	20.58	8.60	12.71	11.19	10.58	0.07
700	21.56	8.64	12.71	11.16	10.55	0.07
800	22.20	8.66	12.71	11.15	10.52	0.07
900	22.76	8.68	12.71	11.13	10.51	0.06
1000	22.76	8.69	12.71	11.13	10.51	0.07

Vùng 4 - mặt cắt 33 - chu kỳ lặp 150 năm;X=685816 Y=1920120

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.28	3.83	12.71	11.95	11.57	0.45
50	7.76	5.75	12.71	11.68	11.20	0.29
100	12.18	7.15	12.71	11.60	11.10	0.14
150	12.95	7.41	12.71	11.57	11.06	0.12
200	13.72	7.67	12.71	11.55	11.03	0.10
250	14.47	7.89	12.71	11.52	10.99	0.09
300	15.23	8.10	12.71	11.49	10.95	0.08
350	16.32	8.26	12.71	11.45	10.89	0.07
400	17.41	8.41	12.71	11.41	10.84	0.07
450	18.52	8.49	12.71	11.37	10.79	0.07
500	19.57	8.57	12.71	11.33	10.74	0.07
600	20.64	8.64	12.71	11.29	10.68	0.07
700	21.62	8.67	12.71	11.25	10.64	0.08
800	22.27	8.70	12.71	11.24	10.62	0.08
900	22.83	8.73	12.71	11.23	10.61	0.08
1000	22.83	8.73	12.71	11.23	10.60	0.08

Vùng 4 - mặt cắt 33 - chu kỳ lặp 200 năm;X=685816 Y=1920120

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.44	4.03	12.71	12.05	11.67	0.44
50	7.85	5.87	12.71	11.78	11.30	0.29
100	12.37	7.24	12.71	11.69	11.20	0.14
150	13.16	7.51	12.71	11.67	11.16	0.12
200	13.92	7.75	12.71	11.64	11.12	0.11
250	14.66	7.97	12.71	11.61	11.08	0.10
300	15.42	8.19	12.71	11.58	11.04	0.09
350	16.51	8.35	12.71	11.54	10.99	0.08
400	17.60	8.50	12.71	11.50	10.93	0.07
450	18.72	8.58	12.71	11.46	10.88	0.06
500	19.77	8.65	12.71	11.43	10.83	0.08
600	20.84	8.72	12.71	11.39	10.78	0.08
700	21.82	8.76	12.71	11.36	10.74	0.08
800	22.46	8.78	12.71	11.34	10.72	0.08
900	23.02	8.80	12.71	11.32	10.70	0.08
1000	23.02	8.82	12.71	11.32	10.70	0.08

Table C-2.34 *Results of wave computation for sea dike design*

Vùng 4 - mặt cắt 34 - chu kỳ lặp 10 năm;X=700719 Y=1906430						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.64	2.11	12.71	12.07	11.64	0.46
50	5.79	3.84	12.71	11.90	11.48	0.33
100	9.86	4.99	12.71	11.88	11.45	0.20
150	9.90	5.11	12.71	11.87	11.44	0.19
200	9.96	5.24	12.71	11.86	11.43	0.18
250	10.31	5.37	12.71	11.84	11.41	0.17
300	10.65	5.51	12.71	11.83	11.39	0.16
350	11.01	5.63	12.71	11.81	11.36	0.16
400	11.36	5.75	12.71	11.79	11.34	0.15
450	11.62	5.87	12.71	11.78	11.32	0.14
500	11.87	5.98	12.71	11.76	11.30	0.13
600	12.37	6.21	12.71	11.73	11.25	0.12
700	12.87	6.43	12.71	11.70	11.21	0.10
800	13.38	6.65	12.71	11.67	11.17	0.09
900	13.88	6.86	12.71	11.64	11.12	0.08
1000	14.39	7.06	12.71	11.61	11.08	0.07

Vùng 4 - mặt cắt 34 - chu kỳ lặp 20 năm;X=700719 Y=1906430						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.91	2.22	11.76	11.24	10.89	0.45
50	6.06	3.99	11.76	11.01	10.60	0.32
100	10.13	5.16	11.76	10.97	10.55	0.20
150	10.18	5.28	11.76	10.96	10.54	0.19
200	10.24	5.40	11.76	10.95	10.53	0.18
250	10.59	5.54	11.76	10.93	10.50	0.17
300	10.93	5.67	11.76	10.91	10.48	0.16
350	11.29	5.80	11.76	10.89	10.46	0.15
400	11.64	5.92	11.76	10.88	10.43	0.14
450	11.90	6.03	11.76	10.86	10.41	0.14
500	12.15	6.15	11.76	10.85	10.39	0.13
600	12.65	6.37	11.76	10.81	10.34	0.12
700	13.16	6.59	11.76	10.78	10.30	0.10
800	13.66	6.81	11.76	10.74	10.25	0.09
900	14.16	7.02	11.76	10.71	10.20	0.08
1000	14.67	7.23	11.76	10.67	10.15	0.07

Vùng 4 - mặt cắt 34 - chu kỳ lặp 50 năm;X=700719 Y=1906430						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.35	2.69	12.71	11.70	11.35	0.45
50	6.51	4.27	12.71	11.49	11.08	0.33
100	10.59	5.39	12.71	11.43	11.02	0.22
150	10.64	5.52	12.71	11.43	11.01	0.21
200	10.70	5.64	12.71	11.42	10.99	0.20
250	11.05	5.77	12.71	11.40	10.97	0.19
300	11.39	5.90	12.71	11.38	10.95	0.18
350	11.75	6.03	12.71	11.37	10.92	0.17
400	12.10	6.15	12.71	11.35	10.90	0.16
450	12.35	6.27	12.71	11.33	10.88	0.16
500	12.61	6.38	12.71	11.32	10.86	0.15
600	13.11	6.61	12.71	11.29	10.82	0.14
700	13.61	6.83	12.71	11.25	10.77	0.12
800	14.12	7.05	12.71	11.22	10.73	0.11
900	14.62	7.27	12.71	11.19	10.68	0.10
1000	15.13	7.47	12.71	11.15	10.63	0.09

Vùng 4 - mặt cắt 34 - chu kỳ lặp 100 năm;X=700719 Y=1906430						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.74	3.12	12.71	11.97	11.63	0.44
50	6.91	4.54	12.71	11.77	11.37	0.33
100	11.00	5.59	12.71	11.71	11.29	0.23
150	11.04	5.71	12.71	11.70	11.27	0.22
200	11.10	5.83	12.71	11.69	11.26	0.21
250	11.45	5.97	12.71	11.67	11.24	0.20
300	11.79	6.10	12.71	11.66	11.22	0.19
350	12.15	6.23	12.71	11.64	11.19	0.18
400	12.50	6.35	12.71	11.62	11.17	0.18
450	12.76	6.46	12.71	11.61	11.15	0.17
500	13.01	6.58	12.71	11.59	11.13	0.16
600	13.51	6.81	12.71	11.56	11.09	0.15
700	14.02	7.03	12.71	11.53	11.04	0.13
800	14.52	7.25	12.71	11.50	11.00	0.12
900	15.02	7.46	12.71	11.46	10.95	0.11
1000	15.53	7.67	12.71	11.43	10.90	0.10

Table C-2.34 *Results of wave computation for sea dike design (continued)*

Vùng 4 - mặt cắt 34 - chu kỳ lặp 125 năm;X=700719 Y=1906430						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.96	3.25	12.71	11.98	11.65	0.44
50	7.03	4.62	12.71	11.78	11.38	0.33
100	11.13	5.84	12.71	11.71	11.29	0.23
150	11.17	5.77	12.71	11.70	11.28	0.22
200	11.23	5.89	12.71	11.69	11.27	0.21
250	11.58	6.02	12.71	11.86	11.25	0.20
300	11.92	6.16	12.71	11.86	11.22	0.19
350	12.28	6.28	12.71	11.64	11.20	0.19
400	12.63	6.40	12.71	11.63	11.18	0.18
450	12.89	6.52	12.71	11.81	11.15	0.17
500	13.14	6.63	12.71	11.60	11.13	0.16
600	13.64	6.86	12.71	11.56	11.09	0.15
700	14.15	7.08	12.71	11.53	11.05	0.14
800	14.65	7.30	12.71	11.50	11.00	0.12
900	15.15	7.52	12.71	11.47	10.96	0.11
1000	15.66	7.73	12.71	11.43	10.91	0.10

Vùng 4 - mặt cắt 34 - chu kỳ lặp 150 năm;X=700719 Y=1906430						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.01	3.42	12.71	12.09	11.76	0.43
50	7.19	4.73	12.71	11.87	11.47	0.33
100	11.29	5.72	12.71	11.80	11.39	0.23
150	11.34	5.85	12.71	11.79	11.37	0.22
200	11.40	5.97	12.71	11.78	11.36	0.21
250	11.74	6.10	12.71	11.77	11.33	0.20
300	12.09	6.24	12.71	11.75	11.31	0.19
350	12.44	6.36	12.71	11.73	11.29	0.19
400	12.79	6.48	12.71	11.72	11.26	0.18
450	13.05	6.60	12.71	11.70	11.24	0.17
500	13.31	6.71	12.71	11.69	11.22	0.17
600	13.80	6.94	12.71	11.65	11.18	0.15
700	14.31	7.16	12.71	11.62	11.13	0.14
800	14.82	7.39	12.71	11.59	11.09	0.13
900	15.31	7.60	12.71	11.56	11.04	0.11
1000	15.82	7.81	12.71	11.52	11.00	0.10

Vùng 4 - mặt cắt 34 - chu kỳ lặp 200 năm;X=700719 Y=1906430						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.18	3.59	12.71	12.19	11.87	0.43
50	7.36	4.84	12.71	11.97	11.58	0.33
100	11.46	5.81	12.71	11.90	11.47	0.23
150	11.51	5.93	12.71	11.89	11.46	0.23
200	11.57	6.05	12.71	11.88	11.45	0.22
250	11.91	6.19	12.71	11.86	11.43	0.21
300	12.26	6.32	12.71	11.84	11.40	0.20
350	12.62	6.44	12.71	11.83	11.38	0.19
400	12.97	6.56	12.71	11.81	11.36	0.18
450	13.22	6.68	12.71	11.79	11.34	0.18
500	13.48	6.79	12.71	11.78	11.31	0.17
600	13.98	7.02	12.71	11.75	11.27	0.16
700	14.49	7.24	12.71	11.72	11.23	0.14
800	14.99	7.46	12.71	11.69	11.18	0.13
900	15.49	7.68	12.71	11.65	11.14	0.12
1000	16.00	7.89	12.71	11.62	11.09	0.11

Table C-2.35 *Results of wave computation for sea dike design*

Vùng 4 - mặt cắt 35 - chu kỳ lặp 10 năm ;X=716906 Y=1893980						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.62	1.57	12.71	12.05	11.69	0.51
50	4.05	2.25	12.71	11.96	11.55	0.46
100	6.42	2.75	12.71	11.93	11.51	0.41
150	6.44	2.78	12.71	11.93	11.50	0.41
200	6.46	2.80	12.71	11.92	11.50	0.41
250	6.39	2.83	12.71	11.93	11.51	0.40
300	6.31	2.87	12.71	11.93	11.51	0.40
350	6.24	2.92	12.71	11.93	11.51	0.40
400	6.15	2.97	12.71	11.94	11.52	0.39
450	6.04	3.05	12.71	11.95	11.53	0.39
500	5.93	3.13	12.71	11.95	11.54	0.38
600	5.77	3.40	12.71	11.96	11.55	0.35
700	6.31	3.77	12.71	11.95	11.54	0.32
800	6.90	4.17	12.71	11.93	11.51	0.28
900	7.68	4.61	12.71	11.91	11.48	0.24
1000	8.48	5.06	12.71	11.88	11.44	0.20

Vùng 4 - mặt cắt 35 - chu kỳ lặp 20 năm;X=716906 Y=1893980						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.86	1.73	11.76	11.24	10.93	0.47
50	4.29	2.35	11.76	11.11	10.74	0.43
100	6.67	2.83	11.76	11.06	10.68	0.39
150	6.69	2.86	11.76	11.06	10.67	0.39
200	6.71	2.89	11.76	11.06	10.67	0.39
250	6.64	2.91	11.76	11.06	10.67	0.39
300	6.56	2.95	11.76	11.06	10.68	0.38
350	6.49	3.00	11.76	11.07	10.68	0.37
400	6.40	3.05	11.76	11.07	10.68	0.37
450	6.29	3.13	11.76	11.08	10.69	0.36
500	6.18	3.21	11.76	11.08	10.70	0.36
600	6.02	3.47	11.76	11.09	10.71	0.33
700	6.57	3.83	11.76	11.07	10.69	0.30
800	7.16	4.23	11.76	11.05	10.67	0.27
900	7.94	4.66	11.76	11.03	10.63	0.23
1000	8.74	5.10	11.76	11.00	10.59	0.19

Vùng 4 - mặt cắt 35 - chu kỳ lặp 50 năm ;X=716906 Y=1893980						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.30	1.95	12.71	11.68	11.35	0.49
50	4.71	2.56	12.71	11.58	11.21	0.45
100	7.12	3.04	12.71	11.54	11.15	0.41
150	7.14	3.06	12.71	11.54	11.15	0.41
200	7.15	3.09	12.71	11.54	11.15	0.41
250	7.08	3.12	12.71	11.54	11.15	0.40
300	7.01	3.16	12.71	11.54	11.15	0.40
350	6.93	3.21	12.71	11.54	11.16	0.40
400	6.85	3.27	12.71	11.55	11.16	0.39
450	6.74	3.35	12.71	11.55	11.17	0.38
500	6.63	3.43	12.71	11.56	11.17	0.38
600	6.47	3.69	12.71	11.56	11.18	0.35
700	7.01	4.06	12.71	11.55	11.16	0.32
800	7.60	4.45	12.71	11.53	11.14	0.29
900	8.38	4.88	12.71	11.50	11.10	0.25
1000	9.19	5.33	12.71	11.47	11.06	0.21

Vùng 4 - mặt cắt 35 - chu kỳ lặp 100 năm;X=716906 Y=1893980						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.69	2.18	12.71	11.97	11.64	0.50
50	5.12	2.75	12.71	11.87	11.50	0.46
100	7.51	3.21	12.71	11.82	11.43	0.42
150	7.53	3.24	12.71	11.82	11.43	0.42
200	7.54	3.27	12.71	11.82	11.43	0.42
250	7.47	3.31	12.71	11.82	11.43	0.41
300	7.40	3.34	12.71	11.82	11.43	0.41
350	7.32	3.40	12.71	11.82	11.43	0.41
400	7.24	3.45	12.71	11.83	11.44	0.40
450	7.13	3.54	12.71	11.83	11.44	0.39
500	7.02	3.62	12.71	11.83	11.45	0.39
600	6.86	3.89	12.71	11.84	11.46	0.36
700	7.40	4.25	12.71	11.82	11.44	0.33
800	7.99	4.65	12.71	11.80	11.41	0.30
900	8.77	5.08	12.71	11.76	11.37	0.26
1000	9.57	5.52	12.71	11.75	11.33	0.23

Table C-2.35 *Results of wave computation for sea dike design (continued)*

Vùng 4 - mặt cắt 35 - chu kỳ lặp 125 năm;X=716906 Y=1893880						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.84	2.24	12.71	11.97	11.64	0.50
50	5.27	2.81	12.71	11.87	11.50	0.46
100	7.86	3.28	12.71	11.83	11.44	0.42
150	7.88	3.31	12.71	11.82	11.44	0.42
200	7.89	3.34	12.71	11.82	11.43	0.42
250	7.82	3.37	12.71	11.82	11.44	0.41
300	7.55	3.41	12.71	11.83	11.44	0.41
350	7.47	3.47	12.71	11.83	11.44	0.41
400	7.39	3.52	12.71	11.83	11.44	0.40
450	7.28	3.61	12.71	11.84	11.45	0.39
500	7.17	3.69	12.71	11.84	11.45	0.39
600	7.01	3.96	12.71	11.84	11.46	0.38
700	7.55	4.32	12.71	11.83	11.44	0.33
800	8.14	4.72	12.71	11.81	11.41	0.30
900	8.92	5.15	12.71	11.78	11.38	0.28
1000	9.73	5.59	12.71	11.75	11.34	0.23

Vùng 4 - mặt cắt 35 - chu kỳ lặp 150 năm;X=716906 Y=1893880						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.92	2.28	12.71	12.06	11.73	0.50
50	5.38	2.85	12.71	11.97	11.59	0.46
100	7.75	3.32	12.71	11.92	11.53	0.42
150	7.78	3.35	12.71	11.92	11.53	0.42
200	7.78	3.38	12.71	11.92	11.53	0.42
250	7.71	3.41	12.71	11.92	11.53	0.42
300	7.63	3.45	12.71	11.92	11.53	0.41
350	7.55	3.51	12.71	11.92	11.53	0.41
400	7.47	3.56	12.71	11.93	11.54	0.41
450	7.38	3.65	12.71	11.93	11.54	0.40
500	7.25	3.73	12.71	11.93	11.55	0.39
600	7.09	4.00	12.71	11.94	11.56	0.37
700	7.64	4.38	12.71	11.92	11.53	0.34
800	8.23	4.76	12.71	11.90	11.51	0.30
900	9.01	5.19	12.71	11.86	11.47	0.27
1000	9.81	5.63	12.71	11.85	11.43	0.23

Vùng 4 - mặt cắt 35 - chu kỳ lặp 200 năm;X=716906 Y=1893880						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.11	2.37	12.71	12.16	11.81	0.51
50	5.54	2.94	12.71	12.06	11.69	0.47
100	7.93	3.40	12.71	12.02	11.63	0.43
150	7.95	3.43	12.71	12.02	11.63	0.43
200	7.96	3.46	12.71	12.02	11.62	0.42
250	7.89	3.50	12.71	12.02	11.63	0.42
300	7.82	3.54	12.71	12.02	11.63	0.42
350	7.74	3.60	12.71	12.02	11.63	0.41
400	7.66	3.65	12.71	12.02	11.63	0.41
450	7.55	3.74	12.71	12.03	11.64	0.40
500	7.44	3.82	12.71	12.03	11.64	0.39
600	7.27	4.09	12.71	12.03	11.65	0.37
700	7.82	4.46	12.71	12.02	11.63	0.34
800	8.41	4.85	12.71	12.00	11.60	0.31
900	9.19	5.28	12.71	11.97	11.57	0.27
1000	10.00	5.72	12.71	11.94	11.53	0.23

Table C-2.36 *Results of wave computation for sea dike design*

Vùng 4 - mặt cắt 36 - chu kỳ lặp 10 năm;X=727416 Y=1876719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.50	1.48	12.71	12.24	11.96	0.45
50	3.56	2.09	12.71	12.18	11.89	0.40
100	5.58	2.55	12.71	12.18	11.87	0.35
150	5.61	2.60	12.71	12.16	11.86	0.35
200	5.64	2.65	12.71	12.16	11.86	0.35
250	5.75	2.70	12.71	12.16	11.85	0.34
300	5.87	2.75	12.71	12.15	11.85	0.34
350	5.98	2.80	12.71	12.15	11.84	0.33
400	6.09	2.85	12.71	12.15	11.84	0.33
450	6.15	2.91	12.71	12.14	11.84	0.33
500	6.22	2.97	12.71	12.14	11.83	0.32
600	6.37	3.10	12.71	12.13	11.83	0.31
700	6.61	3.26	12.71	12.13	11.81	0.30
800	6.86	3.43	12.71	12.12	11.80	0.29
900	7.27	3.62	12.71	12.10	11.78	0.27
1000	7.74	3.81	12.71	12.08	11.76	0.26

Vùng 4 - mặt cắt 36 - chu kỳ lặp 20 năm;X=727416 Y=1876719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.74	1.54	11.76	11.41	11.16	0.44
50	3.81	2.18	11.76	11.34	11.07	0.40
100	5.83	2.65	11.76	11.31	11.05	0.35
150	5.86	2.70	11.76	11.31	11.04	0.34
200	5.89	2.75	11.76	11.31	11.04	0.34
250	6.00	2.80	11.76	11.30	11.03	0.34
300	6.11	2.85	11.76	11.30	11.03	0.33
350	6.23	2.91	11.76	11.29	11.02	0.33
400	6.33	2.96	11.76	11.29	11.02	0.33
450	6.40	3.02	11.76	11.29	11.01	0.32
500	6.47	3.08	11.76	11.28	11.01	0.32
600	6.61	3.22	11.76	11.28	11.00	0.31
700	6.86	3.38	11.76	11.27	10.99	0.29
800	7.11	3.55	11.76	11.26	10.97	0.28
900	7.52	3.74	11.76	11.24	10.95	0.27
1000	7.99	3.92	11.76	11.22	10.93	0.26

Vùng 4 - mặt cắt 36 - chu kỳ lặp 50 năm;X=727416 Y=1876719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.16	1.72	12.71	11.85	11.59	0.47
50	4.22	2.35	12.71	11.79	11.52	0.42
100	6.24	2.84	12.71	11.77	11.50	0.37
150	6.27	2.89	12.71	11.77	11.49	0.37
200	6.30	2.94	12.71	11.77	11.49	0.37
250	6.42	3.00	12.71	11.76	11.48	0.36
300	6.53	3.05	12.71	11.76	11.48	0.36
350	6.64	3.10	12.71	11.75	11.47	0.35
400	6.75	3.16	12.71	11.75	11.47	0.35
450	6.82	3.22	12.71	11.74	11.46	0.35
500	6.88	3.28	12.71	11.74	11.46	0.34
600	7.03	3.42	12.71	11.73	11.45	0.33
700	7.27	3.57	12.71	11.72	11.44	0.32
800	7.52	3.75	12.71	11.71	11.42	0.31
900	7.94	3.93	12.71	11.70	11.40	0.29
1000	8.40	4.12	12.71	11.68	11.38	0.28

Vùng 4 - mặt cắt 36 - chu kỳ lặp 100 năm;X=727416 Y=1876719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.52	1.92	12.71	12.14	11.87	0.48
50	4.58	2.53	12.71	12.07	11.79	0.43
100	6.60	3.01	12.71	12.04	11.76	0.39
150	6.63	3.06	12.71	12.04	11.76	0.38
200	6.66	3.11	12.71	12.04	11.75	0.38
250	6.78	3.16	12.71	12.03	11.75	0.38
300	6.89	3.21	12.71	12.03	11.74	0.37
350	7.00	3.27	12.71	12.02	11.73	0.37
400	7.11	3.32	12.71	12.02	11.73	0.36
450	7.18	3.38	12.71	12.01	11.72	0.36
500	7.24	3.44	12.71	12.01	11.72	0.36
600	7.39	3.58	12.71	12.00	11.71	0.35
700	7.63	3.74	12.71	11.99	11.70	0.33
800	7.86	3.92	12.71	11.98	11.68	0.32
900	8.30	4.10	12.71	11.97	11.66	0.31
1000	8.76	4.28	12.71	11.95	11.64	0.29

Table C-2.36 *Results of wave computation for sea dike design (continued)*

Vùng 4 - mặt cắt 36 - chu kỳ lặp 125 năm;X=727416 Y=1876719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.65	1.97	12.71	12.15	11.88	0.48
50	4.71	2.58	12.71	12.08	11.80	0.43
100	6.74	3.07	12.71	12.05	11.76	0.39
150	6.77	3.12	12.71	12.04	11.76	0.39
200	6.80	3.17	12.71	12.04	11.76	0.38
250	6.91	3.22	12.71	12.04	11.75	0.38
300	7.02	3.27	12.71	12.03	11.75	0.37
350	7.14	3.33	12.71	12.03	11.74	0.37
400	7.24	3.38	12.71	12.02	11.73	0.37
450	7.31	3.44	12.71	12.02	11.73	0.36
500	7.38	3.50	12.71	12.01	11.72	0.36
600	7.52	3.64	12.71	12.01	11.71	0.35
700	7.77	3.90	12.71	12.00	11.70	0.34
800	8.02	3.97	12.71	11.99	11.69	0.32
900	8.43	4.16	12.71	11.97	11.67	0.31
1000	8.90	4.34	12.71	11.95	11.65	0.30

Vùng 4 - mặt cắt 36 - chu kỳ lặp 150 năm;X=727416 Y=1876719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.76	2.02	12.71	12.24	11.96	0.48
50	4.83	2.63	12.71	12.17	11.89	0.44
100	6.85	3.12	12.71	12.14	11.85	0.39
150	6.88	3.17	12.71	12.13	11.85	0.38
200	6.91	3.22	12.71	12.13	11.85	0.39
250	7.02	3.27	12.71	12.13	11.84	0.38
300	7.14	3.32	12.71	12.12	11.83	0.38
350	7.25	3.38	12.71	12.12	11.83	0.37
400	7.36	3.43	12.71	12.11	11.82	0.37
450	7.42	3.50	12.71	12.11	11.82	0.37
500	7.49	3.56	12.71	12.10	11.81	0.36
600	7.64	3.70	12.71	12.10	11.80	0.35
700	7.89	3.85	12.71	12.09	11.79	0.34
800	8.13	4.03	12.71	12.08	11.78	0.33
900	8.55	4.21	12.71	12.06	11.76	0.31
1000	9.01	4.39	12.71	12.04	11.73	0.30

Vùng 4 - mặt cắt 36 - chu kỳ lặp 200 năm;X=727416 Y=1876719						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.99	2.11	12.71	12.33	12.05	0.49
50	5.05	2.73	12.71	12.26	11.97	0.44
100	7.08	3.22	12.71	12.23	11.94	0.40
150	7.10	3.27	12.71	12.22	11.94	0.39
200	7.13	3.32	12.71	12.22	11.93	0.39
250	7.25	3.37	12.71	12.22	11.93	0.39
300	7.36	3.43	12.71	12.21	11.92	0.38
350	7.47	3.48	12.71	12.21	11.92	0.38
400	7.58	3.54	12.71	12.20	11.91	0.37
450	7.65	3.60	12.71	12.20	11.90	0.37
500	7.72	3.66	12.71	12.20	11.90	0.37
600	7.86	3.80	12.71	12.19	11.89	0.35
700	8.10	3.96	12.71	12.18	11.88	0.34
800	8.35	4.13	12.71	12.17	11.86	0.33
900	8.77	4.31	12.71	12.15	11.84	0.32
1000	9.24	4.49	12.71	12.13	11.82	0.31

Table C-2.37 *Results of wave computation for sea dike design*

Vùng 5 - mặt cắt 37 - chu kỳ lặp 10 năm;X=735076 Y=1867950						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.80	1.64	12.71	11.30	10.97	0.55
50	3.67	2.34	12.71	11.24	10.88	0.48
100	5.63	2.85	12.71	11.22	10.86	0.43
150	5.82	2.90	12.71	11.21	10.84	0.43
200	6.00	2.95	12.71	11.20	10.83	0.43
250	6.14	2.99	12.71	11.20	10.82	0.42
300	6.26	3.03	12.71	11.19	10.82	0.42
350	6.32	3.07	12.71	11.19	10.81	0.42
400	6.37	3.11	12.71	11.18	10.81	0.41
450	6.41	3.16	12.71	11.18	10.81	0.41
500	6.44	3.20	12.71	11.18	10.80	0.41
600	6.45	3.32	12.71	11.18	10.80	0.40
700	6.47	3.49	12.71	11.18	10.80	0.38
800	6.83	3.70	12.71	11.16	10.80	0.37
900	6.91	3.97	12.71	11.17	10.79	0.34
1000	7.43	4.29	12.71	11.15	10.76	0.32

Vùng 5 - mặt cắt 37 - chu kỳ lặp 20 năm;X=735076 Y=1867950						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.85	1.85	12.71	11.62	11.30	0.55
50	3.93	2.50	12.71	11.54	11.20	0.50
100	5.89	2.98	12.71	11.52	11.16	0.45
150	6.08	3.03	12.71	11.51	11.15	0.44
200	6.26	3.07	12.71	11.50	11.14	0.44
250	6.40	3.11	12.71	11.50	11.13	0.44
300	6.52	3.15	12.71	11.49	11.12	0.43
350	6.58	3.19	12.71	11.49	11.12	0.43
400	6.64	3.23	12.71	11.49	11.12	0.43
450	6.69	3.28	12.71	11.49	11.12	0.43
500	6.70	3.32	12.71	11.49	11.12	0.42
600	6.71	3.44	12.71	11.49	11.12	0.41
700	6.74	3.60	12.71	11.49	11.12	0.40
800	6.90	3.80	12.71	11.49	11.11	0.38
900	7.18	4.07	12.71	11.48	11.10	0.36
1000	7.70	4.36	12.71	11.46	11.09	0.34

Vùng 5 - mặt cắt 37 - chu kỳ lặp 50 năm;X=735076 Y=1867950						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.26	2.10	13.72	12.04	11.60	0.58
50	4.34	2.72	12.71	11.98	11.62	0.52
100	6.31	3.19	12.71	11.96	11.60	0.48
150	6.49	3.24	12.71	11.95	11.58	0.47
200	6.68	3.29	12.71	11.95	11.57	0.47
250	6.81	3.33	12.71	11.94	11.56	0.47
300	6.93	3.37	12.71	11.94	11.56	0.46
350	6.99	3.41	12.71	11.94	11.55	0.46
400	7.06	3.45	12.71	11.94	11.56	0.46
450	7.09	3.50	12.71	11.93	11.55	0.46
500	7.12	3.55	12.71	11.93	11.55	0.45
600	7.12	3.67	12.71	11.93	11.56	0.44
700	7.15	3.93	12.71	11.93	11.55	0.43
800	7.31	4.04	12.71	11.93	11.54	0.41
900	7.59	4.30	12.71	11.92	11.53	0.39
1000	8.11	4.62	12.71	11.90	11.51	0.36

Vùng 5 - mặt cắt 37 - chu kỳ lặp 100 năm;X=735076 Y=1867950						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.61	2.31	13.72	12.37	12.00	0.60
50	4.70	2.91	13.72	12.33	11.95	0.55
100	6.56	3.37	13.72	12.32	11.93	0.50
150	6.85	3.42	13.72	12.31	11.92	0.50
200	7.03	3.47	13.72	12.30	11.92	0.49
250	7.17	3.51	13.72	12.30	11.91	0.49
300	7.29	3.55	13.72	12.30	11.90	0.49
350	7.35	3.59	13.72	12.29	11.90	0.48
400	7.40	3.64	13.72	12.29	11.90	0.48
450	7.44	3.68	13.72	12.29	11.90	0.48
500	7.47	3.74	13.72	12.29	11.89	0.47
600	7.48	3.86	13.72	12.29	11.89	0.46
700	7.50	4.02	13.72	12.29	11.89	0.45
800	7.66	4.24	13.72	12.29	11.89	0.43
900	7.84	4.51	13.72	12.26	11.87	0.41
1000	8.46	4.82	13.72	12.26	11.85	0.38

Table C-2.37 *Results of wave computation for sea dike design (continued)*

Vùng 5 - mặt cắt 37 - chu kỳ lặp 125 năm;X=735078 Y=1087950						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.72	2.39	13.72	12.47	12.10	0.60
50	4.81	2.97	13.72	12.42	12.06	0.55
100	6.77	3.43	13.72	12.40	12.02	0.51
150	6.93	3.47	13.72	12.40	12.07	0.50
200	7.14	3.52	13.72	12.39	12.00	0.50
250	7.23	3.56	13.72	12.39	11.98	0.50
300	7.40	3.51	13.72	12.38	11.99	0.49
350	7.45	3.55	13.72	12.38	11.98	0.49
400	7.51	3.59	13.72	12.38	11.98	0.49
450	7.55	3.74	13.72	12.38	11.98	0.48
500	7.58	3.79	13.72	12.38	11.98	0.48
600	7.59	3.92	13.72	12.38	11.98	0.47
700	7.61	4.08	13.72	12.38	11.98	0.46
800	7.77	4.30	13.72	12.37	11.97	0.44
900	8.05	4.57	13.72	12.36	11.96	0.42
1000	8.57	4.98	13.72	12.34	11.93	0.39

Vùng 5 - mặt cắt 37 - chu kỳ lặp 150 năm;X=735078 Y=1087950						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.79	2.44	13.72	12.55	12.19	0.60
50	4.88	3.01	13.72	12.51	12.13	0.56
100	6.85	3.47	13.72	12.49	12.10	0.51
150	7.04	3.51	13.72	12.48	12.09	0.51
200	7.22	3.56	13.72	12.48	12.09	0.51
250	7.36	3.60	13.72	12.47	12.09	0.50
300	7.47	3.65	13.72	12.47	12.07	0.50
350	7.54	3.69	13.72	12.47	12.07	0.50
400	7.59	3.73	13.72	12.46	12.08	0.49
450	7.63	3.78	13.72	12.46	12.08	0.49
500	7.66	3.84	13.72	12.46	12.05	0.49
600	7.66	3.96	13.72	12.46	12.05	0.48
700	7.69	4.13	13.72	12.46	12.05	0.46
800	7.85	4.34	13.72	12.46	12.05	0.44
900	8.13	4.61	13.72	12.45	12.04	0.42
1000	8.64	4.93	13.72	12.43	12.01	0.40

Vùng 5 - mặt cắt 37 - chu kỳ lặp 200 năm;X=735078 Y=1087950						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.01	2.55	13.72	12.33	12.25	0.61
50	5.10	3.12	13.72	12.60	12.27	0.56
100	7.05	3.57	13.72	12.58	12.19	0.52
150	7.25	3.62	13.72	12.57	12.18	0.51
200	7.43	3.67	13.72	12.57	12.17	0.51
250	7.57	3.71	13.72	12.56	12.16	0.51
300	7.69	3.75	13.72	12.56	12.16	0.50
350	7.75	3.80	13.72	12.56	12.15	0.50
400	7.80	3.84	13.72	12.55	12.15	0.50
450	7.84	3.89	13.72	12.55	12.15	0.49
500	7.87	3.94	13.72	12.55	12.15	0.49
600	7.88	4.07	13.72	12.55	12.15	0.48
700	7.90	4.24	13.72	12.55	12.15	0.47
800	8.03	4.46	13.72	12.55	12.14	0.45
900	8.34	4.73	13.72	12.53	12.12	0.43
1000	8.85	5.04	13.72	12.51	12.10	0.40

Table C-2.38 *Results of wave computation for sea dike design*

Vùng 5 - mặt cắt 35 - chu kỳ lặp 10 năm:X=743140 Y=1860959

Khoảng cách rời bờ (m)	Độ sâu (m)	Hs (m)	Ts (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	1.50	1.83	12.71	11.32	10.60	0.58
50	4.77	3.17	12.71	11.35	10.64	0.47
100	7.76	4.05	12.71	11.21	10.62	0.37
150	7.87	4.14	12.71	11.20	10.62	0.37
200	7.97	4.23	12.71	11.20	10.61	0.36
250	8.08	4.33	12.71	11.19	10.60	0.35
300	8.19	4.44	12.71	11.19	10.79	0.34
350	8.31	4.56	12.71	11.18	10.78	0.33
400	8.46	4.69	12.71	11.17	10.77	0.32
450	8.70	4.85	12.71	11.16	10.76	0.31
500	8.95	4.97	12.71	11.15	10.74	0.30
600	9.46	5.26	12.71	11.12	10.76	0.29
700	9.87	5.57	12.71	11.09	10.67	0.28
800	10.30	5.91	12.71	11.07	10.64	0.23
900	10.90	6.26	12.71	11.03	10.59	0.20
1000	11.47	6.42	12.71	10.99	10.53	0.17

Vùng 5 - mặt cắt 35 - chu kỳ lặp 20 năm:X=743140 Y=1860959

Khoảng cách rời bờ (m)	Độ sâu (m)	Hs (m)	Ts (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	1.64	2.09	12.71	11.60	11.24	0.60
50	5.04	3.34	12.71	11.51	11.12	0.50
100	8.02	4.19	12.71	11.49	11.10	0.40
150	8.14	4.28	12.71	11.48	11.09	0.39
200	8.24	4.37	12.71	11.47	11.08	0.39
250	8.35	4.48	12.71	11.47	11.07	0.38
300	8.46	4.58	12.71	11.46	11.07	0.37
350	8.58	4.71	12.71	11.46	11.06	0.36
400	8.73	4.83	12.71	11.45	11.05	0.35
450	8.97	4.90	12.71	11.44	11.03	0.34
500	9.22	5.11	12.71	11.42	11.01	0.33
600	9.72	5.21	12.71	11.40	10.98	0.31
700	10.14	5.72	12.71	11.37	10.95	0.28
800	10.57	6.06	12.71	11.35	10.92	0.26
900	11.07	6.45	12.71	11.31	10.87	0.23
1000	11.74	6.88	12.71	11.27	10.82	0.20

Vùng 5 - mặt cắt 35 - chu kỳ lặp 50 năm:X=743140 Y=1860959

Khoảng cách rời bờ (m)	Độ sâu (m)	Hs (m)	Ts (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	2.83	2.52	13.12	12.08	11.73	0.62
50	5.23	3.82	12.71	11.97	11.59	0.52
100	8.49	4.91	12.71	11.94	11.54	0.44
150	8.55	4.59	12.71	11.93	11.54	0.43
200	8.65	4.58	12.71	11.93	11.52	0.42
250	8.76	4.70	12.71	11.92	11.52	0.42
300	8.87	4.81	12.71	11.92	11.51	0.41
350	8.99	4.93	12.71	11.91	11.50	0.40
400	9.14	5.06	12.71	11.90	11.49	0.39
450	9.38	5.20	12.71	11.89	11.48	0.38
500	9.63	5.36	12.71	11.88	11.46	0.37
600	10.13	5.64	12.71	11.85	11.42	0.34
700	10.53	5.95	12.71	11.83	11.40	0.32
800	10.98	6.30	12.71	11.81	11.37	0.29
900	11.48	6.69	12.71	11.77	11.33	0.26
1000	12.14	7.15	12.71	11.75	11.27	0.23

Vùng 5 - mặt cắt 35 - chu kỳ lặp 100 năm:X=743140 Y=1860959

Khoảng cách rời bờ (m)	Độ sâu (m)	Hs (m)	Ts (s)	Tm01 (s)	Tm02 (s)	Set up (m)
0	2.57	2.86	13.12	12.43	12.14	0.63
50	5.29	3.88	13.12	12.33	11.96	0.55
100	8.80	4.81	13.12	12.30	11.90	0.47
150	8.91	4.70	13.12	12.30	11.89	0.46
200	9.01	4.78	13.12	12.29	11.88	0.45
250	9.12	4.90	13.12	12.29	11.86	0.44
300	9.23	5.01	13.12	12.28	11.85	0.44
350	9.35	5.13	13.12	12.28	11.85	0.43
400	9.50	5.29	13.12	12.27	11.85	0.42
450	9.74	5.40	13.12	12.25	11.83	0.41
500	9.99	5.55	13.12	12.24	11.82	0.39
600	10.45	5.84	13.12	12.22	11.79	0.37
700	10.91	6.15	13.12	12.20	11.76	0.35
800	11.34	6.51	13.12	12.17	11.73	0.32
900	11.82	6.90	13.12	12.14	11.68	0.29
1000	12.50	7.38	13.12	12.10	11.62	0.25

Table C-2.38 *Results of wave computation for sea dike design (continued)*

Vùng 5 - mặt cắt 38 - chu kỳ lặp 125 năm;X=743148 Y=1860959

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.88	2.95	13.72	12.58	12.24	0.64
50	5.89	3.93	13.72	12.44	12.05	0.55
100	8.91	4.66	13.72	12.39	11.99	0.48
150	9.01	4.76	13.72	12.39	11.96	0.47
200	9.12	4.85	13.72	12.38	11.97	0.46
250	9.23	4.96	13.72	12.38	11.96	0.45
300	9.34	5.07	13.72	12.37	11.96	0.44
350	9.46	5.19	13.72	12.36	11.95	0.43
400	9.61	5.32	13.72	12.36	11.94	0.42
450	9.85	5.46	13.72	12.34	11.92	0.41
500	10.09	5.60	13.72	12.33	11.91	0.40
600	10.59	5.90	13.72	12.31	11.88	0.38
700	11.02	6.21	13.72	12.29	11.85	0.36
800	11.44	6.57	13.72	12.26	11.82	0.33
900	11.94	6.86	13.72	12.23	11.78	0.30
1000	12.61	7.40	13.72	12.19	11.72	0.27

Vùng 5 - mặt cắt 38 - chu kỳ lặp 150 năm;X=743148 Y=1860959

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.80	3.05	13.72	12.67	12.33	0.64
50	6.02	4.00	13.72	12.53	12.14	0.56
100	9.04	4.73	13.72	12.43	12.07	0.48
150	9.14	4.82	13.72	12.47	12.08	0.47
200	9.24	4.92	13.72	12.47	12.06	0.47
250	9.35	5.02	13.72	12.46	12.05	0.46
300	9.46	5.13	13.72	12.46	12.04	0.45
350	9.58	5.26	13.72	12.45	12.03	0.44
400	9.73	5.39	13.72	12.44	12.02	0.43
450	9.97	5.53	13.72	12.43	12.01	0.42
500	10.22	5.67	13.72	12.42	11.99	0.41
600	10.72	5.97	13.72	12.40	11.96	0.39
700	11.14	6.28	13.72	12.37	11.93	0.36
800	11.57	6.64	13.72	12.35	11.90	0.33
900	12.07	7.03	13.72	12.32	11.86	0.30
1000	12.73	7.47	13.72	12.28	11.81	0.27

Vùng 5 - mặt cắt 38 - chu kỳ lặp 200 năm;X=743148 Y=1860959

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.00	3.20	13.72	12.74	12.39	0.65
50	6.22	4.16	13.72	12.59	12.19	0.57
100	9.23	4.80	13.72	12.53	12.11	0.49
150	9.34	5.30	13.72	12.53	12.10	0.48
200	9.44	5.10	13.72	12.52	12.09	0.48
250	9.55	5.21	13.72	12.51	12.08	0.47
300	9.66	5.32	13.72	12.51	12.07	0.46
350	9.78	5.46	13.72	12.50	12.06	0.45
400	9.93	5.59	13.72	12.49	12.05	0.44
450	10.17	5.74	13.72	12.48	12.03	0.42
500	10.41	5.88	13.72	12.46	12.02	0.41
600	10.91	6.19	13.72	12.44	11.98	0.39
700	11.34	6.51	13.72	12.41	11.95	0.37
800	11.76	6.86	13.72	12.38	11.91	0.34
900	12.26	7.26	13.72	12.35	11.87	0.31
1000	12.92	7.70	13.72	12.31	11.82	0.27

Table C-2.39 *Results of wave computation for sea dike design*

Vùng 5 - mặt cắt 39 - chu kỳ lặp 10 năm X=759391 Y=1848978						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.76	2.10	12.71	11.32	10.82	0.69
50	5.09	3.77	12.71	11.22	10.81	0.45
100	6.20	4.85	12.71	11.20	10.79	0.31
150	6.34	5.06	12.71	11.19	10.76	0.29
200	6.49	5.25	12.71	11.18	10.77	0.27
250	6.65	5.49	12.71	11.17	10.75	0.25
300	6.71	5.72	12.71	11.15	10.73	0.23
350	6.80	5.97	12.71	11.13	10.70	0.21
400	10.02	6.22	12.71	11.11	10.68	0.19
450	10.36	6.47	12.71	11.09	10.64	0.17
500	11.10	6.72	12.71	11.06	10.61	0.15
600	12.19	7.18	12.71	11.01	10.53	0.12
700	13.16	7.61	12.71	10.95	10.44	0.09
800	14.16	7.99	12.71	10.90	10.35	0.07
900	15.13	8.34	12.71	10.84	10.26	0.05
1000	16.12	8.64	12.71	10.78	10.17	0.04

Vùng 5 - mặt cắt 39 - chu kỳ lặp 20 năm X=759391 Y=1848978						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.06	2.40	12.71	11.61	11.22	0.69
50	5.41	3.97	12.71	11.50	11.09	0.45
100	6.53	5.03	12.71	11.47	11.06	0.30
150	6.66	5.23	12.71	11.46	11.05	0.31
200	6.81	5.45	12.71	11.45	11.04	0.30
250	6.16	5.67	12.71	11.44	11.02	0.28
300	6.53	5.90	12.71	11.43	11.00	0.25
350	6.92	6.16	12.71	11.41	10.98	0.23
400	10.34	6.40	12.71	11.39	10.95	0.21
450	10.85	6.65	12.71	11.36	10.92	0.19
500	11.42	6.91	12.71	11.34	10.88	0.17
600	12.51	7.39	12.71	11.29	10.81	0.14
700	13.50	7.82	12.71	11.23	10.73	0.11
800	14.47	8.22	12.71	11.18	10.64	0.09
900	15.45	8.58	12.71	11.12	10.55	0.07
1000	16.43	8.89	12.71	11.05	10.46	0.05

Vùng 5 - mặt cắt 39 - chu kỳ lặp 50 năm X=759391 Y=1848978						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.5169	2.09253	13.7233	12.0079	11.7299	0.60939
50	5.8788	4.29883	12.7059	11.9625	11.5553	0.48177
100	9.031	5.30123	12.7059	11.9276	11.5075	0.36078
150	9.147	5.5035	12.7059	11.8205	11.4695	0.34256
200	9.2685	5.70553	12.7059	11.9129	11.4803	0.32453
250	9.6471	5.94671	12.7059	11.8968	11.4691	0.30416
300	10.0114	6.18492	12.7059	11.8816	11.4491	0.2835
350	10.3995	6.44054	12.7059	11.8633	11.4244	0.26213
400	10.8249	6.69281	12.7059	11.8446	11.3989	0.24103
450	11.3578	6.95362	12.7059	11.8205	11.3656	0.2207
500	11.0902	7.20551	12.7059	11.7960	11.3325	0.20122
600	12.9889	7.66459	12.7059	11.7444	11.2567	0.16636
700	13.9753	8.12641	12.7059	11.6918	11.1821	0.13554
800	14.9474	8.53894	12.7059	11.6373	11.107	0.11038
900	15.9234	8.912	12.7059	11.5807	11.0138	0.08843
1000	16.9043	9.24618	12.7059	11.5228	10.9226	0.07094

Vùng 5 - mặt cắt 39 - chu kỳ lặp 100 năm X=759391 Y=1848978						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.90	3.31	13.72	12.45	12.09	0.63
50	6.29	4.67	13.72	12.29	11.96	0.50
100	9.44	5.67	13.72	12.24	11.79	0.35
150	9.56	5.88	13.72	12.23	11.77	0.35
200	9.70	6.09	13.72	12.22	11.76	0.34
250	10.03	6.35	13.72	12.20	11.74	0.32
300	10.42	6.57	13.72	12.19	11.72	0.30
350	10.81	6.83	13.72	12.17	11.69	0.28
400	11.24	7.08	13.72	12.15	11.67	0.26
450	11.77	7.34	13.72	12.12	11.63	0.24
500	12.31	7.59	13.72	12.10	11.60	0.22
600	13.40	8.07	13.72	12.05	11.53	0.18
700	14.33	8.51	13.72	12.00	11.46	0.15
800	15.35	8.92	13.72	11.95	11.38	0.12
900	16.33	9.30	13.72	11.89	11.30	0.11
1000	17.31	9.64	13.72	11.84	11.22	0.09

Table C-2.39 *Results of wave computation for sea dike design (continued)*

Vùng 5 - mặt cắt 39 - chu kỳ lặp 125 năm;X=758391 Y=1848978						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.04	3.42	13.72	12.54	12.19	0.93
50	6.70	4.75	13.72	12.36	11.95	0.50
100	9.56	5.73	13.72	12.33	11.87	0.39
150	9.87	5.94	13.72	12.32	11.86	0.37
200	9.92	6.06	13.72	12.31	11.85	0.36
250	10.17	6.39	13.72	12.29	11.83	0.33
300	10.54	6.64	13.72	12.26	11.81	0.31
350	10.92	6.89	13.72	12.26	11.78	0.28
400	11.35	7.15	13.72	12.24	11.75	0.26
450	11.38	7.41	13.72	12.21	11.72	0.24
500	12.42	7.66	13.72	12.19	11.69	0.22
600	13.51	8.14	13.72	12.14	11.62	0.19
700	14.50	8.58	13.72	12.09	11.55	0.16
800	15.47	9.00	13.72	12.04	11.47	0.13
900	16.44	9.38	13.72	11.98	11.39	0.11
1000	17.42	9.72	13.72	11.93	11.31	0.09

Vùng 5 - mặt cắt 39 - chu kỳ lặp 150 năm;X=758391 Y=1848978						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.15	3.53	13.72	12.65	12.30	0.63
50	6.52	4.83	13.72	12.47	12.04	0.51
100	9.67	5.80	13.72	12.41	11.96	0.39
150	9.79	6.01	13.72	12.40	11.95	0.37
200	9.85	6.22	13.72	12.40	11.93	0.35
250	10.29	6.46	13.72	12.38	11.91	0.33
300	10.65	6.70	13.72	12.36	11.89	0.31
350	11.04	6.96	13.72	12.34	11.86	0.29
400	11.45	7.21	13.72	12.33	11.84	0.27
450	12.00	7.47	13.72	12.30	11.81	0.25
500	12.54	7.73	13.72	12.28	11.77	0.23
600	13.63	8.21	13.72	12.23	11.70	0.19
700	14.61	8.65	13.72	12.18	11.63	0.16
800	15.58	9.07	13.72	12.12	11.55	0.13
900	16.55	9.45	13.72	12.07	11.47	0.11
1000	17.54	9.79	13.72	12.01	11.39	0.09

Vùng 5 - mặt cắt 39 - chu kỳ lặp 200 năm;X=758391 Y=1848978						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.37	3.78	13.72	12.74	12.38	0.92
50	6.74	5.00	13.72	12.57	12.13	0.50
100	9.91	5.93	13.72	12.50	12.04	0.39
150	10.32	6.14	13.72	12.49	12.03	0.38
200	10.16	6.35	13.72	12.46	12.02	0.36
250	10.52	6.59	13.72	12.47	12.00	0.34
300	10.89	6.83	13.72	12.45	11.98	0.31
350	11.27	7.09	13.72	12.43	11.95	0.29
400	11.70	7.34	13.72	12.41	11.92	0.27
450	12.23	7.60	13.72	12.39	11.89	0.25
500	12.77	7.86	13.72	12.37	11.86	0.23
600	13.96	8.34	13.72	12.31	11.79	0.20
700	14.95	8.78	13.72	12.26	11.72	0.17
800	15.92	9.20	13.72	12.21	11.64	0.14
900	16.79	9.58	13.72	12.16	11.58	0.11
1000	17.77	9.93	13.72	12.10	11.49	0.10

Table C-2.40 *Results of wave computation for sea dike design*

Vùng 5 - mặt cắt 40 - chu kỳ lặp 10 năm;X=775022 Y=1036224						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.63	2.31	12.71	11.40	10.90	0.54
50	6.44	4.53	12.71	11.15	10.73	0.37
100	10.95	5.90	12.71	11.12	10.69	0.21
150	11.72	6.01	12.71	11.10	10.67	0.20
200	11.30	6.13	12.71	11.09	10.65	0.20
250	11.54	6.24	12.71	11.07	10.63	0.19
300	11.79	6.35	12.71	11.06	10.61	0.18
350	12.06	6.47	12.71	11.04	10.58	0.17
400	12.30	6.58	12.71	11.02	10.56	0.17
450	12.50	6.69	12.71	11.01	10.54	0.16
500	12.70	6.80	12.71	10.99	10.52	0.15
600	13.09	7.03	12.71	10.96	10.47	0.14
700	13.53	7.25	12.71	10.92	10.42	0.12
800	14.00	7.48	12.71	10.89	10.37	0.11
900	14.51	7.70	12.71	10.85	10.31	0.10
1000	15.03	7.91	12.71	10.81	10.25	0.09

Vùng 5 - mặt cắt 40 - chu kỳ lặp 20 năm;X=775022 Y=1036224						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.63	2.61	12.71	11.66	11.20	0.56
50	6.75	4.71	12.71	11.43	11.01	0.39
100	11.27	6.06	12.71	11.40	10.97	0.23
150	11.43	6.18	12.71	11.38	10.95	0.22
200	11.61	6.29	12.71	11.37	10.93	0.22
250	11.86	6.41	12.71	11.35	10.91	0.21
300	12.11	6.52	12.71	11.34	10.89	0.20
350	12.37	6.64	12.71	11.32	10.86	0.20
400	12.61	6.75	12.71	11.30	10.84	0.19
450	12.81	6.86	12.71	11.29	10.82	0.18
500	13.01	6.97	12.71	11.27	10.80	0.17
600	13.40	7.20	12.71	11.24	10.75	0.16
700	13.84	7.43	12.71	11.21	10.71	0.15
800	14.31	7.66	12.71	11.17	10.66	0.13
900	14.82	7.89	12.71	11.13	10.60	0.12
1000	15.34	8.11	12.71	11.09	10.54	0.11

Vùng 5 - mặt cắt 40 - chu kỳ lặp 50 năm;X=775022 Y=1036224						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.40	3.13	13.72	12.11	11.71	0.56
50	7.23	5.03	12.71	11.90	11.47	0.41
100	11.76	6.32	12.71	11.85	11.41	0.27
150	11.93	6.44	12.71	11.84	11.40	0.26
200	12.10	6.56	12.71	11.82	11.38	0.25
250	12.35	6.67	12.71	11.81	11.36	0.24
300	12.60	6.78	12.71	11.79	11.33	0.23
350	12.86	6.91	12.71	11.78	11.31	0.23
400	13.11	7.02	12.71	11.76	11.29	0.22
450	13.30	7.13	12.71	11.74	11.27	0.21
500	13.50	7.25	12.71	11.73	11.25	0.20
600	13.89	7.48	12.71	11.70	11.21	0.18
700	14.33	7.71	12.71	11.67	11.16	0.17
800	14.80	7.95	12.71	11.63	11.11	0.16
900	15.31	8.18	12.71	11.59	11.06	0.15
1000	15.83	8.41	12.71	11.56	11.01	0.13

Vùng 5 - mặt cắt 40 - chu kỳ lặp 100 năm;X=775022 Y=1036224						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.82	3.62	13.72	12.47	12.09	0.58
50	7.66	5.34	13.72	12.27	11.84	0.42
100	12.20	6.56	13.72	12.21	11.77	0.29
150	12.37	6.68	13.72	12.20	11.75	0.28
200	12.55	6.80	13.72	12.19	11.73	0.27
250	12.79	6.91	13.72	12.17	11.71	0.26
300	13.04	7.03	13.72	12.16	11.69	0.26
350	13.30	7.15	13.72	12.14	11.67	0.25
400	13.55	7.26	13.72	12.12	11.65	0.24
450	13.75	7.37	13.72	12.11	11.63	0.23
500	13.94	7.48	13.72	12.09	11.61	0.23
600	14.33	7.72	13.72	12.06	11.57	0.21
700	14.77	7.96	13.72	12.03	11.52	0.20
800	15.24	8.20	13.72	12.00	11.47	0.18
900	15.75	8.44	13.72	11.96	11.43	0.17
1000	15.27	8.67	13.72	11.92	11.37	0.15

Table C-2.40 *Results of wave computation for sea dike design (continued)*

Vùng 5 - mặt cắt 40 - chu kỳ lặp 125 năm;X=775022 Y=1836224						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.96	3.78	13.72	12.56	12.18	0.56
50	7.80	5.44	13.72	12.36	11.93	0.42
100	12.54	6.64	13.72	12.30	11.85	0.29
150	12.51	6.75	13.72	12.29	11.84	0.29
200	12.69	6.87	13.72	12.28	11.82	0.28
250	12.93	6.99	13.72	12.26	11.80	0.27
300	13.18	7.11	13.72	12.24	11.78	0.26
350	13.44	7.22	13.72	12.23	11.76	0.25
400	13.69	7.34	13.72	12.21	11.73	0.25
450	13.69	7.45	13.72	12.20	11.71	0.24
500	14.09	7.56	13.72	12.18	11.69	0.23
600	14.48	7.80	13.72	12.15	11.65	0.22
700	14.91	8.04	13.72	12.12	11.61	0.20
800	15.38	8.28	13.72	12.09	11.56	0.19
900	15.89	8.52	13.72	12.05	11.51	0.17
1000	16.41	8.75	13.72	12.01	11.46	0.16

Vùng 5 - mặt cắt 40 - chu kỳ lặp 150 năm;X=775022 Y=1836224						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.09	3.90	13.72	12.65	12.27	0.55
50	7.90	5.52	13.72	12.45	12.02	0.42
100	12.45	6.69	13.72	12.39	11.94	0.30
150	12.82	6.81	13.72	12.36	11.92	0.29
200	12.79	6.93	13.72	12.36	11.90	0.28
250	13.04	7.05	13.72	12.35	11.88	0.28
300	13.29	7.16	13.72	12.33	11.86	0.27
350	13.55	7.28	13.72	12.31	11.84	0.26
400	13.80	7.39	13.72	12.30	11.82	0.25
450	13.99	7.51	13.72	12.28	11.80	0.25
500	14.19	7.62	13.72	12.27	11.78	0.24
600	14.58	7.86	13.72	12.24	11.74	0.22
700	15.02	8.10	13.72	12.21	11.70	0.21
800	15.49	8.34	13.72	12.17	11.65	0.19
900	16.00	8.58	13.72	12.14	11.60	0.18
1000	16.52	8.81	13.72	12.10	11.55	0.16

Vùng 5 - mặt cắt 40 - chu kỳ lặp 200 năm;X=775022 Y=1836224						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.20	4.16	13.72	12.75	12.39	0.55
50	8.14	5.69	13.72	12.55	12.12	0.42
100	12.69	6.82	13.72	12.48	12.02	0.30
150	12.86	6.94	13.72	12.48	12.01	0.30
200	13.04	7.05	13.72	12.45	11.99	0.29
250	13.28	7.17	13.72	12.43	11.97	0.28
300	13.53	7.29	13.72	12.42	11.95	0.27
350	13.80	7.41	13.72	12.40	11.92	0.27
400	14.04	7.52	13.72	12.39	11.90	0.26
450	14.24	7.63	13.72	12.37	11.88	0.25
500	14.43	7.75	13.72	12.36	11.86	0.24
600	14.83	7.99	13.72	12.33	11.82	0.23
700	15.26	8.23	13.72	12.30	11.78	0.21
800	15.73	8.47	13.72	12.26	11.73	0.20
900	16.21	8.71	13.72	12.23	11.68	0.18
1000	16.76	8.94	13.72	12.19	11.63	0.17

Table C-2.41 *Results of wave computation for sea dike design*

Vùng 5 - mặt cắt 41 - chu kỳ lặp 10 năm;X=792355 Y=1825383						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.54	1.28	12.71	11.23	10.85	0.66
50	2.49	1.70	12.71	11.27	10.90	0.62
100	3.37	2.02	12.71	11.28	10.92	0.59
150	3.39	2.18	12.71	11.30	10.95	0.57
200	3.45	2.33	12.71	11.31	10.96	0.55
250	3.80	2.54	12.71	11.30	10.95	0.53
300	4.16	2.75	12.71	11.30	10.95	0.51
350	4.51	2.97	12.71	11.29	10.93	0.48
400	4.93	3.18	12.71	11.28	10.92	0.46
450	5.31	3.40	12.71	11.27	10.91	0.44
500	5.70	3.62	12.71	11.26	10.90	0.42
600	6.49	4.06	12.71	11.24	10.87	0.38
700	7.31	4.51	12.71	11.21	10.84	0.34
800	8.15	4.95	12.71	11.18	10.79	0.30
900	8.97	5.40	12.71	11.15	10.75	0.26
1000	9.83	5.84	12.71	11.11	10.70	0.23

Vùng 5 - mặt cắt 41 - chu kỳ lặp 20 năm;X=792355 Y=1825383						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.73	1.41	12.71	11.49	11.11	0.69
50	2.71	1.82	12.71	11.54	11.17	0.65
100	3.60	2.15	12.71	11.56	11.20	0.61
150	3.62	2.29	12.71	11.57	11.22	0.60
200	3.68	2.45	12.71	11.58	11.23	0.58
250	4.03	2.66	12.71	11.58	11.22	0.56
300	4.31	2.87	12.71	11.57	11.22	0.54
350	4.77	3.09	12.71	11.57	11.21	0.51
400	5.15	3.30	12.71	11.56	11.20	0.49
450	5.54	3.52	12.71	11.55	11.19	0.47
500	5.92	3.74	12.71	11.54	11.17	0.45
600	6.72	4.19	12.71	11.52	11.15	0.41
700	7.54	4.63	12.71	11.49	11.11	0.37
800	8.38	5.08	12.71	11.46	11.07	0.33
900	9.23	5.53	12.71	11.43	11.03	0.29
1000	10.05	5.97	12.71	11.39	10.97	0.26

Vùng 5 - mặt cắt 41 - chu kỳ lặp 50 năm;X=792355 Y=1825383						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.11	1.60	13.72	11.93	11.52	0.73
50	3.08	2.01	12.71	11.99	11.60	0.69
100	3.95	2.34	12.71	12.02	11.64	0.65
150	3.97	2.49	12.71	12.03	11.65	0.64
200	4.03	2.64	12.71	12.04	11.67	0.62
250	4.38	2.85	12.71	12.03	11.66	0.60
300	4.74	3.06	12.71	12.03	11.66	0.58
350	5.12	3.28	12.71	12.02	11.65	0.55
400	5.50	3.50	12.71	12.01	11.64	0.53
450	5.89	3.72	12.71	12.00	11.63	0.51
500	6.27	3.94	12.71	12.00	11.62	0.49
600	7.08	4.38	12.71	11.97	11.59	0.45
700	7.89	4.83	12.71	11.95	11.56	0.41
800	8.72	5.28	12.71	11.92	11.52	0.37
900	9.55	5.73	12.71	11.88	11.47	0.33
1000	10.40	6.19	12.71	11.85	11.42	0.30

Vùng 5 - mặt cắt 41 - chu kỳ lặp 100 năm;X=792355 Y=1825383						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.41	1.79	13.72	12.32	11.91	0.75
50	3.33	2.18	13.72	12.36	11.97	0.72
100	4.25	2.51	13.72	12.38	12.00	0.68
150	4.27	2.66	13.72	12.39	12.01	0.67
200	4.33	2.81	13.72	12.40	12.02	0.65
250	4.68	3.02	13.72	12.39	12.02	0.63
300	5.04	3.23	13.72	12.39	12.01	0.61
350	5.42	3.45	13.72	12.38	12.00	0.58
400	5.81	3.67	13.72	12.37	11.99	0.56
450	6.19	3.89	13.72	12.37	11.98	0.54
500	6.58	4.11	13.72	12.36	11.97	0.52
600	7.37	4.56	13.72	12.34	11.94	0.48
700	8.19	5.01	13.72	12.31	11.91	0.44
800	9.03	5.46	13.72	12.28	11.87	0.40
900	9.85	5.91	13.72	12.25	11.83	0.36
1000	10.70	6.36	13.72	12.21	11.79	0.33

Table C-2.41 *Results of wave computation for sea dike design (continued)*

Vùng 5 - mặt cắt 41 - chu kỳ lặp 125 năm;X=792355 Y=1825383						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.51	1.85	13.72	12.40	11.99	0.76
50	3.46	2.24	13.72	12.45	12.05	0.72
100	4.36	2.57	13.72	12.47	12.09	0.69
150	4.37	2.71	13.72	12.48	12.10	0.67
200	4.44	2.87	13.72	12.48	12.11	0.66
250	4.79	3.08	13.72	12.48	12.10	0.64
300	5.15	3.29	13.72	12.48	12.10	0.61
350	5.53	3.51	13.72	12.47	12.09	0.59
400	5.91	3.73	13.72	12.46	12.08	0.57
450	6.30	3.95	13.72	12.45	12.07	0.55
500	6.68	4.17	13.72	12.45	12.06	0.53
600	7.47	4.62	13.72	12.43	12.03	0.49
700	8.30	5.07	13.72	12.40	12.00	0.45
800	9.13	5.52	13.72	12.37	11.96	0.41
900	9.95	5.97	13.72	12.34	11.92	0.37
1000	10.81	6.42	13.72	12.30	11.87	0.34

Vùng 5 - mặt cắt 41 - chu kỳ lặp 150 năm;X=792355 Y=1825383						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.60	1.90	13.72	12.49	12.08	0.77
50	3.55	2.29	13.72	12.53	12.14	0.73
100	4.44	2.61	13.72	12.56	12.17	0.70
150	4.46	2.76	13.72	12.57	12.18	0.68
200	4.52	2.92	13.72	12.57	12.19	0.66
250	4.87	3.13	13.72	12.57	12.19	0.64
300	5.23	3.34	13.72	12.56	12.18	0.62
350	5.62	3.56	13.72	12.56	12.17	0.60
400	6.00	3.78	13.72	12.55	12.16	0.58
450	6.38	4.00	13.72	12.54	12.15	0.56
500	6.77	4.22	13.72	12.53	12.14	0.54
600	7.56	4.67	13.72	12.51	12.12	0.49
700	8.39	5.12	13.72	12.49	12.08	0.45
800	9.22	5.57	13.72	12.46	12.04	0.42
900	10.04	6.02	13.72	12.43	12.00	0.38
1000	10.90	6.47	13.72	12.39	11.95	0.34

Vùng 5 - mặt cắt 41 - chu kỳ lặp 200 năm;X=792355 Y=1825383						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.78	1.99	13.72	12.58	12.16	0.78
50	3.73	2.38	13.72	12.62	12.23	0.74
100	4.62	2.71	13.72	12.65	12.26	0.70
150	4.64	2.86	13.72	12.66	12.27	0.69
200	4.70	3.02	13.72	12.66	12.28	0.67
250	5.05	3.23	13.72	12.66	12.28	0.65
300	5.41	3.44	13.72	12.65	12.27	0.63
350	5.79	3.66	13.72	12.65	12.26	0.61
400	6.18	3.88	13.72	12.64	12.25	0.59
450	6.56	4.10	13.72	12.63	12.24	0.56
500	6.95	4.32	13.72	12.62	12.23	0.54
600	7.74	4.77	13.72	12.60	12.20	0.50
700	8.56	5.22	13.72	12.58	12.17	0.46
800	9.40	5.67	13.72	12.55	12.13	0.42
900	10.22	6.12	13.72	12.51	12.09	0.39
1000	11.08	6.56	13.72	12.48	12.04	0.35

Table C-2.42 *Results of wave computation for sea dike design*

Vùng 5 - mặt cắt 42 - chu kỳ lặp 10 năm;X=807602 Y=1812309

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.50	1.33	12.71	11.25	10.87	0.66
50	2.61	1.93	12.71	11.30	10.96	0.60
100	3.68	2.36	12.71	11.32	10.98	0.54
150	4.06	2.56	12.71	11.31	10.97	0.52
200	4.45	2.75	12.71	11.31	10.96	0.50
250	4.81	2.93	12.71	11.30	10.95	0.48
300	5.16	3.11	12.71	11.29	10.94	0.47
350	5.50	3.28	12.71	11.28	10.93	0.45
400	5.84	3.45	12.71	11.27	10.92	0.44
450	6.18	3.63	12.71	11.26	10.90	0.42
500	6.52	3.79	12.71	11.25	10.89	0.41
600	7.18	4.12	12.71	11.23	10.86	0.38
700	7.82	4.44	12.71	11.20	10.83	0.35
800	8.47	4.76	12.71	11.17	10.79	0.33
900	9.12	5.06	12.71	11.14	10.75	0.31
1000	9.77	5.35	12.71	11.11	10.70	0.29

Vùng 5 - mặt cắt 42 - chu kỳ lặp 20 năm;X=807602 Y=1812309

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.70	1.51	12.71	11.56	11.21	0.68
50	2.82	2.06	12.71	11.58	11.24	0.63
100	3.89	2.48	12.71	11.59	11.25	0.57
150	4.28	2.68	12.71	11.58	11.24	0.55
200	4.66	2.87	12.71	11.58	11.23	0.53
250	5.02	3.05	12.71	11.57	11.22	0.52
300	5.37	3.23	12.71	11.56	11.21	0.50
350	5.72	3.40	12.71	11.55	11.19	0.49
400	6.06	3.57	12.71	11.54	11.18	0.47
450	6.40	3.74	12.71	11.53	11.17	0.46
500	6.73	3.91	12.71	11.52	11.16	0.44
600	7.39	4.24	12.71	11.50	11.13	0.41
700	8.04	4.56	12.71	11.47	11.09	0.39
800	8.68	4.87	12.71	11.45	11.06	0.36
900	9.33	5.18	12.71	11.41	11.01	0.34
1000	9.98	5.47	12.71	11.38	10.97	0.32

Vùng 5 - mặt cắt 42 - chu kỳ lặp 50 năm;X=807602 Y=1812309

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.02	1.72	13.72	12.00	11.64	0.73
50	3.14	2.25	12.71	12.03	11.67	0.67
100	4.21	2.67	12.71	12.03	11.68	0.62
150	4.60	2.86	12.71	12.03	11.67	0.60
200	4.98	3.05	12.71	12.02	11.66	0.58
250	5.34	3.24	12.71	12.01	11.65	0.57
300	5.70	3.41	12.71	12.01	11.64	0.55
350	6.04	3.59	12.71	12.00	11.63	0.53
400	6.38	3.76	12.71	11.99	11.62	0.52
450	6.72	3.93	12.71	11.98	11.60	0.50
500	7.06	4.09	12.71	11.97	11.59	0.49
600	7.71	4.42	12.71	11.95	11.56	0.46
700	8.36	4.74	12.71	11.92	11.53	0.44
800	9.00	5.06	12.71	11.89	11.49	0.41
900	9.65	5.36	12.71	11.86	11.45	0.39
1000	10.30	5.66	12.71	11.83	11.41	0.37

Vùng 5 - mặt cắt 42 - chu kỳ lặp 100 năm;X=807602 Y=1812309

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.30	1.88	13.72	12.34	11.95	0.76
50	3.42	2.41	13.72	12.38	12.00	0.71
100	4.49	2.83	13.72	12.39	12.02	0.66
150	4.88	3.03	13.72	12.38	12.01	0.64
200	5.26	3.21	13.72	12.38	12.00	0.62
250	5.62	3.40	13.72	12.37	11.99	0.60
300	5.98	3.57	13.72	12.36	11.98	0.59
350	6.32	3.75	13.72	12.35	11.97	0.57
400	6.66	3.92	13.72	12.34	11.96	0.56
450	7.00	4.09	13.72	12.33	11.95	0.54
500	7.34	4.26	13.72	12.32	11.93	0.53
600	7.99	4.58	13.72	12.30	11.90	0.50
700	8.64	4.90	13.72	12.28	11.87	0.47
800	9.28	5.22	13.72	12.25	11.84	0.45
900	9.93	5.52	13.72	12.22	11.80	0.43
1000	10.58	5.81	13.72	12.19	11.75	0.41

Table C-2.42 *Results of wave computation for sea dike design (continued)*

Vùng 5 - mặt cắt 42 - chu kỳ lặp 125 năm;X=807602 Y=1812309						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.28	1.87	13.72	12.43	12.04	0.78
50	3.40	2.40	13.72	12.46	12.09	0.73
100	4.47	2.82	13.72	12.48	12.11	0.67
150	4.86	3.02	13.72	12.47	12.10	0.66
200	5.25	3.21	13.72	12.46	12.09	0.64
250	5.60	3.39	13.72	12.46	12.08	0.62
300	5.96	3.57	13.72	12.45	12.07	0.60
350	6.30	3.74	13.72	12.44	12.06	0.59
400	6.64	3.91	13.72	12.43	12.05	0.57
450	6.98	4.08	13.72	12.42	12.03	0.56
500	7.32	4.25	13.72	12.41	12.02	0.54
600	7.98	4.58	13.72	12.39	11.99	0.52
700	8.62	4.90	13.72	12.36	11.96	0.49
800	9.27	5.21	13.72	12.34	11.92	0.47
900	9.91	5.52	13.72	12.31	11.88	0.44
1000	10.56	5.81	13.72	12.27	11.84	0.42

Vùng 5 - mặt cắt 42 - chu kỳ lặp 150 năm;X=807602 Y=1812309						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.44	1.96	13.72	12.51	12.11	0.78
50	3.56	2.49	13.72	12.55	12.17	0.73
100	4.64	2.91	13.72	12.56	12.19	0.68
150	5.03	3.11	13.72	12.56	12.18	0.66
200	5.41	3.30	13.72	12.55	12.17	0.64
250	5.77	3.48	13.72	12.54	12.16	0.62
300	6.12	3.66	13.72	12.53	12.15	0.61
350	6.46	3.83	13.72	12.53	12.14	0.59
400	6.81	4.00	13.72	12.52	12.13	0.58
450	7.15	4.17	13.72	12.51	12.11	0.56
500	7.48	4.34	13.72	12.50	12.10	0.55
600	8.14	4.67	13.72	12.47	12.07	0.52
700	8.78	4.99	13.72	12.45	12.04	0.49
800	9.43	5.30	13.72	12.42	12.00	0.47
900	10.08	5.60	13.72	12.39	11.96	0.45
1000	10.73	5.90	13.72	12.36	11.92	0.43

Vùng 5 - mặt cắt 42 - chu kỳ lặp 200 năm;X=807602 Y=1812309						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.59	2.04	13.72	12.59	12.18	0.79
50	3.71	2.57	13.72	12.63	12.25	0.74
100	4.79	3.00	13.72	12.65	12.28	0.69
150	5.18	3.20	13.72	12.65	12.27	0.67
200	5.56	3.38	13.72	12.64	12.26	0.65
250	5.92	3.57	13.72	12.63	12.25	0.63
300	6.27	3.74	13.72	12.62	12.24	0.62
350	6.62	3.92	13.72	12.61	12.23	0.60
400	6.96	4.09	13.72	12.61	12.21	0.59
450	7.30	4.26	13.72	12.59	12.20	0.57
500	7.63	4.42	13.72	12.58	12.19	0.56
600	8.29	4.75	13.72	12.56	12.16	0.53
700	8.94	5.07	13.72	12.54	12.12	0.51
800	9.58	5.38	13.72	12.51	12.09	0.48
900	10.23	5.68	13.72	12.48	12.05	0.46
1000	10.88	5.98	13.72	12.45	12.00	0.44

Table C-2.43 *Results of wave computation for sea dike design*

Vùng 5 - mặt cắt 43 - chu kỳ lặp 10 năm;X=825711 Y=1802165						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.53	1.31	12.71	11.22	10.85	0.67
50	2.81	1.83	12.71	11.27	10.92	0.62
100	3.63	2.22	12.71	11.29	10.95	0.57
150	3.65	2.40	12.71	11.30	10.97	0.56
200	3.73	2.57	12.71	11.31	10.98	0.54
250	4.16	2.82	12.71	11.30	10.97	0.51
300	4.61	3.05	12.71	11.30	10.96	0.49
350	5.08	3.29	12.71	11.28	10.94	0.46
400	5.55	3.51	12.71	11.28	10.93	0.44
450	6.00	3.74	12.71	11.26	10.91	0.42
500	6.45	3.96	12.71	11.25	10.90	0.40
600	7.34	4.38	12.71	11.22	10.88	0.36
700	8.19	4.78	12.71	11.19	10.81	0.33
800	9.05	5.15	12.71	11.15	10.76	0.30
900	9.94	5.49	12.71	11.10	10.69	0.28
1000	10.82	5.77	12.71	11.05	10.63	0.26

Vùng 5 - mặt cắt 43 - chu kỳ lặp 20 năm;X=825711 Y=1802165						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.76	1.50	12.71	11.53	11.17	0.70
50	2.85	1.98	12.71	11.55	11.20	0.65
100	3.88	2.35	12.71	11.56	11.21	0.61
150	3.90	2.52	12.71	11.57	11.23	0.59
200	3.97	2.70	12.71	11.58	11.24	0.57
250	4.41	2.94	12.71	11.57	11.23	0.55
300	4.85	3.18	12.71	11.57	11.22	0.52
350	5.32	3.42	12.71	11.55	11.21	0.50
400	5.79	3.65	12.71	11.54	11.19	0.48
450	6.24	3.87	12.71	11.53	11.17	0.45
500	6.69	4.09	12.71	11.52	11.16	0.43
600	7.58	4.52	12.71	11.49	11.12	0.40
700	8.44	4.91	12.71	11.46	11.07	0.37
800	9.30	5.29	12.71	11.42	11.02	0.34
900	10.19	5.62	12.71	11.37	10.96	0.32
1000	11.06	5.90	12.71	11.32	10.89	0.30

Vùng 5 - mặt cắt 43 - chu kỳ lặp 50 năm;X=825711 Y=1802165						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.14	1.73	13.72	11.99	11.63	0.73
50	3.24	2.17	12.71	12.03	11.68	0.69
100	4.26	2.53	12.71	12.05	11.70	0.65
150	4.29	2.70	12.71	12.06	11.72	0.63
200	4.36	2.87	12.71	12.07	11.73	0.61
250	4.80	3.12	12.71	12.06	11.71	0.59
300	5.24	3.35	12.71	12.05	11.70	0.56
350	5.71	3.60	12.71	12.04	11.69	0.54
400	6.18	3.83	12.71	12.03	11.67	0.52
450	6.63	4.05	12.71	12.02	11.66	0.50
500	7.08	4.27	12.71	12.00	11.64	0.48
600	7.97	4.69	12.71	11.97	11.60	0.44
700	8.83	5.08	12.71	11.93	11.55	0.41
800	9.69	5.45	12.71	11.89	11.49	0.38
900	10.58	5.77	12.71	11.84	11.43	0.36
1000	11.45	6.05	12.71	11.79	11.36	0.35

Vùng 5 - mặt cắt 43 - chu kỳ lặp 100 năm;X=825711 Y=1802165						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.50	1.94	13.72	12.35	11.98	0.76
50	3.60	2.38	13.72	12.39	12.02	0.72
100	4.62	2.74	13.72	12.41	12.05	0.68
150	4.64	2.91	13.72	12.42	12.06	0.66
200	4.72	3.08	13.72	12.42	12.07	0.64
250	5.16	3.33	13.72	12.41	12.06	0.62
300	5.60	3.56	13.72	12.41	12.05	0.60
350	6.07	3.81	13.72	12.39	12.03	0.57
400	6.54	4.04	13.72	12.38	12.02	0.55
450	6.99	4.26	13.72	12.37	12.00	0.53
500	7.44	4.48	13.72	12.36	11.98	0.51
600	8.33	4.90	13.72	12.32	11.94	0.48
700	9.19	5.29	13.72	12.28	11.89	0.44
800	10.05	5.65	13.72	12.24	11.83	0.42
900	10.94	5.97	13.72	12.19	11.77	0.40
1000	11.81	6.24	13.72	12.15	11.71	0.38

Table C-2.43 *Results of wave computation for sea dike design (continued)*

Vùng 5 - mặt cắt 43 - chu kỳ lặp 125 năm;X=825711 Y=1802165						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.64	2.02	13.72	12.44	12.05	0.77
50	3.74	2.48	13.72	12.49	12.11	0.73
100	4.77	2.82	13.72	12.50	12.13	0.69
150	4.78	2.99	13.72	12.50	12.15	0.67
200	4.86	3.16	13.72	12.51	12.15	0.65
250	5.30	3.41	13.72	12.50	12.14	0.63
300	5.74	3.65	13.72	12.49	12.13	0.60
350	6.21	3.89	13.72	12.48	12.11	0.58
400	6.68	4.12	13.72	12.47	12.10	0.56
450	7.14	4.34	13.72	12.46	12.08	0.54
500	7.59	4.56	13.72	12.44	12.06	0.52
600	8.48	4.98	13.72	12.41	12.02	0.48
700	9.33	5.37	13.72	12.37	11.97	0.45
800	10.19	5.73	13.72	12.33	11.91	0.43
900	11.08	6.05	13.72	12.28	11.85	0.40
1000	11.98	6.32	13.72	12.23	11.79	0.39

Vùng 5 - mặt cắt 43 - chu kỳ lặp 150 năm;X=825711 Y=1802165						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.75	2.09	13.72	12.52	12.13	0.77
50	3.85	2.53	13.72	12.56	12.19	0.73
100	4.88	2.88	13.72	12.58	12.22	0.69
150	4.90	3.05	13.72	12.58	12.23	0.67
200	4.96	3.23	13.72	12.59	12.23	0.66
250	5.41	3.48	13.72	12.59	12.22	0.63
300	5.86	3.71	13.72	12.58	12.21	0.61
350	6.33	3.95	13.72	12.57	12.20	0.59
400	6.80	4.18	13.72	12.55	12.18	0.56
450	7.25	4.41	13.72	12.54	12.16	0.54
500	7.70	4.63	13.72	12.52	12.14	0.52
600	8.59	5.04	13.72	12.48	12.10	0.49
700	9.45	5.43	13.72	12.45	12.05	0.46
800	10.31	5.79	13.72	12.4	11.99	0.43
900	11.20	6.11	13.72	12.36	11.93	0.41
1000	12.07	6.38	13.72	12.32	11.87	0.39

Vùng 5 - mặt cắt 43 - chu kỳ lặp 200 năm;X=825711 Y=1802165						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.98	2.21	13.72	12.60	12.21	0.78
50	4.08	2.65	13.72	12.65	12.27	0.74
100	5.11	3.01	13.72	12.67	12.31	0.70
150	5.13	3.18	13.72	12.68	12.31	0.68
200	5.20	3.35	13.72	12.68	12.32	0.66
250	5.64	3.60	13.72	12.68	12.31	0.64
300	6.08	3.84	13.72	12.67	12.30	0.61
350	6.56	4.09	13.72	12.65	12.28	0.59
400	7.02	4.31	13.72	12.64	12.27	0.57
450	7.48	4.53	13.72	12.63	12.25	0.55
500	7.93	4.75	13.72	12.61	12.23	0.53
600	8.82	5.16	13.72	12.58	12.18	0.50
700	9.69	5.55	13.72	12.54	12.13	0.47
800	10.54	5.91	13.72	12.50	12.08	0.44
900	11.43	6.22	13.72	12.45	12.01	0.42
1000	12.30	6.49	13.72	12.40	11.95	0.40

Table C-2.44 *Results of wave computation for sea dike design*

Vùng 5 -mặt cắt 44 - chu kỳ lặp 10 năm;X=834776 Y=1782923

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.80	1.45	12.71	11.23	10.87	0.75
50	2.75	2.08	12.71	11.27	10.93	0.69
100	3.87	2.51	12.71	11.28	10.95	0.62
150	4.50	2.75	12.71	11.25	10.92	0.60
200	5.14	2.95	12.71	11.23	10.89	0.58
250	5.78	3.09	12.71	11.21	10.85	0.57
300	6.34	3.19	12.71	11.19	10.82	0.57
350	6.53	3.24	12.71	11.18	10.81	0.56
400	6.70	3.29	12.71	11.17	10.80	0.56
450	6.82	3.34	12.71	11.16	10.79	0.56
500	6.91	3.38	12.71	11.15	10.76	0.55
600	6.92	3.49	12.71	11.15	10.78	0.54
700	6.99	3.64	12.71	11.14	10.76	0.53
800	7.44	3.80	12.71	11.11	10.72	0.52
900	7.95	3.94	12.71	11.08	10.68	0.51
1000	8.32	4.06	12.71	11.06	10.65	0.51

Vùng 5 -mặt cắt 44 - chu kỳ lặp 20 năm;X=834776 Y=1782923

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm0⁻¹ [s]	Tm02 [s]	Set up [m]
0	1.84	1.65	12.71	11.58	11.23	0.79
50	2.99	2.22	12.71	11.58	11.23	0.72
100	4.12	2.66	12.71	11.58	11.23	0.67
150	4.76	2.89	12.71	11.53	11.19	0.65
200	5.39	3.09	12.71	11.51	11.16	0.63
250	6.03	3.21	12.71	11.49	11.13	0.62
300	6.59	3.31	12.71	11.46	11.10	0.61
350	6.78	3.37	12.71	11.45	11.09	0.61
400	6.95	3.42	12.71	11.44	11.08	0.61
450	7.07	3.46	12.71	11.44	11.07	0.60
500	7.16	3.51	12.71	11.43	11.06	0.60
600	7.17	3.62	12.71	11.42	11.05	0.59
700	7.24	3.77	12.71	11.41	11.03	0.58
800	7.69	3.93	12.71	11.38	11.00	0.57
900	8.20	4.06	12.71	11.36	10.96	0.56
1000	8.57	4.18	12.71	11.33	10.93	0.55

Vùng 5 -mặt cắt 44 - chu kỳ lặp 50 năm;X=834776 Y=1782923

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.22	1.69	13.72	11.97	11.61	0.84
50	3.38	2.44	12.71	11.98	11.63	0.78
100	4.50	2.88	12.71	11.99	11.64	0.73
150	5.14	3.10	12.71	11.96	11.60	0.71
200	5.77	3.30	12.71	11.94	11.58	0.69
250	6.42	3.41	12.71	11.91	11.54	0.68
300	6.98	3.51	12.71	11.89	11.51	0.68
350	7.16	3.56	12.71	11.88	11.50	0.67
400	7.34	3.62	12.71	11.87	11.49	0.67
450	7.46	3.66	12.71	11.87	11.48	0.67
500	7.55	3.71	12.71	11.86	11.47	0.66
600	7.55	3.82	12.71	11.85	11.46	0.66
700	7.82	3.97	12.71	11.84	11.45	0.64
800	8.07	4.13	12.71	11.81	11.41	0.63
900	8.59	4.27	12.71	11.79	11.37	0.62
1000	8.95	4.38	12.71	11.77	11.35	0.62

Vùng 5 -mặt cắt 44 - chu kỳ lặp 100 năm;X=834776 Y=1782923

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm0⁻¹ [s]	Tm02 [s]	Set up [m]
0	2.56	2.10	13.72	12.30	11.92	0.88
50	3.72	2.64	13.72	12.32	11.96	0.83
100	4.84	3.08	13.72	12.33	11.97	0.77
150	5.48	3.29	13.72	12.31	11.94	0.75
200	6.12	3.48	13.72	12.28	11.91	0.74
250	6.76	3.59	13.72	12.26	11.87	0.73
300	7.32	3.69	13.72	12.24	11.84	0.72
350	7.51	3.74	13.72	12.23	11.83	0.72
400	7.68	3.79	13.72	12.22	11.82	0.72
450	7.81	3.84	13.72	12.21	11.81	0.71
500	7.89	3.89	13.72	12.21	11.80	0.71
600	7.90	4.00	13.72	12.20	11.79	0.70
700	7.97	4.15	13.72	12.18	11.78	0.69
800	8.42	4.31	13.72	12.16	11.74	0.68
900	8.94	4.44	13.72	12.13	11.71	0.67
1000	9.30	4.56	13.72	12.11	11.68	0.66

Table C-2.44 *Results of wave computation for sea dike design (continued)*

Vùng 5 -mặt cắt 44 - chu kỳ lặp 125 năm;X=834776 Y=1782923						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.73	2.22	13.72	12.40	12.03	0.88
50	3.89	2.74	13.72	12.42	12.05	0.83
100	5.02	3.17	13.72	12.42	12.05	0.78
150	5.66	3.38	13.72	12.39	12.02	0.76
200	6.30	3.57	13.72	12.37	11.99	0.74
250	6.94	3.68	13.72	12.34	11.95	0.74
300	7.50	3.78	13.72	12.32	11.93	0.73
350	7.69	3.83	13.72	12.31	11.91	0.73
400	7.86	3.88	13.72	12.30	11.90	0.72
450	7.98	3.93	13.72	12.30	11.89	0.72
500	8.07	3.98	13.72	12.29	11.89	0.72
600	8.08	4.09	13.72	12.28	11.88	0.71
700	8.15	4.24	13.72	12.27	11.86	0.70
800	8.60	4.39	13.72	12.24	11.82	0.69
900	9.12	4.53	13.72	12.22	11.79	0.68
1000	9.48	4.64	13.72	12.20	11.76	0.67

Vùng 5 -mặt cắt 44 - chu kỳ lặp 150 năm;X=834776 Y=1782923						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.8406	2.28449	13.7233	12.4826	12.1037	0.89064
50	4.0024	2.80623	13.7233	12.4985	12.1274	0.83738
100	5.1303	3.2325	13.7233	12.5053	12.1359	0.78643
150	5.767	3.44016	13.7233	12.4771	12.0991	0.76887
200	6.4051	3.62558	13.7233	12.4539	12.0689	0.75271
250	7.052	3.73428	13.7233	12.428	12.035	0.74588
300	7.61	3.82998	13.7233	12.4074	12.008	0.73972
350	7.7981	3.88268	13.7233	12.3978	11.9955	0.73631
400	7.9696	3.9338	13.7233	12.3891	11.9841	0.73296
450	8.0934	3.98177	13.7233	12.3819	11.9747	0.72977
500	8.18	4.03167	13.7233	12.3758	11.9669	0.72627
600	8.1874	4.14686	13.7233	12.3677	11.9559	0.71741
700	8.2566	4.29276	13.7233	12.3547	11.9385	0.70616
800	8.7095	4.44918	13.7233	12.3286	11.9037	0.6957
900	9.2247	4.58421	13.7233	12.3025	11.8687	0.68757
1000	9.5885	4.69839	13.7233	12.2824	11.8416	0.68069

Vùng 5 -mặt cắt 44 - chu kỳ lặp 200 năm;X=834776 Y=1782923						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.00	2.38	13.72	12.57	12.18	0.90
50	4.17	2.90	13.72	12.58	12.21	0.85
100	5.29	3.32	13.72	12.59	12.22	0.80
150	5.93	3.53	13.72	12.56	12.18	0.78
200	6.57	3.71	13.72	12.54	12.15	0.77
250	7.22	3.82	13.72	12.51	12.12	0.76
300	7.77	3.91	13.72	12.49	12.09	0.75
350	7.96	3.96	13.72	12.48	12.08	0.75
400	8.13	4.01	13.72	12.48	12.07	0.75
450	8.26	4.06	13.72	12.47	12.06	0.74
500	8.34	4.11	13.72	12.46	12.05	0.74
600	8.35	4.23	13.72	12.45	12.04	0.73
700	8.42	4.37	13.72	12.44	12.02	0.72
800	8.87	4.53	13.72	12.42	11.99	0.71
900	9.39	4.66	13.72	12.39	11.95	0.70
1000	9.75	4.78	13.72	12.37	11.92	0.70

Table C-2.45 *Results of wave computation for sea dike design*

Vùng 5 -mặt cắt 45 - chu kỳ lặp 10 năm;X=851024 Y=1770993

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.84	1.15	12.71	10.84	10.32	0.98
50	2.42	1.35	12.71	10.93	10.48	0.97
100	2.98	1.53	12.71	10.98	10.56	0.95
150	3.06	1.56	12.71	10.99	10.57	0.95
200	3.16	1.63	12.71	10.99	10.57	0.94
250	3.26	1.67	12.71	10.99	10.58	0.94
300	3.35	1.72	12.71	10.99	10.58	0.93
350	3.46	1.77	12.71	10.99	10.58	0.93
400	3.58	1.81	12.71	10.99	10.58	0.93
450	3.66	1.85	12.71	10.99	10.58	0.92
500	3.78	1.91	12.71	10.99	10.58	0.92
600	3.95	2.00	12.71	10.99	10.58	0.91
700	4.15	2.09	12.71	10.99	10.58	0.91
800	4.35	2.18	12.71	10.99	10.57	0.90
900	4.55	2.28	12.71	10.98	10.56	0.89
1000	4.75	2.37	12.71	10.97	10.55	0.89

Vùng 5 -mặt cắt 45 - chu kỳ lặp 20 năm;X=851024 Y=1770993

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.10	1.27	12.71	11.09	10.56	1.05
50	2.67	1.48	12.71	11.19	10.72	1.03
100	3.21	1.66	12.71	11.24	10.81	1.02
150	3.31	1.71	12.71	11.24	10.82	1.01
200	3.42	1.76	12.71	11.26	10.82	1.01
250	3.51	1.80	12.71	11.25	10.82	1.00
300	3.61	1.85	12.71	11.25	10.83	1.00
350	3.71	1.89	12.71	11.25	10.83	1.00
400	3.81	1.94	12.71	11.25	10.83	0.99
450	3.91	1.99	12.71	11.25	10.83	0.99
500	4.01	2.03	12.71	11.25	10.83	0.99
600	4.21	2.13	12.71	11.25	10.83	0.98
700	4.41	2.22	12.71	11.25	10.82	0.97
800	4.60	2.31	12.71	11.24	10.81	0.96
900	4.81	2.40	12.71	11.23	10.80	0.96
1000	5.01	2.49	12.71	11.23	10.79	0.95

Vùng 5 -mặt cắt 45 - chu kỳ lặp 50 năm;X=851024 Y=1770993

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.48	1.53	13.72	11.69	11.23	1.12
50	3.05	1.72	13.72	11.68	11.23	1.11
100	3.60	1.85	13.72	11.68	11.23	1.10
150	3.71	1.90	13.72	11.68	11.23	1.09
200	3.81	1.95	12.71	11.68	11.24	1.09
250	3.90	1.99	12.71	11.68	11.24	1.09
300	4.00	2.04	12.71	11.68	11.24	1.08
350	4.10	2.09	12.71	11.68	11.24	1.08
400	4.20	2.14	12.71	11.68	11.25	1.08
450	4.30	2.18	12.71	11.68	11.24	1.07
500	4.40	2.23	12.71	11.68	11.24	1.07
600	4.60	2.32	12.71	11.68	11.24	1.06
700	4.80	2.41	12.71	11.68	11.23	1.05
800	4.99	2.51	12.71	11.67	11.23	1.05
900	5.20	2.60	12.71	11.66	11.22	1.04
1000	5.40	2.69	12.71	11.66	11.20	1.03

Vùng 5 -mặt cắt 45 - chu kỳ lặp 100 năm;X=851024 Y=1770993

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.82	1.76	13.72	12.04	11.58	1.18
50	3.40	1.90	13.72	12.03	11.58	1.17
100	3.95	2.02	13.72	12.03	11.58	1.16
150	4.05	2.07	13.72	12.03	11.58	1.15
200	4.15	2.12	13.72	12.03	11.58	1.15
250	4.25	2.17	13.72	12.03	11.58	1.15
300	4.34	2.21	13.72	12.04	11.58	1.14
350	4.44	2.26	13.72	12.04	11.58	1.14
400	4.55	2.31	13.72	12.04	11.58	1.13
450	4.65	2.35	13.72	12.03	11.58	1.13
500	4.75	2.40	13.72	12.03	11.58	1.13
600	4.94	2.49	13.72	12.03	11.58	1.12
700	5.14	2.58	13.72	12.03	11.57	1.11
800	5.34	2.68	13.72	12.02	11.56	1.11
900	5.54	2.77	13.72	12.01	11.55	1.10
1000	5.74	2.86	13.72	12.00	11.54	1.09

Table C-2.45 *Results of wave computation for sea dike design (continued)*

Vùng 5 -mặt cắt 45 - chu kỳ lặp 125 năm;X=851024 Y=1770993						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.99	1.86	13.72	12.14	11.68	1.18
50	3.57	1.99	13.72	12.13	11.67	1.17
100	4.12	2.11	13.72	12.13	11.67	1.16
150	4.22	2.16	13.72	12.13	11.66	1.16
200	4.33	2.20	13.72	12.13	11.66	1.15
250	4.42	2.25	13.72	12.13	11.66	1.15
300	4.52	2.30	13.72	12.13	11.66	1.15
350	4.62	2.34	13.72	12.13	11.66	1.14
400	4.72	2.39	13.72	12.13	11.66	1.14
450	4.82	2.44	13.72	12.13	11.66	1.14
500	4.92	2.48	13.72	12.13	11.67	1.13
600	5.12	2.58	13.72	12.12	11.67	1.13
700	5.32	2.67	13.72	12.12	11.66	1.12
800	5.51	2.76	13.72	12.11	11.65	1.11
900	5.71	2.85	13.72	12.10	11.64	1.10
1000	5.92	2.95	13.72	12.09	11.62	1.10

Vùng 5 -mặt cắt 45 - chu kỳ lặp 150 năm;X=851024 Y=1770993						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.11	1.92	13.72	12.23	11.77	1.19
50	3.69	2.05	13.72	12.22	11.76	1.18
100	4.24	2.17	13.72	12.22	11.76	1.17
150	4.34	2.22	13.72	12.22	11.76	1.17
200	4.44	2.26	13.72	12.22	11.77	1.16
250	4.54	2.31	13.72	12.22	11.77	1.16
300	4.64	2.35	13.72	12.22	11.77	1.15
350	4.74	2.40	13.72	12.22	11.76	1.15
400	4.84	2.45	13.72	12.22	11.76	1.15
450	4.94	2.49	13.72	12.22	11.76	1.14
500	5.04	2.54	13.72	12.21	11.76	1.14
600	5.24	2.63	13.72	12.21	11.75	1.13
700	5.44	2.73	13.72	12.20	11.74	1.13
800	5.63	2.82	13.72	12.20	11.73	1.12
900	5.83	2.91	13.72	12.19	11.72	1.11
1000	6.03	3.00	13.72	12.18	11.71	1.11

Vùng 5 -mặt cắt 45 - chu kỳ lặp 200 năm;X=851024 Y=1770993						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	3.22	1.98	13.72	12.31	11.85	1.22
50	3.80	2.10	13.72	12.31	11.85	1.21
100	4.35	2.22	13.72	12.30	11.84	1.20
150	4.45	2.27	13.72	12.30	11.85	1.19
200	4.55	2.31	13.72	12.31	11.85	1.19
250	4.66	2.36	13.72	12.31	11.86	1.19
300	4.74	2.41	13.72	12.30	11.85	1.18
350	4.84	2.45	13.72	12.30	11.85	1.18
400	4.94	2.50	13.72	12.30	11.85	1.17
450	5.05	2.55	13.72	12.30	11.84	1.17
500	5.15	2.59	13.72	12.30	11.84	1.17
600	5.34	2.69	13.72	12.29	11.83	1.16
700	5.54	2.78	13.72	12.29	11.82	1.15
800	5.74	2.87	13.72	12.28	11.81	1.15
900	5.94	2.96	13.72	12.27	11.80	1.14
1000	6.14	3.06	13.72	12.26	11.79	1.13

Table C-2.46 *Results of wave computation for sea dike design*

Vùng 5 -mặt cắt 46 - chu kỳ lặp 10 năm;X=864235 Y=1755809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	¯p [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.56	1.11	12.71	11.19	10.81	0.69
50	2.17	1.39	12.71	11.27	10.91	0.65
100	2.76	1.61	12.71	11.30	10.96	0.62
150	2.90	1.72	12.71	11.30	10.96	0.61
200	3.06	1.82	12.71	11.30	10.96	0.60
250	3.30	1.95	12.71	11.30	10.96	0.59
300	3.53	2.08	12.71	11.30	10.96	0.58
350	3.78	2.21	12.71	11.30	10.96	0.57
400	4.02	2.33	12.71	11.29	10.95	0.56
450	4.26	2.46	12.71	11.29	10.95	0.54
500	4.51	2.58	12.71	11.29	10.94	0.53
600	5.00	2.83	12.71	11.27	10.93	0.51
700	5.49	3.07	12.71	11.26	10.91	0.49
800	5.97	3.31	12.71	11.24	10.88	0.47
900	6.46	3.55	12.71	11.23	10.86	0.45
1000	6.95	3.79	12.71	11.20	10.83	0.43

Vùng 5 -mặt cắt 46 - chu kỳ lặp 20 năm;X=864235 Y=1755809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.78	1.23	12.71	11.45	11.05	0.71
50	2.39	1.51	12.71	11.53	11.17	0.69
100	2.98	1.73	12.71	11.57	11.22	0.66
150	3.12	1.84	12.71	11.57	11.22	0.65
200	3.28	1.95	12.71	11.57	11.22	0.64
250	3.52	2.08	12.71	11.57	11.22	0.63
300	3.75	2.20	12.71	11.56	11.22	0.62
350	4.00	2.33	12.71	11.56	11.21	0.61
400	4.24	2.45	12.71	11.56	11.21	0.59
450	4.48	2.58	12.71	11.55	11.20	0.58
500	4.73	2.70	12.71	11.55	11.20	0.57
600	5.22	2.95	12.71	11.54	11.19	0.55
700	5.71	3.19	12.71	11.52	11.16	0.53
800	6.19	3.43	12.71	11.51	11.14	0.51
900	6.68	3.67	12.71	11.49	11.11	0.49
1000	7.17	3.91	12.71	11.46	11.08	0.47

Vùng 5 -mặt cắt 46 - chu kỳ lặp 50 năm;X=864235 Y=1755809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	¯p [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.12	1.41	13.72	11.88	11.46	0.77
50	2.73	1.65	13.72	11.97	11.59	0.74
100	3.31	1.92	12.71	12.01	11.65	0.72
150	3.46	2.03	12.71	12.01	11.65	0.71
200	3.62	2.14	12.71	12.01	11.65	0.69
250	3.85	2.27	12.71	12.01	11.65	0.68
300	4.09	2.39	12.71	12.00	11.64	0.67
350	4.33	2.52	12.71	12.00	11.64	0.66
400	4.58	2.64	12.71	12.00	11.63	0.65
450	4.82	2.77	12.71	11.99	11.62	0.64
500	5.07	2.89	12.71	11.99	11.62	0.63
600	5.55	3.14	12.71	11.97	11.60	0.60
700	6.04	3.38	12.71	11.96	11.58	0.58
800	6.53	3.63	12.71	11.94	11.56	0.56
900	7.02	3.86	12.71	11.92	11.53	0.54
1000	7.51	4.10	12.71	11.90	11.50	0.53

Vùng 5 -mặt cắt 46 - chu kỳ lặp 100 năm;X=864235 Y=1755809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.41	1.57	13.72	12.22	11.78	0.81
50	3.03	1.85	13.72	12.32	11.92	0.78
100	3.61	2.00	13.72	12.37	12.00	0.76
150	3.76	2.20	13.72	12.37	12.00	0.75
200	3.91	2.31	13.72	12.37	12.00	0.73
250	4.15	2.44	13.72	12.36	11.99	0.72
300	4.39	2.56	13.72	12.36	11.99	0.71
350	4.63	2.69	13.72	12.35	11.98	0.70
400	4.87	2.81	13.72	12.35	11.97	0.69
450	5.12	2.94	13.72	12.34	11.96	0.68
500	5.36	3.06	13.72	12.34	11.96	0.67
600	5.85	3.31	13.72	12.32	11.94	0.64
700	6.34	3.55	13.72	12.31	11.92	0.62
800	6.83	3.79	13.72	12.29	11.89	0.60
900	7.32	4.03	13.72	12.27	11.87	0.59
1000	7.81	4.27	13.72	12.25	11.84	0.57

Table C-2.46 *Results of wave computation for sea dike design (continued)*

Vùng 5 -mặt cắt 46 - chu kỳ lặp 125 năm;X=864235 Y=1755809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.59	1.79	13.72	12.46	12.12	0.80
50	3.21	2.00	13.72	12.47	12.10	0.76
100	3.80	2.19	13.72	12.46	12.09	0.76
150	3.95	2.30	13.72	12.46	12.09	0.75
200	4.10	2.41	13.72	12.46	12.08	0.74
250	4.32	2.54	13.72	12.45	12.08	0.73
300	4.58	2.66	13.72	12.45	12.07	0.72
350	4.82	2.79	13.72	12.44	12.07	0.70
400	5.06	2.91	13.72	12.44	12.06	0.69
450	5.31	3.04	13.72	12.43	12.05	0.68
500	5.55	3.16	13.72	12.42	12.04	0.67
600	6.04	3.41	13.72	12.41	12.02	0.65
700	6.53	3.65	13.72	12.39	12.00	0.63
800	7.02	3.89	13.72	12.38	11.98	0.61
900	7.50	4.13	13.72	12.36	11.95	0.59
1000	8.00	4.37	13.72	12.33	11.92	0.57

Vùng 5 -mặt cắt 46 - chu kỳ lặp 150 năm;X=864235 Y=1755809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.69	1.85	13.72	12.57	12.20	0.81
50	3.31	2.06	13.72	12.55	12.16	0.79
100	3.90	2.26	13.72	12.54	12.17	0.77
150	4.04	2.38	13.72	12.54	12.17	0.76
200	4.20	2.47	13.72	12.54	12.17	0.75
250	4.44	2.59	13.72	12.54	12.16	0.74
300	4.67	2.72	13.72	12.53	12.16	0.72
350	4.92	2.84	13.72	12.53	12.15	0.71
400	5.16	2.97	13.72	12.52	12.14	0.70
450	5.41	3.09	13.72	12.52	12.13	0.69
500	5.65	3.22	13.72	12.51	12.12	0.68
600	6.14	3.46	13.72	12.50	12.10	0.66
700	6.63	3.70	13.72	12.48	12.08	0.64
800	7.12	3.95	13.72	12.46	12.06	0.62
900	7.60	4.18	13.72	12.44	12.03	0.60
1000	8.10	4.42	13.72	12.42	12.00	0.58

Vùng 5 -mặt cắt 46 - chu kỳ lặp 200 năm;X=864235 Y=1755809						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.77	1.90	13.72	12.65	12.29	0.82
50	3.39	2.11	13.72	12.64	12.27	0.80
100	3.98	2.29	13.72	12.63	12.26	0.79
150	4.13	2.40	13.72	12.63	12.26	0.78
200	4.29	2.51	13.72	12.63	12.25	0.76
250	4.52	2.64	13.72	12.63	12.25	0.75
300	4.76	2.77	13.72	12.62	12.24	0.74
350	5.00	2.89	13.72	12.62	12.23	0.73
400	5.25	3.02	13.72	12.61	12.23	0.72
450	5.49	3.14	13.72	12.60	12.22	0.71
500	5.74	3.26	13.72	12.60	12.21	0.70
600	6.23	3.51	13.72	12.58	12.19	0.68
700	6.72	3.75	13.72	12.57	12.17	0.66
800	7.20	3.99	13.72	12.55	12.14	0.64
900	7.69	4.23	13.72	12.53	12.11	0.62
1000	8.18	4.47	13.72	12.51	12.08	0.60

Table C-2.47 *Results of wave computation for sea dike design*

Vùng 5 -mặt cắt 47 - chu kỳ lặp 10 năm;X=873344 Y=1736684						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.53	1.43	12.71	11.14	10.72	0.72
50	2.68	2.39	12.71	11.24	10.89	0.60
100	3.90	3.04	12.71	11.26	10.92	0.50
150	4.48	3.35	12.71	11.25	10.90	0.46
200	5.16	3.65	12.71	11.23	10.87	0.43
250	5.96	3.95	12.71	11.22	10.86	0.40
300	6.53	4.22	12.71	11.20	10.82	0.37
350	7.02	4.43	12.71	11.19	10.80	0.35
400	7.50	4.73	12.71	11.17	10.78	0.33
450	7.96	4.99	12.71	11.15	10.76	0.30
500	8.41	5.24	12.71	11.14	10.74	0.28
600	9.34	5.75	12.71	11.10	10.69	0.24
700	10.33	6.27	12.71	11.05	10.63	0.20
800	11.57	6.76	12.71	10.99	10.54	0.17
900	12.69	7.15	12.71	10.92	10.44	0.14
1000	14.24	7.49	12.71	10.85	10.34	0.13

Vùng 5 -mặt cắt 47 - chu kỳ lặp 20 năm;X=873344 Y=1736684						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.72	1.60	12.71	11.44	11.04	0.73
50	2.38	2.50	12.71	11.52	11.17	0.63
100	4.00	3.14	12.71	11.54	11.20	0.53
150	4.58	3.46	12.71	11.53	11.17	0.49
200	5.36	3.76	12.71	11.52	11.15	0.46
250	6.36	4.06	12.71	11.50	11.13	0.43
300	6.73	4.33	12.71	11.48	11.11	0.40
350	7.22	4.59	12.71	11.47	11.08	0.38
400	7.70	4.85	12.71	11.46	11.07	0.36
450	8.15	5.10	12.71	11.44	11.04	0.33
500	8.31	5.35	12.71	11.42	11.02	0.31
600	9.34	5.87	12.71	11.38	10.97	0.27
700	10.53	6.39	12.71	11.34	10.91	0.23
800	11.76	6.86	12.71	11.28	10.83	0.19
900	13.09	7.31	12.71	11.21	10.75	0.17
1000	14.44	7.62	12.71	11.14	10.63	0.15

Vùng 5 -mặt cắt 47 - chu kỳ lặp 50 năm;X=873344 Y=1736684						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.02	1.83	13.72	11.94	11.56	0.76
50	3.19	2.69	12.71	11.99	11.63	0.66
100	4.32	3.30	12.71	12.00	11.65	0.57
150	5.00	3.63	12.71	11.99	11.63	0.54
200	5.68	3.94	12.71	11.98	11.61	0.50
250	6.38	4.24	12.71	11.96	11.58	0.47
300	7.05	4.51	12.71	11.95	11.56	0.45
350	7.54	4.73	12.71	11.93	11.54	0.42
400	8.02	5.03	12.71	11.92	11.52	0.40
450	8.47	5.29	12.71	11.90	11.50	0.38
500	8.93	5.51	12.71	11.89	11.48	0.35
600	9.85	6.05	12.71	11.85	11.43	0.31
700	10.84	6.53	12.71	11.81	11.37	0.27
800	12.08	7.03	12.71	11.75	11.29	0.23
900	13.40	7.50	12.71	11.68	11.20	0.21
1000	14.76	7.82	12.71	11.61	11.11	0.19

Vùng 5 -mặt cắt 47 - chu kỳ lặp 100 năm;X=873344 Y=1736684						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.32	2.14	13.72	12.31	11.92	0.79
50	3.48	2.96	13.72	12.31	11.93	0.70
100	4.51	3.56	13.72	12.31	11.93	0.60
150	5.29	3.91	13.72	12.30	11.91	0.57
200	5.97	4.22	13.72	12.29	11.89	0.53
250	6.57	4.52	13.72	12.27	11.86	0.50
300	7.34	4.80	13.72	12.26	11.84	0.47
350	7.83	5.06	13.72	12.24	11.82	0.45
400	8.31	5.32	13.72	12.23	11.80	0.43
450	8.76	5.58	13.72	12.21	11.78	0.40
500	9.22	5.83	13.72	12.20	11.76	0.38
600	10.14	6.35	13.72	12.16	11.72	0.34
700	11.13	6.87	13.72	12.12	11.66	0.29
800	12.37	7.36	13.72	12.07	11.59	0.26
900	13.89	7.78	13.72	12.01	11.51	0.23
1000	15.04	8.10	13.72	11.94	11.42	0.22

Table C-2.47 *Results of wave computation for sea dike design (continued)*

Vùng 5 -mặt cắt 47 - chu kỳ lặp 125 năm;X=873344 Y=1736684						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.99	1.84	13.72	12.37	11.96	0.83
50	3.16	2.66	13.72	12.45	12.08	0.73
100	4.29	3.27	13.72	12.47	12.11	0.64
150	4.97	3.61	13.72	12.46	12.09	0.60
200	5.65	3.92	13.72	12.45	12.07	0.57
250	6.35	4.22	13.72	12.43	12.05	0.54
300	7.01	4.50	13.72	12.41	12.02	0.51
350	7.50	4.77	13.72	12.40	12.01	0.49
400	7.98	5.02	13.72	12.39	11.99	0.46
450	8.44	5.28	13.72	12.37	11.97	0.44
500	8.89	5.54	13.72	12.36	11.95	0.42
600	9.82	6.06	13.72	12.32	11.91	0.37
700	10.81	6.59	13.72	12.28	11.85	0.33
800	12.04	7.09	13.72	12.23	11.78	0.29
900	13.36	7.52	13.72	12.16	11.69	0.26
1000	14.71	7.84	13.72	12.09	11.60	0.25

Vùng 5 -mặt cắt 47 - chu kỳ lặp 150 năm;X=873344 Y=1736684						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.57	2.32	13.72	12.49	12.10	0.79
50	3.74	3.11	13.72	12.49	12.10	0.70
100	4.88	3.73	13.72	12.49	12.10	0.61
150	5.56	4.06	13.72	12.48	12.08	0.58
200	6.24	4.37	13.72	12.47	12.06	0.54
250	6.94	4.67	13.72	12.45	12.04	0.51
300	7.60	4.95	13.72	12.43	12.02	0.48
350	8.09	5.22	13.72	12.42	12.00	0.46
400	8.57	5.47	13.72	12.40	11.98	0.44
450	9.03	5.73	13.72	12.39	11.95	0.41
500	9.48	5.99	13.72	12.37	11.93	0.39
600	10.41	6.50	13.72	12.34	11.89	0.35
700	11.40	7.02	13.72	12.30	11.83	0.31
800	12.63	7.51	13.72	12.24	11.76	0.27
900	13.98	7.93	13.72	12.18	11.68	0.24
1000	15.31	8.24	13.72	12.12	11.59	0.23

Vùng 5 -mặt cắt 47 - chu kỳ lặp 200 năm;X=873344 Y=1736684						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.68	2.39	13.72	12.62	12.25	0.78
50	3.86	3.11	13.72	12.64	12.27	0.70
100	5.01	3.68	13.72	12.64	12.28	0.62
150	5.69	4.01	13.72	12.63	12.25	0.59
200	6.37	4.33	13.72	12.62	12.23	0.55
250	7.07	4.63	13.72	12.60	12.21	0.52
300	7.73	4.91	13.72	12.58	12.18	0.50
350	8.23	5.17	13.72	12.57	12.16	0.47
400	8.71	5.43	13.72	12.55	12.15	0.45
450	9.16	5.68	13.72	12.54	12.13	0.43
500	9.62	5.94	13.72	12.52	12.10	0.41
600	10.54	6.46	13.72	12.49	12.06	0.36
700	11.53	6.98	13.72	12.44	12.00	0.32
800	12.77	7.47	13.72	12.38	11.92	0.28
900	14.09	7.89	13.72	12.32	11.83	0.26
1000	15.44	8.21	13.72	12.25	11.74	0.24

Table C-2.48 *Results of wave computation for sea dike design*

Vùng 5 -mặt cắt 43 - chu kỳ lặp 10 năm;X=885424 Y=1720489

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.62	1.07	12.71	11.18	10.78	0.69
50	2.07	1.32	12.71	11.27	10.92	0.67
100	2.58	1.52	12.71	11.31	10.98	0.65
150	2.60	1.64	12.71	11.33	11.00	0.63
200	2.65	1.78	12.71	11.34	11.01	0.62
250	3.03	1.99	12.71	11.33	11.00	0.61
300	3.40	2.18	12.71	11.32	10.99	0.58
350	3.00	2.39	12.71	11.31	10.98	0.56
400	4.21	2.58	12.71	11.30	10.97	0.54
450	4.61	2.76	12.71	11.29	10.95	0.52
500	5.01	2.93	12.71	11.28	10.94	0.51
600	5.78	3.22	12.71	11.25	10.90	0.48
700	6.35	3.46	12.71	11.23	10.87	0.46
800	6.87	3.66	12.71	11.21	10.84	0.45
900	7.30	3.85	12.71	11.19	10.82	0.43
1000	7.70	4.04	12.71	11.17	10.79	0.42

Vùng 5 -mặt cắt 48 - chu kỳ lặp 20 năm;X=885424 Y=1720489

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.72	1.19	12.71	11.46	11.07	0.73
50	2.27	1.43	12.71	11.53	11.18	0.71
100	2.78	1.63	12.71	11.58	11.23	0.69
150	2.80	1.76	12.71	11.59	11.25	0.67
200	2.86	1.89	12.71	11.59	11.26	0.66
250	3.23	2.10	12.71	11.59	11.25	0.64
300	3.61	2.30	12.71	11.58	11.24	0.62
350	4.01	2.51	12.71	11.57	11.23	0.60
400	4.41	2.70	12.71	11.57	11.22	0.58
450	4.81	2.88	12.71	11.55	11.20	0.56
500	5.22	3.04	12.71	11.54	11.19	0.55
600	5.96	3.33	12.71	11.52	11.16	0.52
700	6.56	3.56	12.71	11.49	11.13	0.50
800	7.07	3.77	12.71	11.47	11.10	0.48
900	7.50	3.97	12.71	11.45	11.07	0.47
1000	7.90	4.15	12.71	11.44	11.05	0.46

Vùng 5 -mặt cắt 43 - chu kỳ lặp 50 năm;X=885424 Y=1720489

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.03	1.36	13.72	11.88	11.47	0.79
50	2.58	1.60	12.71	11.97	11.59	0.77
100	3.09	1.81	12.71	12.01	11.65	0.74
150	3.11	1.94	12.71	12.02	11.67	0.73
200	3.17	2.08	12.71	12.03	11.67	0.72
250	3.54	2.29	12.71	12.02	11.67	0.69
300	3.92	2.49	12.71	12.02	11.66	0.67
350	4.32	2.69	12.71	12.01	11.65	0.65
400	4.72	2.88	12.71	12.00	11.64	0.63
450	5.12	3.06	12.71	11.99	11.62	0.62
500	5.52	3.22	12.71	11.98	11.61	0.60
600	6.29	3.51	12.71	11.95	11.57	0.58
700	6.87	3.74	12.71	11.93	11.55	0.56
800	7.38	3.95	12.71	11.91	11.52	0.55
900	7.81	4.14	12.71	11.89	11.49	0.53
1000	8.21	4.33	12.71	11.87	11.47	0.52

Vùng 5 -mặt cắt 48 - chu kỳ lặp 100 năm;X=885424 Y=1720489

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.30	1.50	13.72	12.22	11.79	0.83
50	2.85	1.75	13.72	12.31	11.92	0.81
100	3.36	1.97	13.72	12.36	11.99	0.79
150	3.37	2.10	13.72	12.37	12.00	0.77
200	3.43	2.24	13.72	12.38	12.01	0.76
250	3.81	2.45	13.72	12.37	12.01	0.74
300	4.18	2.65	13.72	12.37	12.00	0.72
350	4.58	2.85	13.72	12.36	11.99	0.70
400	4.98	3.03	13.72	12.35	11.98	0.68
450	5.39	3.21	13.72	12.34	11.96	0.66
500	5.79	3.38	13.72	12.33	11.95	0.65
600	6.56	3.66	13.72	12.30	11.91	0.62
700	7.13	3.89	13.72	12.28	11.88	0.60
800	7.65	4.10	13.72	12.26	11.85	0.59
900	8.08	4.29	13.72	12.24	11.83	0.57
1000	8.48	4.48	13.72	12.22	11.80	0.56

Table C-2.48 *Results of wave computation for sea dike design (continued)*

Vùng 5 -mặt cắt 43 - chu kỳ lặp 125 năm;X=885424 Y=1720489						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.39	1.55	13.72	12.31	11.88	0.85
50	2.93	1.80	13.72	12.40	12.00	0.82
100	3.44	2.02	13.72	12.45	12.08	0.80
150	3.46	2.15	13.72	12.46	12.09	0.78
200	3.52	2.29	13.72	12.46	12.09	0.77
250	3.89	2.50	13.72	12.46	12.09	0.75
300	4.27	2.70	13.72	12.45	12.08	0.73
350	4.67	2.90	13.72	12.44	12.07	0.71
400	5.07	3.08	13.72	12.44	12.06	0.69
450	5.47	3.26	13.72	12.42	12.04	0.67
500	5.88	3.42	13.72	12.41	12.03	0.66
600	6.64	3.70	13.72	12.39	11.99	0.64
700	7.22	3.93	13.72	12.36	11.96	0.62
800	7.74	4.14	13.72	12.34	11.94	0.60
900	8.17	4.34	13.72	12.32	11.91	0.59
1000	8.56	4.53	13.72	12.31	11.89	0.57

Vùng 5 -mặt cắt 48 - chu kỳ lặp 150 năm;X=885424 Y=1720489						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.47	1.60	13.72	12.39	11.96	0.85
50	3.02	1.85	13.72	12.48	12.09	0.83
100	3.53	2.07	13.72	12.54	12.16	0.81
150	3.55	2.20	13.72	12.54	12.17	0.79
200	3.61	2.34	13.72	12.55	12.18	0.78
250	3.98	2.55	13.72	12.54	12.17	0.76
300	4.36	2.75	13.72	12.54	12.16	0.74
350	4.76	2.95	13.72	12.53	12.15	0.72
400	5.16	3.13	13.72	12.52	12.14	0.70
450	5.56	3.31	13.72	12.51	12.13	0.68
500	5.97	3.47	13.72	12.50	12.11	0.67
600	6.73	3.75	13.72	12.47	12.07	0.65
700	7.31	3.98	13.72	12.45	12.05	0.63
800	7.82	4.19	13.72	12.43	12.02	0.61
900	8.26	4.39	13.72	12.41	11.99	0.60
1000	8.65	4.58	13.72	12.39	11.97	0.58

Vùng 5 -mặt cắt 44 - chu kỳ lặp 200 năm;X=885424 Y=1720489						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.68	1.69	13.72	12.48	12.04	0.86
50	3.21	1.95	13.72	12.57	12.17	0.84
100	3.72	2.17	13.72	12.63	12.25	0.82
150	3.74	2.31	13.72	12.63	12.26	0.80
200	3.80	2.45	13.72	12.64	12.27	0.79
250	4.17	2.66	13.72	12.63	12.26	0.77
300	4.55	2.85	13.72	12.63	12.25	0.75
350	4.95	3.05	13.72	12.62	12.24	0.73
400	5.35	3.24	13.72	12.61	12.23	0.71
450	5.75	3.41	13.72	12.60	12.21	0.69
500	6.16	3.57	13.72	12.59	12.19	0.68
600	6.92	3.85	13.72	12.56	12.16	0.66
700	7.50	4.08	13.72	12.54	12.13	0.64
800	8.02	4.29	13.72	12.52	12.10	0.62
900	8.45	4.48	13.72	12.50	12.08	0.61
1000	8.84	4.68	13.72	12.48	12.05	0.59

Table C-2.49 *Results of wave computation for sea dike design*

Vùng 5 -mặt cắt 49 - chu kỳ lặp 10 năm;X=899526 Y=1706327

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.54	1.06	12.71	11.07	10.60	0.72
50	1.96	1.32	12.71	11.14	10.73	0.69
100	2.36	1.56	12.71	11.19	10.81	0.66
150	2.80	1.86	12.71	11.28	10.93	0.63
200	3.23	2.12	12.71	11.32	10.99	0.60
250	3.67	2.34	12.71	11.31	10.97	0.58
300	4.10	2.54	12.71	11.30	10.96	0.56
350	4.54	2.73	12.71	11.28	10.94	0.54
400	4.97	2.90	12.71	11.27	10.93	0.53
450	5.34	3.05	12.71	11.26	10.91	0.51
500	5.71	3.19	12.71	11.24	10.89	0.50
600	6.39	3.42	12.71	11.21	10.85	0.48
700	6.85	3.61	12.71	11.19	10.82	0.47
800	7.26	3.79	12.71	11.17	10.79	0.46
900	7.70	3.95	12.71	11.14	10.75	0.45
1000	8.11	4.10	12.71	11.12	10.72	0.44

Vùng 5 -mặt cắt 49 - chu kỳ lặp 20 năm;X=899526 Y=1706327

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.73	1.22	12.71	11.45	11.01	0.76
50	2.15	1.45	12.71	11.44	11.04	0.73
100	2.57	1.69	12.71	11.44	11.05	0.71
150	3.00	1.97	12.71	11.53	11.17	0.68
200	3.43	2.23	12.71	11.57	11.23	0.65
250	3.86	2.45	12.71	11.56	11.22	0.62
300	4.29	2.65	12.71	11.55	11.21	0.60
350	4.74	2.84	12.71	11.54	11.19	0.59
400	5.16	3.01	12.71	11.53	11.17	0.57
450	5.53	3.16	12.71	11.51	11.15	0.56
500	5.90	3.30	12.71	11.50	11.14	0.55
600	6.58	3.53	12.71	11.47	11.10	0.53
700	7.05	3.72	12.71	11.45	11.07	0.52
800	7.47	3.89	12.71	11.42	11.03	0.50
900	7.89	4.05	12.71	11.40	11.00	0.49
1000	8.31	4.21	12.71	11.37	10.97	0.48

Vùng 5 -mặt cắt 49 - chu kỳ lặp 50 năm;X=899526 Y=1706327

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.01	1.40	13.72	11.92	11.54	0.82
50	2.43	1.69	12.71	12.01	11.65	0.79
100	2.84	1.94	12.71	12.05	11.70	0.76
150	3.27	2.18	12.71	12.04	11.69	0.73
200	3.71	2.40	12.71	12.03	11.69	0.70
250	4.14	2.62	12.71	12.02	11.67	0.68
300	4.58	2.82	12.71	12.01	11.66	0.66
350	5.02	3.00	12.71	12.00	11.64	0.65
400	5.44	3.17	12.71	11.98	11.62	0.63
450	5.81	3.32	12.71	11.97	11.60	0.62
500	6.18	3.46	12.71	11.95	11.58	0.61
600	6.86	3.68	12.71	11.92	11.55	0.59
700	7.33	3.87	12.71	11.90	11.51	0.58
800	7.76	4.04	12.71	11.88	11.48	0.56
900	8.18	4.20	12.71	11.85	11.45	0.55
1000	8.59	4.36	12.71	11.83	11.42	0.54

Vùng 5 -mặt cắt 49 - chu kỳ lặp 100 năm;X=899526 Y=1706327

Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.25	1.54	13.72	12.26	11.86	0.87
50	2.67	1.83	13.72	12.35	11.98	0.83
100	3.08	2.09	13.72	12.39	12.04	0.80
150	3.52	2.33	13.72	12.39	12.03	0.78
200	3.95	2.55	13.72	12.38	12.02	0.75
250	4.38	2.76	13.72	12.37	12.01	0.73
300	4.82	2.96	13.72	12.36	11.99	0.71
350	5.26	3.15	13.72	12.34	11.97	0.69
400	5.69	3.31	13.72	12.33	11.95	0.68
450	6.06	3.46	13.72	12.31	11.93	0.67
500	6.43	3.59	13.72	12.30	11.91	0.66
600	7.11	3.82	13.72	12.27	11.88	0.64
700	7.57	4.00	13.72	12.24	11.84	0.63
800	8.00	4.18	13.72	12.22	11.81	0.61
900	8.42	4.34	13.72	12.20	11.78	0.60
1000	8.83	4.49	13.72	12.18	11.75	0.59

Table C-2.49 *Results of wave computation for sea dike design (continued)*

Vùng 5 -mặt cắt 49 - chu kỳ lặp 125 năm;X=899526 Y=1706327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.32	1.58	13.72	12.34	11.94	0.88
50	2.73	1.87	13.72	12.43	12.06	0.85
100	3.15	2.13	13.72	12.48	12.12	0.82
150	3.58	2.37	13.72	12.47	12.11	0.79
200	4.02	2.59	13.72	12.46	12.10	0.77
250	4.45	2.80	13.72	12.45	12.09	0.75
300	4.89	3.00	13.72	12.44	12.07	0.73
350	5.33	3.18	13.72	12.43	12.05	0.71
400	5.75	3.35	13.72	12.41	12.03	0.69
450	6.12	3.50	13.72	12.40	12.01	0.68
500	6.49	3.63	13.72	12.38	11.99	0.67
600	7.17	3.85	13.72	12.35	11.96	0.65
700	7.64	4.04	13.72	12.33	11.92	0.64
800	8.07	4.21	13.72	12.31	11.89	0.63
900	8.49	4.37	13.72	12.28	11.86	0.62
1000	8.90	4.52	13.72	12.26	11.83	0.61

Vùng 5 -mặt cắt 49 - chu kỳ lặp 150 năm;X=899526 Y=1706327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.44	1.64	13.72	12.43	12.02	0.89
50	2.85	1.94	13.72	12.52	12.14	0.85
100	3.26	2.20	13.72	12.56	12.20	0.82
150	3.70	2.44	13.72	12.56	12.19	0.80
200	4.13	2.66	13.72	12.55	12.18	0.77
250	4.57	2.87	13.72	12.54	12.17	0.75
300	5.00	3.07	13.72	12.53	12.15	0.73
350	5.45	3.25	13.72	12.51	12.13	0.72
400	5.87	3.41	13.72	12.50	12.12	0.70
450	6.24	3.56	13.72	12.48	12.10	0.69
500	6.61	3.69	13.72	12.47	12.08	0.68
600	7.29	3.91	13.72	12.44	12.04	0.66
700	7.76	4.10	13.72	12.41	12.00	0.65
800	8.18	4.27	13.72	12.39	11.97	0.64
900	8.60	4.43	13.72	12.37	11.94	0.62
1000	9.02	4.58	13.72	12.34	11.91	0.61

Vùng 5 -mặt cắt 49 - chu kỳ lặp 200 năm;X=899526 Y=1706327						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.60	1.73	13.72	12.51	12.10	0.90
50	3.01	2.03	13.72	12.60	12.22	0.87
100	3.42	2.29	13.72	12.65	12.29	0.83
150	3.86	2.53	13.72	12.64	12.28	0.81
200	4.30	2.75	13.72	12.64	12.27	0.79
250	4.73	2.96	13.72	12.63	12.25	0.77
300	5.17	3.16	13.72	12.61	12.24	0.75
350	5.61	3.34	13.72	12.60	12.22	0.73
400	6.03	3.50	13.72	12.58	12.20	0.71
450	6.40	3.64	13.72	12.57	12.18	0.70
500	6.77	3.78	13.72	12.55	12.16	0.69
600	7.46	4.00	13.72	12.52	12.12	0.68
700	7.92	4.18	13.72	12.50	12.09	0.66
800	8.35	4.35	13.72	12.48	12.06	0.65
900	8.77	4.51	13.72	12.45	12.02	0.64
1000	9.18	4.66	13.72	12.43	11.99	0.63

Table C-2.50 *Results of wave computation for sea dike design*

Vùng 5 -mặt cắt 50 - chu kỳ lặp 10 năm;X=919184 Y=1689275						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.55	1.13	12.71	11.20	10.74	0.74
50	2.14	1.44	12.71	11.30	10.90	0.71
100	2.70	1.69	12.71	11.34	10.97	0.68
150	2.72	1.68	12.71	11.32	10.95	0.66
200	2.92	2.08	12.71	11.31	10.93	0.64
250	3.39	2.48	12.71	11.29	10.90	0.59
300	3.96	2.91	12.71	11.29	10.91	0.54
350	4.53	3.57	12.71	11.33	10.96	0.46
400	5.12	4.09	12.71	11.34	10.97	0.39
450	5.78	4.45	12.71	11.32	10.95	0.35
500	6.44	4.80	12.71	11.30	10.92	0.31
600	7.83	5.45	12.71	11.26	10.86	0.24
700	9.38	6.12	12.71	11.21	10.78	0.18
800	10.98	6.67	12.71	11.15	10.69	0.14
900	11.96	7.14	12.71	11.10	10.61	0.10
1000	12.94	7.58	12.71	11.04	10.53	0.07

Vùng 5 -mặt cắt 50 - chu kỳ lặp 20 năm;X=919184 Y=1689276						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.71	1.22	12.71	11.47	11.00	0.77
50	2.31	1.53	12.71	11.57	11.17	0.74
100	2.86	1.79	12.71	11.62	11.24	0.71
150	2.89	1.98	12.71	11.60	11.22	0.69
200	2.98	2.18	12.71	11.59	11.20	0.66
250	3.56	2.57	12.71	11.56	11.17	0.62
300	4.12	2.99	12.71	11.57	11.17	0.57
350	4.69	3.66	12.71	11.61	11.24	0.49
400	5.29	4.18	12.71	11.62	11.25	0.42
450	5.94	4.54	12.71	11.60	11.23	0.38
500	6.61	4.89	12.71	11.59	11.20	0.34
600	7.99	5.59	12.71	11.55	11.14	0.27
700	9.55	6.23	12.71	11.50	11.07	0.21
800	11.02	6.79	12.71	11.44	10.98	0.16
900	12.12	7.27	12.71	11.38	10.91	0.13
1000	13.10	7.71	12.71	11.33	10.83	0.10

Vùng 5 -mặt cắt 50 - chu kỳ lặp 50 năm;X=919184 Y=1689275						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	1.97	1.37	13.72	11.94	11.46	0.83
50	2.56	1.68	13.72	11.98	11.54	0.80
100	3.12	1.94	13.72	12.00	11.58	0.76
150	3.15	2.13	13.72	11.98	11.55	0.74
200	3.24	2.37	13.72	11.98	11.56	0.72
250	3.77	3.00	12.71	12.07	11.69	0.64
300	4.32	3.51	12.71	12.10	11.74	0.57
350	4.92	3.94	12.71	12.09	11.73	0.52
400	5.53	4.32	12.71	12.09	11.72	0.47
450	6.19	4.69	12.71	12.07	11.69	0.42
500	6.85	5.04	12.71	12.05	11.67	0.39
600	8.24	5.74	12.71	12.02	11.61	0.31
700	9.79	6.40	12.71	11.97	11.54	0.25
800	11.26	6.97	12.71	11.91	11.46	0.20
900	12.35	7.46	12.71	11.86	11.39	0.16
1000	13.33	7.92	12.71	11.81	11.31	0.13

Vùng 5 -mặt cắt 50 - chu kỳ lặp 100 năm;X=919184 Y=1689276						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.17	1.52	13.72	12.27	11.79	0.86
50	2.76	1.84	13.72	12.37	11.94	0.83
100	3.32	2.12	13.72	12.42	12.02	0.79
150	3.34	2.34	13.72	12.40	12.00	0.77
200	3.43	2.60	13.72	12.41	12.01	0.74
250	3.96	3.22	13.72	12.46	12.10	0.66
300	4.51	3.71	13.72	12.46	12.12	0.59
350	5.12	4.08	13.72	12.47	12.10	0.55
400	5.73	4.43	13.72	12.46	12.09	0.50
450	6.39	4.80	13.72	12.44	12.08	0.46
500	7.05	5.16	13.72	12.43	12.04	0.42
600	8.44	5.87	13.72	12.39	11.98	0.34
700	9.99	6.54	13.72	12.34	11.91	0.28
800	11.46	7.11	13.72	12.29	11.84	0.23
900	12.55	7.61	13.72	12.24	11.77	0.19
1000	13.53	8.08	13.72	12.19	11.70	0.16

Table C-2.50 *Results of wave computation for sea dike design (continued)*

Vùng 5 -mặt cắt 50 - chu kỳ lặp 125 năm;X=819184 Y=1689276						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.00	1.42	13.72	12.46	12.01	0.67
50	2.80	1.73	13.72	12.51	12.10	0.64
100	3.15	1.99	13.72	12.54	12.14	0.61
150	3.18	2.19	13.72	12.52	12.12	0.76
200	3.27	2.39	13.72	12.51	12.10	0.76
250	3.84	2.77	13.72	12.48	12.07	0.72
300	4.41	3.18	13.72	12.48	12.08	0.67
350	4.99	3.83	13.72	12.54	12.16	0.59
400	5.58	4.34	13.72	12.55	12.18	0.52
450	6.24	4.72	13.72	12.54	12.16	0.46
500	6.90	5.07	13.72	12.52	12.14	0.44
600	8.28	5.79	13.72	12.49	12.08	0.36
700	9.83	6.46	13.72	12.44	12.01	0.30
800	11.30	7.04	13.72	12.39	11.94	0.25
900	12.39	7.54	13.72	12.34	11.87	0.21
1000	13.37	8.02	13.72	12.29	11.81	0.17

Vùng 5 -mặt cắt 50 - chu kỳ lặp 150 năm;X=819184 Y=1689276						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.30	1.56	13.72	12.45	11.96	0.83
50	2.89	1.91	13.72	12.55	12.11	0.64
100	3.44	2.19	13.72	12.59	12.19	0.81
150	3.46	2.41	13.72	12.58	12.16	0.76
200	3.55	2.67	13.72	12.58	12.16	0.75
250	4.09	3.26	13.72	12.61	12.27	0.63
300	4.64	3.78	13.72	12.66	12.30	0.61
350	5.24	4.15	13.72	12.65	12.26	0.55
400	5.86	4.50	13.72	12.64	12.26	0.52
450	6.52	4.87	13.72	12.62	12.24	0.48
500	7.18	5.23	13.72	12.61	12.21	0.43
600	8.56	5.95	13.72	12.57	12.16	0.36
700	10.11	6.62	13.72	12.52	12.09	0.30
800	11.58	7.20	13.72	12.47	12.02	0.25
900	12.67	7.70	13.72	12.42	11.95	0.21
1000	13.65	8.17	13.72	12.37	11.88	0.17

Vùng 5 -mặt cắt 50 - chu kỳ lặp 200 năm;X=819184 Y=1689275						
Khoảng cách từ bờ [m]	Độ sâu [m]	Hs [m]	Tp [s]	Tm01 [s]	Tm02 [s]	Set up [m]
0	2.43	1.65	13.72	12.54	12.05	0.86
50	3.02	1.98	13.72	12.64	12.20	0.85
100	3.58	2.27	13.72	12.68	12.26	0.81
150	3.60	2.48	13.72	12.67	12.26	0.79
200	3.69	2.74	13.72	12.67	12.27	0.76
250	4.22	3.35	13.72	12.73	12.36	0.68
300	4.77	3.85	13.72	12.76	12.39	0.62
350	5.36	4.22	13.72	12.74	12.37	0.57
400	6.00	4.58	13.72	12.73	12.35	0.53
450	6.65	4.95	13.72	12.71	12.33	0.46
500	7.31	5.31	13.72	12.70	12.30	0.44
600	8.70	6.03	13.72	12.66	12.25	0.37
700	10.25	6.70	13.72	12.61	12.18	0.30
800	11.72	7.28	13.72	12.56	12.11	0.25
900	12.61	7.76	13.72	12.51	12.04	0.21
1000	13.79	8.26	13.72	12.47	11.97	0.18

C2. Method for wave computation in the shielded areas with wave-generating factors

C2.1 Bases of wave computation method at the shielded areas with no impact of incident ocean waves

Method and results of wave computation are presented in Appendix B corresponding to the coastal areas under the direct impacts of incident ocean wave field. In case the coastal areas are shielded by the islands or the wave computation for the estuarine areas further landwards, it is necessary to apply the method of direct wave computation from the wave-generating factors, including: wind velocity, fetch, wind duration and the depth, as well as the coastal and estuarine bathymetries. In case of coastal areas from Quang Ninh to Quang Nam, especially the coastal areas from Mong Cai to Hai Phong it is necessary to apply the method of wave computation with wave-generating factors presented as follows:

- Wind data used for wave computation is presented thoroughly in Appendix B.1.1 of Guideline on Sea dike design [13];
- Wind fetch is determined in two cases: actual fetch and equivalent fetch as per formulae B-3, B-4 and Table B-3 of [13];
- Frequency of the water levels corresponding to different return periods are derived from the findings of Project No. 1, including the frequency of wind setup and storm setup; the depth of computing point will include the actual depths adding wind setup and storm setup.

* Method for wave calculation

Method for wave calculation directly from the wave-generating factors is used as per the formulae B-11 and B-12 in the Guideline on Sea dike design [13]. In this document, some available computation table for different range of wind velocities, wind fetches and average depths (from Table 1 to Table 12). In this report, FBASE software version 1.21 provided for Institue of Mechanics by Delft Hydraulics within the framework of Project VIE/87/020 supported by UNDP [15] have been used.

C2.2 Look-up tables of wave computation results at the shielded areas with no impacts of incident ocean waves

The preliminary wave computation for sea dike design for the shielded areas with no impacts of incident ocean wave field is performed by means of referring to the available tables. In order to specify the computation results, the computation tables have been compiled with the detailed wave parameters (different from the look-up tables of computation results for each range as presented in the document [13]).

C2.2.1 Look-up tables for the areas from Quang Ninh to Hai Phong

In case of the coastal areas in Quang Ninh, available tables of wave computation results corresponding to different return periods based on the research findings on wind velocities corresponding to different return periods at Co To, Hong Gai and Hon Dau stations [14] can be used. Table 1-6 gives the available results of wave parameters including significant wave height and wave priod corresponding to different return periods of 10 years, 20 years, 50 years và 100 years. The depth range of 5m, 10m and 15m and the fetches of 5km, 10km, 15km, 20km, 25km, and 30 km are the available depths and fetches in the areas adjacent to the the coastal areas of Mong Cai – Hai Phong with the shielded islands outside (including Gulfs of Tien Yen, Ha Coi, Ha Long, Bai Tu Long).

Table 1. *Computed wave height and wave period for the area of Quang Ninh – Hai Phong; Fetch X=5km*

Độ sâu trung bình		Chu kỳ lặp			
		10 năm	20 năm	50 năm	100 năm
D = 05 m	Hs [m]	0.95	1.03	1.11	1.29
	T [s]	3.52	3.66	3.81	4.12
D = 10 m	Hs [m]	1.09	1.20	1.31	1.57
	T [s]	3.71	3.87	4.04	4.38
D = 15 m	Hs [m]	1.13	1.25	1.38	1.67
	T [s]	3.79	3.96	4.13	4.49

Table 2. *Computed wave height and wave period for the area of Quang Ninh – Hai Phong; Fetch X=10km*

Độ sâu trung bình		Chu kỳ lặp			
		10 năm	20 năm	50 năm	100 năm
D = 05 m	Hs [m]	1.10	1.18	1.27	1.44
	T [s]	3.96	4.11	4.28	4/60
D = 10 m	Hs [m]	1.37	1.49	1.63	1.91
	T [s]	4.25	4.42	4.62	5.00
D = 15 m	Hs [m]	1.46	1.60	1.76	2.11
	T [s]	4.37	4.56	4.76	5.17

Table 3. *Computed wave height and wave period for the area of Quang Ninh – Hai Phong; Fetch X=15km*

Độ sâu trung bình		Chu kỳ lặp			
		10 năm	20 năm	50 năm	100 năm
D = 05 m	Hs [m]	1.18	1.25	1.33	1.50
	T [s]	4.21	4.37	4.54	4.88
D = 10 m	Hs [m]	1.53	1.66	1.81	2.10
	T [s]	4.57	4.76	4.96	5.36
D = 15 m	Hs [m]	1.67	1.83	2.01	2.38
	T [s]	4.73	4.93	5.15	5.58

Table 4. *Computed wave height and wave period for the area of Quang Ninh – Hai Phong; Fetch X=20km*

Độ sâu trung bình		Chu kỳ lặp			
		10 năm	20 năm	50 năm	100 năm
D = 05 m	Hs [m]	1.22	1.29	1.37	1.53
	T [s]	4.39	4.55	4.72	5.06
D = 10 m	Hs [m]	1.65	1.78	1.93	2.22
	T [s]	4.81	5.00	5.21	5.62
D = 15 m	Hs [m]	1.83	2.00	2.18	2.57
	T [s]	5.00	5.20	5.43	5.88

Table 5. *Computed wave height and wave period for the area of Quang Ninh – Hai Phong; Fetch X=25km*

Độ sâu trung bình		Chu kỳ lập			
		10 năm	20 năm	50 năm	100 năm
D = 05 m	Hs [m]	1.24	1.31	1.39	1.54
	T [s]	4.50	4.68	4.86	4.20
D = 10 m	Hs [m]	1.74	1.87	2.01	2.32
	T [s]	4.99	5.18	5.40	5.82
D = 15 m	Hs [m]	1.96	2.13	2.32	2.71
	T [s]	5.20	5.42	5.65	6.11

Table 6. *Computed wave height and wave period for the area of Quang Ninh – Hai Phong; Fetch X=30km*

Độ sâu trung bình		Chu kỳ lập			
		10 năm	20 năm	50 năm	100 năm
D = 05 m	Hs [m]	1.26	1.33	1.41	1.55
	T [s]	4.62	4.78	4.96	5.31
D = 10 m	Hs [m]	1.80	1.93	2.08	2.37
	T [s]	5.13	5.33	5.55	5.98
D = 15 m	Hs [m]	2.06	2.23	2.43	2.83
	T [s]	5.37	5.39	5.83	6.30

C2.2.2. Look-up tables for the shielded coastal areas

In case the computation of wave parameters with wave-generating factors at the shielded coastal areas is necessary and deep water waves cannot propagate directly onshore, Tables 7÷12, which give available results of wave parameters including significant wave height and wave periods corresponding to the wind velocities of 10m/s; 15m/s; 20m/s; 25m/s; 30m/s; 40m/s and 50m/s, can be used. Maximum velocity of 50m/s corresponding to the strongest wind may occur. The depth ranges of 5m, 10m and 15m and the fetches of 5km, 10km, 15km, 20km, 25km, and 30 km are the available depths and fetches at the areas adjacent to coast with shielding islands outside or the estuaries.

Table 7. *Computed wave height and wave period*

Fetch X=5km

Độ sâu trung bình		Vận tốc gió trung bình [m/s]						
		10	15	20	25	30	40	50
D = 05 m	Hs [m]	0.44	0.67	0.88	1.07	1.25	1.57	1.84
	T [s]	2.5	3.0	3.4	3.8	4.1	4.6	5.0
D = 10 m	Hs [m]	0.47	0.73	1.00	1.26	1.52	2.01	2.47
	T [s]	2.6	3.1	3.6	4.0	4.3	4.9	5.4
D = 15 m	Hs [m]	0.47	0.75	1.04	1.32	1.61	2.18	2.73
	T [s]	2.6	3.2	3.7	4.1	4.4	5.1	5.6

Table 8. *Computed wave height and wave period*

Fetch X=10km

Độ sâu trung bình		Vận tốc gió trung bình [m/s]						
		10	15	20	25	30	40	50
D = 05 m	Hs [m]	0.55	0.81	1.03	1.23	1.40	1.70	1.94
	T [s]	2.8	3.4	3.8	4.2	4.5	5.1	5.9
D = 10 m	Hs [m]	0.61	0.94	1.26	1.57	1.86	2.39	2.86
	T [s]	2.9	3.6	4.1	4.5	4.9	5.6	6.2
D = 15 m	Hs [m]	0.62	0.98	1.34	1.69	2.04	2.70	3.38
	T [s]	3.0	3.7	4.2	4.7	5.1	5.8	6.4

C2.3 User's Manual of FBASE softwares for wave computation according to wave-generating factors

- Run FBASE.EXE, the display interface is shown in Figure C-1.

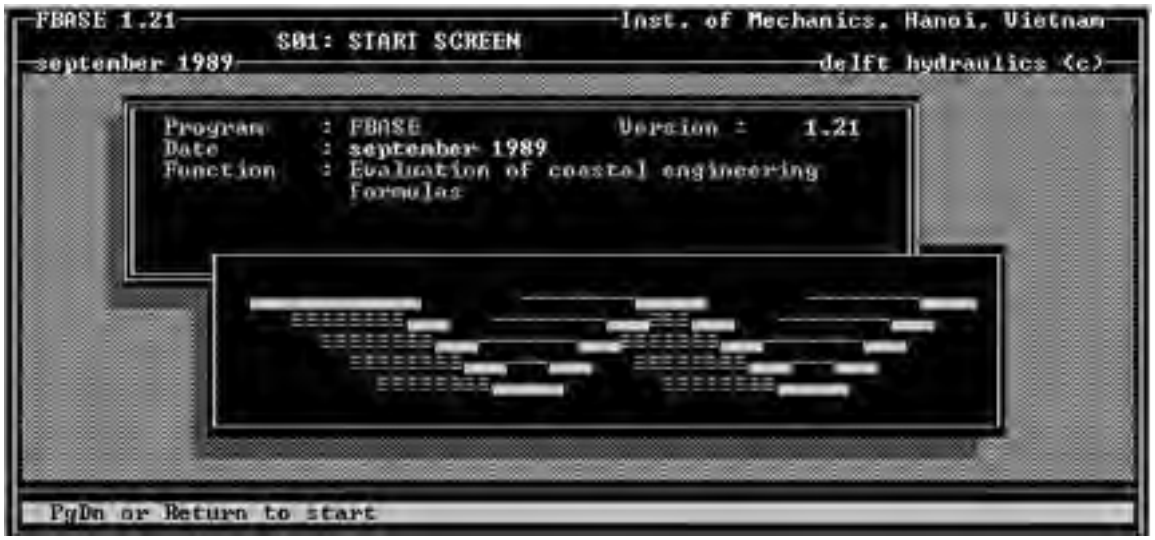


Figure C-1. *User Interface of the program FBASE.EXE*

- Press Page Down or Enter, the display interface is shown in Figure C-2, select the hydraulic calculation command.

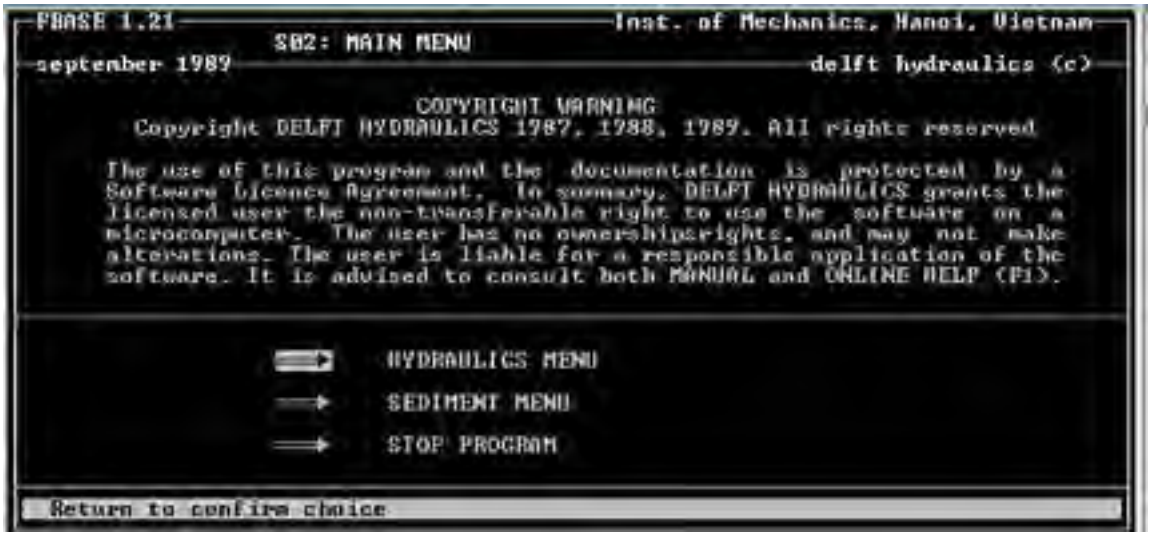


Figure C-2. *Selection interface of HYDRAULIC MENU*

- Press Page Down or Enter the display interface is shown in Figure C-3, select the computing method of SMB.

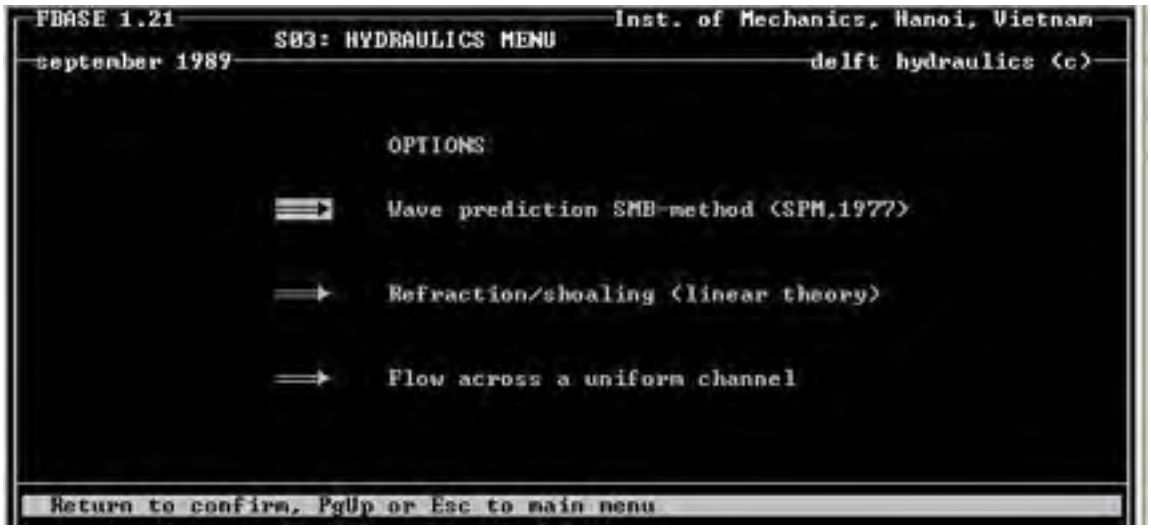


Figure C-3. *Selection interface of "wave prediction SMB- method"*

- Press Page Down or Enter, the display interface is shown in Figure C-4.1, select the computing option with the direct fetch.

Figure C-4.1 *Selection interface of "Direct input of fetch length"*

- Press Page Down or Enter, the display interface is shown in Figure C-5.1, input the data on fetch, wind velocity, duration (if available) and average depth.

Figure C-5.1 *Data input interface of wave-generating factors*

- Press Page Down or Enter, the display interface is shown in Figure C-6.1, the computation results include wave height, wave period in case of deep water, in case of average depth and equivalent wind duration.

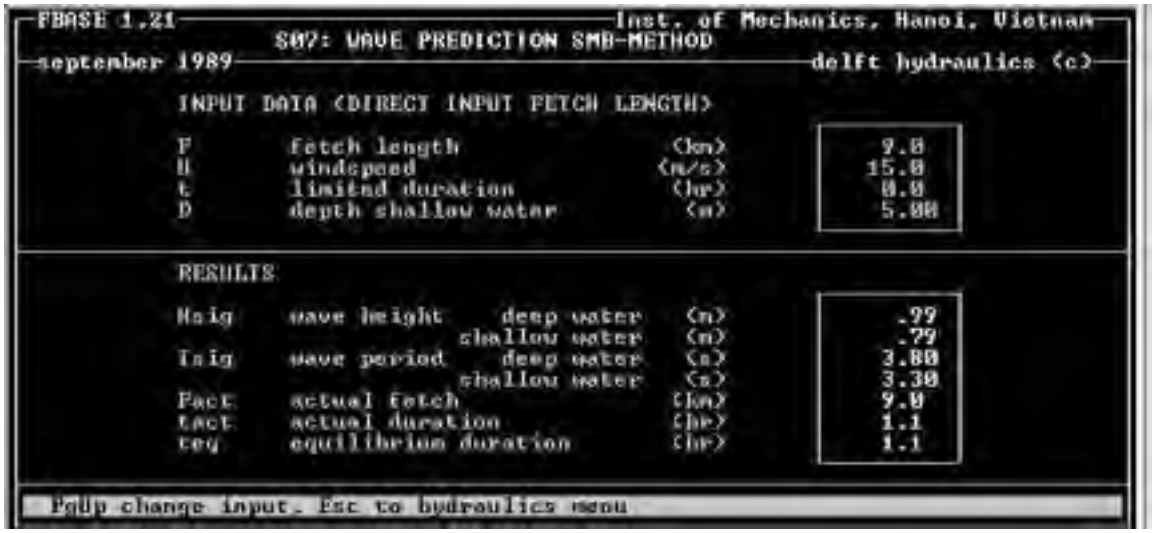


Figure C-6.1 *Display Interface of computation results*

- Press Page Down or Enter, the display interface is shown in Figure C-4.2, select the computing option with equivalent fetch (in case the computation area is under the influence of topography corresponding to Figure B-1 [7]).

Figure C-4.2 *Selection interface of "Via effective fetch"*

- Press Page Down or Enter, the display interface is shown in Figure C-4.3, input the angles between the rays in order to calculate the equivalent fetch. For example, the angle input of 12^0 will generate 7 rays

Figure C-4.3 *Data input interface of angles between the rays*

- Press Page Down or Enter, the display interface is shown in Figure C-4.4, input the data on wind fetches according to the rays (7 rays).

Figure C-4.4 *Data input interface of fetches according to the rays*

- Press Page Down or Enter, the display interface is shown in Figure C-5.2, corresponding to equivalent wind fetch, input the data on wind velocity, wind duration (if available) and average depth – similar to Figure C-5.1.

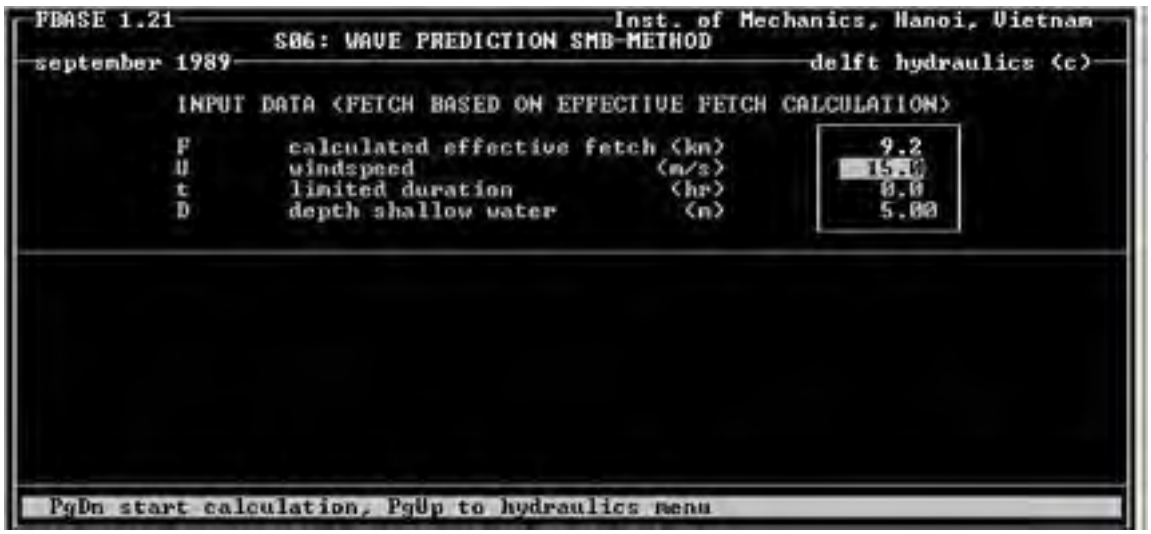


Figure C-5.2 *Data input interface of wave-generating factors in case of equivalent fetch*

- Press Page Down or Enter, the display interface is shown in Figure C-6.2, the computing results includes the wave heights, wave periods in case of deep water, in case of average depth and equivalent wind duration.

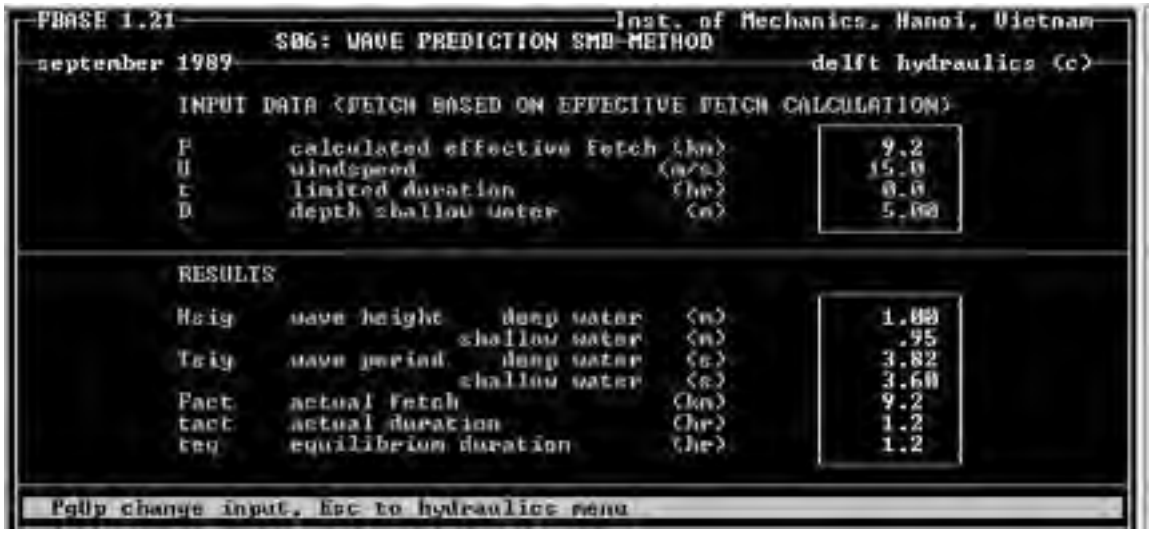


Figure C-6.2 *Display interface of the computation resutls in case of equivalent fetch*

The CD-ROM and FBASE software is handed over with this document.

C3. Wave reduction factor through mangrove forest

WAVE REDUCTION FACTOR - TOTAL WATER LEVEL 3.5M, 9TH-GRADED WAVES

Density of mangrove forest 60m:

	Equivalent density [plants/m²]	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density [plants/m²]	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
Diameter [m]	0.05	[illegible]	[illegible]	[illegible]	[illegible]	0.22	0.221	0.232	[illegible]	[illegible]	0.274	0.283	0.292	[illegible]	[illegible]	[illegible]	[illegible]
	0.07	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.34	0.35	0.36	0.37	0.38	[illegible]	[illegible]
	0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.427	0.438	0.448	0.462	0.471	0.48

Density of mangrove forest 120m:

	Equivalent density [plants/m²]	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density [plants/m²]	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
Diameter [m]	0.05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.441	0.452	0.463	0.473	0.485	[illegible]	[illegible]	0.51
	0.07	[illegible]	0.408	0.426	0.443	0.458	[illegible]	[illegible]	[illegible]	0.512	0.524	0.534	0.545	0.555	0.564	0.573	0.581
	0.10	[illegible]	0.483	[illegible]	[illegible]	[illegible]	[illegible]	0.561	0.573	0.587	0.598	[illegible]	[illegible]	0.628	[illegible]	[illegible]	[illegible]

Density of mangrove forest 180m:

	Equivalent density [plants/m²]	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density [plants/m²]	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
Diameter [m]	0.05	[illegible]	[illegible]	0.451	0.467	0.481	[illegible]	0.51	0.523	[illegible]	[illegible]	[illegible]	[illegible]	0.573	[illegible]	[illegible]	[illegible]
	0.07	[illegible]	[illegible]	[illegible]	0.537	0.552	[illegible]	0.579	[illegible]	[illegible]	0.615	0.623	[illegible]	0.641	[illegible]	[illegible]	[illegible]
	0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.66	0.671	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Density of mangrove forest 240m:

	Equivalent density [plants/m²]	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density [plants/m²]	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
Diameter [m]	0.05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.547	[illegible]	[illegible]	0.58	[illegible]	[illegible]	[illegible]	0.62	[illegible]	[illegible]	[illegible]
	0.07	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	0.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Density of mangrove forest 300m:

	Equivalent density [plants/m²]	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density [plants/m²]	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
Diameter [m]	0.05	0.516	[illegible]	[illegible]	0.569	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.647	[illegible]	0.662	0.67	0.67	[illegible]	[illegible]
	0.07	0.584	[illegible]	0.62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.704	0.713	0.721	0.729	0.736	0.743	0.749
	0.10	0.653	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.745	0.754	0.762	[illegible]	0.777	[illegible]	[illegible]	[illegible]	[illegible]

WAVE REDUCTION FACTOR - TOTAL WATER LEVEL 4.0M, 12TH-GRADED WAVES

Density of mangrove forest 60m:

	Equivalent density [plants/m²]	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density [plants/m²]	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
Diameter [m]	0.05	0.198	0.211	0.226	0.24	0.253	0.265	0.276	0.287	0.298	[illegible]	0.318	0.328	0.337	0.346	0.355	0.363
	0.07	0.252	0.269	[illegible]	[illegible]	[illegible]	0.328	0.341	0.353	[illegible]	[illegible]	[illegible]	[illegible]	0.405	0.416	0.429	0.438
	0.10	0.318	0.337	0.355	[illegible]	0.386	0.401	[illegible]	[illegible]	0.444	0.455	[illegible]	0.480	0.490	0.499	0.509	0.517

Density of mangrove forest 120m:

	Equivalent density [plants/m²]	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density [plants/m²]	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
Diameter [m]	0.05	[illegible]	0.374	0.391	0.407	0.422	0.436	0.449	[illegible]	0.472	[illegible]	[illegible]	[illegible]	[illegible]	0.524	0.533	0.541
	0.07	0.422	0.441	0.459	0.476	0.491	[illegible]	0.518	0.531	0.543	0.554	[illegible]	0.574	0.583	0.592	[illegible]	[illegible]
	0.10	0.493	0.513	[illegible]	0.549	0.564	0.578	0.591	[illegible]	0.617	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.681

Density of mangrove forest 180m:

Diameter (m)	Equivalent density (plants/m²)	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density (plants/m²)	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
	0.05	0.442	0.460	0.481	0.497	0.512	0.526	0.539	0.551	0.562	0.573	0.583	0.592	0.601	0.61	0.618	0.625
	0.07	0.512	0.531	0.549	0.564	0.578	0.592	0.603	0.616	0.627	0.637	0.647	0.655	0.664	0.672	0.681	0.688
	0.10	0.583	0.601	0.618	0.633	0.647	0.659	0.671	0.683	0.693	0.703	0.711	0.721	0.728	0.735	0.742	0.748

Density of mangrove forest 240m:

Diameter (m)	Equivalent density (plants/m²)	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density (plants/m²)	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
	0.05	0.489	0.508	0.526	0.542	0.557	0.57	0.583	0.595	0.606	0.616	0.626	0.635	0.644	0.652	0.66	0.667
	0.07	0.557	0.575	0.592	0.608	0.622	0.635	0.647	0.658	0.668	0.678	0.687	0.695	0.703	0.711	0.719	0.726
	0.10	0.626	0.644	0.66	0.676	0.687	0.699	0.710	0.722	0.731	0.739	0.749	0.756	0.765	0.769	0.775	0.781

Density of mangrove forest 300m:

Diameter (m)	Equivalent density (plants/m²)	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Actual density (plants/m²)	3.2	3.6	3.9	4.3	4.6	4.9	5.3	5.6	5.9	6.2	6.6	6.9	7.2	7.5	7.9	8.2
	0.05	0.544	0.567	0.58	0.595	0.61	0.623	0.635	0.646	0.656	0.666	0.675	0.683	0.691	0.699	0.706	0.713
	0.07	0.61	0.629	0.643	0.658	0.671	0.683	0.694	0.704	0.714	0.723	0.731	0.739	0.746	0.752	0.758	0.766
	0.10	0.673	0.691	0.706	0.719	0.731	0.743	0.753	0.762	0.770	0.778	0.786	0.792	0.799	0.805	0.810	0.815

APPENDIX D – COMPUTATION OF WAVE PRESSURE

D-1. Wave pressure distribution on slope

In case of slopes that are strengthened by fabricated or cast-in-place concrete slabs with $1,5 \leq \cot g\varphi \leq 5$, the diagram of wave pressure is shown in Figure D-1. In this diagram, the maximum design wave pressure p_d (KPa) is determined by the following formula:

$$p_d = k_s\, k_t\, p_{tcl}\, \rho g\, H_s \qquad \text{(D-1)}$$

where,

k_s – coefficient, determined by the following formula:

$$k_s = 0,85 + 4,8\frac{H_s}{L_s} + \cot g\varphi\left(0,028 - 1,15\frac{H_s}{L_s}\right) \qquad \text{(D-2)}$$

k_t – coefficient, given in Table D-1;

P_{tcl} – maximum relative wave presure on the slope at point 2 (see Figure D-1), given in Table D-2.

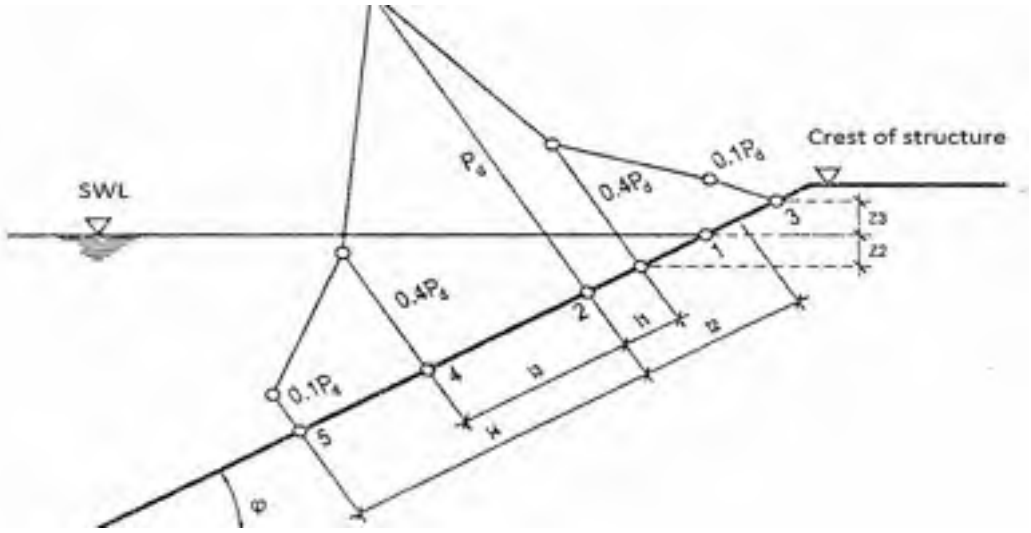


Figure D-1. *Wave pressure graph on the slope*

Table D -1. *Coefficient k_t*

Wave steepness L_s/H_s	10	15	20	25	35
Coefficient k_t	1	1,15	1,3	1,35	1,48

Table D-2. *Coefficient P_{tcl}*

Wave height H_s/m	0,5	1	1,5	2,0	2,5	3,0	3,5	≥ 4
Maximum of relative wave presure value P_{tcl}	3,7	2,8	2,3	2,1	1,9	1,8	1,75	1,7

- The ordinate Z_2(m) of point No. 2 (point of application of the maximum design wave pressure P_d) is determined by the following formula:

$$Z_2 = A + \frac{1}{\cot g^2 \varphi}\left[1 - \sqrt{2\cot g^2 \varphi + 1}\right](A + B) \qquad \text{(D-3)}$$

in which A and B are the parameters in meter, determined by the following formulae:

$$A = H_s\left(0{,}47 + 0{,}023\frac{L_s}{Hs}\right)\frac{1+\cot g^2\varphi}{\cot g^2\varphi} \qquad \text{(D-4)}$$

$$B = H_s\left[0{,}95 - (0{,}84\cot g\varphi - 0{,}25)\frac{H_s}{L_s}\right] \qquad \text{(D-5)}$$

- The ordinate Z_3 (m) corresponding to wave run-up on the slope is determined as per Appendix B. On the other parts of the slope which are higher or lower than point No. 2 (see Figure D-1), the ordinates P (kPa) of the wave pressure diagram at different distances as follows:

$P = 0{,}4p_d$ at $\begin{cases} L_1 = 0{,}0125L_\varphi(m) \\ L_3 = 0{,}0265L_\varphi(m) \end{cases}$

$P = 0{,}1p_d$ at $\begin{cases} L_2 = 0{,}0325L_\phi(m) \\ L_4 = 0{,}0075L_\phi(m) \end{cases}$

in which $L_\varphi = \dfrac{L_s \cot g\varphi}{\sqrt[4]{\cot g^2\varphi - 1}}$ (D-6)

D.2. Negative wave pressure (wave uplift pressure)

In case of wave run-down, instantaneous value of water pressure on the protecting slabs will up and orthogonal with block concrete, namely negative wave pressure.

- Ordinate p_c of the diagram of wave pressure under the strengthening slabs for sloping structures must be determined by the following formula:

$$p_C = k_S\, k_t\, p_{crcl}\, \rho g H_s \qquad \text{(D-7)}$$

where, p_{crcl} – relative wave uplift pressure, determined as per Figure D-2.

In case of the structures of grade I and II and wave height H_{SP}>1,5m, if the arguments are adequate, the wave pressures on the slope with strengthening slabs can be determined by the method of taking un-harmonic characteristics of wind-generated waves into consideration.

In case of berm or variation of inclination on each section of the slope, then wave

pressures on protecting structural elements on the slope must be determined by the findings of physical models.

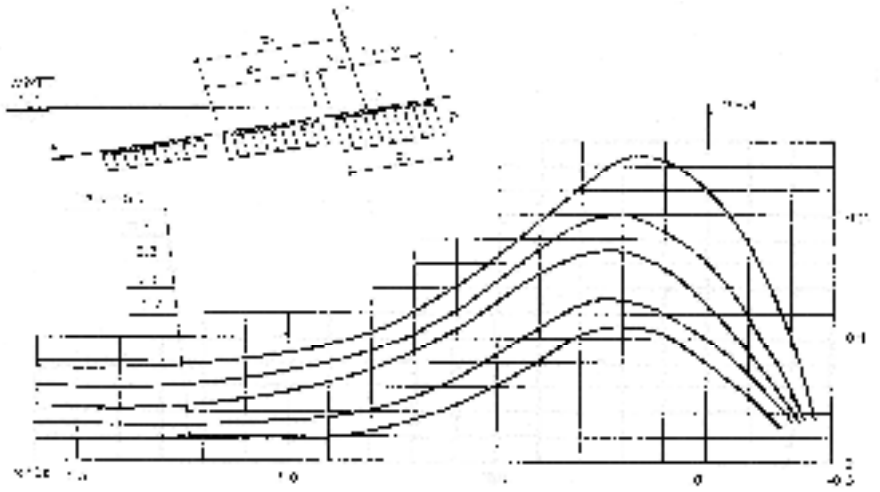


Figure D-2 *Diagram for determining the wave uplift pressure*

D.3. Wave presure to protected sea dike structures

D3.1. With submerged breakwater

Maximum values of horizontal component P_z (kN/m) and the vertical components P_z and P_c(kN/m) of the resultant wave load on submerged breakwater in case of wave trough are calculated by the horizontal and vertical wave pressure diagram (see Figure D-3). In these graphs, values of P (kPa) is determined taking the inclination i of the base into consideration by the following formula:

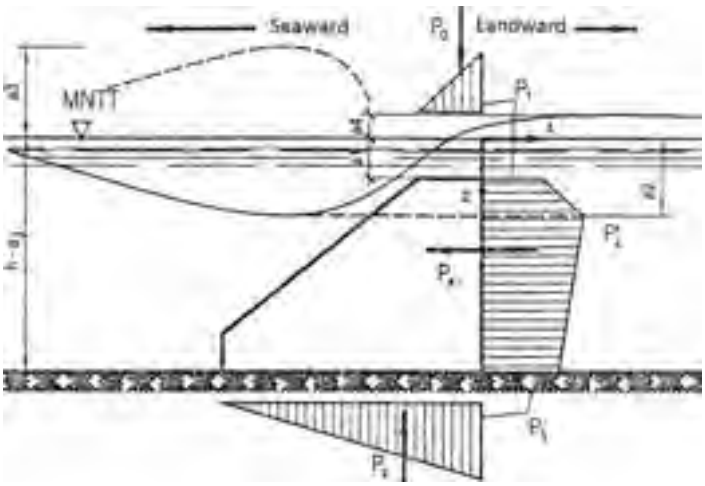


Figure D-3. *Diagram of wave presure on a section of submerged breakwater*

a) In case of the base inclination i ≤ 0,04

- At the depth a_1:

$$p_1 = \zeta g\,(a_1 - a_4) \qquad \text{if} \quad a_1 < a_2 \qquad \text{(D-8)}$$

$$p_1 = p_2 \qquad \text{if} \quad a_1 > a_2 \qquad \text{(D-9)}$$

- At the depth a_2:

$$p_2 = \zeta g H_s \left(0{,}015 \frac{L_s}{h} + 0{,}03 \frac{h - a_1}{h} \right) - \zeta g a_4 \qquad \text{(D-10)}$$

- At the depth $a_3 = h$

$$P_3 = K_W P_2 \qquad \text{(D-11)}$$

b) In case of the base inclination i > 0,04

- At the depth a_1: p_1 is determined by the formulae (D-8) and (D-9)

- At the depth a_2: $p_2 = \zeta g\,(a_2 - a_4)$ (D-12)

- At the depth $a_3 = h$ $P_3 = P_2$ (D-13)

where,

a_1 – depth, determined from the crest to the design water level (m) ;

a_2 – depth, determined from the design water level to the wave trough (m), given in Table (D-3);

K_W – coefficient, given in Table (D-4);

a_4 – depth, determined from the water level at lee side to the design water level (m) determined by the following formula:

$$a_4 = - k_{th} (a_1 - a_5) - a_1 \qquad \text{(D-14)}$$

k_{th} - Coefficient, given in Table (D-3);

a_5 – Depth, determined from the wave middle in front of the submerged breakwater to the design water level (m), given in Table (D-3);

ζ - Breaker index.

Table D-3 *Coefficient K_{th}*

Corresponding wave height H_s/h	0,4	0,5	0,6	0,7	0,8	0,9	1
Relative falling of wave trough a_2/h	0,14	0,17	0,20	0,22	0,24	0,26	0,28
Relative rising of wave middle a_S/h	-0,13	-0,16	-0,20	-0,24	-0,28	-0,32	-0,37
Coefficient k_{th}	0,76	0,73	0,69	0,66	0,63	0,60	0,57

Table D-4 *Coefficient K_W*

Wave steepness L_s/H_s	8	10	15	20	25	30	35
Coefficient K_W	0,73	0,75	0,8	0,85	0,9	0,95	1

D.3.2. In case of offshore breakwater

Maximum values of horizontal component P_z (kN/m) and the vertical components P_z (kN/m) of the resultant load of wave breaking on vertical breakwater (without landward filling soil) must be determined by the horizontal and vertical wave pressure diagram (see Figure D-4), in which the values of p (kPa) and η_C (m) must be determined depending on the location of the structures.

a) In case the structure is located at the depth where the waves break for the last time (see Figure D-4a), the following formulae can be applied:

$$p = p_u = \xi g H_{SD}(0,033 L_S/h + 0,75) \quad \text{(D-15)}$$

$$\eta_c = -\frac{p_i}{\xi g} \quad \text{(D-16)}$$

b) In case the structure is located at the water edge (see Figure D.4b), the following formulae can be applied:

$$p = p_i = (1-0,3a_i/a_u)p_u \quad \text{(D-17)}$$

$$\eta_c = -\frac{p_i}{\xi g} \quad \text{(D-18)}$$

c) In case the structure is located on shore, above water edge and in the range of wave runup (see Figure D.4c), the following formulae can be applied:

$$p = p_i = 0,7(1-a_1/a_r)p_n \quad \text{(D-19)}$$

$$\eta_c = \frac{p_i}{\xi g} \quad \text{(D-20)}$$

where,

η_c - height of wave crest with reference to the design water level at the location of breakwater (m) ;

H_{Sb} - Wave height at the point where waves break for the last time (m) ;

a_u - Distance from the point where waves break for the last time to the water edge (m) ;

a_i - Distance from the point where waves break for the last time to the location of the structure (m) ;

a_l - Distance from the water edge to the location of the structure (m) ;

a_r - Distance from the water edge to run-up boudary of breaking waves ;

In case of no structure existing, a_r can be determined by the following formula :

$$a_r = R_{S1\%} \cot g\varphi \qquad \text{(D-21)}$$

Note: *If the height determined from the crest to the design water level $Z_1 \geq -0,3.H_S$, then the wave pressure determined by the formulae D-15, D-17, D-19 must be multiplied by coefficient k_{Zd} which given in Table D-5.*

Table D-5. *Coefficient k_{Zd}*

Height determined from the crest to the design water level Z_1 (m)	- 0,3H_s	0,0	+0,3H_s	+0,65H_s
Coefficient k_{Zd}	0,95	0,85	0,8	0,5

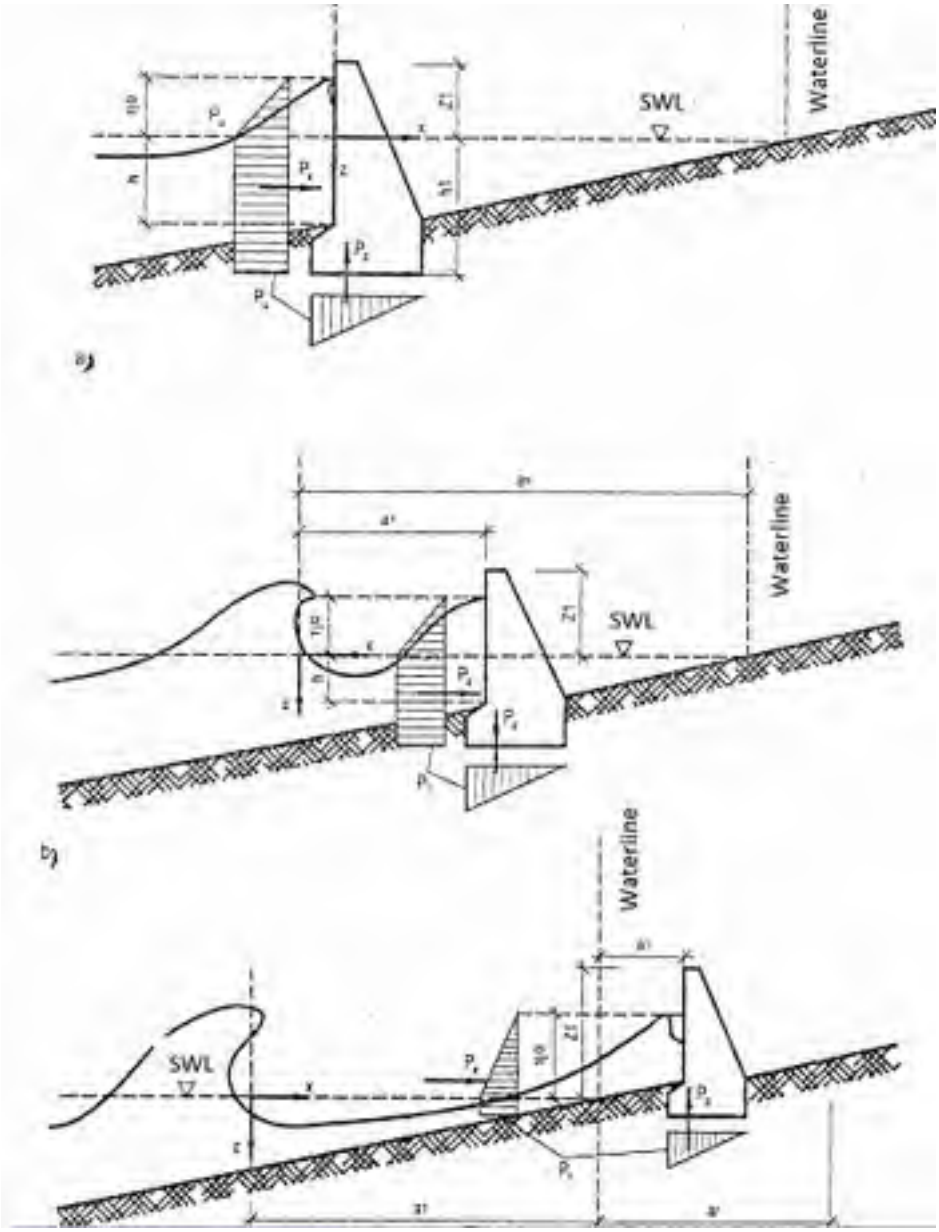


Figure D-4. *Diagram of wave pressure on vertical breakwater*

D.3.3. Vertical breakwater connected to the shoreline

Maximum values of horizontal component P_z (kN/m) and the vertical components P_z (kN/m) of the resultant load of wave breaking on vertical breakwater (without landward filling soil) in case of wave run-down are calculated by the horizontal and vertical wave pressure diagram (see Figure D-5), in which the value of p_r (kPa) is determined by the following formula:

$$p_r = \zeta\, g(\Delta z_1 - 0{,}75H_{Sb}) \qquad \text{(D-22)}$$

where, Δz_1 - Falling of water level with reference to the design water level in front of the vertical wall in case of wave run-down (m). Depending on the distance a_1 between the water edge to the structure; Δz_1 is determined as follows:

$Z_r = 0$ with $a_1 \geq 3H_{Sb}$

$Z_r = 0{,}25\ H_{Sb}$ with $a_1 < 3H_{Sb}$

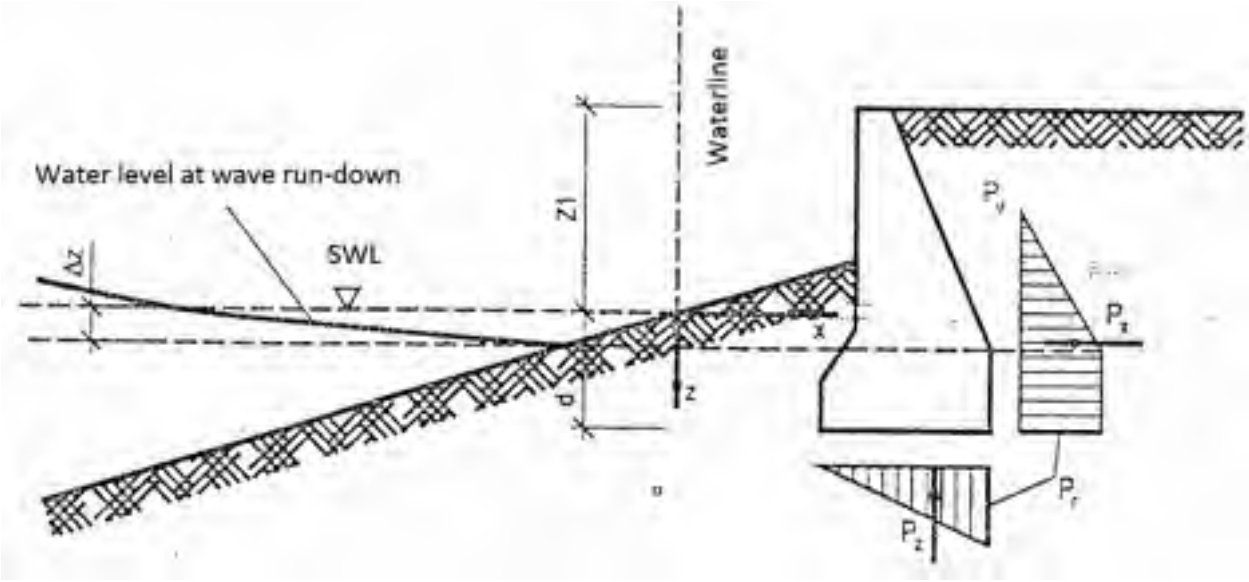


Figure D-5. *Diagrams of wave pressure on vertical wall in case of wave run-down*

D.3.4 Groyne

Maximum values of horizontal component $P_{x,ext}$,$P_{x,int}$ (KN) and the vertical components P_z (kN/m) of the resultant load of waves on a section of groyne are determined by the horizontal and vertical wave pressure diagram (see Figure D-6). In these diagrams, the value of external wave pressure $P_{x,ext}$ (KPa) and internal wave pressure P_{int} (KPa) on the groyne and the corresponding height of wave crest η_{ext} (m) and η_{int} (m) must be determined by the following formulae:

$$P_{ext} = k_a \zeta g H_S (1+\cos^2\alpha) \qquad \text{(D-23)}$$

$$\eta_{ext} = P_{ext}/\ \zeta g \eta_{int} = P_{int}/\zeta g \qquad \text{(D-24)}$$

where, k_α – coefficient, given in Table D-6, depending on the angle of incident wave crests approaching the groyne with a width of b and a length of l.

Table D-6 *Coefficient* K_α

Lateral side	cotgα	Coefficient k_α with l/L_s of			
		≤ 0,03	0,05	0,1	≥ 0,2
Exterior side	-	1,0	0,75	0,65	0,6
Interior side	0	1,0	0,75	0,65	0,6
	0,2	0,45	0,45	0,45	0,45
	0,5	0,18	0,22	0,30	0,35
	1,0	0	0	0	0

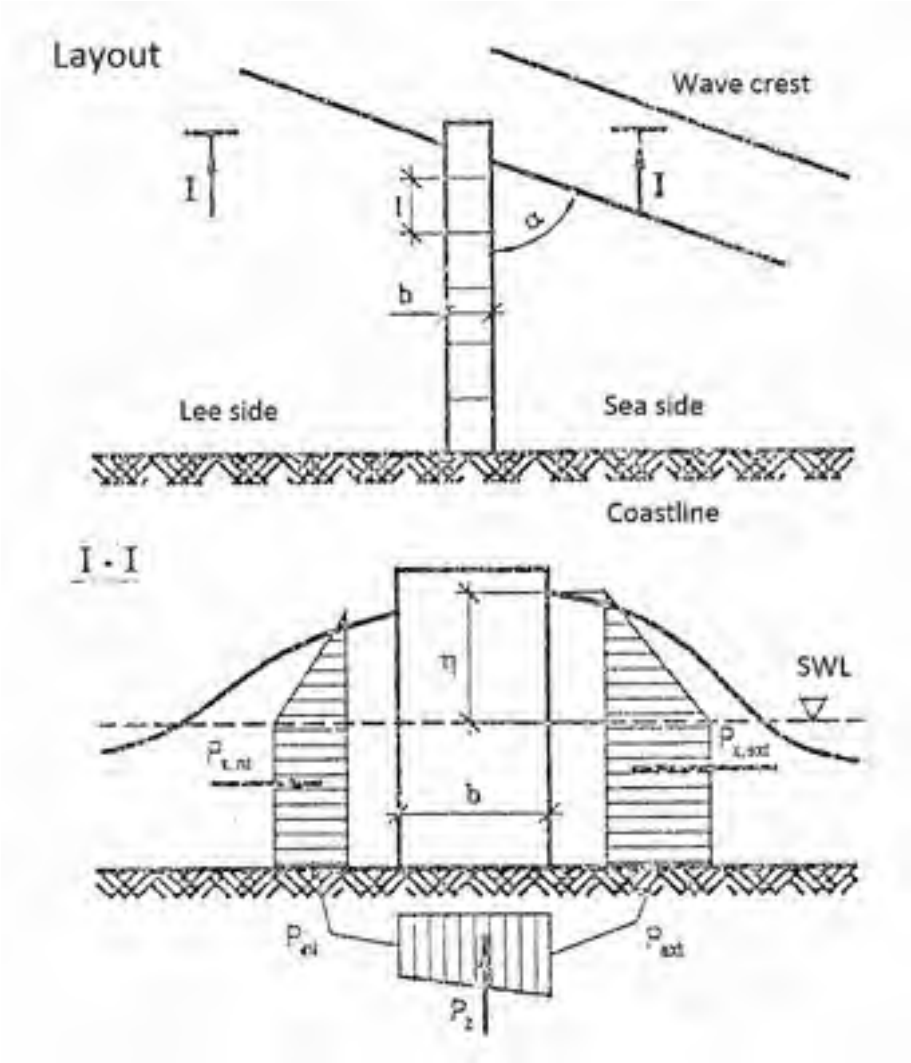


Figure D-6. *Diagrams of wave pressures on a groyne*

APPENDIX E - *SOFT SOIL TREATMENT*

E.1. Types of soil foundation needing treatment

1. ***Evaluation by soil composition***

- Soft clay;
- Peat: organic content > 13%;
- Quick sand;
- Soil with the content of soluble impurity of chloride salt greater than 5%, of sulphate salt or chloride sunlphate greater than 10% in terms of weight.
- Alluvial soil, muddy soil, loamy soil (with low bearing capacity).

2. ***Evaluation by forming origin***

- Types of mineral origin, can be mixed with organic matters during the deposition (organic content up to 10 - 12%);
- Soft soil can also be formed in the form of silt, fine silt in the valleys (void ratio e > 1.0, degree of saturation G > 0.8);
- Types of organic origin which usually formed in the mudflats;
- Soft soil in mudflats with peat.

3. ***Evaluation by testing results***

- For non-cohesive soil: Compactness D<0.66, number of hammering in the dynamic penetration test N < 30.
- For cohesive soil, the values of viscosity criterion I_L are as follows:
  + Clayey sandy soil: $I_L \geq 0$.
  + Sandy clayey soil and clay: $I_L > 0{,}25$

4. ***Requirements of the determination of physico-mechanical properties of soft soil***

a. Method of shearing-resistant criterion testing

- Dangerous case for dike stability is that when the phreatic level drops suddenly while completely saturated. Therefore, the non-consolidated, rapid-shearing and non-drainage diagram (UU diagram) should be chosen for the completely saturated prepared samples;
- In case of embankment on the natural foundation: triaxial compression test UU determining (c_{uu} and ϕ_{uu}) by the non-consolidated, non-drainage testing diagram;
- In case of embankment on reinforced foundation: using the rapid-shearing, consolidated and non-drainage testing diagram c, ϕ;
- In case of chronological embankment: Tria-axial compression test CU determining (c_{cu} and ϕ_{cu}) by consolidated, non-drainage diagram, measuring pore water pressure.

b. In order to measure the deformation of filling soil, the test determining the settling compression criteria a, modulus of deformation E and lateral (horizontal) swelling factor need to be conducted.

E.2. Computation of counter-pressure dimensions

1. Parameters of cross-section

- Dike cross-section

The parameters of preliminary dike cross-section are as follows:

+ Crest width: B_{crest}

+ Footing width: B_{foot}

+ Dike height: H

+ Seaward and landward slope: m_{tl}, m_{hl}

- Counter-pressure cross-section

Dimensions of the counter-pressure footing include thickness (h), width (L), slope angle (b). The width of counter-pressure footing on each side should exceed the range of critical sliding curve by at least 1-3m. The height of counter-pressure footing should not be too large to cause uplift sliding for the counter-pressure filling part which can be determined by the two methods presented below.

2. Method of determination by plastic deformation zone

Method of computing the dimensions of counter-pressure is based on the development of the plastic deformation zone within the soil foundation. With the dike foundation, load distribution has trapezoidal pattern and the plastic deformation zone below the structure has the oval shape which is concave in the middle (Figure E-1). The allowable plastic deformation development zone is half of the distance between the two outer edges of the counter-pressure footing. The width of plastic deformation zone is defined by the net of declination curve θ_M with equal values.

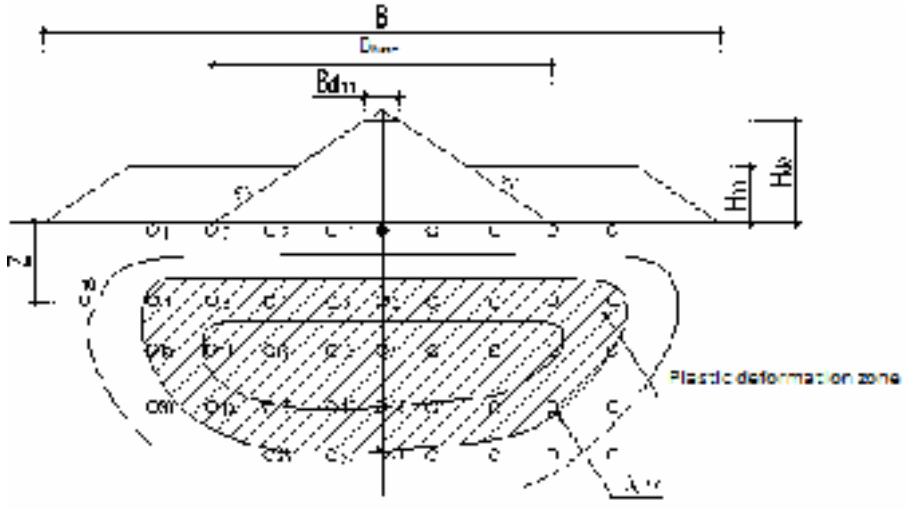


Figure E-1. *Counter-pressure footing*

The plastic deformation zone is drawn as followed: Divide the soil foundation into square net system and then determine the principal stress σ_1, σ_2 or σ_z, σ_y and τ_{xy} at

the nodes of the net and calculate the corresponding angle of declination θ_M . Draw the isoline of θ_M. The region corresponding to the curve of $\theta_M = \varphi$ (φ - internal friction angle of soil foundation) is the plastic deformation zone. Empirically, the width of counter-pressure footing is twice of the width of plastic deformation zone.

The value of declination angle θ_M is determine by the following formula:

$$\sin\theta_M = \frac{\sigma_1 - \sigma_2}{\sigma_1 + \sigma_2 + 2\gamma(z + h_m + h_c)} \qquad \text{(E-1)}$$

where σ_1, σ_2 - principal stresses at the surveying point within the soil foundation;

$$\sigma_1 = \mu p \qquad \text{(E-2)}$$

$$\sigma_2 = \nu p \qquad \text{(E-3)}$$

μ and ν - dependent coefficients $v = \frac{z}{b}$, $d = \frac{y}{b}$ given in Table 15-6, 15-7 in the Appendix.

p – average principal stress causing settling and distributed under the foundation base.

Or in terms of σ_z, σ_y, τ_{xy} applying the following formula:

$$\sin^2\theta_M = \frac{(\sigma_z - \sigma_y)^2 + 4\tau_{xy}^2}{\left[\sigma_z + \sigma_y + 2\gamma(z + h_m + h_c)^2\right]} \qquad \text{(E-4)}$$

where σ_z, σ_y, τ_{xy} - vertical, horizontal compressing stress components and tangential stress at surveying point;

$$\sigma_z = k_z\, p \qquad \text{(E-5)}$$

$$\sigma_y = k_y\, p \qquad \text{(E-6)}$$

$$\tau_{zy} = \tau_{yz} = k_\tau\, p \qquad \text{(E-7)}$$

$$p = \sigma_o - \gamma h_m \qquad \text{(E-8)}$$

k_z, k_y, k_τ - dependent coefficients $v = \frac{z}{b}$, $d = \frac{y}{b}$ (given in the tables)

γ - volumetric weight of soil foundation;

z - depth of the surveying point;

h_m - placing depth of the foundation

$$h_c = \frac{c}{\gamma \mathrm{tg}\varphi} \qquad \text{(E-9)}$$

c - unit cohesive force of soil foundation;

φ - internal friction angle of soil foundation ;

* The height of counter-pressure is decided on the basis of safety factor against sliding and satisfy the technical-economical conditions.

3. Method of nomogram

By means of nomogram method, the dimensions of counter-pressure footing are determined empirically and then the safety factor of the embankment with the counter-pressure footing is checked by using the nomogram.

By Chinese experience :

Height h > 1/3H

Width L = (2/3-3/4) length of the uplifting soil

By Pilot's nomogram :

Height h = 40÷50% of filling height of the dike H

Width h = 2÷3 times of the thickness of soft soil D

The nomograms assisting the are presented in the reference books.

4. Stability computation

The computing diagram here include the computation of general stability for the dike profile with the improved stability by means of counter-pressure footing, and the computation of stability for the filling mass used for the pressure countering.

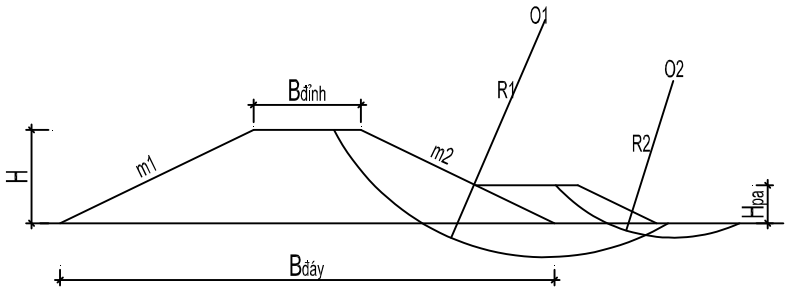


Figure E-2. *Computing diagram for the stability of dike profile treated by pressure countering.*

5. Settlement

The settlement of dike is computed as per the guideline on foundation design.

E.3. Excavating and replacing the base soil partially or completely

1. Designing the replacing sand buffer layer

When designing the sand buffer layer, the following conditions must be satisfied:

- The sand buffer layer is stable under the acting of structural load.

- Pressure on the surface of soil layer under the buffer layer caused by the structural load must be less than specified pressure on the surface of that soil layer.

- The total settlement of the buffer layer and the underlying soil layer as well as the irregular settlement of the foundation must be less than the limited value stipulated in the code for foundation design.

There are two trends in the computation of the dimensions of sand buffer layer that are most commonly used:

- Considering the sand buffer layer a part of the structural foundation and calculate it as a shallow foundation placed on a natural base. This is an approximate assumption but the computation is rather simple.

- Considering the sand buffer layer a part of the soil foundation, i.e. identifying the linear deformation. When computing the dimensions of the sand buffer layer, the distribution rules as well as the formulas determining stresses which presented in the lecture notes of Soil Mechanics can be applied.

Some approximate methods are presented below:

a. Determining dimensions of sand buffer layer based on the deforming conditions of soil foundation

According to this method, the dimensions of sand buffer layer are determined meeting the following condition: Total stress created by structural load and self weight of soil foundation and sand buffer layer exerting on the surface of the soft soil layer under the buffer layer must be less than or equal to the specified pressure on that soil layer, meaning:

$$\sigma_1+\sigma_2 \leq R^{tc} \qquad \text{(E-10)}$$

where:

σ_1 - permanent stress created by self weight of foundation soil and sand buffer layer exerting on the surface of soft soil layer under the buffer layer;

$$\sigma_1 = \gamma_đ h_đ+\gamma h_m \qquad \text{(E-11)}$$

$\gamma_đ$, γ - volumetric weight of the sand buffer layer and foundation soil;

$h_đ$, h_m - thickness of sand buffer layer and foundation placing depth;

σ_2 - stress created by structural load exerting on the surface of soft soil layer under the buffer layer;

$$\sigma_2 = \alpha_0(\sigma_0^{tc} - \gamma h_m) \qquad \text{(E-12)}$$

α_0 – coefficient taking the stress variation along the depth, depending on the ratio

$$m = \frac{2z}{b} \text{ and } n = \frac{l}{b}$$

with z - depth calculated from the foundation base to the point where the stress is being considered;

l - foundation length;

b - foundation width;

σ_0^{tc} - average specified stress under the foundation base determined as follows:

- In case of centric load:

$$\sigma_0^{tc} = \gamma_{tb} h_m + \frac{\sum N^{tc}}{F} \qquad \text{(E-14)}$$

- In case of eccentric load:

$$\sigma_0^{tc} = \frac{\sigma_{max}^{tc} + \sigma_{min}^{tc}}{2} \qquad \text{(E-15)}$$

$$\sigma^{tc}_{max,min} = \gamma_{tb} h_m + \frac{\sum N^{tc}}{F} \pm \frac{\sum M^{tc}}{W} \quad \text{(E-16)}$$

$\sum N^{tc}$ - Total vertical specified load created by structures exerting at the foundation base;

$\sum M^{tc}$ - Total specified moment created by structural load exerting at the foundation base;

F - Area of foundation base;

W - Section modulus of the foundation base;

γ_{tb} - Average volumetric weight of the foundation and soil exerting on the foundation, taking the value of 2 (T/m^3);

R^{tc} - Specified pressure on the surface of soft soil layer under the sand buffer layer, calculated by the formula given in the code for foundation design:

$$R^{tc}=[Ab_{mq}+B(h_m+h_đ)]\gamma^0_{tb}+DC^{tc} \quad \text{(E-17)}$$

A, B, D - Dimensionless coefficients, depending on the specified internal friction angle, given in the tables of the code for foundation design;

b_{mq} – Conventional width of the foundation, determined as follows:

- For strip foundation:

$$b_{mq} = \frac{\sum N^{tc}}{\sigma_2 l} \quad \text{(E-18)}$$

- For rectangular foundation:

$$b_{mq} = \sqrt{\Delta^2 + F_{mq}} - \Delta \quad \text{(E-19)}$$

$$\Delta = \frac{l-b}{2} \quad \text{(E-20)}$$

$$F_{mq} = \frac{\sum N^{tc}}{\sigma_2} \quad \text{(E-21)}$$

γ^0_{tb} - average volumetric weight of the soil layers from the natural surface to the base of buffer layer, taking the uplifting pressure of water into consideration;

C^{tc} - Specified cohesive force of the soil foundation below the base of sand buffer layer.

For simplicity in computation, the thickness of the sand buffer layer $h_đ$ can be determined by the following approximate formula:

$$h_đ = Kb \quad \text{(E-22)}$$

Where:

K – Coefficient depending on the ratios $\frac{a}{b}$ and $\frac{R_1}{R_2}$

R_1 - Specified pressure on the surface of sand buffer layer, at the depth $h_{m;}$

R_2 - Specified pressure on the surface of soft soil layer, under the sand buffer layer, above the depth of (h_m+h_d), determined by the nomogram given in Figure E-3;

b – Width of the foundation;

After determining the thickness of sand buffer layer by the formula (E-22), it is necessary to check the condition (E-10) and the settlement under the foundation of the structure. If the conditions are not satisfied, the thickness of sand buffer layer or the area of the foundation should be increased;

The settlement under the foundation of the structure is calculated by the following formula:

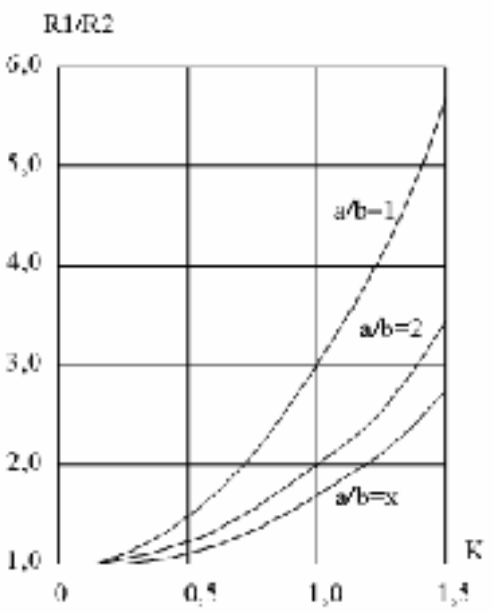


Figure E-3. *Nomogram for the determination of coefficient K*

$$S = S_1 + S_2 \leq S_{gh} \qquad \text{(E-23)}$$

where,

S_1 - settlement of the sand buffer layer;

S_2 - settlement of the soil layers under the sand buffer layer;

S_{gh} - Allowable limited settlement for each type of structure, determined as per the current codes for foundation design.

In order to ensure the stability of the soil surrounding the sand buffer layer, the width of buffer layer must be enough so that the lateral deformation caused by the structural load is not too large and in the allowable limit.

By the design experience, in order to ensure the aforementioned requirement, the angle of load exerting α is taken as the internal friction angle $\varphi_đ$ of the sand buffer layer ($\alpha=\varphi_đ$) or take the values in the range of 30-45^0 (α=30-45^0). The width of sand buffer layer is then calculated by the following formula:

$$b_đ = b + 2h_đ tg\alpha \qquad \text{(E-24)}$$

b. Determination of dimensions of sand buffer layer using the method proposed by B.I. Đalmatov

When determining dimensions of sand buffer layer under the rigid foundation, B.I. Đalmatov has based on the condition of equilibrium between the lateral pressure created by the sliding prism and the soil pressure exerting surrounding the sand buffer layer. Assuming that the distribution of soil pressure exerting surrounding sand buffer layer due to the self weight is the same as the distribution pattern of hydrostatic pressure and the distribution of pressure under the base of buffer layer created by the structural pressure and self weight of the buffer layer is considered uniform. The aforementioned assumptions can be considered rational if the soil surrounding the buffer layer is soft soil in saturated state.

Based on those proposal, B.I. Đalmatov has investigated the two cases and established the formulae determining the dimensions of sand buffer layer for each case.

Case I: Sliding surface AD intersect the base of sand buffer layer (Figure E-4)

Taking the equilibrium condition of the sliding prism ADFC into consideration and from the closed force polygon, we get:

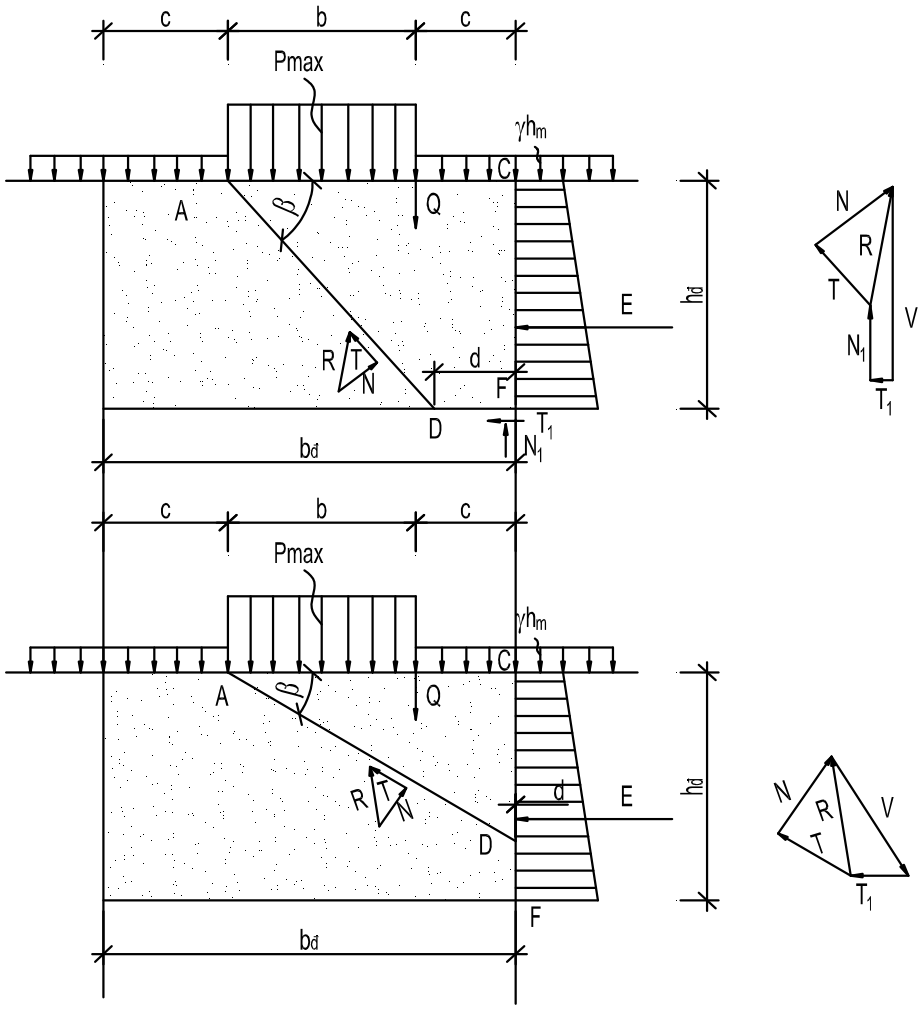


Figure E-4. *Computing diagram for the computation of sand buffer layer according to B.I.Đalmatov's proposal*

a – sliding surface AD intersecting the base of sand buffer layer;

b - sliding surface AD intersecting the vertical plane CF;

$$tg(\beta-\varphi_đ)=\frac{T_1+E}{Q-N_1} \qquad \text{(E-25)}$$

$$E=\gamma h_đ(h_m+0{,}5h_đ) \qquad \text{(E-26)}$$

$$N_1=\left[\left(P_{max}-\gamma h_m\right)\frac{b}{b_d}+\gamma h_m+\gamma_d h_d\right] \qquad \text{(E-27)}$$

$$T=N_1 tg\varphi_1 \qquad \text{(E-28)}$$

where:

β - inclination corresponding to the sliding surface AD;

$\varphi_đ$ - Internal friction angle of sand within the buffer layer;

P_{max} – Maximum (limited) pressure created by the design load exerting under the foundation base;

φ_1 - Internal friction angle of sand within the soil layers under the buffer layer;

γ, γ_d - Volumetric weight of the soft soil layer and the sand buffer layer.

designating:

$$n = \frac{b}{b_d}$$

$$k = \frac{\gamma_d}{\gamma}$$

also by transforming, the average value of the maximum pressure P_{max} exerting at the foundation base can be derived as follows:

$$P_{max} = \frac{\gamma}{n}\left\{\begin{array}{c}\dfrac{h_d(h_m + 0{,}5h_d) + a(h_m + kh_d - nh_m)\left[tg\varphi_1 + tg(\beta - \varphi_d)\right]}{(b_d - a)tg(\beta - \varphi_d) - atg\varphi_1} - \\ \dfrac{\left[hmc + 0{,}5(b + c + a)khd\right]tg(\beta - \varphi d)}{(bd - a)tg(\beta - \varphi d) - atg\varphi_1}\end{array}\right\} \quad \text{(E-29)}$$

Case 2: Sliding surface AD intersect the vertical plane CF. In this case, the values of N_1 and T_1 are zero, therefore:

$$P_{max} = \frac{\gamma(b + c)^2 tg\beta}{2b}\left[\frac{(b + c)tg\beta + 2h_m}{(b + c)tg(\beta - \varphi_d)} - \frac{2h_m c}{(b + c)^2 tg\beta} - k\right] \quad \text{(E-30)}$$

For convenience in calculation, formula (E-30) has been proposed to be rewritten in the simple form as follow:

$$p_{max} = \frac{\gamma}{2b}\left[m^2(A_1 - kD_1) + 2hm(mB_1 - c)\right] \quad \text{(E-31)}$$

Where:

$$M = b + c \quad \text{(E-32)}$$

$$A_1 = \frac{tg^2\beta}{tg(\beta - \varphi_d)} \quad \text{(E-33)}$$

$$B_1 = \frac{tg\beta}{tg(\beta - \varphi_d)} \quad \text{(E-34)}$$

$$D = tg\beta \quad \text{(E-35)}$$

The values of A_1, B_1, D_1 in Formula (E-31) depend on β and φ_d given in the tables of Foundation Design Handbook.

Consequently, the calculation of dimensions of sand buffer layer depends on the selection of P_{max} value. After changing the value of inclination b and based on the two formulae (3-19), (3-20) or formula (3-21), the minimum value of P_{max} can be obtained. This minimum value of P_{max} must satisfy the following condition:

$$\sigma_0^{tt} \le \frac{p_{max}}{1{,}1} \quad \text{(E-36)}$$

Where,

σ_0^{tt} - average design stress created by design load at the foundation base, determined as follows:

- In case of centric load:

$$\sigma_0^{tt} = \gamma_{tb} h_m + \frac{\sum N^{tt}}{F} \quad \text{(E-37)}$$

- In case of eccentric load:

$$\sigma_0^{tt} = \frac{\sigma_{max}^{tt} + \sigma_{min}^{tt}}{2} \quad \text{(E-38)}$$

$$\sigma_{\substack{max \\ min}}^{tt} = \gamma_{tb} h_m + \frac{\sum N^{tt}}{F} \pm \frac{\sum M^{tt}}{W} \quad \text{(E-39)}$$

$\sum N^{tt}$ and $\sum M^{tt}$ - Total vertical design load and total design moment exerting at the foundation base;

F - Area of foundation base;

W - Section modulus of the foundation base;

Determining the width of buffer layer by the method of B.I. Dalmatov will give reliable and rational results, especially in case of saturated soft soil foundation with high compressibility. In comparison with the other methods, however, the computing process is more complicated when determining the minimum value of P_{max}.

2. Settlement computation

Calculation of foundation settlement with the sand buffer layer is conducted under the same procedure as multi-layer soil foundation.

E.4. Usage of Geotextile

1. Placing geotextile as a lining in the excavated hole and inside the dike body

Due to the characteristic of soft soil, i.e. low bearing capacity and high settling compressibility, when excavating a part of the foundation and replacing with a better sand or soil layer, the settlement and stability will be improved partially. However, during the first stage of construction or operation, sinking settlement of the replacing soil layer into the soft soil foundation usually occurs pushing the underlying soft soil up to both sides. Taking advantage of seperating capcity of geotextile, one (or some) layer of this as a lining in the excavate hole in order to prevent the sinking settlement and also redistribute the structural load on the base.

In case the soft soil layer has been replaced partially but the dike still unstable, some geotextile layers can be placed inside the dike body in order to improve the shear resisting capacity of the filling soil and thus improve the dike stability.

2. Replacing soil mass can be covered by a geotextile bag

The replacing soil mass covered by a geotextile bag is a type of composite material which is very good for the treatment of foundation, due to the following causes:

- Shear resisting strength of soil + geotextile is much larger than foundation soil and therefore the bearing capacity will increase;

- The contracting compressibility of the replacing soil mass is lower and therefore the settlement of the structure will decrease;

- Good water drainage and guiding capacity of the geotextile bags will enhance the consolidation process of the foundation when bearing the external load.

3. Requirements of geotextile used for soil lining or coating

The geotextile used as a lining in the excavating holes replacing soil or covering the replacing soil must satisfy the following conditions:

- Good soil blocking capacity: The openings of geotextile must be small enough to prevent the soil particles of certain sizes in the replacing soil layer from moving into foundation soil.

The dimension of filtering geotextile openings is determined by means of the homogeneity C_u and d_{50} of soil. C_u is determined by the following formual:

$$C_u = \frac{d_{60}}{d_{10}}$$

where,

d_{60} – diameter of the soil particle which cannot be exceeded by 60% of the particle weight ;

d_{10} - diameter of the soil particle which cannot be exceeded by 10% of the particle weight ;

d_{50} - diameter of the soil particle which cannot be exceeded by 50% of the particle weight.

Depending on the soil particle characteristics and the soil homogeneity C_u, the dimension of filtering openings of geotextile can be determined.

- Good permeability: Geotextile placed inside the foundation must not change pattern of the seepage flow, i.e. the permeability of geotextile must be large enough for the water to go through and must not create uplift pressure beyond the allowable level.

Permeability coefficient of the geotextile must satisfy the following requirement:

$$k_g \geq \frac{t.k}{5.d_{50}}$$

where:

k_g – permeability coefficient of geotextile;

t - thickness of geotextile;

k - permeability coefficient of soil;

- Clogging resisting: The openings of geotextile must be large enough so that there is no clogging during working time. By the experience in other countries, for non-woven geotextile, the ratio of opening area to the total area of geotextile must be greater than 30%; for woven geotextile, this ratio must be greater than 4%.

- Durability: Geotextile used to improve the stability of soft soil foundation must be based on the calculation in section 2 and 3, the following criteria must also be satisfied:

+ Selecting the geotextile with the minimum disruptive tensile strength greater than 25 kN/m in order to ensure high efficiency of compaction at the first filling layer;

+ Elongation at break ≤ 25%;

+ Penetration-resisting capacity (CBR): 1500 + 5000N (BS 6906-4)

- Sewing thread for geotextile is the dedicated thread with diameter of, disruptive tensile strength > 40N per thread.

- The dedicated sewing machine must be used to sew the geotextile. Geotextile sewing machine is the professional one with the thread head distance of 7 to 10mm.

4. Structural design and computation

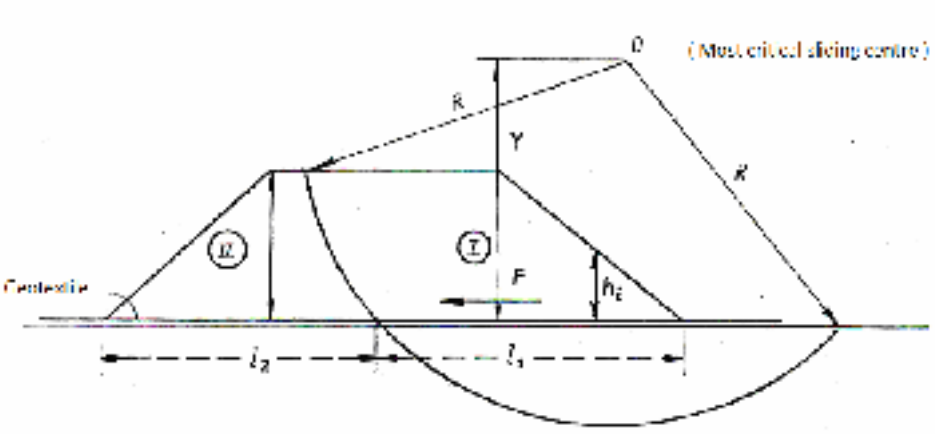


Figure E-5. *Acting mechanism of the geotextile layer*

Designating: **I** is active zone (sliding mass); **II** is passive zone (where geotextile acting as an anchor); F is tensile force borne by geotextile (T/m); Y is the moment arm of the force F with the most critical sliding center.

a) When placing geotextile between the soft soil and filling foundation as shown in Figure E-5, the friction between filling soil and the upper surface of geotextile will create the retaining sliding mass force F (ignoring the friction between soft soil and the lower surface of geotextile)

Applying this method, the following condition must be met in the design:

$$F \leq F_{cp} \qquad \text{(E-40)}$$

Where:

F – tensile force exerting on the geotextile (T/m);

F_{cp} – allowable tensile force for the geotextile with a width of 1m (T/m).

b) Allowable tensile force for the geotextile F_{cp} is determined by the following conditions:

- Condition of geotextile:

$$F_{cp} = \frac{F_{max}}{k} \qquad \text{(E-41)}$$

Where:

F_{max} – break resisting strength of geotextile of 1m size (T/m);

k – Safety factor,

k = 2 for geotextile made of polyester;

k = 5 for geotextile made of polypropylene or polyethylene.

- Condition of friction for the geotextile layer placing directly on the soft soil:

$$F_{cp} = \sum_{\lambda_2}^{\lambda_1} \gamma_d h_i f' \qquad \text{(E-42)}$$

$$F_{cp} = \sum_{0}^{\lambda_2} \gamma_d h_i f' \qquad \text{(E-43)}$$

Where:

λ_1 and λ_2 - length of geotextile within active and passive zones;

γ_d - volumetric weight of filling soil;

f' - allowable friction coefficient between the filling soil and geotextile used in the computation;

h_i – filling height on the geotextile (varying in the range λ_1 to λ_2, from h_i = h to h_i = 0) (see Figure E-5).

Expression (E-42) and (E-43) is the total friction on the geotextile within the active and passive zones:

$$f' = k'.\frac{2}{3} tg\varphi \qquad \text{(E-44)}$$

where:

φ - internal friction angle of the filling soil determined correspondingly to the actual compactness of the filling foundation or available sand buffer layer (degree);

k' - reserve coefficient of friction, the value 2/3 can be used.

Determination of λ_1 and λ_2 is performed at the same time with the check of the above-mentioned stability level: assuming the force F in order to ensure that the minimum stability factor satisfies the aforementioned requirement and check the condition (E-41) in such a way that the conditions (E-41), (E-42) and (E-43) are all met;if these conditions are met, the geotextile with corresponding value of F_{max} can be

selected on the basis of the minimum value of F_{cp} according to the aforementioned relations.

c) Geotextile used to improve the stability of the filling foundation on soft soil can be placed in one or many layers (1÷4 layers), if there is a demand for the improvement of drainage, arrange the geotextile and sand with the thickness of 30-50cm in alternate layers. Total disruptive tensile strength of these layers must be equal to F_{max} determined in (b) section.

Notes: In case of the upper geotextile layers placed inside the filling sand (upper and lower surfaces are in contact with sand), the value of F_{cp} calculated by (E-42) and (E-43) is multiplied by 2, from this the total allowable friction of the geotextile layers can be determined.

d. Computation of general stability of the structure:

Computation of the stability against deep sliding with the sliding stability factor requires $K_{min} > 1,20$ applying the classical method of fragmentation:

$$K_{min} \frac{M_{momengiu} + F.Y}{M_{momentruot}} \qquad \text{(E-45)}$$

E.5. Filling in layers with consolidation – chronological filling

1. Limited height

In case of the dike route which is not so high and the construction period is allowed to be extended, the effective methods is to divide the dike height into 2 or 3 layers with increasing height in many years facilitating the consolidation and therefore improving the bearing capacity.

Allowable limited height $[H_{gh}]$ of filling soil mass based on the bearing capacity of soft soil foundation $[H_{gh}]$ is calculated by the following formula:

$$[H_{gh}] = \frac{5,14.C_u}{K\gamma_đ} \qquad \text{(E-46)}$$

$$\text{or} \quad [H_{gh}] = \frac{5,14xC}{K\gamma_đ x(1 - 5,14.tg\varphi_w)}$$

Where:

C_u- shear resisting strength of foundation soil determined by the triaxial compressing test with non-consolidating, rapid-shearing diagram without drainage;

C, φ - cohesive force and internal friction angle of soil determined with flat shearing machine and the non-consolidating, rapid-shearing test without drainage;

$\gamma_đ$- specific weight of filling soil;

K- safety factor, K=1,25.

If the required height of the dike (h_{dike}) is lower than the allowable limited height, $h_đ \leq H_{gh}$, the dike can be embanked directly on the natural foundation.

If $h_đ \geq H_{gh}$, i.e. the bearing capacity of foundation soil is not enough, certain methods must be applied in order to improve the bearing capacity of the soft soil foundation before embanking up to the required height.

2. Determining filling parameters

- Determining the safety height H_{at} of the filling soil mass with the natural soft soil foundation

Safety height H_{at} of the filling soil mass with the volumetric weight $\gamma_đ$ is:

$$H_{at}=\frac{3,14xC_u}{\gamma_đ} \qquad \text{(E-47)}$$

C_u – shear resisting strenght of foundation soil. If the testing data determining C_u on triaxial machine is unavailable, the data on φ, C of foundation soil determined on flat shearing machine can be used, applying the following expression:

$$H_{at}=\frac{3,14xC}{\gamma_đ x(1-5,14.tg\varphi_w)} \qquad \text{(E-48)}$$

- Selecting the thickness of the filling soil layer in first stage designated by h_1

In order to ensure the stability of the soft soil foundation under the dike, the thickness of the first filling soil layer (h_1) should not exceed the safety height (H_{at}) for the foundation soil, i.e.:

$$h_1 \leq H_{at} \qquad \text{(E-49)}$$

If necessary, the value in the range $H_{at} \leq h_1 \leq [H_{gh}]$ can be chosen.

- Determining the time interval when the construction break is needed (T1):

After finishing filling up layer h_1, a waiting period T_1 is needed for the foundation soil to reach the required degree of consolidation U_t under the pressure created by the first soil layer $P_1=\gamma_đ h_1$;

$$T_1=t\ x\left(\frac{H_1}{h}\right)^n \qquad \text{(E-50)}$$

where, n – consolidation index, depending on plasticity index (I_p) and consistency index I_L of soil. For muddy soil, cohesive soil in pasty or pasty plastic state, the value n = 2 can be used;

t – duration of compression of soil sample with the height h (h=2cm) under the pressure $P_1 = \gamma_đ h_1$ until the required degree of consolidation U_1 is reached in the laboratory;

H_1 – thickness of foundation soil compressed by the pressure $P_1 = \gamma_đ h_1$ created by the first filling soil layer.

In case the testing data on shear resisting strength with time and with the degree of consolidation is unavailable, the consolidation time for each filling layer can be determined by the following formula:

$$t = \frac{T_v h^2}{C_v} \qquad \text{(E-51)}$$

T_v is determined by the relation between the degree of consolidation U and T_v.

- Investigating the stability of foundation soil after the time interval T_1 in order to determine the thickness of the second filling layer (h_2)

After the duration T_1, due to the consolidating compression, the shear resisting characteristics of foundation soil will reach the values of φ_{cu}, C_{cu}. In comparison with the value φ_u, C_u in the initial natural state, the shear resisting strength of foundation soil will increase:

$$\left.\begin{aligned}\Delta C_{cu} &= C_{cu} - C_u \\ \Delta\varphi_{cu} &= \varphi_{cu} - \varphi_{cu}\end{aligned}\right\} \quad \text{(E-52)}$$

Investigating the safety height, allowable limited height of the dike after the time interval T_1 with the shear resisting strength determined by the average rate of increment:

$$\left.\begin{aligned}C_{cu}^{tt} &= C_u + \frac{\Delta C_{cu}}{2} \\ \varphi_{cu}^{tt} &= \varphi_u + \frac{\Delta\varphi_{cu}}{2}\end{aligned}\right\} \quad \text{(E-53)}$$

- Safety height of the filling soil mass after the time interval T_1 is:

$$H_{at} = \frac{3{,}14 x C_{cu}^{tt}}{\gamma_d x(1 - 5{,}14.tg\varphi_{cu}^{tt})} \quad \text{(E-54)}$$

- Allowable limited height of the filling soil mass after the time interval T1 is:

$$[H_{gh}] = \frac{5{,}14 x C_{cu}^{tt}}{K\gamma_d x(1 - 5{,}14.tg\varphi_{cu}^{tt})} \quad \text{(E-55)}$$

If $H_đ \le [H_{gh}]$, the necessary thickness of the second filling layer (h2) is:

$$h_2 = H_đ - h_1 \quad \text{(E-56)}$$

If $H_đ > [H_{gh}]$, the necessary thickness of the second filling layer (h2) is:

$$h_2 = [H_{gh}] - h_1 \quad \text{(E-57)}$$

After finishing filling up the second layer, a waiting time T2 is needed until the next filling period.

3. Performing the investigation of consolidation state of soft soil under the filling foundation applying the following methods:

- Measure the pore water pressure;

- Measure the settlement of soft soil layer;

- Determine the increase of cohesive force C_u by the vane shearing test;

Applying the computing method in order to inverstigate and to make sure that the construction can be started, and if not, the waiting period for the consolidation must be extended or the most appropriate method must be chosen.

E.6. Special methods

E.6.1- Method of foundation consolidation by the vertical drainage equipments (applying sand pile or vertical artificial drain)

Method of vertical drainage consolidation is applied when the soft soil layer is relatively thick, the drainage consolidation period of the foundation soil is long. In order to reduce the consolidation period, the drainage distance need to be shortened by the vertical arrangement of drainge passages, and at the same time by covering the surface of foundation soil with drainage sand layer and loading layer in order to accelerate the consoliation process. The vertical drainage passages can be sand pipes or vertical artifical drain.

a. Sand pipe is formed using steel pipes driven into the soil by the pipe driver. The sand is filled into the pipe and then the steel pipe is lifted up. Diameter of the sand pipes is normally in the order of 20÷30cm and 30÷40cm in water. Distance between the sand pipes is normally in the order of 8-10 times of the diameter, the length should not exceed 20m. Thickness of drainage sand layer on top of the sand pipes is in the order of 0,3÷0,5m on dry land and 1,0m in water .

b. Vertical artificial drain has the common section area of 100x4mm to 100x7mm. Vertical artificial drain is also inserted into the soft soil foundation using the dedicated equipments. The distance between the drains is 1,0÷1,5m. Nowadays, the driving depth into the soft soil foundation of the vertical artificial drain is less than 20m with a maximum of 23m.

Due to the vertical drainage means, water consolidating in the deep layers of soft soil under the action of filling load will flow into drainage passage and follow the horizontal drainage layer to reach the drainage pump. However, in order to ensure the improvement of the drainage efficiency, the minimum height of filling foundation should be 4m and in design the following conditions must be satisfied:

$$\sigma_{vz} + \sigma_z \geq (1{,}2 \sim 1{,}5).\ \sigma_{pz}\ ; \qquad \text{(E-58)}$$

$$\eta = \frac{(\sigma_{vz} + \sigma_z) - \log\sigma_{pz}}{(\sigma_{vz} + \sigma_z) - \log\sigma_{vz}} > 0{,}6\ ; \qquad \text{(E-59)}$$

where σ_{vz} – vertical stress (pressure) created by self weight of the soft soil layers at the depth z (MPa) ;

$$\sigma_{vz} = \Sigma\ \gamma_i\ .\ h_i\ ;$$

where γ_i and h_i are the volumetric weight and thickness of the soil layer i within the range from contact plane between the soft soil and the base of filling foundation (z=0) to the depth z in the soft soil ; note that for the soft soil layers lying under the phreatic level, the buoyant volumetric weight γ_i must be used.

σ_z = vertical stress (pressure) created by filling load (filling foundation and the available loading filling parts, but excluding the filling height hx converted from the vehicular load) exerting at the depth z in soft soil from the base of filling foundation (MPa);

σ_{pz} = pre-consolidating pressure at the depth z in soft soil (MPa); σ_{pz} is determined by the consolidation test.

Conditions (E-58) and (E-59) must be satisfied at all the values of the depth z within the range from the base of filling foundation to the driving depth of sand pipe or artificial vertical drain.

If the above-mentioned conditions are not satisfied, the method of pre-loading can be combined in order to increase the value of σ_z .

Methods of vertical drainage consolidation are usually applied when the soft soil layer is thick (thickness of soft soil layer exceeds the width of filling foundation base) and the filling foundation is hight. Due to the hight construction cost, these methods are only applied when the others cannot ensure the standard of remaining consolidating settlement ΔS during the stipulated construction time.

Upon applying the method of vertical drainage consolidation, the sand buffer layer must be used. If the sand pipes are used, the top of these pipes must be in direct contact with the sand buffer layer. If the artificial vertical drain is used, the penetration through the sand buffer layer is required and the minimum extra cut part is 20cm above the upper surface of sand buffer layer.

Sand used for sand pipes must also have requirements of filtering and clogging resistance.

Artificial vertical drain used for vertical drainage consolidation must satisfy the following requirements:

+ Dimension of the openings of the filtering cover (determined according to Standard ASTM D4571): $O_{95} \leq 75$ μm;
+ Permeability coefficienct of the filtering cover (ASTM D4491): $\geq 1.10^{-4}$ m/sec;
+ Drainage capacity of the drains with a pressure of 350 KN/m2 (ASTM D4716): $q_w \geq 60.10^{-6}$ m^3/sec;
+ Tensile resisting strength corresponding to the elongation less than 10% (ASTM D4595) against tearing during construction : ≥ 1 KN/drain;
+ Elongation (along the entire drain width) (ASTM D4632): >20%;
+ Width of the drains (to be compatible with standardized drain placing equipment): 100 mm ± 0,05 mm.

Determining the depth of sand pipe or vertical drain is a technical-economical problem requiring the designer to consider on the basis of the distribution of the settlement of the soft soil layers along the depth under the acting of filling load for each design case. It is not necessary to place within the entire influence range of filling load (range of settlement), only necessary to the depth where the consolidating settlement of the soft soil layer is small. From this depth upwards, the total settlement accounts for a ratio which is large enough compared with the forecast consolidating settlement S_c in such a way that if the rate of consolidation is accelerated in the range

where the piles or drains are placed, it is adequate to meet the criteria of remaining allowable consolidating settlement during the required construction time.

Therefore, the design must propose different alternatives of sand pipes and vertical drains arrangement (in terms of depth and distance). Each arranging alternative in terms of depth must satisfy the aforementioned conditions.

When applying the method of vertical drainage consolidation, the pre-loading process must be combined and in all cases the maintaining duration of filling load should not be less than 6 months. Any type of soil (including organic soil) can be used to fill up the pre-loading layers, but sand is the best option. The slope of pre-loading filling is up to 1:0.75 and the degree of compactness is K = 0,9 (standard compaction).

E.6.2. Foundation treatment using soil-cement piles

Nowadays, the calculation of bearing capacity and deformation of soil foundation reinforced by soil-cement piles is still the problem needing more development researches. There are two main viewpoints as follows:

- From the viewpoint of pile foundation. From this viewpoint, the piles requires relatively large stiffness and their tips are driven to the load-bearing soil layers. The load acting on the foundation will then mainly exert on the soil-cement piles (ignoring the acting of soil under the foundation base). In case the piles cannot be driven to the load-bearing soil layer, the same calculating method for friction piles can be used. This viewpoint is adopted when calculating the arrangement of piles under the foundation base.

- From the viewpoint of equivalent base: the soil base is improved after treatment with the physico-mechanical properties of an equivalent base (γ_{td} ; φ_{td} ; E_{td});

Method of soil-cement pile design, given in the Shanghai Code (China) and TCXD 385-2006 (Ministry of Construction), is presented below.

1. Computation from the viewpoint of pile foundation

a) Allowable bearing force of single soil-cement pile should be determined by means of the test on the load of single pile, and it can also be estimated by the formula (E-60) or (E-61):

$$P_a = \eta . f_{cu} . A_P \qquad \text{(E-60)}$$

$$\text{or} \quad P_a = U_P . \Sigma q_{si} \lambda_i + \alpha . A_P . q_P \qquad \text{(E-61)}$$

Where,

P_a – allowable bearing force for single pile (kN);

f_{cu} – average value of indoor compression resisting strength (kPa) of the soil-cement test sample (a cube with the side length of 70,7mm) with the same mixing formula of soil cement for the pile body, after 90-day duration and in standard maintenance conditions;

A_P – cross section area of the columns (m^2);

η - reduction factor of column body strength, the values of 0,3 ~ 0,4 can be used;

U_P – column circumference (m);

q_{si} – allowable friction of the i^{th} soil layer surrounding the column.

+ For silty soil: q_{si} = 5~8 kPa;

+ For muddy soil: q_{si} = 8~12 kPa;

+ For clay: q_{si} = 12~15 kPa;

λ_i – thickness of the i^{th} soil layer surrounding the pile (m);

q_P – bearing force of the natural foundation soil at the tip of the pile (kPa);

α - reduction factor of bearing force of the natural foundation soil at the tip of the pile, the values of 0,4 ~ 0,6 can be used.

The bearing force of composite foundation soil with load-bearing soil-cement piles should be determined by means of the test with the load of combined foundation, and it can also be estimated by the following formula:

$$f_{sp} = {m.P_a}/{A_p} + \beta(1-m)f_s \qquad \text{(E-62)}$$

Where,

f_{sp} - allowable bearing force of combined foundation (kPa);

f_s - allowable bearing force of the natural foundation soil between the piles (kPa);

m - distribution ratio of pile area and soil area;

β - reduction factor of bearing force of soil between the piles.

+ In case of soft soil at the pile tips: β = 0,5 ~ 1,0;

+ In case of hard soil at the pile tips: β = 0,1 ~ 0,4.

It can also be based on the requirement of the structure to reach the allowable bearing force of combined foundation, the distribution ratio of the pile area to soil area is calculated by the following formula:

$$m = \frac{f_{sp} - \beta.f_s}{P_a l A_P - \beta.f_s} \qquad \text{(E-63)}$$

Arranging the lay-out of load-bearing soil-cement piles can be based on the requirement of bearing force and the deformation of foundation base in relation to the superstructures as well as their structural characteristics. Cylinder-typed, wall-typed, enclosing-typed or block-typed reinforcement can be applied and arranged only within the range of foundation base lay-out. The pile length must be considered on the basis of many factors such as the deformation requirement of the architecture (structure) block and the foundation structure.

For the treatment of pile foundation base, the piles can be arranged in square or equilateral triangular patterns, and the total number of piles required can be calculated by the following formual:

$$n = \frac{m.A}{A_p} \qquad \text{(E-64)}$$

Where,

n – total number of piles;

A – area of foundation base (m^2).

When the load-bearing soil-cement piles has relatively large distribution ratio of soil and pile (m>20%), and not arranged in single rows, cluster of soil-cement piles and soil between piles must be considered a conventional monolithic foundation. In order to check the strength of the soft soil layer under the conventional monolithic foundation base, the following formula is applied:

$$\mu = \frac{f_{sp}.A + G - A_s.q_s - f_s.(A - A_1)}{A_1} < f \qquad \text{(E-65)}$$

Where,

f_{sp} - compression force of the base surface of the conventional monolithic foundation (kPa);

G - weight of conventional monolithic foundation (kN);

A_s - area of the lateral surface of conventional monolithic foundation (m^2);

q_s - average friction on the lateral surface of conventional monolithic foundation (kPa);

f_s - allowable bearing force of soil near the edge of conventional monolithic foundation (kPa);

A_1 – area of the base surface of the conventional monolithic foundation (m2);

f – allowable bearing force of the foundation base after adjusting the base surface of the conventional monolithic foundation (kPa).

b) Calculation of deformation:

Calculation of the deformation of composite foundation soil with load-bearing soil-cement piles must include the total contracting deformation of soil-cement pile cluster and deforming contraction of the non-reinforced soil layer under the pile tip. The value of contracting deformation of the soil-cement pile cluster can be based on the structure of the upper part, pile length, pile body strenght etc. the values of 20-40 mm is taken by experience. The value of contracting deformation of the non-reinforced soil layer under the tip of soil-cement piles is calculated in the same way as non-reinforced natural base soil.

2. Computation from the viewpoint of equivalent base

This viewpoint is appropriate when the soil-cement piles for the base reinforcement of filling soil mass are used. The density of piles then should be approximately 12 ~ 20%, also the cement content should not exceed 300 kg/m^3 of pile. This is for the purpose of limiting the large difference between the foundation and the filling soil mass above.

Foundation after being reinforced is considered homogeneous with the improved strength data of φ_{td}, C_{td}, E_{td} compared with the values of φ, C, E of foundation soil before the reinforcement. The equivalent conversion formula is based on the stiffness of soil-cement piles, soil and the area of soil replaced with soil-cement piles.

Designating m as the ratio of the area of replacing soil-cement piles to the area of foundation soil:

$$m = \frac{A_p}{A_s} \quad \text{(E-66)}$$

$$\varphi_{td} = m\varphi_{pile} + (1-m)\varphi_{base} \quad \text{(E-67)}$$

$$C_{td} = mC_{pile} + (1-m)C_{base} \quad \text{(E-68)}$$

$$E_{td} = mE_{pile} + (1-m)E_{base} \quad \text{(E-69)}$$

Where A_p – Area of foundation soil replaced with soil-cement piles (i.e., area of occupying soil-cement piles);

A_s- Area of foundation soil to be reinforced

By this computing method, the following two criteria are needed to check in the soil improvement problem:

- Criteria of strength: φ_{td} , C_{td} of reinforced foundation must satisfy the condition of bearing capacity under the acting of structural load.

- Criteria of deformation: Deformation modulus of the reinforced foundation E_{td} must satisfy the condition of settlement.

Analytical formulae and available geo-technical softwares can be used to solve this problem.

3. Input data used for computation

The input data requires not only the physico-mechanical properties of the non-reinforced base soil, but also the data on 90-day soil-cement piles. Necessary test should be conducted in order to provide the data for the consultants. The best way is to conduct the field test with in situ soil. However, by doing so, time and finance are required. Therefore, the standard allows taking in situ soil sample in order to mix the prepared samples indoors. The criteria used in the calculation is taken from the indoor sample test and appropriate reduction (usually 2 times) based on the experience of the designer.

In fact, in case the conditions of testing is not available (indoors and in situ), the designer can use the results of similar structures. However, field tests should be conducted before mass construction in order to adjust the design.