2.2.2.5 Basic Bridge Planning Concepts

(1) River Condition

1) Design High Water Level

It was confirmed in this Study that there has been no severe flooding since the BD study was completed. Accordingly, there is no difference in the design high water level for each of the proposed bridges. Max HWL, Ordinary HWL, and LWL were established on the basis of interview results undertaken during the BD survey stage. The Max HWL was adopted as the design high water level as shown in Table 2.2.8. Note that the appropriateness of these design water levels were reviewed and checked based on rainfall data in the vicinity of the bridge site.

Table 2.2.8 Field Survey Water Levels and Design High Water Level

Br. No.	Bridge Name	Water Level			Remarks (Max. Year)
		Max HWL (Design HWL)	Ord. HWL	Ord. LWL	
36	DA DUNG	14.70	12.00	5.90	(1999)
37	TRANG	61.40	60.40	55.90	(1999)
43	TAM NGAN	127.70	127.10	125.00	(2000)
52	EA SOUP	20.00	18.80	10.40	(1983)
56	KRONG K'MAR	12.00	10.10	5.30	(1989)
83	NGOI NGAN	9.80	8.80	7.90	(2000)

2) Freeboard under Girders

Freeboard under girders shall be set based on whether there is debris observed under bridges.

Table 2.2.9 Freeboard under Girders

Conditions	Freeboard
Navigation clearance not required	In flat terrain without debris: H=0.5m In the mountainous terrain with debris: H=1.0m

(2) Superstructure Type

There is no change in the superstructure type selected in the Implementation Review Study because the previous study result is deemed appropriate. The previous study chose a post-tensioned PC T-girder for a 20-30m span with total bridge length ranging from 30m to 100m for the proposed bridges, taking into consideration the economic aspects as well as previous experience in Vietnam. The typical PC bridge cross-section and side view are as shown in Figure 2.2.4.

In this Study, the design conditions of some of the bridges were modified to suit actual field conditions as follows:

- Da Dung Bridge

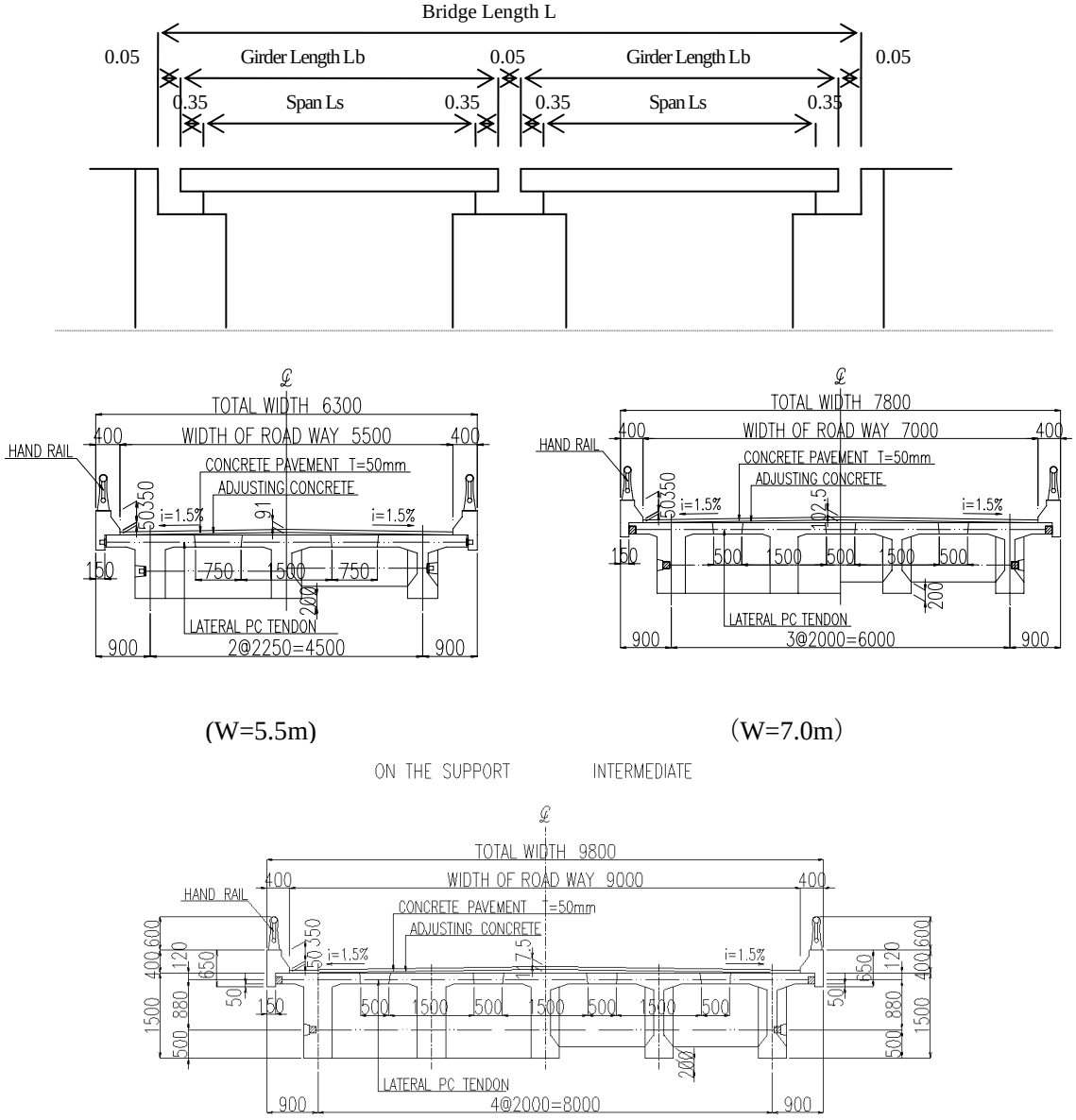
  Provision of deeper Girder depth enhances girder stiffness considering the increase in formation width and live load.

- Tran Bridge and Krong K'Mar Bridge

  Provision of deeper Girder depth enhances girder stiffness considering the increase in live load.

- Ngoi Ngan Bridge

  Only the formation width was increased. The girder depth was not changed although the number of girders was increased from 3 to 4.



(W=5.5m) (W=7.0m)

(W=9.0m)

Width (m)	Span (m)	Girder Length Lb (m)	Girder Height (m)		Girder Type
			H-13	HL93x80%	
5.5	21	21.700	1.05	1.20	T-Girder
	27	27.700	1.35	-	
7.0	18	18.700	0.90	1.00	
	21	21.700	1.05	1.15	
	24	24.700	1.25	1.25	
	27	27.700	1.35	1.40	
9.0	30	30.700	1.40	1.50	

Figure 2.2.4 Typical PC Girder for Study Bridges

(3) Substructure & Foundation

There is no change in the type of substructure and foundation selected in the previous study because the study result of the previous study is deemed appropriate. The type of substructure and foundation selected are as shown in Table 2.2.10.

Table 2.2.10 Substructure & Foundation Type

Substructure/ Foundation	Type	Reason for Selection
Abutment	Reversed T	Commonly applied for abutments for economic reasons.
Pier	Wall	Presents fewer obstacles to river flow to avert souring.
	Pile-bent	Used for economic reasons when the flow velocity is slow and there is little possibility of scouring.
Foundation	Spread Foundation	Adopted when a reliable bearing layer is present at a shallow depth.
	Pile Foundation	RC 400 mm square pile adopted for economic and transportability reasons. It is difficult to drive piles to a great depth with the presence of medium layer containing boulders and stones. In such cases, steel pipe piles of 600 mm in diameter will be used for depths greater than 24m.

The maximum driving length of an RC square pile is 24m (12m x 2), because of the presence of stones and boulders unlike the Mekong Delta. Driving of low strength concrete piles would be difficult. For Terms 1 and 2 of the Project pile-caps were constructed above LWL considering constructability when water depth is relatively high even in the dry season. This time pile-cap will be built under the riverbeds for the proposed bridges because of the low LWL and also to protect them from scouring.

(4) Approach Roads & Soft Ground Treatment

The carriageway width of the approach road will be 5.5m for Da Dung Bridge and Tam Ngan Bridge, 6.0m for Ea Soup Bridge, Krong K'Mar Bridge and Ngoi Ngan Bridge, and 7.0m for Tran Bridge. The length, vertical gradient and horizontal alignment of the approach roads are planned based on the topography and existing land use conditions at each of the bridge site. A 1.5m shoulder will be provided at both sides of the carriageway. The side slopes were determined based on the embankment height as shown in Figure 2.2.5

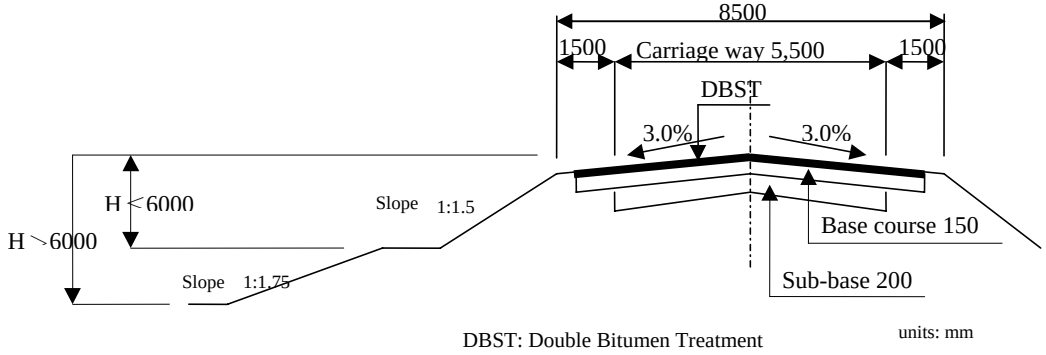


Figure 2.2.5 Typical Road Cross Section

The soft ground treatment will be executed at Krong K'Mar Bridge, as the necessity of strengthening the existing ground to support the high embankment was confirmed. Although there are various methods to treat soft ground, the Plastic Board Drain (PBD) method has been deemed appropriate for this site from previous experience in Terms 1 and 2 of the Project as well as for economic reasons. Table 2.2.11 shows the comparison of the various methods for soft ground treatment of the BD study.

Table 2.2.11 Selection of Soft Ground Treatment Method

	Method			
	Sand Drain	**Plastic Board Drain**	**Sand Compaction**	**Pre-cast pile**
Diameter （mm）	400	65	700	400×400
Increase in strength of sub-soil(kg/c ㎡)	C = 0.3 ⇒ 1.0	C = 0.3 ⇒ 0.5	C = 0.3 ⇒ 3.0	—
Characteristics	Most popular	Construction speed high	Effective for sand layer	Piles to support embankment load
Depth for practical application	30m	15m	35m	30m
Minimum interval	1.2m	0.9m	1.2m	1.0m
Construction speed	300m/day	2,500m/day	150m/day	120m/day
Ratio of cost	1.0	0.2	2.4	11.0
Others	Many satisfactory results	Many satisfactory results in Vietnam	-	-

(5) Revetment & Riverbed Protection

1) Revetment

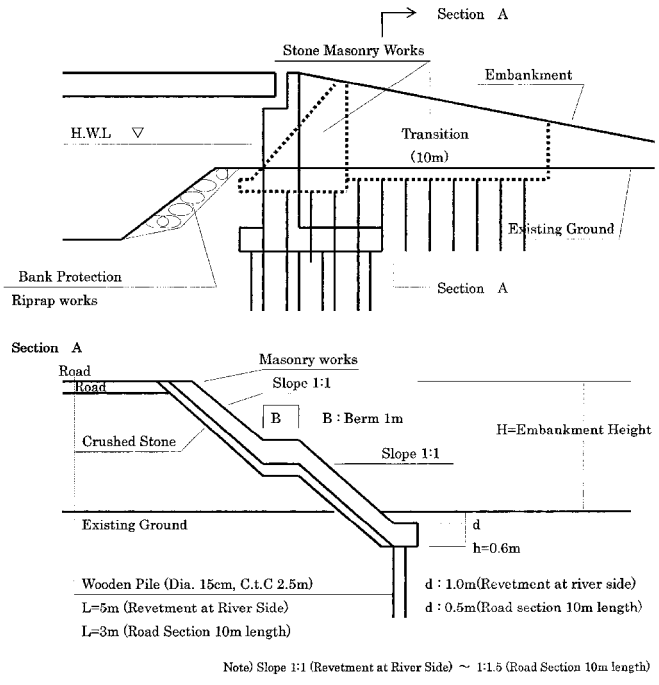


Figure 2.2.6 Slope Protection Works

The abutments of the proposed bridges were set back from the river waterline. However, in rainy season, that certain scouring and erosion is anticipated to occur around bridges and approach embankments due to high water velocity. To protect the embankments around abutments, stone masonry will be adopted up to the design HWL and up to 10m from abutments along approach roads. The typical cross-section is illustrated in Figure 2.2.6. On riverbanks, mattress gabion will be placed for the protection, because of its flexibility, durability and economy.

2) Pier Foundation Protection

When scouring is anticipated around a pier provided with a pile foundation, the structure should be protected with stone or mattress gabion. The area indicated in Figure 2.2.7 depends on the assumed scouring depth. However, if the footing is placed on bedrock, protection work will not be needed above the footing.

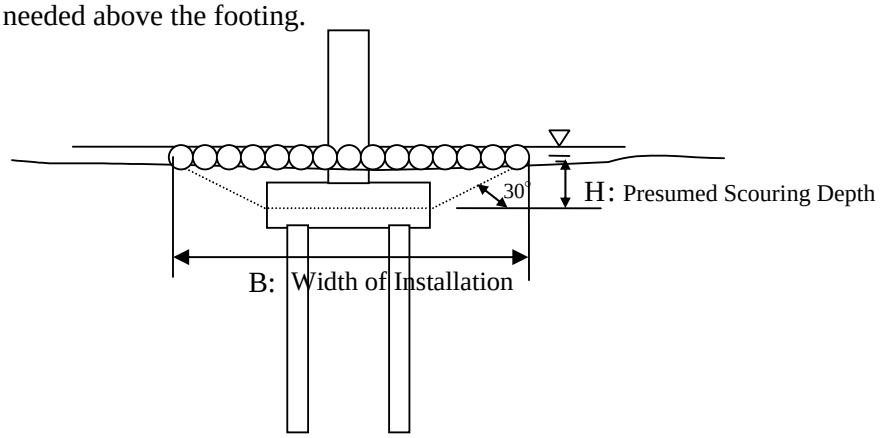


Figure 2.2.7 Pier Footing Protection

2.2.2.6 Design Criteria for Bridges & Approach Roads

(1) Design Standards

The following Vietnamese Design Standards were basically adopted for the Project.

- HIGHWAY SPECIFICATIONS FOR DESIGN, TCVN4054-05, 22TCN-273-01
- SPECIFICATION FOR BRIDGE DESIGN, 22TCN-272-05

In addition to the standards listed above, Japanese and AASHTO standards were also applied as needed.

(2) Design Methodology

Structural members will be mainly designed by the allowable stress method.

(3) Road Class & Design Speed

Based on the Vietnamese Standard (i.e. TCVN 4054-05), highways are classified into 7 categories depending on the level of importance and traffic volume. Generally, provincial roads are classified as Road Class III or IV, and district and commune roads are classified as Road Class IV or V.

Table 2.2.12 Road Class & Design Speed

Design categories	Expressway	I	II	III	IV	V	VI	
Design speed (Km/h)	120 120	120 120	100 100	80 60	60 40	40 30	30 20	Flat Mountain
Function	National Highway (NH)			NH& PR	PR & DT	DT&Commune road		
Design traffic volume (PCU/day)	>25000	>15000	>6000	>3000	>500	>200	<200	

(4) Road & Bridge Cross Sections

The formation widths of the proposed bridges were determined to be flexible considering the site conditions (as described in Section 2.2.2.2). The carriageway width for the approach roads will be same as the bridge, taking into consideration previous practices of this project (as shown in Figure 2.2.5).

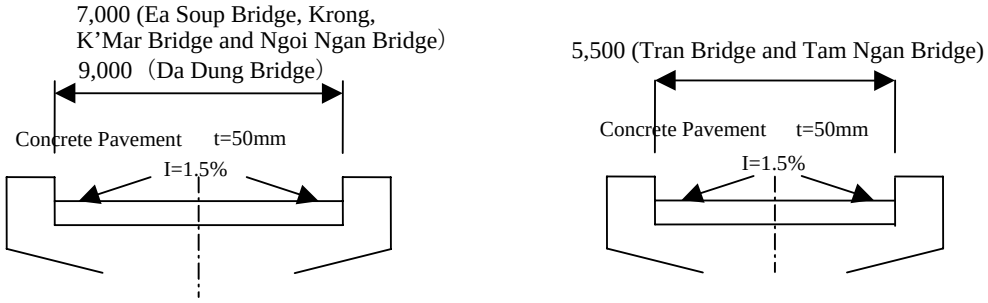


Figure 2.2.8 Cross Section of Bridge

Note that a formation width of 5.5m is capable of having a truck and sedan pass each other on a bridge.

(5) Design Loads

1) Live Load

Based on the analysis as described in Section 2.2.2.3, the live loads shown in Table 2.2.13 are to be adopted for the proposed bridges.

Table 2.2.13 Live Loads for Proposed Bridges

Type of Live Load	Bridge Name
HL93x65% (equivalent to H-13)	Tam Ngan Bridge and Ngoi Ngan Bridge
HL93x80% (equivalent to H-18)	Da Dung Bridge, Tran Bridge, Ea Soup Bridge and Krong K'Mar Bridge

2) Seismic Horizontal Force

The same concept will be adopted as in the previous study for seismic horizontal force to be applied for the detailed design. Based on AASHTO and Vietnamese Standard, the horizontal seismic coefficient at 0.05 will be adopted for the proposed bridges.

Table 2.2.14 Seismic Coefficient for Bridge Design

Seismic Coefficient Indicator (SI)	Provincial Name	Design Seismic Coefficient
SI≦7	Other provinces	0.05
SI>7	Thanh Hoa & Ha Tinh Province	0.16

3) Other Loads

The following loads will be considered as required:

- Dead load
- Impact load
- Wind load
- Influence of creep for concrete
- Influence of dry shrinkage for concrete
- Earth pressure
- Static pressure of water
- Water pressure during flood
- Buoyancy
- Settlement

(6) Material Strength

Unit weights and strength of materials are shown in the table below.

1) Unit weights for materials

Table 2.2.15 Unit Weights of Materials

Designation	Self-weight kN/m^3	Designation	Self-weight kN/m^3
Steel	78.5	Cement, Mortar	21.5
Concrete reinforced	25.0	Asphalt concrete	23.0
Pre-stressed concrete	25.0	Concrete pavement	23.5
Non-reinforced concrete	23.5	Timber	8.0

2) Strength of Materials

In principle, the compressive strength of concrete and reinforcement were considered based on the Vietnam Bridge Standard.

Table 2.2.16 Strength of Concrete

Designation	Strength (N/mm^2)
PC Girder (post tension)	35
Slab	30
Abutment & Pier	21
Concrete Pile	30

Table 2.2.17 Strength of Steel

Designation	Yield Strength (N/mm^2)
Round Bar (A-Ⅰ)	σ py= 190
Deformed Bar (A-Ⅱ)	σ py= 240
Deformed (A-Ⅲ)	σ py= 300

(7) Geometric Standards

The road geometric standards set out in the Vietnam Standard TCVN 4054-05 were basically used for this Project. However, it flexibility was decided considering consistency with the alignment of the approach road and the local situation. The major items of the standard are shown in Table 2.2.18.

In addition, the maximum longitudinal grade to be adopted is 6%, taking into consideration the presence of numerous bicycle users.

Table 2.2.18 Geometric Design

Item	Unit	Design Standard			
Design Speed	**Km/hr**	**80**	**60**	**40**	**30**
Horizontal alignment					
Minimum curve radius	m	250	125	60	30
Vertical alignment					
Maximum gradient	%	5	6	8	10
Minimum radius of crest	m	4000	2500	700	400
Minimum radius of sag	m	2000	1000	450	250
Minimum vertical curve length	m	70	50	35	25
Cross section					
Cross fall	%	2	2	2	2
Maximum super-elevation	%	8	7	6	6

Da Dung Bridge（Binh Thuan Province）

Considering that the bridge is located in the center of Logi Town, the design speed should be appropriate for safety reasons. In addition, the section of the approach roads to be improved will be very long at vertical minimum radius at speed of 80km/h or 60km/h. Therefore, a 40km/h design speed is deemed appropriate.

Tran Bridge（Binh Thuan Province）

Since the width of the access road is narrow, it is desirable to reduce the design speed for safety reasons. In addition, the section of the approach roads to be improved will be too long at vertical minimum radius at speed of 80km/h or 60km/h. Therefore, a 40km/h design speed is deemed appropriate.

Tan Ngan Bridge（Ninh Thuan Province）

Since the road is mountainous road with narrow width, and the right end of the bridge will be an intersection, a 40km/h design speed will be applied.

Ea Soup Bridge (Dak Lak Province)

Since the bridge is located in mountainous area at the outer edge of the district center of Ea Soup, the design speed should be reduced for safety reasons. In addition, it is necessary to keep small horizontal curve (R=50) to connect the exscinding road. Therefore, a 30km/h design speed will be applied.

Krong K’Mar Bridge (Dak Lak Province)

Since the bridge is located in mountainous at the outer edge of the district center of Krong K’Mar, the design speed should be limited for safety purposes. Therefore, a 40km/h design speed will be applied.

Ngoi Ngan Bridge (Khanh Hoa Province)

Since the bridge is located in an economic zone near the city area and school zone, the design speed should be limited for safety reasons. In addition, it is necessary to keep small horizontal curve to connect the exscinding road, and the improvement section of the approach roads will also be very long at vertical minimum radius at design speed of 80km/h or 60km/h. Therefore, a 40km/h design speed will be applied.

Embankment height and slope shall be in compliance with the applicable requirements of Vietnamese Standard TCVN4054-05.

Table 2.2.19 Embankment Height & Slope

Type of Soil	Slope（H＜6m）	Slope（6m＜H＜12m）
Sand and Silt or Clay	1:1.5	1:1.75

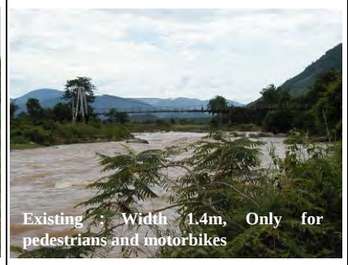
2.2.2.7 Summary of Bridge Design

The design results of the proposed 6 bridges are summarized in Table 2.2.20.

2.2.3 General Drawings for Proposed Bridges

A general view of the 6 proposed bridges is attached with each bridge provided with two drawings (one for the bridge structure and one for the approach roads).

Table 2.2.20 Summary of Bridge Design Results

		Da Dung Bri. (Binh Thuan Pro.)	**Tran Bri.** (Binh Thuan Pro.)	**Tam Ngan Bri.** (Ninh Thuan Pro.)	**Ea Soup Bri.** (Dak Lak Pro.)	**Krong K'Mar Bri.** (Dak Lak Pro.)	**Ngoi Ngan Bri.** (Khanh Hoa Pro.)
1. Photo		 Existing：Width 4.4m, Load limit 2.5t	 Existing：Width 3.4m, Load limit 5.0t	 Existing：Width 1.4m, Only for pedestrians and motorbikes	 Existing：Width 4.4m, Load limit 18.0t	 Existing：Width 4.4m, Load limit 5.0t	 Existing：Width 3.5m, Only for pedestrians and motorbikes
2. Feature		This bridge is located in the centre of Logi Town. A large number of bicycles and motorbikes are using. Other bridges on the same route have already been constructed with 9.0m width and 30 tons load limit.	This bridge is links to NH1and NH28, and traffic volume is increasing rapidly. A new bridge along the same route was already improved to 30 tons load limit.	This bridge will connect with Lam Son - Phuoc Hoa route which has been upgrading. The parmanent access for ethnic minorities living on the right bank side	This bridge is located at the outer edge of the district centre of Ea Soup. The other bridges along the same route were constructed with 30 tons load limit. Heavy vehicles must cross the riverbed near the bridge at low water level.	This bridge is located at the outer edge of the district centre of Krong K'mar. The new bridges along the same route were constructed with 30 tons load limit. Heavy vehicles must cross the riverbed near the bridge at low water level.	This bridge is located along Nguyen Hue route within Van Phong Gulf economic zone. This route is under upgrading. Other bridges on the same route have already been constructed with width of 6.0m + walkway and 15 tons load limit.
3.Bridge Location		No Change （15m upstream of existing）	No Change （Same location of existing）	No Change （About 80m upstream of existing）	No Change （15m downstream of existing）	No Change （11m upstream of existing）	No Change （5m downstream of existing）
4.Bridge Type		No Change （PC-T Girder, Spread Footing）	No Change （PC-T Girder, Spread Footing）	No Change （PC-T Girder, Spread Footing）	No Change （PC-T Girder, Spread Footing）	No Change （PC-T Girder, RC Piles）	No Change （PC-T Girder, RC Piles）
5. Bridge Length		No Change: 92.3m(30+30+30)	No Change: 65.3m(21+21+21)	No Change: 71.3m(21+27+21)	No Change: 59.3m(18+21+18)	No Change: 71.3m(21+27+21)	No Change: 49.55m(24+24)
6.Bridge Width	Previous Design	7.0m	5.5m	5.5m	7.0m	7.0m	5.5m
	Request from DOT	12.0m	12.0m	8.0m	7.0m	7.0m	9.0m
	Application	**9.0m** Providing greater safety for bicycles and pedestrians (students). Consideration of consistency with other bridges on the same route.	No Change (5.5m) Consideration of existing road width. There is no upgrading plan on existing road.	No Change (5.5m) There is no upgrading plan on existing road.	No Change (7.0m) Consideration of traffic volume and consistency with other bridges on the same route.	No Change (7.0m) Consideration of traffic volume and consistency with new bridges on the same route.	**7.0m** Consideration of provincial road upgrading plan and consistency with other bridges on the same route.
7.Live Load	Previous Design	65%HL93 (equivalent to H13)	65%HL93 (equivalent to H13)	65%HL93 (equivalent to H13)	80%HL93 (equivalent to H18)	65%HL93 (equivalent to H13)	65%HL93 (equivalent to H13)
	Request from DOT	HL93 (equivalent to H30)	HL93 (equivalent to H30)	HL93 (equivalent to H30)	HL93 (equivalent to H30)	HL93 (equivalent to H30)	HL93 (equivalent to H30)
	Application	80%HL93 (equivalent to H18) Same as the other bridges on the same route.	80%HL93 (equivalent to H18) Same as the new bridges on the same route.	No Change 65%HL93 (equivalent to H13) There is no upgrading plan on existing road.	No Change 80%HL93 (equivalent to H18) Consideration of traffic volume and consistency with other bridges on the same route.	80%HL93 (equivalent to H18) Consideration of traffic volume and consistency with new bridges on the same route.	No Change 65%HL93 (equivalent to H13) Consideration of consistency with other bridges on the same route.
8.Approach Road Length		No Change (see General Drawings)					
9.Rivetment & River Protection		No Change (see General Drawings)					
10.Road Drainage		No Change (see General Drawings)					
11.Soft Ground Treatment		No Change (Soft ground treatment will be executed at Bridge No56)					

Note) ▭ : Change Item from Previous Design

THE SOCIALIST REPUBLIC OF VIETNAM PROJECTS MANAGEMENT UNIT NO.2, MINISTRY OF TRANSPORTS				
PROJECT	THE PROJECT FOR RECONSTRUCTION OF BRIDGES IN THE CENTRAL DISTRICT (PHASE II)			
CONSULTANT	ORIENTAL CONSULTANTS CO., LTD			
	DESIGNED BY	CHECKED BY	APPROVED BY	
NAME				
SIGNATURE				
DATE				

SECTION	SCALE	DRAWING NO.	SHEET NO.
	1/200 ,1/1000	B-1	1 OF 1
DRAWING TITLE	ROAD PLANNING (BR.NO.36 DA DUNG BRIDGE)		

REV.NO.	DATE	DESCRIPTION	SIGNATURE

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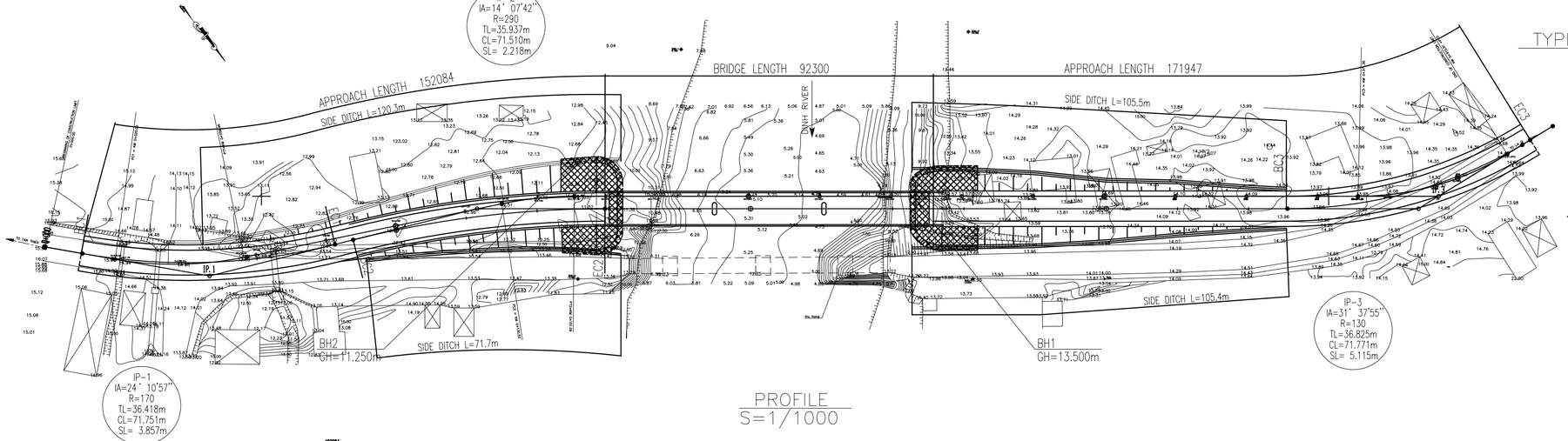

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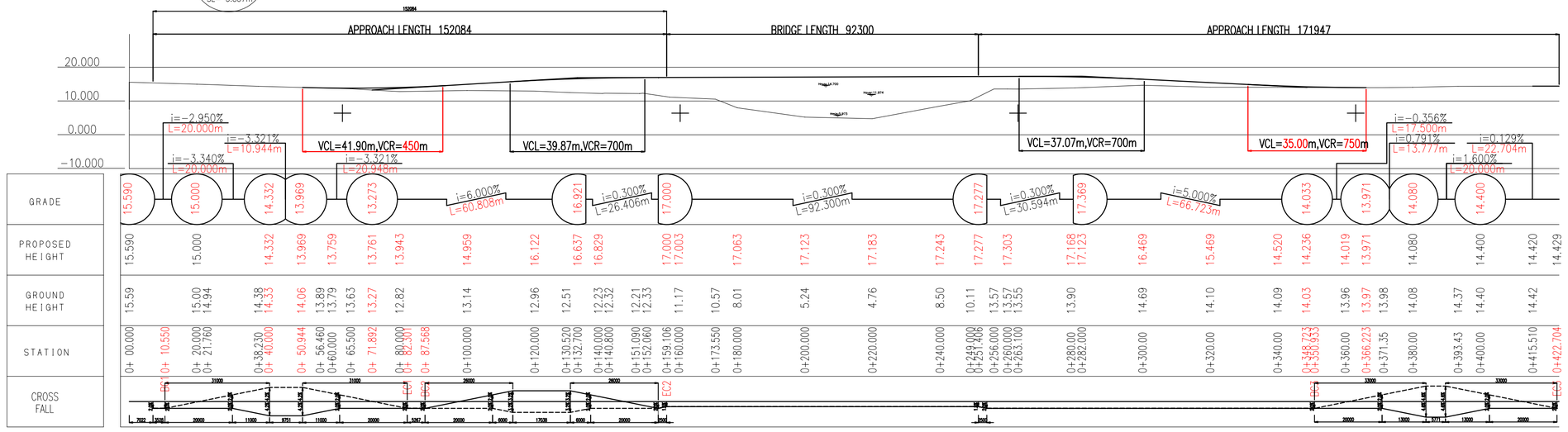

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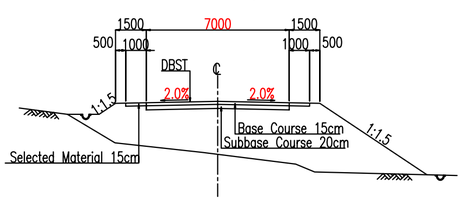

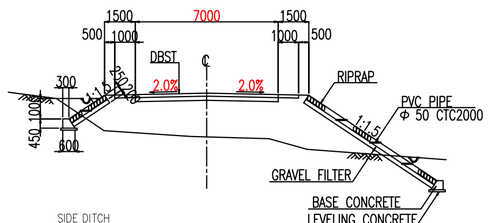

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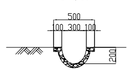

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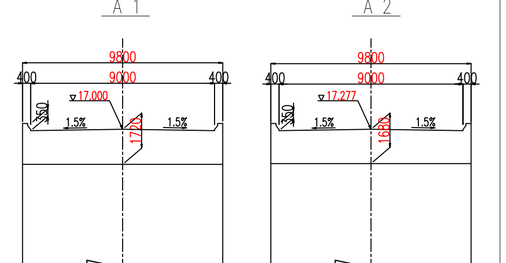

THE SOCIALIST REPUBLIC OF VIETNAM PROJECTS MANAGEMENT UNIT NO.2, MINISTRY OF TRANSPORTS			
PROJECT	THE PROJECT FOR RECONSTRUCTION OF BRIDGES IN THE CENTRAL DISTRICT (PHASE II)		
CONSULTANT	ORIENTAL CONSULTANTS CO., LTD.		
	DESIGNED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

SECTION	SCALE	DRAWING NO.	SHEET NO.
	1/100 ,1/200 ,1/400	B-2	1 OF 1
DRAWING TITLE	BRIDGE STRUCTURE (BR.NO.36 DA DUNG BRIDGE)		

REV.NO.	DATE	DESCRIPTION	SIGNATURE

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GENERAL VIEW OF THE BRIDGE

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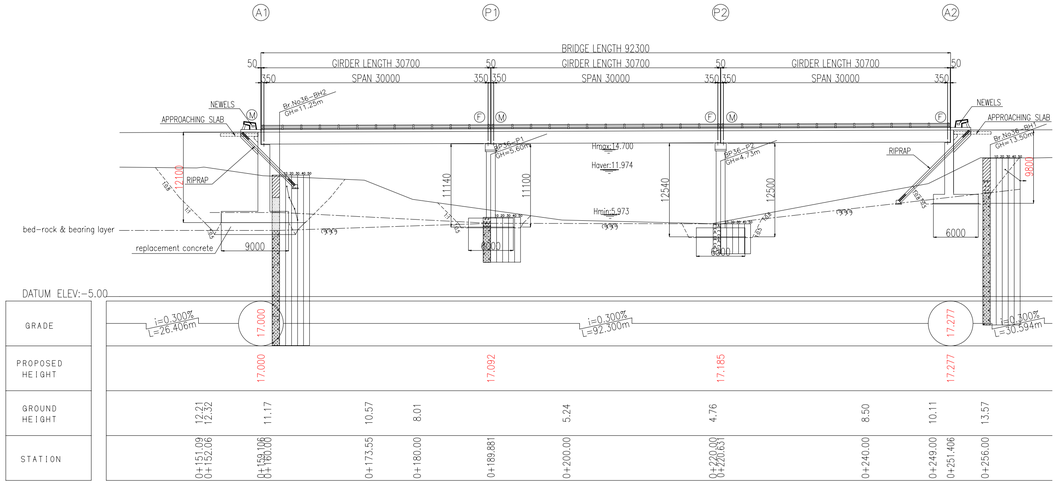

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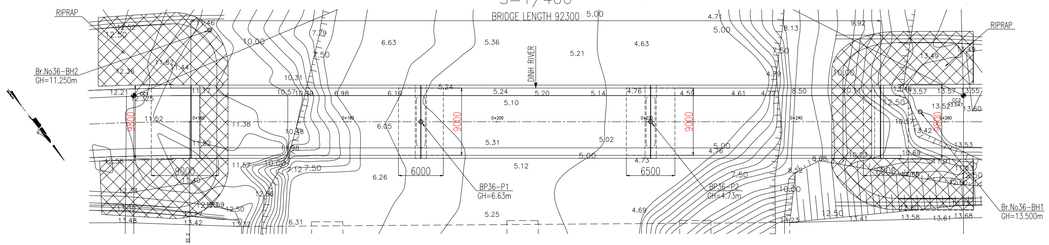

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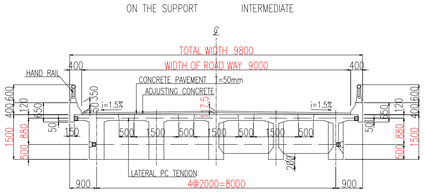
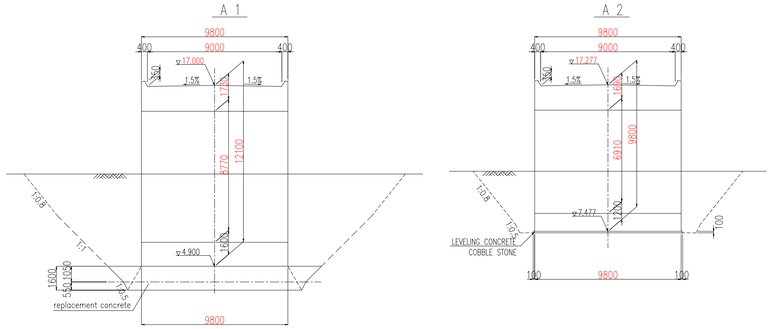
GIRDER LENGTH 30700

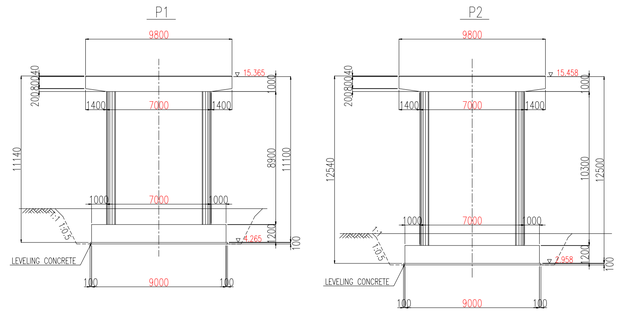


FRONT VIEW
S=1/200

ABUTMENT



PIER



Note:
The footing of abutments and piers shall be located into more than fifty centimeters under the surface of bearing stratum which consists of stiff rock , gravel or sandy soil.

DESIGN CRITERIA

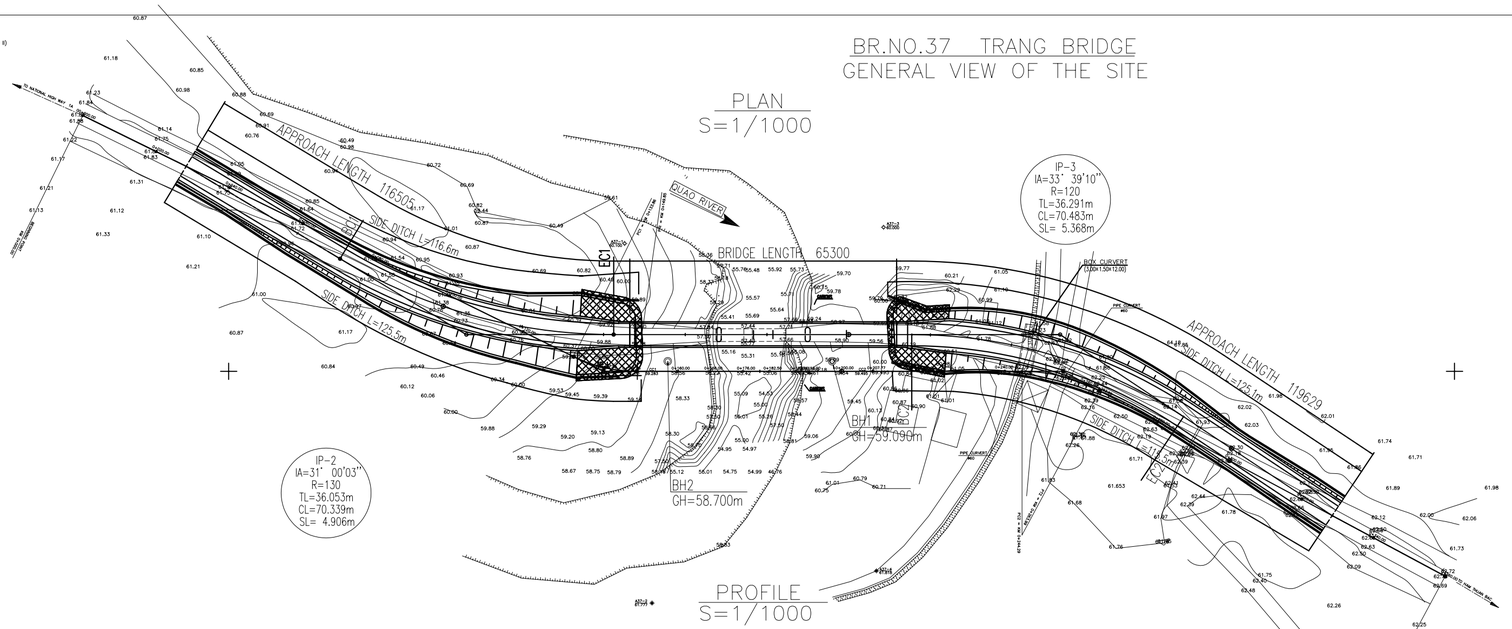
General Condition		
Design Live Load		HL-93,XXX%
Design Speed		V=40km/h
Bridge Length(Span Length)		92.30m(30.00m+30.00m+30.00m)
Freeboard		0.5m
Longitudinal Gradient		0.30 %
Cross-fall of Carriage way		1.50 %
Super Structure Type		Prestressed Concrete
Sub Structure Type	Abutment	Reinforced Concrete
	Pier	Reinforced Concrete
Foundation Type	Abutment	A1:Spread foundation
		A2:Spread foundation
	Pier	P1:Spread foundation
		P2:Spread foundation
Material Strength		
Super Structure Type	Girder	σ28=35N/mm²
	Cross Beam	σ28=30N/mm²
	Slab	σ28=30N/mm²
Surface	Curb,Handrail	σ28=21N/mm²
Sub Structure Type		σ28=21N/mm²
Reinforcing Steel		SD295(σy=295N/mm²)

THE SOCIALIST REPUBLIC OF VIETNAM PROJECTS MANAGEMENT UNIT NO.2, MINISTRY OF TRANSPORTS				
PROJECT	THE PROJECT FOR RECONSTRUCTION OF BRIDGES IN THE CENTRAL DISTRICT (PHASE II)			
CONSULTANT	ORIENTAL CONSULTANTS CO., LTD			
	DESIGNED BY	CHECKED BY	APPROVED BY	
NAME				
SIGNATURE				
DATE				

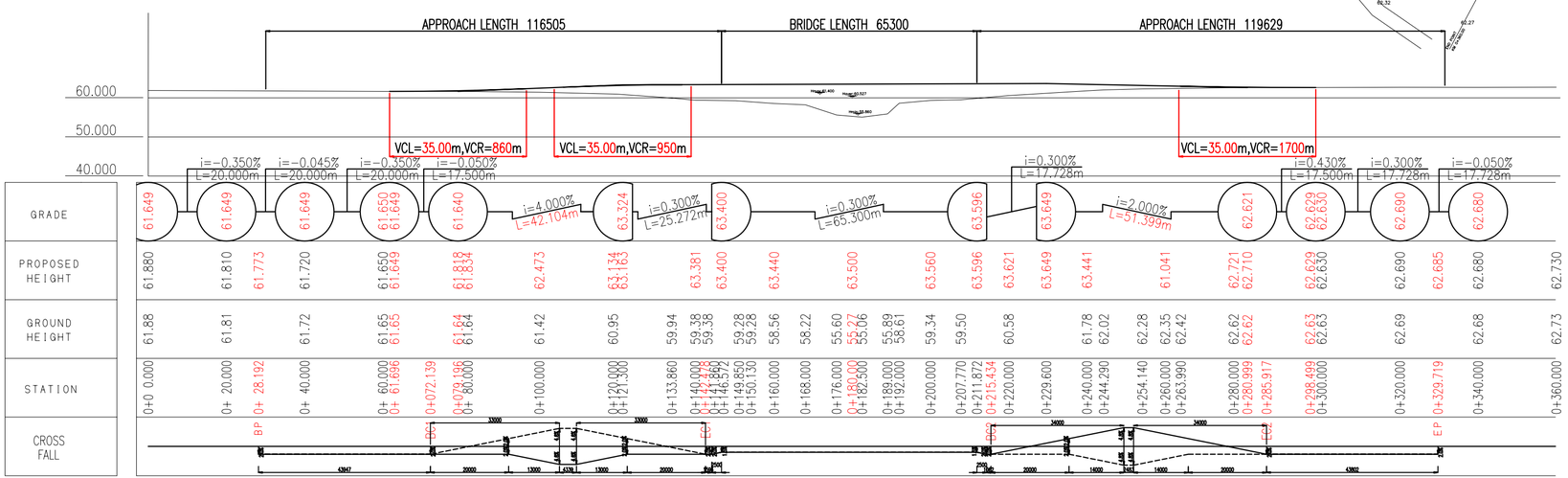
SECTION	SCALE	DRAWING NO.	SHEET NO.
	1/200 ,1/1000	C-1	1 OF 1
DRAWING TITLE	ROAD PLANNING (BR.NO.37 TRANG BRIDGE)		
REV.NO.	DATE	DESCRIPTION	SIGNATURE

BR.NO.37 TRANG BRIDGE
GENERAL VIEW OF THE SITE

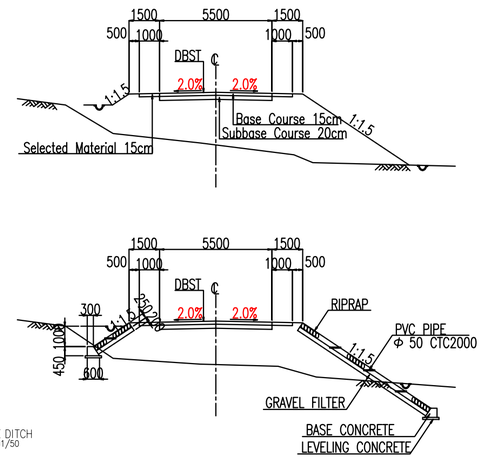
PLAN
S=1/1000



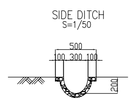
PROFILE
S=1/1000



TYPICAL CROSS SECTION OF APPROACH ROAD
S=1/200

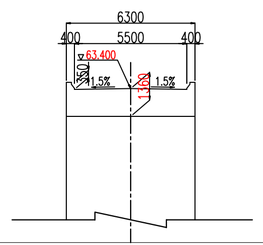


SIDE DITCH
S=1/50

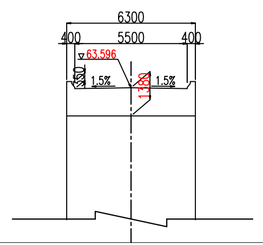


ABUTMENT S=1/200

A 1



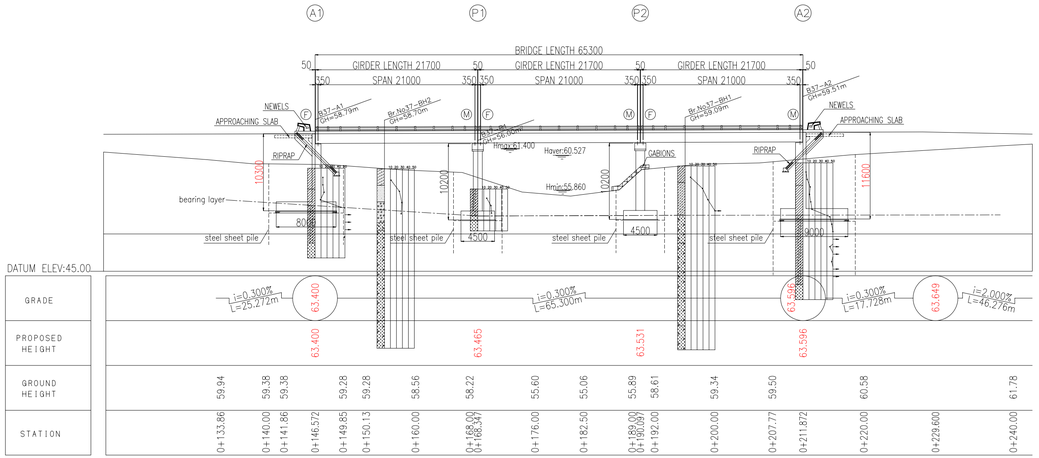
A 2



THE SOCIALIST REPUBLIC OF VIETNAM PROJECTS MANAGEMENT UNIT NO.2, MINISTRY OF TRANSPORTS			
PROJECT	THE PROJECT FOR RECONSTRUCTION OF BRIDGES IN THE CENTRAL DISTRICT (PHASE II)		
CONSULTANT	ORIENTAL CONSULTANTS CO., LTD.		
	DESIGNED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

SECTION	SCALE	DRAWING NO.	SHEET NO.
	1/100 ,1/200 ,1/400	C-2	1 OF 1
DRAWING TITLE	BRIDGE STRUCTURE (BR.NO.37 TRANG BRIDGE)		
REV.NO.	DATE	DESCRIPTION	SIGNATURE

PROFILE
S=1/400

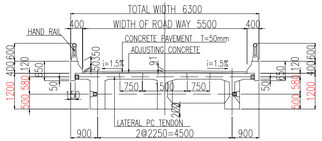


BR.NO.37 TRANG BRIDGE
GENERAL VIEW OF THE BRIDGE

CROSS SECTION
S=1/100

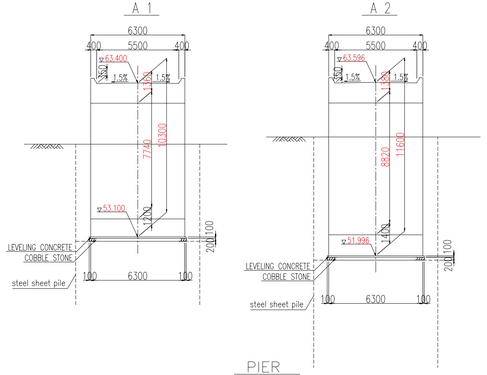
GIRDER LENGTH 21750

ON THE SUPPORT INTERMEDIATE

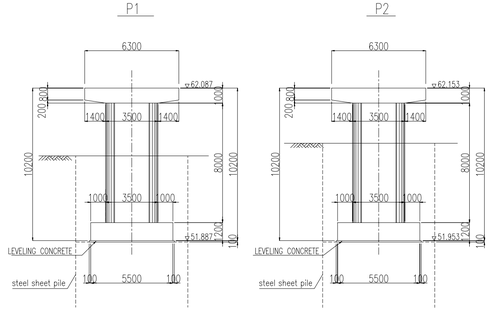


FRONT VIEW
S=1/200

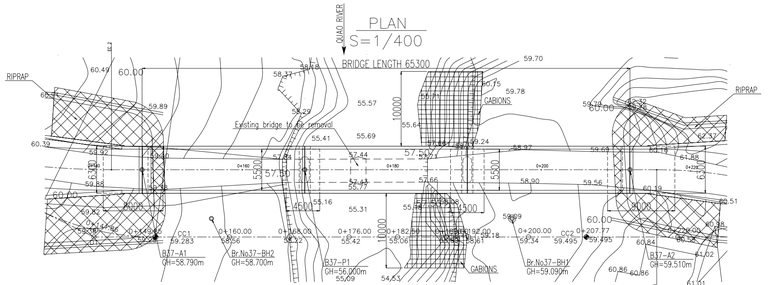
ABUTMENT



PIER



PLAN
S=1/400



Note:
The footing of abutments and piers shall be located into more than fifty centimeters under the surface of bearing stratum which consists of stiff rock , gravel or sandy soil.

DESIGN CRITERIA

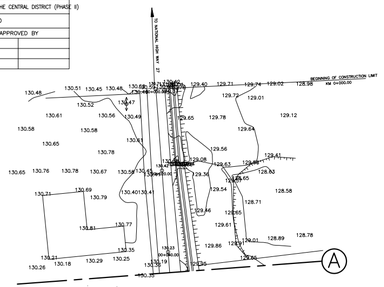
General Condition		
Design Live Load		HL-93,X60%
Design Speed		V=40km/h
Bridge length(Span Length)		65.30m(21.00m+21.00m+21.00m)
Freeboard		0.5m
Longitudinal Gradient		0.30 %
Cross-fall of Carriage way		1.50 %
Super Structure Type		Prestressed Concrete
Sub Structure Type	Abutment	Reinforced Concrete
	Pier	Reinforced Concrete
Foundation Type	Abutment	A1:Spread foundation
		A2:Spread foundation
	Pier	P1:Spread foundation
		P2:Spread foundation
Material Strength		
Super Structure Type	Girder	σ28=35N/mm²
	Cross Beam	σ28=30N/mm²
	Slab	σ28=30N/mm²
Surface	Curb,Handrail	σ28=21N/mm²
Sub Structure Type		σ28=21N/mm²
Reinforcing Steel		SD295(σy=295N/mm²)

THE SOCIALIST REPUBLIC OF VIETNAM PROJECTS MANAGEMENT UNIT NO.2, MINISTRY OF TRANSPORTS				
PROJECT	THE PROJECT FOR RECONSTRUCTION OF BRIDGES IN THE CENTRAL DISTRICT (PHASE II)			
CONSULTANT	ORIENTAL CONSULTANTS CO., LTD			
	DESIGNED BY	CHECKED BY	APPROVED BY	
NAME				
SIGNATURE				
DATE				

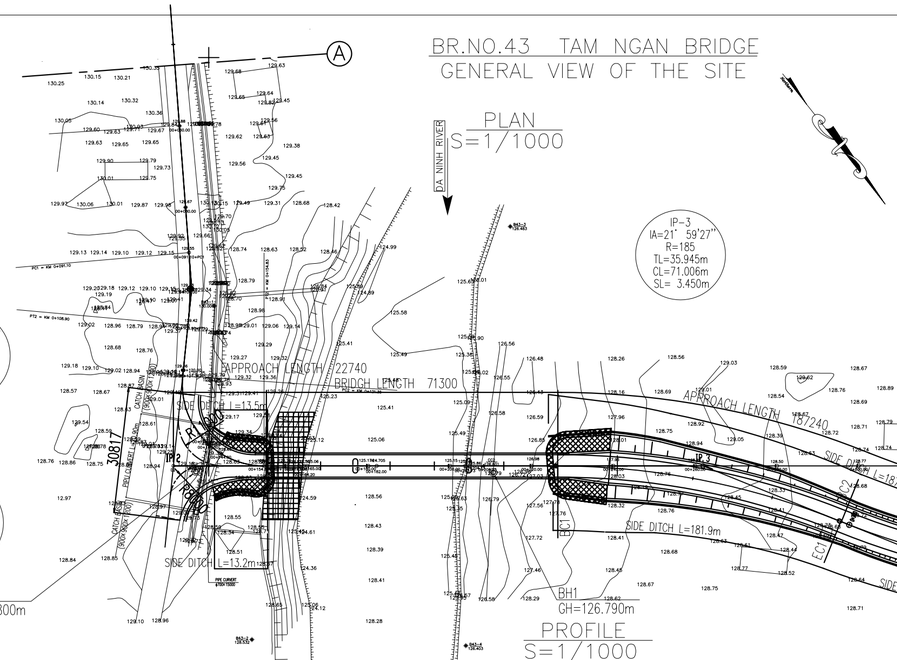
SECTION	SCALE	DRAWING NO.	SHEET NO.
	1/200 ,1/1000	D-1	1 OF 1
DRAWING TITLE	ROAD PLANNING (BR.NO.43 TAM NGAN BRIDGE)		

REV.NO.	DATE	DESCRIPTION	SIGNATURE

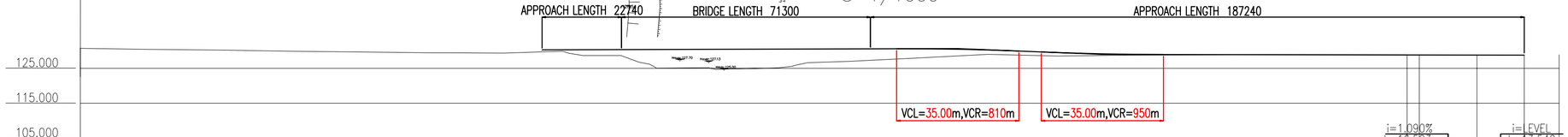
BR.NO.43 TAM NGAN BRIDGE
GENERAL VIEW OF THE SITE

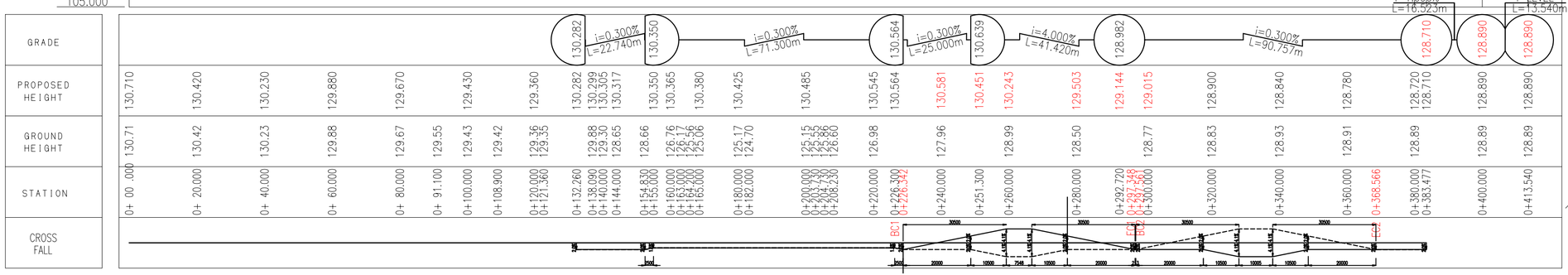


PLAN
S=1/1000

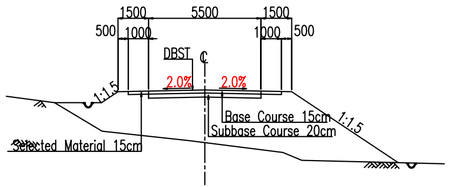


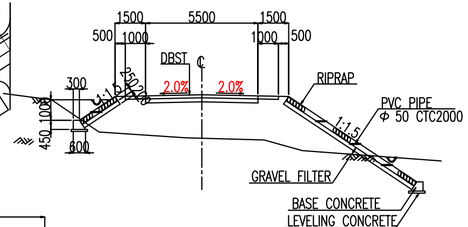
PROFILE
S=1/1000



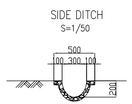


TYPICAL CROSS SECTION OF APPROACH ROAD
S=1/200



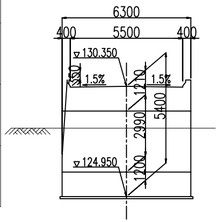


SIDE DITCH
S=1/50

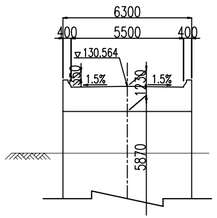


ABUTMENT S=1/200

A 1



A 2

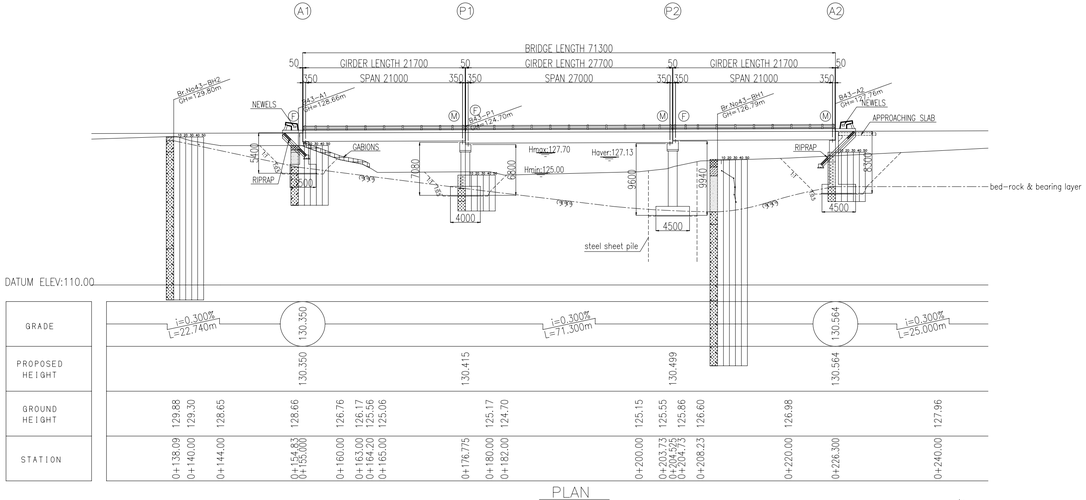


THE SOCIALIST REPUBLIC OF VIETNAM PROJECTS MANAGEMENT UNIT NO.2, MINISTRY OF TRANSPORTS			
PROJECT	THE PROJECT FOR RECONSTRUCTION OF BRIDGES IN THE CENTRAL DISTRICT (PHASE II)		
CONSULTANT	ORIENTAL CONSULTANTS CO., LTD.		
	DESIGNED BY	CHECKED BY	APPROVED BY
NAME			
SIGNATURE			
DATE			

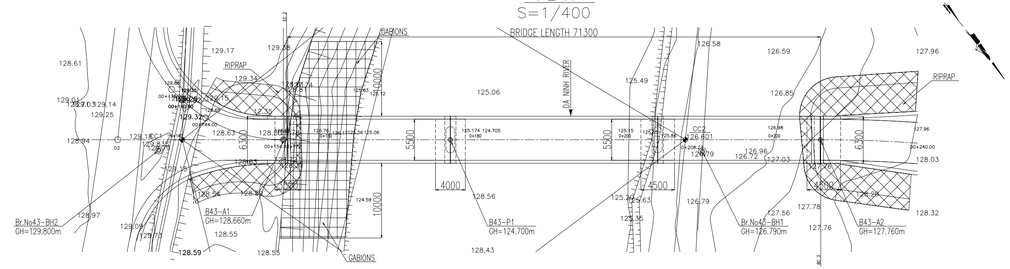
SECTION	SCALE	DRAWING NO.	SHEET NO.
	1/100 ,1/200 ,1/400	D-2	1 OF 1
DRAWING TITLE	BRIDGE STRUCTURE (BR.NO.43 TAM NGAN BRIDGE)		

REV.NO.	DATE	DESCRIPTION	SIGNATURE

# PROFILE
S=1/400



# PLAN
S=1/400

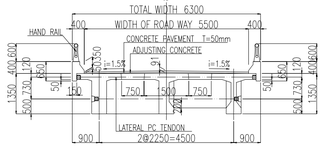


BR.NO.43 TAM NGAN BRIDGE
GENERAL VIEW OF THE BRIDGE

# CROSS SECTION
S=1/100

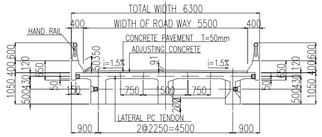
GIRDER LENGTH 27700

ON THE SUPPORT INTERMEDIATE



GIRDER LENGTH 21700

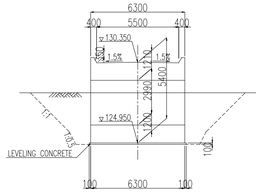
ON THE SUPPORT INTERMEDIATE



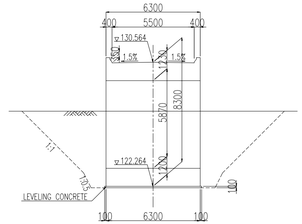
# FRONT VIEW
S=1/200

ABUTMENT

A 1

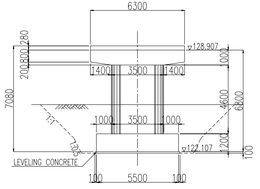


A 2

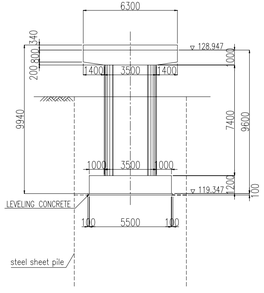


PIER

P1



P2



Note:
The footing of abutments and piers shall be located into more than fifty centimeters under the surface of bearing stratum which consists of stiff rock , gravel or sandy soil.

DESIGN CRITERIA

General Condition		
Design Live Load	HL-93 M&S	
Design Speed	V=40km/h	
Bridge length(Span Length)	71.30m(21.00m+27.00m+21.00m)	
Freeboard	1.0m	
Longitudinal Gradient	0.30 %	
Cross-fall of Carriage way	1.50 %	
Super Structure Type	Prestressed Concrete	
Sub Structure Type	Abutment	Reinforced Concrete
	Pier	Reinforced Concrete
Foundation Type	Abutment	A1:Spread foundation
		A2:Spread foundation
	Pier	P1:Spread foundation
		P2:Spread foundation
Material Strength		
Super Structure Type	Girder	σ28=35N/mm²
	Cross Beam	σ28=30N/mm²
	Slab	σ28=30N/mm²
Surface	Curb,Handrail	σ28=21N/mm²
Sub Structure Type		σ28=21N/mm²
Reinforcing Steel		SD295(σy=295N/mm²)