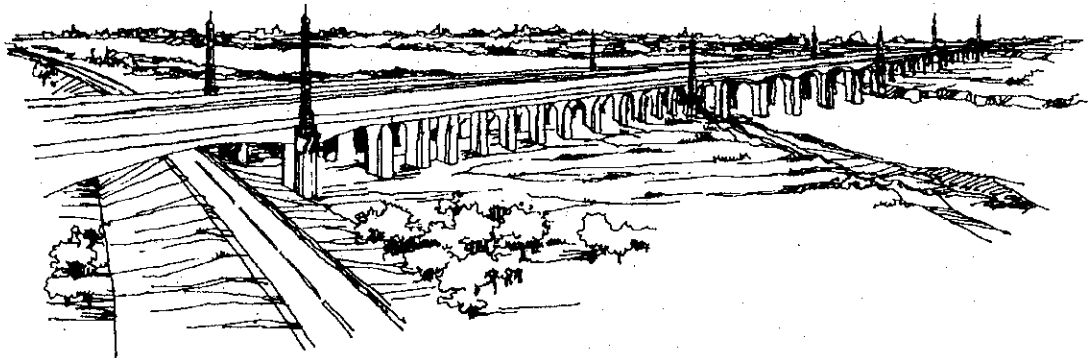


JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
PROJECT MANAGEMENT UNIT THANG LONG
MINISTRY OF TRANSPORT
THE SOCIALIST REPUBLIC OF VIET NAM

THE DETAILED DESIGN OF THE RED RIVER BRIDGE (THANH TRI BRIDGE) CONSTRUCTION PROJECT IN THE SOCIALIST REPUBLIC OF VIET NAM

FINAL REPORT

VOLUME IV : DESIGN REPORT



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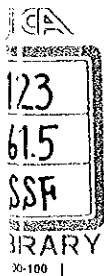


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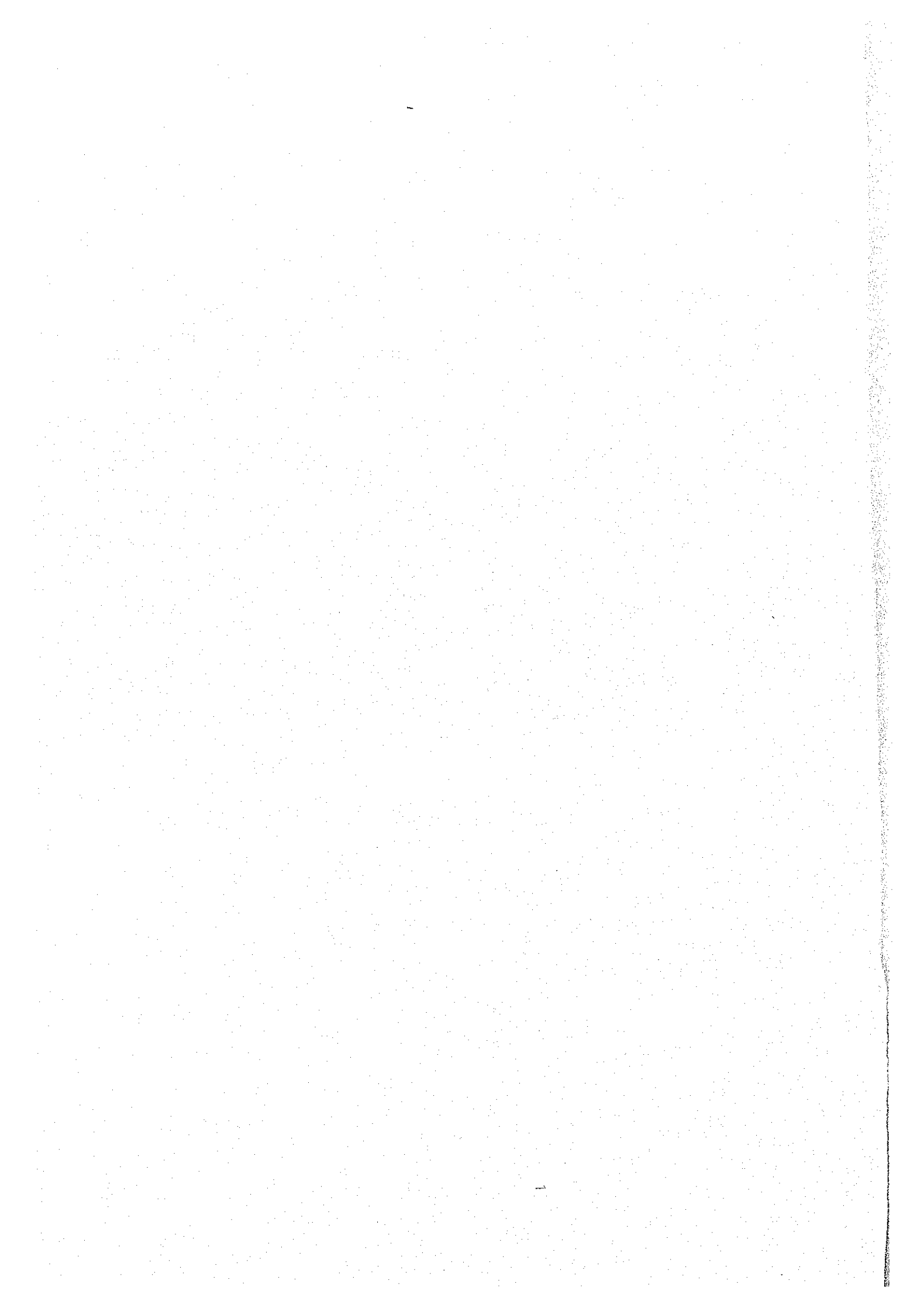
June 2000

PACIFIC CONSULTANTS INTERNATIONAL

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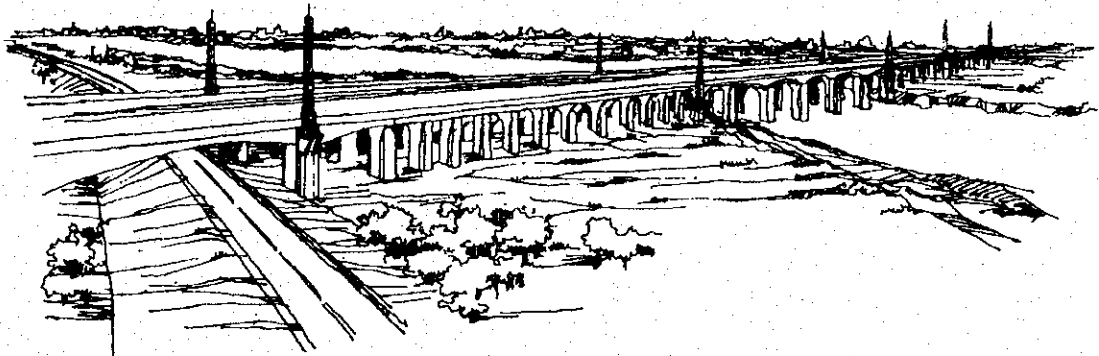


JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
PROJECT MANAGEMENT UNIT THANG LONG
MINISTRY OF TRANSPORT
THE SOCIALIST REPUBLIC OF VIET NAM

**THE DETAILED DESIGN
OF
THE RED RIVER BRIDGE (THANH TRI BRIDGE)
CONSTRUCTION PROJECT
IN
THE SOCIALIST REPUBLIC OF VIET NAM**

FINAL REPORT

VOLUME IV : DESIGN REPORT



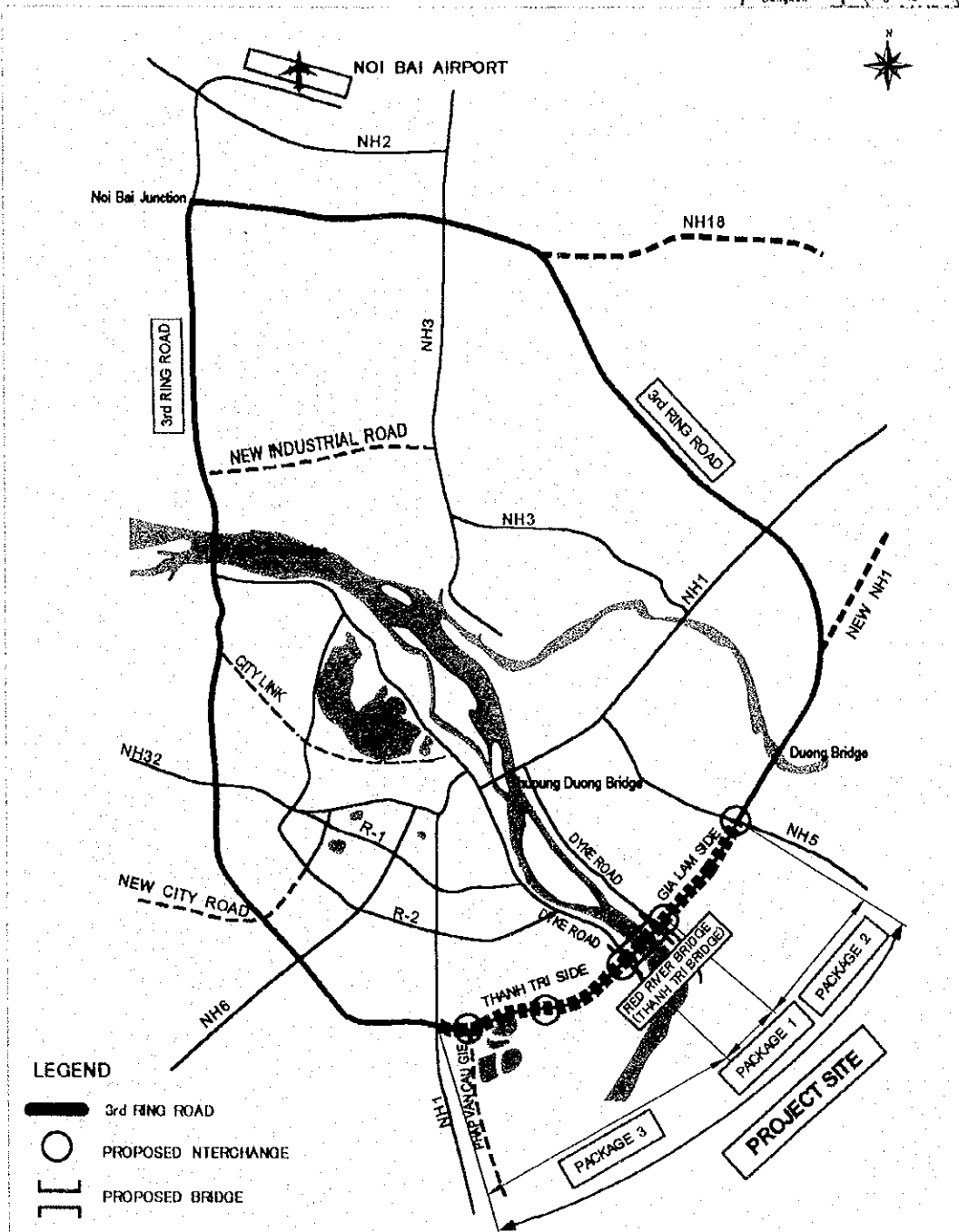
June 2000

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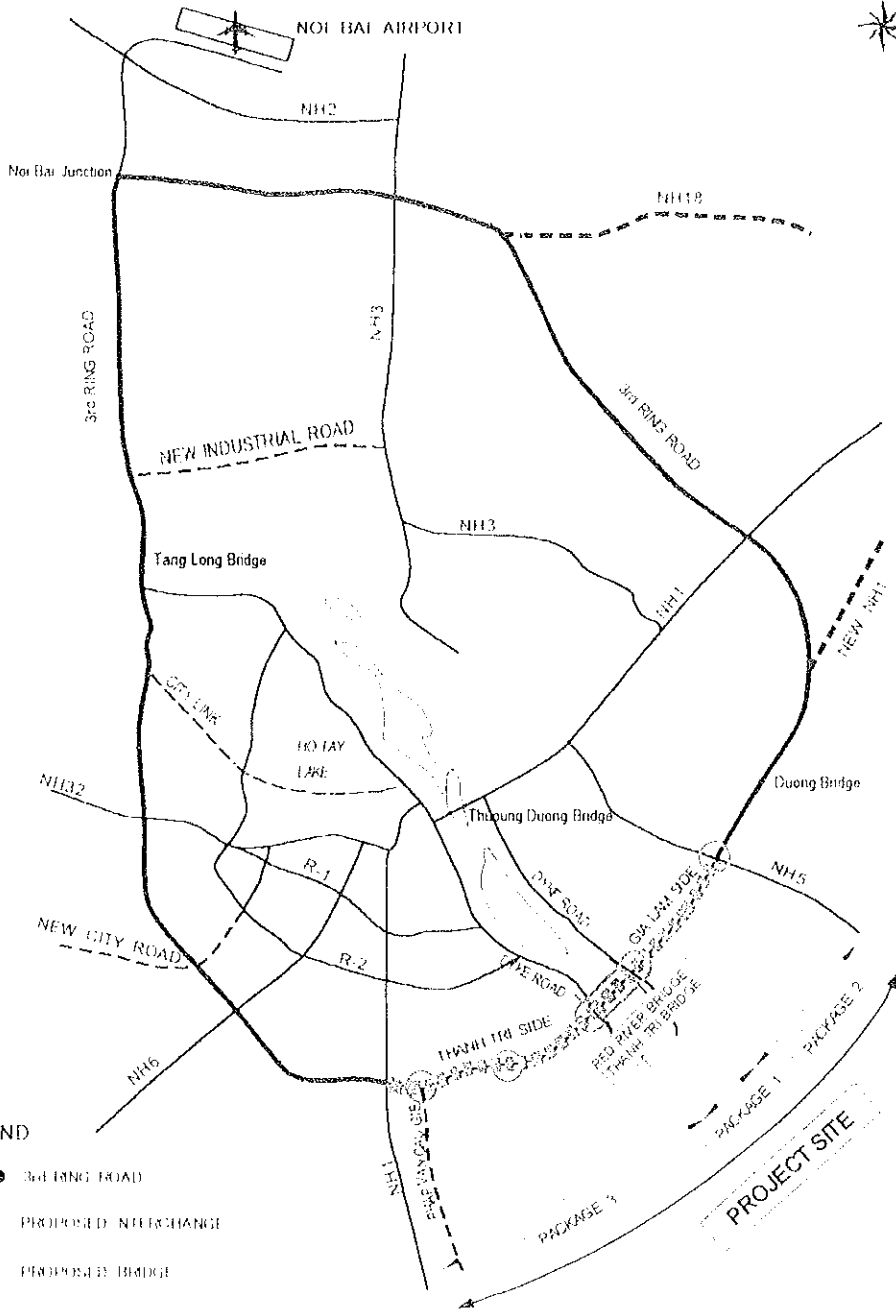
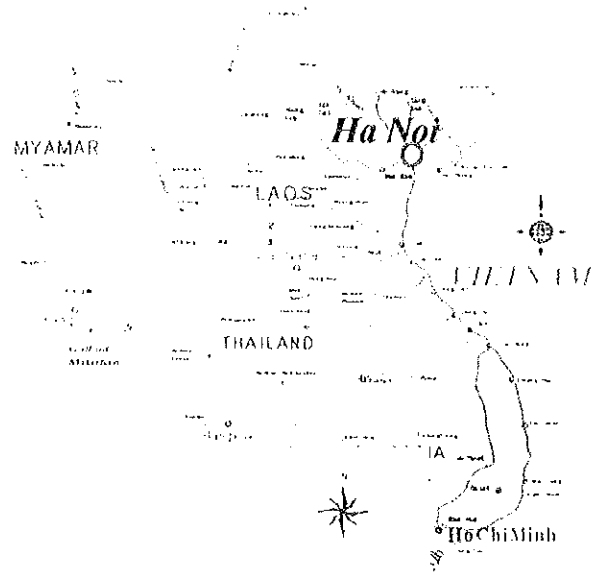


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PROJECT LOCATION MAP



PROJECT LOCATION MAP



LEGEND

-  3rd RING ROAD
-  PROPOSED INTERCHANGE
-  PROPOSED BRIDGE

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Volume	V: Tender Documents (Draft)
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**THE DETAILED DESIGN
OF
THE RED RIVER BRIDGE (THANH TRI BRIDGE) CONSTRUCTION PROJECT
IN
THE SOCIALIST REPUBLIC OF VIETNAM
FINAL REPORT – Volume IV: Design Report**

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1. GENERAL NOTES

GENERAL NOTES

THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM VIETNAM NATIONAL CONSTRUCTION DESIGN INSTITUTE	DESIGNED BY S. H. H. H.
PROJECT NAME HAI PHONG BRIDGE (PART OF THE HAI PHONG CONSTRUCTION PROJECT)	DATE
PROJECT LOCATION HAI PHONG CONSTRUCTION PROJECT	

PROJECT NO.	SCALE	DRAWING NO.	SHEET NO.
1	1	C-0-0-1	1

GENERAL NOTES

IV. ALLOWABLE STRESSES

- Concrete
- 1-1 Prestressed Concrete Structures : unit in kgf/cm²

Description	Class of Concrete
(1) Compressive Stress	A-1, A-2 and A-3
- Temporary stress before losses due to creep and shrinkage	180 (=0.4f _c)
- Stress at service load after losses have occurred	0.784(f _c) ^{3/2}
(2) Tensile Stress	
- Temporary stress before losses due to creep and shrinkage	31.8 (=1.59(C ₁) ^{3/2})
- Stress at service load after losses have occurred	15.8 (=0.79(C ₁) ^{3/2})
(3) Anchorage Bearing Stress	210 but not to exceed 0.9f _c

(Note) f_c : compressive strength of concrete at time of initial prestress (kgf/cm²)
C₁ shall be not less than 360kgf/cm²

V. OTHER DESIGN CONDITIONS

- Hooks, development and splices of reinforcing steel shall conform to Articles 8.23 through 8.32 of the AASHTO.
- Minimum N-value of standard penetration test for bearing stratum shall be 50.
- Safety factor for foundation design shall be in accordance with Article 4.5.6.2 of the AASHTO.
- Allowable horizontal displacement at the top of pile:
 - except earthquake force 15mm
 - for earthquake force 50mm

VI. OTHERS

- Elevations, stations and coordinates are shown in meters. Other dimensions are shown in millimeters unless otherwise specified.

III. MATERIALS

- Concrete

Design strengths f_c (by cylinder specimen) of concrete are as follows:

Class	Strength f _c (kgf/cm ²)	Description
A-1	400	cast-in-place prestressed concrete box girders for cantilever erection
A-2	400	cast-in-place prestressed concrete box girders (H=2.75m)
A-3	400	precast prestressed concrete I-girders (PC I-girder)
B-1	350	(not applicable)
C-1	290	reinforced concrete (RC) deck slabs, diaphragms of PC I-girders, parapet and foundation of lighting poles excluding those for RC hollow slab
C-2	290	precast RC piles
C-3	290	RC piers (including cantilevered pier heads, pier columns and footings), RC abutments (including wing walls), RC retaining walls, box culverts
C-4	290	RC hollow slab, parapet and foundation of lighting poles for RC hollow slab
C-5	290	RC hollow slab
D-1	240	(not applicable)
E-1	210	approach slabs
E-2	210	pipe culverts
E-3	210	slab for foundation (pile) below pipe and box culverts
E-4	210	precast concrete curbs
G	-	lean concrete, leveling concrete
Y	290	cast-in-place reinforced concrete piles

2. Reinforcing Steel

Reinforcing steel for concrete shall conform to the followings or equivalent:

Type	JIS G3112
	Designation
Round Bar	SR 235
Deformed Bar	SD 295A
	Yield Strength (kgf/cm ²)
	2,400
	3,000

3. Prestressing Steel

Prestressing steel shall conform to the followings or equivalent:

Type	Designation	Yield Strength (kgf/cm ²)	Tensile Strength (kgf/cm ²)
A	JIS G3536, SWPR7BL 12T15.2	16,000	19,000
B	JIS G3536, SWPR7BL 4T15.2	16,000	19,000
C	JIS G3536, SWPR7BL 3T15.2	16,000	19,000
D	JIS G3536, SWPR7BL 12T12.7	16,000	19,000
E	JIS G3536, SWPR7BL 7T12.7	16,000	19,000
F	JIS G3112, SBRP330/1180 Φ32	9,500	12,000

I. DESIGN SPECIFICATIONS

AASHTO Standard Specifications for Highway Bridges, 16th edition, 1956 (hereinafter called as AASHTO) shall be adopted in conjunction with Vietnamese Bridge Design Codes 221CN 018-79 and Japanese Specifications for Highway Bridges, the 1956 edition.

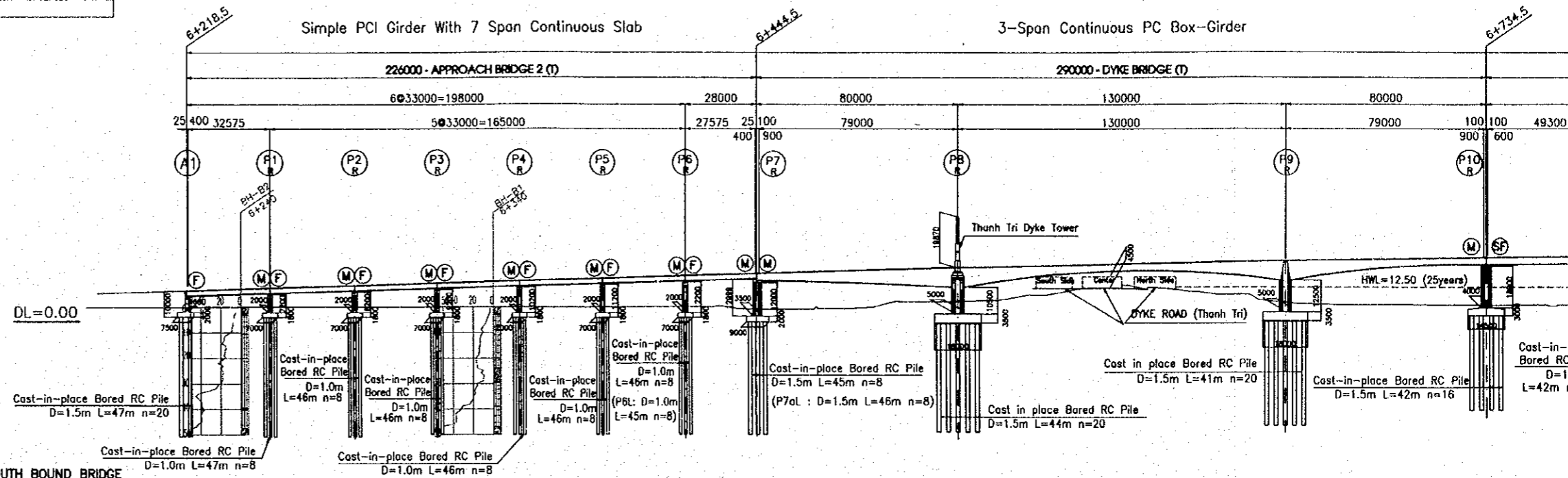
1. LOADS

- Reinforced/ Prestressed Concrete : 2,500 kgf/m²
 - Plain Concrete : 7,850 kgf/m²
 - Cast Iron Cast Steel : 7,250 kgf/m²
 - Cast Iron : 2,300 kgf/m²
 - Asphalt Pavement : 50 kgf/m²
 - Rolling : 50 kgf/m
- Live Load : 125K
 - ESD : 125K
 - Application of live loading and reduction in loading intensity called as AASHTO Article 3.11 and 3.12 of AASHTO.
 - Live loads H30 and X880 specified in Vietnamese Bridge Design Codes 221CN 018-79 are also considered.
- Impact : $I = 15.24 / \sqrt{L + 38}$
in which, L = impact fraction (maximum 30 percent)
 - Wind Load : The requirements of AASHTO Article 3.15 with a base wind velocity of 160 km/hr shall be adopted to the design.
 - Longitudinal Force : 7% of the live load in all lanes carrying traffic headed in the same direction (AASHTO Article 3.5)
 - Centrifugal Force (AASHTO Article 3.10)
C = $0.75 \times V^2 / R$
in which, C = the centrifugal force in percent of the live load, without impact in the design
R = the radius of the curve in meters
 - Shaking Force : 0.4 tf/m (without impact) irrespective of the number of traffic lanes (Vietnamese Bridge Design Codes 221CN 018-79, Article 2.15)
 - Effect of Temperature : 5C to 45C
Range of Air Temperature : 5C to 45C
 - Earthquake Load : Seismic Acceleration Coefficient : 0.17
 - Vessel Collision Force : In Direction Parallel to the Navigation Channel : 631 tf
In Direction Normal to the Navigation Channel : 316 tf
Note: The vessel collision force shall be calculated in accordance with Article 3.14 of AASHTO UFD Bridge Design Specifications, 2nd edition, 1986.
 - River Flow Force : P = $52.5 \times K \times V^2$ (AASHTO Article 3.18.1)
P = pressure in kgf per square meter
V = velocity of water in meters per second
K = coefficient of resistance
Note: The design shall be subjected to drift piles, and square-ended piers, 0.7 for circular piers, and 0.5 for angle ended piers where the angle is 30 degrees or less.
 - Earth Pressure : Earth pressure shall be calculated by Coulomb's equation.
 - Combinations of Loads and Load Factors : Combinations of loads and load factors shall be in accordance with Section 3, Part 8 of AASHTO.

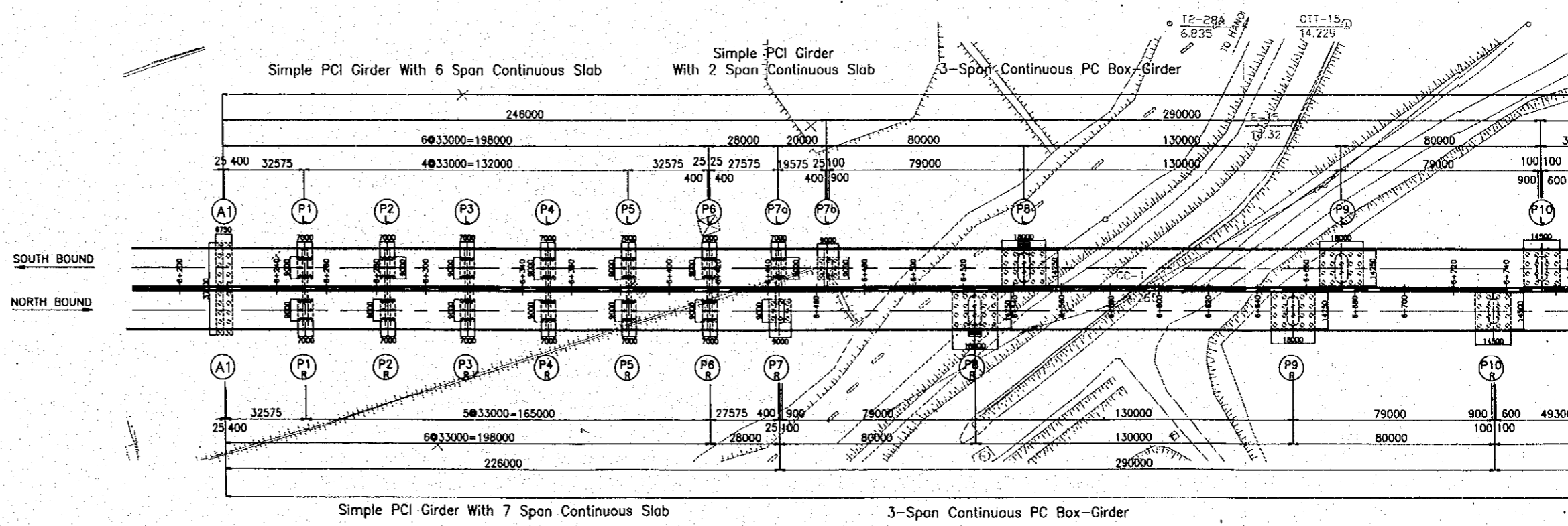
2. RED RIVER BRIDGE

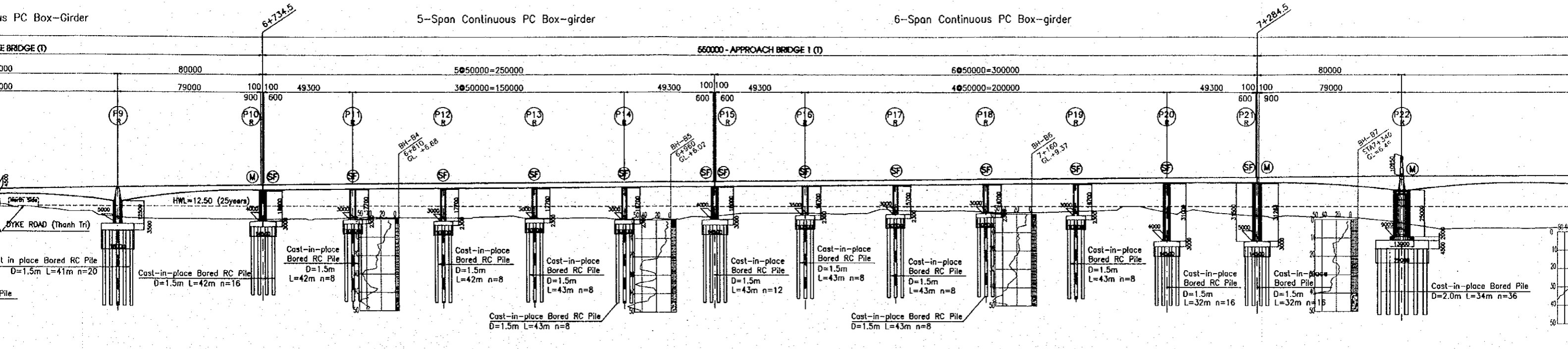
Main Bridge

THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM THANG LONG PROJECTS MANAGEMENT UNIT, MINISTRY OF TRANSPORT		DESIGNED BY
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		NAME
PROJECT RED RIVER BRIDGE (THANH TRI BRIDGE) CONSTRUCTION PROJECT		SIGNATURE
CONSULTANT PACIFIC CONSULTANTS INTERNATIONAL		DATE



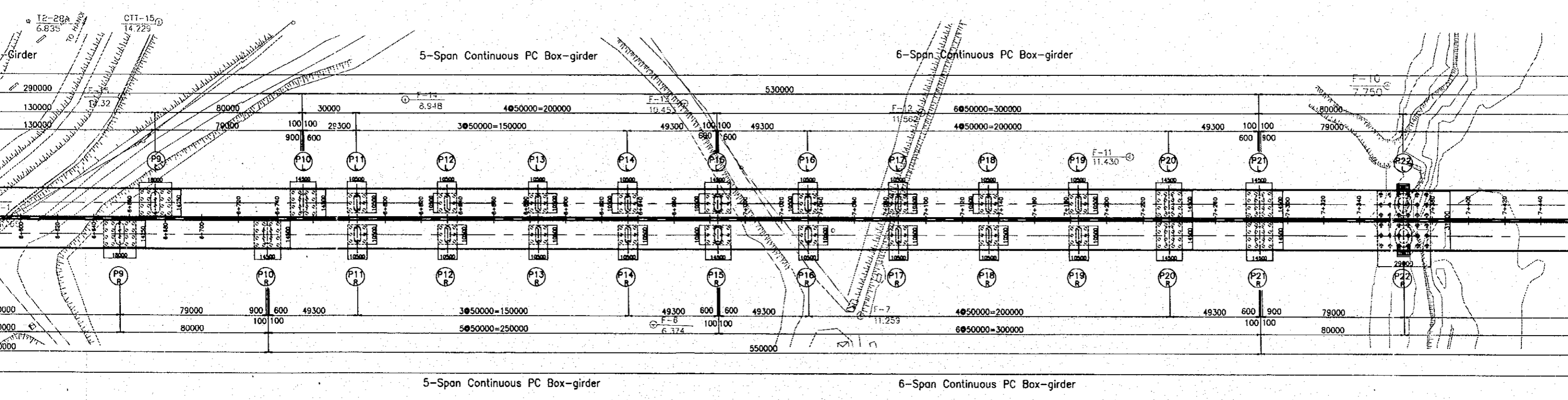
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ELEVATION	11.968	12.945	13.935	14.925	15.915	16.905	17.895	18.735	19.335	21.016	21.522	22.575	23.380	23.825	24.157	24.988	25.212
GROUND HEIGHT	5.503	5.575	5.551	5.656	5.680	5.675	5.817	4.830	4.842	7.819	9.001	14.28	10.34	7.549	6.712	6.529	6.690
STATION	6+218.5	6+251.5	6+284.5	6+317.5	6+350.5	6+383.5	6+416.5	6+444.5	6+464.5	6+524.5	6+544.5	6+590	6+630	6+654.5	6+674.5	6+734.5	6+754.5



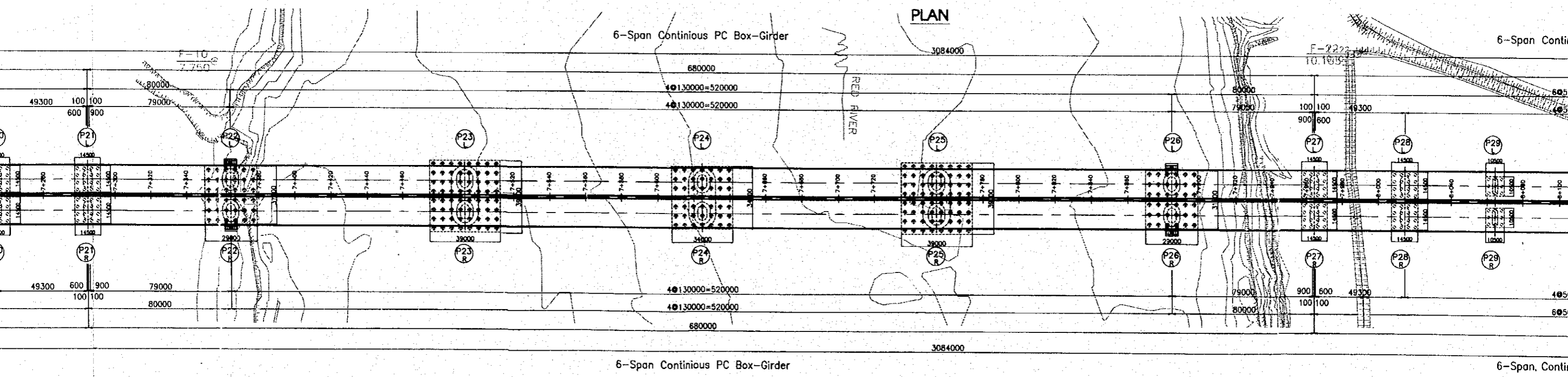
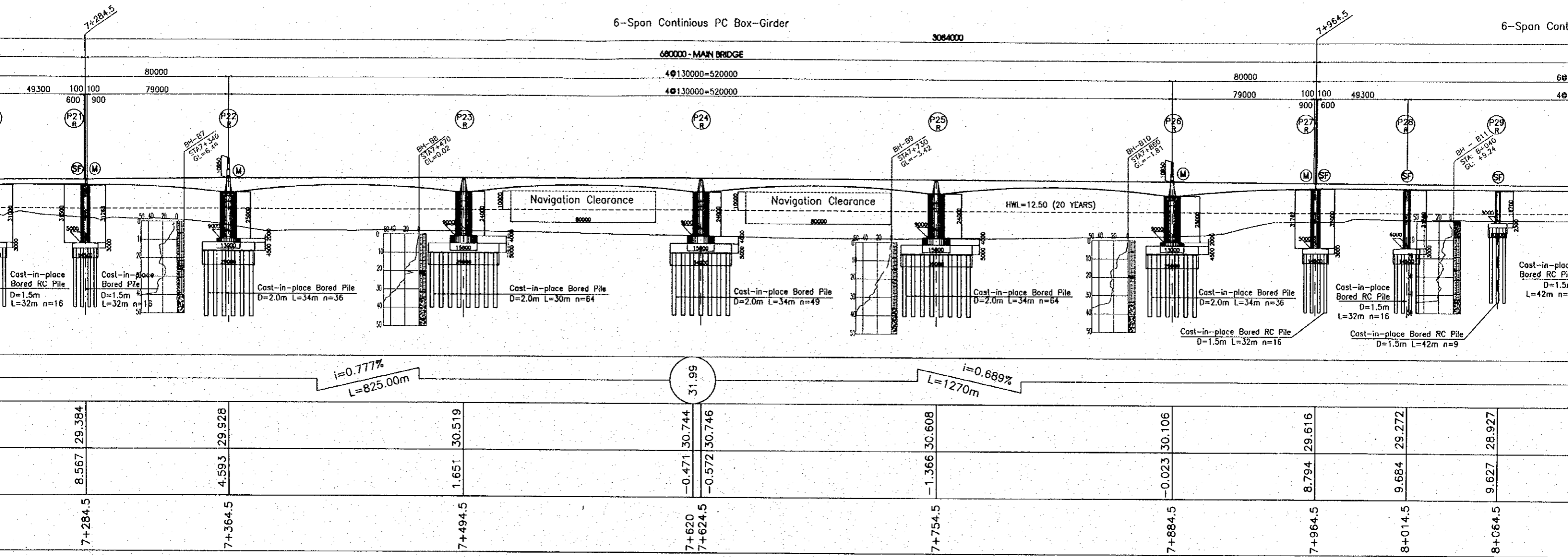


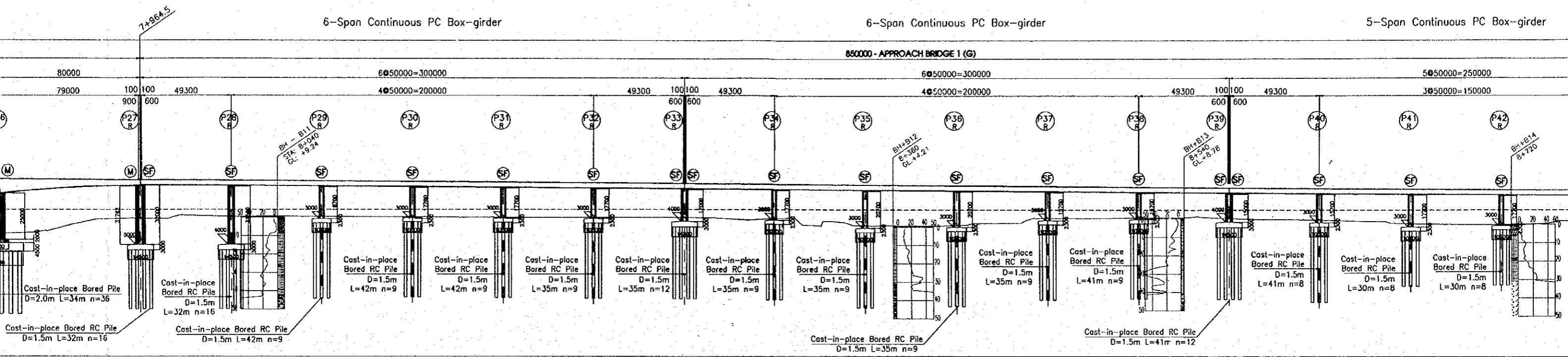
10.34	23.380	24.30	7.549	23.825	6.529	24.988	6.690	25.212	7.133	25.496	7.125	25.888	7.139	26.277	6.484	26.665	8.219	27.054	9.802	27.442	11.331	27.830	10.454	28.219	10.885	28.607	10.358	28.996	8.567	29.384	4.593	29.928
6+630	6+654.5	6+674.5	6+734.5	6+754.5	6+784.5	6+834.5	6+884.5	6+934.5	6+984.5	7+034.5	7+084.5	7+134.5	7+184.5	7+234.5	7+284.5	7+364.5																

$i=0.777\%$
 $L=825.00m$



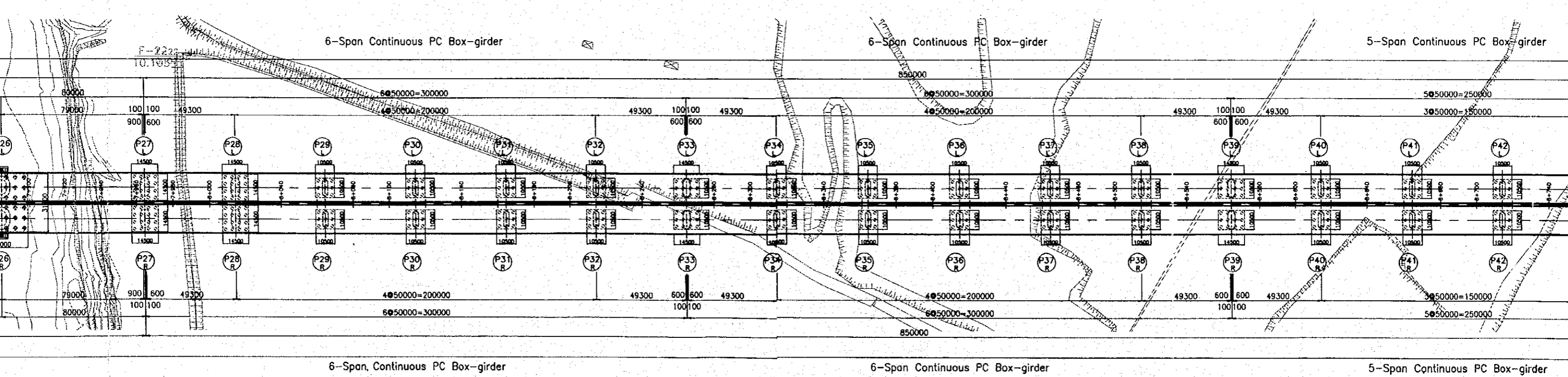
PROFILE - NORTH BOUND BRIDGE

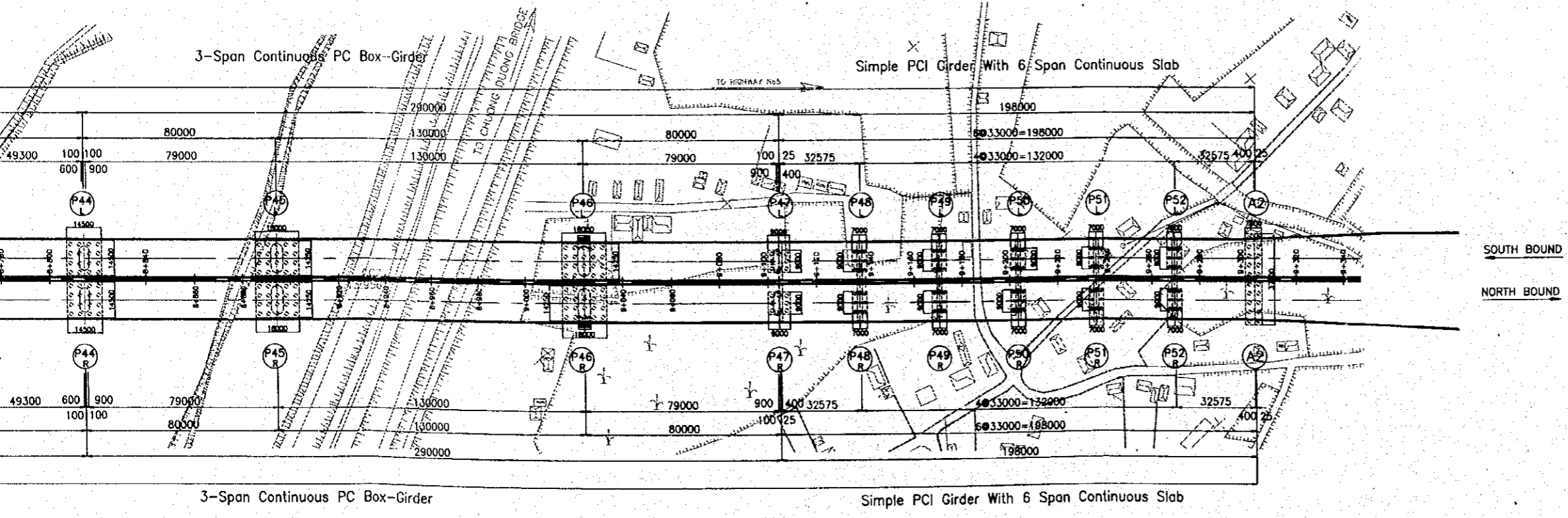
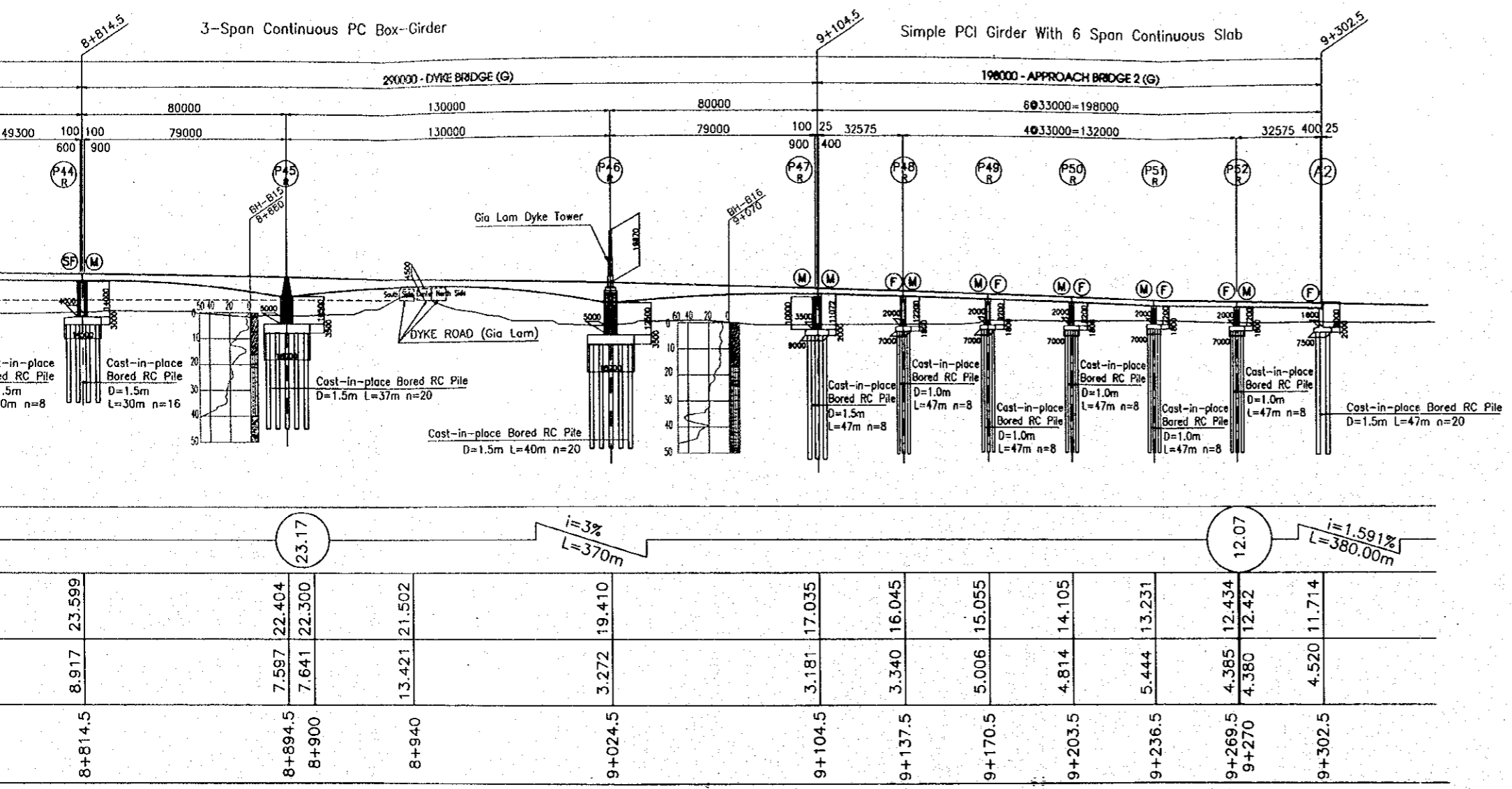




$i=0.689\%$
 $L=1270m$

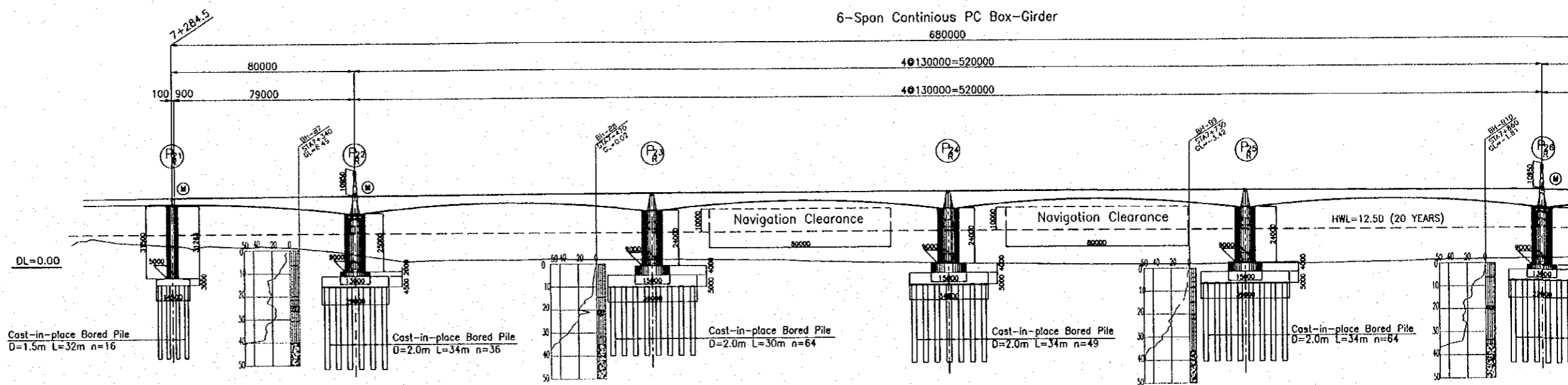
8.794	29.616	9.684	29.272	9.627	28.927	9.504	28.583	9.196	28.238	9.162	27.894	9.194	27.549	8.640	27.204	4.788	26.860	5.002	26.515	8.991	26.171	9.280	25.826	8.955	25.482	8.039	25.137	6.038	24.793	5.659	24.448
7+964.5		8+014.5		8+064.5		8+114.5		8+164.5		8+214.5		8+264.5		8+314.5		8+364.5		8+414.5		8+464.5		8+514.5		8+564.5		8+614.5		8+664.5		8+714.5	



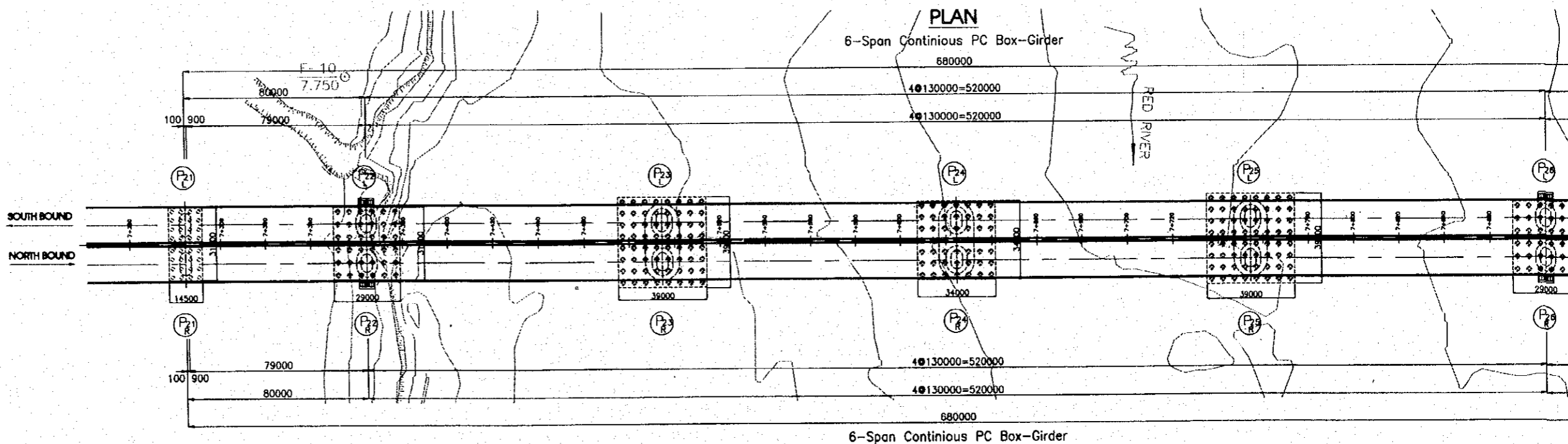


THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM TUANG LONG PROJECTS MANAGEMENT UNIT, MINISTRY OF TRANSPORT	DESIGNED BY NAME S.WATABE
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SIGNATURE
PROJECT RED RIVER BRIDGE (THANH TRI BRIDGE) CONSTRUCTION PROJECT	DATE
CONSULTANT PACIFIC CONSULTANTS INTERNATIONAL	

PROFILE - NORTH BOUND BRIDGE



GRADE	i=0.777% L=825.00m		31.99		i=0.689% L=1270m	
ELEVATION	29.384	29.928	30.519	30.744	30.608	30.106
GROUND HEIGHT	8.567	4.593	1.651	-0.471	-1.366	-0.023
STATION	7+284.5	7+364.5	7+494.5	7+620 7+624.5	7+754.5	7+884.5

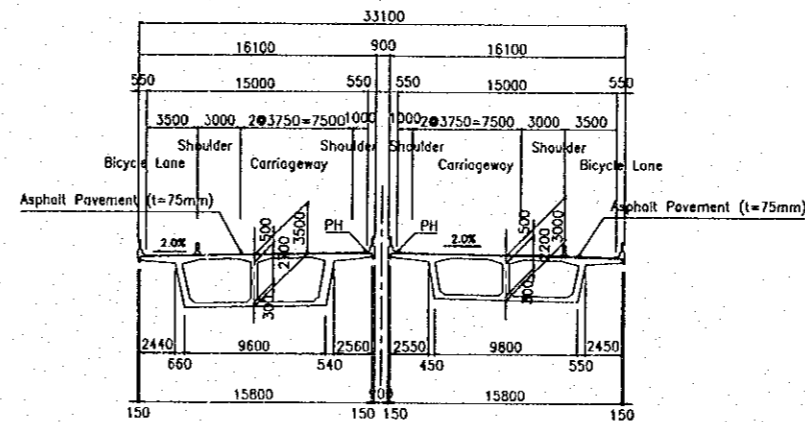


PACKAGE	SCALE	DRAWING No.	SHEET No.
1	1/2000	C-1-1-3	
GENERAL VIEW OF MAIN BRIDGE			

TYPICAL CROSS SECTIONS OF BRIDGE (S=1/500)

TYPICAL CROSS SECTION OF SUPERSTRUCTURE

MIDDLE OF SPAN END SUPPORT
(ON PIER P21L, P21R, P27L, P27R)



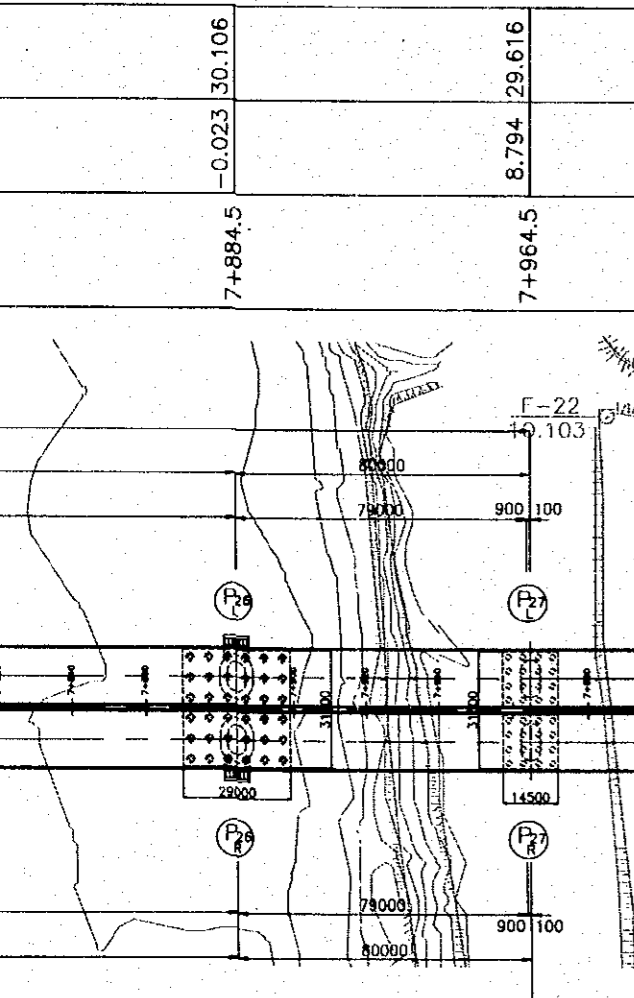
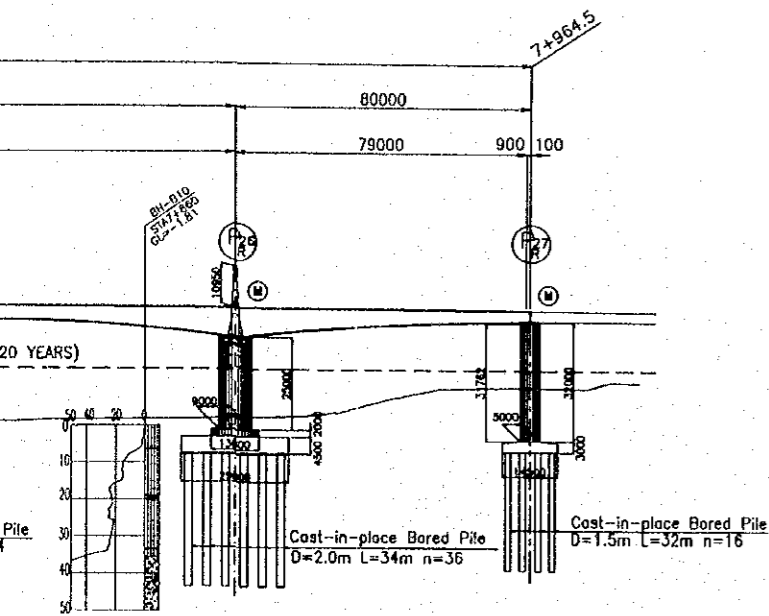
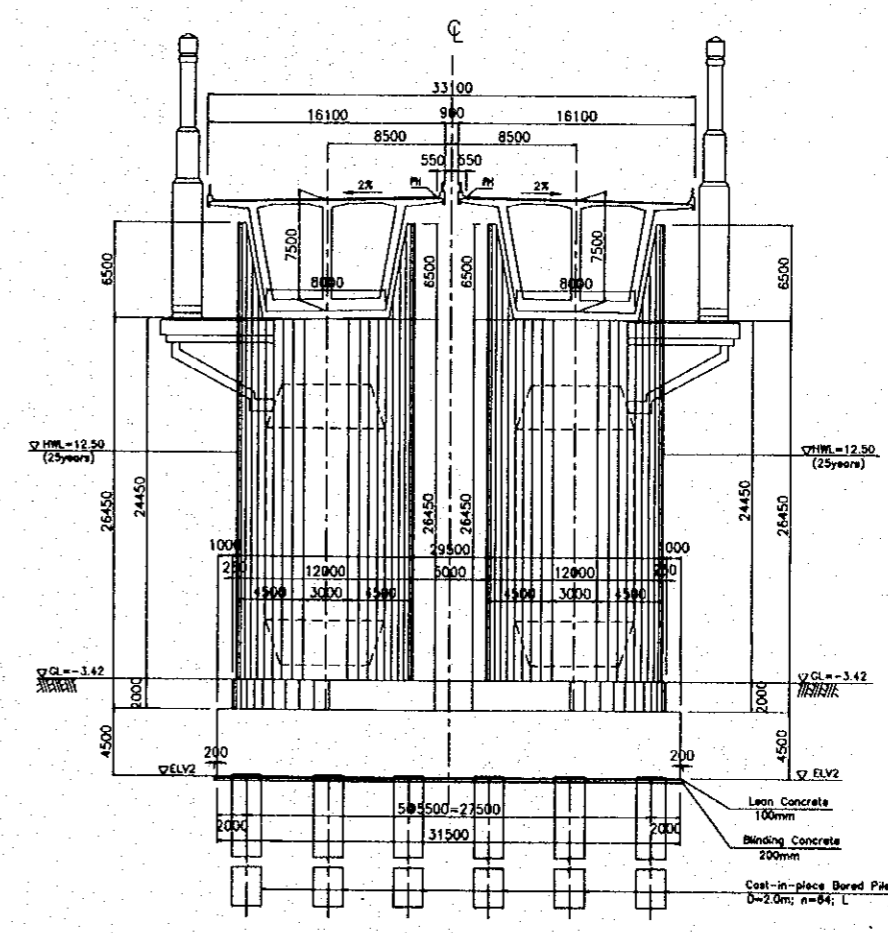
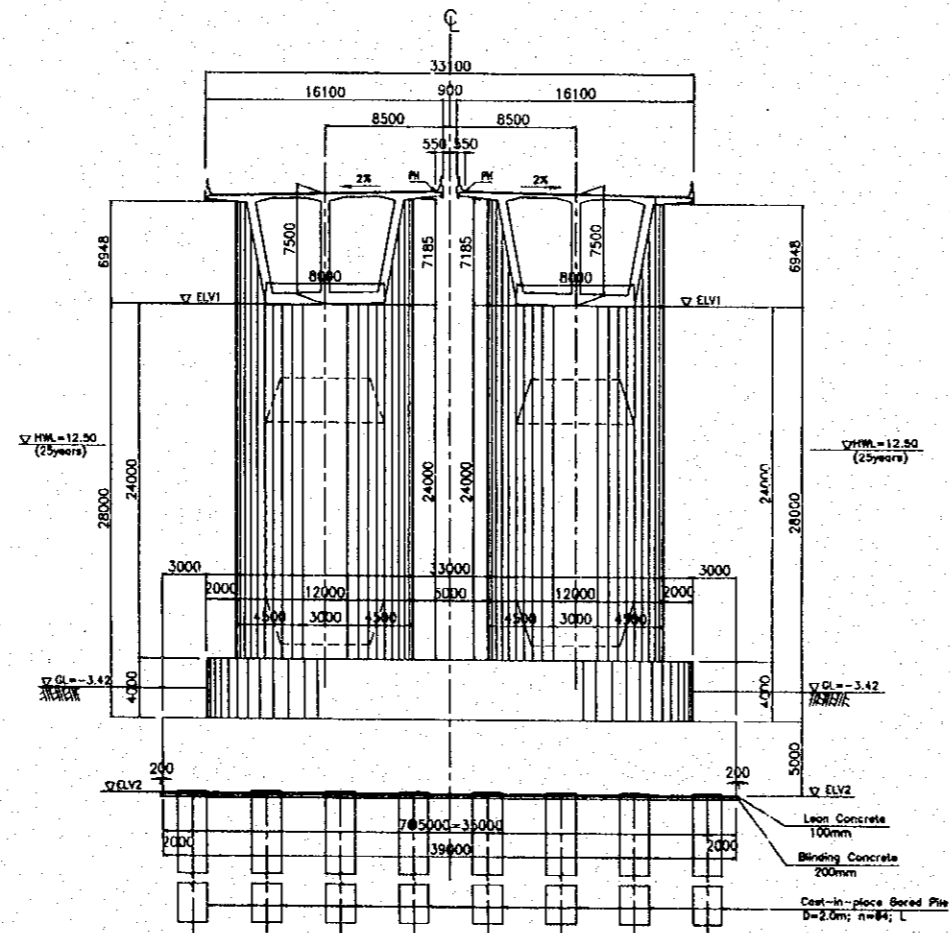
TYPICAL CROSS SECTION OF SUBSTRUCTURE

P23L, P25L (SOUTH BOUND)

P23L, P25L (NORTH BOUND)

R22L, P26L (SOUTH BOUND)

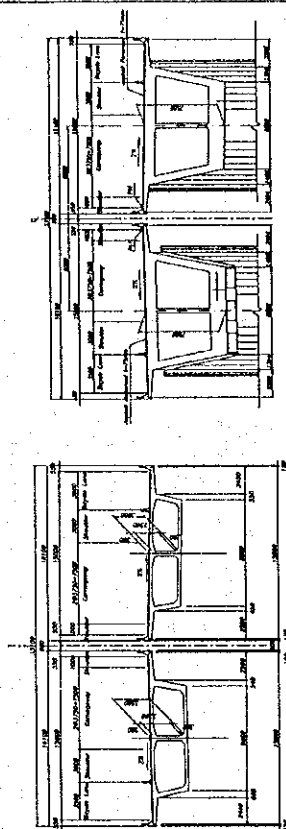
R22R, P26R (NORTH BOUND)



2.2 Superstructure

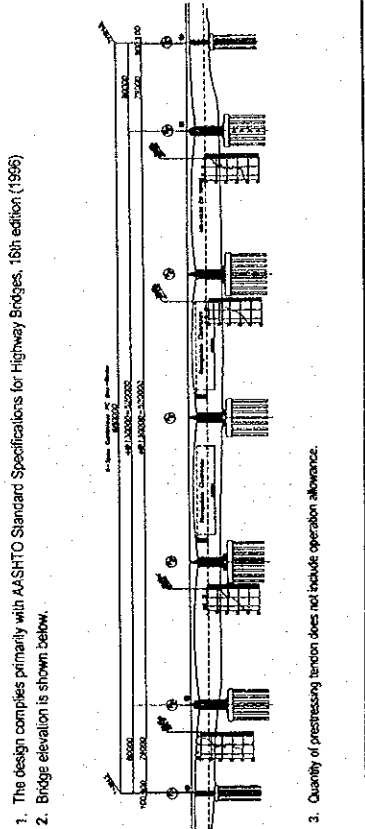
PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name	Red River Bridge Main Bridge		Route	Hnazi No.3 Ring Road	Road Alignment	90 degrees Slew Angle	16.1 m	Seismic Coefficient		0.17
Structural Type	6-span continuous PC box girder		Bridge Length	680.0	Span Arrangement	79.0 + 4@130.0 + 79.0	15.0 m	Effective Width		0.17
Main Girder	Number of Girders	1 nos.	Girder Height	varies (3.0 - 7.5 m)	Maximum Displacement					
	Girder Spacing	2 nos./side span 4 nos./mid-span	Height/Span Ratio	H/L = 1/17.3 (H at support)						
Crossbeam	Number of Crossbeams	2 nos./side span 4 nos./mid-span	Crossbeam Spacing	26.0 m (approximately)	Crossbeam Height	varies				
	Structural Type	Prestressed Concrete Slab	Prestressing Tendon	3T15.2 (SBPR7B)	Tendon Spacing	500 mm				
Design Strength of Concrete	fc = 400 kgf/cm ²		Allowable Stress Increase Coefficient							
	Bending Moment	Slab Depth	Combined Stresses in Concrete							
Canalviated Slab	-12.86 tf.m/m	500	top fiber	7.1	bottom fiber	23.3				
Span Center	5.80 tf.m/m	300	top fiber	49.3	bottom fiber	4.1				
Intermediate Support	-8.66 tf.m/m	500	top fiber	26.4	bottom fiber	7.5				
Design Theory	Beam Theory		Prestressing Tendon	12T15.2 (SBPR7B)						
Construction Method	Cast-in-place Concrete Segment Balanced Cantilever Construction									
Unfactored Bending Moment	Location	immediately after prestressing		allowable stress		at service load				
		combined stress	allowable stress	combined stress	allowable stress					
Center of Side Span	8,571 tf.m	top fiber	kgf/cm ²	135.5	kgf/cm ²	160.0	kgf/cm ²	160.0	kgf/cm ²	160.0
Intermediate Support (Side Span)	-67,916 tf.m	bottom fiber	kgf/cm ²	-4.2	kgf/cm ²	-31.8	kgf/cm ²	-31.8	kgf/cm ²	-31.8
Intermediate Support (Internal)	-94,701 tf.m	top fiber	kgf/cm ²	15.7	kgf/cm ²	-31.8	kgf/cm ²	-31.8	kgf/cm ²	-31.8
Center of Internal Span	13,836 tf.m	bottom fiber	kgf/cm ²	62.8	kgf/cm ²	160.0	kgf/cm ²	160.0	kgf/cm ²	160.0
Shear Force Check Point at End Support	Unfactored Shear Force	833 tf	top fiber	kgf/cm ²	-7.3	kgf/cm ²	-31.8	kgf/cm ²	-31.8	kgf/cm ²
		3,088 tf	bottom fiber	kgf/cm ²	82.3	kgf/cm ²	160.0	kgf/cm ²	160.0	kgf/cm ²
Support Reaction	Factored Shear Force	1,440 tf	top fiber	kgf/cm ²	45.5	kgf/cm ²	160.0	kgf/cm ²	160.0	kgf/cm ²
		4,321 tf	bottom fiber	kgf/cm ²	-8.8	kgf/cm ²	-31.8	kgf/cm ²	-31.8	kgf/cm ²
Dead Load, Rd	Unit	P21 (= P27)	Diagonal Tension Stress		Slump	Vertical Prestressing Tendon				
		tf	847	2-D19@125/web	not provided					
Live Load, Rl	tf	250	2-D19@125/web		732@1,000					
		1,087	2,250#x.3 pot bearing		6,673					
Total Reaction	tf	4,008 x.3 pot bearing	P22 (= P26)		6,096					
		1,087	847	250	575					
Bearing Capacity and Type	tf	4,008 x.3 pot bearing	P22 (= P26)		6,673					
		1,087	847	250	575					



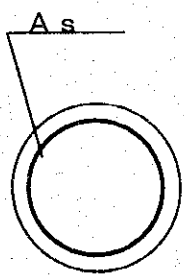
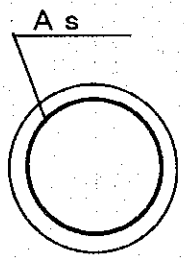
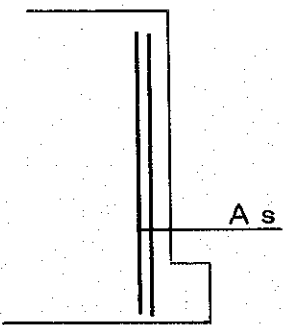
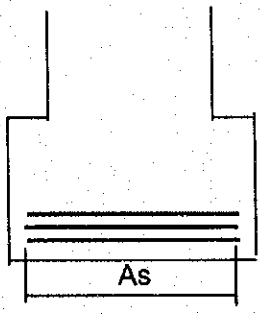
Expansion Joint	Location	Type of Joint	Girder Clearance
		Rubber joint	200 mm

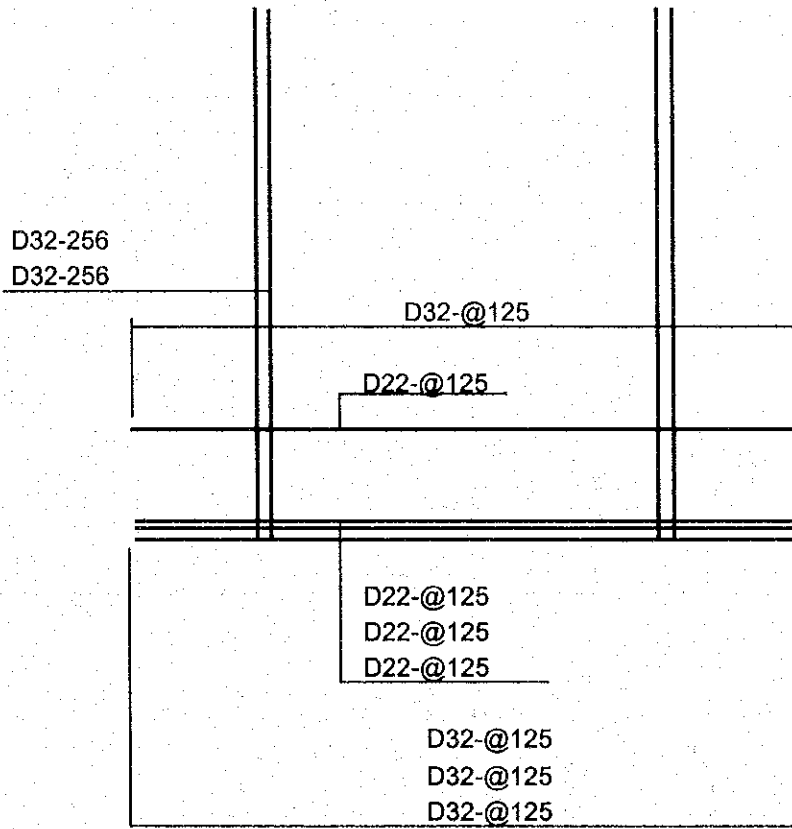
Items	Unit	Specification	Quantity/Bridge	Quantity/m ² of concrete
Concrete	m ³	fc = 400 kgf/cm ²	12,121	—
External Formwork	m ²	—	20,156	1.56 m ² /m ³
Internal Formwork	m ²	—	18,606	1.54 m ² /m ³
Reinforcing Bar	kgf	SD295A (JIS G3112)	1,756,010	144.9 kgf/m ³
longitudinal	kgf	12T15.2 (SBPR7B)	419,085	34.5 kgf/m ³
transverse (deck slab)	kgf	3T15.2 (SBPR7B)	70,889	5.84 kgf/m ³
transverse (crossbeam)	kgf	232mm bar (SBPP930M180)	18,402	1.52 kgf/m ³
Total	kgf	—	508,386	—



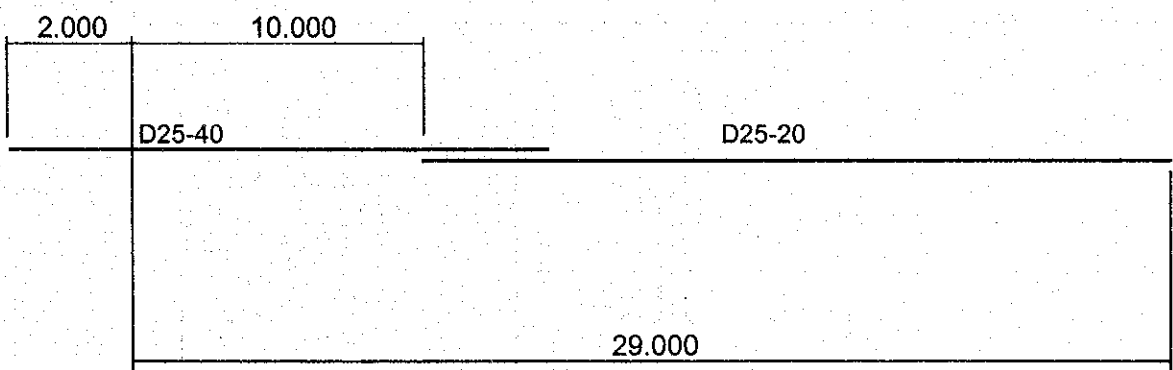
1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)
 2. Bridge elevation is shown below.
 3. Quantity of prestressing tendon does not include operation allowance.

2.3 Substructure
MAIN BRIDGE
P22

Number of Pile	36		
Pile Length (m)	34.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	0.00	< 1.5
	Earthquake	0.42	< 1.5
Bearing Capacity (tf)	Usual	908	< 1,036
	Earthquake	1,413	< 1,581
Pile		As= D25-40	2,338 < 2,700
		As= D25-20	---- < 2,700
Column		As= D32-256 D32-256 (@125)	776 < 2,700
Footing		As = D32@125 D32@125 D32@125	2,375 < 2,700

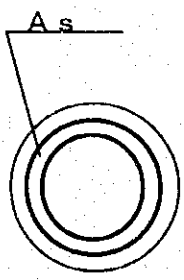
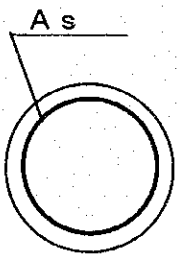
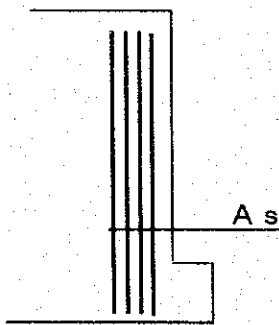
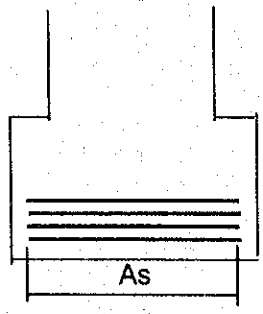


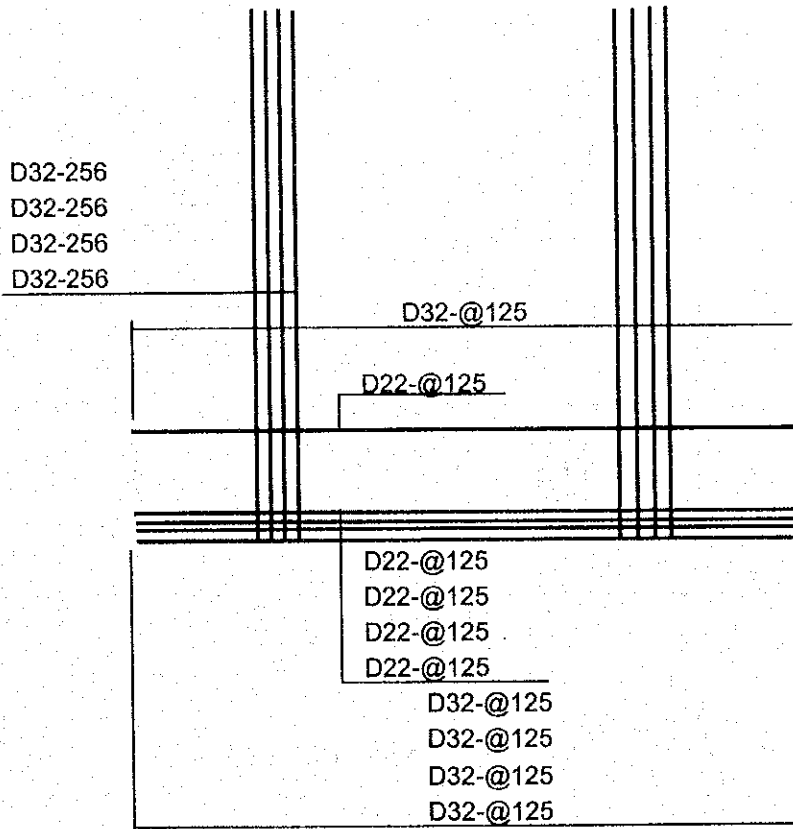
Pile



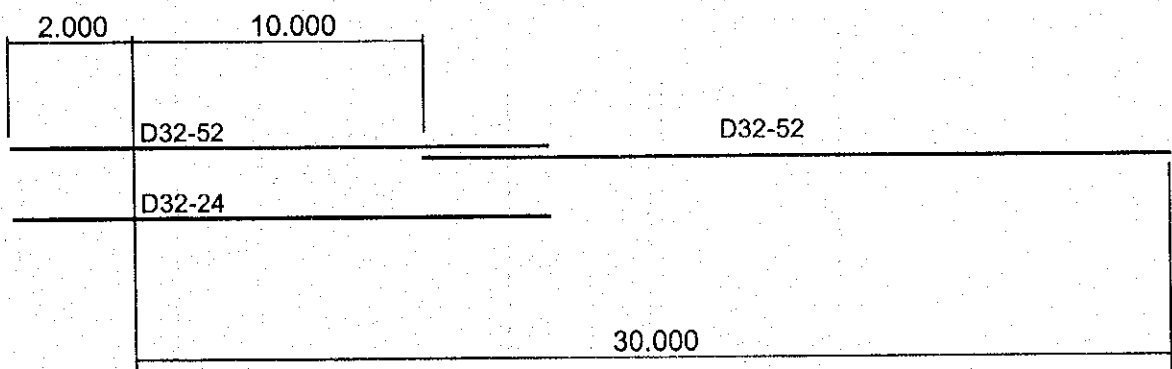
MAIN BRIDGE

P23

Number of Pile	49		
Pile Length (m)	30.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	0.46 <	1.5
	Earthquake	0.84 <	1.5
Bearing Capacity (tf)	Usual	969 <	1,033
	Earthquake	1,328 <	1,578
Pile		As= D32-52 D32-24	2,580 < 2,700
		As= D32-52	----- < 2,700
Column		As= D32-256 D32-256 D32-256 D32-256 (@125)	2,520 < 2,700
Footing		As = D32@125 D32@125 D32@125 D32@125	2,695 < 1,800

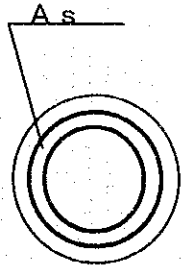
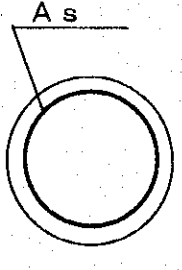
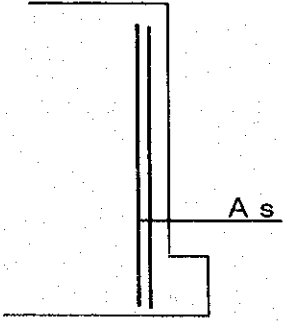
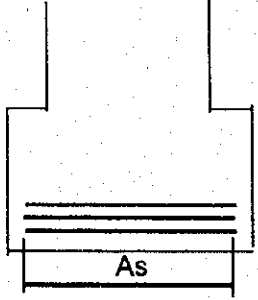


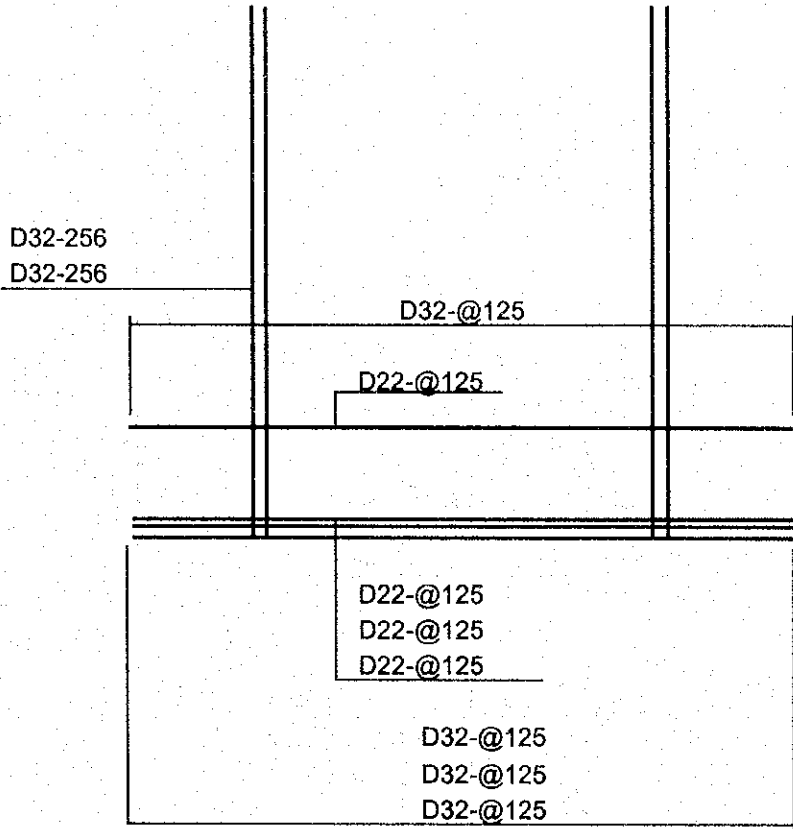
Pile



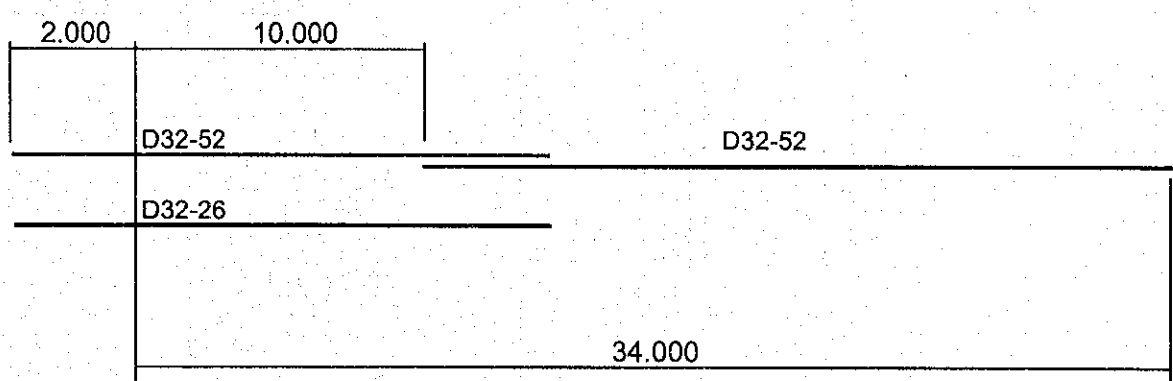
MAIN BRIDGE

P24

Number of Pile	49		
Pile Length (m)	34.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	0.14	< 1.5
	Earthquake	1.07	< 1.5
Bearing Capacity (tf)	Usual	852	< 971
	Earthquake	1,362	< 1,489
Pile		<p>As= D32-52 D32-26</p>	<p>1,866 < 2,700</p>
		<p>As= D32-52</p>	<p>---- < 2,700</p>
Column		<p>As= D32-256 D32-256 (@125)</p>	<p>1,953 < 2,700</p>
Footing		<p>As = D32@125 D32@125 D32@125</p>	<p>2,571 < 1,800</p>

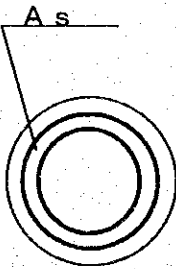
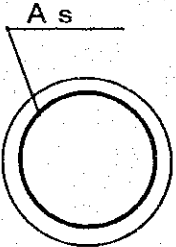
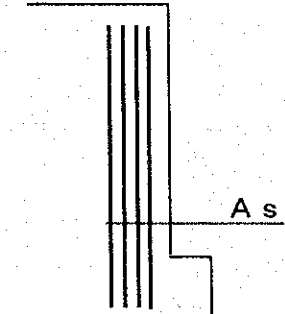
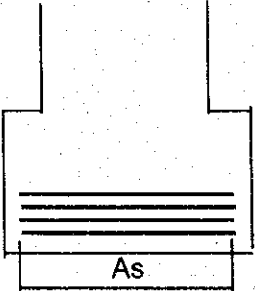


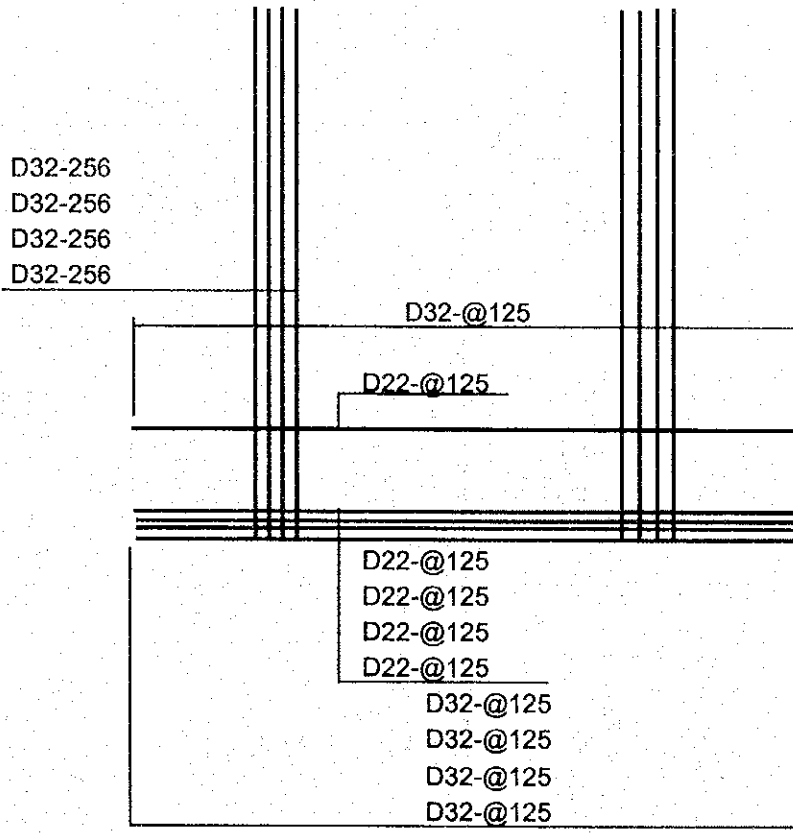
Pile



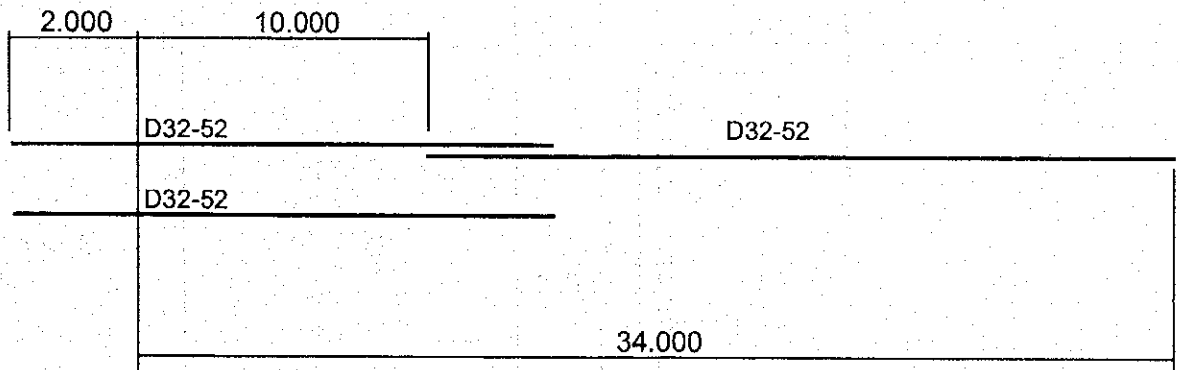
MAIN BRIDGE

P25

Number of Pile	64		
Pile Length (m)	34.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	0.67	< 1.5
	Earthquake	1.23	< 1.5
Bearing Capacity (tf)	Usual	975	< 976
	Earthquake	1,341	< 1,496
Pile		As= D32-52 D32-52	2,141 < 2,700
		As= D32-52	----- < 2,700
Column		As= D32-256 D32-256 D32-256 D32-256 (@125)	2,520 < 2,700 (Refer to P23)
Footing		As = D32@125 D32@125 D32@125 D32@125	2,690 < 2,700

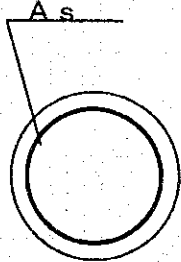
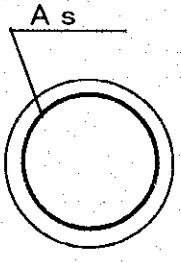
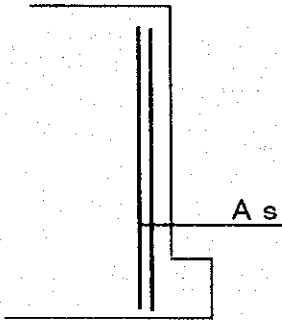
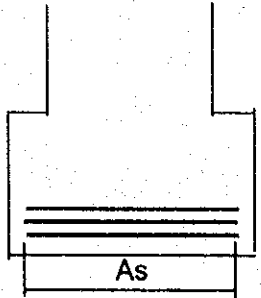


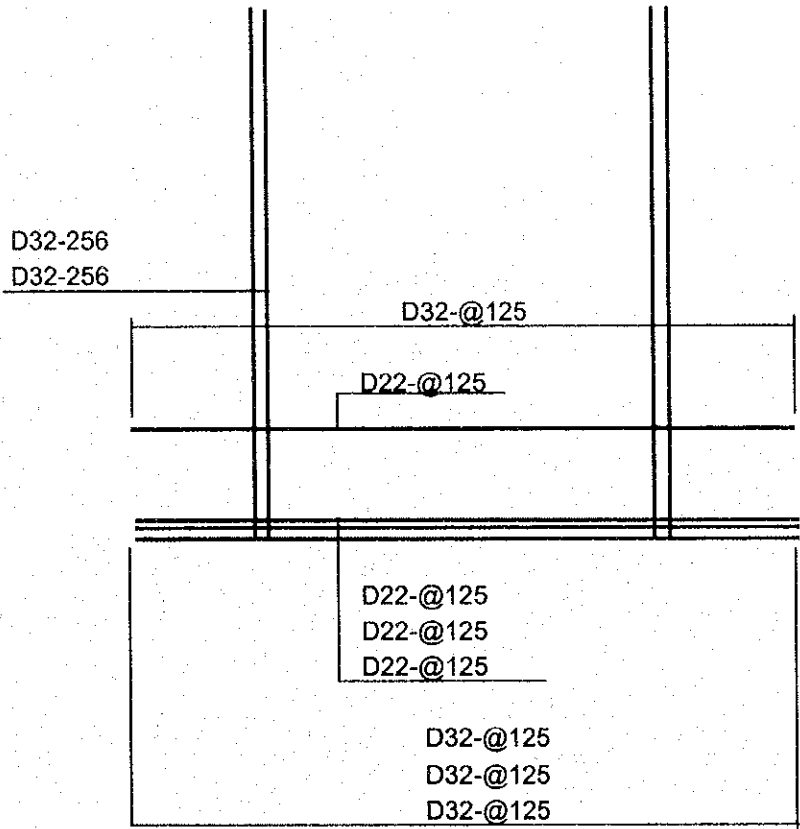
Pile



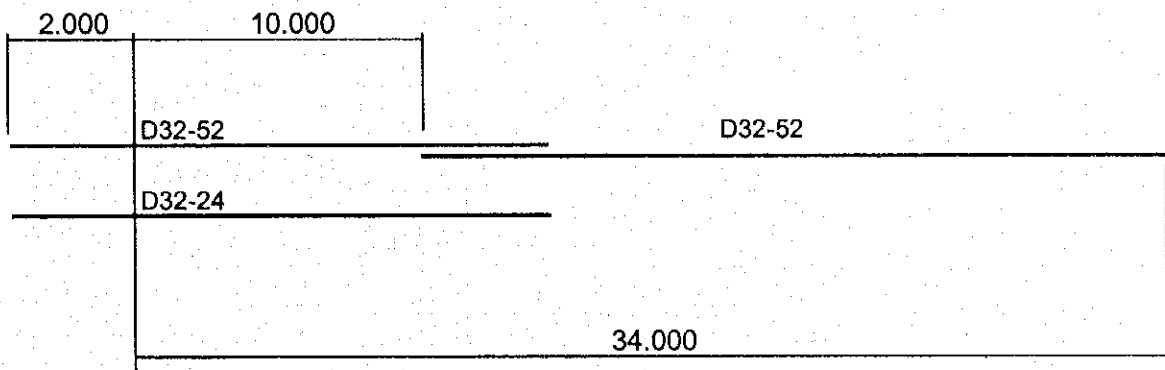
MAIN BRIDGE

P26

Number of Pile	36		
Pile Length (m)	34.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	0.00	< 1.5
	Earthquake	0.52	< 1.5
Bearing Capacity (tf)	Usual	908	< 1,042
	Earthquake	1,424	< 1,578
Pile		As= D29-40	2,283 < 2,700
		As= D29-20	----- < 2,700
Column		As= D32-256 D32-256 (@125)	776 < 2,700 (Refer to P22)
Footing		As = D32@125 D32@125 D32@125	2,375 < 1,800 (Refer to P22)



Pile

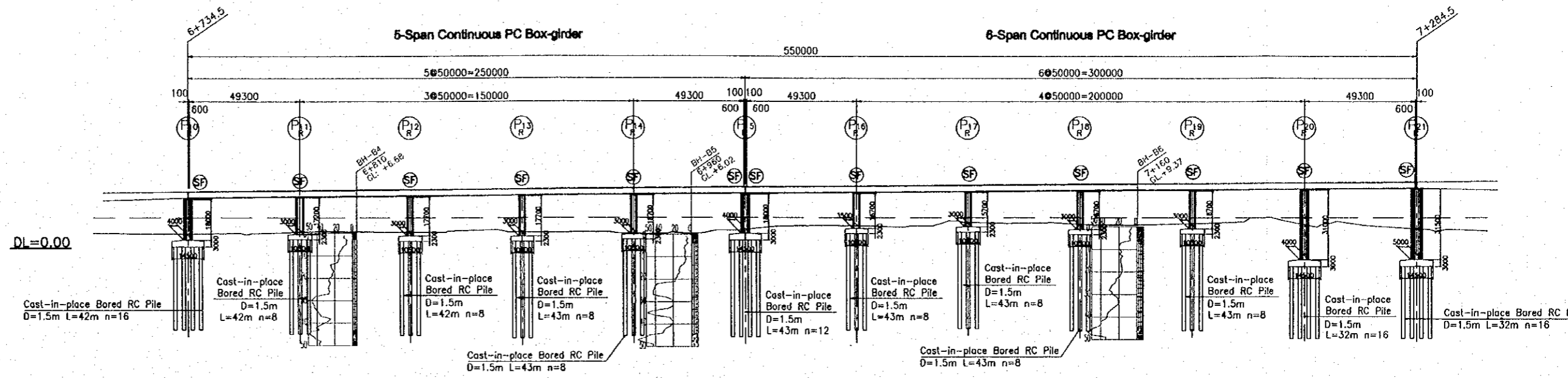


3. RED RIVER BRIDGE

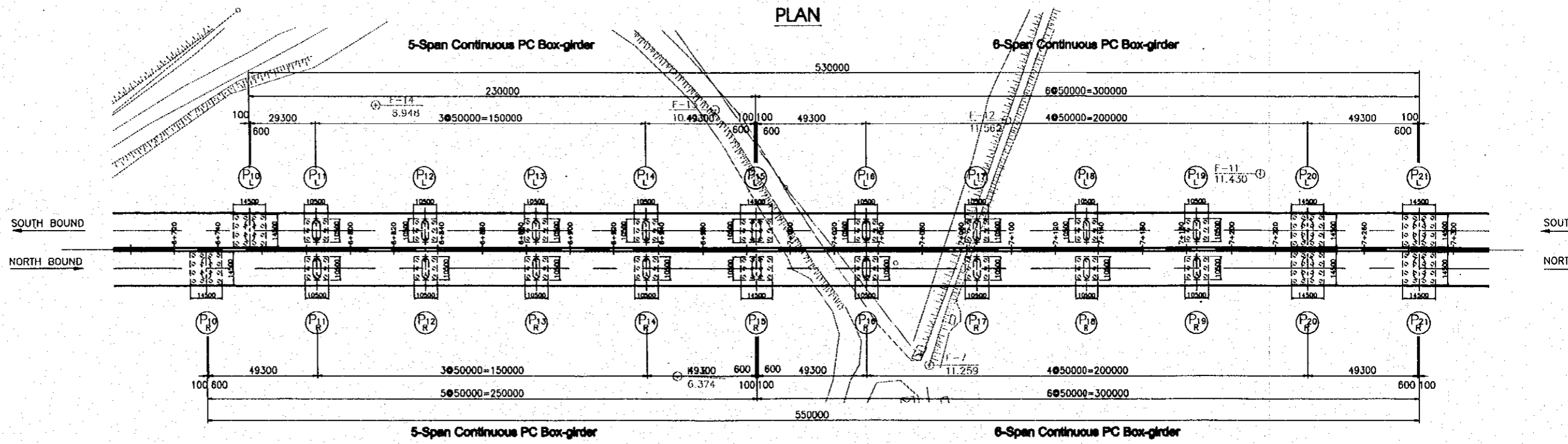
Approach Bridge 1

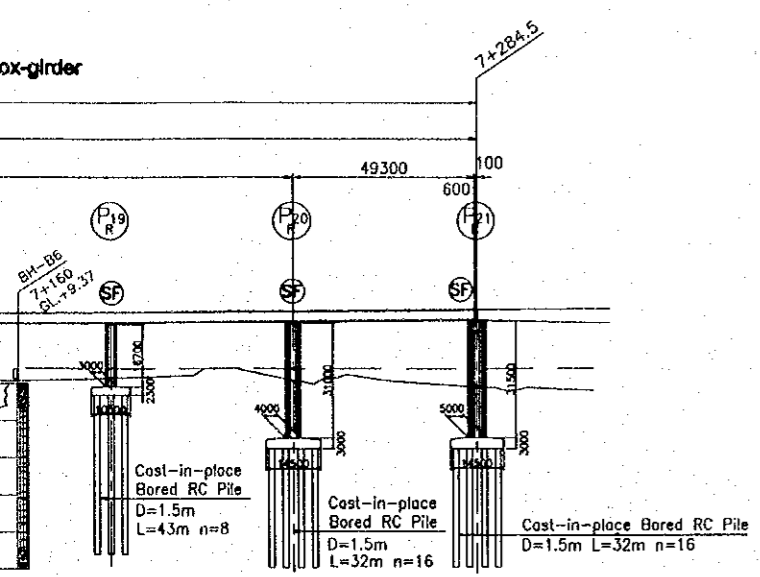
THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM THANG LONG PROJECTS MANAGEMENT UNIT, MINISTRY OF TRANSPORT		DESIGNED BY	S. WATABE
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		NAME	
PROJECT	RED RIVER BRIDGE (THANH TRI BRIDGE) CONSTRUCTION PROJECT	SIGNATURE	
COORDINATOR	PACIFIC CONSULTANTS INTERNATIONAL	DATE	

PROFILE - NORTH BOUND BRIDGE

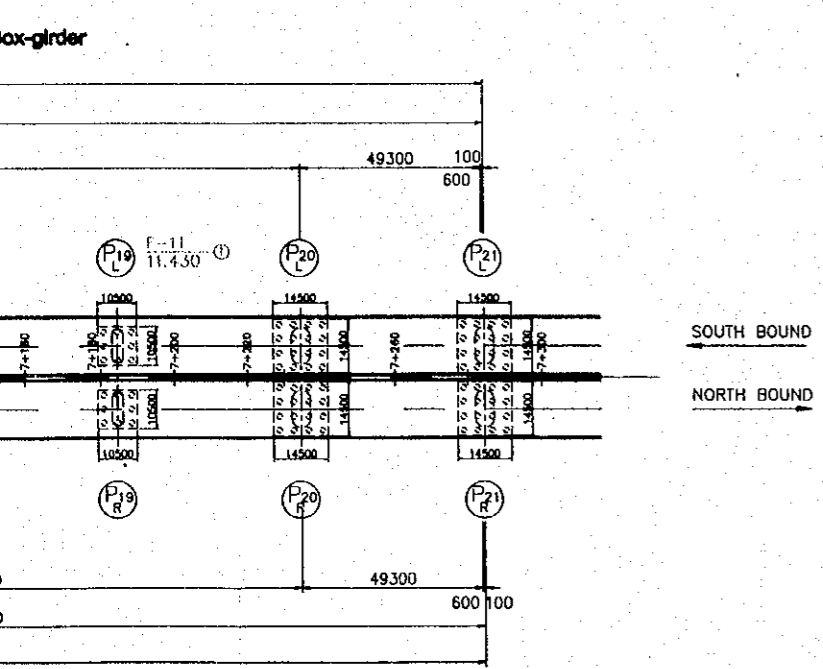


GRADE													
ELEVATION	24.988	25.212	25.496	25.888	26.277	26.665	27.054	27.442	27.830	28.219	28.607	28.996	29.384
GROUND HEIGHT	6.529	6.690	7.133	7.125	7.139	6.484	8.219	9.802	11.331	10.454	10.885	10.358	8.567
STATION	6+734.5	6+754.5	6+784.5	6+834.5	6+884.5	6+934.5	6+984.5	7+034.5	7+084.5	7+134.5	7+184.5	7+234.5	7+284.5



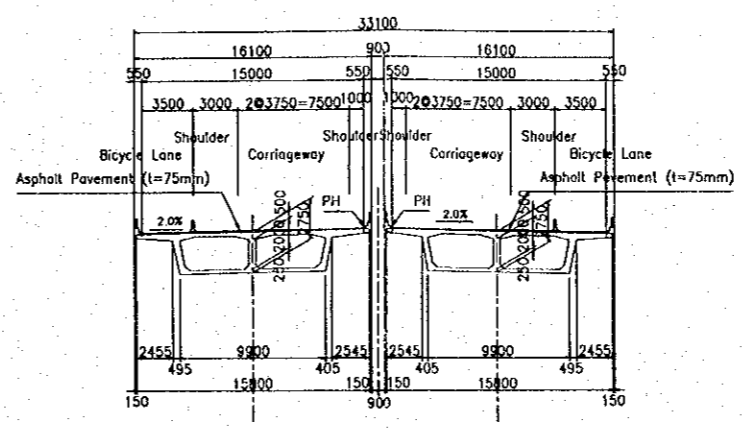


10.885	28.607	10.358	28.996	8.567	29.384
7+184.5		7+234.5		7+284.5	

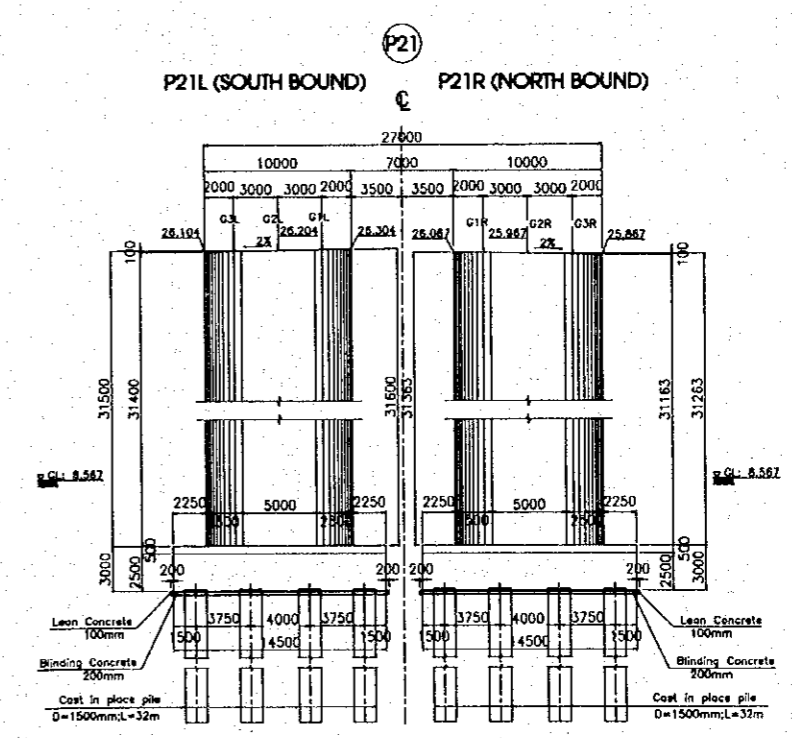
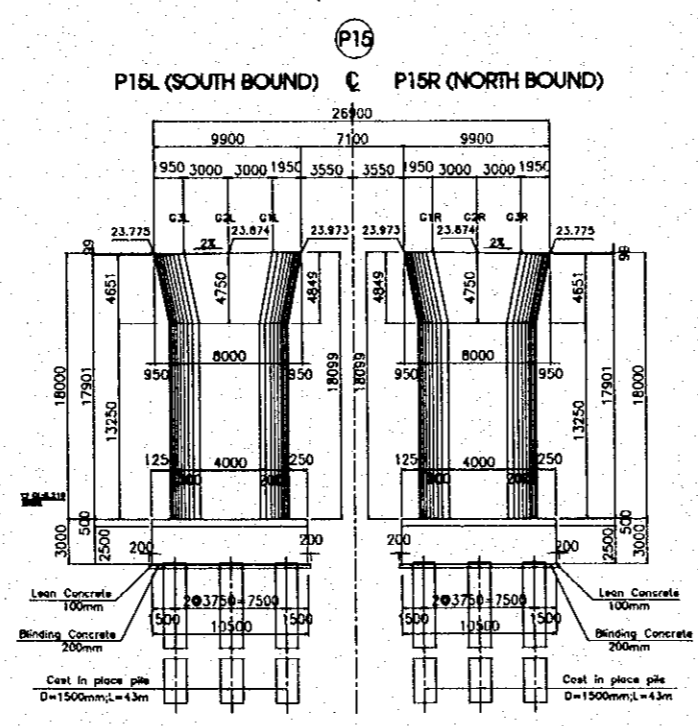


TYPICAL CROSS SECTIONS OF BRIDGE (S=1/500)

TYPICAL CROSS SECTION OF SUPERSTRUCTURE

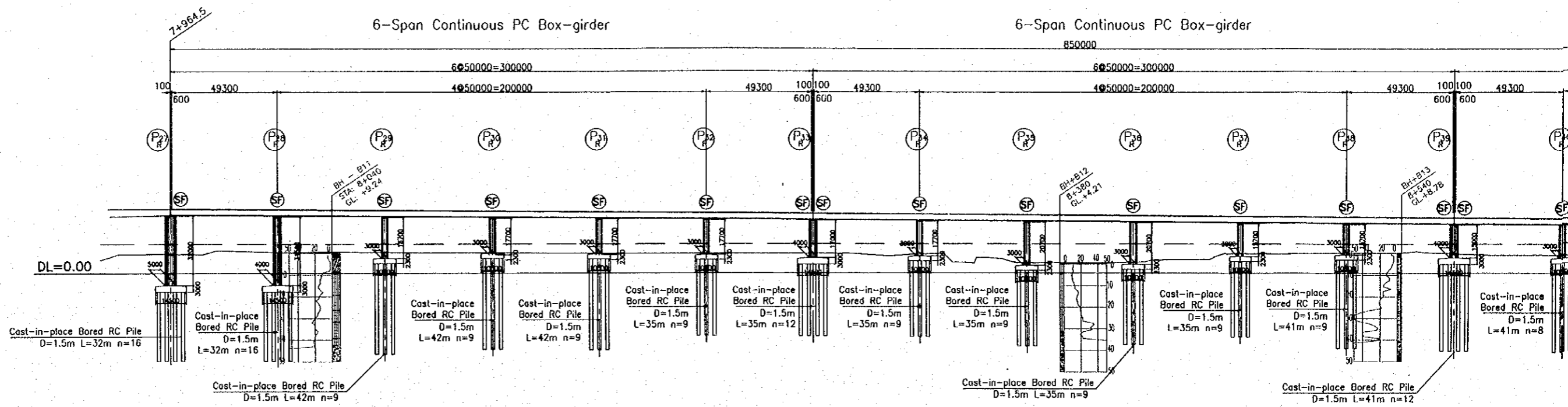


TYPICAL CROSS SECTION OF SUBSTRUCTURE



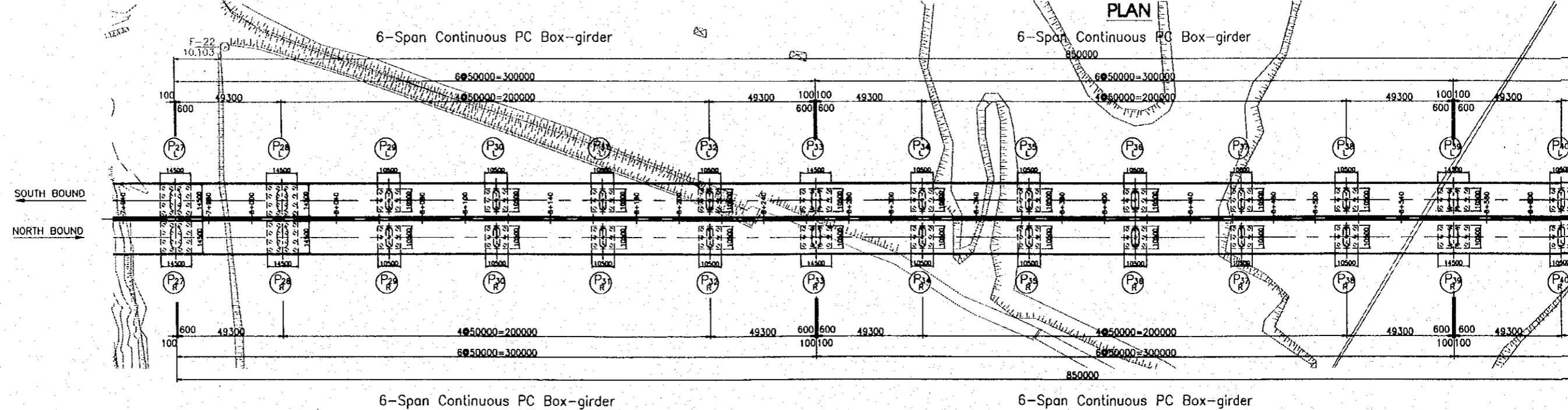
THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM THANG LONG PROJECTS MANAGEMENT UNIT, MINISTRY OF TRANSPORT	DESIGNED BY NAME S. WATABE
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SIGNATURE
PROJECT RED RIVER BRIDGE (THANH TRI BRIDGE) CONSTRUCTION PROJECT	DATE
CONSULTANT PACIFIC CONSULTANTS INTERNATIONAL	

PROFILE - NORTH BOUND BRIDGE

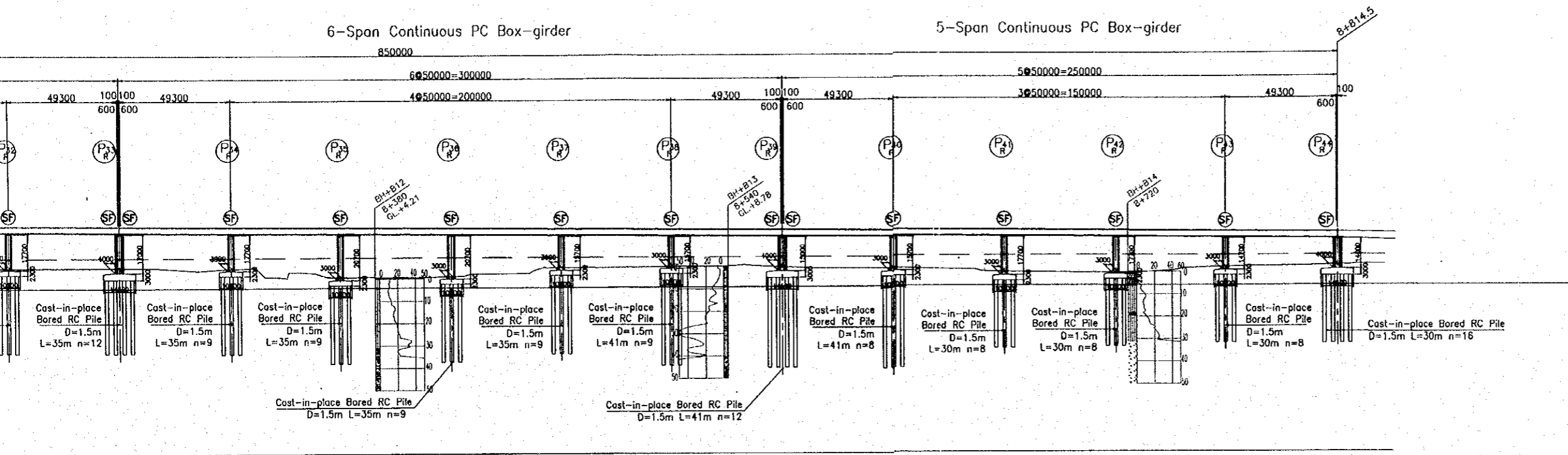


GRADE														
ELEVATION	29.616	29.272	28.927	28.583	28.238	27.894	27.549	27.204	26.860	26.515	26.171	25.826	25.482	25.137
GROUND HEIGHT	8.794	9.684	9.627	9.504	9.196	9.162	9.194	8.640	4.788	5.002	8.991	9.280	8.955	8.039
STATION	7+964.5	8+014.5	8+064.5	8+114.5	8+164.5	8+214.5	8+264.5	8+314.5	8+364.5	8+414.5	8+464.5	8+514.5	8+564.5	8+614.5

I=0.689%
L=1270m

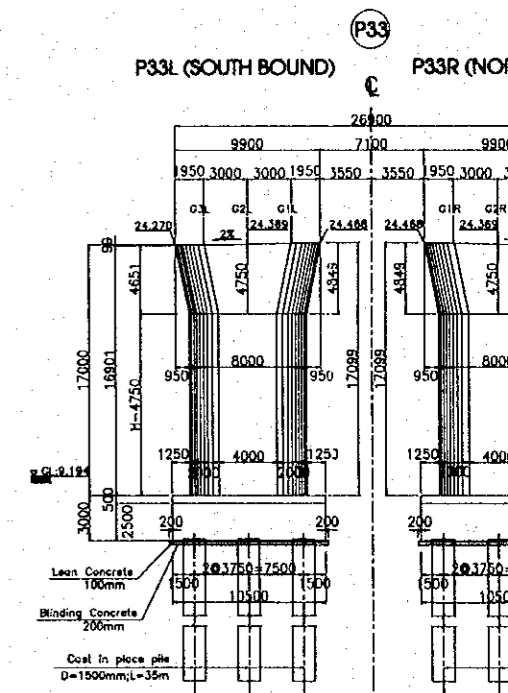
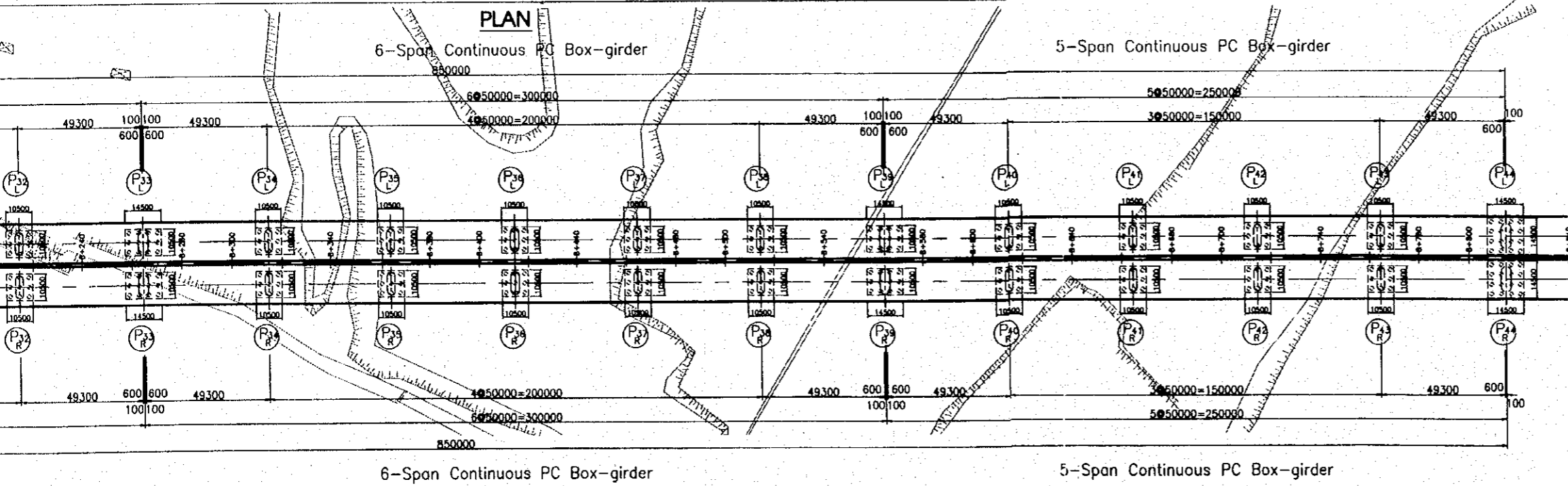


PROFILE - NORTH BOUND BRIDGE



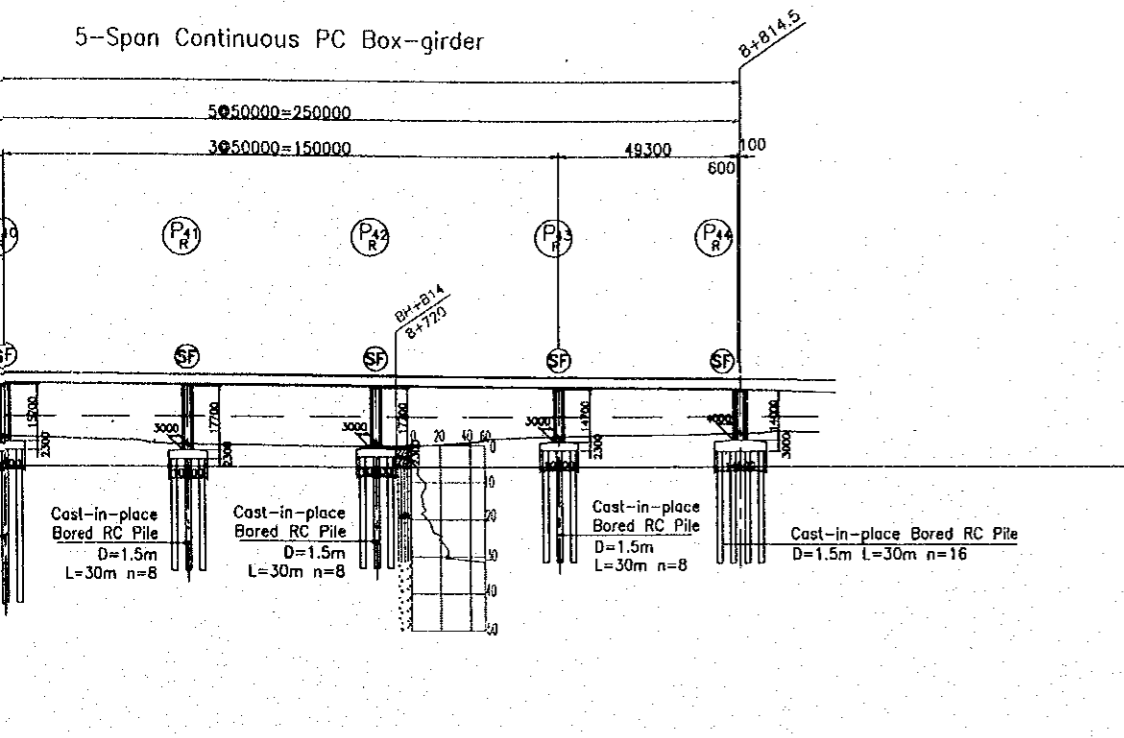
$I=0.689\%$
 $L=1270m$

8+214.5	8+264.5	8+314.5	8+364.5	8+414.5	8+464.5	8+514.5	8+564.5	8+614.5	8+664.5	8+714.5	8+764.5	8+814.5
9.162	9.194	8.640	4.788	5.002	8.991	9.280	8.955	8.039	6.038	5.659	8.083	8.917
27.894	27.549	27.204	26.860	26.515	26.171	25.826	25.482	25.137	24.793	24.448	24.096	23.599



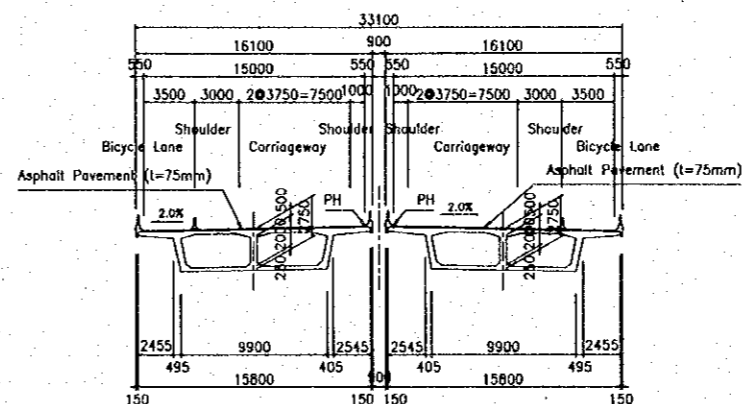
SOUTH BOUND
NORTH BOUND

5-Span Continuous PC Box-girder

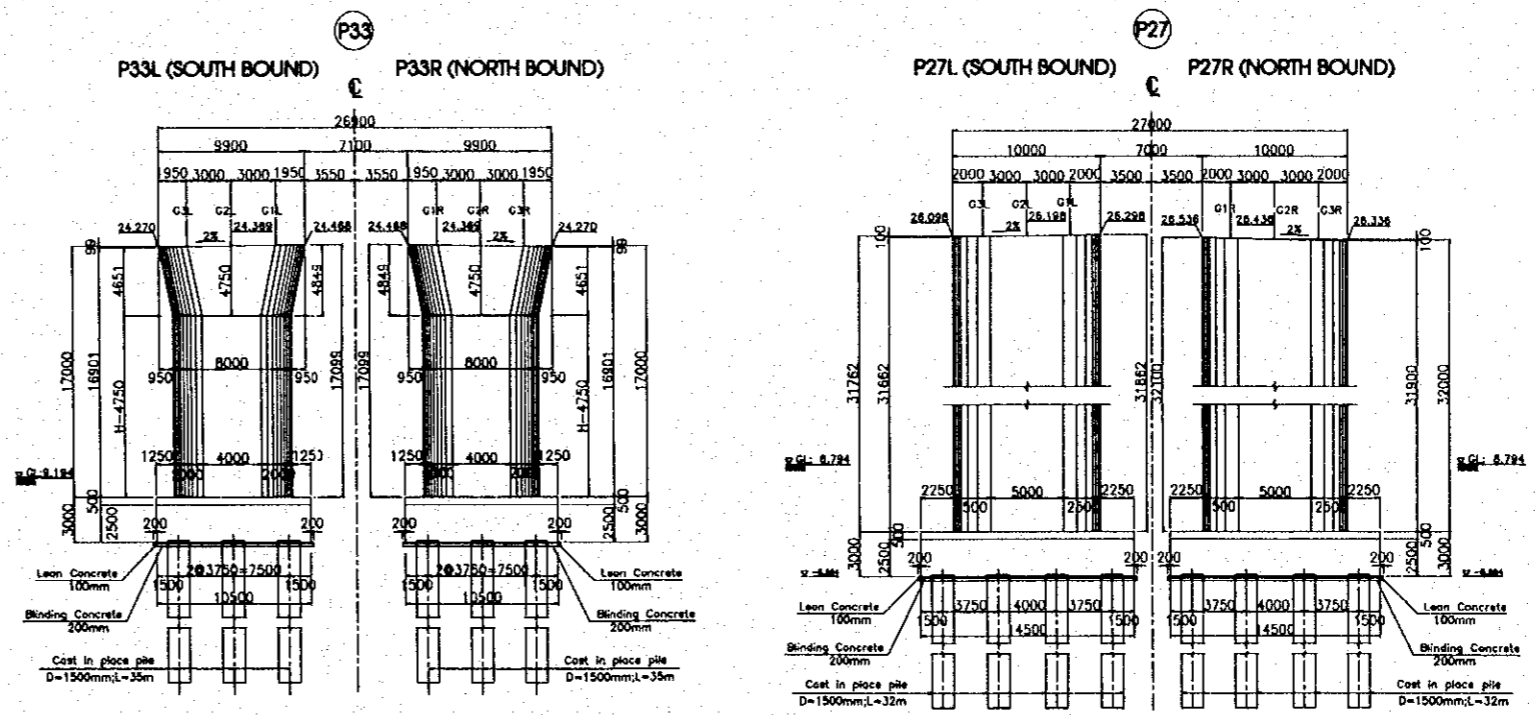


TYPICAL CROSS SECTIONS OF BRIDGE
(S=1/500)

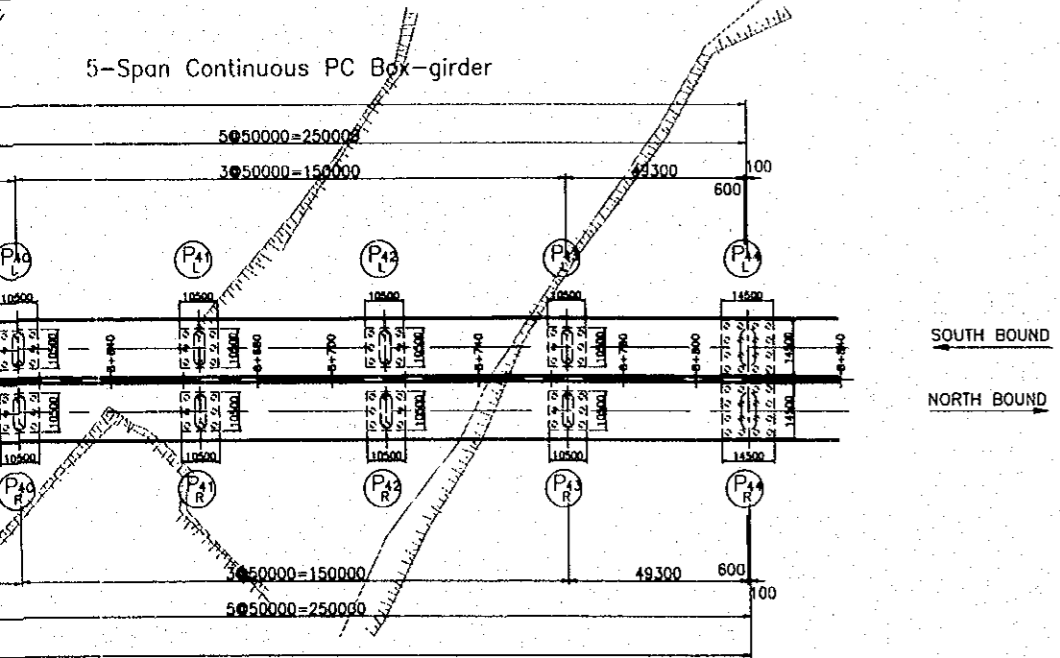
TYPICAL CROSS SECTION OF SUPERSTRUCTURE



TYPICAL CROSS SECTION OF SUBSTRUCTURE

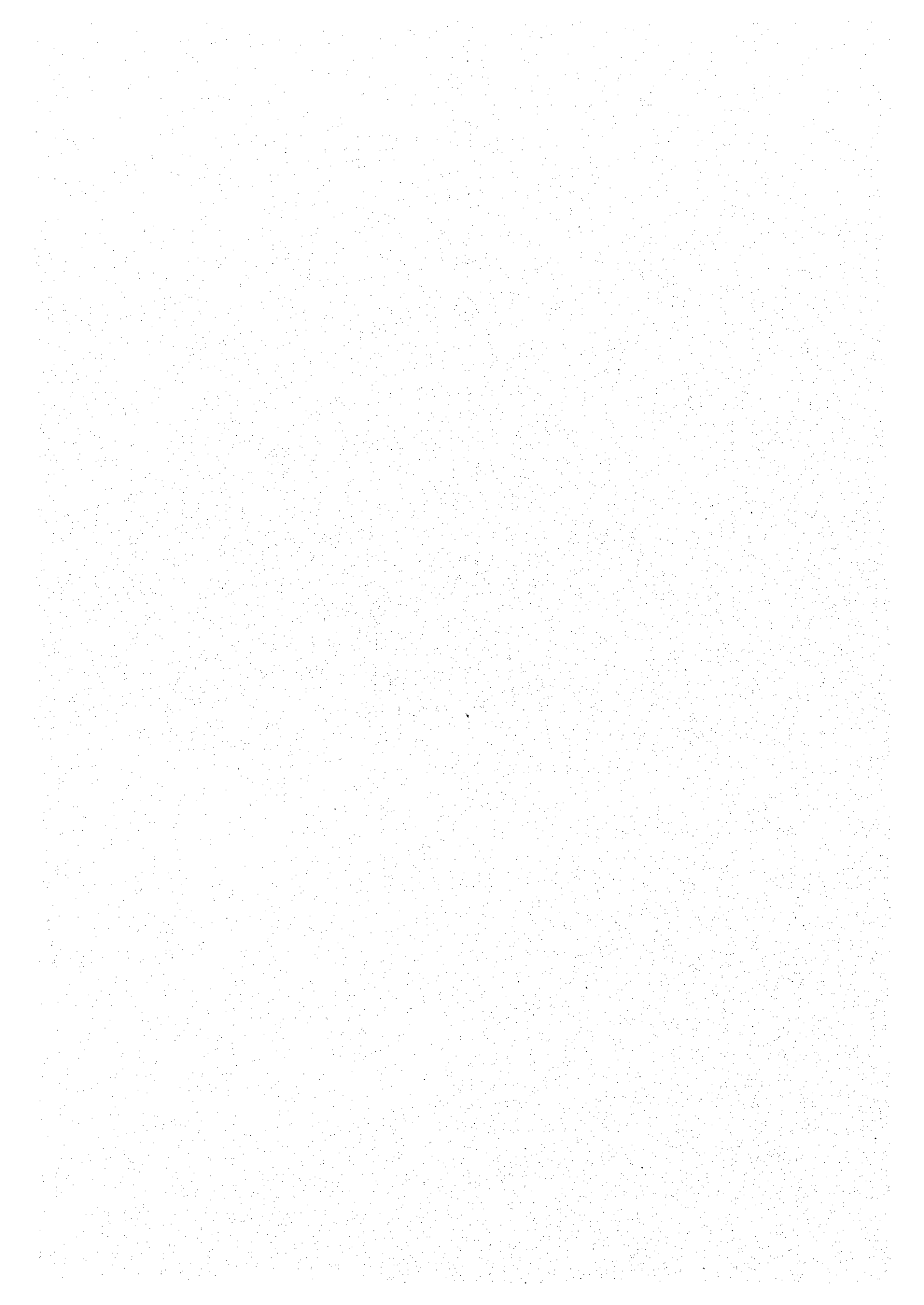


5-Span Continuous PC Box-girder



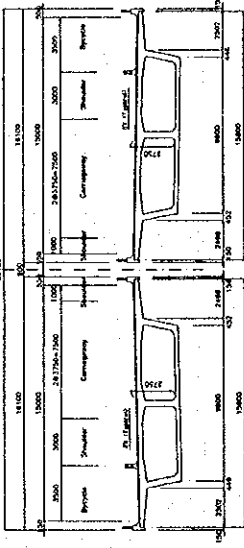
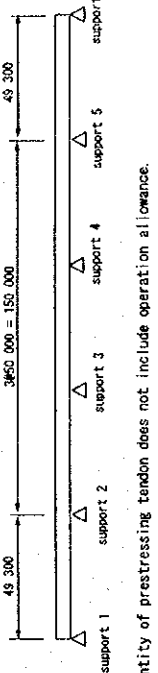
SOUTH BOUND
NORTH BOUND

5-Span Continuous PC Box-girder



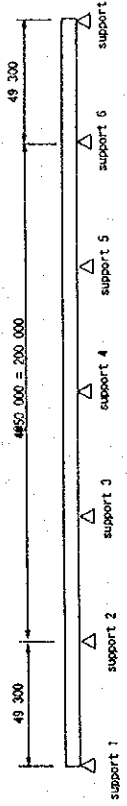
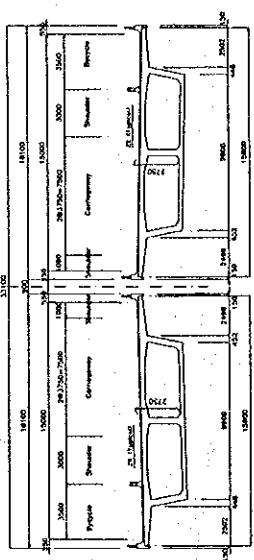
3.2 Superstructure

PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name	Red River Bridge Approach Bridge 1: Type A		Route		Hanoi No. 3 Ring Road		Road Alignment		Skew Angle		90 degrees		Roadway Width		Total Width		Seismic Coefficient		longitudinal		transverse	
Structural Type	5-span continuous PC box girder		Bridge Length		250.0 m		Span Arrangement		49.3 + 3650.0 + 49.3		16.1 m		Effective Width		15.0 m		0.17		0.17		0.17	
Main Girder	Number of Girders		1 nos.		Girder Height		2.75 m		Maximum Displacement		mm (1/-)		Cross-section									
Crossbeam	Number of Crossbeams		2 nos./span		Height/Span Ratio		HL = 1/18.2 (constant girder height)		Crossbeam Height		2.0 m											
Structural Type	Prestressed Concrete Slab		Prestressing tendon		3T15.2 (SBPR7B)		Tendon Spacing		500 mm													
Design Strength of Concrete	f _c = 400 kgf/cm ²		Allowable Stress Increase Coefficient																			
Bending Moment	Slab Depth		Combined Stresses in Concrete																			
Cancelled Slab	-12.86 tf.m/m		500 mm		top fiber		7.1 kgf/cm ²		bottom fiber		23.3 kgf/cm ²											
Span Center	5.80 tf.m/m		300 mm		top fiber		49.3 kgf/cm ²		bottom fiber		4.1 kgf/cm ²											
Intermediate Support	-6.66 tf.m/m		500 mm		top fiber		26.4 kgf/cm ²		bottom fiber		7.5 kgf/cm ²											
Design Theory	Beam Theory		Prestressing Tendon		12T15.2 (SBPR7B)																	
Construction Method	Cast-in-place Concrete		Span-by-span Construction																			
Unfactored Bending Moment	Location		Immediately after prestressing		at service load		allowable stress															
Center of Side Span	8.282 tf.m		top fiber		combined stress		62.1 kgf/cm ²		160.0 kgf/cm ²													
Intermediate Support (Side Span)	-8.951 tf.m		bottom fiber		combined stress		1.8 kgf/cm ²		-31.8 kgf/cm ²													
Intermediate Support (Internal)	-6.616 tf.m		top fiber		combined stress		0.4 kgf/cm ²		-31.8 kgf/cm ²													
Center of Internal Span	6.222 tf.m		bottom fiber		combined stress		64.9 kgf/cm ²		160.0 kgf/cm ²													
Shear Force Check Point at End Support	730 tf		1.061 tf		Diagonal Tension Stress		2.8 kgf/cm ²		-31.8 kgf/cm ²													
Support Reaction at Internal Support	1.226 tf		1.744 tf		Vertical Prestressing tendon		46.3 kgf/cm ²		160.0 kgf/cm ²													
Dead Load, Rd	tf		746		Stirrup		2-D16@125/web		not provided													
Live Load, Rl	tf		132		Diagonal Tension Stress		2.190		263													
Total Reaction	tf		878		Diagonal Tension Stress		2.481		2.223													
Bearing Capacity and Type	tf		300tf x 3 elastomeric bearing		Diagonal Tension Stress		150tf x 3 elastomeric bearing		800tf x 3 elastomeric bearing													
Expansion Joint	Location		P10R, P44R and P44L		Type of Joint		Rubber joint		Girder Clearance		200 mm											
Items	Unit		Specification		Quantity/Bridge		Quantity/m ² of concrete															
Concrete	m ³		f _c = 400 kgf/cm ²		3.257		-															
External Formwork	m ²		-		5,001		1.54 m ² /m ³															
Internal Formwork	m ²		-		4,991		1.53 m ² /m ³															
Reinforcing Bar	kgf		SD295A (JIS G3112)		378,633		116.0 kgf/m ³															
longitudinal	kgf		12T15.2 (SBPR7B)		90,510		27.8 kgf/m ³															
transverse (deck slab)	kgf		3T15.2 (SBPR7B)		25,512		7.8 kgf/m ³															
transverse (crossbeam)	kgf		4T15.2 (SBPR7B)		2,660		0.82 kgf/m ³															
Total	kgf		-		118,683		-															
<p>1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)</p> <p>2. Nomenclature of supports are as follows.</p>  <p>3. Quantity of prestressing tendon does not include operation allowance.</p>																						

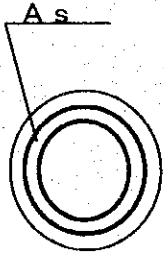
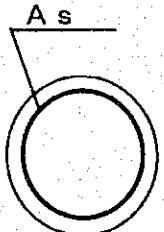
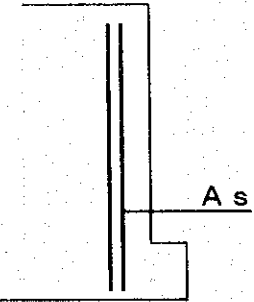
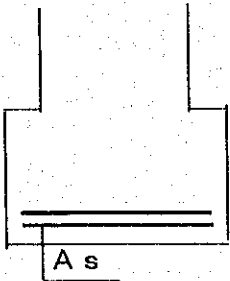
PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

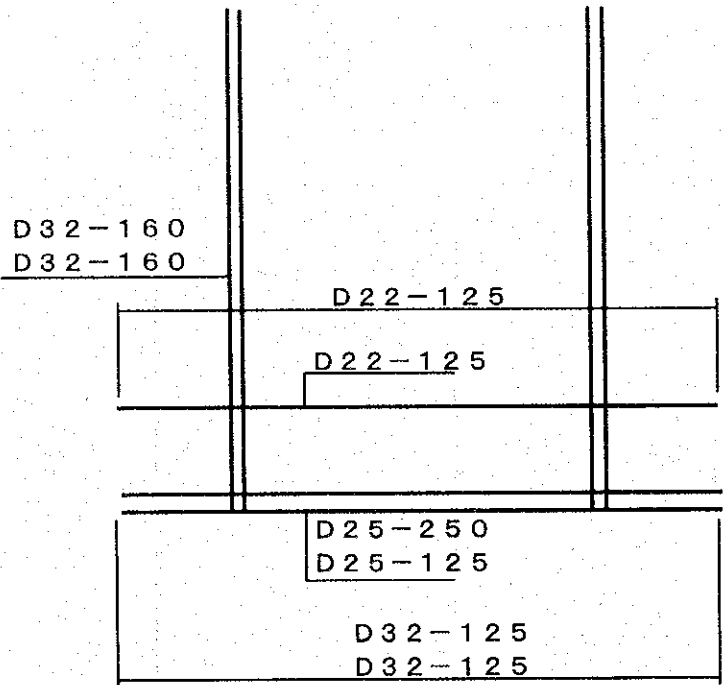
Bridge Name	Red River Bridge Approach Bridge 1, Type C		Route	Highway No. 3 Ring Road	Road Alignment	skew Angle	90 degrees	Roadway Width	Total Width	Seismic Coefficient	longitudinal	0.17									
Structural Type	6-span continuous PC box girder		Bridge Length	300.0 m	Span Arrangement	49.3 + 49.0 + 49.3	Effective Width						15.0 m	transverse	0.17						
Main Girder	Number of Girders	1 nos.	Girder Height	2.75 m	Maximum Displacement																
	Girder Spacing	-	Height/Span Ratio	H/L = 1/18.2 (constant girder height)																	
Crossbeam	Number of Crossbeams	2 nos./span	Crossbeam Spacing	3115.2 (SBRP7B)	Tendon Spacing	500 mm															
	Structural Type	Prestressed Concrete Slab																			
Design Strength of Concrete	f'c = 400 kgf/cm ²		Allowable Stress Increase Coefficient																		
	Combined Stresses in Concrete																				
Deck Slab Design	Bending Moment		Slab Depth		Prestressing Tendon								12T15.2 (SBRP7B)								
	Cantilevered Slab	-12.86 tf.m/m	500 mm	Top fiber	7.1 kgf/cm ²	bottom fiber	22.3 kgf/cm ²														
	Span Center	5.80 tf.m/m	300 mm	Top fiber	49.3 kgf/cm ²	bottom fiber	4.1 kgf/cm ²														
Intermediate Support	-6.66 tf.m/m	500 mm	Top fiber	26.4 kgf/cm ²	bottom fiber	7.5 kgf/cm ²															
Design Theory	Beam Theory		Prestressing Tendon										12T15.2 (SBRP7B)								
Construction Method	Cast-in-place Concrete Span-by-span Construction																				
Design of Main Girder	Unfactored Bending Moment		Location		Immediately after prestressing		at service load														
	Center of Side Span	8,292 tf.m	Top fiber	combined stress	allowable stress	combined stress	allowable stress														
			Bottom fiber	kgf/cm ²	kgf/cm ²	kgf/cm ²	kgf/cm ²														
	Intermediate Support (Side Span)	-8,951 tf.m	Top fiber	kgf/cm ²	kgf/cm ²	kgf/cm ²	kgf/cm ²														
			Bottom fiber	kgf/cm ²	kgf/cm ²	kgf/cm ²	kgf/cm ²														
	Intermediate Support (Internal)	-6,616 tf.m	Top fiber	kgf/cm ²	kgf/cm ²	kgf/cm ²	kgf/cm ²														
			Bottom fiber	kgf/cm ²	kgf/cm ²	kgf/cm ²	kgf/cm ²														
	Center of Internal Span	6,222 tf.m	Top fiber	kgf/cm ²	kgf/cm ²	kgf/cm ²	kgf/cm ²														
			Bottom fiber	kgf/cm ²	kgf/cm ²	kgf/cm ²	kgf/cm ²														
	Shear Force Check Point at End Support	730 tf	Unfactored Shear Force	Factored Shear Force		Diagonal Tension Stress		Stirrup		Vertical Prestressing Tendon											
1,226 tf			1,061 tf	1,744 tf	2-D10@125/web	2-D10@125/web	not provided														
Support Reaction	Unit	Support 1 (= Support 6)	Support 2 (= Support 5)	Support 3 (= Support 4)																	
Dead Load, Rd	tf	746	2,190	1,960																	
Live Load, Rl	tf	132	291	263																	
Total Reaction	tf	878	2,481	2,223																	
Bearing Capacity and Type		300tf x 3 elastomeric bearing	850tf x 3 elastomeric bearing	800tf x 3 elastomeric bearing																	
Expansion Joint												Location		Type of Joint		Girder Clearance					
Right & Left of P15, P21, P27, P33 and P39												Rubber joint		200 mm							
Items												Unit		Specification		Quantity/bridge		Quantity/1m ² of concrete			
Concrete												m ³		f'c = 400 kgf/cm ²		3,910		-			
External Formwork												m ²		-		6,001		1.53 m ² /m ²			
Internal Formwork												m ²		-		5,989		1.53 m ² /m ²			
Reinforcing Bar												kgf		SD295A (JIS G3112)		454,948		116.4 kgf/m ³			
longitudinal												kgf		12T15.2 (SBRP7B)		106,492		27.2 kgf/m ³			
transverse (deck slab)												kgf		3T15.2 (SBRP7B)		30,635		7.9 kgf/m ³			
transverse (crossbeam)												kgf		4T15.2 (SBRP7B)		3,192		0.82 kgf/m ³			
Total												kgf		-		140,319		-			
Remarks												<p>1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996).</p> <p>2. Nomenclature of supports are as follows.</p> <p>3. Quantity of prestressing tendon does not include operation allowance.</p>									



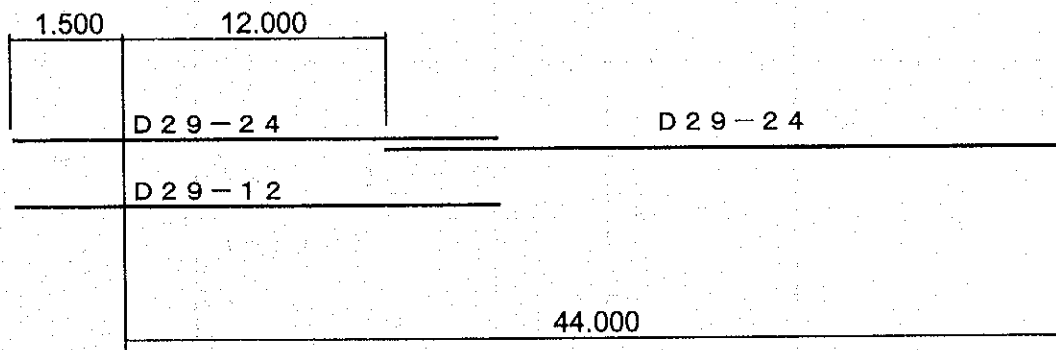
3.3 Substructure

APPROACH BRIDGE-1 THANH TRI SIDE
Pier P10-P15

Number of Pile	16		
Pile Length (m)	44.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.016	< 1.5
	Earthquake	0.856	< 1.5
Bearing Capacity (tf)	Usual	324	< 983
	Earthquake	721	< 1,402
Pile		As = D 29 - 24 D 29 - 12	2,450 < 2,700
		As = D 29 - 24	2,622 < 2,700
Column		As = D 32 - 160 D 32 - 160 (@ 125)	2,460 < 2,700
Footing		As = D25@125 D25@250	2,140 < 2,700

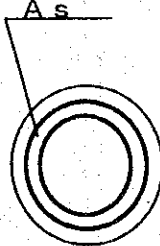
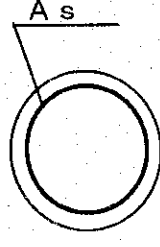
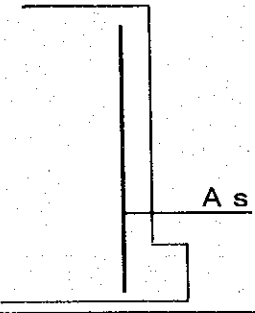
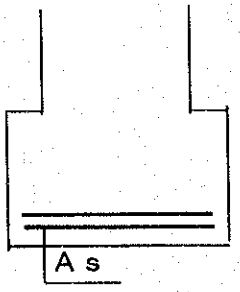


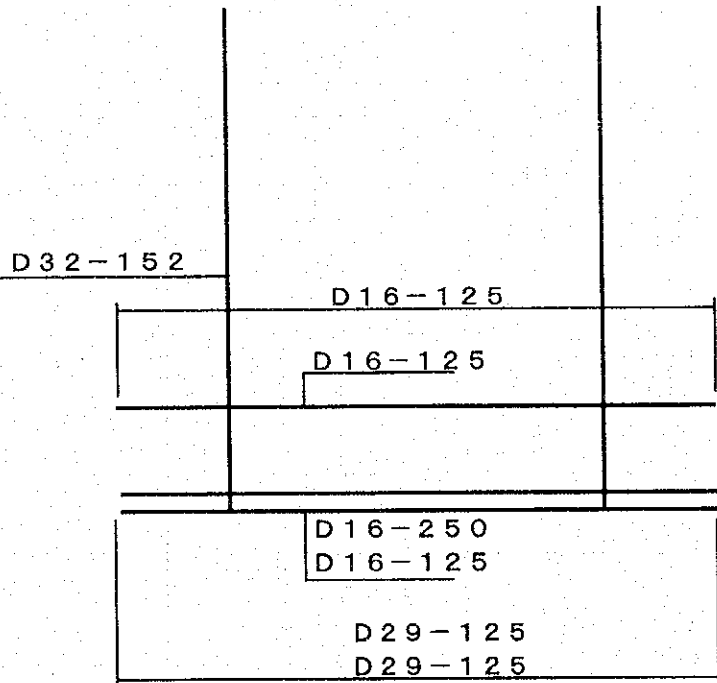
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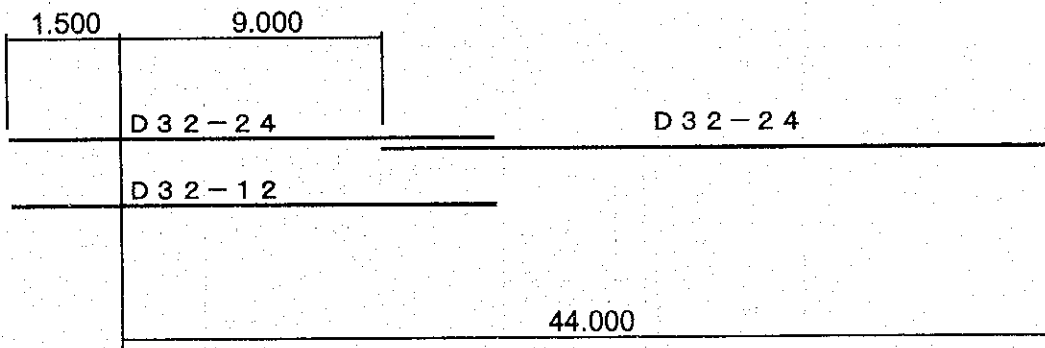
APPROACH BRIDGE-1 THANH TRI SIDE

Pier P11~P14, P16~P19

Number of Pile	8		
Pile Length (m)	44.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.741	< 1.5
Bearing Capacity (tf)	Usual	496	< 1,037
	Earthquake	1,098	< 1,537
Pile		As = D 32 - 24 D 32 - 12	2,175 < 2,700
		As = D 32 - 24	2,170 < 2,700
Column		As = D 32 - 152 (@ 125)	2,272 < 2,700
Footing		As = D16@125 D16@250	----- < 1,600

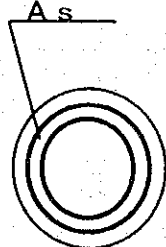
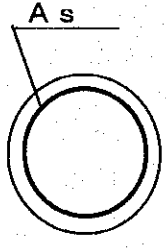
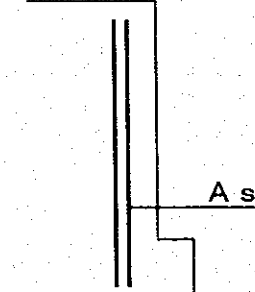
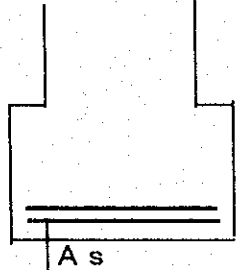


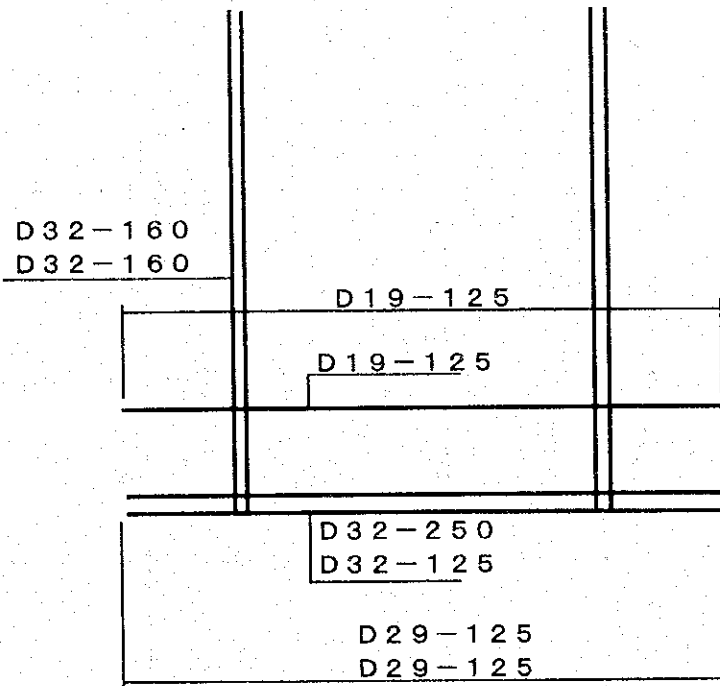
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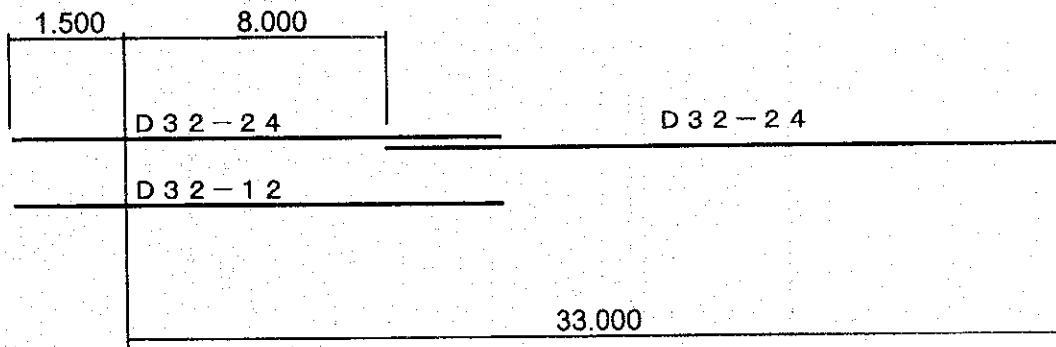
APPROACH BRIDGE-1 THANH TRI SIDE

Pier P20

Number of Pile	16		
Pile Length (m)	33.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.372	< 1.5
Bearing Capacity (tf)	Usual	671	< 898
	Earthquake	1240	< 1,332
Pile		As = D 32 - 24 D 32 - 12	2,336 < 2,700
		As = D 32 - 24	2,668 < 2,700
Column		As = D 32 - 160 D 32 - 160 (@ 125)	2,657 < 2,700
Footing		As = D32@125 D32@250	2,289 < 2,700

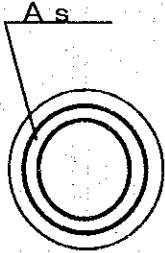
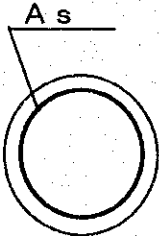
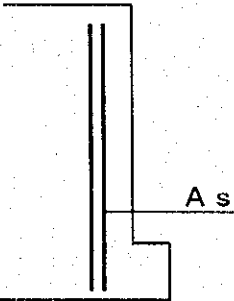
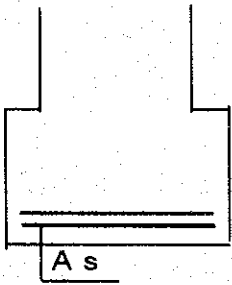


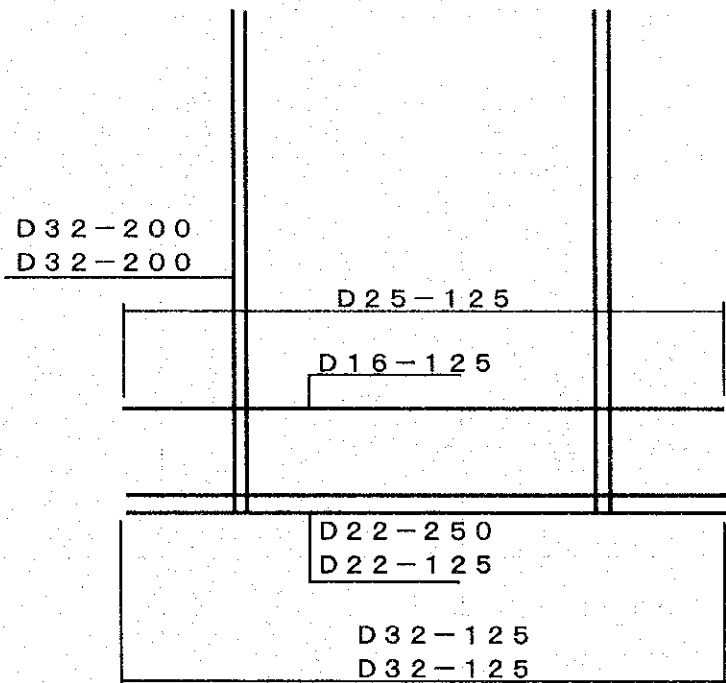
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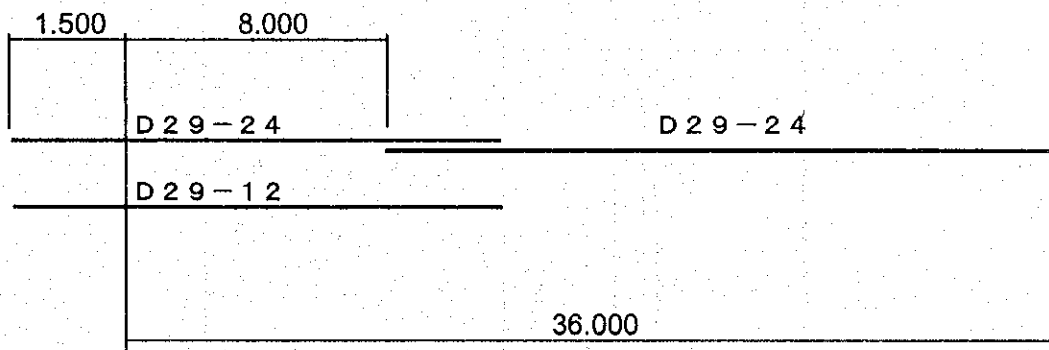
APPROACH BRIDGE-1 THANH TRI SIDE

Pier P21

Number of Pile	16		
Pile Length (m)	36.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.002	< 1.5
	Earthquake	0.421	< 1.5
Bearing Capacity (tf)	Usual	707	< 920
	Earthquake	1354	< 1,355
Pile		$A_s = D 29 - 24$ $D 29 - 12$	2,687 < 2,700
		$A_s = D 29 - 24$	2,581 < 2,700
Column		$A_s = D 32 - 200$ $D 32 - 200$ (@125)	2,466 < 2,700
Footing		$A_s = D22@125$ $D22@250$	1,125 < 1,600

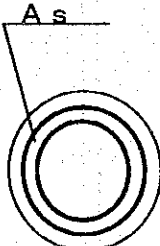
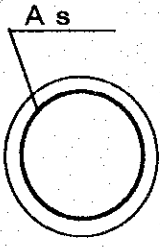
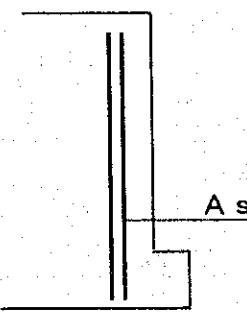
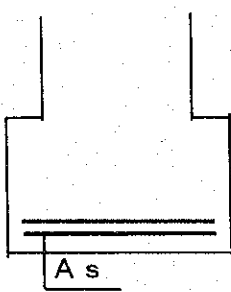


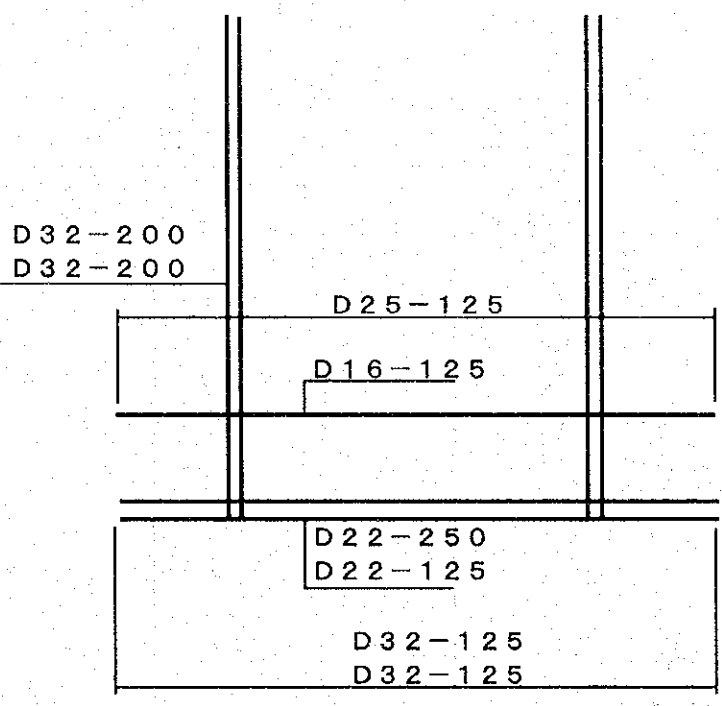
Pile



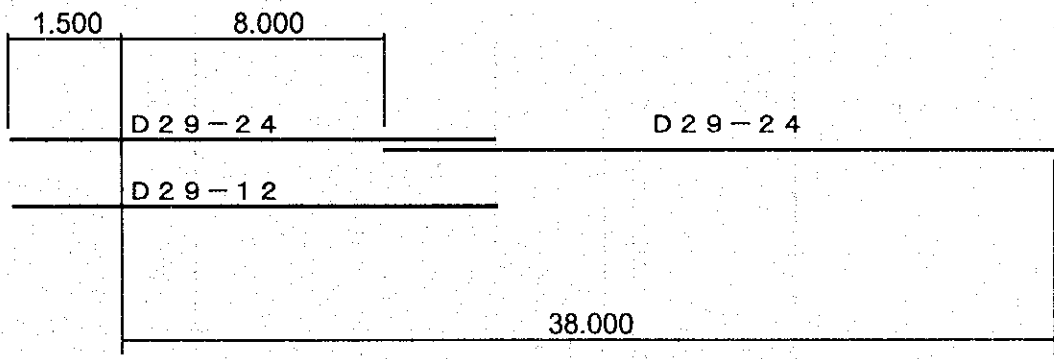
APPROACH BRIDGE-1 GIA LAM SIDE

Pier P27

Number of Pile	16		
Pile Length (m)	38.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.002	< 1.5
	Earthquake	0.514	< 1.5
Bearing Capacity (tf)	Usual	711	< 955
	Earthquake	1,379	< 1,404
Pile		As = D 29 - 24 D 29 - 12	2,642 < 2,700
		As = D 29 - 24	2,655 < 2,700
Column		As = D 32 - 200 D 32 - 200 (@ 125)	2,494 < 2,700
Footing		As = D22@125 D22@250	2,526 < 2,700

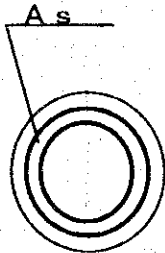
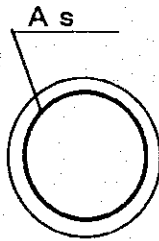
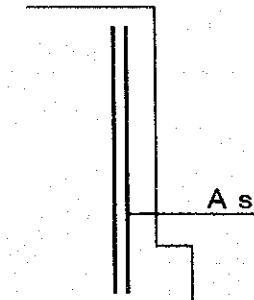
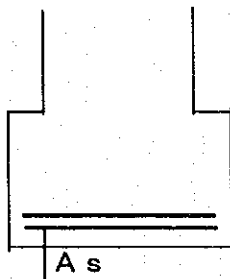


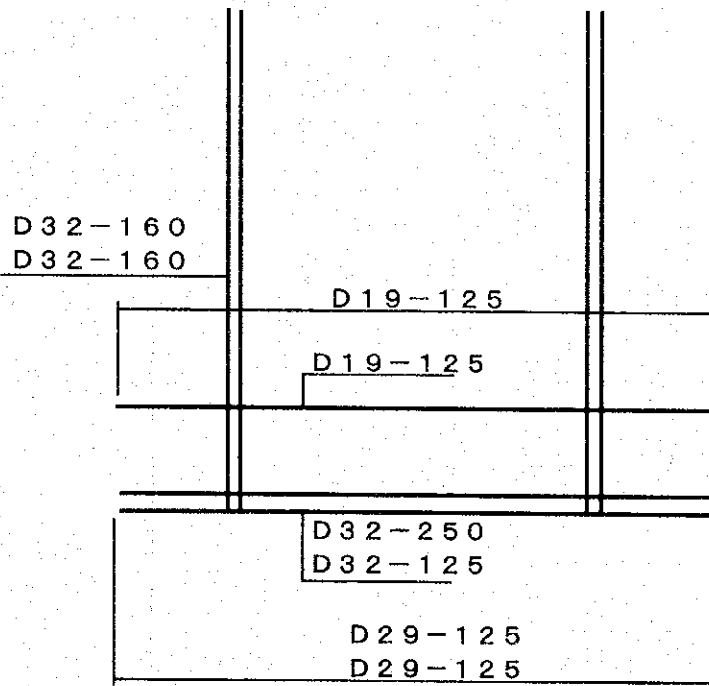
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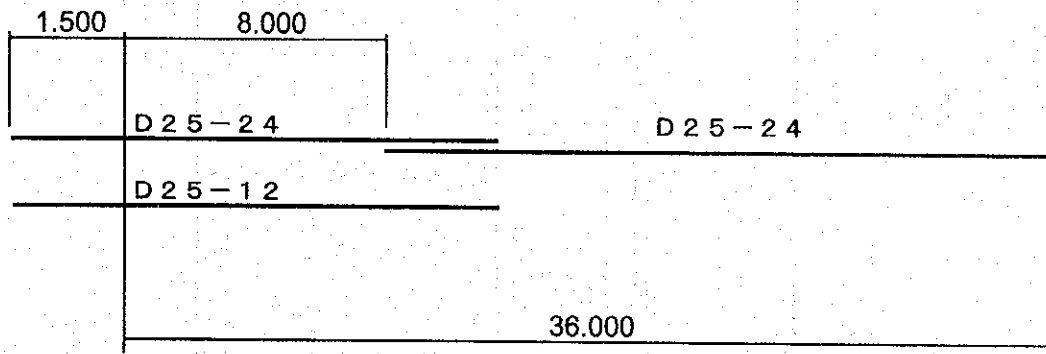
APPROACH BRIDGE-1 GIA LAM SIDE

Pier P28

Number of Pile	16		
Pile Length (m)	36.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.424	< 1.5
Bearing Capacity (tf)	Usual	707	< 889
	Earthquake	1,286	< 1,307
Pile		As = D 25 - 24 D 25 - 12	2,376 < 2,700
		As = D 25 - 24	2,248 < 2,700
Column		As = D 32 - 160 D 32 - 160 (@ 125)	2,657 < 2,700
Footing		As = D32@125 D32@250	2,585 < 2,700

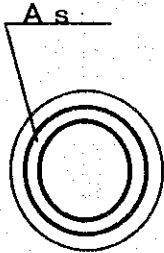
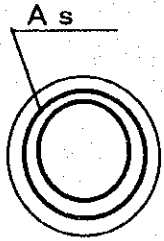
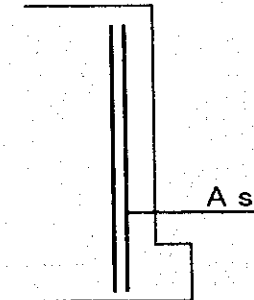
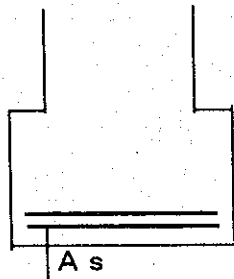


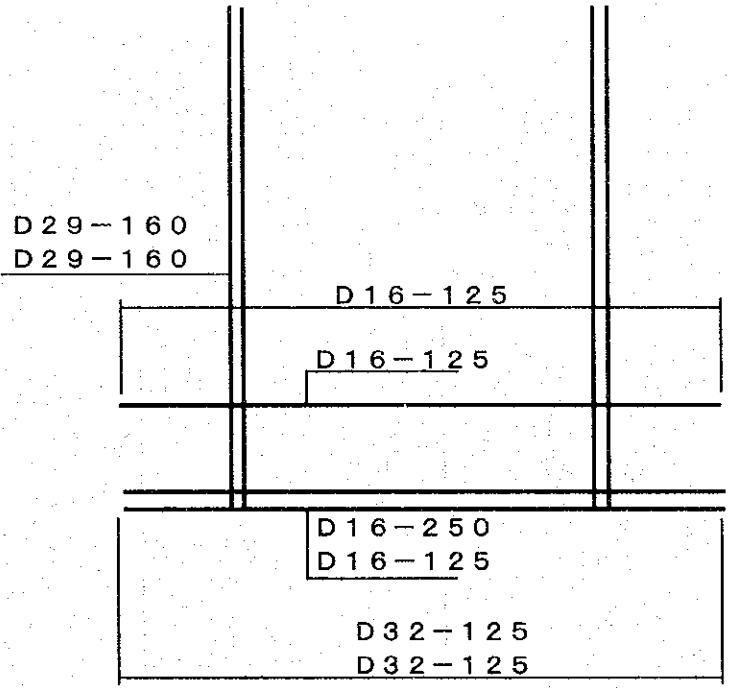
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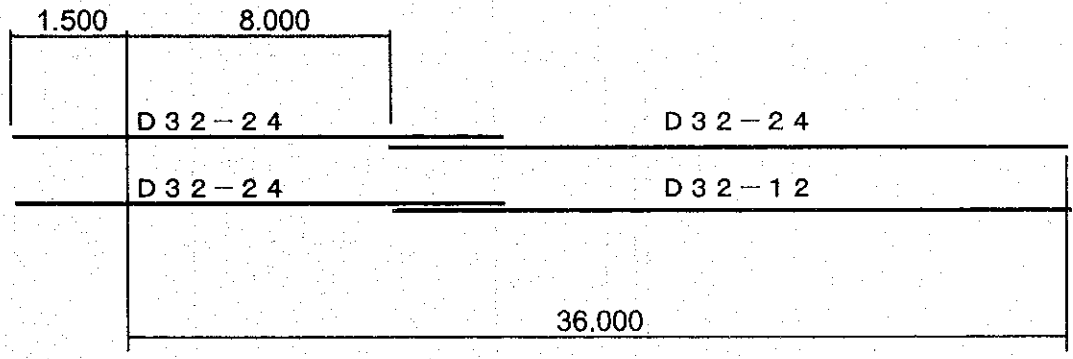
APPROACH BRIDGE-1 GIA LAM SIDE

Pier P29~P32, P34~P38, P40~P43

Number of Pile	9		
Pile Length (m)	36.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.633	< 1.5
Bearing Capacity (tf)	Usual	460	< 801
	Earthquake	1,149	< 1,176
Pile		As = D32-24 D32-24	2,487 < 2,700
		As = D32-24 D32-12	2,216 < 2,700
Column		As = D29-160 D29-160 (@125)	2,336 < 2,700
Footing		As = D16@125 D16@250	eee < 1,600

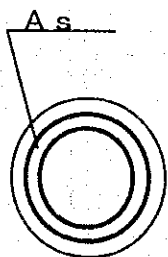
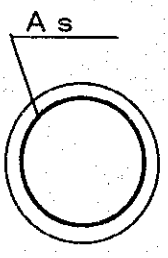
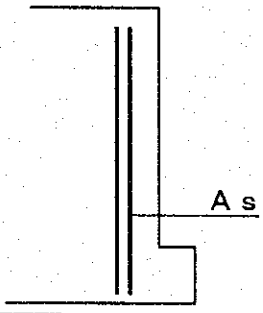
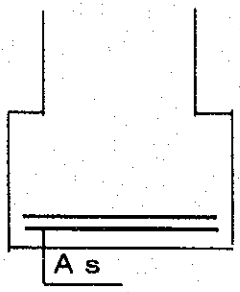


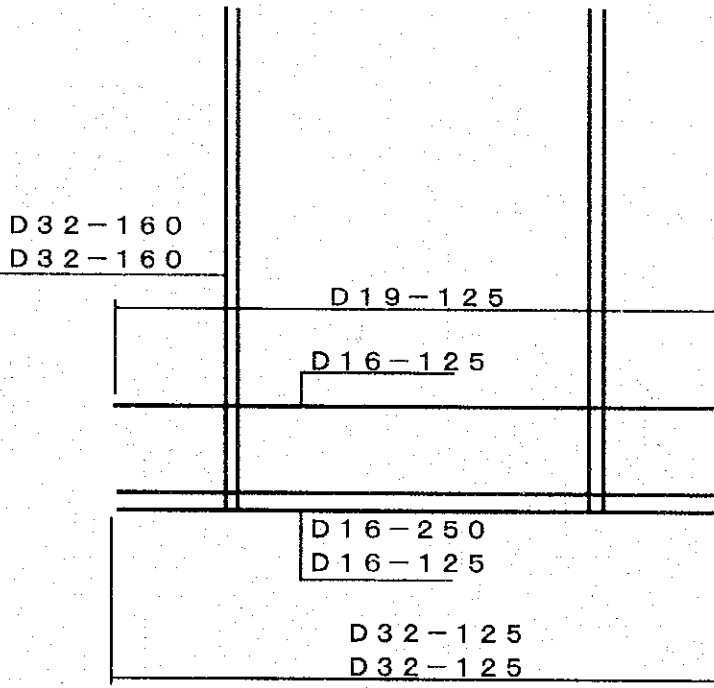
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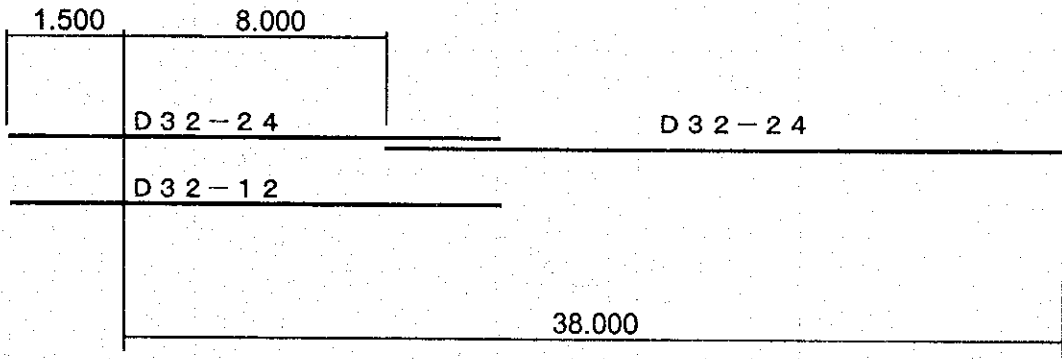
APPROACH BRIDGE-1 GIA LAM SIDE

Pier P33, P39

Number of Pile	10		
Pile Length (m)	38.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.543	< 1.5
Bearing Capacity (tf)	Usual	439	< 794
	Earthquake	1,012	< 1,164
Pile		As = D 32 - 24 D 32 - 12	2,375 < 2,700
		As = D 32 - 24	2,340 < 2,700
Column		As = D 32 - 160 D 32 - 160 (@ 125)	2,304 < 2,700
Footing		As = D16@125 D16@250	eee < 1,600

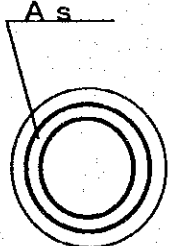
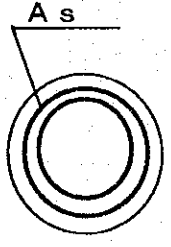
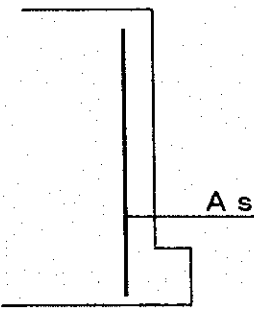
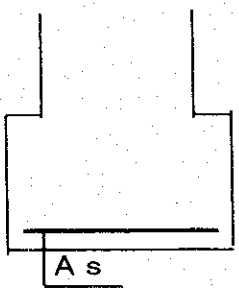


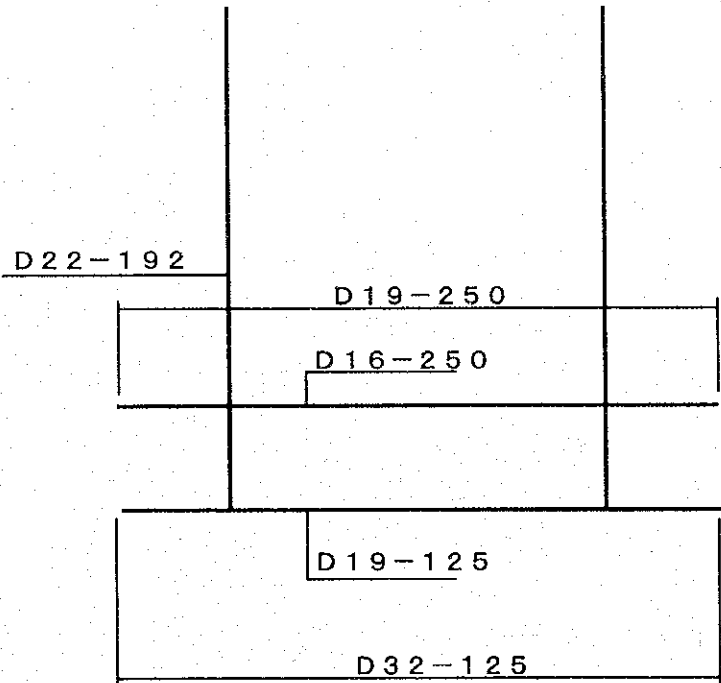
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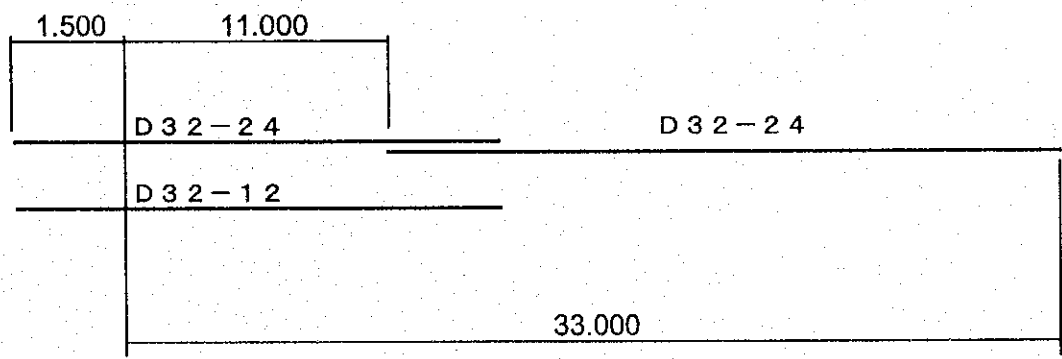
APPROACH BRIDGE-1 GIA LAM SIDE

Pier P44

Number of Pile	16		
Pile Length (m)	33.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.004	< 1.5
	Earthquake	1.019	< 1.5
Bearing Capacity (tf)	Usual	323	< 555
	Earthquake	649	< 809
Pile		As = D 32 - 24 D 32 - 12	2,595 < 2,700
		As = D 32 - 24	2,026 < 2,700
Column		As = D 22 - 192 (@ 125)	2,382 < 2,700
Footing		As = D19@125	2597 < 2,700



P i l e



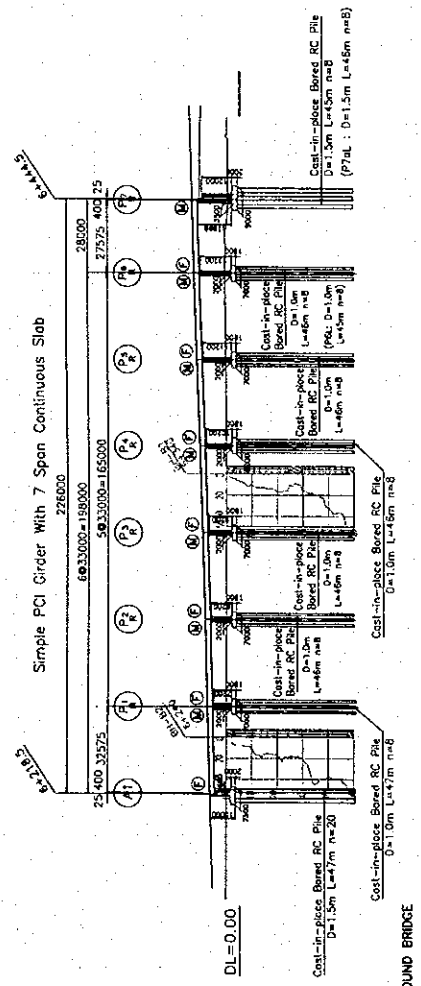
4. RED RIVER BRIDGE

Approach Bridge 2

PACKAGE	SCALE	DRAWING No.	SHEET No.
1	1/2000	C-4-1-1	

THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM PUBLIC WORK PROJECTS MANAGEMENT UNIT, MINISTRY OF TRANSPORT		DESIGNED BY S. WANG
VIET-AMERICAN COOPERATION PROJECT HAI PHONG BRIDGE (THANH TRU BRIDGE) CONSTRUCTION PROJECT		SIGNATURE
PROJECT		DATE
VIET-AMERICAN COOPERATION PROJECT		

PROFILE - NORTH BOUND BRIDGE

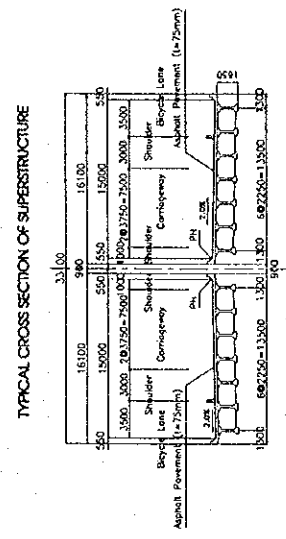


GRADE	ELEVATION	GROUND HEIGHT	STATION
			6+218.5
			6+251.5
			6+284.5
			6+317.5
			6+350.5
			6+383.5
			6+416.5
			6+444.5
			6+464.5

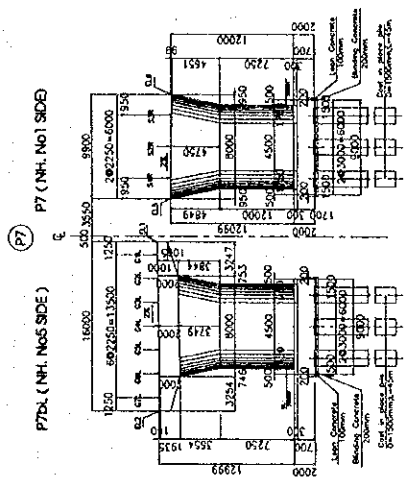
i=3.00%
L=430.00m

() FOR SOUTH BOUND BRIDGE

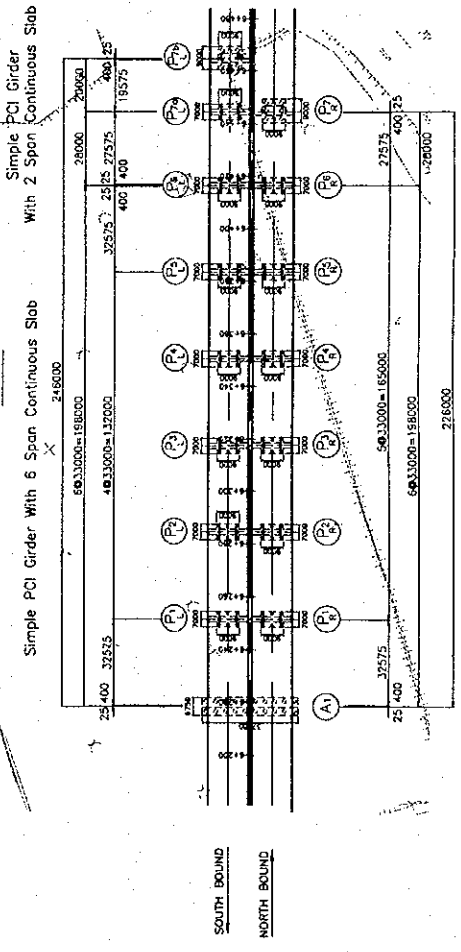
TYPICAL CROSS SECTIONS OF BRIDGE
(S=1/500)



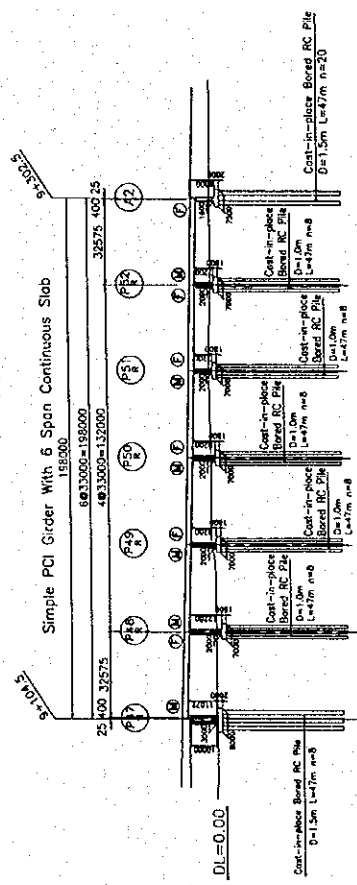
TYPICAL CROSS SECTION OF SUBSTRUCTURE



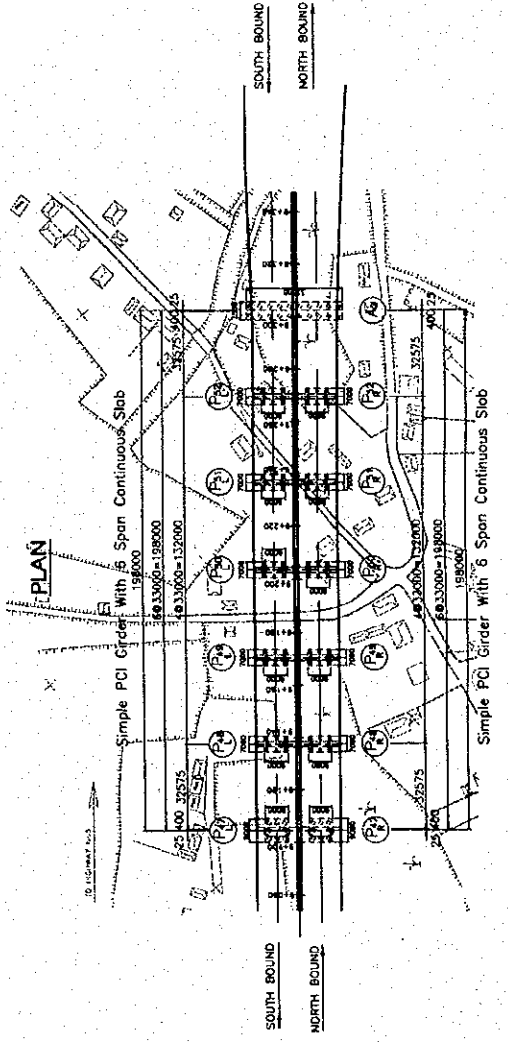
PLAN



PROFILE - NORTH BOUND BRIDGE

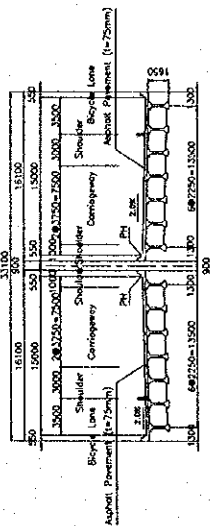


GRADE	ELEVATION	GROUND HEIGHT	STATION
	17.035	16.045	9+104.5
	15.055	5.006	9+170.5
	14.105	4.814	9+203.5
	13.231	5.444	9+236.5
	12.434	4.385	9+269.5
	12.42	4.380	9+270
	11.714	4.520	9+302.5



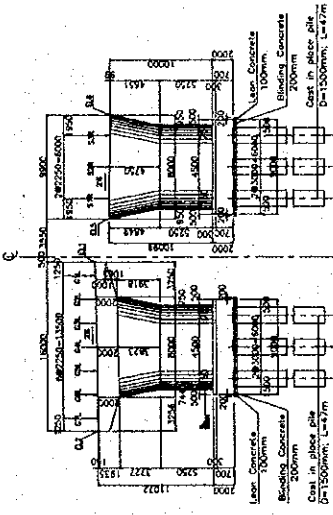
TYPICAL CROSS SECTIONS OF BRIDGE
(S=1/500)

TYPICAL CROSS SECTION OF SUPERSTRUCTURE

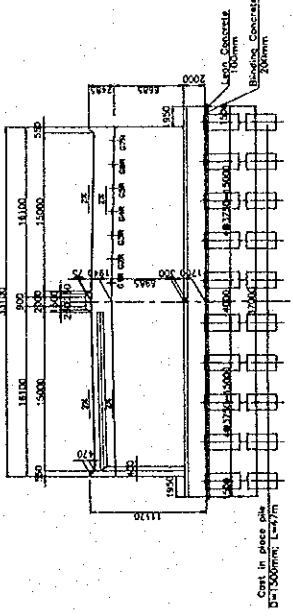


TYPICAL CROSS SECTION OF SUBSTRUCTURE

P47L (HIGHWAY NO.5 SIDE) P47R (HEIGHT NO.1 SIDE)

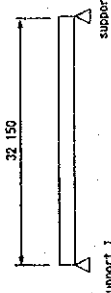


BEHIND ABUTMENT A2 FRONT ABUTMENT A2



PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

4.2 Superstructure

Bridge Name	Approach Bridge 2	Route	Hwazi No. 3 Ring Road	Road Alignment	Slew Angle	90 degrees	Roadway Width	Total Width	Effective Width	21.1 m	Seismic Coefficient	0.17
Structural Type	Simple Span PC I-girder Bridge L = 33.0m, H = 1.85m	Bridge Length	33.0 m	Span Arrangement	32.15 m					20.0 m		0.17
Main Girder	Number of Girders	1 nos.	Girder Height	1.65 m	Maximum Displacement	mm (1/—)						
	Girder Spacing	2.325 m	Height/Span Ratio	H/L = 1/19.5 (constant girder height)								
Crossbeam	Number of Crossbeams	3 nos./span	Crossbeam Spacing	8.0 m (approximately)			Crossbeam Height 1.57 m					
	Structural Type	Reinforced Concrete Slab	Reinforcement Arrangement	D19@125 (top & bottom)								
Deck Slab Design	Design Strength of Concrete	f'c = 290 kgf/cm ²										
	Bending Moment	Stresses										
	+ve & -ve	3.029 tf.m/m	200 mm	78.5	kgf/cm ²	rebar	1.188	kgf/cm ²				
Design Theory	Beam Theory	Post-tensioned Precast Concrete Girder										
Construction Method	12T12.7 (SBPR7B)											
Unfactored Bending Moment/Girder	Location	immediately after prestressing		at service load								
		combined stress	allowable stress	combined stress	allowable stress							
	top fiber	24.1	kgf/cm ²	-15.0	kgf/cm ²	-	kgf/cm ²	-	kgf/cm ²			
	bottom fiber	181.5	kgf/cm ²	198.0	kgf/cm ²	-	kgf/cm ²	-	kgf/cm ²			
total service load	top fiber	-	kgf/cm ²	-	kgf/cm ²	110.7	kgf/cm ²	180.0	kgf/cm ²			
	bottom fiber	-	kgf/cm ²	-	kgf/cm ²	-21.6	kgf/cm ²	-31.8	kgf/cm ²			
Shear Force Check Point	Unfactored Shear Force	Factored Shear Force/Girder		Diagonal Tension Stress		Stirrup		Vertical Prestressing Tendon				
		at End Support	101	tf	159	tf	-	4-D19@125	not provided			
Support Reaction and Bearings	Support Reaction	Unit	Support 1 (= Support 2)									
	Dead Load, Rd	tf	71.7									
	Live Load, Rl	tf	20.7									
Total Reaction	tf	92.4										
Bearing Type	elastomeric bearing											
Expansion Joint												
Location												
Type of Joint												
Rubber joint												
Girder Clearance												
50 mm (typical)												
Items												
Unit												
Specification												
Quantity/Girder												
Quantity/m ² of concrete												
Formwork	Concrete	m ²	f'c = 400 kgf/cm ²									
	Side	m ²	24.6									
	Bottom	m ²	128.5									
Reinforcing Bar	longitudinal	kgf	SD295A (JIS G3112)									
	transverse (deck slab)	kgf	12T15.2 (SBPR7B)									
	transverse (crossbeam)	kgf	3T15.2 (SBPR7B)									
Prestressing Tendon	longitudinal	kgf	4T15.2 (SBPR7B)									
	Total	kgf	1,588									
Primary Construction Materials												
Remarks												
1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1995)												
2. Nomenclature of supports are as follows.												
												
3. Quantity of prestressing tendon includes operation allowance of 1.56/each.												

PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name	Approach Bridge 2		Route	Hanoi No. 3 Ring Road	Road Alignment	varies	Skew Angle	90 degrees	Roadway Width	16.1 m	Total Width	15.0 m	Seismic Coefficient	0.17
Structural Type	Simple Span PC Girder Bridge		Bridge Length	28.0 m	Span Arrangement	27.15 m			Effective Width	15.0 m			transverse	0.17
Main Girder	Number of Girders	1 nos.	Girder Height	1.65 m	Maximum Displacement									
	Girder Spacing	2.25 m	Height/Span Ratio	H/L = 1/17 (constant girder height)		Crossbeam Height	1.57 m							
Crossbeam	Number of Crossbeams	3 nos./span	Crossbeam Spacing	8.0 m (approximately)		Reinforcement Arrangement	D19@25 (top & bottom)							
	Structural Type	Reinforced Concrete Slab	Prestressing Tendon			Allowable Stress Increase Coefficient								
Design Strength of Concrete		f'c = 290 kgf/cm ²												
Bending Moment		Slab Depth												
++ve	-ve	2.929	200 mm	concrete	64	kgf/cm ² rebar	1.017	kgf/cm ²						
Design Theory		Beam Theory												
Construction Method		Post-tensioned Precast Concrete Girder												
Unfactored Bending Moment/Girder	Location	immediately after prestressing		at service load										
	top fiber	combined stress	allowable stress	combined stress	allowable stress									
girder weight only	161 tf.m	7.0 kgf/cm ²	-15.0 kgf/cm ²	- kgf/cm ²	- kgf/cm ²									
		147.8 kgf/cm ²	198.0 kgf/cm ²	- kgf/cm ²	- kgf/cm ²									
total service load	607 tf.m	- kgf/cm ²	- kgf/cm ²	79.2 kgf/cm ²	160.0 kgf/cm ²									
		- kgf/cm ²	- kgf/cm ²	-12.0 kgf/cm ²	-31.8 kgf/cm ²									
Shear Force Check Point at End Support		94 tf	Factored Shear Force/Girder	148 tf	Diagonal Tension Stress	Stirrup	4-D19@25	Vertical Prestressing Tendon	not provided					
Support Reaction		Unit	Support 1 (= Support 2)											
Dead Load, Rd		tf	64.2											
Live Load, Rl		tf	20.9											
Total Reaction		tf	85.1											
Bearing Type		elastomeric bearing												

Expansion Joint	Location	Type of Joint	Girder Clearance
		Rubber joint	50 mm (typical)

Items	Unit	Specification	Quantity/Girder	Quantity/m ² of concrete
Concrete	m ³	f'c = 400 kgf/cm ²	21.3	-
Side Formwork	m ²	-	108.9	5.11 m ² /m ³
Bottom Formwork	m ²	-	18.2	0.85 m ² /m ³
Reinforcing Bar	kgf	SD295A (JIS 6312)	2,850	133.8 kgf/m ³
longitudinal Prestressing Tendon	kgf	12T15.2 (SBPR7B)	1,085	50.9 kgf/m ³
transverse (check slab) Prestressing Tendon	kgf	3T15.2 (SBPR7B)	-	-
transverse (crossbeam) Prestressing Tendon	kgf	4T15.2 (SBPR7B)	-	-
Total	kgf	-	1,085	-

1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)

2. Nomenclature of supports are as follows.

3. Quantity of prestressing tendon includes operation allowance of 1.5m/each.

PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name	Approach Bridge 2	Route	Hanoi No. 3 Ring Road	Road Alignment	Skew Angle	90 degrees	Roadway Width	Total Width	Seismic Coefficient	0.17
Structural Type	Simple Span PC I-girder Bridge L = 20.0m, H = 1.65m	Bridge Length	20.0 m	Span Arrangement	19.15		Effective Width 15.0 m	16.1 m		0.17
Main Girder										
Number of Girders	1 nos.	Girder Height	1.65 m	Maximum Displacement	mm (1/-)					
Girder Spacing	2.250 m	Height/Span Ratio	H/L = 1/12.1 (constant girder height)							
Number of Crossbeams	2 nos./span	Crossbeam Spacing	6.5 m (approximately)	Crossbeam Height	1.57 m					
Structural Type	Reinforced Concrete Slab	Prestressing Tendon	D19@25 (top & bottom)							
Design Strength of Concrete	f'c = 290 kgf/cm ²									
Deck Slab Design										
Bending Moment	Stresses									
+ve & -ve	2.932 tf.m/m	200 mm concrete	64 kgf/cm ² rebar	1.017 kgf/cm ²						
Design of Main Girder										
Design Theory	Beam Theory	Post-tensioned Precast Concrete Girder	Prestressing Tendon	12T12.7 (SBPR7B)						
Design of Main Girder										
Unfactored Bending Moment/Girder	Location	immediately after prestressing	at service load							
girder weight only	top fiber	combined stress	allowable stress							
	bottom fiber	4.9 kgf/cm ²	-15.0 kgf/cm ²							
total service load	top fiber	105.0 kgf/cm ²	198.0 kgf/cm ²							
	bottom fiber	- kgf/cm ²	- kgf/cm ²							
Shear Force Check Point at End Support	75 tf	Factored Shear Force/Girder	Stirrup	Vertical Prestressing Tendon						
	123 tf	12.1 kgf/cm ²	4-D10@25	not provided						
Support Reaction and Bearings										
Support Reaction	Unit	Support 1 (= Support 2)								
Dead Load, Rd	tf	44.3								
Live Load, Rl	tf	19.9								
Total Reaction	tf	64.2								
Bearing Type	elastic/rigid bearing									

Cross-section

Items	Unit	Specification	Quantity/Girder	Girder Clearance
Concrete	m ³	f'c = 400 kgf/cm ²	15.8	Quantity/m ³ of concrete
Side Formwork	m ²	-	77.0	4.87 m ² /m ³
Bottom Formwork	m ²	-	13.0	0.82 m ² /m ³
Reinforcing Bar	kgf	S0295A (JIS G3112)	2,179	137.9 kgf/m ³
longitudinal Prestressing Tendon	kgf	12T15.2 (SBPR7B)	591	37.4 kgf/m ³
transverse (deck slab) Prestressing Tendon	kgf	3T15.2 (SBPR7B)	-	-
transverse (crossbeam) Prestressing Tendon	kgf	4T15.2 (SBPR7B)	-	-
Total	kgf	-	591	-

The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)

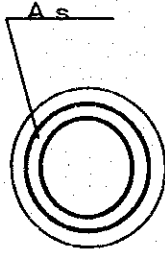
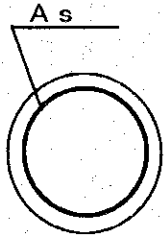
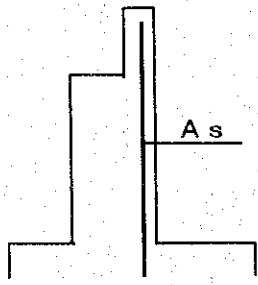
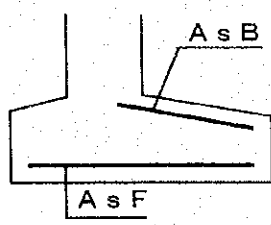
2. Nomenclature of supports are as follows.

3. Quantity of prestressing tendon includes operation allowance of 1.5%/each.

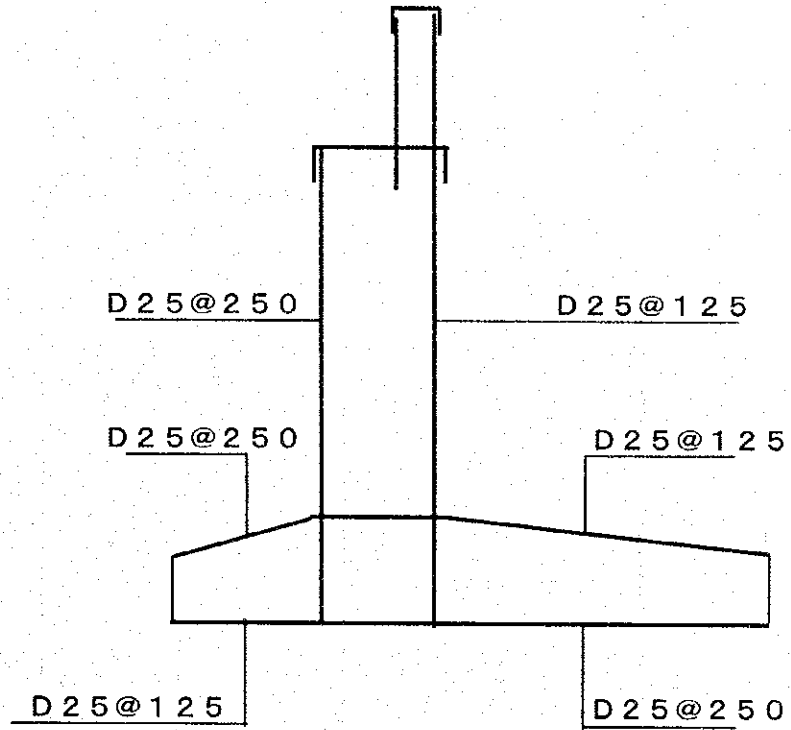
4.3 Substructure

APPROACH BRIDGE-2 THANH TRI SIDE

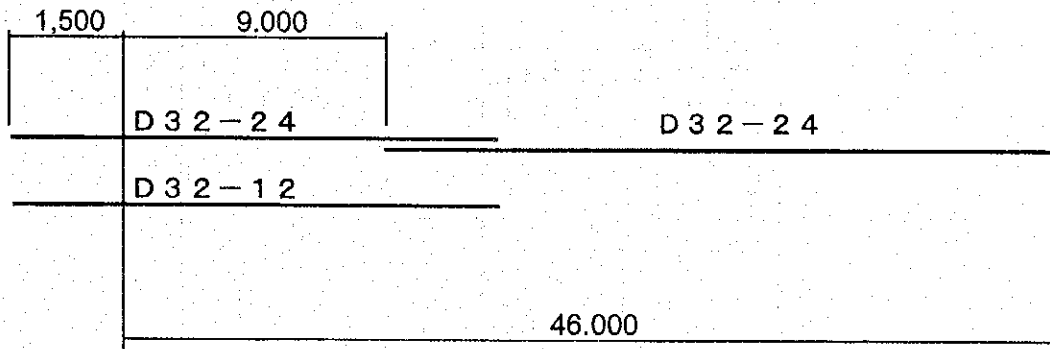
A1 (Fix)

Number of Pile	20		
Pile Length (m)	46.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.412	< 1.5
	Earthquake	1.472	< 1.5
Bearing Capacity (tf)	Usual	382	< 1,123
	Earthquake	572	< 1,606
Pile		As = D 32 - 24 D 32 - 12	2,233 < 2,700
		As = D 32 - 24	1,352 < 2,700
Body		As = D 25 @ 125	2,155 < 2,700
Footing		As F = D 25 @ 125 As B = D 25 @ 125	2,265 < 2,700

Body & Footing

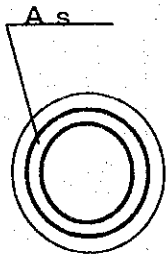
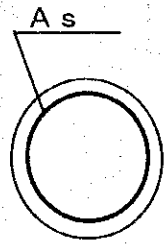
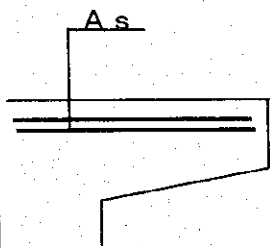
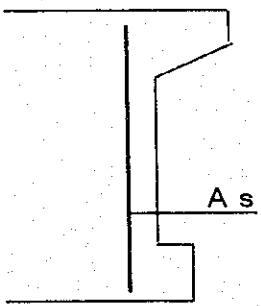


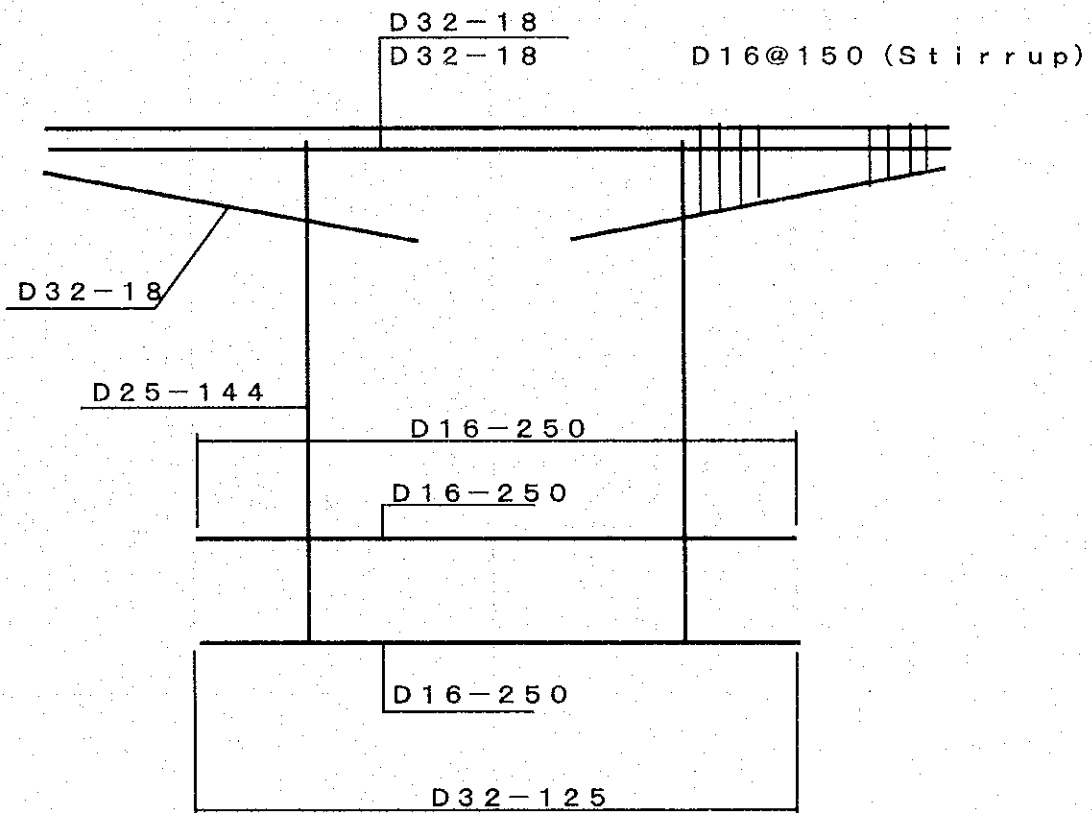
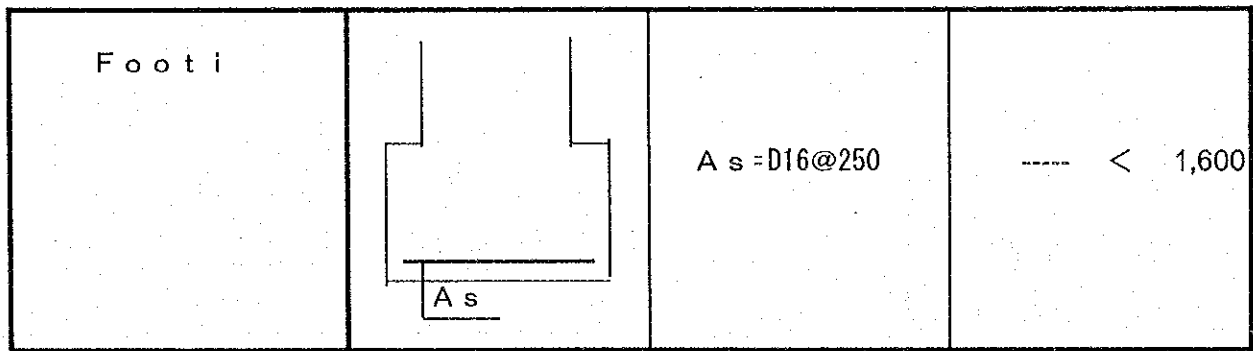
Pile



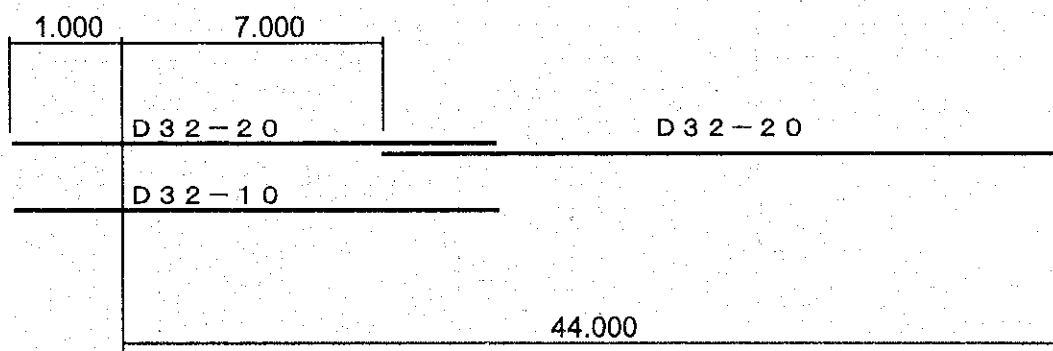
APPROACH BRIDGE-2 THANH TRI SIDE

Pier P1 · P2 · P3 · P4 · P5 · P6 · P7a

Number of Pile	8		
Pile Length (m)	44.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.987	< 1.5
Bearing Capacity (tf)	Usual	282	< 561
	Earthquake	590	< 812
Pile		$A_s = D32 - 20$ $D32 - 10$	2,108 < 2,700
		$A_s = D32 - 10$	1,899 < 2,700
Beam		$A_s = D32 - 18$ $D32 - 18$ (@110)	1,648 < 1,800
Column		$A_s = D25 - 144$ (@125)	2,384 < 2,700

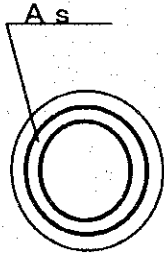
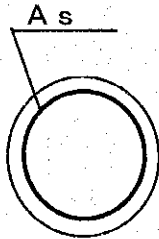
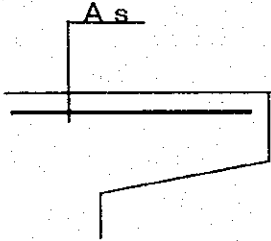
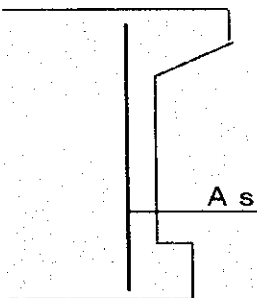


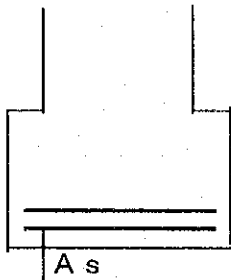
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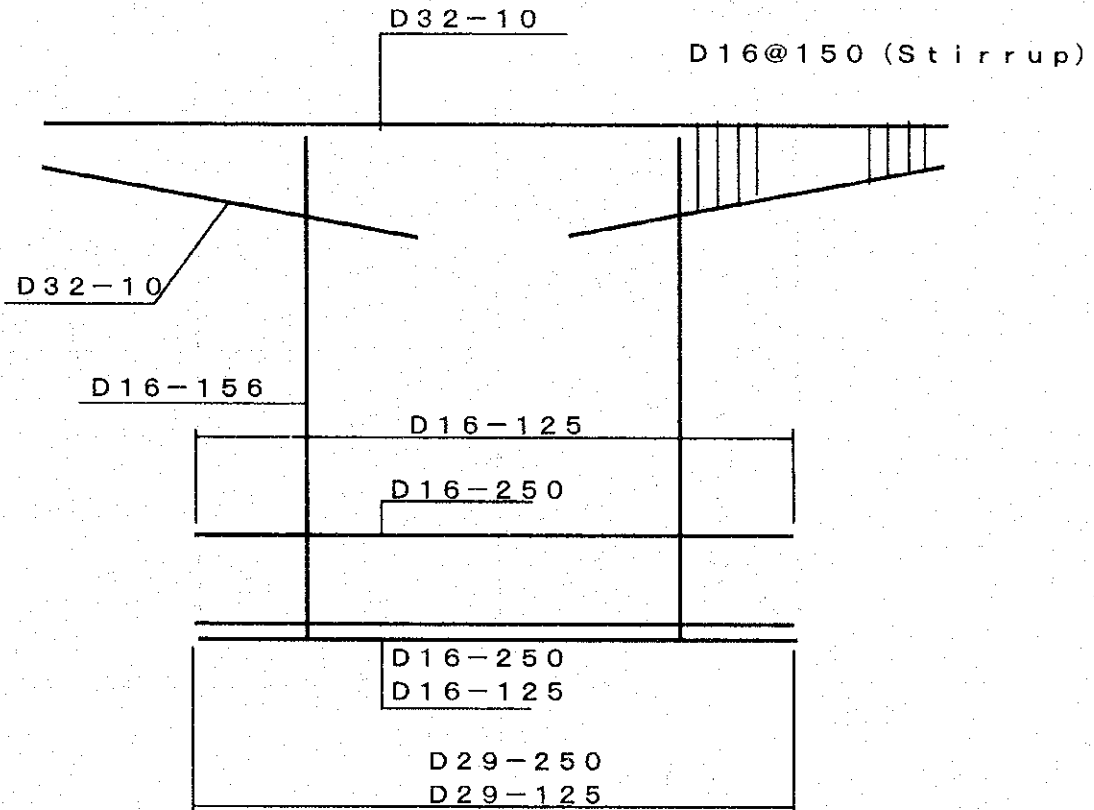


APPROACH BRIDGE-2 THANH TRI SIDE

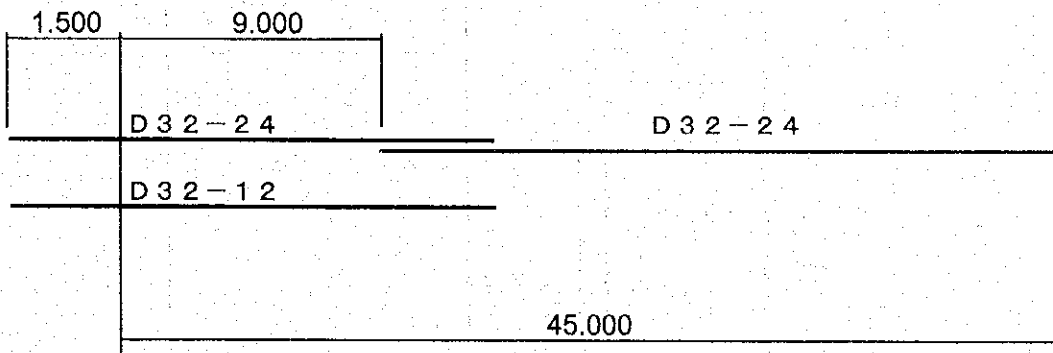
Pier P7·P7b

Number of Pile	8		
Pile Length (m)	45.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.002	< 1.5
	Earthquake	0.804	< 1.5
Bearing Capacity (tf)	Usual	427	< 947
	Earthquake	790	< 1,366
Pile		As = D 32 - 24 D 32 - 12	2,239 < 2,700
		As = D 32 - 24	1,995 < 2,700
Beam		As = D 32 - 10 (@ 125)	1,625 < 1,800
Column		As = D16-156 (@ 125)	1,482 < 2,700

Foot i		$A_s = D16-125$ $D16-250$	$\text{-----} < 1,600$
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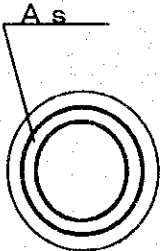
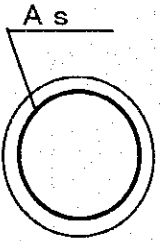
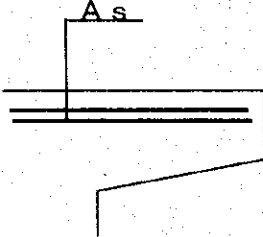
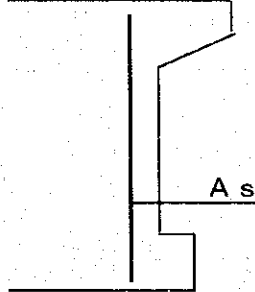


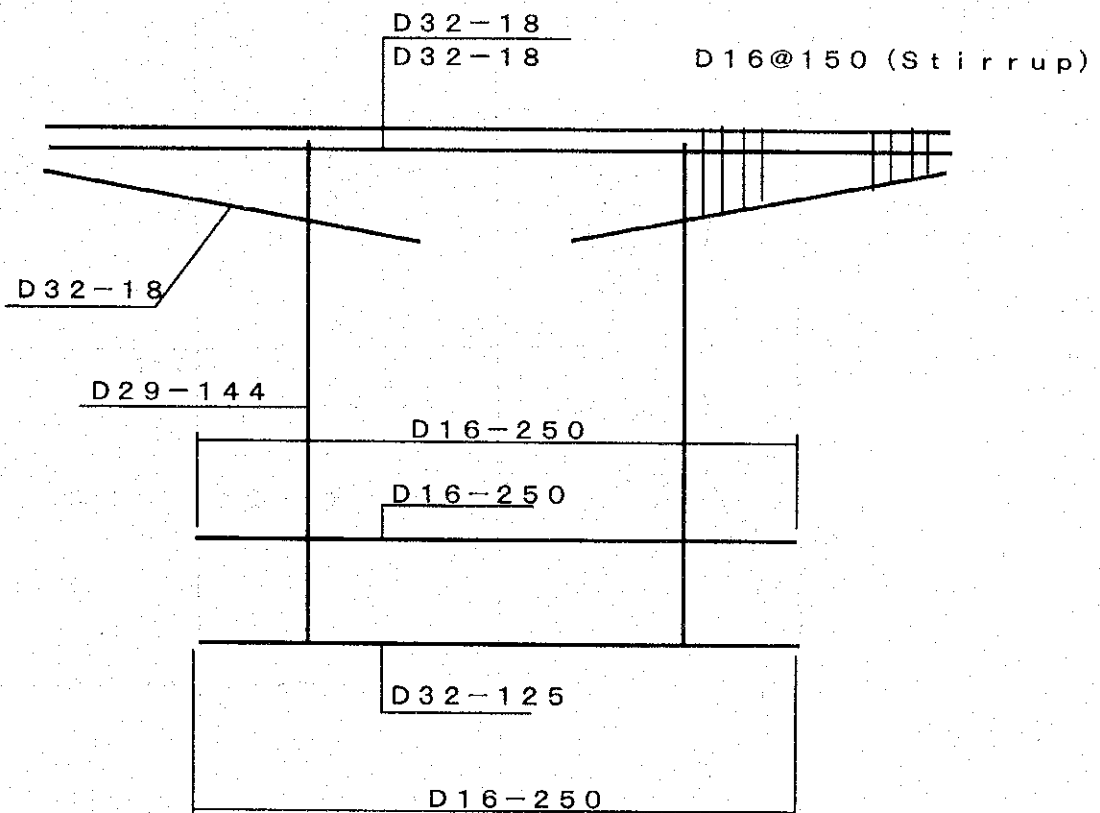
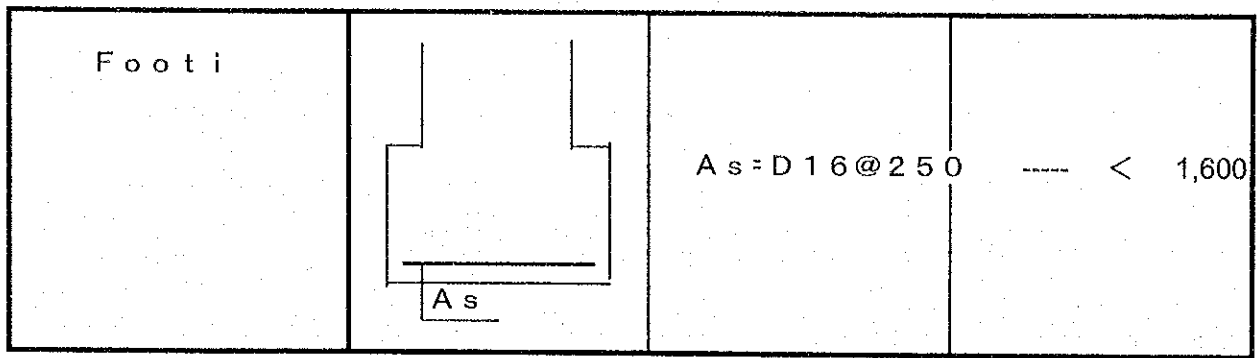
P i l e



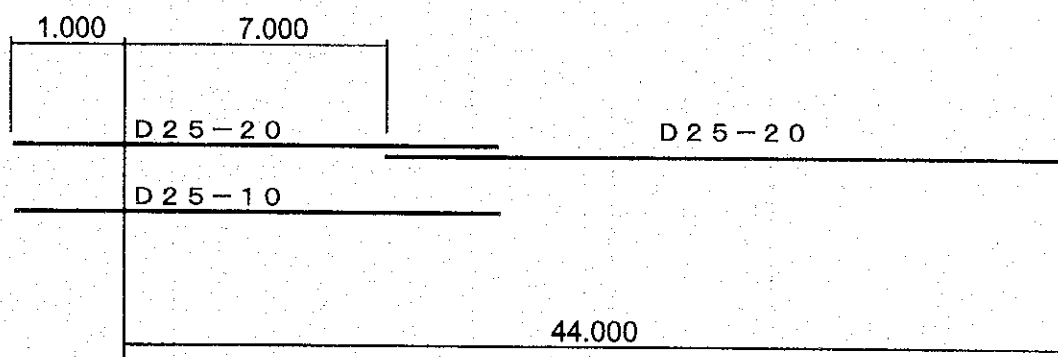
APPROACH BRIDGE-2 GIALAM SIDE

Pier P48·49·50·51·52

Number of Pile	8		
Pile Length (m)	43.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.632	< 1.5
Bearing Capacity (tf)	Usual	282	< 593
	Earthquake	590	< 855
Pile		As = D 25 - 20 D 25 - 10	2,342 < 2,700
		As = D 25 - 10	2,323 < 2,700
Beam		As = D 32 - 18 D 32 - 18 (@ 110)	1,647 < 1,800
Column		As = D 29 - 144 (@ 125)	2,384 < 2,700

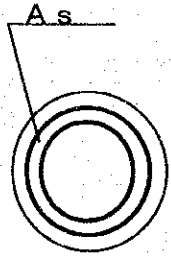
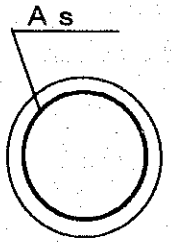
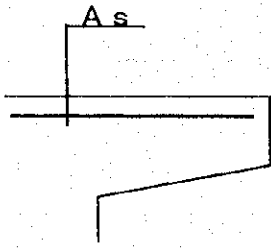
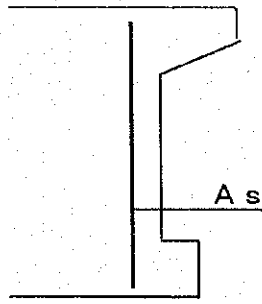


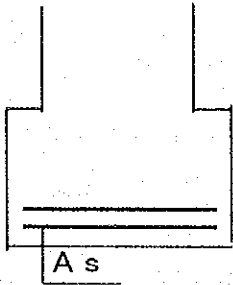
P i l e

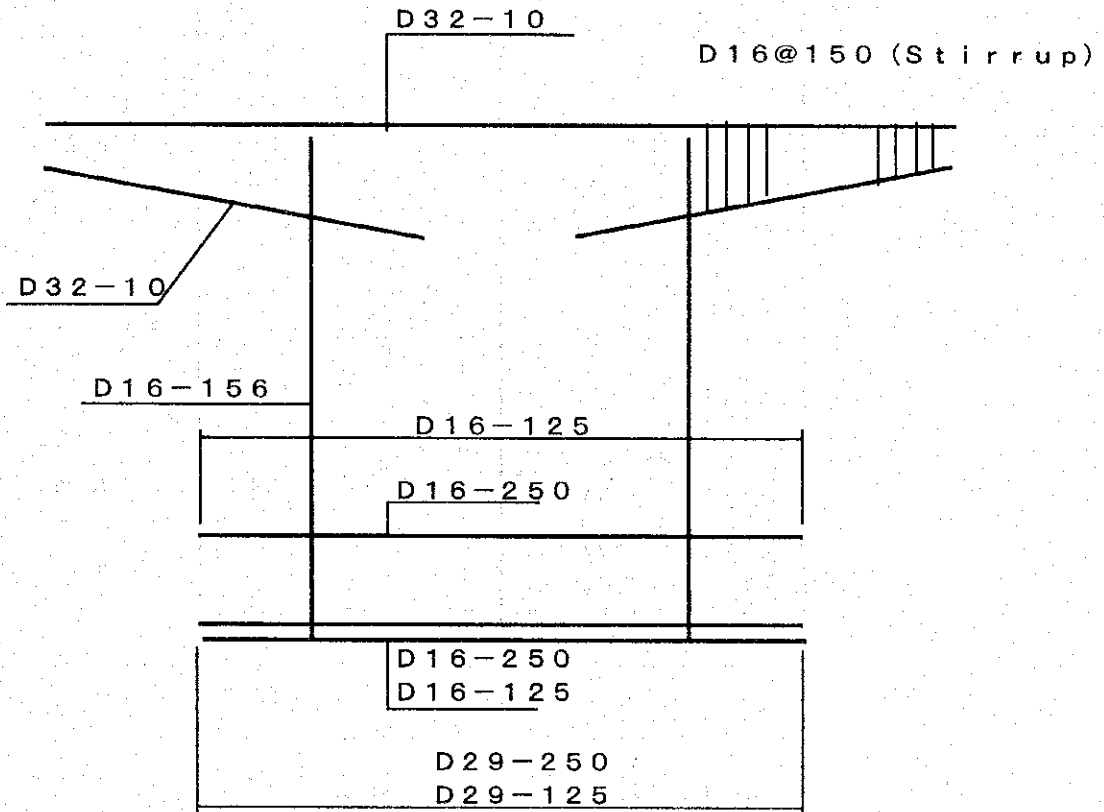


APPROACH BRIDGE-2 GIALAM SIDE

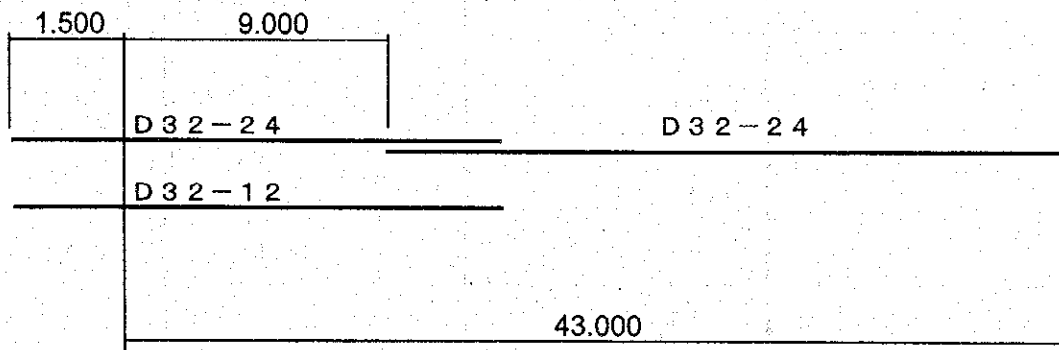
Pier P47

Number of Pile	8		
Pile Length (m)	43.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.007	< 1.5
	Earthquake	0.590	< 1.5
Bearing Capacity (tf)	Usual	423	< 964
	Earthquake	817	< 1,385
Pile		$A_s = D32-24$ $D32-12$	1,642 < 2,700
		$A_s = D32-24$	1,605 < 2,700
Beam		$A_s = D32-10$ (@125)	1,625 < 1,800
Column		$A_s = D16-156$ (@125)	2,264 < 2,700

Footi		$A_s = D16-125$ $D16-250$	$\text{---} < 1,600$
-------	---	------------------------------	----------------------

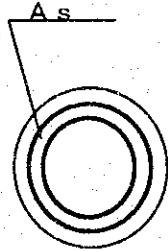
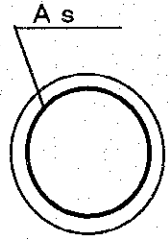
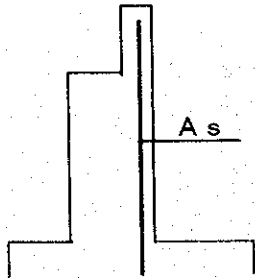
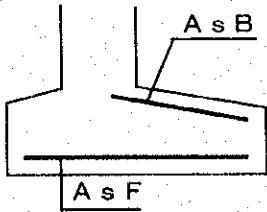


Pile

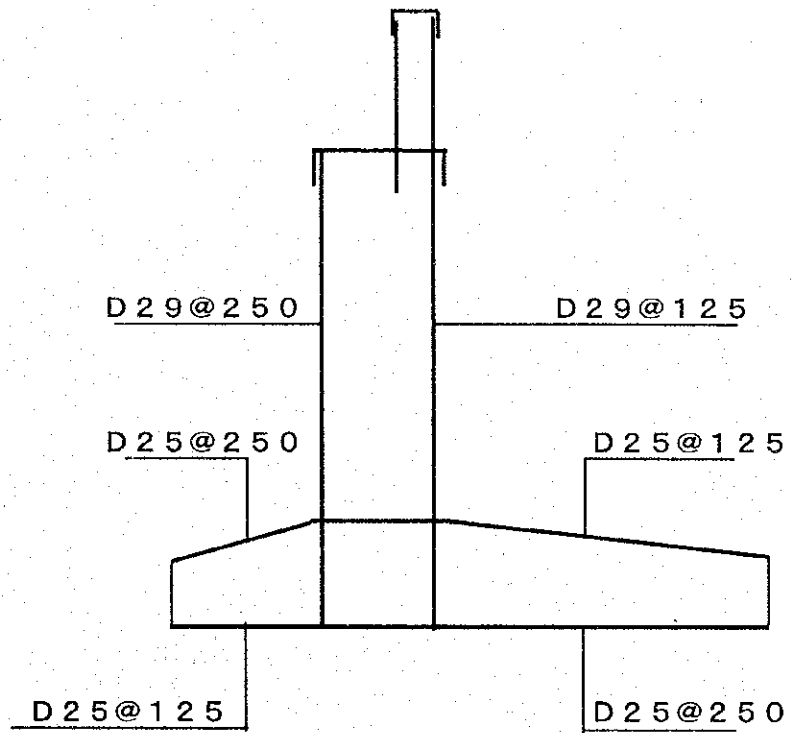


APPROACH BRIDGE-2 GIALAM SIDE

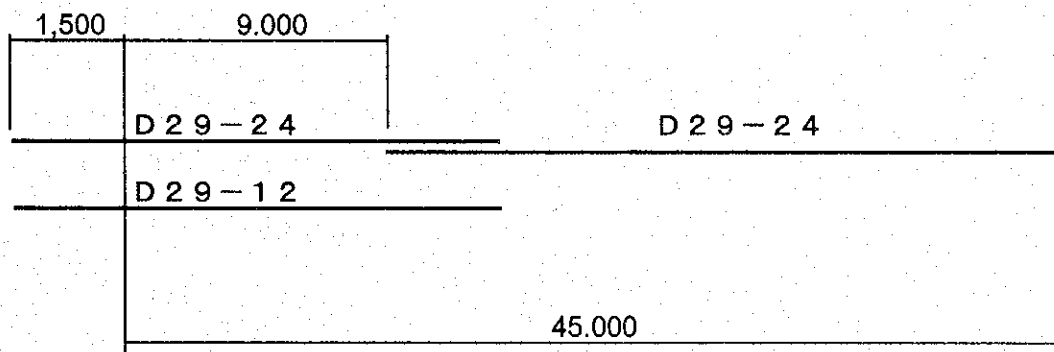
A2 (Fix)

Number of Pile	20		
Pile Length (m)	45.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.565	< 1.5
	Earthquake	1.039	< 1.5
Bearing Capacity (tf)	Usual	413	< 990
	Earthquake	583	< 1,452
Pile		$A_s = D29-24$ $D29-12$	2,604 < 2,700
		$A_s = D29-24$	1,854 < 2,700
Body		$A_s = D29@125$	2,348 < 2,700
Footing		$A_s F = D25@125$ $A_s B = D25@125$	2,328 < 2,700

Body & Footing



Pile



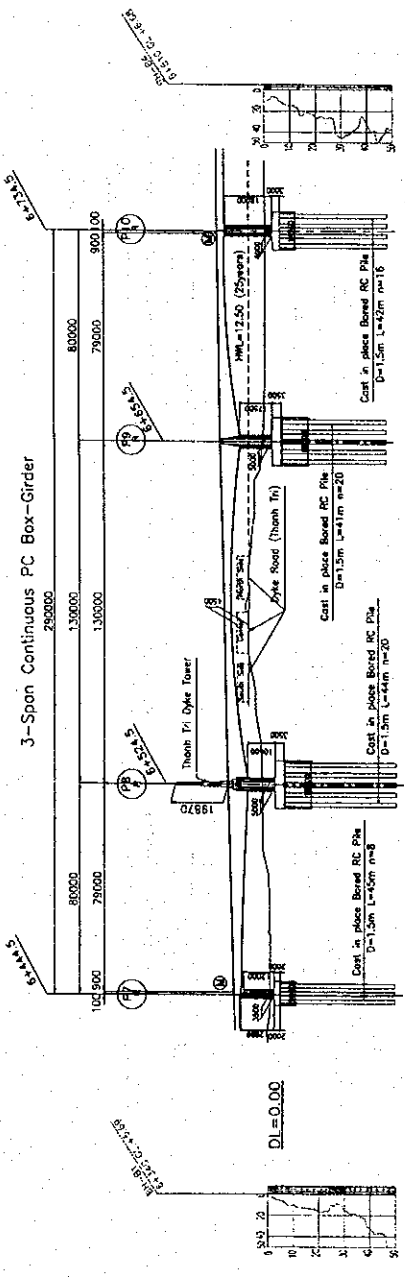
5. RED RIVER BRIDGE

Dyke Bridge

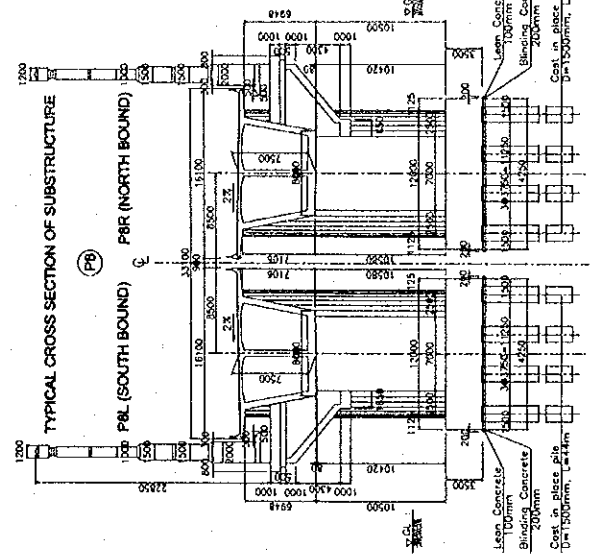
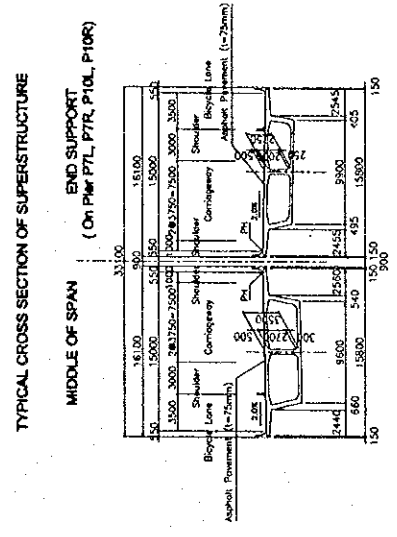
PROJECT	SCALE	DRAWING NO.	SHEET NO.
1	1/2000	C-2-1-1	
GENERAL VIEW OF DYKE BRIDGE (7)			

DESIGNED BY	DATE
NAME	DATE
SCALE	DATE
PROJECT	DATE

PROFILE - NORTH BOUND BRIDGE

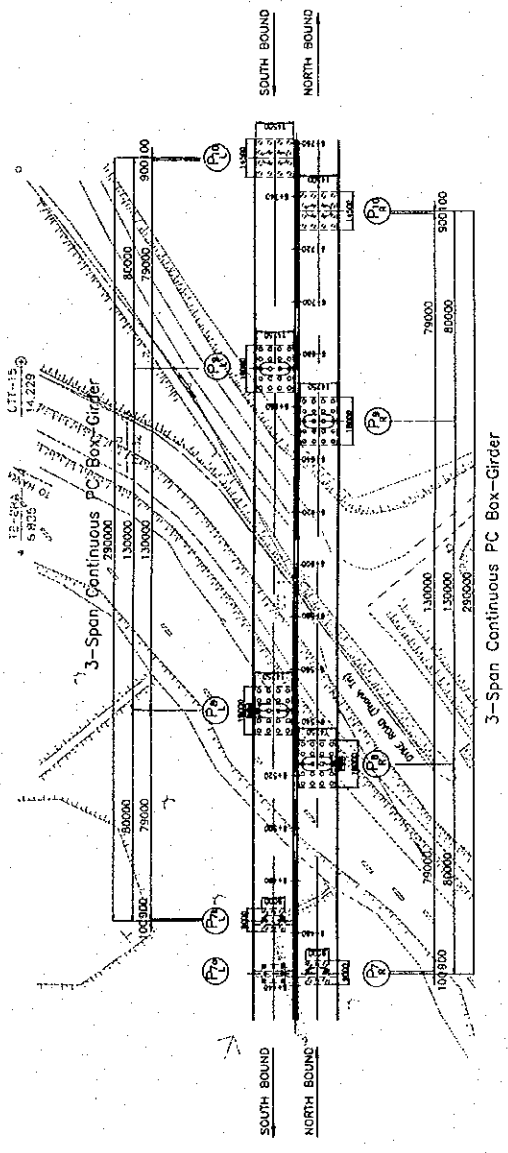


TYPICAL CROSS SECTIONS OF BRIDGE (S=1/500)

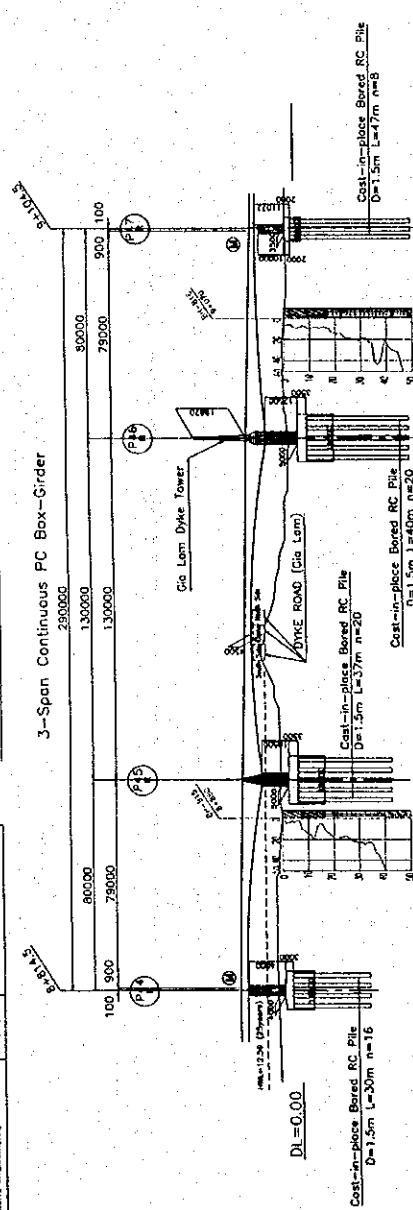


GRADE	ELEVATION	GROUND HEIGHT	STATION
	6+754.5	6.690	25.212
	6+734.5	6.529	24.988
	6+674.5	6.712	24.157
	6+654.5	7.549	23.825
	6+630	10.34	23.380
	6+590	14.28	22.575
	6+544.5	9.001	21.522
	6+524.5	7.819	21.016
	6+464.5	4.842	19.335
	6+444.5	4.830	18.735

PLAN



PROFILE - NORTH BOUND BRIDGE

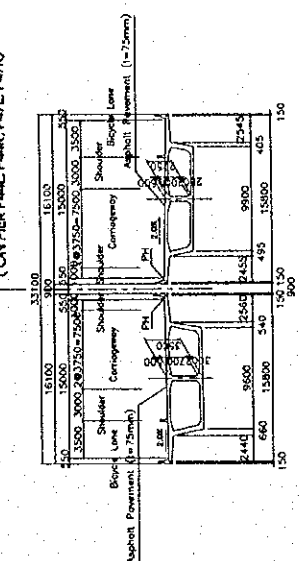


GRADE	ELEVATION	GROUND HEIGHT	STATION
	8.917	23.599	8+814.5
	7.597	22.404	8+894.5
	7.641	22.300	8+900
	13.421	21.502	8+940
	3.272	19.410	9+024.5
	3.181	17.035	9+104.5

TYPICAL CROSS SECTIONS OF BRIDGE
(S=1/500)

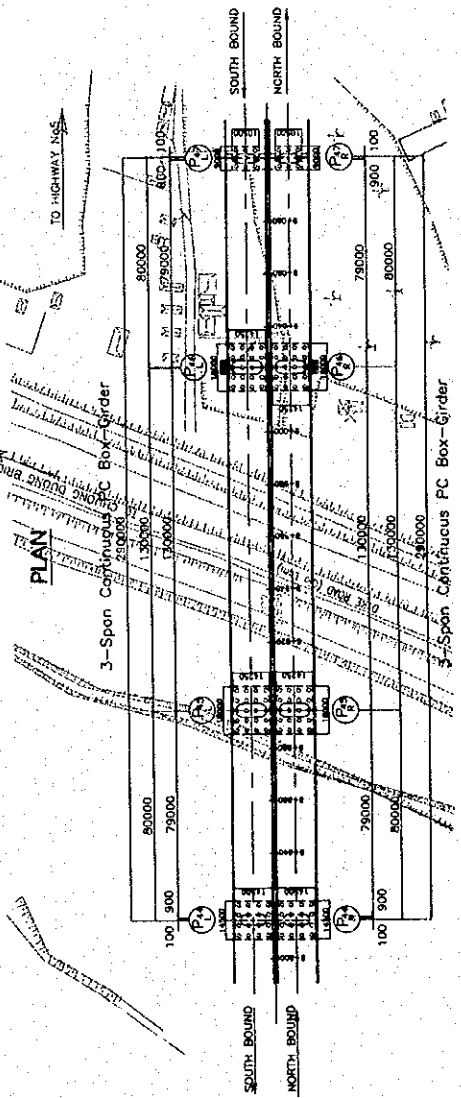
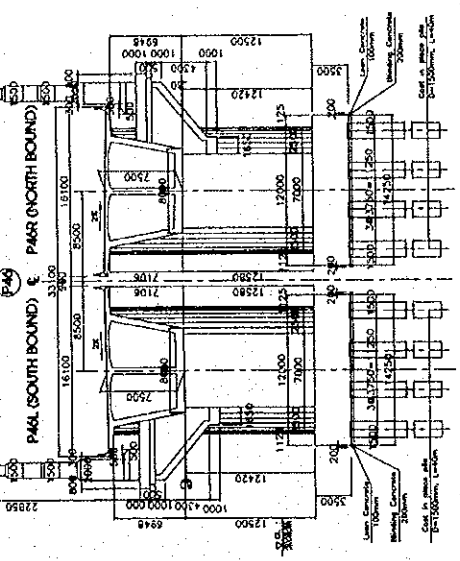
TYPICAL CROSS SECTION OF SUPERSTRUCTURE

MIDDLE OF SPAN



TYPICAL CROSS SECTION OF SUBSTRUCTURE

PILAS (SOUTH BOUND) & PARS (NORTH BOUND)

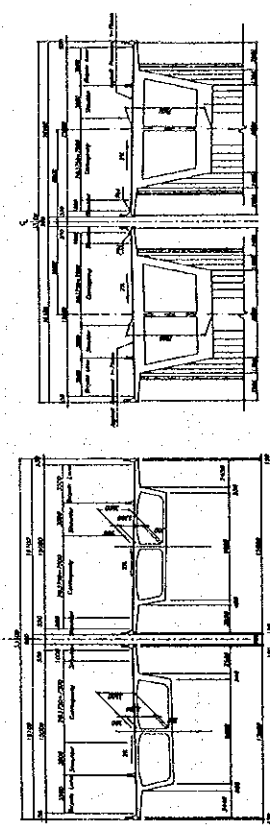
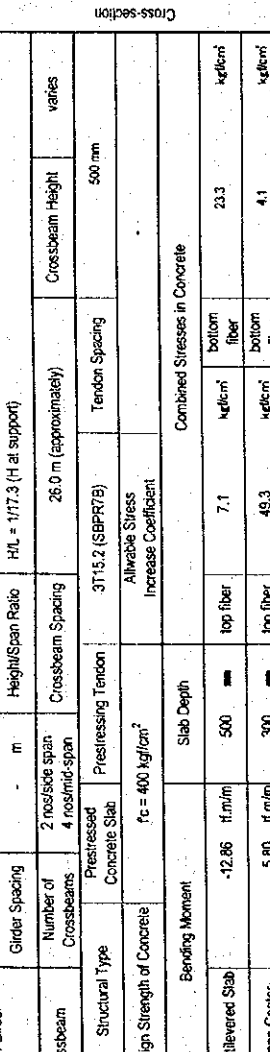
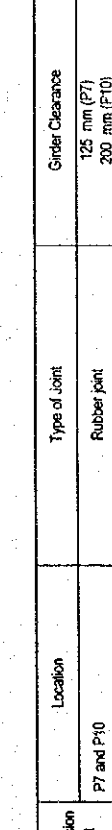


5.2 Superstructure

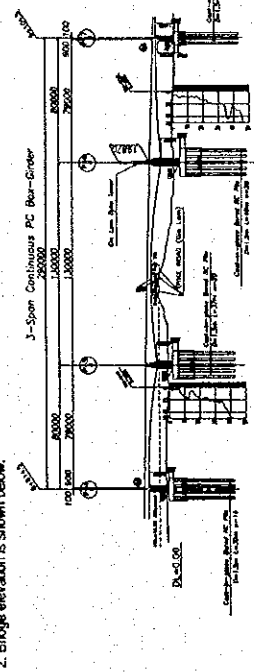
PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name	Red River Bridge Dyke Bridge (Tham Th Side)	Route	Had No.3 Ring Road	Road Alignment	straight	Skew Angle	90 degrees	Total Width	16.1 m	Seismic Coefficient	0.17
Structural Type	3-span continuous PC box girder	Bridge Length	280.0 m	Span Arrangement	79.0 + 130.0 + 79.0	Effective Width	15.0 m	Quantity/bridge	4,854	Quantity/ m^2 of concrete	1.52 m^2/m^3
Main Girder	Number of Girders	1 nos.	Girder Height	varies (2.75 - 7.5 m)	Maximum Displacement						
	Girder Spacing	m	Height/Span Ratio	H/L = 1/17.3 (1 at support)							
Crossbeam	Number of Crossbeams	2 nos/each span 4 nos/mid-span	Crossbeam Spacing	26.0 m (approximately)	Crossbeam Height						
	Structural Type	Prestressed Concrete Slab	Prestressing Tendon	3T15.2 (SBPR7B)	Tendon Spacing						
Design Strength of Concrete		$f_c = 400 \text{ kgf/cm}^2$		Allowable Stress Increase Coefficient							
Bending Moment		Slab Depth		Combined Stresses in Concrete							
Can'tilevered Slab	-12.86 $t/m/m$	500 mm	top fiber	7.1	bottom fiber	23.3					
Span Center	5.80 $t/m/m$	300 mm	top fiber	49.3	bottom fiber	4.1					
Intermediate Support	-6.66 $t/m/m$	500 mm	top fiber	26.4	bottom fiber	7.5					
Design Theory		Beam Theory		Prestressing Tendon		12T15.2 (SBPR7B)					
Construction Method		Cast-in-place Concrete Segment Balanced Cantilever Construction									
Unfactored Bending Moment		Location		Immediately after prestressing		at service load					
Center of Side Span	5,051 t/m	top fiber	combined stress	allowable stress	combined stress	allowable stress					
		bottom fiber	kgf/cm^2	kgf/cm^2	kgf/cm^2	kgf/cm^2	160.0				
Intermediate Support (Side Span)	-77,109 t/m	top fiber	kgf/cm^2	kgf/cm^2	kgf/cm^2	kgf/cm^2	-31.8				
		bottom fiber	kgf/cm^2	kgf/cm^2	kgf/cm^2	kgf/cm^2	-31.8				
Center of Internal Span	15,604 t/m	top fiber	kgf/cm^2	kgf/cm^2	kgf/cm^2	kgf/cm^2	160.0				
		bottom fiber	kgf/cm^2	kgf/cm^2	kgf/cm^2	kgf/cm^2	-31.8				
Shear Force Check Point		Unfactored Shear Force		Factored Shear Force		Diagonal Tension Stress		Slump			
at End Support	595 t	2,959 t	1,961 t	4,214 t	2-019@25/web	2-019@25/web	not provided				
at Internal Support	2,959 t	4,214 t	2-019@25/web	2-019@25/web	732@1,000						
Support Reaction		Unit		P7 (= P10)							
Dead Load, Rd	t	522									
Live Load, RL	t	226									
Total Reaction	t	748									
Bearing Capacity and Type		400 x 3 pot bearing									
Remarks		<p>1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 18th edition (1986)</p> <p>2. Bridge elevation is shown below.</p> <p>3. Quality of prestressing tendon does not include operation allowance.</p> <p>4. This design is also applied to the Dyke Bridge on Gila Lam Side.</p>									

PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

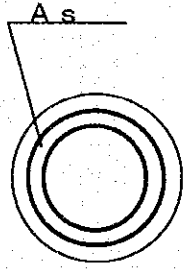
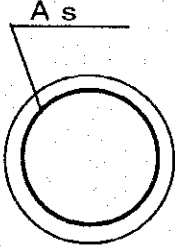
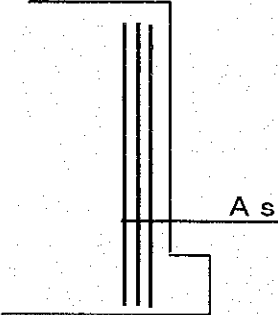
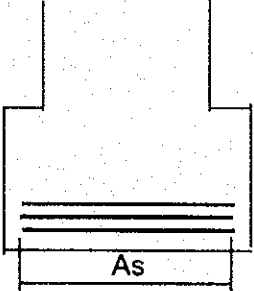
Bridge Name	Red River Bridge Dyke Bridge (Gis Lam Side)		Route	Hanoi No.3 Ring Road		Skew Angle	90 degrees		Total Width	16.1 m		Seismic Coefficient	0.17	
Structural Type	3-span continuous PC box girder		Bridge Length	290.0 m		Span Arrangement	79.0 + 130.0 + 79.0		Effective Width	15.0 m		longitudinal	0.17	
Main Girder	Number of Girders	1 nos.		Girder Height	varies (2.75 - 7.5 m)		Maximum Displacement							
	Girder Spacing	2 nos./side span 4 nos./mid-span		Height/Span Ratio	H/L = 1/17.3 (H at support)									
Crossbeam	Number of Crossbeams	2 nos./side span 4 nos./mid-span		Crossbeam Spacing	26.0 m (approximately)		Tendon Spacing	500 mm						
	Structural Type	Prestressed Concrete Slab		Prestressing Tendon	3T15.2 (SBPR7B)									
Design Strength of Concrete	fc = 400 kgf/cm ²		Allowable Stress Increase Coefficient											
Bending Moment	Slab Depth		Combined Stresses in Concrete											
Can'tilevered Slab	-12.86 ft.m/m	500 mm	top fiber	7.1 kgf/cm ²	bottom fiber	23.3 kgf/cm ²								
Span Center	5.80 ft.m/m	300 mm	top fiber	49.3 kgf/cm ²	bottom fiber	4.1 kgf/cm ²								
Intermediate Support	-6.66 ft.m/m	500 mm	top fiber	26.4 kgf/cm ²	bottom fiber	7.5 kgf/cm ²								
Design Theory	Beam Theory		Prestressing Tendon	12T15.2 (SBPR7B)										
Construction Method	Cast-in-place Concrete Segment Balanced Cantilever Construction													
Unfactored Bending Moment	Location	immediately after prestressing		allowable stress	at service load									
	combined stress	allowable stress	combined stress	allowable stress	allowable stress									
Center of Side Span	5.051 ft.m	top fiber	kgf/cm ²	kgf/cm ²	70.2 kgf/cm ²	160.0 kgf/cm ²								
		bottom fiber	kgf/cm ²	kgf/cm ²	-4.2 kgf/cm ²	-31.8 kgf/cm ²								
Intermediate Support (Side Span)	-77.109 ft.m	top fiber	kgf/cm ²	kgf/cm ²	-1.2 kgf/cm ²	-31.8 kgf/cm ²								
		bottom fiber	kgf/cm ²	kgf/cm ²	62.0 kgf/cm ²	160.0 kgf/cm ²								
Center of Internal Span	15.604 ft.m	top fiber	kgf/cm ²	kgf/cm ²	-7.3 kgf/cm ²	-31.8 kgf/cm ²								
		bottom fiber	kgf/cm ²	kgf/cm ²	96.8 kgf/cm ²	160.0 kgf/cm ²								
Shear Force Check Point at End Support	585 ft	Factored Shear Force		1,061 ft	Diagonal Tension Stress		Shrinkup		Vertical Prestressing Tendon					
at Internal Support	2,998 ft	4,214 ft		2-D19@125web		not provided		732@1,000						
Support Reaction	Unit	P44 (= P47)												
Dead Load, Rd	ft	522												
Live Load, Rl	ft	226												
Total Reaction	ft	748												
Bearing Capacity and Type	4008 x 3 pot bearing													

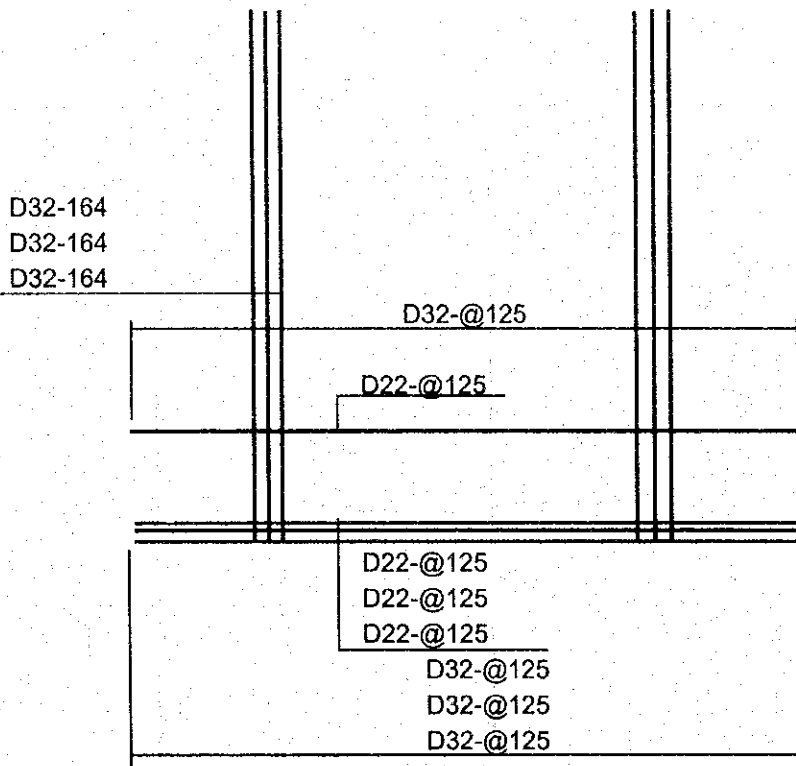
1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 18th edition (1996)
 2. Bridge elevation is shown below.



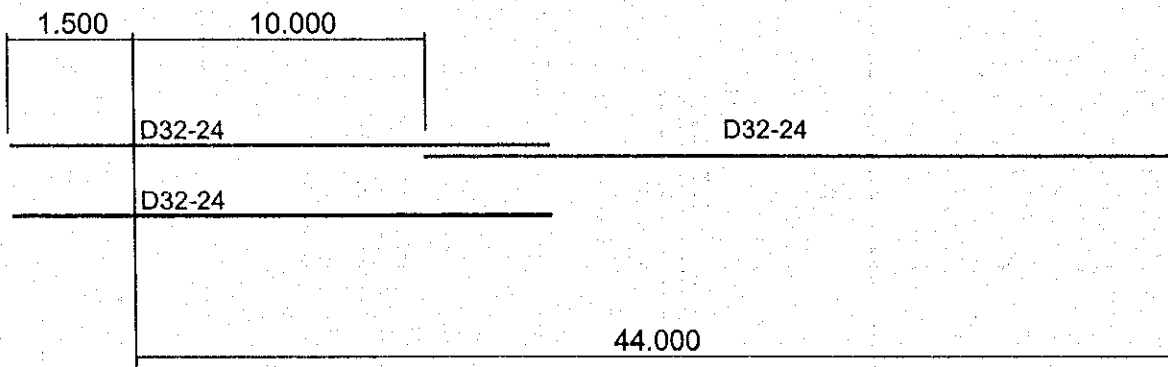
3. Quantity of prestressing tendon does not include operation allowance.
 4. This design is also applied to the Dyke Bridge on Gis Lam Side.

5.3 Substructure
DYKE BRIDGE THANH TRI SIDE
P8LR

Number of Pile	20		
Pile Length (m)	44.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.11 <	1.5
	Earthquake	0.43 <	1.5
Bearing Capacity (tf)	Usual	675 <	841
	Earthquake	930 <	1,286
Pile		As= D32-24 D32-24	1,640 < 1,840
		As= D32-24	----- < 1,840
Column		As= D32-164 D32-164 D32-164 (@125)	2,527 < 2,700
Footing		As = D32@125 D32@125 D32@125	2,626 < 2,700

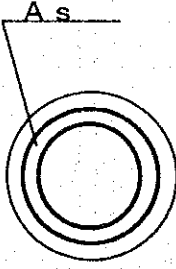
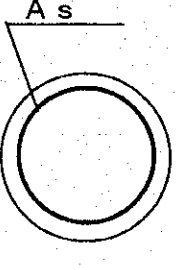
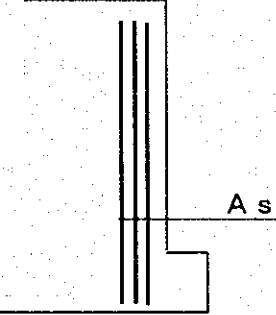
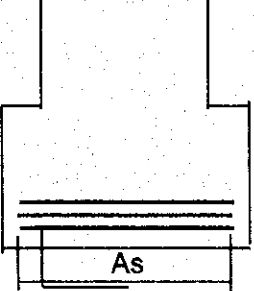


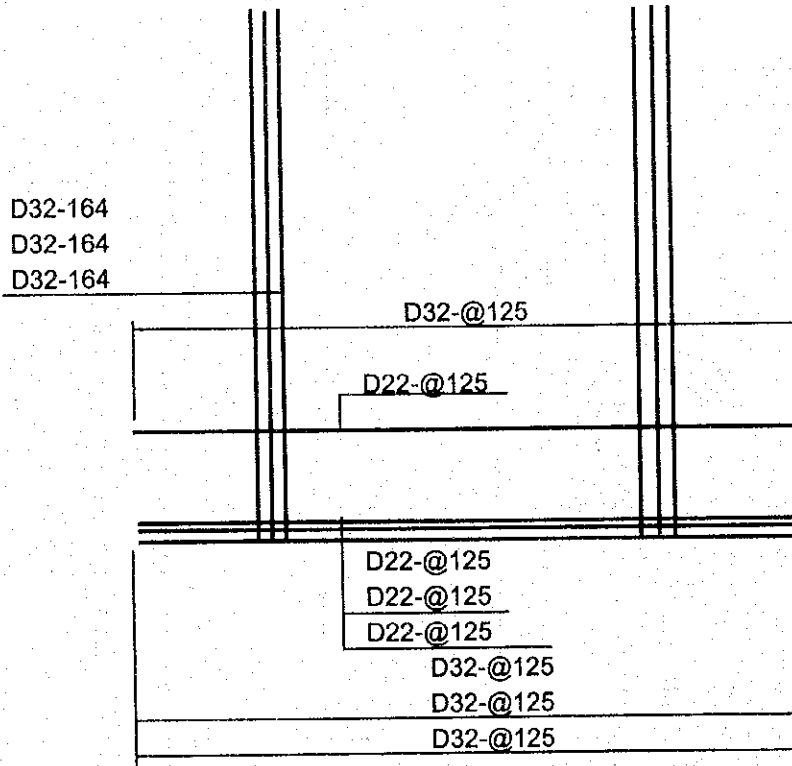
Pile



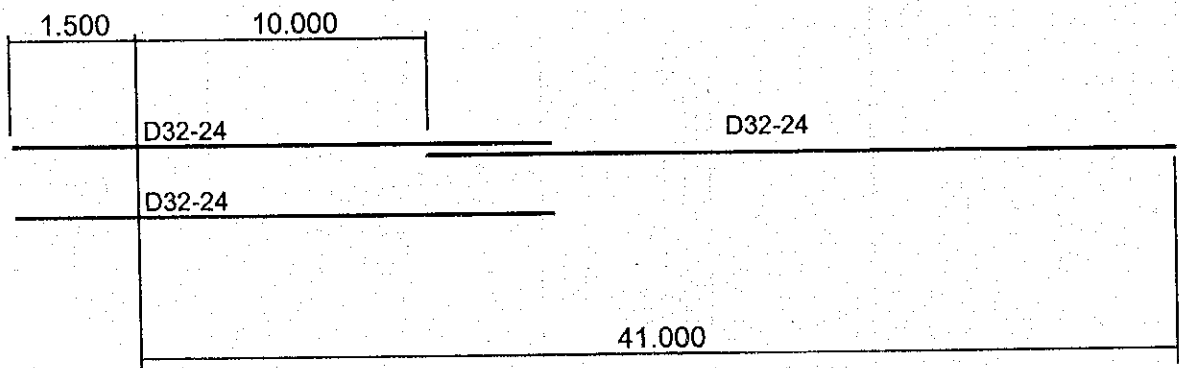
DYKE BRIDGE THANH TRI SIDE

P9LR

Number of Pile	20		
Pile Length (m)	41.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.50	< 1.5
	Earthquake	0.72	< 1.5
Bearing Capacity (tf)	Usual	616	< 981
	Earthquake	860	< 1,493
Pile		As= D32-24 D32-24	1,166 < 1,840
		As= D32-24	----- < 1,840
Column		As= D32-164 D32-164 D32-164 (@125)	2,527 < 2,700 (Refer to P8)
Footing		As = D32@125 D32@125 D32@125	2,626 < 2,700 (Refer to P8)

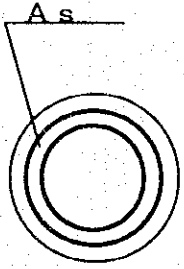
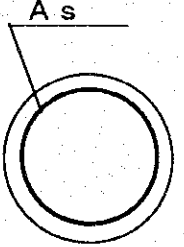
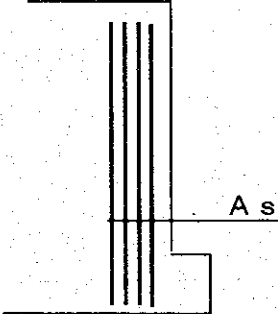
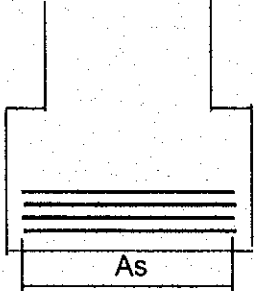


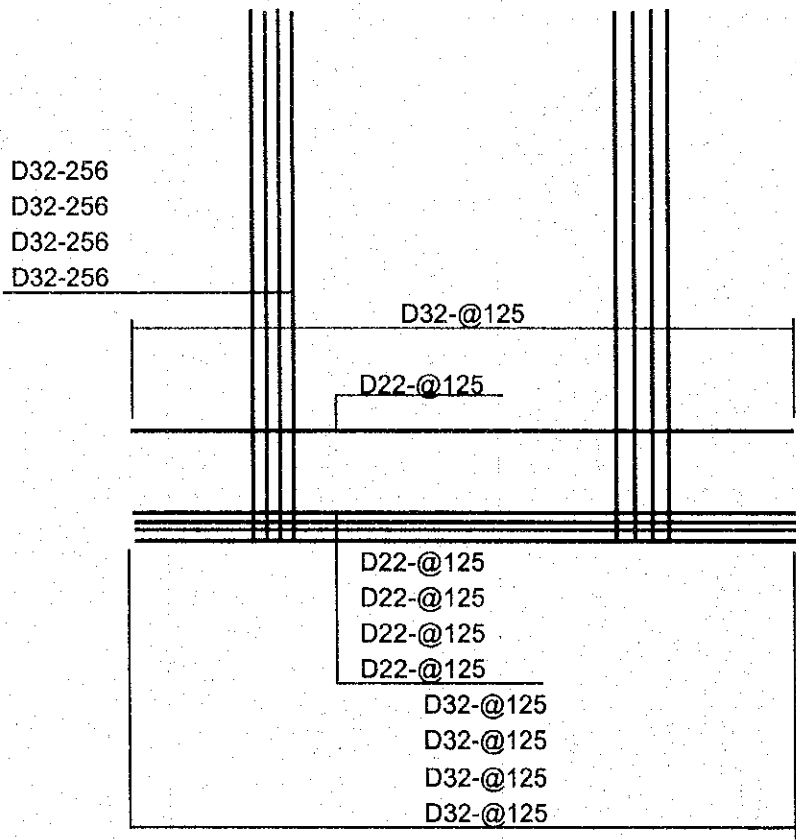
Pile



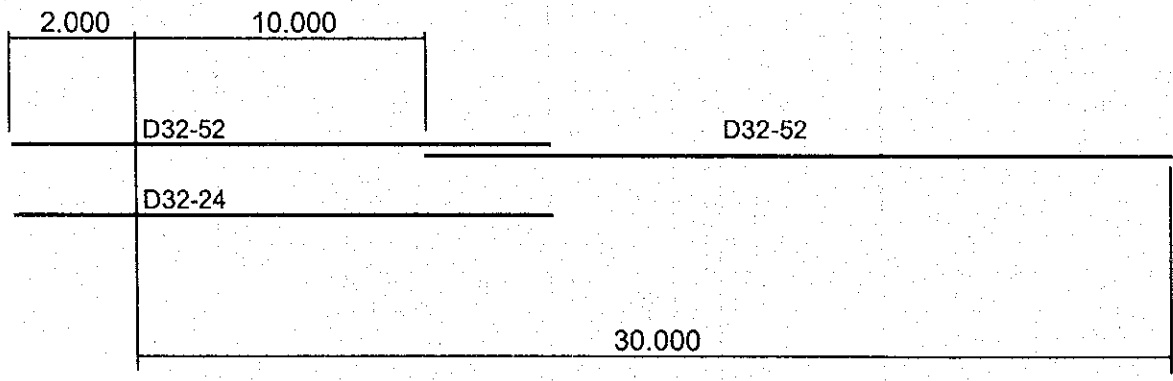
MAIN BRIDGE

P23

Number of Pile	64		
Pile Length (m)	30.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	0.46	< 1.5
	Earthquake	0.84	< 1.5
Bearing Capacity (tf)	Usual	969	< 1,033
	Earthquake	1,328	< 1,578
Pile		As= D32-52 D32-24	2,387 < 2,700
		As= D32-24	----- < 2,700
Column		As= D32-256 D32-256 D32-256 D32-256 (@125)	2,520 < 2,700
Footing		As = D32@125 D32@125 D32@125 D32@125	1,786 < 1,800

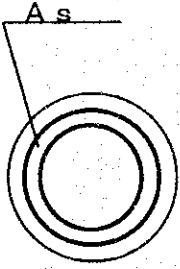
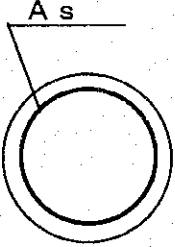
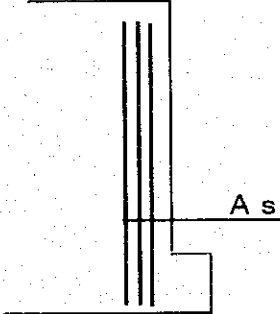
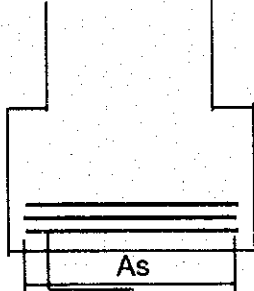


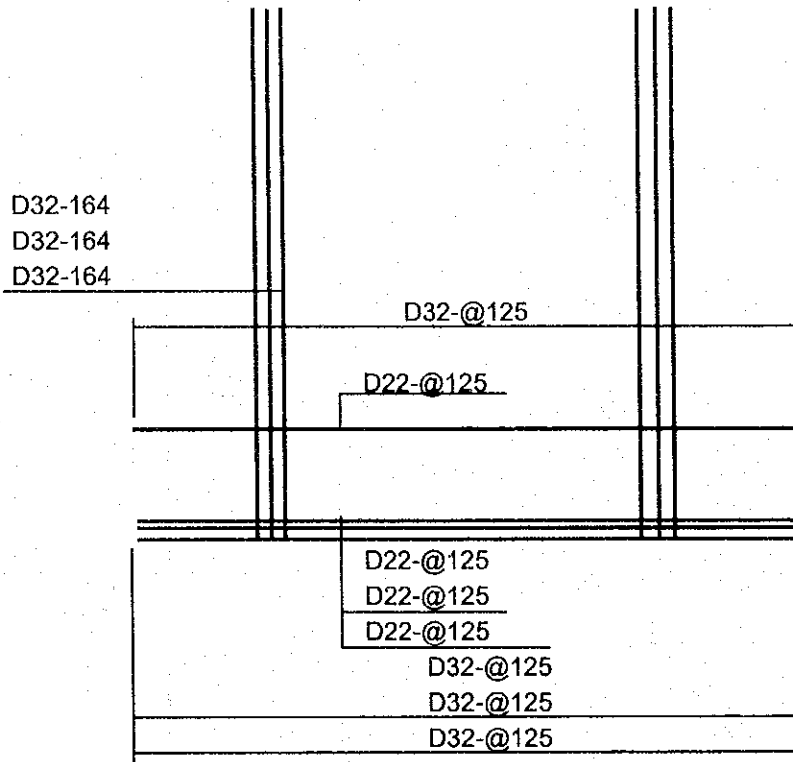
Pile



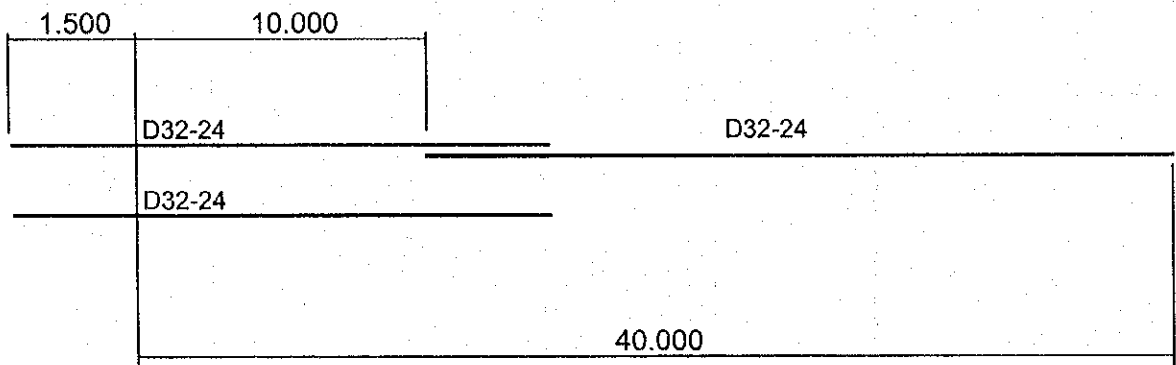
DYKE BRIDGE GIA LAM SIDE

P46LR

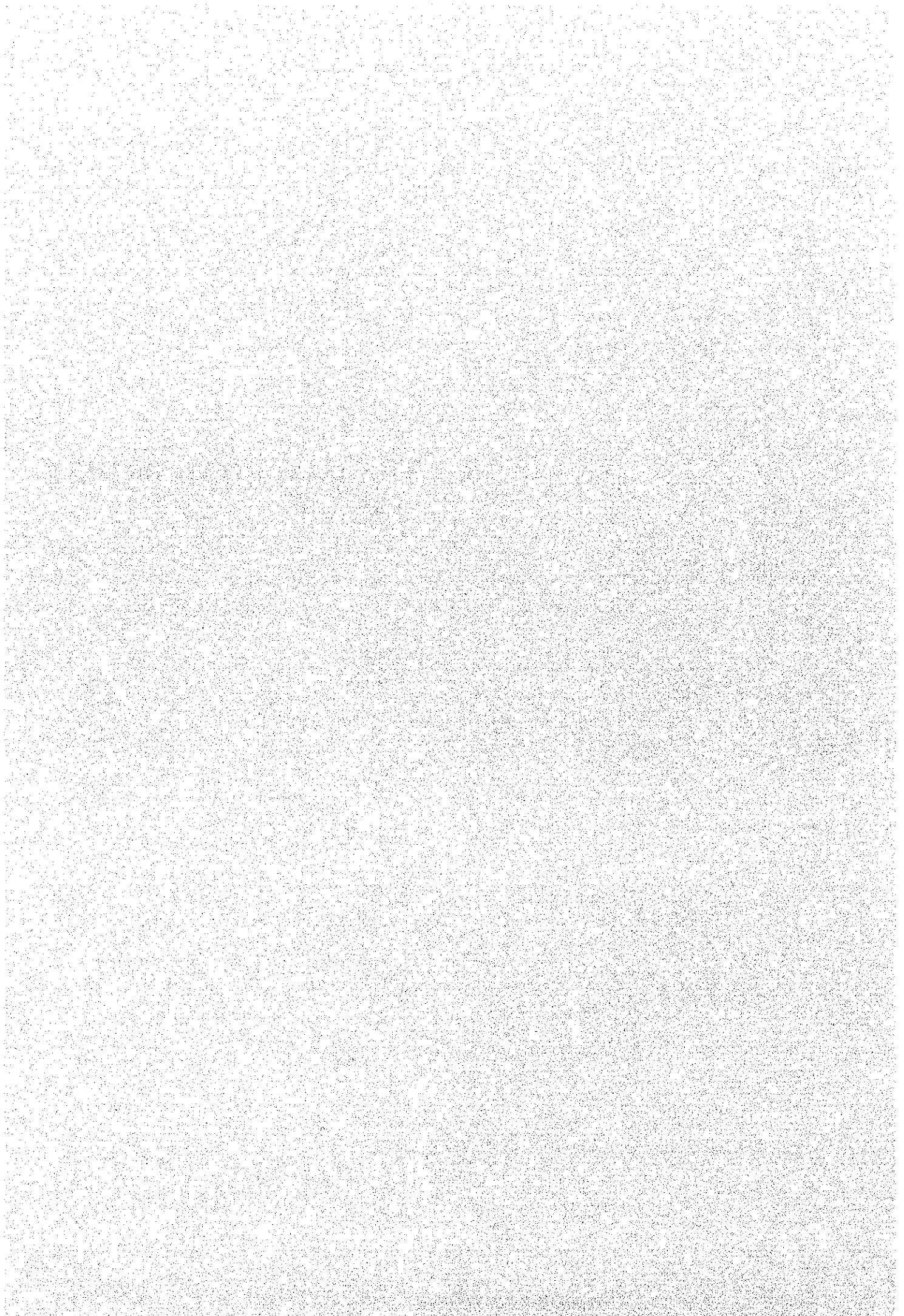
Number of Pile	20		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.16	< 1.5
	Earthquake	0.62	< 1.5
Bearing Capacity (tf)	Usual	631	< 837
	Earthquake	922	< 1,278
Pile		As= D32-24 D32-24	733 < 1,840
		As= D32-24	----- < 1,840
Column		As= D32-164 D32-164 D32-164 (@125)	2,527 < 2,700 (Refer to P8)
Footing		As = D32@125 D32@125 D32@125	2,530 < 2,700



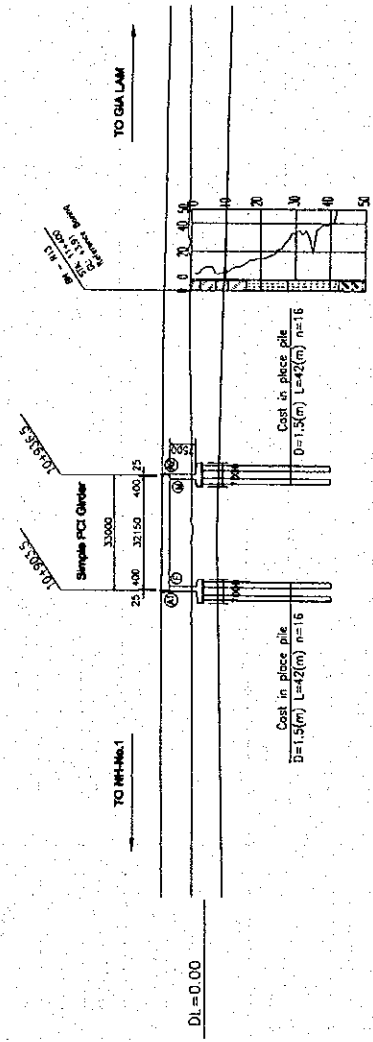
Pile



6. GIA LAM ROAD BRIDGE

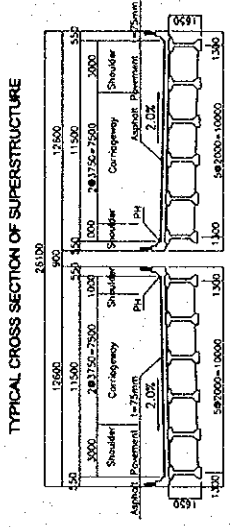


PROFILE (SCALE: 1:1500)

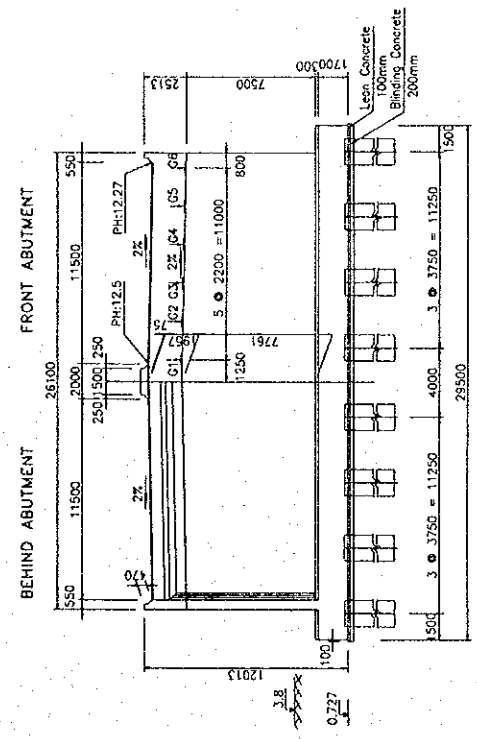


GRADE	ELEVATION	GROUND HEIGHT	STATION
	15.53		
	4.06	12.51	10+936.5
	13.53		10+920.0
	3.95	12.51	10+903.5

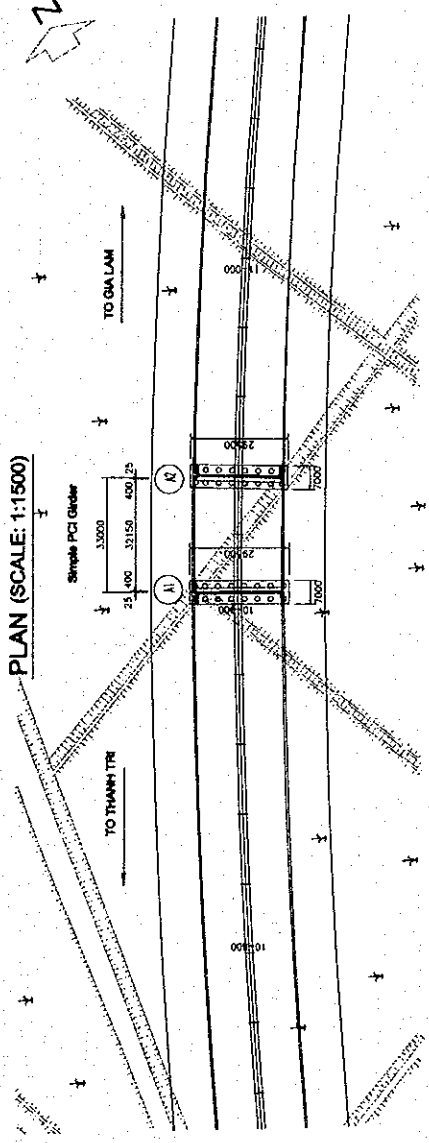
TYPICAL CROSS SECTION OF BRIDGE
(S=1/300)



TYPICAL CROSS SECTION OF SUBSTRUCTURE



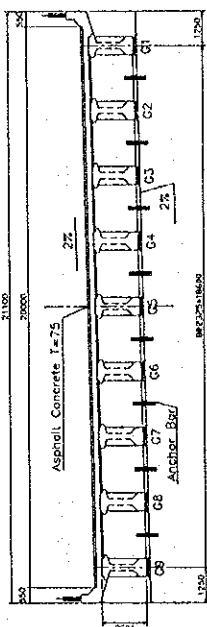
PLAN (SCALE: 1:1500)



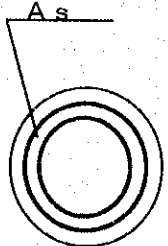
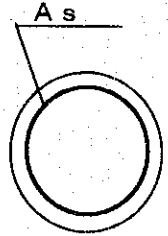
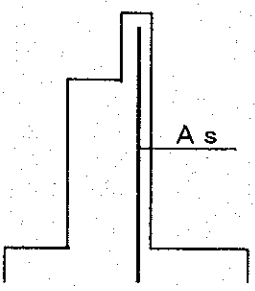
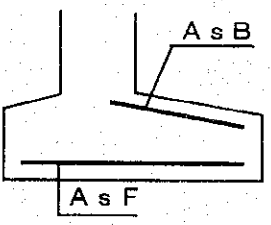
PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

6.2 Superstructure

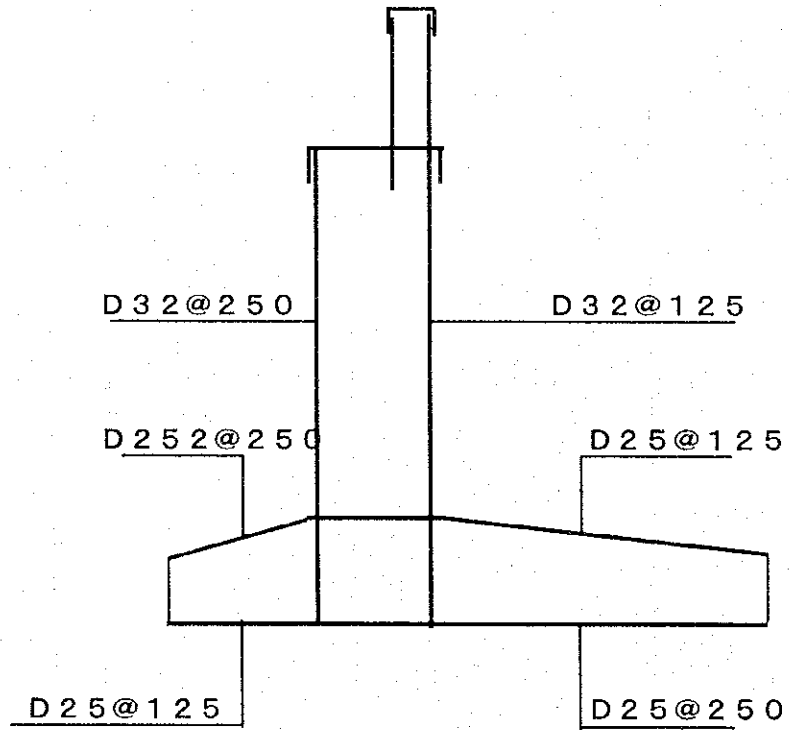
Bridge Name	Gta Lam Road Bridge	Route	Hanoi No. 3 Ring Road	Road Alignment	Skew Angle	90 degrees	Roadway Width	Total Width	21.1 m	Seismic Coefficient	0.17
Structural Type	Simple Span PC I-girder Bridge L = 33.0m, H = 1.65m	Bridge Length	33.0 m	Span Arrangement	32.15 m		Effective Width	20.0 m			0.17
Main Girder	Number of Girders: 1 nos. Girder Spacing: 2.325 m Height/Span Ratio: 1/19.5 (constant girder height)	Girder Height	1.65 m	Maximum Displacement	mm (1/-)						
Crossbeam	Number of Crossbeams: 3 nos./span Crossbeam Spacing: 8.0 m (approximately)	Crossbeam Height	1.57 m								
Structural Type	Reinforced Concrete Slab	Prestressing Tendon	Reinforcement Arrangement								
Design Strength of Concrete	f'c = 290 kgf/cm ²	Allowable Stress Increase Coefficient									
Bending Moment	Slab Depth	Stresses									
+ve & -ve	3.029 tf.m/m	200 mm	78.5 kgf/cm ² concrete	rebar	1.188 kgf/cm ²						
Design Theory	Beam Theory	Prestressing Tendon	12T12.7 (SBPR7B)								
Construction Method	Post-tensioned Precast Concrete Girder										
Unfactored Bending Moment/Girder	Location	Immediately after prestressing		at service load							
		combined stress	allowable stress	combined stress	allowable stress						
	top fiber	24.1 kgf/cm ²	-15.0 kgf/cm ²	- kgf/cm ²	- kgf/cm ²						
	bottom fiber	181.5 kgf/cm ²	198.0 kgf/cm ²	- kgf/cm ²	- kgf/cm ²						
total service load	top fiber	- kgf/cm ²	110.7 kgf/cm ²	160.0 kgf/cm ²							
	bottom fiber	- kgf/cm ²	-21.6 kgf/cm ²	-31.8 kgf/cm ²							
Shear Force Check Point at End Support	Unfactored Shear Force	Factored Shear Force/Girder	Diagonal Tension Stress	Stirrup	Vertical Prestressing Tendon						
	101 tf	159 tf	-	4-D13@125	not provided						
Support Reaction	Unit	Support 1 (= Support 2)									
Dead Load, Rd	tf	71.7									
Live Load, Rl	tf	20.7									
Total Reaction	tf	92.4									
Bearing Type	elastic bearing										
Support Reactions and Bearings											
Design of Main Girder											
Primary Construction Materials											
Concrete	Unit	Specification	Quantity/Girder	Quantity							
Side	m ³	f'c = 400 kgf/cm ²	24.6	128.5							
Bottom	m ³	-	21.4	0.87 m ² /m ³							
Reinforcing Bar	kgf	SD295A (JIS G3112)	3.237	131.6 kgf/m ³							
longitudinal	kgf	12T15.2 (SBPR7B)	1.588	64.6 kgf/m ³							
transverse (deck slab)	kgf	3T15.2 (SBPR7B)	-	-							
transverse (crossbeam)	kgf	4T15.2 (SBPR7B)	-	-							
Total	kgf	-	1.588	-							
1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)											
2. Nomenclature of supports are as follows.											
3. Quantity of prestressing tendon includes operation allowance of 1.5m/each.											
Remarks											



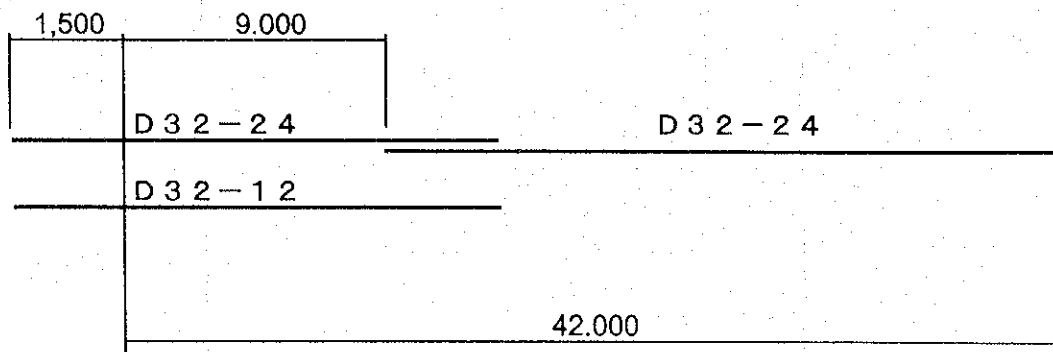
6.3 Substructure
 Gia Lam Road Bridge
 A1, A2

Number of Pile	16		
Pile Length (m)	42.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.678	< 1.5
	Earthquake	1.201	< 1.5
Bearing Capacity (tf)	Usual	418	< 1,005
	Earthquake	603	< 1,477
Pile		$A_s = D32-24$ $D32-12$	2,213 < 2,700
		$A_s = D32-24$	1,461 < 2,700
Body		$A_s = D32@125$	2,250 < 2,700
Footing		$A_s F = D25@125$ $A_s B = D25@125$	2,160 < 2,700

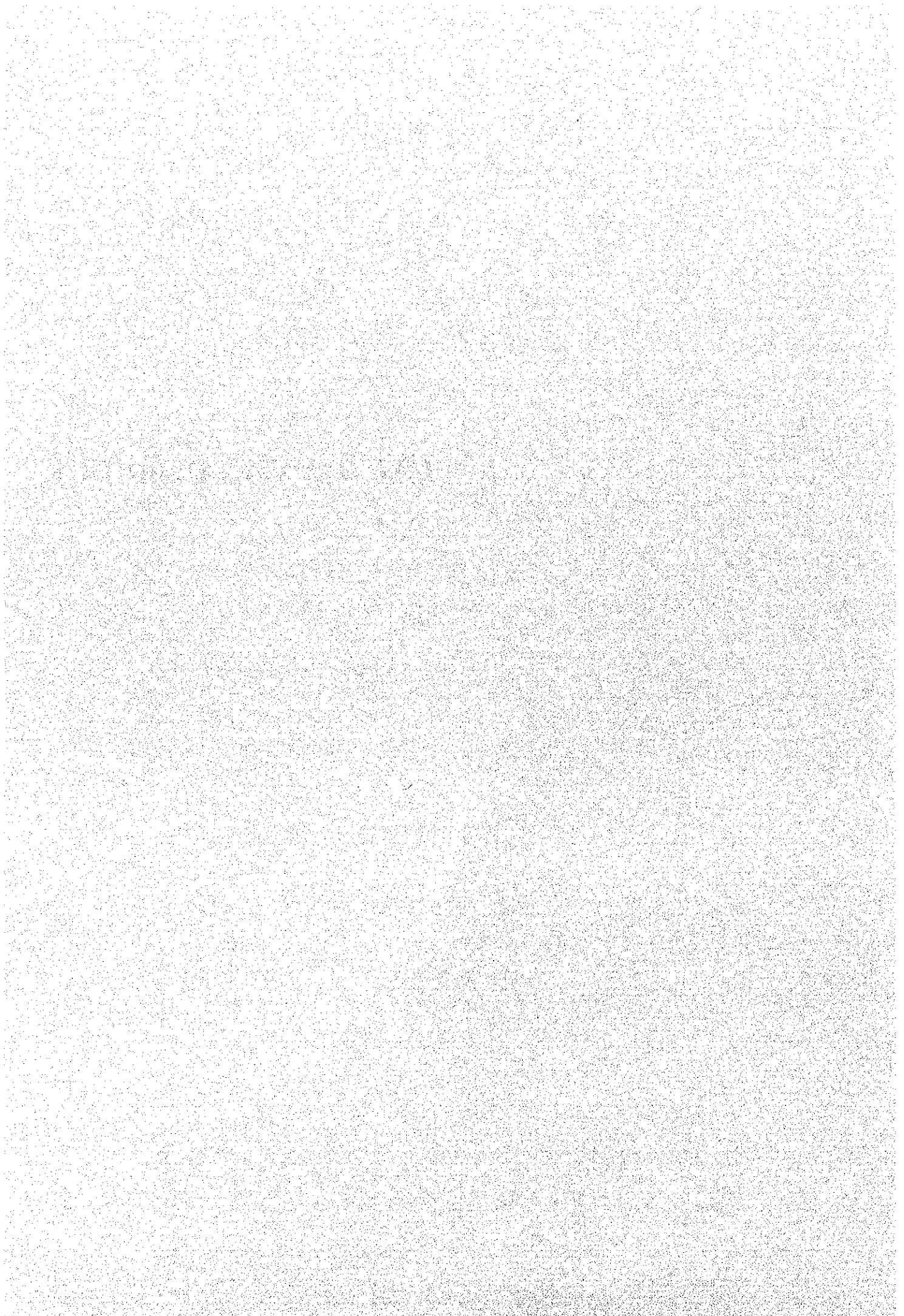
Body & Footing



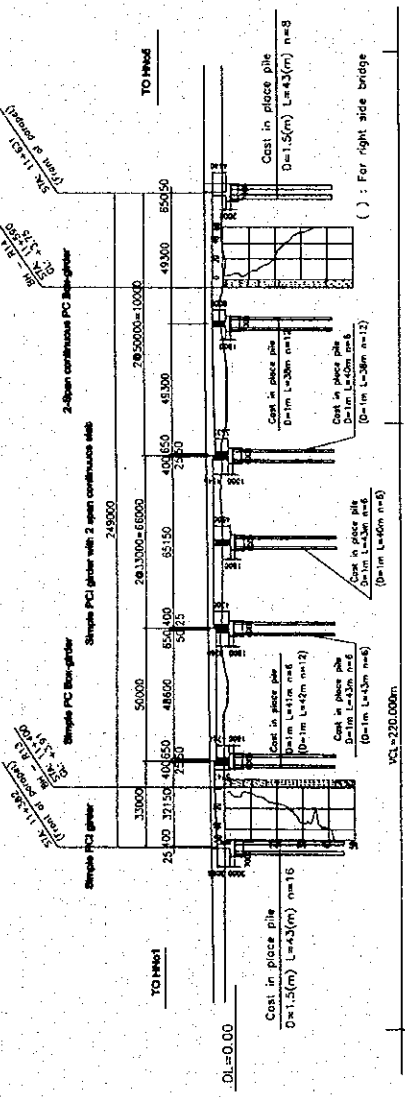
Pile



7. CAU BAY CANAL BRIDGE

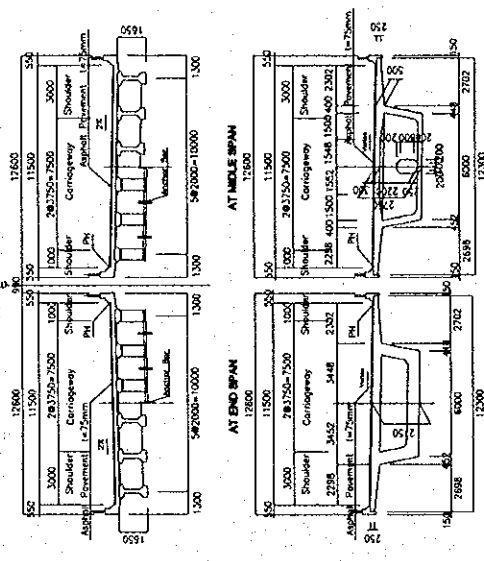


PROFILE - LEFT SIDE BRIDGE
SCALE 1:2000

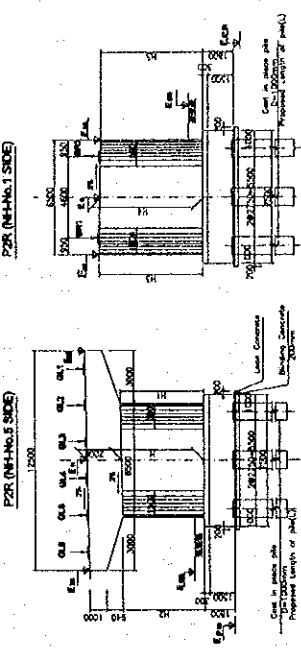


TYPICAL CROSS SECTION OF BRIDGE (SCALE 1:300)

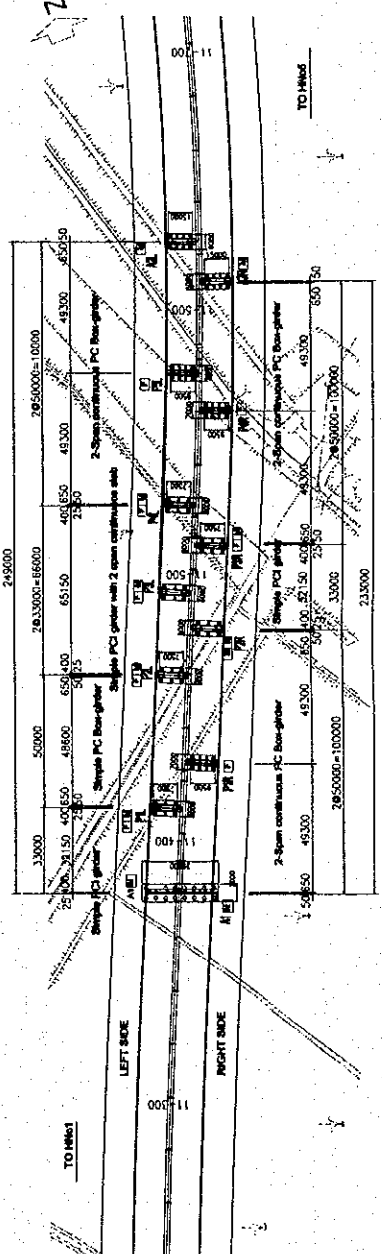
TYPICAL CROSS SECTION OF SUPERSTRUCTURE



TYPICAL CROSS SECTION OF SUBSTRUCTURE



PLANE



GRADE	ELEVATION	GROUND HEIGHT	STATION
8.470	4.01		11+320
10.600	9.912	2.80	11+415
10.600	10.067	4.11	11+427.5
10.600	10.091	4.45	11+430
10.600	10.352	4.45	11+465
10.600	10.452	4.40	11+448.2
10.600	10.596	4.40	11+498
10.600	10.572	4.40	11+515
10.600	10.586	4.40	11+531
10.600	10.600	2.00	11+540
10.600	10.600	2.00	11+565
10.600	10.600	3.15	11+581
10.600	10.600	3.67	11+615
10.600	10.600	3.68	11+631
10.600	10.600	3.68	11+680

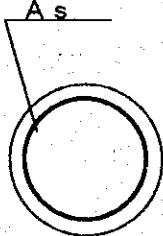
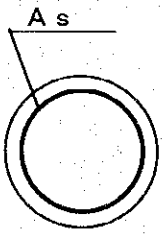
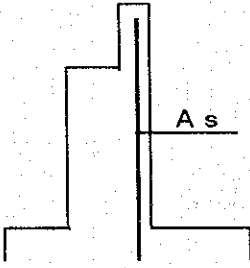
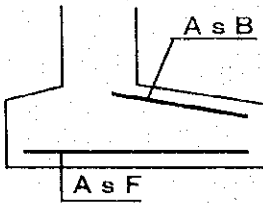
PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

7.2 Superstructure

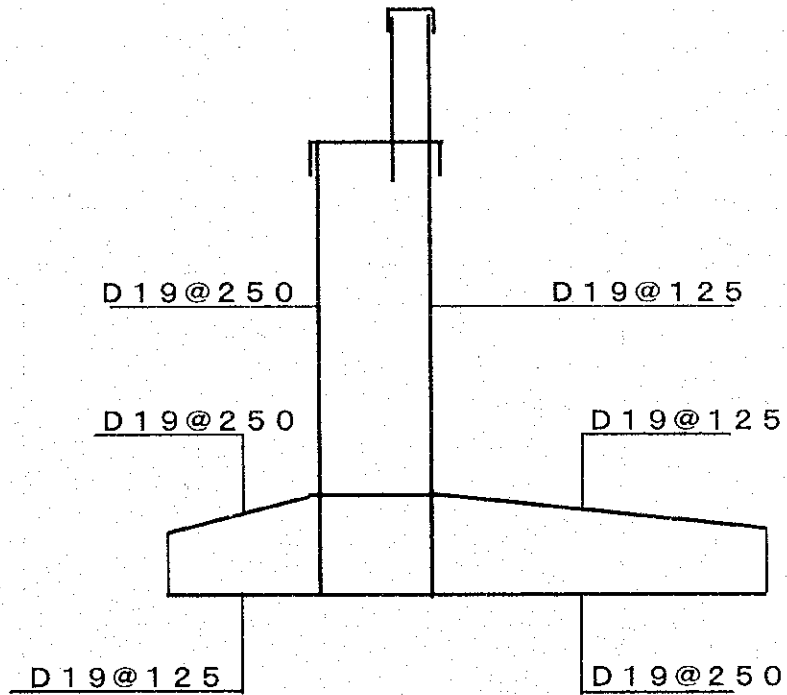
Bridge Name	Gao Bay Canal Bridge		Route	Haoi No. 3 Ring Road	Road Alignment	A = 700 & 575.5	Skew Angle	90 degrees	90 degrees	Total Width	11.5 m	Seismic Coefficient	0.17
Structural Type	2-span Continuous Box Girder		Bridge Length	100.0 m	Span Arrangement	49.3 + 49.3 m	Span Arrangement	49.3 + 49.3 m	90 degrees	Effective Width	12.1 m	Seismic Coefficient	0.17
Main Girder	Number of Girders	1 nos.	Girder Height	2.75 m	Maximum Displacement	mm (1/—)							
	Girder Spacing	— m	H/L = 1/17.9 (constant girder height)										
Crossbeam	Number of Crossbeams	2 nos./span	Crossbeam Spacing	16.0 m (approximately)	Grossbeam Height	2.0 m							
	Structural Type	Prestressing Tendon	4T15.2 (SBPR7B)	Tendon Spacing	500 mm								
Design Strength of Concrete	f'c = 400 kgf/cm ²		Allowable Stress Increase Coefficient										
Bending Moment	Slab Depth		Combined Stresses in Concrete										
	Cantilevered Slab	-13.89 tf.m/m	500 mm	top fiber	19.6 kgf/cm ²	bottom fiber	22.7 kgf/cm ²						
Span Center	10.41 tf.m/m	300 mm	top fiber	69.4 kgf/cm ²	bottom fiber	5.4 kgf/cm ²							
Design Theory	Beam Theory		Prestressing Tendon	12T15.2 (SBPR7B)									
Construction Method	Construction on Fixed Staging												
Unfactored Bending Moment	Span Center	5.806 tf.m	Location	Immediately after prestressing		at service load							
		top fiber	combined stress	allowable stress	combined stress	allowable stress							
	bottom fiber	— kgf/cm ²	— kgf/cm ²	56.6 kgf/cm ²	160.0 kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²
	Intermediate Support	-7.501 tf.m	top fiber	— kgf/cm ²	— kgf/cm ²	14.0 kgf/cm ²	-31.8 kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²	— kgf/cm ²
bottom fiber	— kgf/cm ²	— kgf/cm ²	-6.4 kgf/cm ²	-31.8 kgf/cm ²	76.0 kgf/cm ²	160.0 kgf/cm ²							
Shear Force Check Point at End Support	538 tf	Unfactored Shear Force	Factored Shear Force	793 tf	Diagonal Tension Stress	Stirrup	2-D19@125/web	Vertical Prestressing Tendon	not provided				
at Internal Support	954 tf	1,378 tf	Support 1 (= Support 3)	Support 2	Support 3	Support 1	Support 2	Support 3					
Dead Load, Rd	561 tf	1,603 tf											
Live Load, Rl	123 tf	291 tf											
Total Reaction	684 tf	1,894 tf											
Bearing Capacity and Type	500tf x 2 pot bearing	950tf x 2 pot bearing											
Design of Main Girder	Primary Construction Materials												
Deck Slab Design	Items	Unit	Specification	Quantity/bridge	Quantity/1m ² of concrete								
	Concrete	m ³	f'c = 400 kgf/cm ²	924	—								
	External Formwork	m ²	—	1,684	1.82 m ² /m ³								
	Internal Formwork	m ²	—	1,123	1.22 m ² /m ³								
	Reinforcing Bar	kgf	S0295A (JIS G3112)	132,683	143.6 kgf/m ³								
	longitudinal	kgf	12T15.2 (SBPR7B)	30,828	33.4 kgf/m ³								
transverse (deck slab)	kgf	3T15.2 (SBPR7B)	10,469	11.3 kgf/m ³									
transverse (crossbeam)	kgf	4T15.2 (SBPR7B)	895	0.97 kgf/m ³									
Total	kgf	—	42,192	—									
1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)													
2. Nomenclature of supports are as follows.													
3. Quantity of prestressing tendon does not include operation allowance.													
Support Reaction and Bearings	Unit	Support 1 (= Support 3)	Support 2	Support 3									
Dead Load, Rd	tf	561	1,603	291									
Live Load, Rl	tf	123	291	1,894									
Total Reaction	tf	684	1,894	950tf x 2 pot bearing									
Bearing Capacity and Type	tf	500tf x 2 pot bearing	950tf x 2 pot bearing										
Remarks	<p>1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)</p> <p>2. Nomenclature of supports are as follows.</p> <p>3. Quantity of prestressing tendon does not include operation allowance.</p>												

7.3 Substructure
Cau Bay Canal Bridge

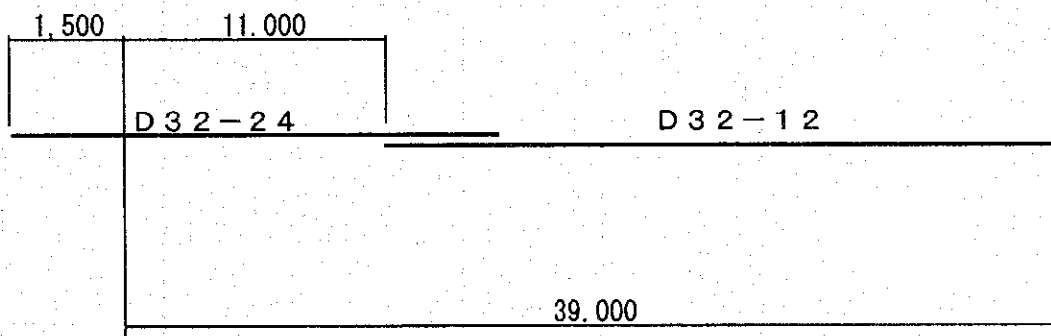
A1, A2

Number of Pile	8		
Pile Length (m)	39.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.709	< 1.5
	Earthquake	1.206	< 1.5
Bearing Capacity (tf)	Usual	382	< 1052
	Earthquake	502	< 1,549
Pile		$A_s = D32-24$	2,322 < 2,700
		$A_s = D32-12$	1,824 < 2,700
Body		$A_s = D19@125$	2,570 < 2,700
Footing		$A_s F = D19@125$ $A_s B = D19@125$	2,289 < 2,700

Body & Footing

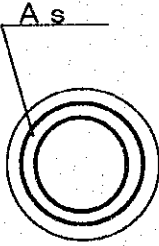
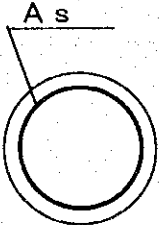
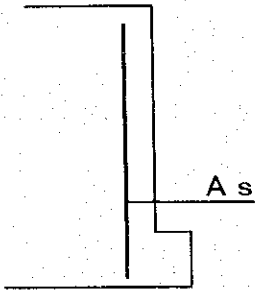
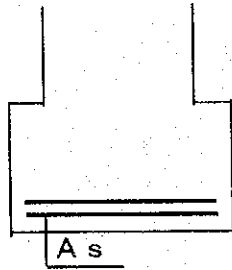


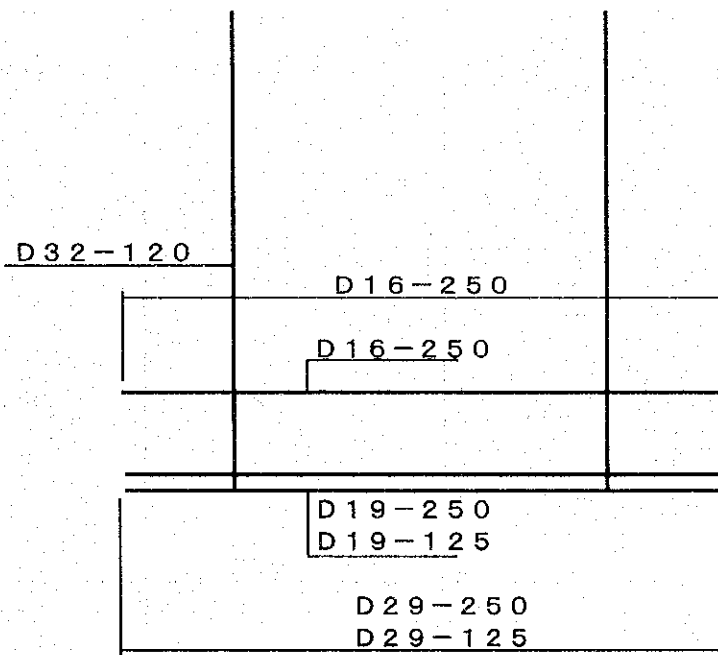
Pile



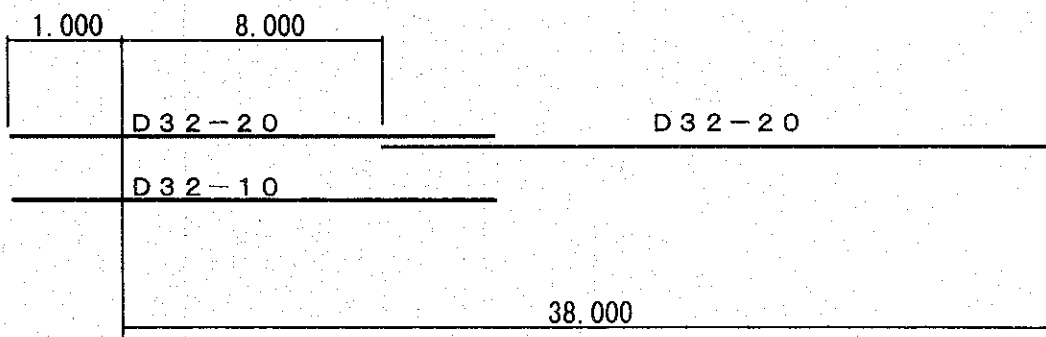
Cau Bay Canal Bridge

Pier P1R·P4R·P5L

Number of Pile	12		
Pile Length (m)	38.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.043	< 1.5
Bearing Capacity (tf)	Usual	202	< 654
	Earthquake	537	< 968
Pile		$A_s = D32-20$ $D32-10$	2,253 < 2,700
		$A_s = D32-10$	2,040 < 2,700
Column		$A_s = D32-120$ (@125)	2,412 < 2,700
Footing		$A_s = D19@125$ $D19@250$	1,414 < 1,600

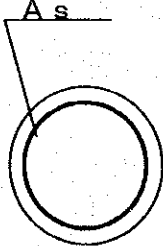
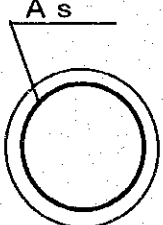
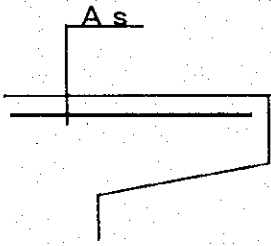
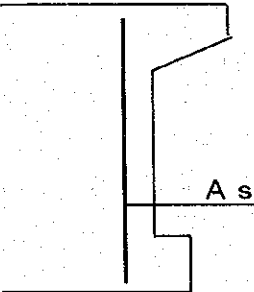


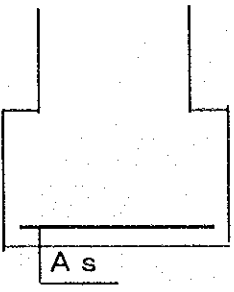
Pile

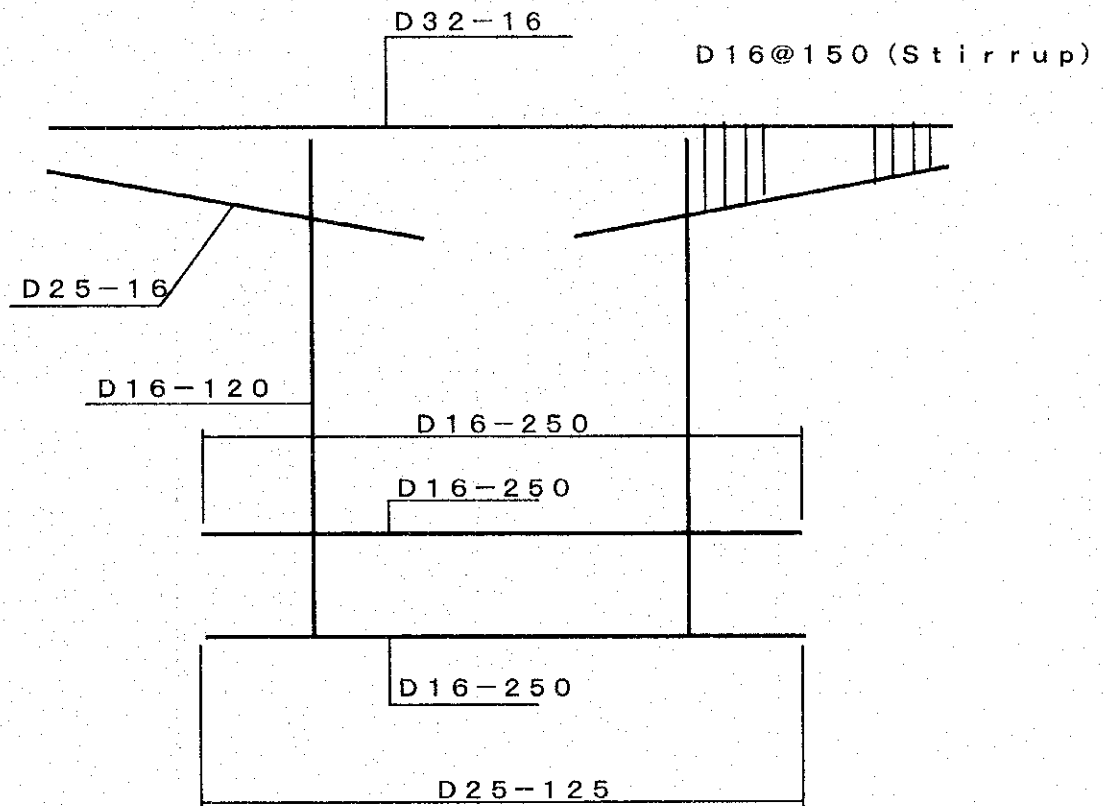


Cau Bay Canal Bridge

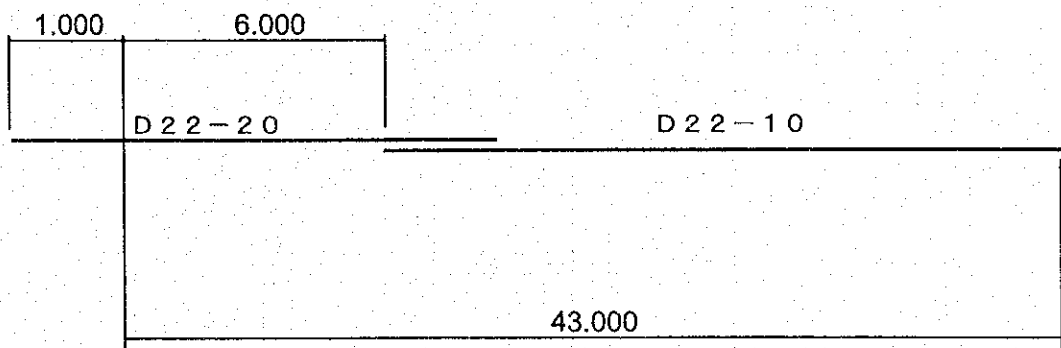
Pier P3L

Number of Pile	6		
Pile Length (m)	43.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.542	< 1.5
Bearing Capacity (tf)	Usual	243	< 639
	Earthquake	388	< 944
Pile		As = D 22 - 20	2,506 < 2,700
		As = D 22 - 10	2,663 < 2,700
Beam		As = D 32 - 16	1,703 < 1,800
Column		As = D 16 - 120 (@ 125)	e e e e < 2,700

Foot i		As = D16@250	e e e e < 1,600
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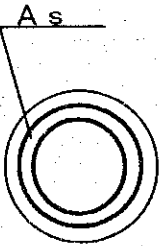
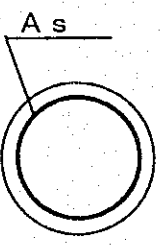
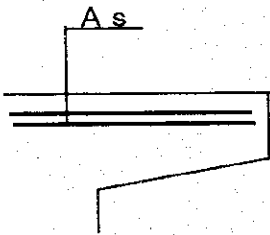
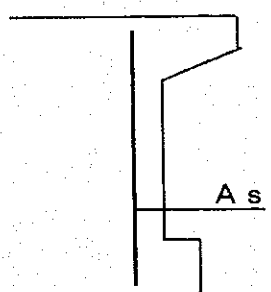


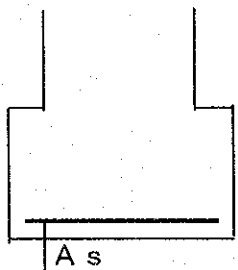
P i l e

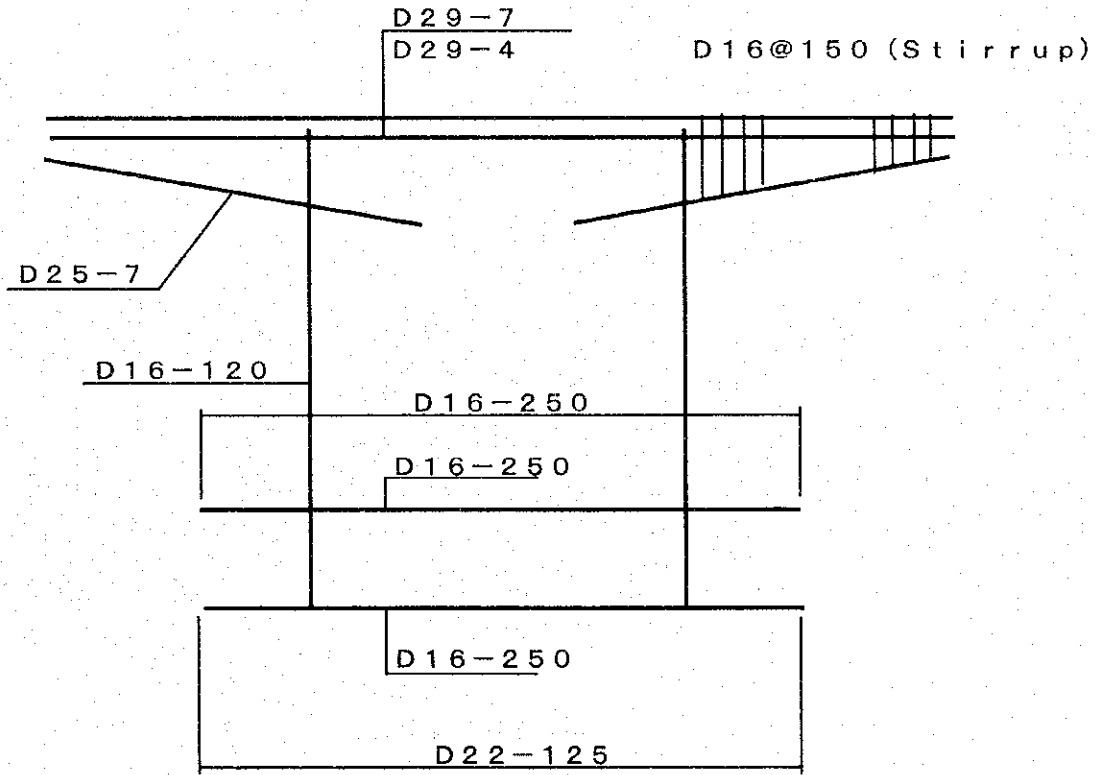


Cau Bay Canal Bridge

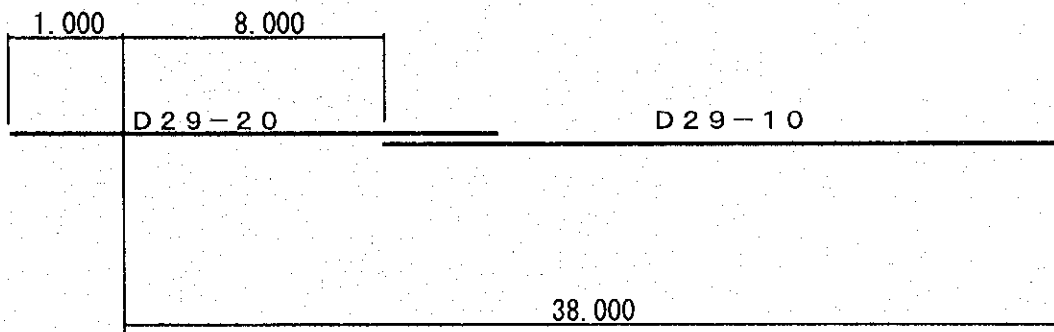
Pier P1L · P2L · P4L · P2R · P3R

Number of Pile	6		
Pile Length (m)	38.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.052	< 1.5
	Earthquake	0.957	< 1.5
Bearing Capacity (tf)	Usual	330	< 625
	Earthquake	555	< 927
Pile		$A_s = D29-20$ $D29-10$	$2,423 < 2,700$
		$A_s = D29-10$	$2,059 < 2,700$
Beam		$A_s = D29-7$ $D29-4$	$1,557 < 1,800$
Column		$A_s = D16-128$ (@125)	$2,553 < 2,700$

Foot i		A s = D16@125	1,415 < 1,600
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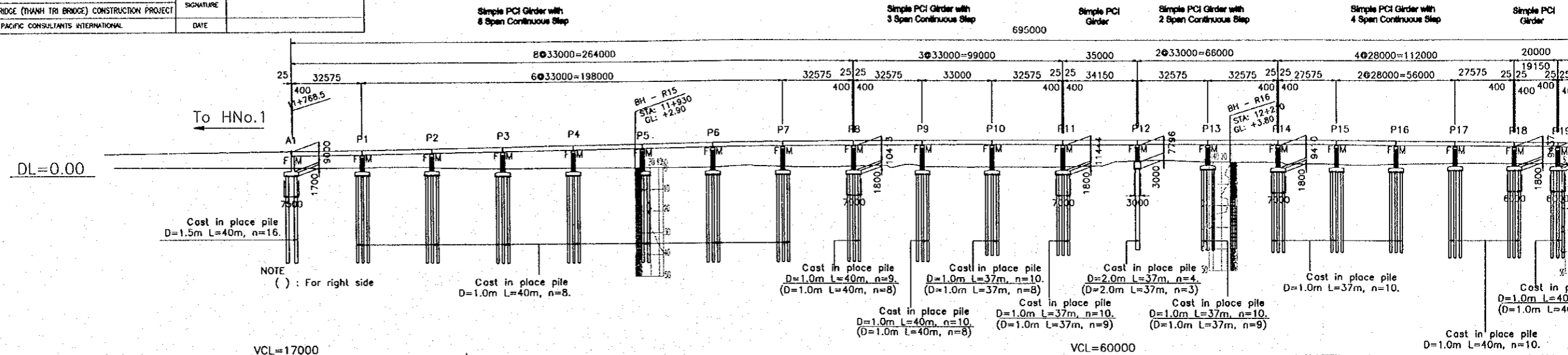
P i l e



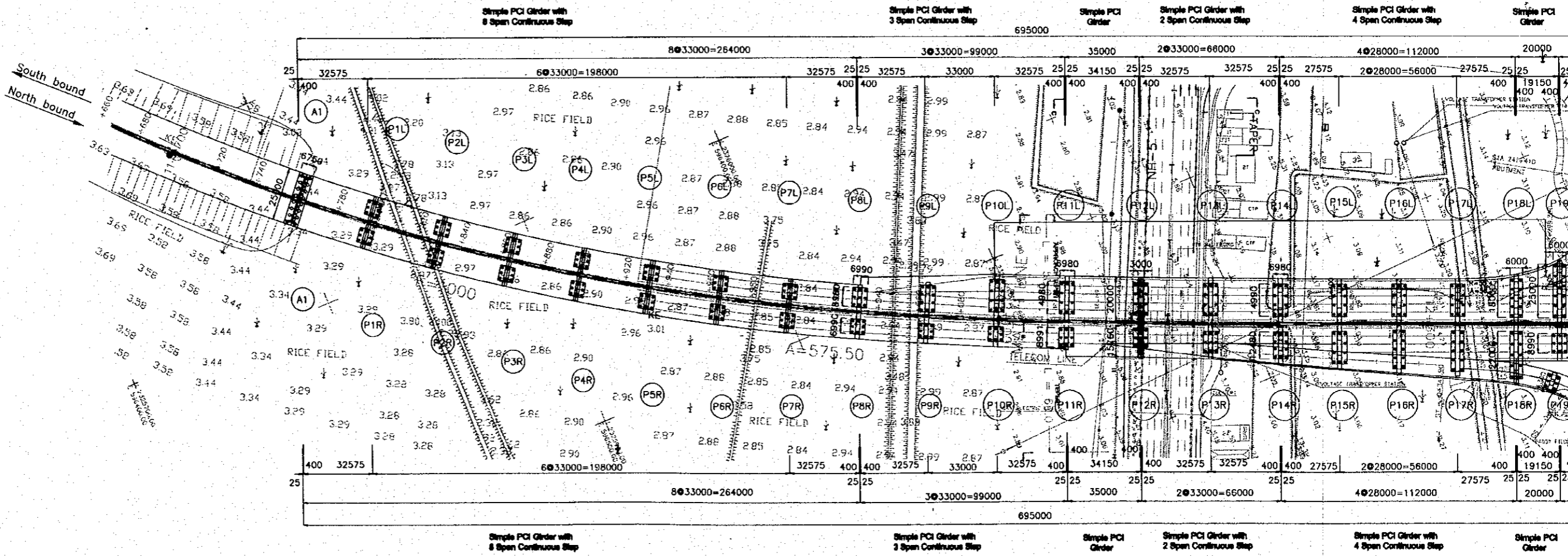
8. NATIONAL HIGHWAY NO.5 FLYOVER

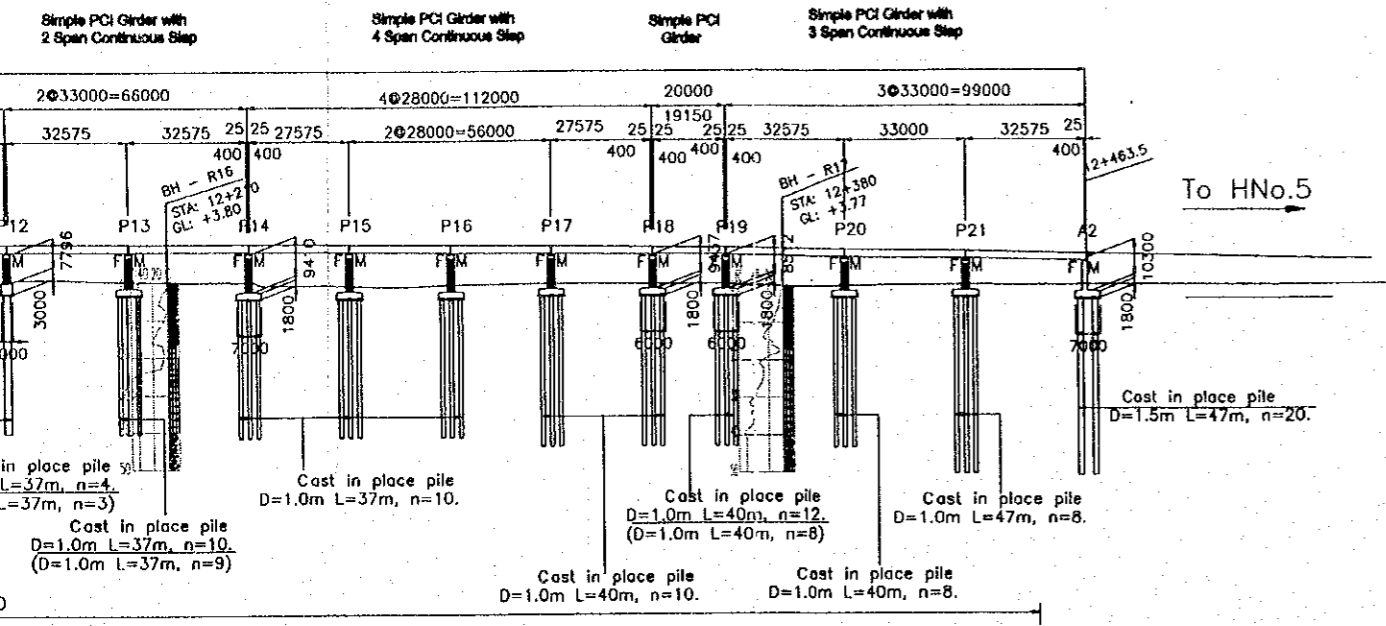
THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM THANG LONG PROJECTS MANAGEMENT UNIT, MINISTRY OF TRANSPORT		DESIGNED BY S. WATABE
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		NAME
PROJECT RED RIVER BRIDGE (THANH TRI BRIDGE) CONSTRUCTION PROJECT	SIGNATURE	
CONSULTANT PACIFIC CONSULTANTS INTERNATIONAL	DATE	

PROFILE - LEFT SIDE BRIDGE



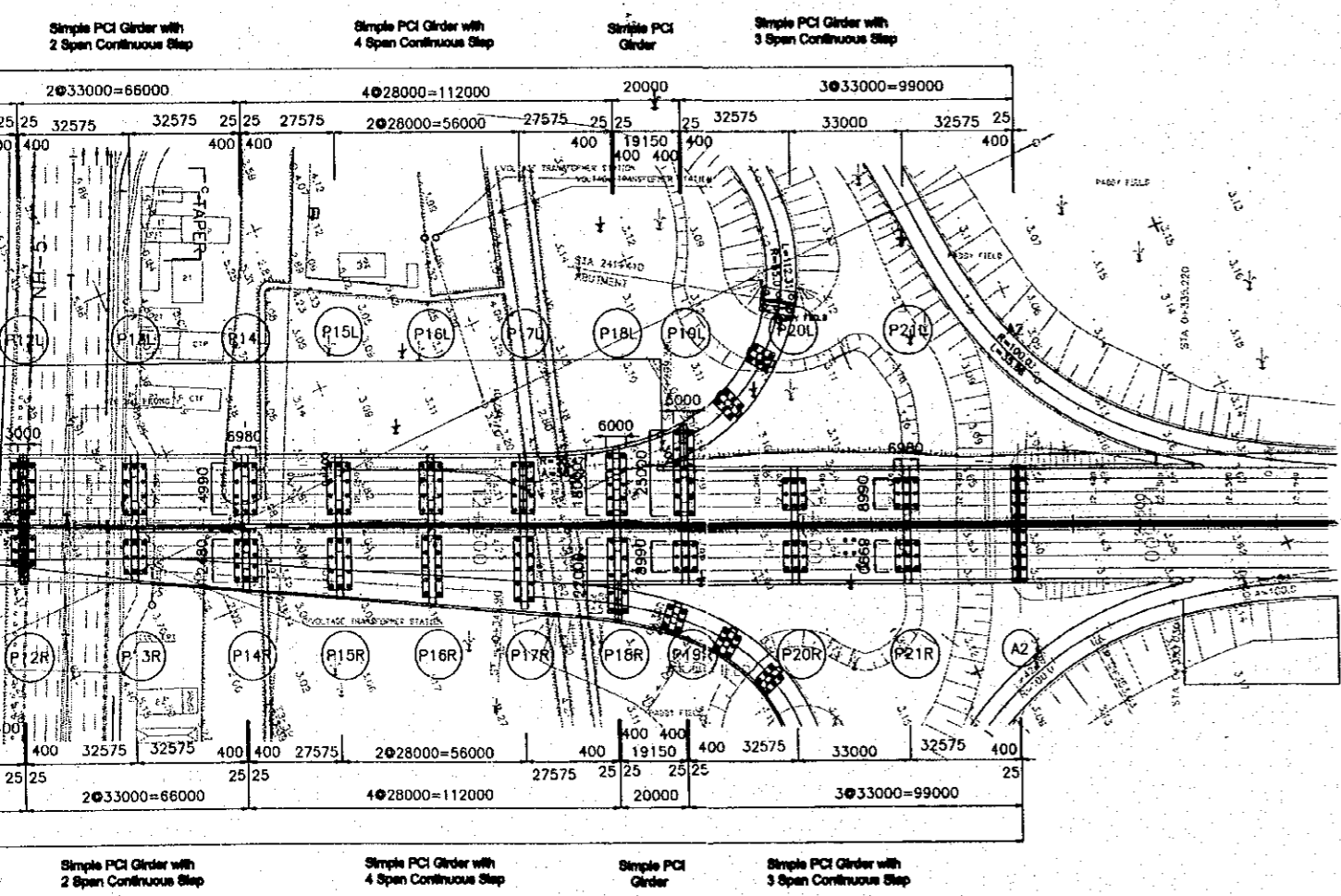
GRADE	i=0% Level		i=2.00% L=385.0m																					
ELEVATION	10.600	10.600	10.170	11.061	11.468	12.004	12.641	13.227	13.740	14.179	14.546	14.841	15.063	15.212	15.289	15.299	15.291	15.219	15.074	14.894	14.662	14.378	14.041	13.768
GROUND HEIGHT			3.423	3.409	3.490	3.485	2.860	2.890	2.924	2.906	3.077	3.092	3.094	2.888	2.972	3.397	5.609	5.239	4.938	3.823	4.005	4.274	4.110	4.000
STATION			11+765.0	11+768.5	11+801.5	11+834.5	11+867.5	11+900.5	11+933.5	11+966.5	11+999.5	12+032.5	12+065.5	12+098.5	12+131.5	12+150.0	12+166.5	12+199.5	12+232.5	12+260.5	12+288.5	12+316.5	12+344.5	12+364.5





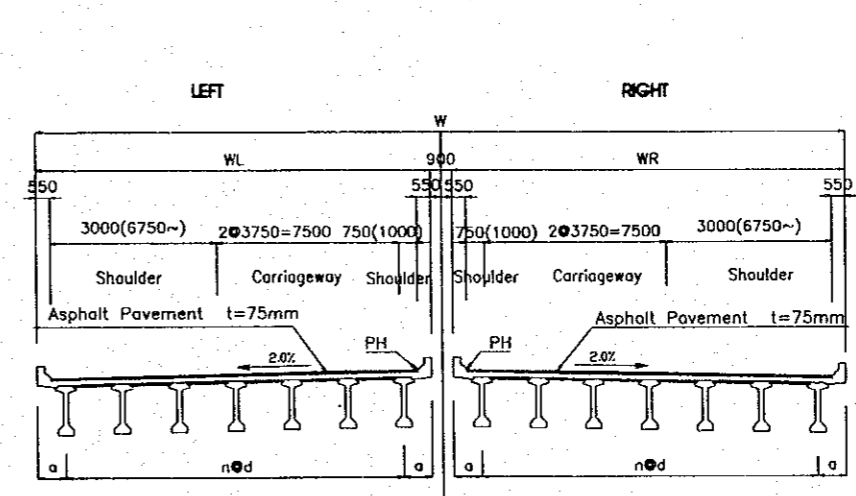
i=2.00%

12+166.5	12+199.5	12+232.5	12+260.5	12+288.5	12+316.5	12+344.5	12+364.5	12+397.5	12+430.5	12+463.5
5.239	4.938	3.823	4.005	4.274	4.110	4.000	3.411	3.632	3.607	12.000



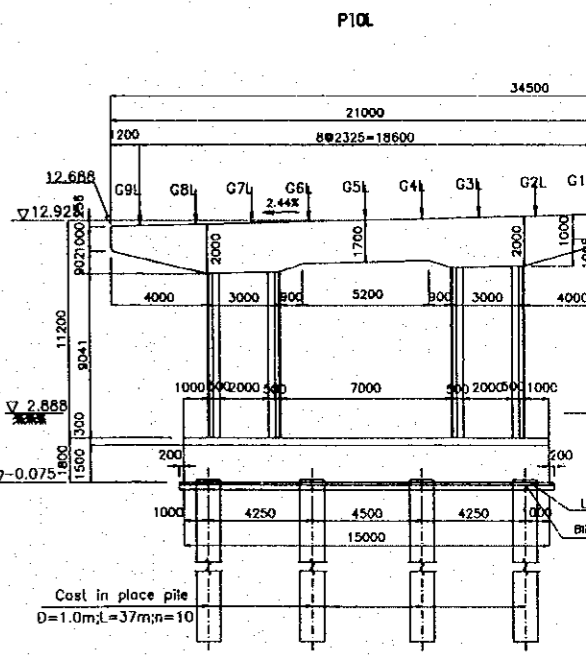
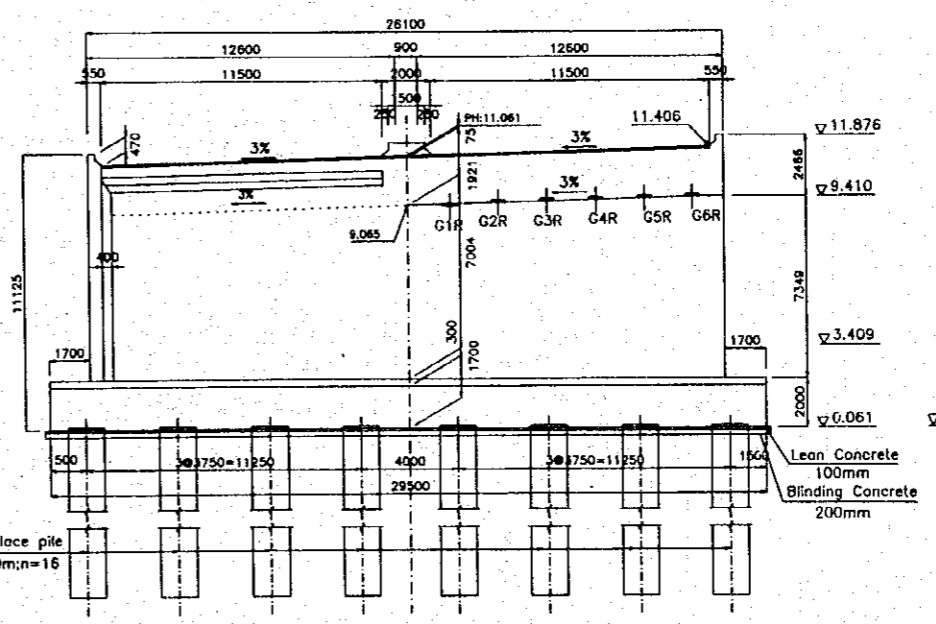
TYPICAL CROSS SECTION (S=1)

TYPICAL CROSS SECTION OF SUPERSTRUCTURAL

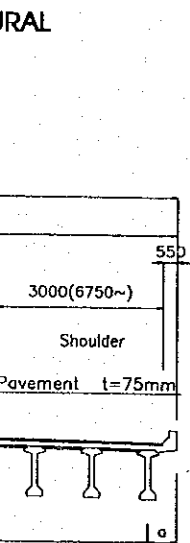
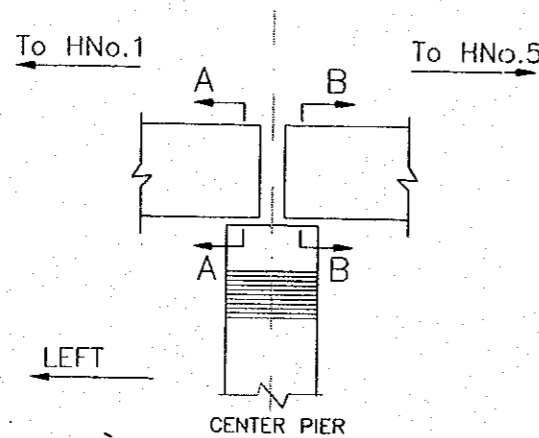


ABUTMENT A1

South bound
North bound



TYPICAL CROSS SECTION OF BRIDGE (S=1/300)



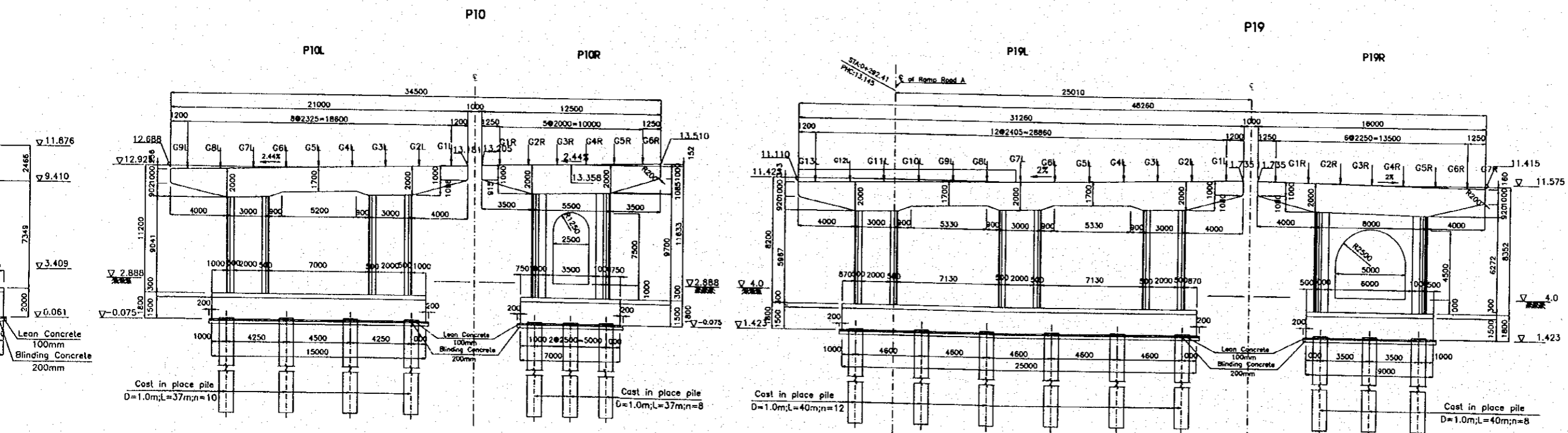
DIMENSION OF SUPERSTRUCTURE CROSS SECTION OF THE LEFT BRIDGE

LOCATION	SECTION A				Number of Girder	SECTION B			
	n	d (mm)	a (mm)	WL (mm)		n	d (mm)	a (mm)	WL (mm)
A1-P7	5	2000	1300	12600	6	5	2000	1300	12600
P8	5	2000	1300	12600	6	7	1943	1250	16100
P9	7	2300	1250	18600	8	8	2013	1250	18600
P10-P16	8	2325	1250	21100	9	8	2325	1250	21100
P17	8	2330	1250	21140	9	9	2071	1250	21140
P18	9	2364	1250	23778	10	12	1773	1250	23778
P19	12	2405	1250	31362	13	6	2250	1300	16100
P20-A2	6	2250	1300	16100	7	6	2250	1300	16100

DIMENSION OF SUPERSTRUCTURE CROSS SECTION OF THE RIGHT BRIDGE

LOCATION	SECTION A				Number of Girder	SECTION B			
	n	d (mm)	a (mm)	WR (mm)		n	d (mm)	a (mm)	WR (mm)
A1-P10	5	2000	1300	12600	6	5	2000	1300	12600
P11	5	2000	1300	12600	6	6	2267	1250	16100
P12	6	2227	1250	15860	7	6	2227	1250	15860
P13	6	2415	1250	16991	7	7	2070	1250	16991
P14	7	2387	1250	19211	8	8	2089	1250	19211
P15	8	2333	1250	21182	9	9	2074	1250	21182
P16	9	2291	1250	23122	10	10	2062	1250	23122
P17	10	2258	1250	25081	11	11	2053	1250	25081
P18	11	2319	1250	28005	12	6	2250	1300	16100
P19-A2	6	2250	1300	16100	7	6	2250	1300	16100

TYPICAL CROSS SECTION OF SUBSTRUCTURAL



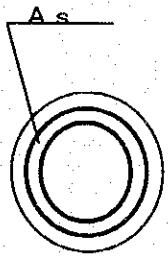
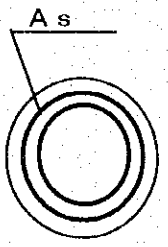
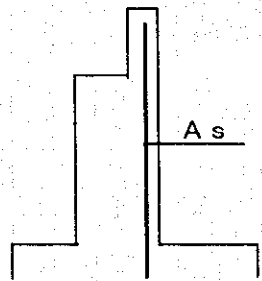
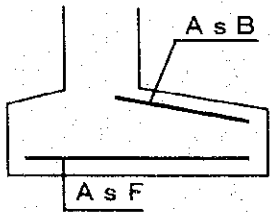
PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name	NH-605		Route	Nhaoi No.3 Ring Road		Road Alignment	varies		Skew Angle	90 degrees		Roadway Width	Total Width		Seismic Coefficient	0.17		
Structural Type	Simple Span PC I-girder Bridge		Bridge Length	33.0		Span Arrangement	-		32.15	m		Effective Width	21.1		m		0.17	
Main Girder	Number of Girders		Girder Height	1.65		Maximum Displacement	-		mm (/ -)									
	Girder Spacing		Height/Span Ratio	H/L = 1/19.5 (constant girder height)														
Crossbeam	Number of Crossbeams		Grossbeam Spacing	8.0 m (approximately)		Crossbeam Height	1.57		m									
Structural Type	Reinforced Concrete Slab		Prestress Tendon	-		Reinforcement Arrangement	D10@125 (top & bottom)											
Design Strength of Concrete	f'c = 290 kgf/cm ²		Allowable Stress Increase Coefficient	-														
Bending Moment	Slab Depth		Stresses															
+ve & -ve	3.029 tf.m/m		200 mm	78.5	kgf/cm ²	rebar	1.188		kgf/cm ²									
Design Theory	Beam Theory		Post-tensioned Precast Concrete Girder	12112.7 (SBPR7B)														
Construction Method	-		Expansion Joint	-		Location	-		Type of Joint	Rubber joint		Girder Clearance	50 mm (typical)					
Unfactored Bending Moment/Girder	Location		immediately after prestressing		at service load													
girder weight only	225 tf.m		combined stress	allowable stress	combined stress	allowable stress												
	top fiber	24.1	kgf/cm ²	-15.0	kgf/cm ²	-	kgf/cm ²	-	kgf/cm ²									
total service load	787 tf.m		bottom fiber	181.5	kgf/cm ²	-	kgf/cm ²	-	kgf/cm ²									
	top fiber	-	kgf/cm ²	-	kgf/cm ²	110.7	kgf/cm ²	160.0	kgf/cm ²									
bottom fiber	-	kgf/cm ²	-	kgf/cm ²	-21.6	kgf/cm ²	-31.8	kgf/cm ²										
Shear Force Check Point at End Support	Unfactored Shear Force		Factored Shear Force/Girder	Diagonal Tension Stress		Stirrup	Vertical Prestressing Tendon											
Support Reaction	Unit		Support 1 (= Support 2)	-		4-D10@125	not provided											
Dead Load, Rd	tf		71.7															
Live Load, Rl	tf		20.7															
Total Reaction	tf		92.4															
Bearing Type	-		elastomeric bearing															
Design of Main Girder	Items		Unit	Specification	Quantity/Girder	Quantity/m ³ of concrete												
Concrete	m ³		f'c = 400 kgf/cm ²	24.6														
Side Formwork	m ²		-	128.5	5.22 m ² /m ³													
Bottom Formwork	m ²		-	21.4	0.87 m ² /m ³													
Reinforcing Bar	kgf		SD295A (JIS G3112)	3,237	131.6 kgf/m ³													
longitudinal Tendon	kgf		12T15.2 (SBPR7B)	1,588	64.6 kgf/m ³													
transverse (deck slab) Tendon	kgf		3T15.2 (SBPR7B)	-	-													
transverse (crossbeam) Tendon	kgf		4T15.2 (SBPR7B)	-	-													
Total	kgf		-	1,588	-													
<p>1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)</p> <p>2. Nomenclature of supports are as follows.</p> <div style="text-align: center;"> </div> <p>3. Quantity of prestressing tendon includes operation allowance of 1.5m/each.</p>																		
<p>Remarks</p>																		

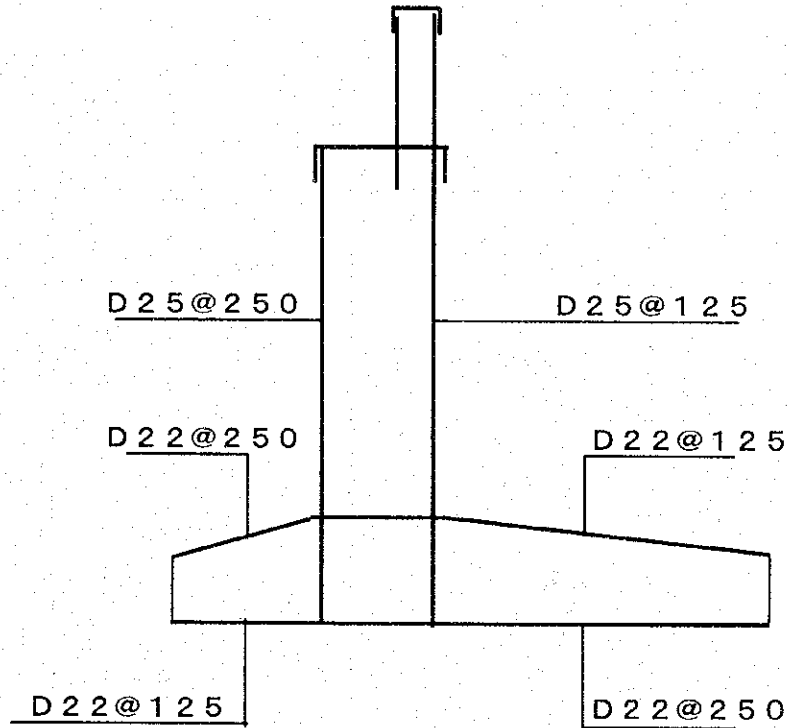
PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name	NH-No5	Route	Hanoi No.3 Ring Road	Road Alignment	90 degrees Skew Angle	Roadway Width	Total Width	Seismic Coefficient	longitudinal	transverse
Structural Type	Simple Span PC T-girder Bridge L = 28.0m, H = 1.50m	Bridge Length	28.0 m	Span Arrangement	27.15 m		21.1 m		0.17	0.17
Main Girder	1 nos. Girder Height	1.5 m	Maximum Displacement							
Crossbeam	3 nos./span	Height/Span Ratio	H/L = 1/18.7 (constant girder height)	Crossbeam Height	1.42 m					
Structural Type	Reinforced Concrete Slab	Prestressing Tendon	Reinforcement Arrangement	D19@125 (top & bottom)						
Design Strength of Concrete	$f'c = 290 \text{ kgf/cm}^2$	Allowable Stress Increase Coefficient								
Bending Moment	Slab Depth	79 cm	Stresses							
+ve & -ve	3.029	200 mm	concrete rebar	1.188						
Design Theory	Beam Theory		Prestressing Tendon	12T12.7 (SBPR7B)						
Construction Method	Post-tensioned Precast Concrete Girder									
Unfactored Bending Moment/Girder	Location	immediately after prestressing	at service load							
girder weight only	top fiber	combined stress	allowable stress	allowable stress						
	bottom fiber	7.3 kgf/cm ²	-15.0 kgf/cm ²	- kgf/cm ²	- kgf/cm ²					
total service load	top fiber	169.0 kgf/cm ²	198.0 kgf/cm ²	- kgf/cm ²	- kgf/cm ²					
	bottom fiber	- kgf/cm ²	- kgf/cm ²	88.6 kgf/cm ²	160.0 kgf/cm ²					
		- kgf/cm ²	- kgf/cm ²	-14.2 kgf/cm ²	-31.8 kgf/cm ²					
Shear Force Check Point at End Support	Unfactored Shear Force	92 tf	Factored Shear Force/Girder	146 tf						
Support Reaction	Unit	Support 1 (= Support 2)	Support 1							
Dead Load, Rd	tf	62.4	62.4							
Live Load, Rl	tf	20.5	20.5							
Total Reaction	tf	82.7	82.7							
Bearing Type		elastic bearing								
Expansion Joint	Location									
Type of Joint	Rubber joint									
Items	Unit	Specification	Quantity/Girder	Quantity/m ² of concrete						
Concrete	m ³	$f'c = 400 \text{ kgf/cm}^2$	20.0	-						
Side	m ²	-	100.2	5.01 m ² /m ²						
Bottom	m ²	-	18.2	0.91 m ² /m ²						
Reinforcing Bar	kgf	S0235A (JIS G3112)	2.795	139.8 kgf/m ²						
longitudinal	kgf	12T15.2 (SBPR7B)	1.085	54.3 kgf/m ²						
transverse (deck slab)	kgf	3T15.2 (SBPR7B)	-	-						
transverse (crossbeam)	kgf	4T15.2 (SBPR7B)	-	-						
Total	kgf	-	1.085	-						
Remarks	<p>1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)</p> <p>2. Nomenclature of supports are as follows.</p> <div style="text-align: center;"> </div> <p>3. Quantity of prestressing tendon includes operation allowance of 1.5m/each.</p>									

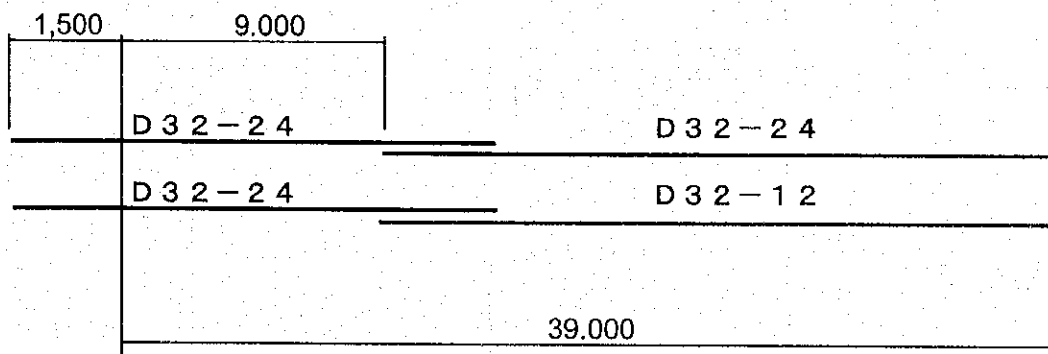
8.3 Substructure
 NH-5 FLYOVER
 A1 (Fix)

Number of Pile	16		
Pile Length (m)	39.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.699	< 1.5
	Earthquake	1.486	< 1.5
Bearing Capacity (tf)	Usual	346	< 1,123
	Earthquake	542	< 1,606
Pile		As = D 32 - 24 D 32 - 24	2,621 < 2,700
		As = D 32 - 24 D 32 - 12	1,677 < 2,700
Body		As = D 25 @ 125	2,196 < 2,700
Footing		As F = D 22 @ 125 As B = D 22 @ 125	2,653 < 2,700

Body & Footing

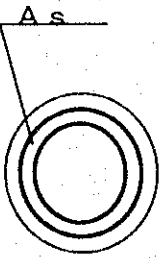
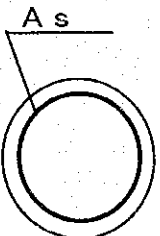
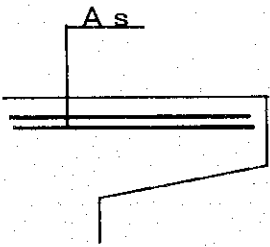
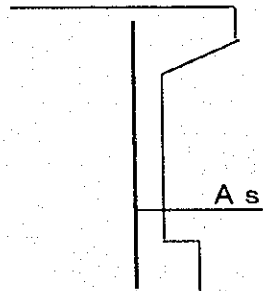


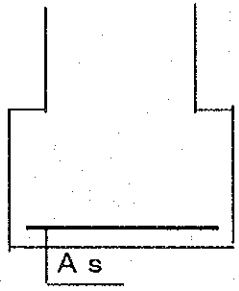
Pile

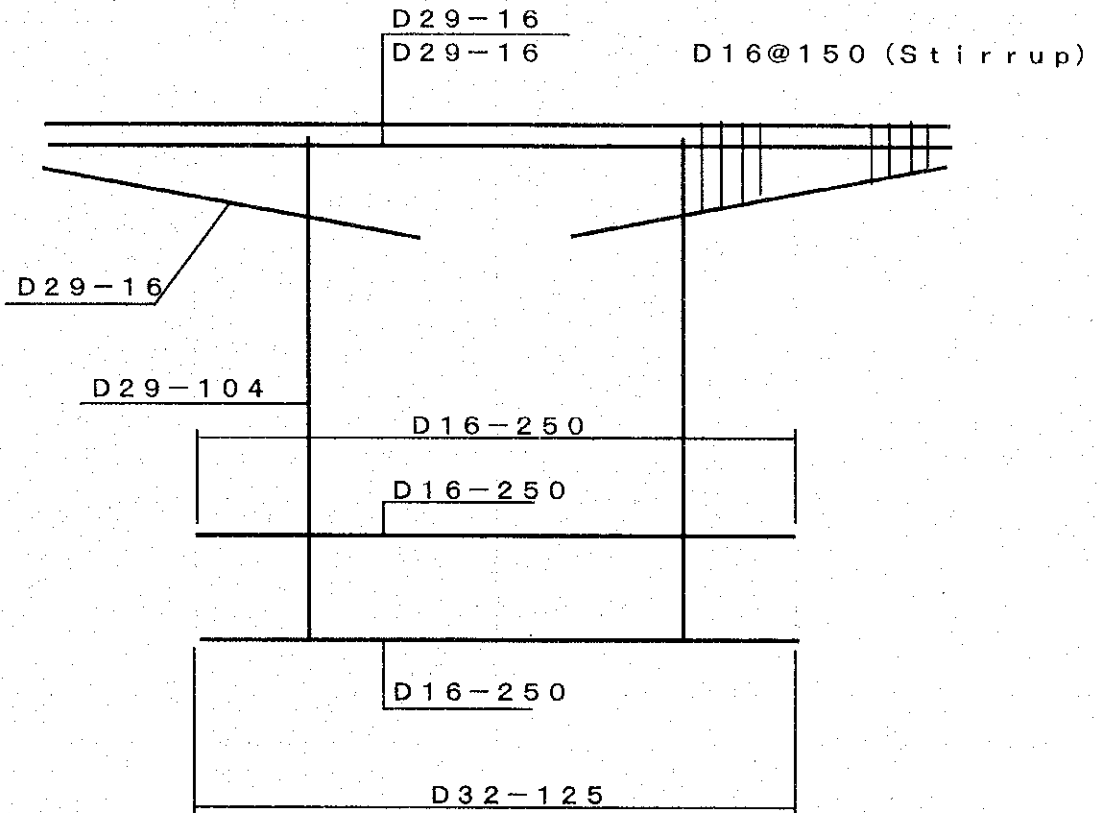


NH-5 FLYOVER

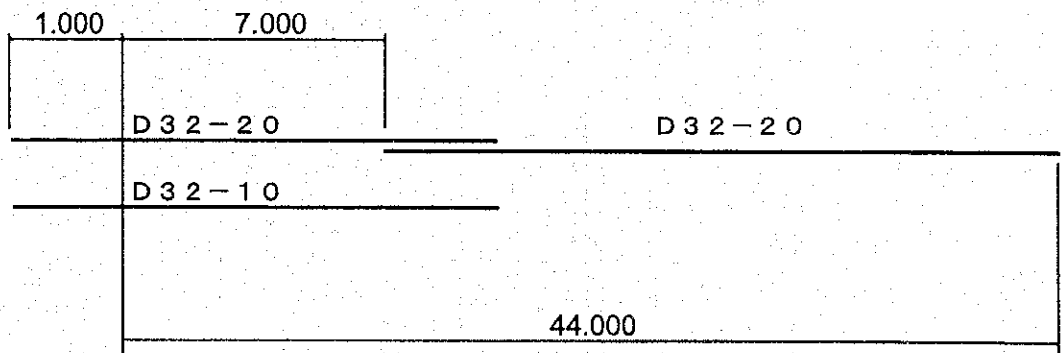
Pier P1L~P7L · P1R~P10R

Number of Pile	8		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.853	< 1.5
Bearing Capacity (tf)	Usual	210	< 562
	Earthquake	475	< 830
Pile		As = D29-20 D29-10	2,598 < 2,700
		As = D29-10	2,522 < 2,700
Beam		As = D29-16 D29-16 (@125)	1,783 < 1,800
Column		As = D29-104 (@125)	2,245 < 2,700

Foot i		As = D16@250	----- < 1,600
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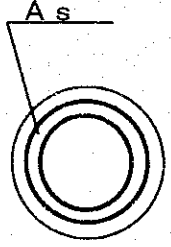
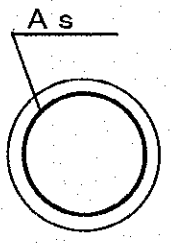
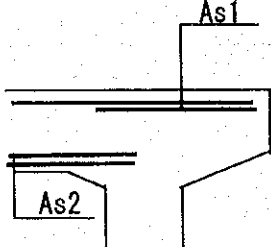
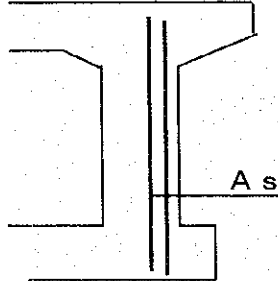


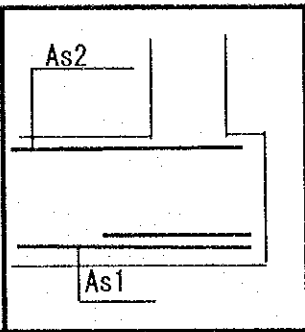
P i l e

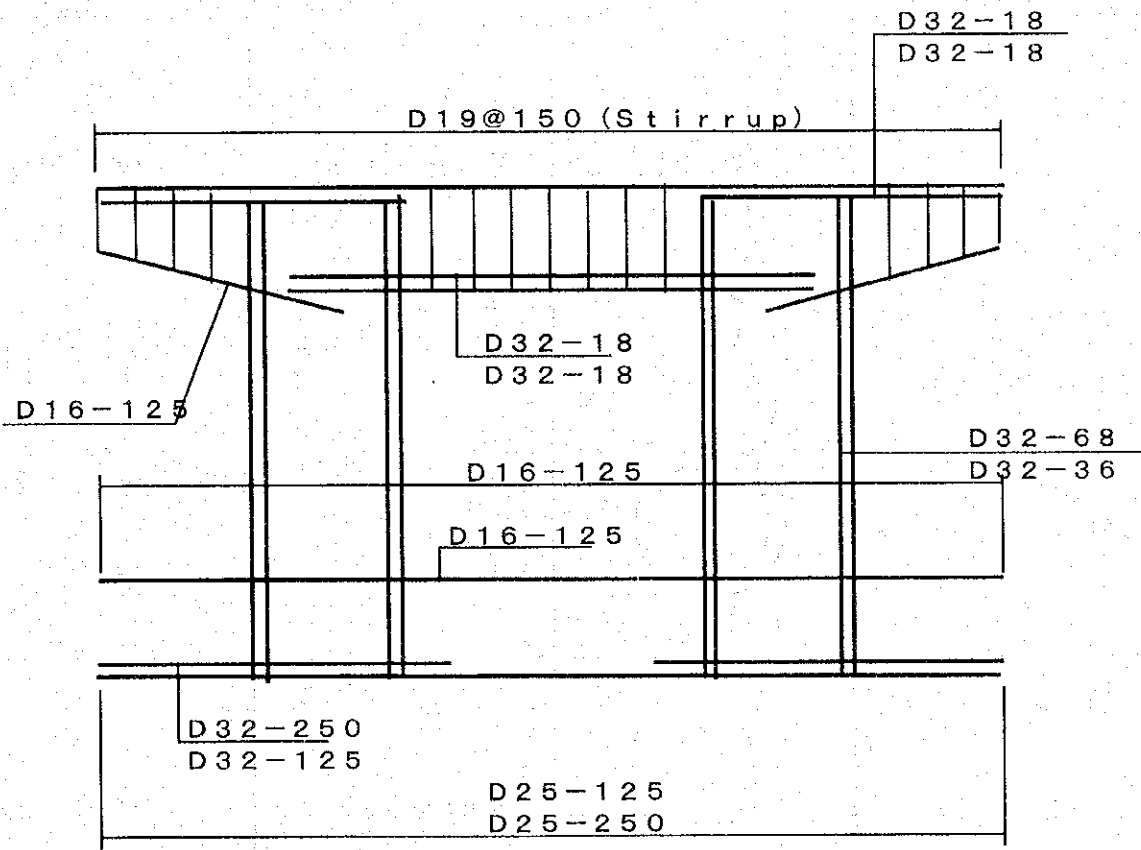


NH-5 FLYOVER

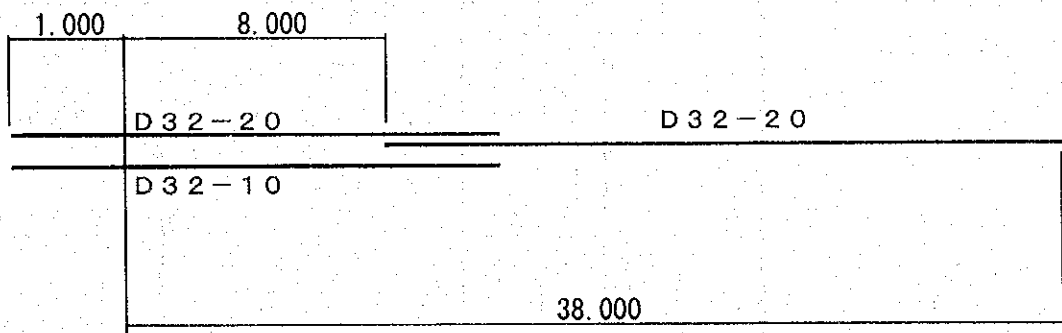
Pier P9L~P11L, P13L~P17L, P14R, P15R

Number of Pile	10		
Pile Length (m)	38.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.993	< 1.5
Bearing Capacity (tf)	Usual	274	< 538
	Earthquake	522	< 796
Pile		As = D32-20 D32-10	2,119 < 2,700
		As = D32-20	1,708 < 2,700
Beam		As1 = D32-18 D32-18 As2 = D32-18 D32-18	1,626 < 1,800
Column		As = D32-68 (@125) D32-36 (@250)	1,729 < 2,700

Footi		$A_s = D16@250$ $A_s = D32@125$ $D32@125$	$1,631 < 1,800$
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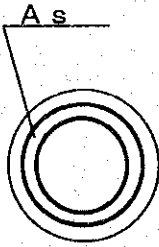
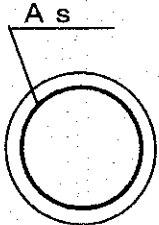
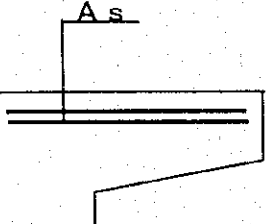
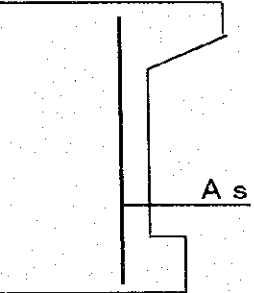


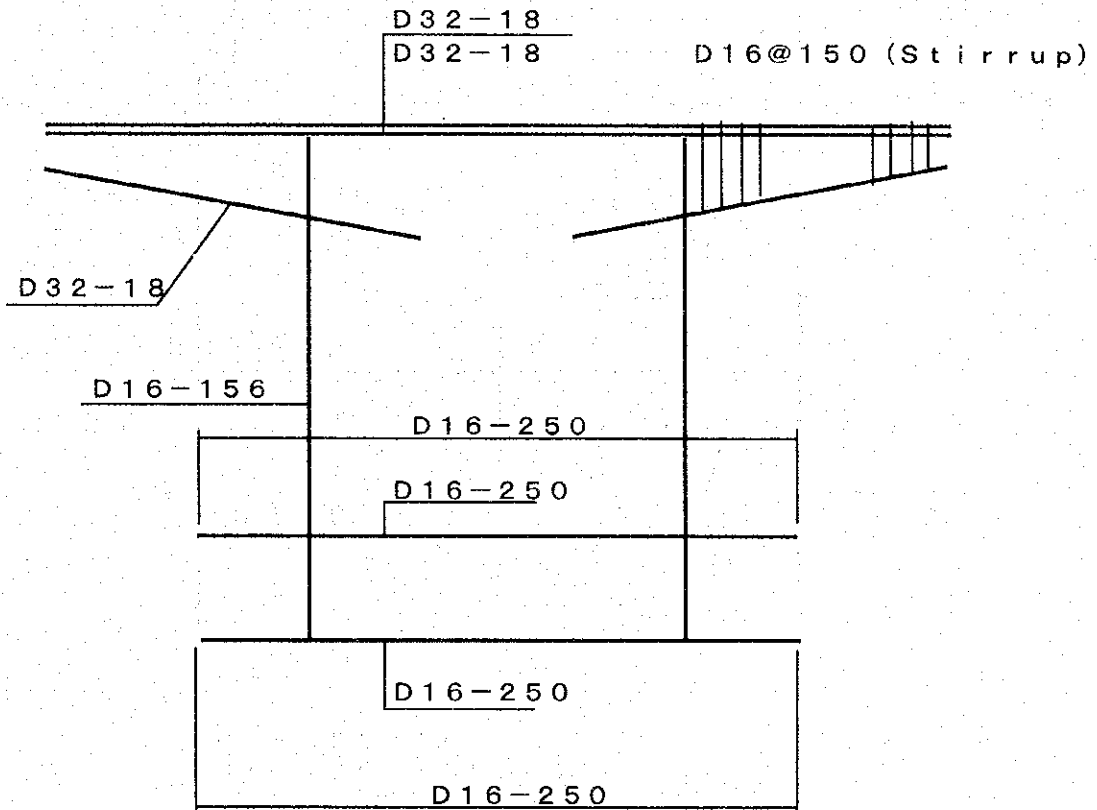
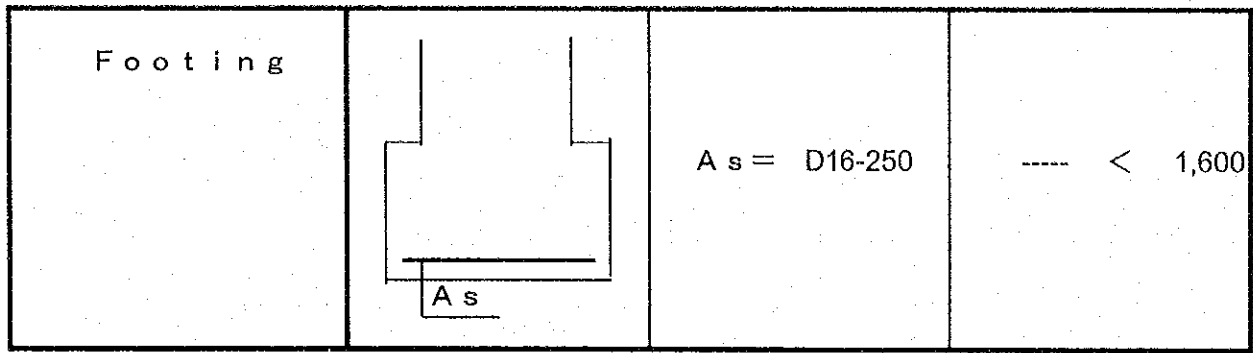
P i l e



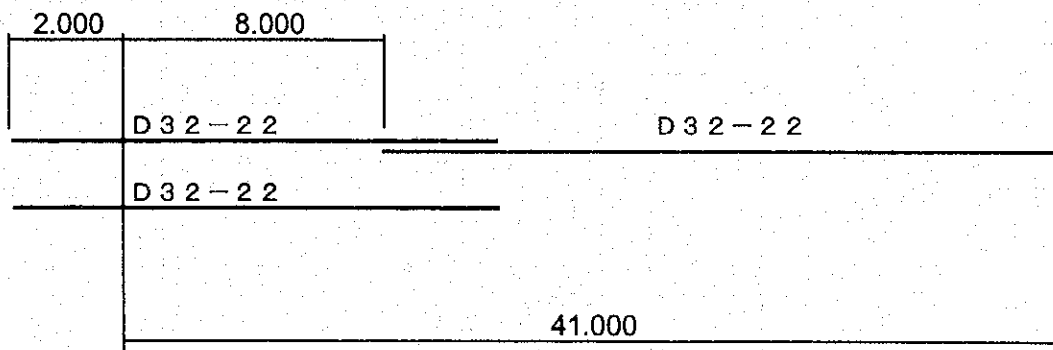
NH-5 FLYOVER

Pier P12R

Number of Pile	3		
Pile Length (m)	41.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	P12L Refen	< 1.5
	Earthquake	P12L Refen	< 1.5
Bearing Capacity (tf)	Usual	P12L Refen	< 1,511
	Earthquake	P12L Refen	< 2,252
Pile		As = D32-22 D32-22	P12L Refen < 2,700
		As = D32-22	P12L Refen < 2,700
Beam		As = D32-18 D32-18 (@110)	1,652 < 1,800
Column		As = D16-144 (@125)	2,326 < 2,700

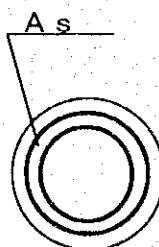
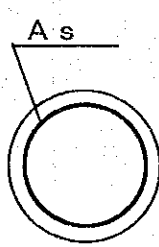
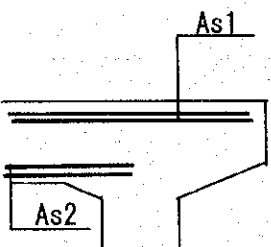
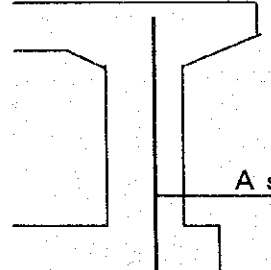


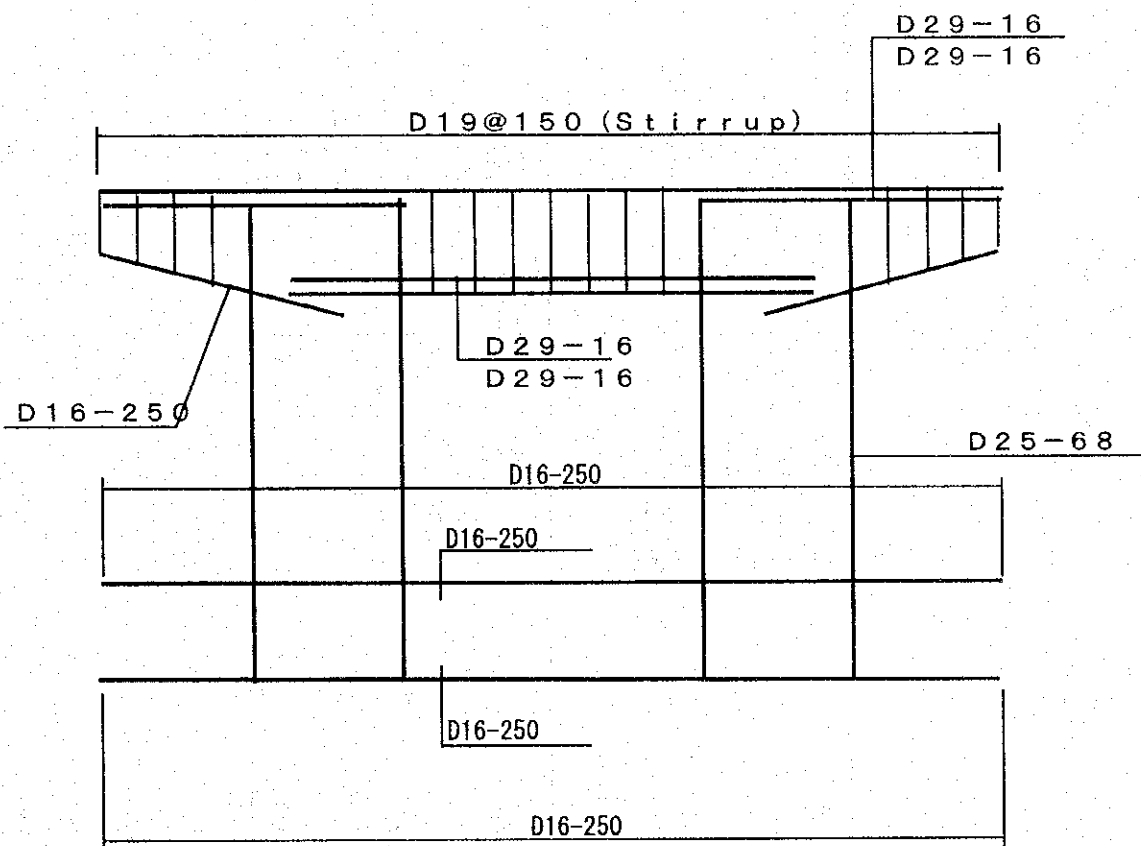
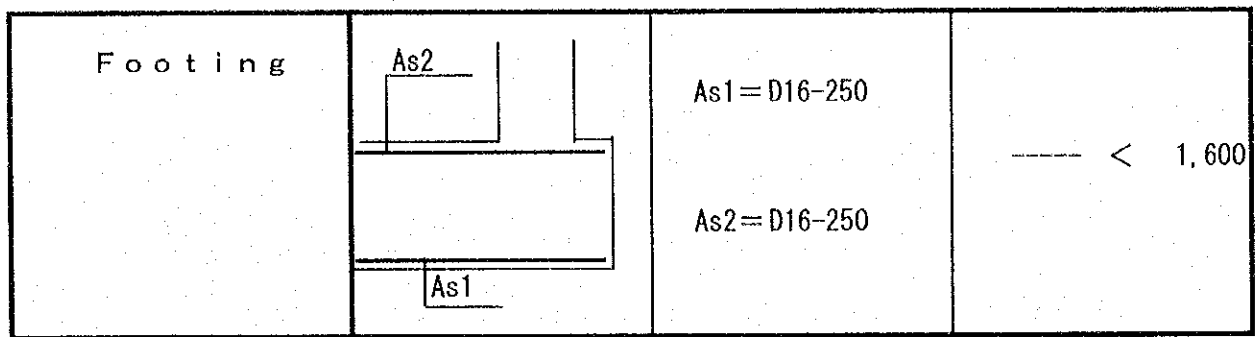
Pile



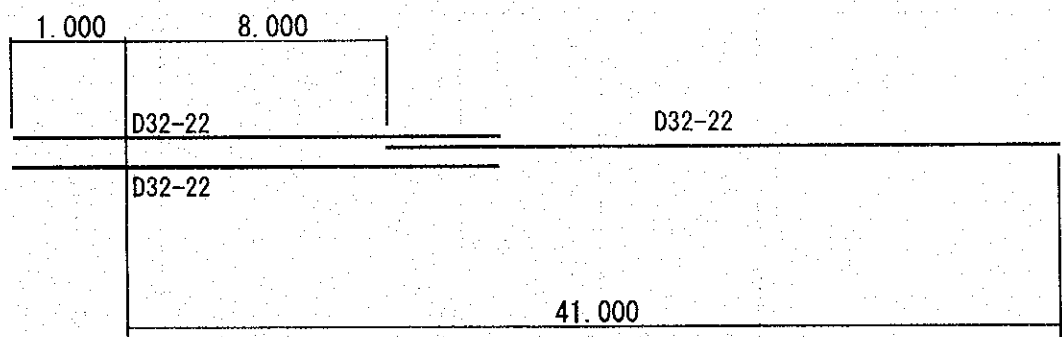
NH-5 FLYOVER

Pier P12L

Number of Pile	4		
Pile Length (m)	41.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.640	< 1.5
Bearing Capacity (tf)	Usual	639	< 1,511
	Earthquake	534	< 2,252
Pile		As = D32-22 D32-22	2,178 < 2,700
		As = D32-22	2,699 < 2,700
Beam		As1 = D29-16 D29-16 As2 = D29-16 D29-16	1,600 < 1,800
Column		As = D25-68 (@125)	2,556 < 2,700

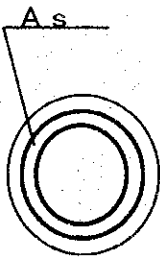
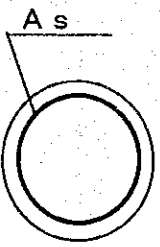
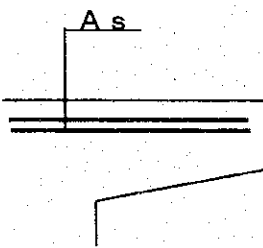
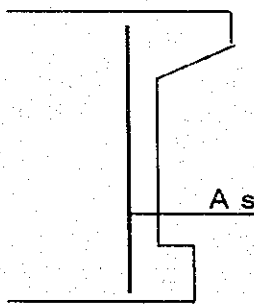


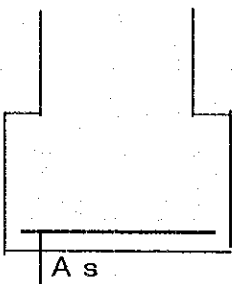
P i l e

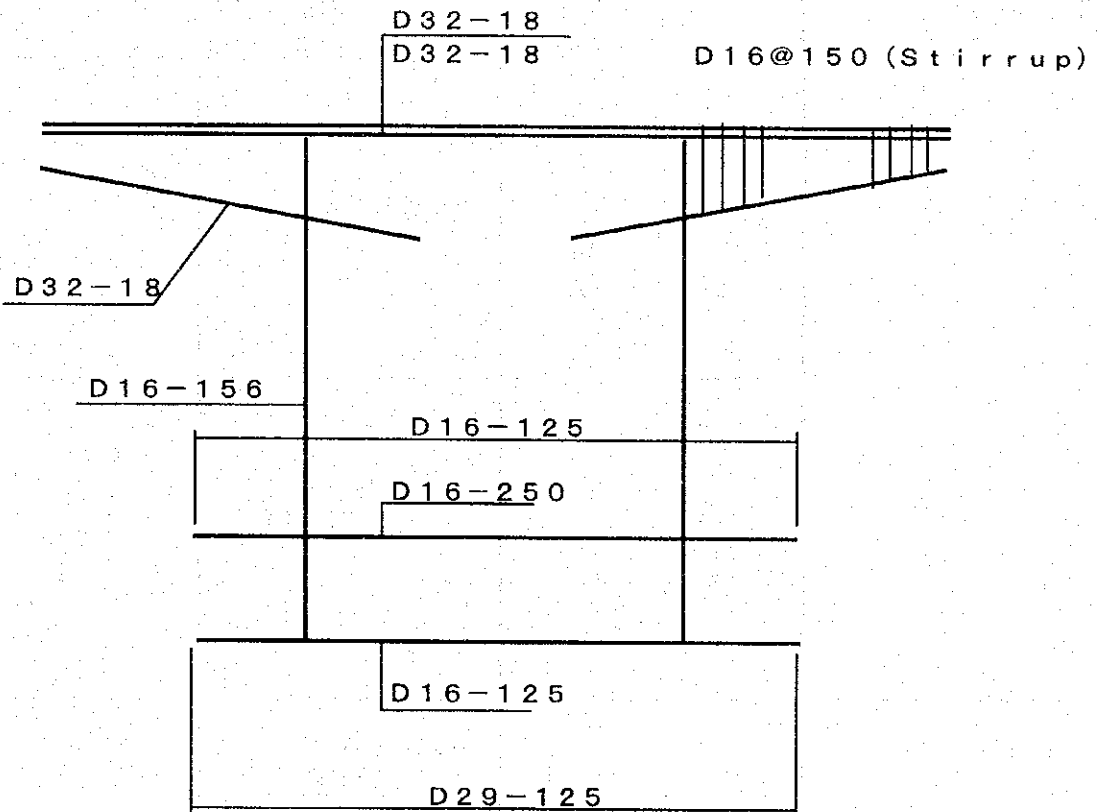


NH-5 FLYOVER

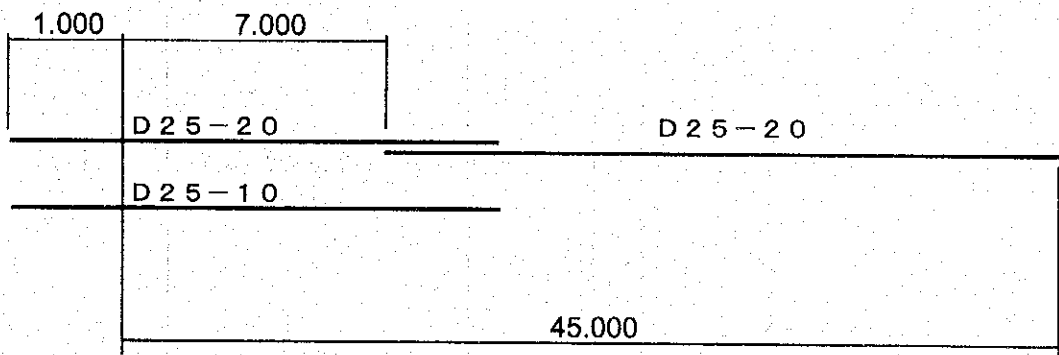
Pier P8L · P20L · P21L · P11R, P13R, P19R~P21R

Number of Pile	8		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.585	< 1.5
Bearing Capacity (tf)	Usual	244	< 724
	Earthquake	439	< 1,079
Pile		As = D25-20 D25-10	2,013 < 2,700
		As = D32-24	1,649 < 2,700
Beam		As = D32-18 D32-18 (@110)	1,652 < 1,800
Column		As = D16-144 (@125)	2,326 < 2,700

Footing		As = D16-250	----- < 1,600
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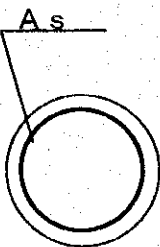
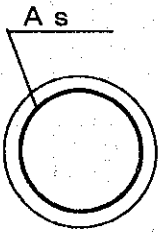
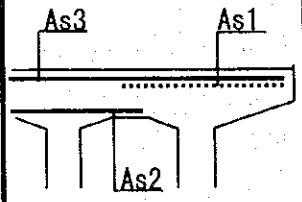
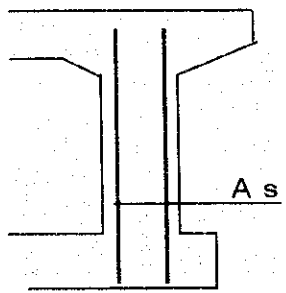


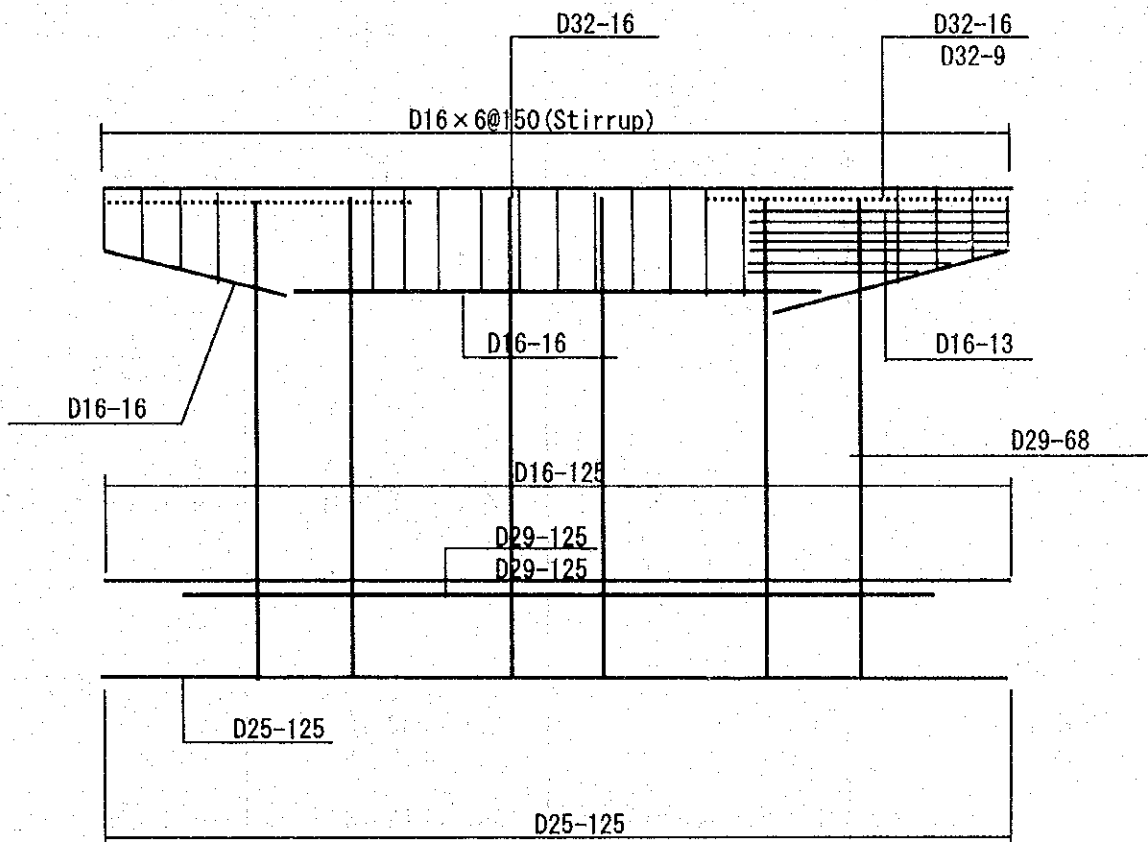
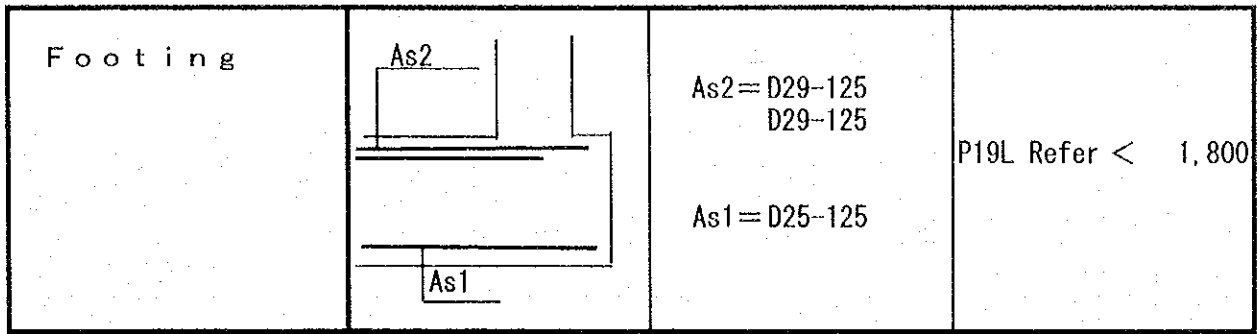
Pile



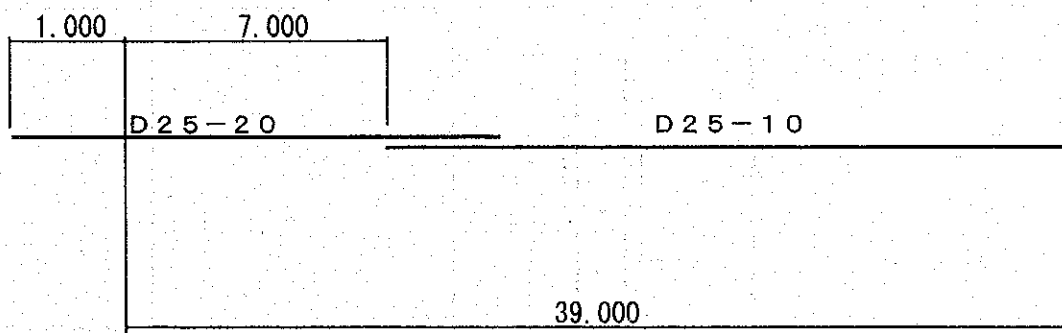
NH-5 FLYOVER

Pier P16R, P18L

Number of Pile	10		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	P19L Refer	< 1.5
	Earthquake	P19L Refer	< 1.5
Bearing Capacity (tf)	Usual	P19L Refer	< 538
	Earthquake	P19L Refer	< 796
Pile		As = D25-20	P19L Refer < 2,700
		As = D25-10	P19L Refer < 2,700
Beam		As1 = D32-16 D32-9 As2 = D16-16 As3 = D32-16	1,663 < 1,800
Column		As = D29-68 (@125)	1,763 < 2,070

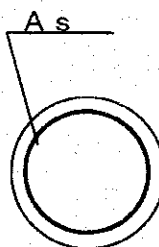
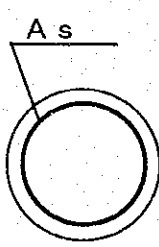
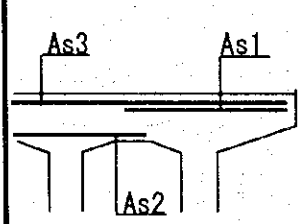
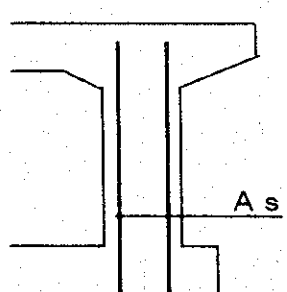


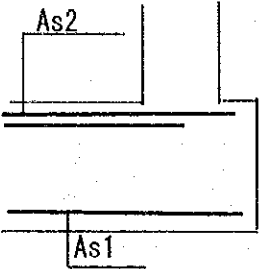
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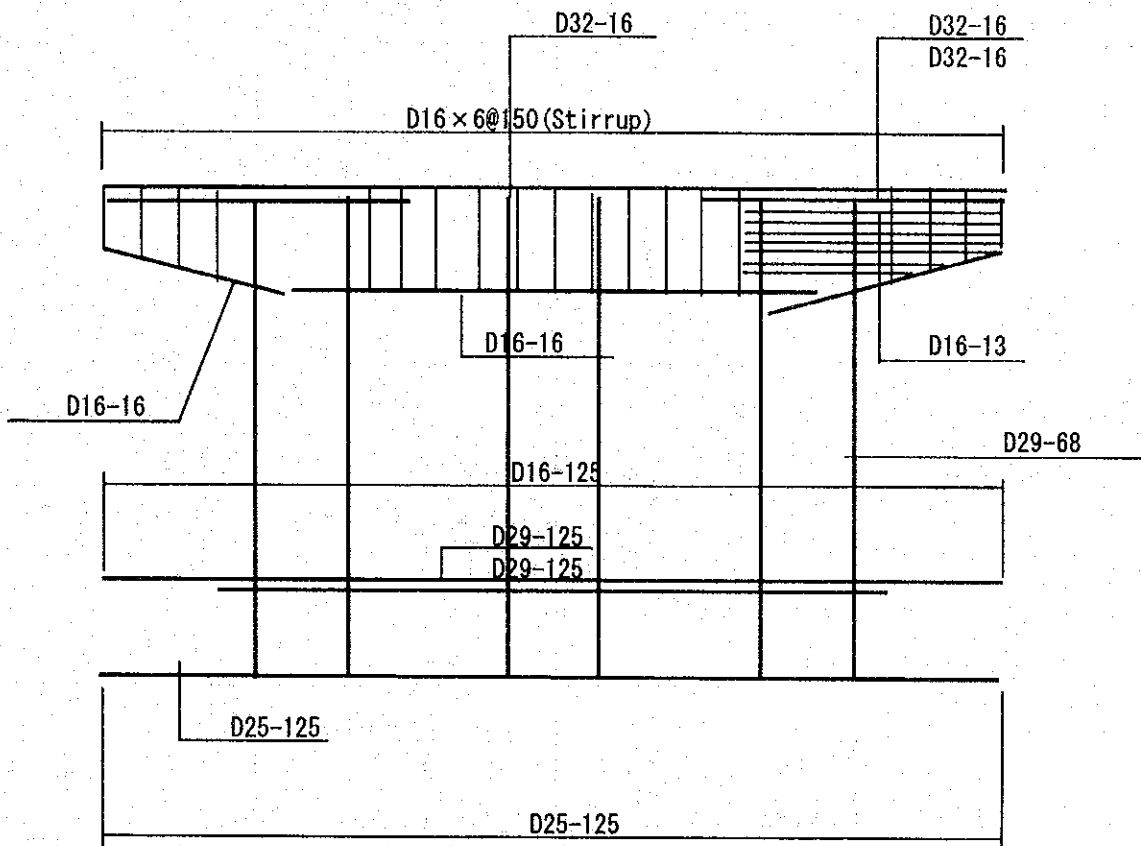


NH-5 FLYOVER

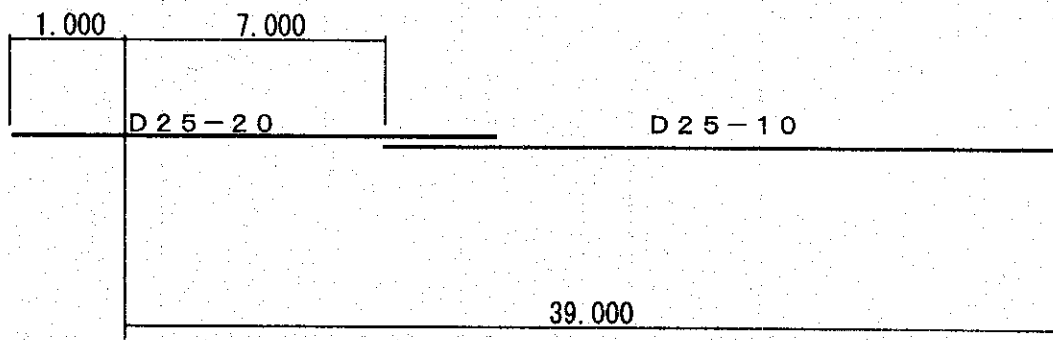
Pier P17R

Number of Pile	10		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	P19L Refer	< 1.5
	Earthquake	P19L Refer	< 1.5
Bearing Capacity (tf)	Usual	P19L Refer	< 538
	Earthquake	P19L Refer	< 796
Pile		As = D25-20	P19L Refer < 2,700
		As = D25-10	P19L Refer < 2,700
Beam		As1 = D32-16 D32-16 As2 = D16-16 As3 = D32-16	1,439 < 1,800
Column		As = D29-68 (@125)	1,878 < 2,070

Footing		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	P19L Refer < 1,600
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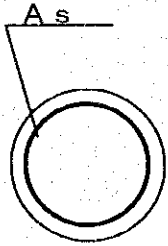
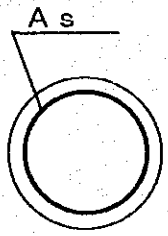
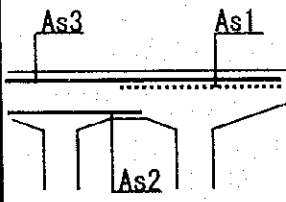
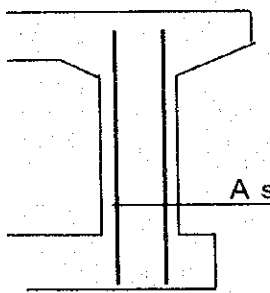


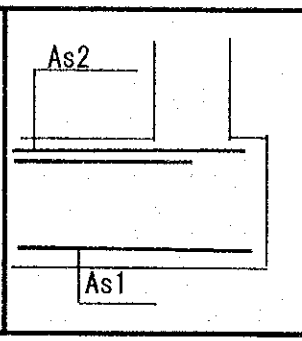
P i l e

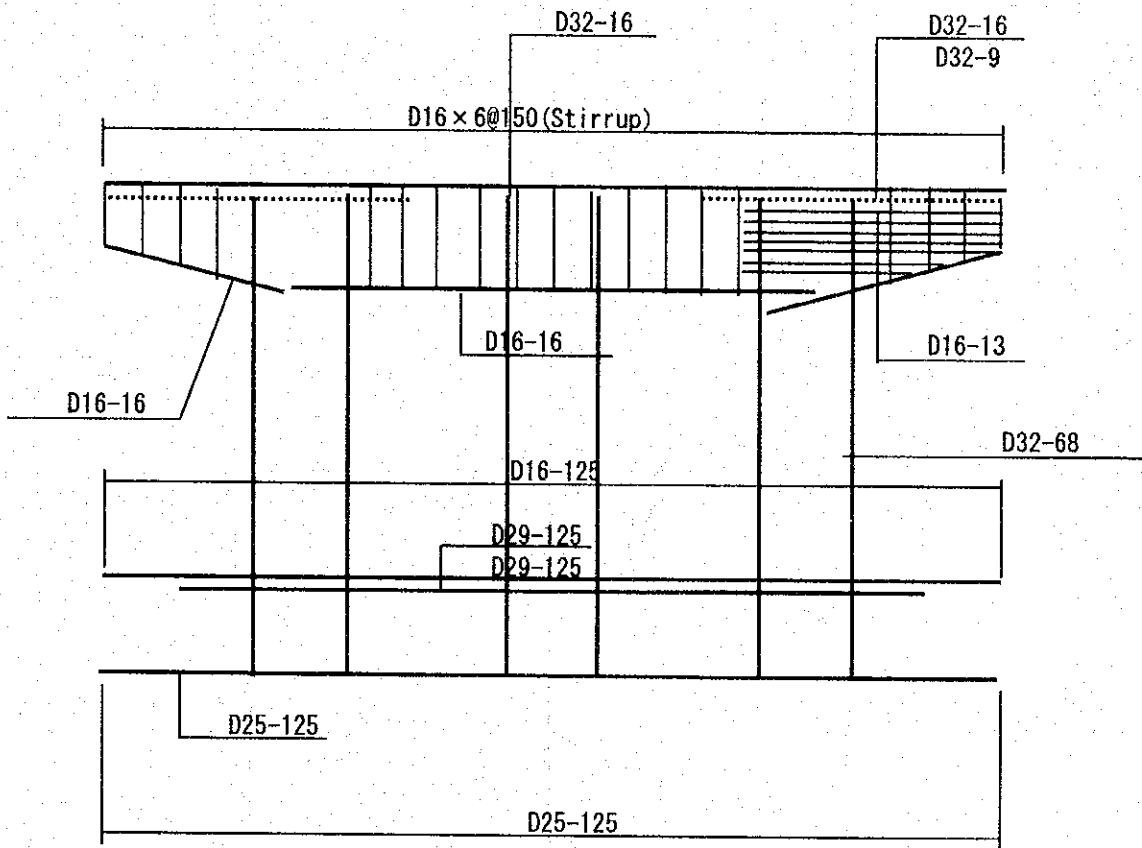


NH-5 FLYOVER

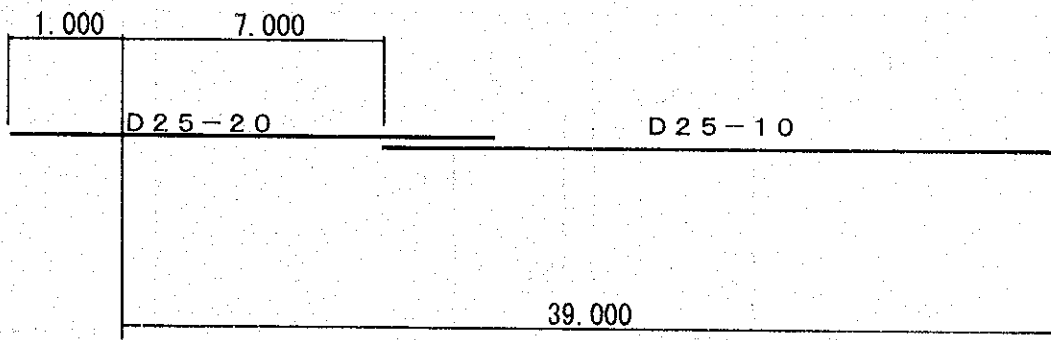
Pier P18R

Number of Pile	10		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	P19L Refer	< 1.5
	Earthquake	P19L Refer	< 1.5
Bearing Capacity (tf)	Usual	P19L Refer	< 538
	Earthquake	P19L Refer	< 796
Pile		As = D25-20	P19L Refer < 2,700
		As = D25-10	P19L Refer < 2,700
Beam		As1 = D32-16 D32-9 As2 = D16-16 As3 = D32-16	1,540 < 1,800
Column		As = D32-68 (@125)	1,945 < 2,070

<p>Footing</p>		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>P19L Refer < 1,800</p>
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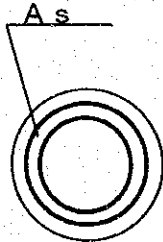
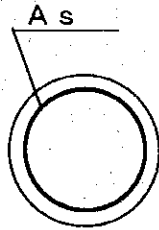
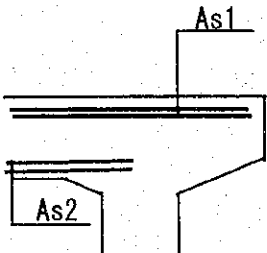
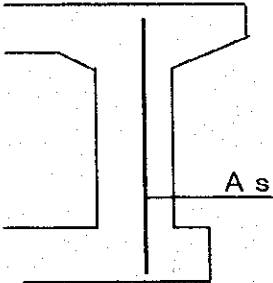


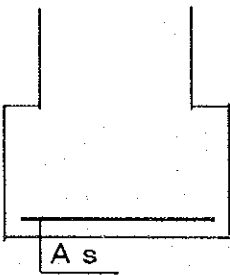
P i l e

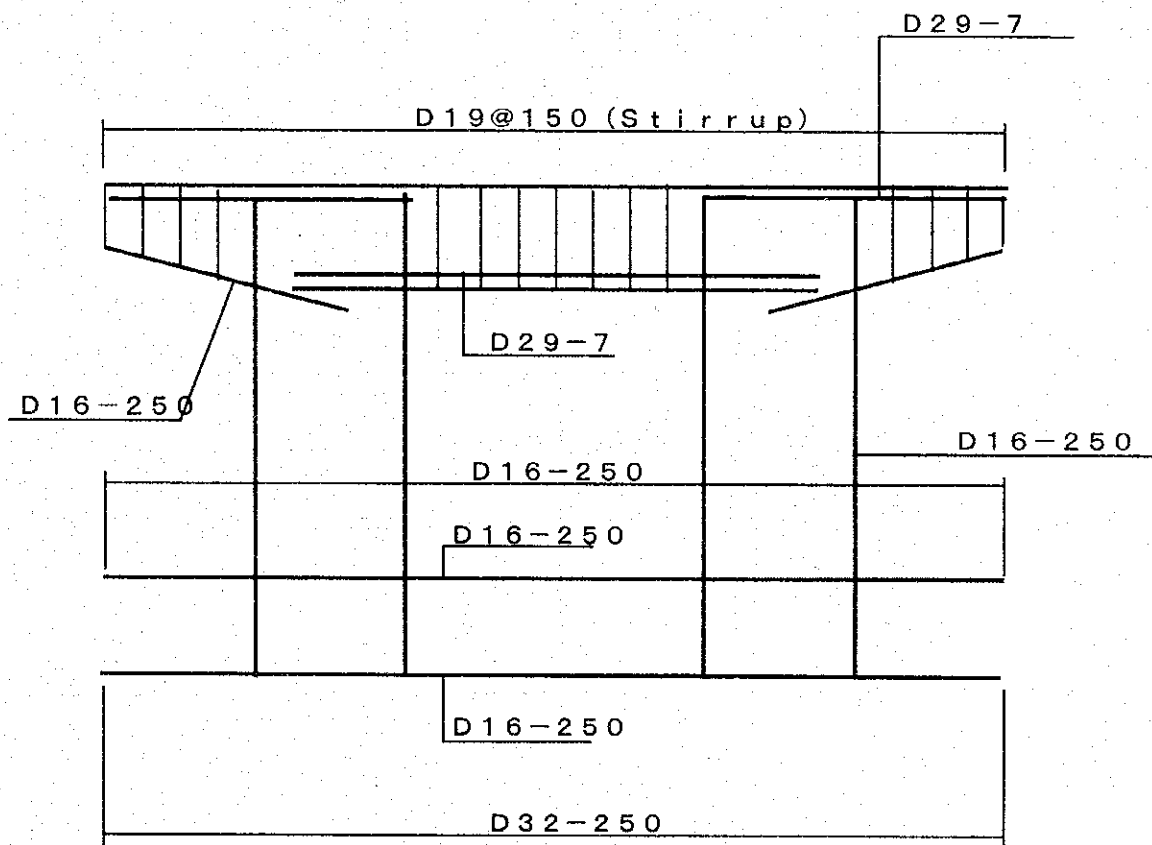


NH-5 FLYOVER

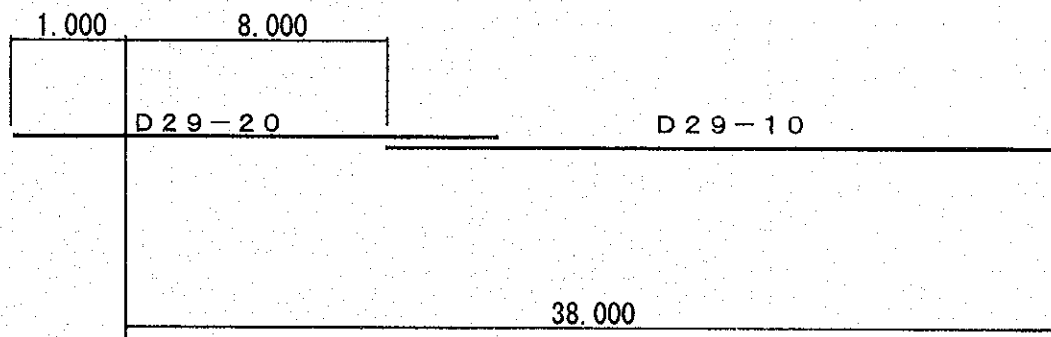
Pier P14R·P16R·P17R·P18L

Number of Pile	4		
Pile Length (m)	40.00		
Pile Diameter (m)	2.000		
Horizontal Displacement (cm)	Usual	0.052	< 1.5
	Earthquake	0.957	< 1.5
Bearing Capacity (tf)	Usual	330	< 625
	Earthquake	555	< 927
Pile		As = D29-20 D29-10	2,423 < 2,700
		As = D29-10	2,059 < 2,700
Beam		As1 = D29-7 D29-4 As2 = D29-7 D29-4	1,557 < 1,800
Column		As = D16-128 (@125)	2,553 < 2,700

Foot i		A s = D16@125	1,415 < 1,600
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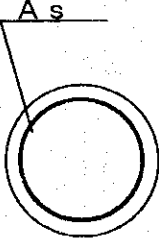
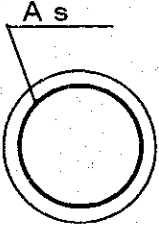
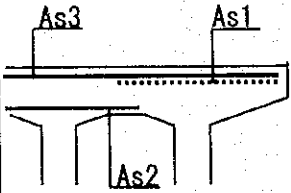
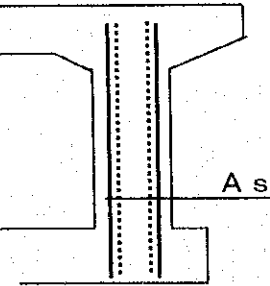


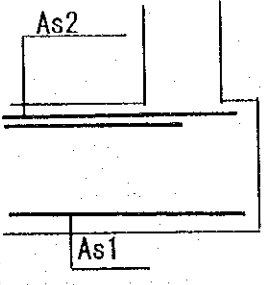
Pile

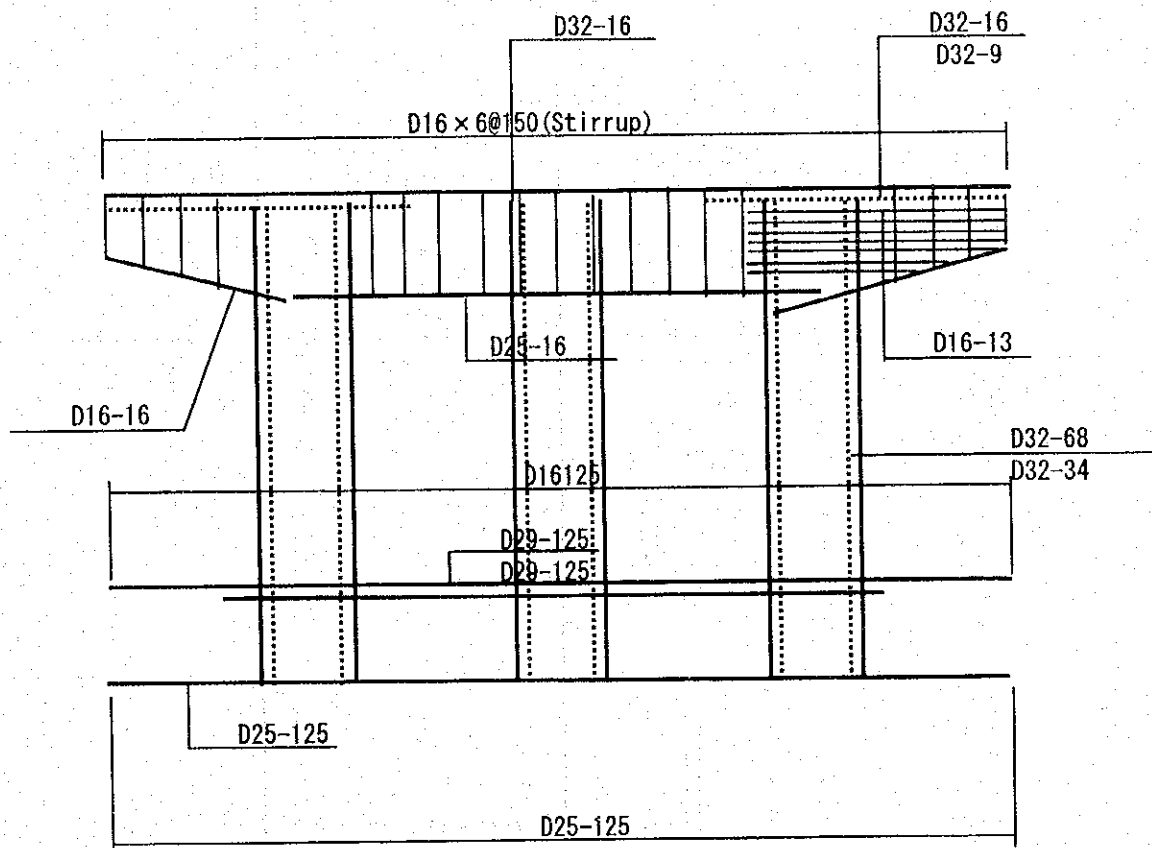


NH-5 FLYOVER

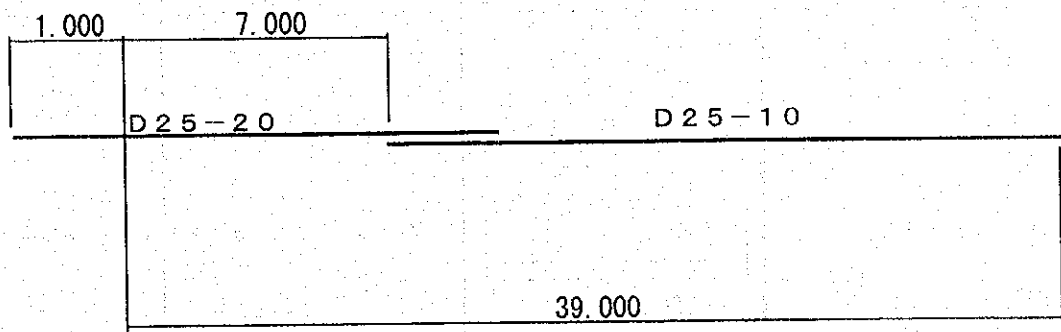
Pier P19L

Number of Pile	10		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.003	< 1.5
	Earthquake	0.528	< 1.5
Bearing Capacity (tf)	Usual	305	< 704
	Earthquake	420	< 1,050
Pile		As = D25-20	2,006 < 2,700
		As = D25-10	490 < 2,700
Beam		As1 = D32-16 D32-9 As2 = D25-16 As3 = D32-16	1,699 < 1,800
Column		As = D32-68 D32-34 (@125) (@250)	1,748 < 2,070

Footing		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	$1,360 < 1,600$
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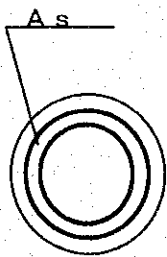
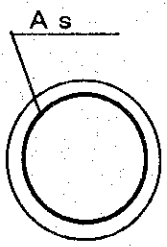
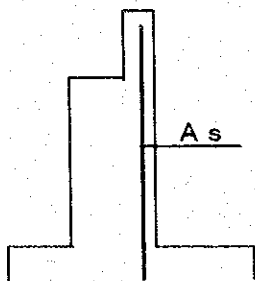
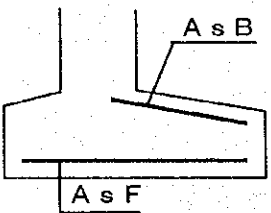


P i l e

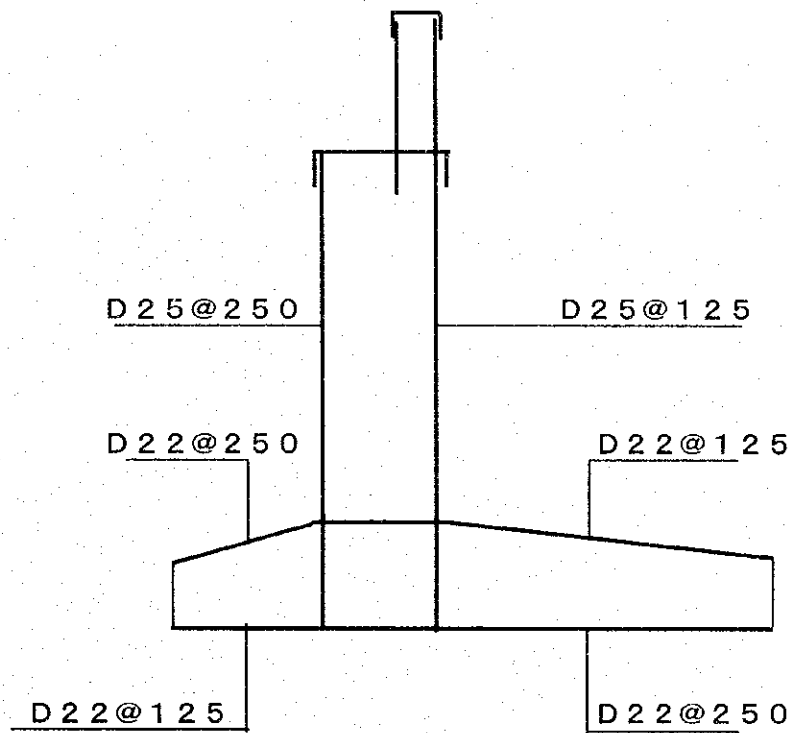


NH-5 FLYOVER

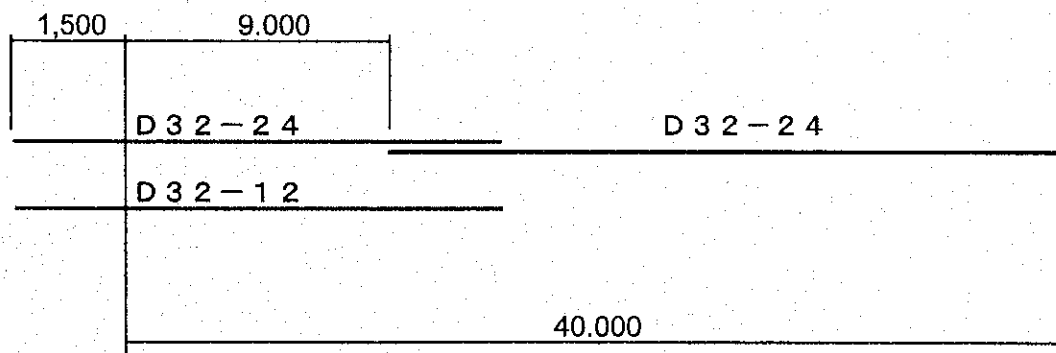
A 2 (M o v)

Number of Pile	20		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.594	< 1.5
	Earthquake	1.043	< 1.5
Bearing Capacity (tf)	Usual	401	< 1,163
	Earthquake	543	< 1,727
Pile		As = D 3 2 - 2 4 D 3 2 - 2 4	2,274 < 2,700
		As = D 3 2 - 1 2	1,482 < 2,700
Body		As = D 2 5 @ 1 2 5	2,648 < 2,700
Footing		As F = D 2 2 @ 1 2 5 As B = D 2 2 @ 1 2 5	2,309 < 2,700

Body & Footing

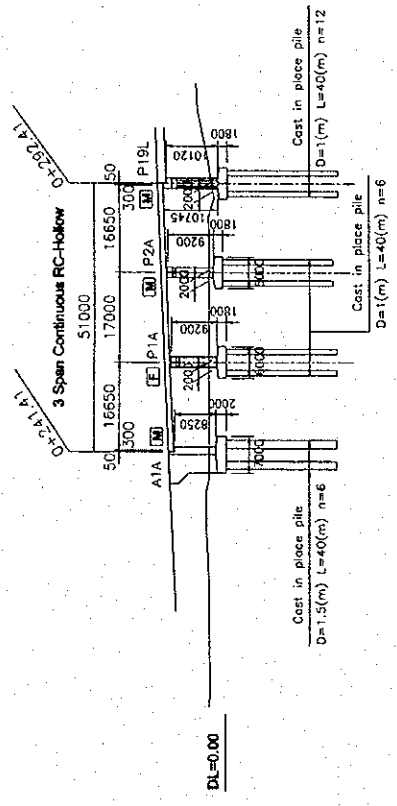


Pile



**9. NATIONAL HIGHWAY NO.5 INTERCHANGE
RAMP BRIDGE**

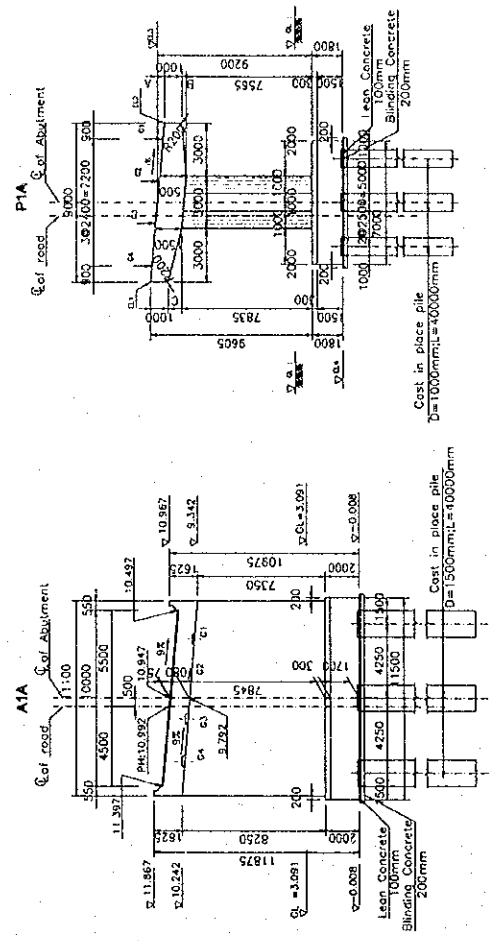
PROFILE OF BRIDGE
 (SCALE: 1:1000)



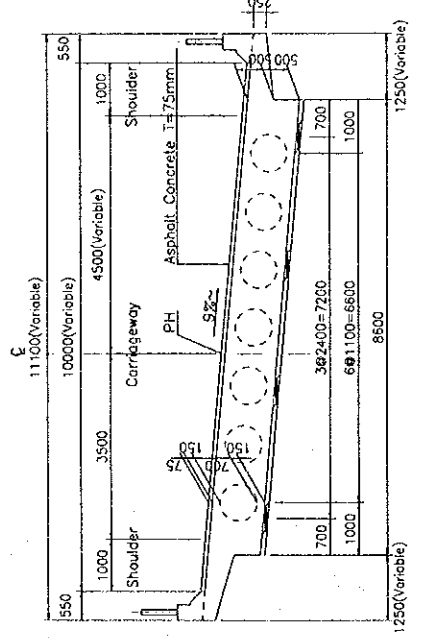
GRADE	PROPOSED HEIGHT	GROUND LEVEL	STATION
11.661	13.145	10.992	0+241.41
$i=6\%$ $L=40m$	12.516	11.411	0+250.00
$i=3.5\%$ $L=40m$	12.516	11.799	0+258.41
	13.145	10.992	0+275.41
		2.990	0+292.41

TYPICAL CROSS SECTION OF BRIDGE
 (SCALE: 1:300)

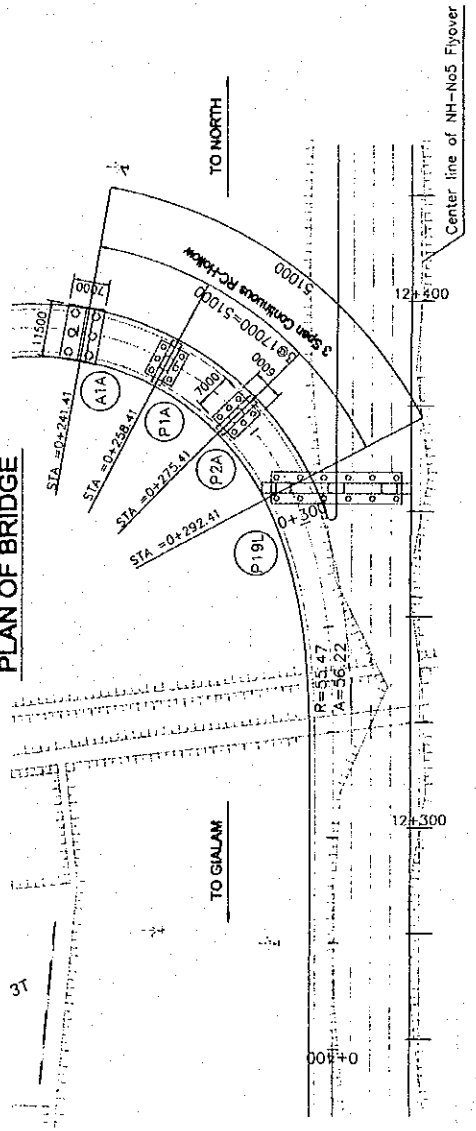
TYPICAL CROSS SECTION OF SUBSTRUCTURE
 (SCALE: 1:300)



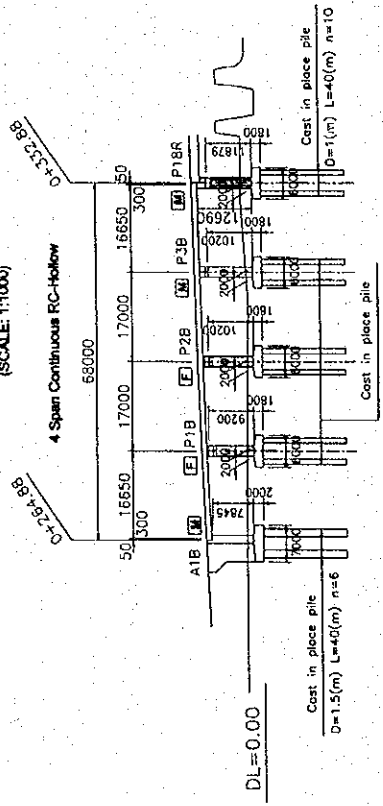
TYPICAL CROSS SECTION OF SUPERSTRUCTURE
 (SCALE: 1:100)



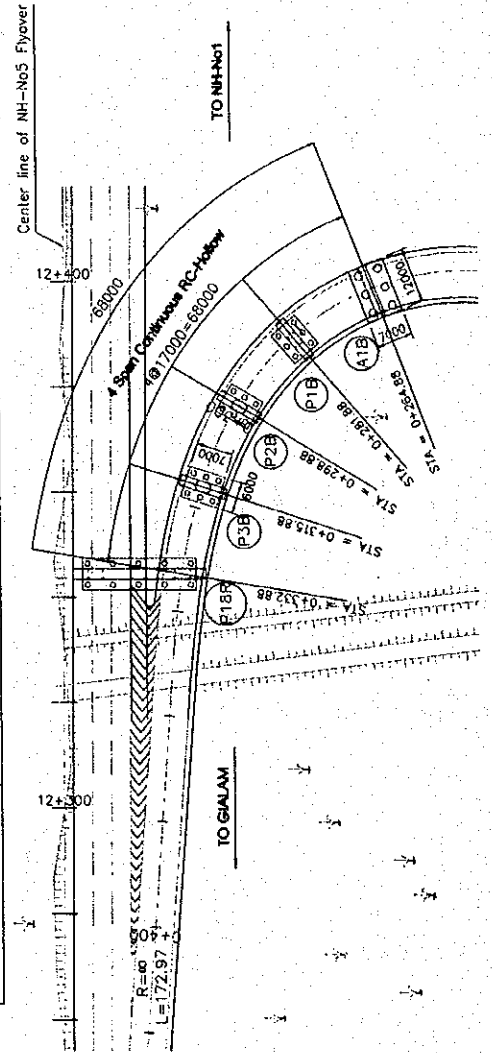
PLAN OF BRIDGE



PROFILE OF BRIDGE
 (SCALE: 1:1000)

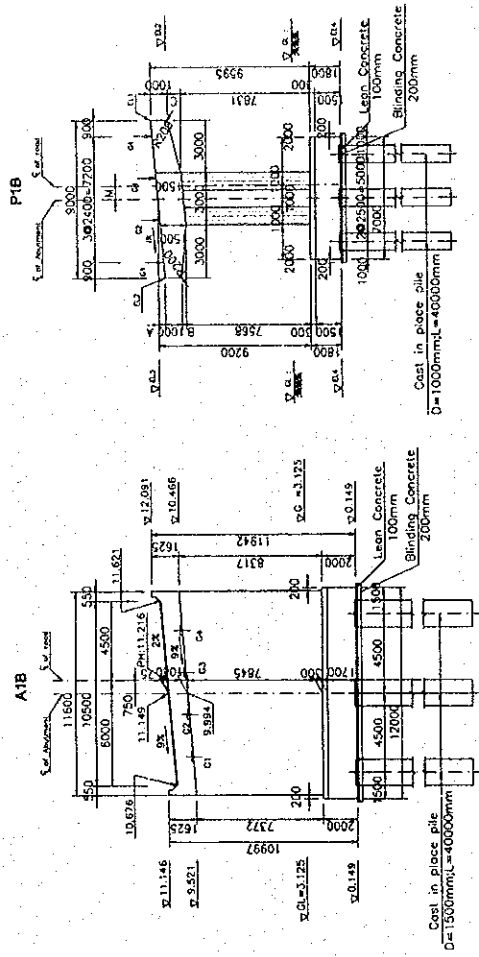


GRADE	PROPOSED HEIGHT	GROUND LEVEL	STATION
12.781	3.125	3.113	0+264.88
13.574	3.109	3.113	0+281.88
13.208	3.078	3.100	0+290.00
12.694	3.109	3.078	0+298.88
12.356	3.109	3.078	0+315.88
13.574	3.312	3.312	0+332.88

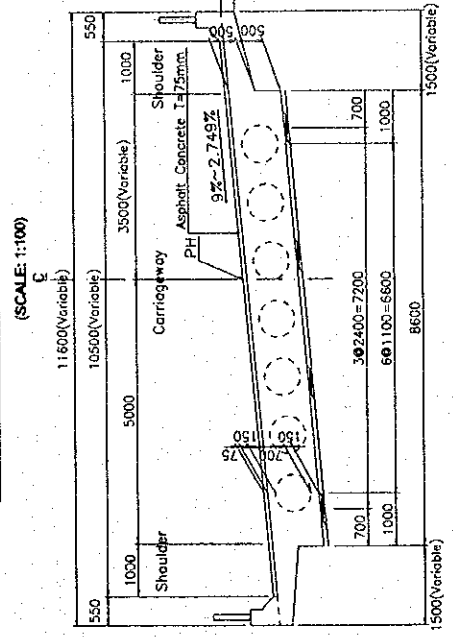


TYPICAL CROSS SECTION OF BRIDGE
 (SCALE: 1:300)

TYPICAL CROSS SECTION OF SUBSTRUCTURE
 (SCALE: 1:300)



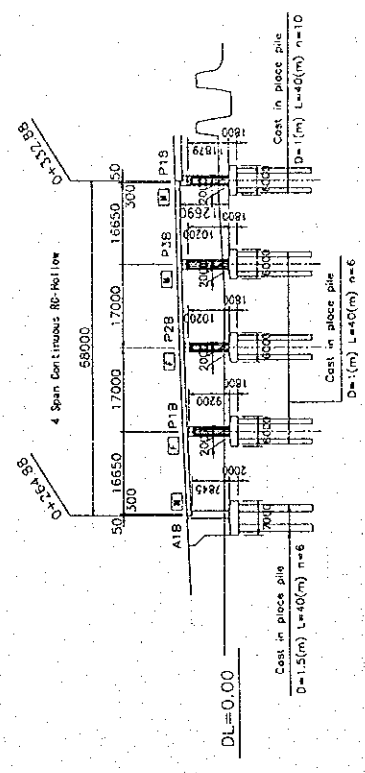
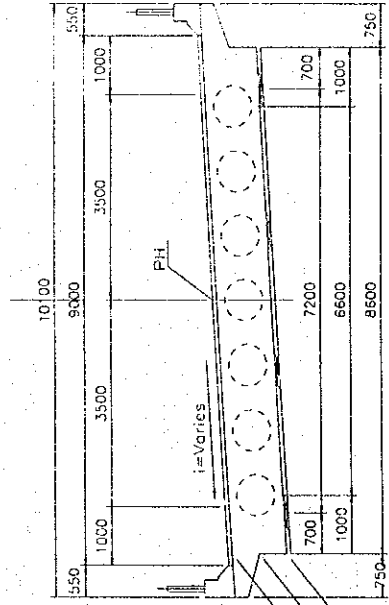
TYPICAL CROSS SECTION OF SUPERSTRUCTURE
 (SCALE: 1:100)



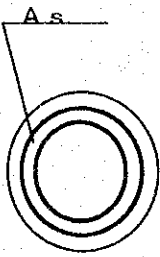
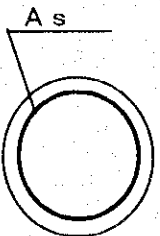
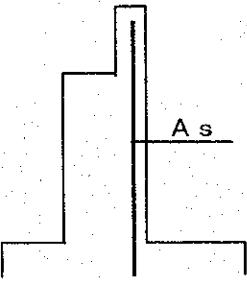
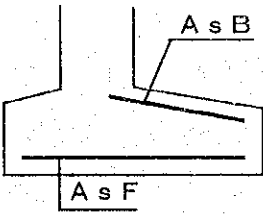
(from ST. 0+264.88 to ST. 0+332.88)

RE INFORCED CONCRETE BRIDGE DESIGN SUMMARY

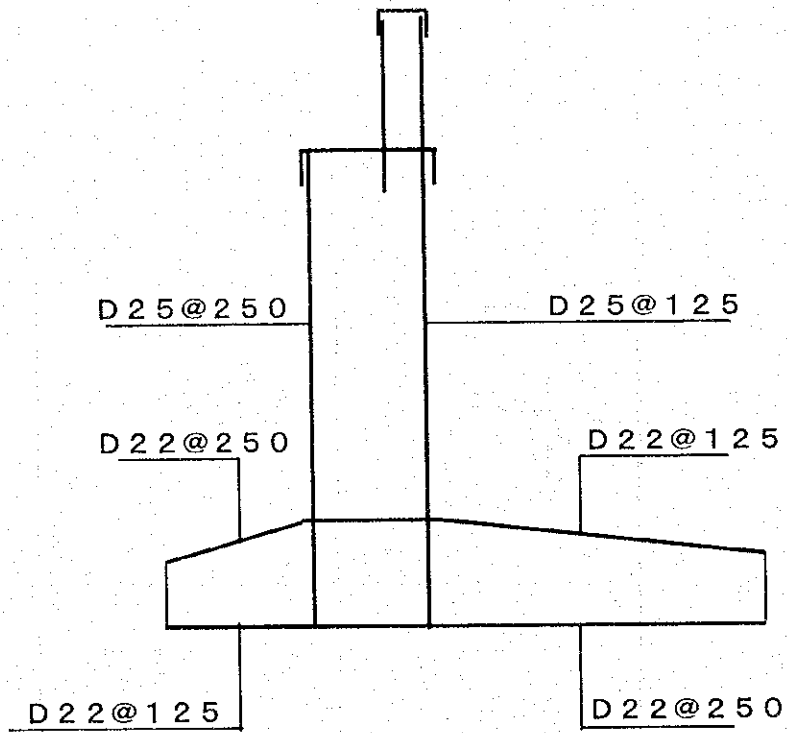
Bridge Name	B-Ramp Bridge		Route	NI-No5 Flyover Interchange	Road Alignment	R=50~A=62	Skew Angle	90 (81)	Roadway Width	10.10 m	Total Width	10.10 m	Seismic Coefficient	0.17	Longitudinal	0.17
Structural Type	RC-Hollow Slab		Bridge Length	68.000 m	Span Arrangement	16.65+2x17.00+16.65	Effective Width	9.00 m	Effective Width	9.00 m	Effective Width	9.00 m	Seismic Coefficient	0.17	Transverse	0.17
Main Girder	Number of Girders	1 nos.	Girder Height	1.00 m	Maximum Displacement	---	mm (1/1)									
	Girder Spacing	---	Height/Span Ratio	H/L = 1/17												
Crossbeam	Number of Crossbeams	---	Beam Spacing	---	Beam Height	---	mm									
	Deck Slab Depth	1,000 mm	Design Strength of Concrete	290 kgf/cm ²	Allowable Stress Increase Coefficient	1.0										
Deck Slab Design	Bending Moment	Primary Reinforcement	Stress	Concrete Compression	28 kgf/cm ²	Allowable Stress	Distribution Reinforcement									
	7.0 tf.m/m (cantilevered slab)	D16-Ctc125	Reinforcing Bar	1,152 kgf/cm ²	Reinforcing Bar	1,800 kgf/cm ²	D13-Ctc125									
Design Theory	Beam Theory															
Construction Method	Construction on Fixed Staging															
Design Of Main Girder	Section Forces		Reinforcement Arrangement	Stress		Allowable Stress										
	Span Center	Dead Load	446 tf.m	032-84	Concrete Compressive Stress	49 kgf/cm ²	90 kgf/cm ²									
		Live Load	252 tf.m		Reinforcing Bar Tensile Stress	1,293 kgf/cm ²	1,800 kgf/cm ²									
		Total	698 tf.m													
	Intermediate Support	Shear Force	---	D13-ctc300 (stirrup)	Concrete Shear Stress	---	kgf/cm ²	---								
		Dead Load	635 tf.m	(032-84)+(032-28)	Concrete Compressive Stress	68 kgf/cm ²	90 kgf/cm ²									
		Live Load	165 tf.m		Reinforcing Bar Tensile Stress	1,211 kgf/cm ²	1,800 kgf/cm ²									
	Total	800 tf.m														
	Shear Force	284 tf	D13-ctc300 (stirrup)	Average Shear Stress	8.59 kgf/cm ²	8.73 kgf/cm ²										
	Support Reaction	Ac1	Pc1	Pc2	Pc3	Pc4										
Dead Load, Rd (tf)	146	427	347	427	146											
Live Load, RI (tf)	68	136	136	136	68											
Total Reaction (tf)	214	563	483	563	214											
Support Condition	M	F	F	M	M											
Bearing	Type of Bearing	Movable	Elastomeric Bearing													
		Fixed	Elastomeric Bearing													
Support Reaction	Remarks		Primary Construction Materials		Expansion Joint		Location		Type of Joint		Girder Clearance					
	Concrete	Quantity	m ³	f'c =	290 kgf/cm ²	498	Ab1	Rubber Joint	50 mm							
		Reinforcing Bar	tf	SD295	89.5	P18R	Rubber Joint	100 mm								
		External Formwork	m ²	1,045												
	Formwork	Tube Formwork	m	φ =	700 mm	400										
		Quantity	---													
	Quantity	---														
	Quantity	---														
	Quantity	---														
	Quantity	---														
Quantity	---															
Quantity	---															



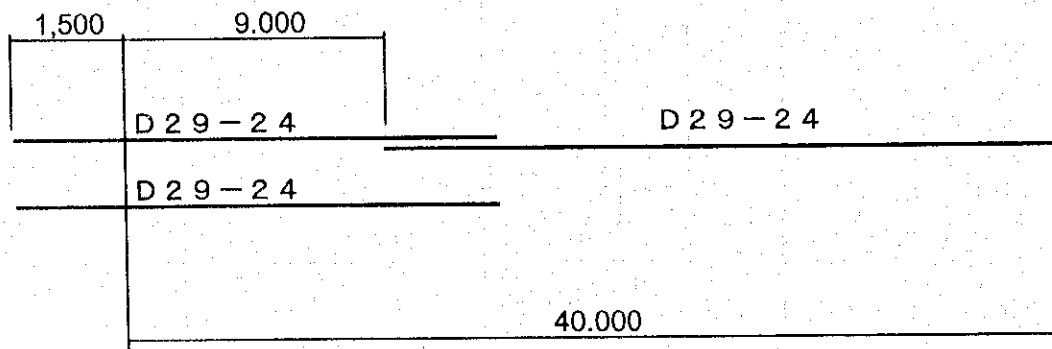
9.3 Substructure
 NH-5 FLYOVER (A-RAMP)
 A a 1

Number of Pile	6		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.563	< 1.5
	Earthquake	1.019	< 1.5
Bearing Capacity (tf)	Usual	343	< 1,148
	Earthquake	475	< 1,704
Pile		As = D 29 - 24 D 29 - 24	2,620 < 2,700
		As = D 29 - 24	1,637 < 2,700
Body		As = D 25 @ 125	2,153 < 2,700
Footing		AsF = D 22 @ 125 AsB = D 22 @ 125	2,056 < 2,700

Body & Footing

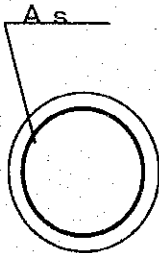
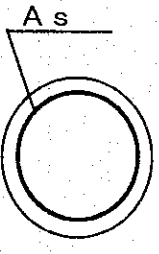
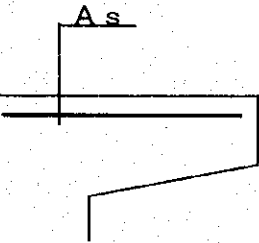
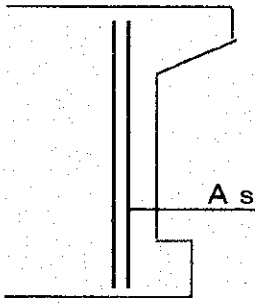


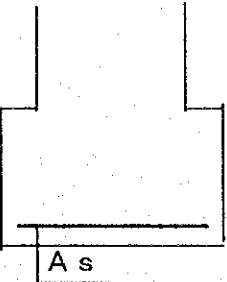
Pile

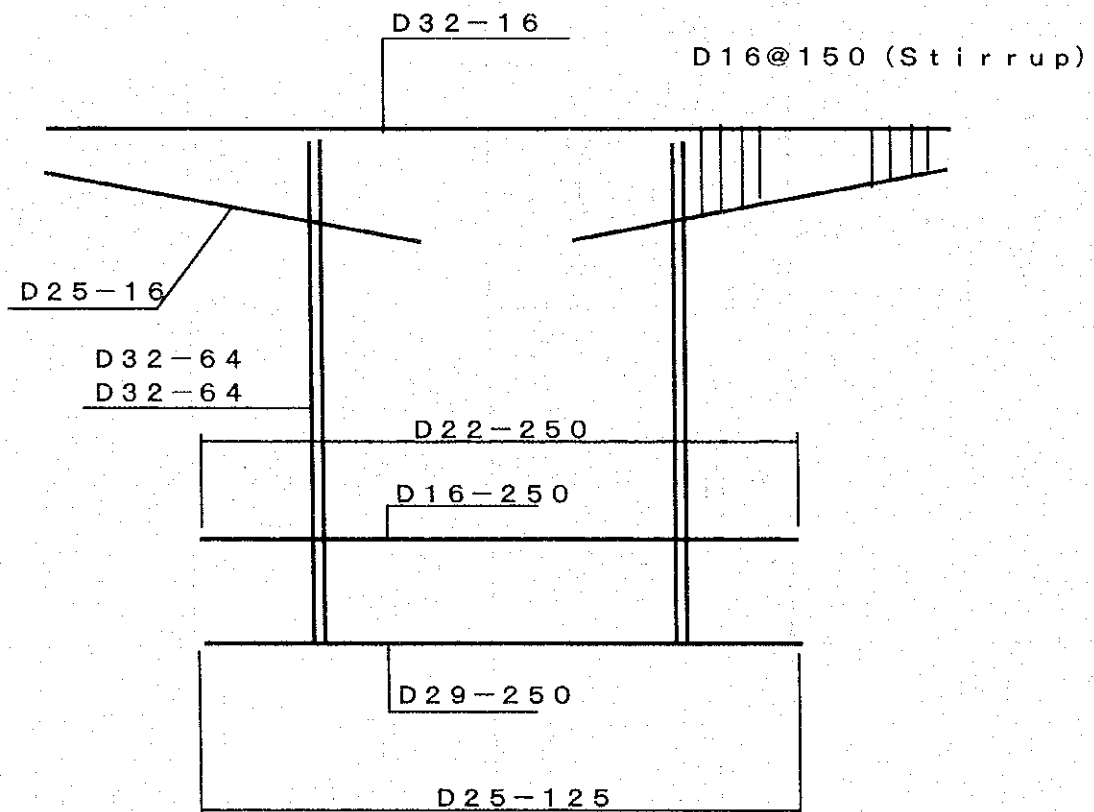


NH-5 FLYOVER (A-RAMP)

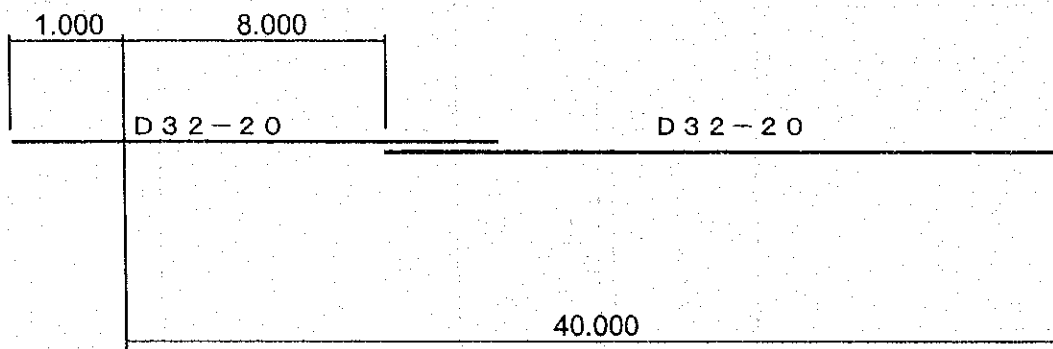
Pier Pa1~Pa3

Number of Pile	6		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.722	< 1.5
Bearing Capacity (tf)	Usual	146	< 720
	Earthquake	380	< 1,073
Pile		As = D 32 - 20	2,614 < 2,700
		As = D 32 - 10	2,605 < 2,700
Beam		As = D 32 - 16 (@ 125)	1,477 < 1,800
Column		As = D32-64 D32-64	2,346 < 2,700

Foot i		As = D29@250	2,204 < 2,700
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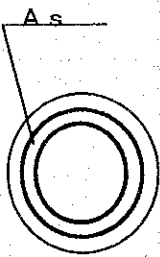
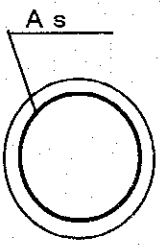
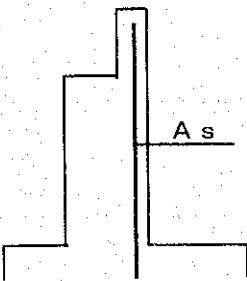
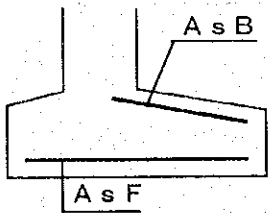


P i l e

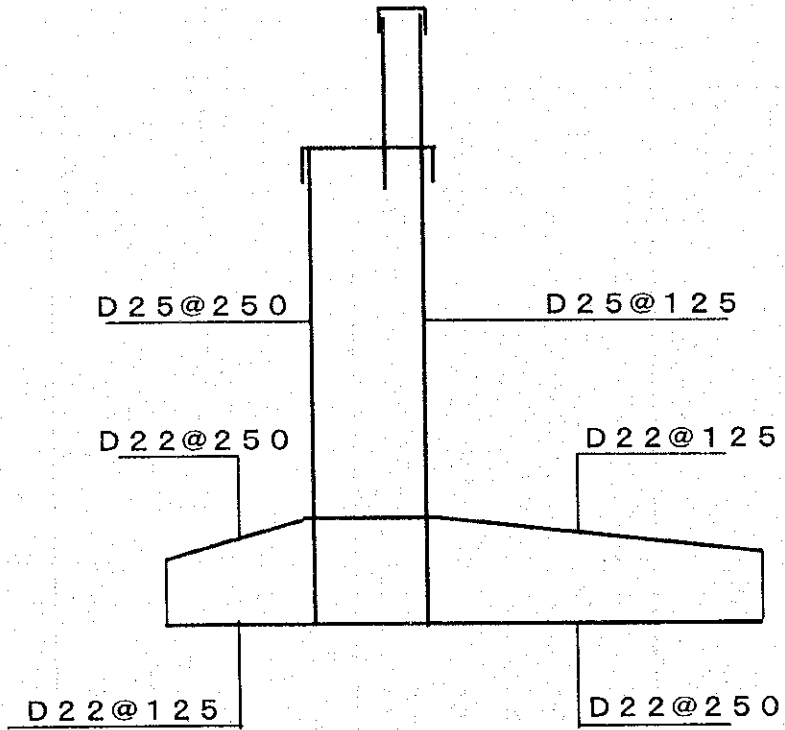


NH-5 FLYOVER (C-RAMP)

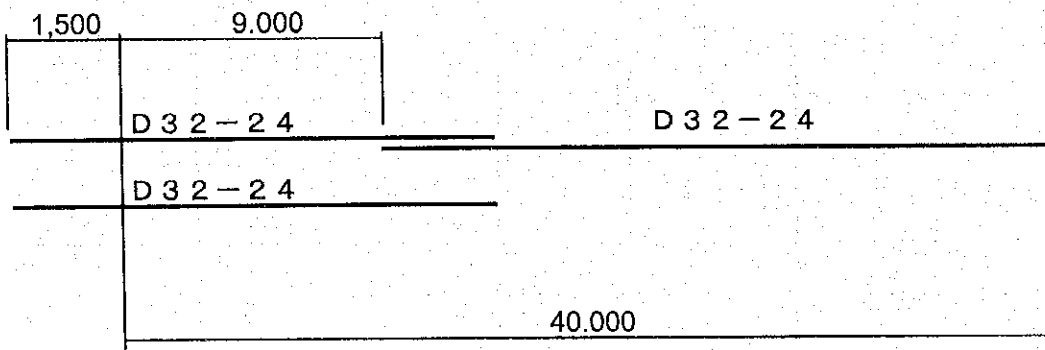
A c 1

Number of Pile	6		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.647	< 1.5
	Earthquake	1.160	< 1.5
Bearing Capacity (tf)	Usual	385	< 1,148
	Earthquake	536	< 1,704
Pile		As = D 32 - 24 D 32 - 24	2,488 < 2,700
		As = D 32 - 24	1,562 < 2,700
Body		As = D 25 @ 125	2,106 < 2,700
Footing		AsF = D 22 @ 125 AsB = D 22 @ 125	2,177 < 2,700

Body & Footing

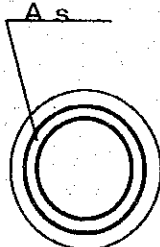
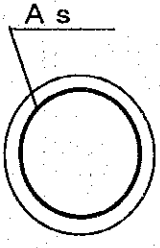
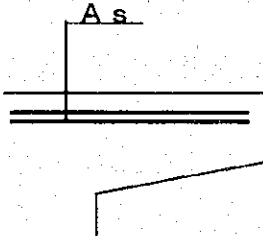
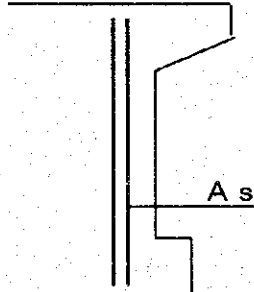


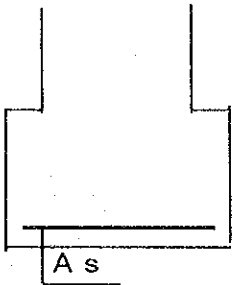
Pile

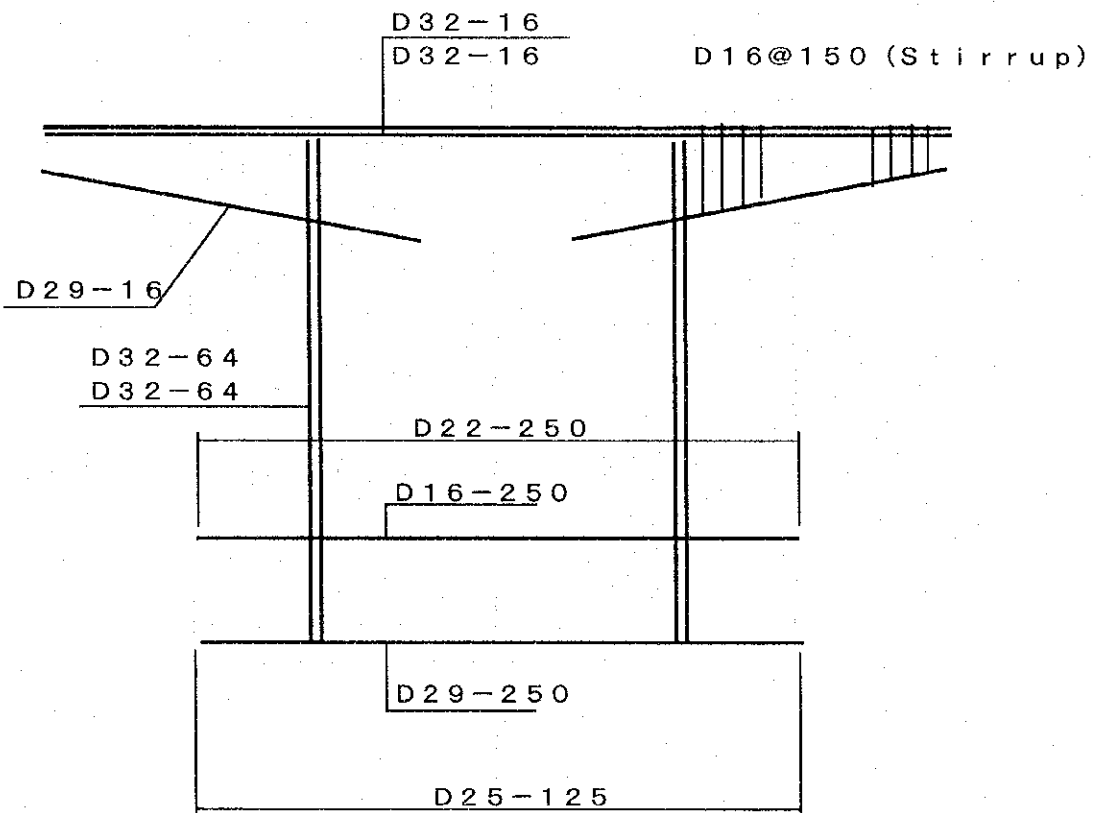


NH-5 FLYOVER (C-RAMP)

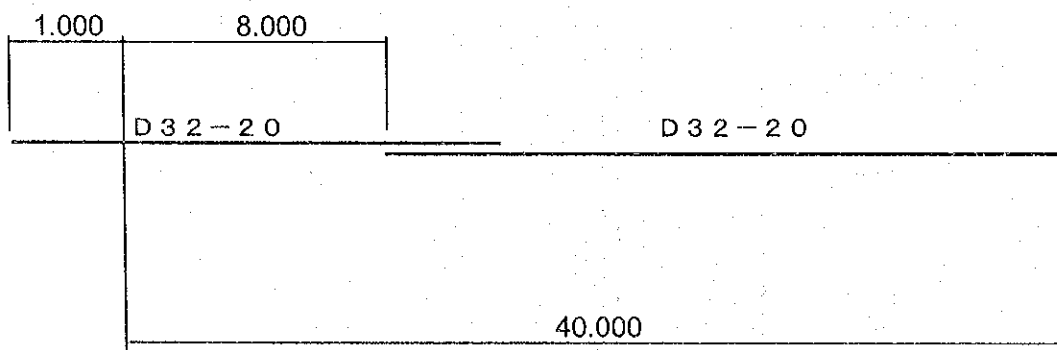
Pier Pc1~Pc2

Number of Pile	6		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.818	< 1.5
Bearing Capacity (t)	Usual	150	< 720
	Earthquake	416	< 1,073
Pile		As = D 29 - 20 D 29 - 10	1,646 < 2,700
		As = D 29 - 20	777 < 2,700
Beam		As = D 32 - 16 D 32 - 8 (@ 125)	1,606 < 1,800
Column		As = D32 - 64 D32 - 64	2,494 < 2,700

Footi		As = D29@250	2,391 < 2,700
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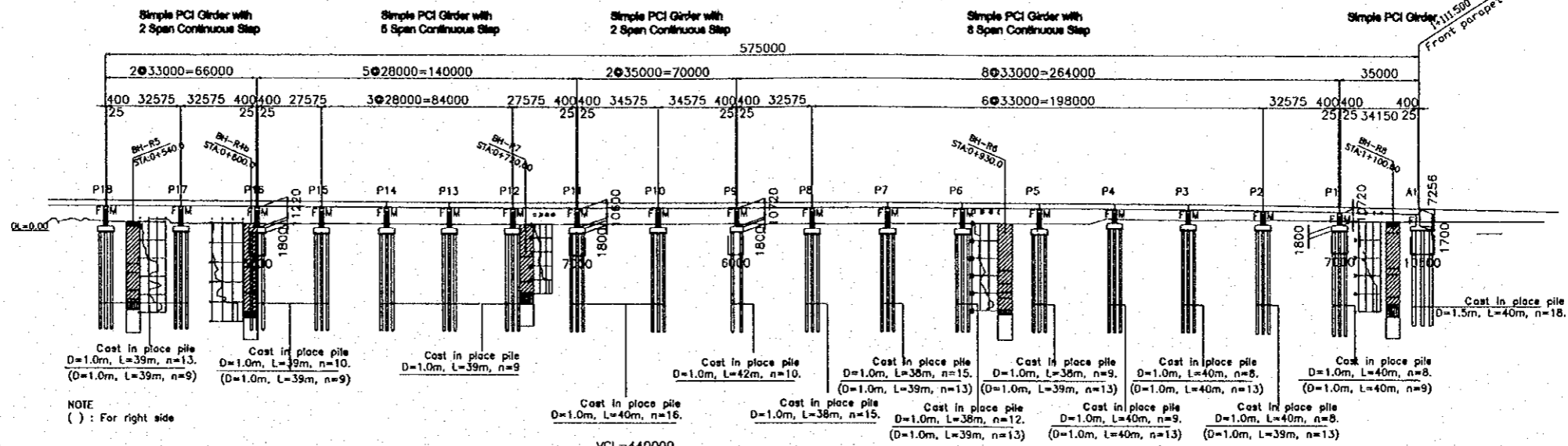
Pile



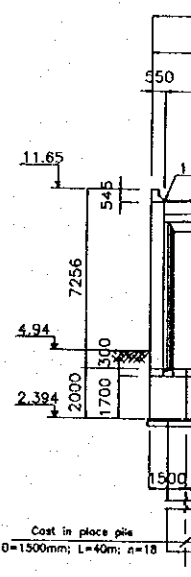
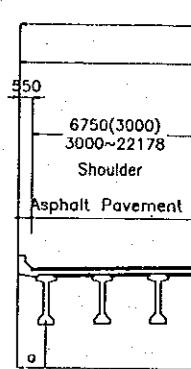
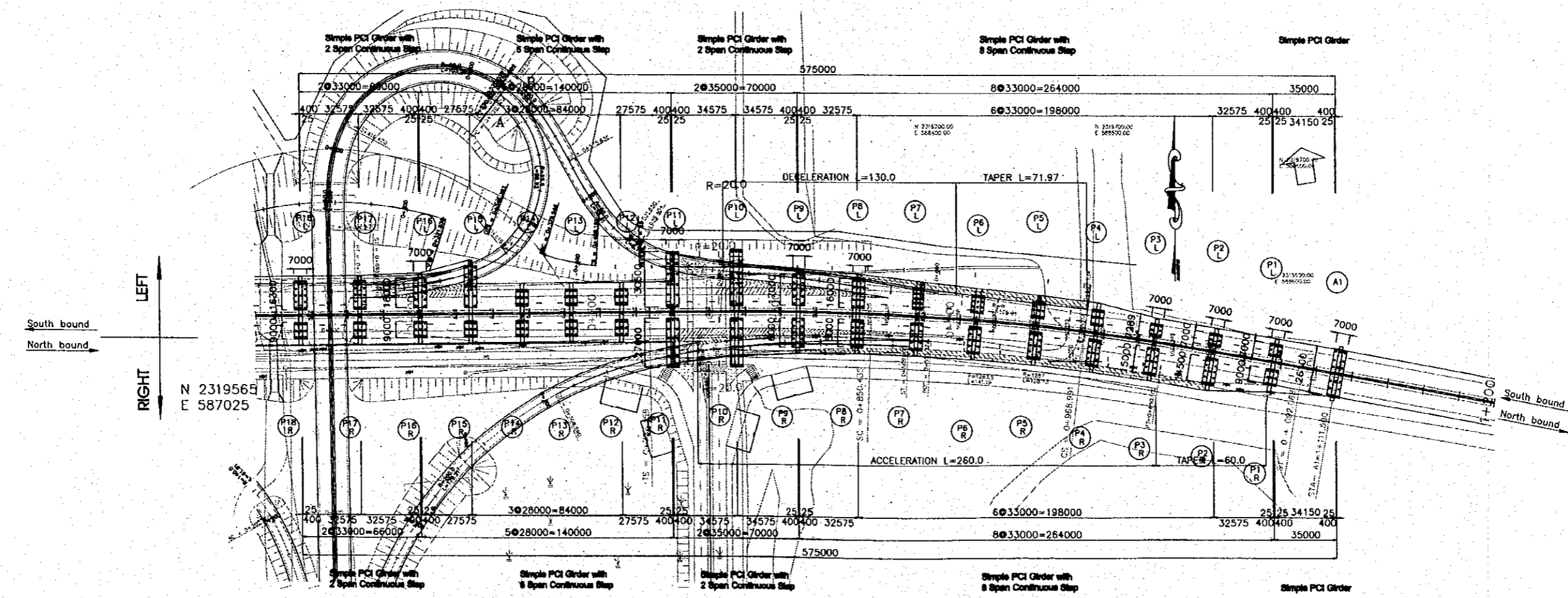
10. PHAP VAN VIADUCT

THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM THANG LONG PROJECTS MANAGEMENT UNIT, MINISTRY OF TRANSPORT		DESIGNED BY
PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)		NAME S. WATABE
RED RIVER BRIDGE (THANH TRI BRIDGE) CONSTRUCTION PROJECT		SIGNATURE
CONSULTANT	PACIFIC CONSULTANTS INTERNATIONAL	DATE

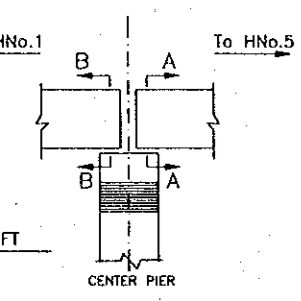
PROFILE - SOUTH BOUND BRIDGE



GRADE	BH-R5		BH-R4b		BH-R7		BH-R6		BH-R8	
ELEVATION	15.30	15.46	15.56	15.62	15.64	15.62	15.57	15.48	15.32	15.11
GROUND HEIGHT	3.67	3.17	3.10	3.20	3.21	3.08	3.16	3.26	3.34	3.14
STATION	0+536.5	0+540	0+569.5	0+602.5	0+630.5	0+658.5	0+686.5	0+714.5	0+742.5	0+770.5



TYPICAL CROSS SECTION OF BRIDGE (SCALE = 1/300)



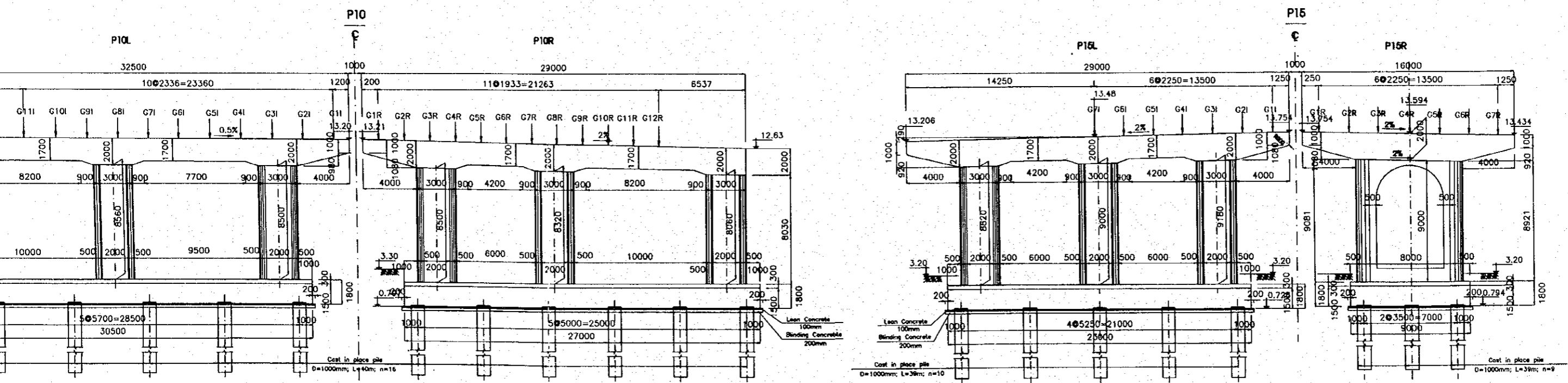
DIMENSION OF SUPERSTRUCTURE CROSS SECTIONS OF THE RIGHT BRIDGE

LOCATION	SECTION A					SECTION B				
	n	d (mm)	a (mm)	WR (mm)	Number of girder	n	d (mm)	a (mm)	WR (mm)	Number of girder
A1	5	2000	1300	12600	6	5	2000	1300	12600	6
P1	8	2325	1250	21100	9	8	2325	1250	21100	9
P2~P7	8	2380	1250	21541	9	8	2380	1250	21541	9
P8	8	2448	1250	22080	9	9	2176	1250	22080	10
P9	9	2362	1250	23760	10	11	1933	1250	23762	12
P10	11	2316	1250	27972	12	6	2250	1300	16100	7
P12~P14	6	2250	1300	16100	7	6	2413	1300	16100	7

DIMENSION OF SUPERSTRUCTURE CROSS SECTIONS OF THE LEFT BRIDGE

LOCATION	SECTION A				SECTION B				
	n	d (mm)	a (mm)	WL (mm)	n	d (mm)	WL (mm)	Number of girder	
A1	5	2000	1300	12600	5	2000	12600	6	
P1~P3	5	2000	1300	12600	5	2000	12600	6	
P4	6	2276	1250	16158	6	2267	16100	7	
P5	6	2413	1250	16976	7	2068	16976	8	
P6	7	2318	1250	18727	8	2028	18727	9	
P7	8	2297	1250	20878	9	2042	20878	10	
P8	9	2313	1250	23317	10	2082	23317	11	
P9	10	2336	1250	25856	11	1946	25856	13	
P10	12	2419	1250	31528	6	2250	16100	7	
P12~P14	6	2250	1300	16100	7	6	2250	16100	7
P15	6	2250	1300	16100	7	11	2434	29272	12
P16	11	1787	1250	22160	8	2458	22160	9	
P17~P18	8	2325	1250	21100	9	8	2325	21100	9

TYPICAL CROSS SECTION OF SUBSTRUCTURE

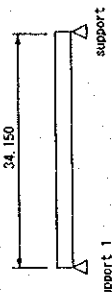


PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

10.2 Superstructure

Bridge Name	Phap Van Viaduct		Route	Hanoi No. 3 Ring Road	Road Alignment	varies	Skew Angle	90 degrees	90 degrees	21.1 m	Seismic Coefficient	0.17
Structural Type	Simple Span PC I-girder Bridge		Bridge Length	35.0 m	Span Arrangement		34.15 m		21.1 m	20.0 m		0.17
Main Girder	Number of Girders	1 nos.	Girder Height	1.75 m	Maximum Displacement	mm(1/—)						
	Girder Spacing	2.325 m	Height/Span Ratio	H/L = 1/20 (constant girder height)								
Crossbeam	Number of Crossbeams	3 nos./span	Crossbeam Spacing	8.5 m (approximately)	Reinforcement Arrangement	D19@125 (top & bottom)						
	Structural Type	Reinforced Concrete Slab	Prestressing Tendon									
Design Strength of Concrete	f'c = 290 kgf/cm ²		Allowable Stress Increase Coefficient									
Bending Moment	Slab Depth											
	+ve & -ve	3.029 tf.m/m	200 mm concrete	78.5 kgf/cm ²	rebar	1.188 kgf/cm ²						
Design Theory	Beam Theory	12T12.7 (SBPR7B)										
Construction Method	Post-tensioned Precast Concrete Girder											
Unfactored Bending Moment/Girder	Location	immediately after prestressing										
	girder weight only	262 tf.m	combined stress	allowable stress	at service load							
total service load	top fiber	27.1 kgf/cm ²	allowable stress	-15.0 kgf/cm ²	combined stress	-	kgf/cm ²	-	kgf/cm ²			
	bottom fiber	178.4 kgf/cm ²	allowable stress	198.0 kgf/cm ²	combined stress	-	kgf/cm ²	-	kgf/cm ²			
Shear Force Check Point at End Support	top fiber	-	allowable stress	-	kgf/cm ²	115.1 kgf/cm ²	160.0 kgf/cm ²					
	bottom fiber	-	allowable stress	-	kgf/cm ²	-23.4 kgf/cm ²	-31.8 kgf/cm ²					
Support Reaction	Unfactored Shear Force											
	Factored Shear Force/Girder	166 tf	Diagonal Tension Stress	Stirrup	Vertical Prestressing tendon							
Dead Load, Rd	tf	77.0	4-D13@125									
Live Load, Rl	tf	20.8	not provided									
Total Reaction	tf	97.8										
Bearing Type	elastic bearing											

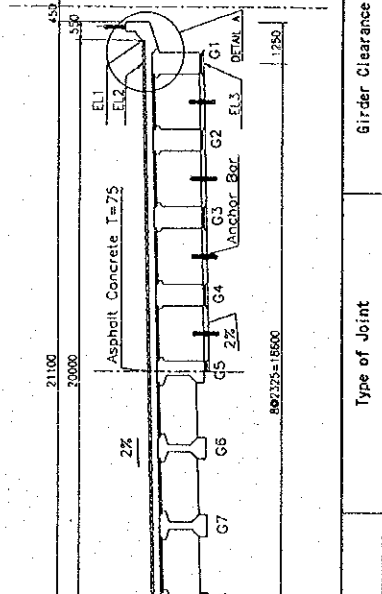
Expansion Joint	Location	Type of Joint	Girder Clearance		
	-	Rubber joint	50 mm (typical)		
Primary Construction Materials	Items	Unit	Specification	Quantity/Girder	Quantity/1m ³ of concrete
	Concrete	m ³	f'c = 400 kgf/cm ²	27.0	-
	Side Formwork	m ²	-	143.6	5.32 m ² /m ³
	Bottom Formwork	m ²	-	22.7	0.84 m ² /m ³
	Reinforcing Bar	kgf	SD295A (JIS G3112)	3,706	137.3 kgf/m ³
	Prestressing Tendon	kgf	12T15.2 (SBPR7B)	1,681	62.3 kgf/m ³
Total	kgf	-	1,681	-	-

Remarks	<p>1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)</p> <p>2. Nomenclature of supports are as follows.</p>  <p>3. Quantity of prestressing tendon includes operation allowance of 1.5m/each.</p>
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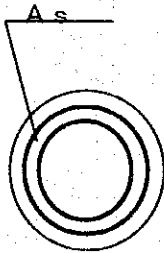
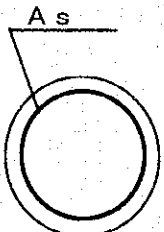
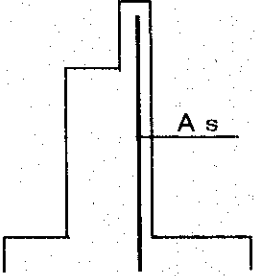
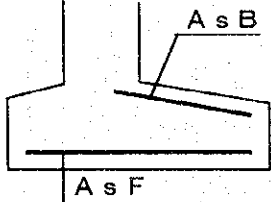
Support Reaction and Bearings	Unit	Support 1 (= Support 2)
Dead Load, Rd	tf	77.0
Live Load, Rl	tf	20.8
Total Reaction	tf	97.8
Bearing Type	elastic bearing	

PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

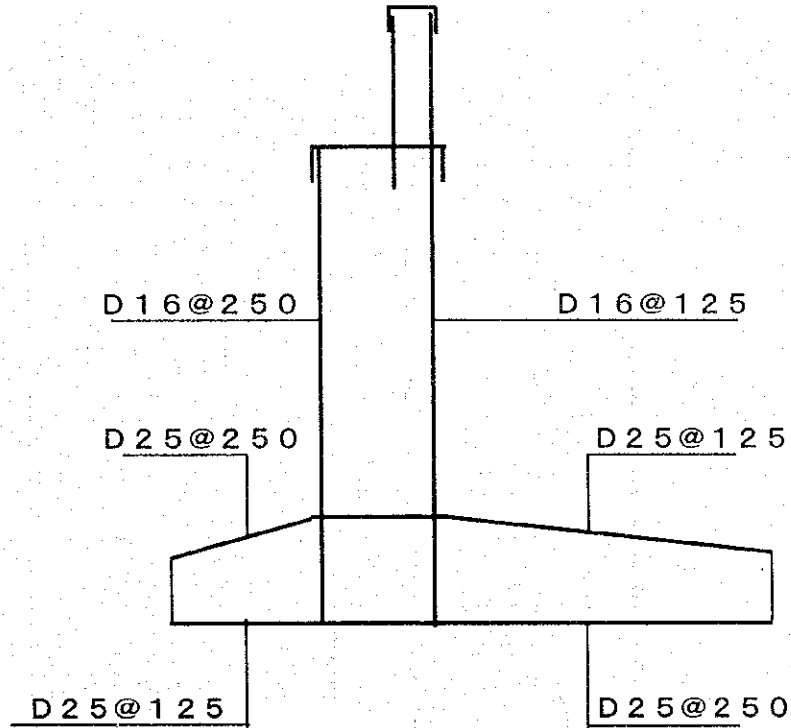
Bridge Name	Phap Van Viaduct	Route	Hanoi No. 3 Ring Road	Road Alignment	varies	Skew Angle	90 degrees	Roadway Width	Total Width	21.1 m	Seismic Coefficient	longitudinal	0.17
Structural Type	Simple Span PC I-girder Bridge L = 28.0m, H = 1.50m	Bridge Length	28.0 m	Span Arrangement		27.15 m		Effective Width	20.0 m			transverse	0.17
Main Girder	Number of Girders	1 nos.	Girder Height	1.5 m	Maximum Displacement								
	Girder Spacing	2.325 m	Height/Span Ratio	H/L = 1/18.7 (constant girder height)									
Crossbeam	Number of Crossbeams	3 nos./span	Crossbeam Spacing	8.0 m (approximately)	Crossbeam Height	1.42 m							
	Reinforced Concrete Slab	Prestress Tendon	Reinforcement Arrangement	D19@125 (top & bottom)									
Design Strength of Concrete													
f'c = 290 kgf/cm ²													
Allowable Stress Increase Coefficient													
Stresses													
Bending Moment													
Slab Depth													
+ve & -ve													
3.029													
200 mm													
79 kgf/cm ² rebar													
1.188 kgf/cm ²													
Design Theory													
Beam Theory													
Post-tensioned Precast Concrete Girder													
Design Theory													
12T12.7 (SBPR7B)													
Construction Method													
Post-tensioned Precast Concrete Girder													
Immediately after prestressing													
at service load													
Unfactored Bending Moment/Girder	Location												
	combined stress	allowable stress	combined stress	allowable stress									
girder weight only	top fiber	7.3 kgf/cm ²	-15.0 kgf/cm ²	- kgf/cm ²	- kgf/cm ²								
	bottom fiber	169.0 kgf/cm ²	198.0 kgf/cm ²	- kgf/cm ²	- kgf/cm ²								
total service load	top fiber	- kgf/cm ²	- kgf/cm ²	86.6 kgf/cm ²	160.0 kgf/cm ²								
	bottom fiber	- kgf/cm ²	- kgf/cm ²	-14.2 kgf/cm ²	-31.8 kgf/cm ²								
Design of Main Girder													
Primary Construction Materials													
Concrete													
m ³													
f'c = 400 kgf/cm ²													
Quantity/Girder													
20.0													
Side													
m ²													
-													
Bottom													
m ²													
-													
Reinforcing Bar													
kgf													
S295A (JIS G3112)													
Quantity/Girder													
2.795													
longitudinal													
kgf													
12T15.2 (SBPR7B)													
Quantity/Girder													
1.085													
transverse (deck slab)													
kgf													
3T15.2 (SBPR7B)													
transverse (crossbeam)													
kgf													
4T15.2 (SBPR7B)													
Total													
kgf													
-													
Quantity/ha ² of concrete													
-													
5.01 m ² /m ³													
-													
0.91 m ² /m ³													
139.8 kgf/m ³													
54.3 kgf/m ³													
1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)													
2. Nomenclature of supports are as follows.													
3. Quantity of prestressing tendon includes operation allowance of 1.5m/each.													
Remarks													
Support Reaction													
Unit													
Support 1 (= Support 2)													
Dead Load, Rd													
tf													
62.4													
Live Load, RL													
tf													
20.5													
Total Reaction													
tf													
82.7													
Bearing Type													
elastomeric bearing													



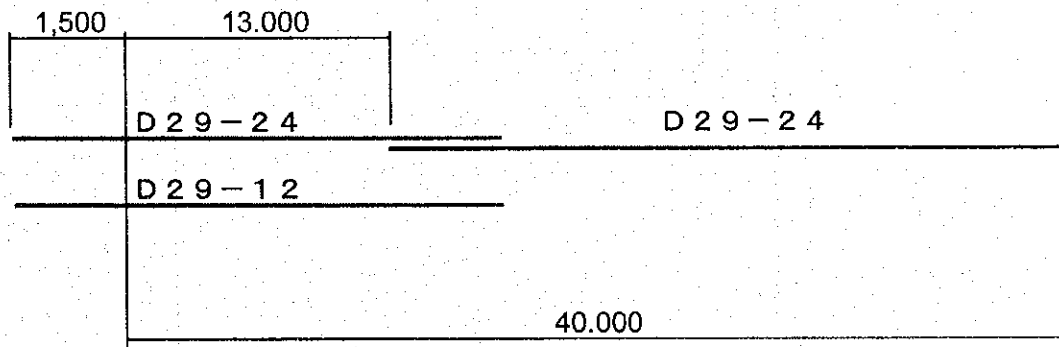
10.3 Substructure
 Phap Van Viaduct
 A 1 (M o v)

Number of Pile	18		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.817	< 1.5
	Earthquake	1.486	< 1.5
Bearing Capacity (tf)	Usual	367	< 482
	Earthquake	467	< 705
Pile		As = D 29 - 24 D 29 - 12	2,515 < 2,700
		As = D 29 - 24	2,226 < 2,700
Body		As = D 16 @ 125	2,472 < 2,700
Footing		As F = D 25 @ 125 As B = D 25 @ 125	2,418 < 2,700

Body & Footing

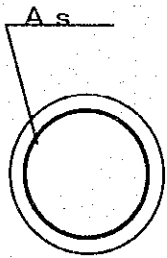
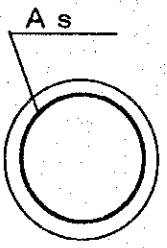
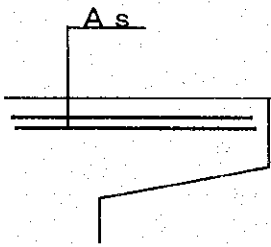
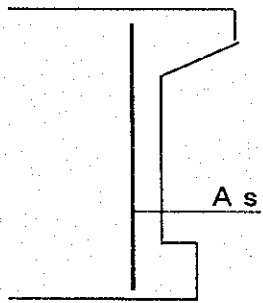


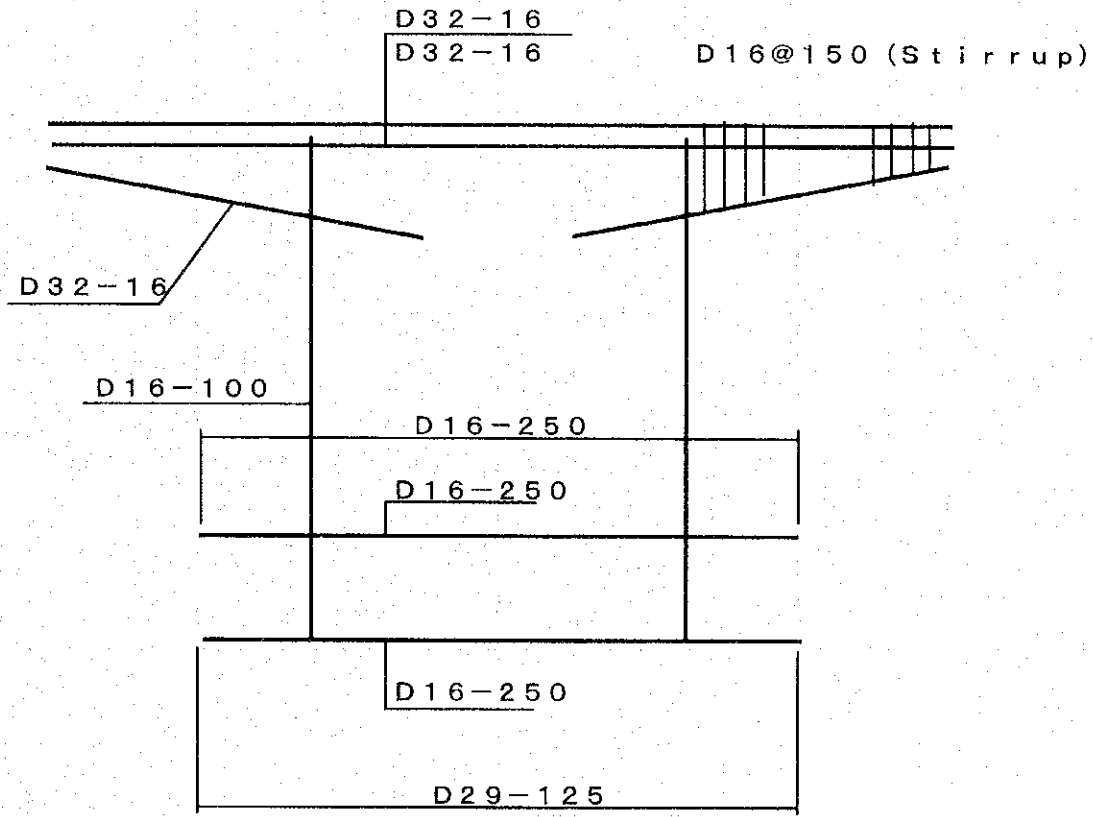
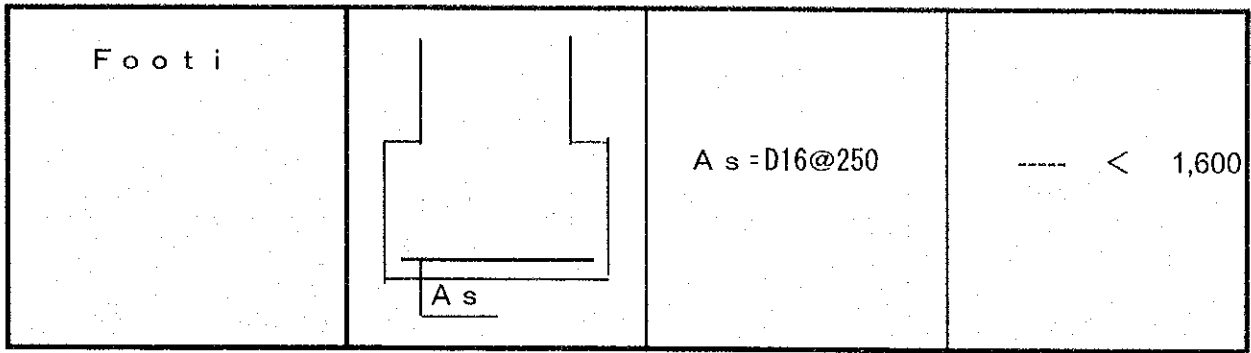
Pile



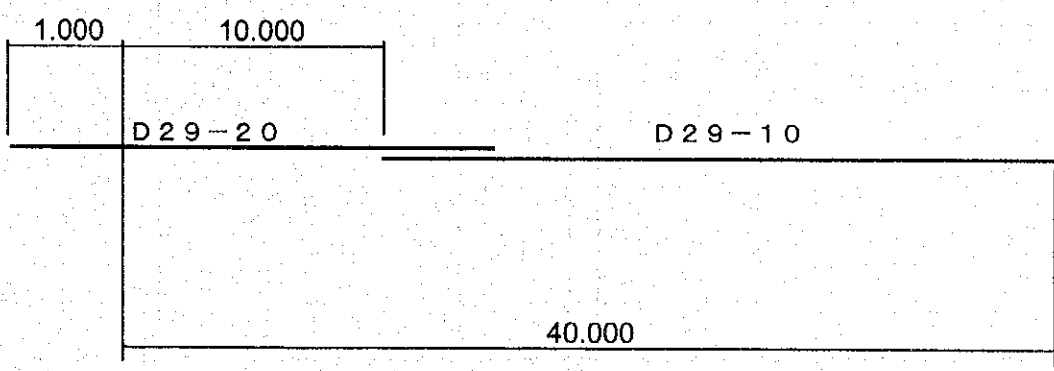
Phap Van Viaduct

Pier P1L~P3L

Number of Pile	8		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.285	< 1.5
Bearing Capacity (tf)	Usual	194	< 261
	Earthquake	358	< 384
Pile		As = D29-20	2,330 < 2,700
		As = D29-10	2,693 < 2,700
Beam		As = D32-16 D32-16 (@125)	1,502 < 1,800
Column		As = D16-100 (@125)	----- < 2,700

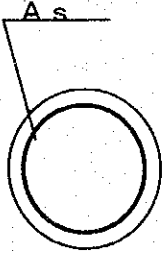
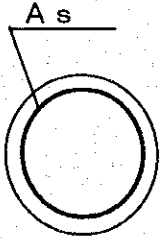
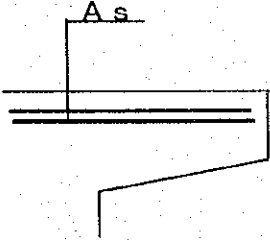
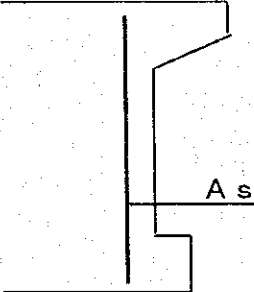


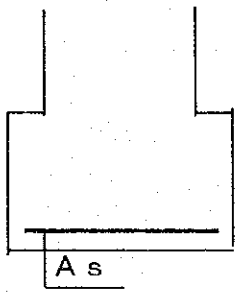
Pile

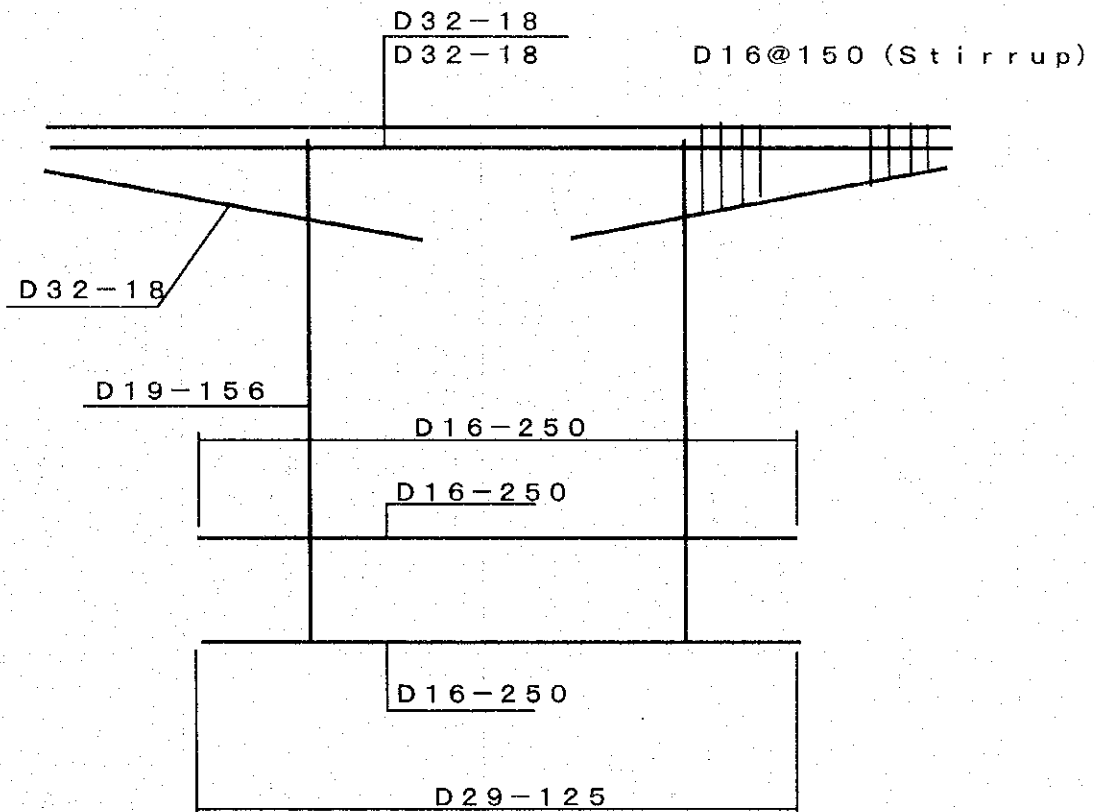


Phap Van Viaduct

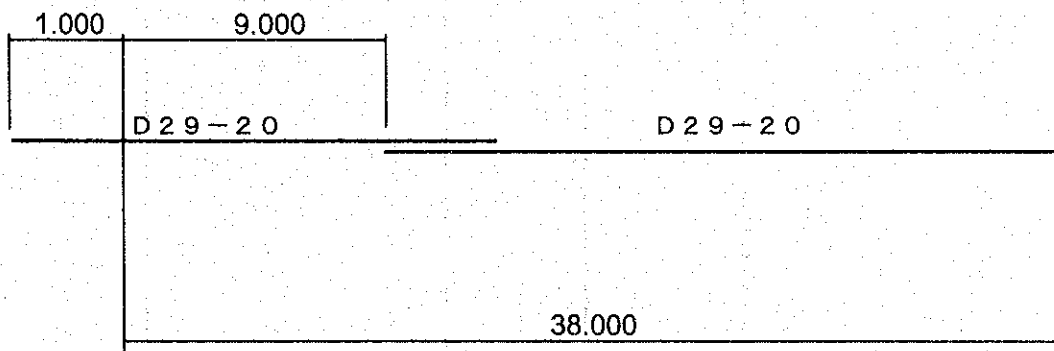
P 6 L

Number of Pile	12		
Pile Length (m)	38.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.038	< 1.5
Bearing Capacity (tf)	Usual	179	< 262
	Earthquake	379	< 380
Pile		$A_s = D29 - 20$	$2,389 < 2,700$
		$A_s = D29 - 10$	$2,537 < 2,700$
Beam		$A_s = D32 - 18$ $D32 - 18$ (@110)	$1,596 < 1,800$
Column		$A_s = D19 - 156$ (@125)	$2,605 < 2,700$

Foot i		A s = D16@250	----- < 1,600
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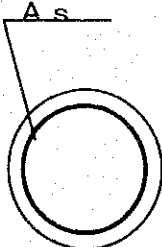
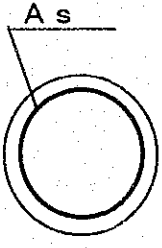
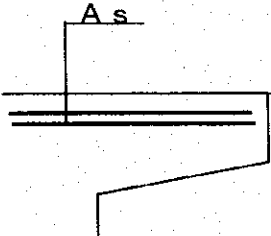
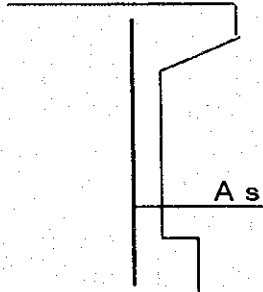


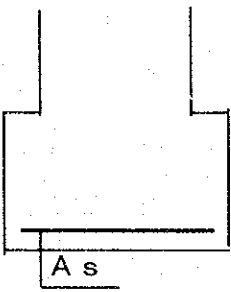
Pile

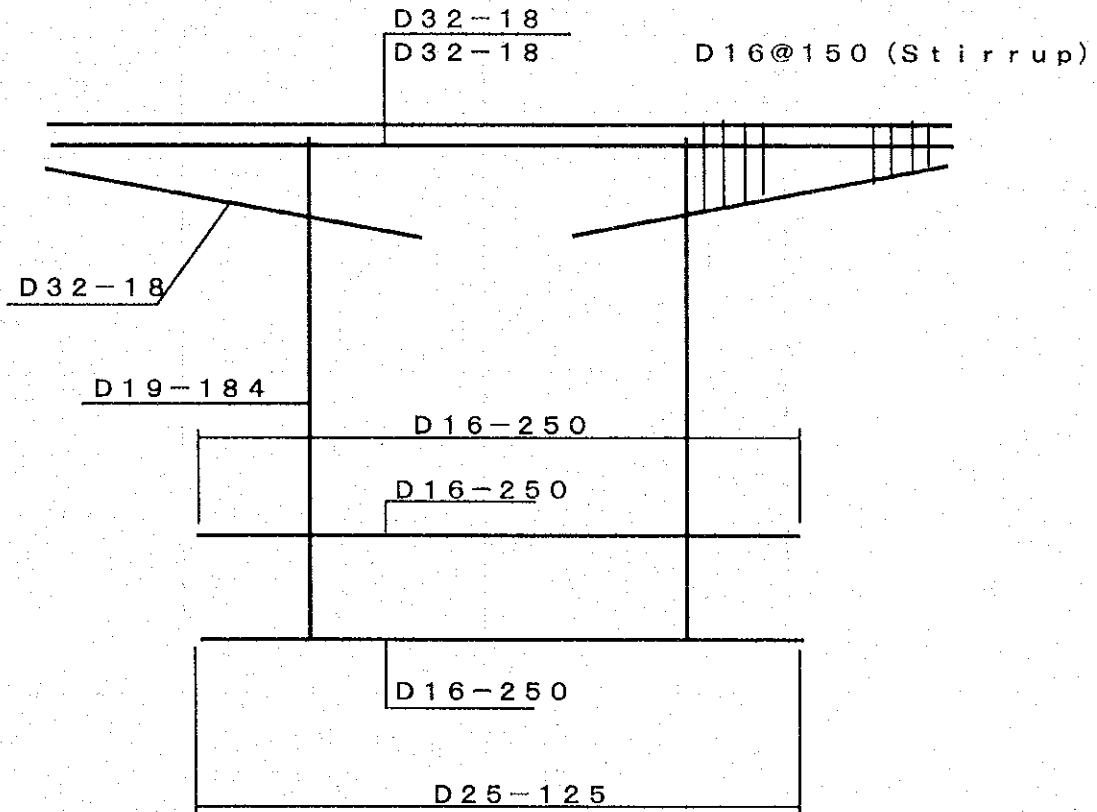


Phap Van Viaduct

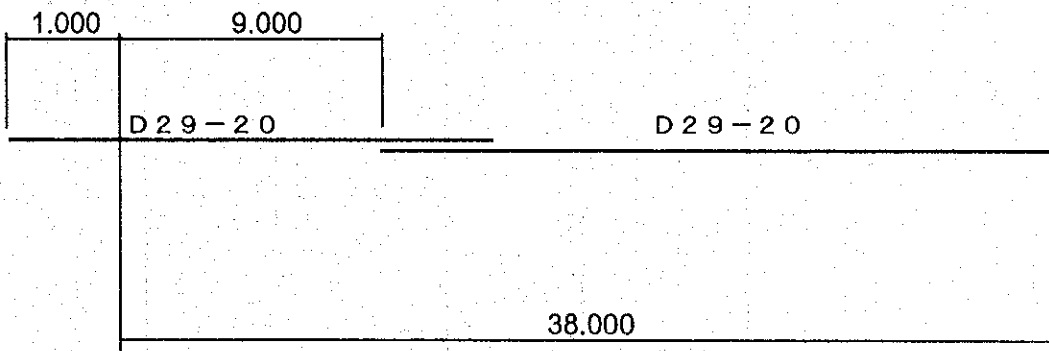
P 7 L

Number of Pile	15		
Pile Length (m)	38.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.958	< 1.5
Bearing Capacity (tf)	Usual	145	< 259
	Earthquake	355	< 375
Pile		As = D 29 - 20	2,221 < 2,700
		As = D 29 - 10	2,650 < 2,700
Beam		As = D 32 - 18 D 32 - 18 (@ 110)	1,298 < 1,800
Column		As = D 22 - 184 (@ 125)	2,081 < 2,700

Foot i		A s = D16@250	----- < 1,600
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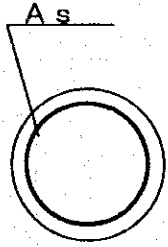
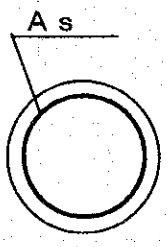
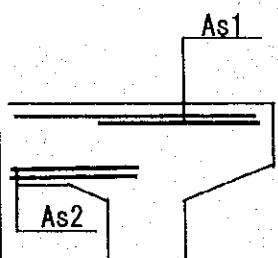
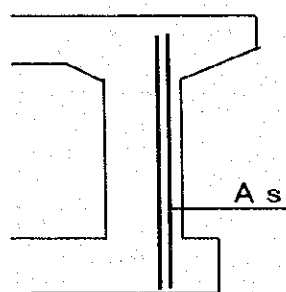


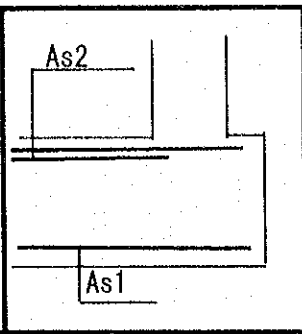
P i l e

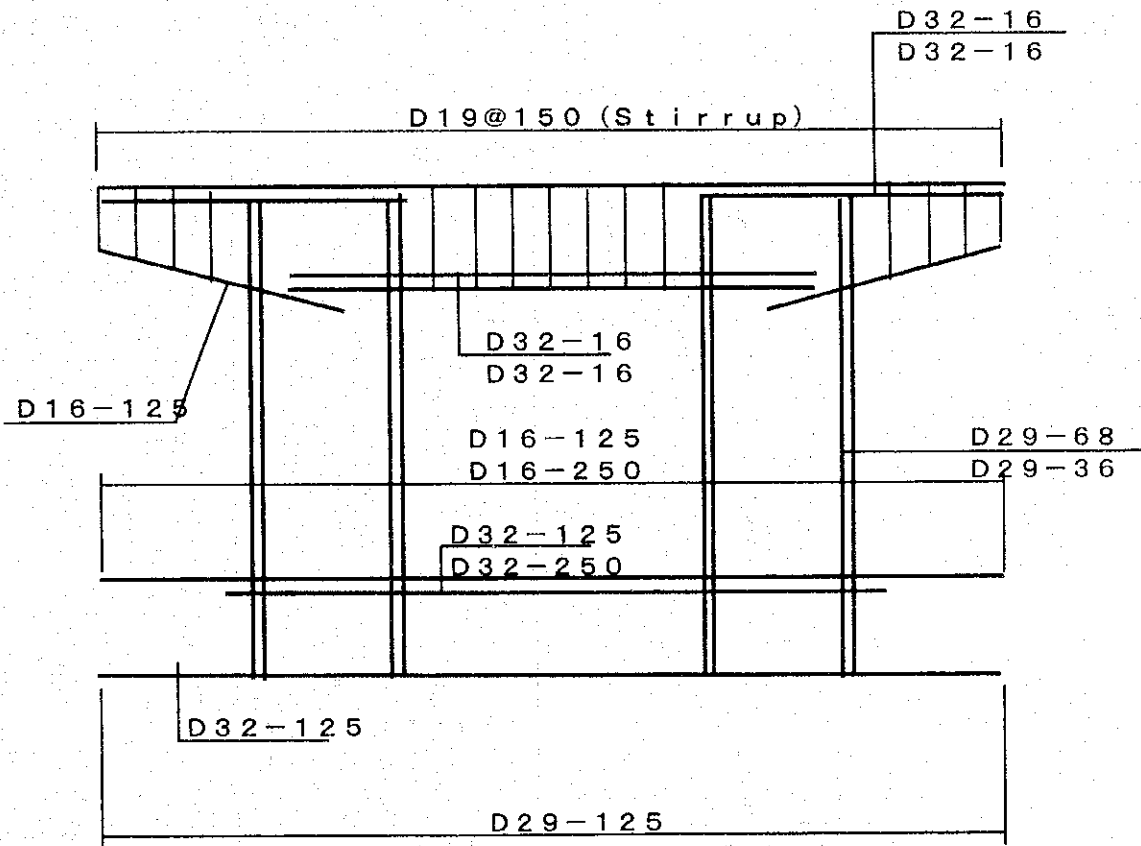


Phap Van Viaduct

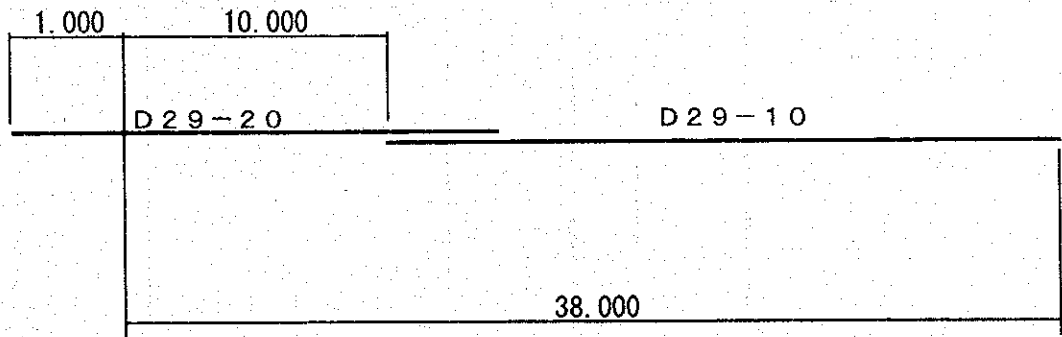
Pier P8L

Number of Pile	15		
Pile Length (m)	38.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.015	< 1.5
Bearing Capacity (tf)	Usual	179	< 265
	Earthquake	379	< 384
Pile		As = D 29 - 20	2,538 < 2,700
		As = D 29 - 10	2,256 < 2,700
Beam		As1 = D 32 - 16 D 32 - 16 As2 = D 32 - 16 D 32 - 16	1,750 < 1,800
Column		As = D 29 - 68 (@ 125) D 29 - 36	2,275 < 2,700

Footi		<p>As2 = D32@125 D32@250</p> <p>As1 = D32@125</p>	<p>1,604 < 1,800</p>
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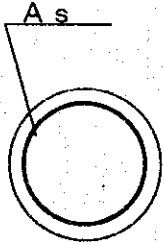
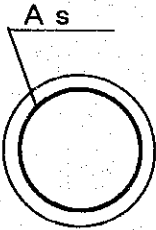
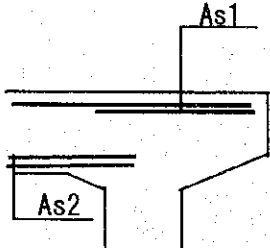
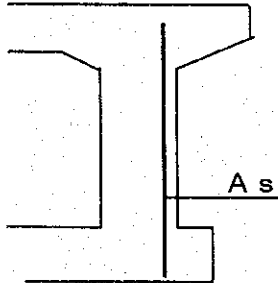


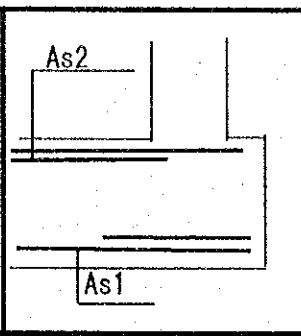
Pile

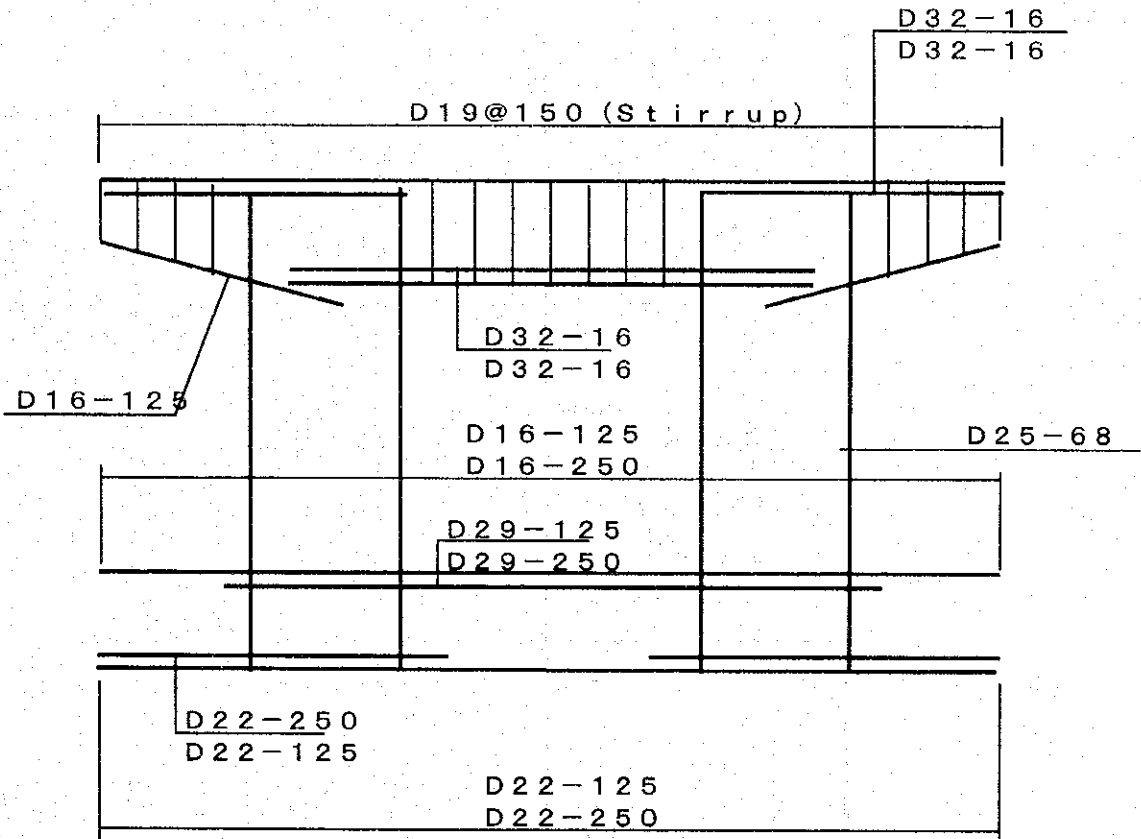


Phap Van Viaduct

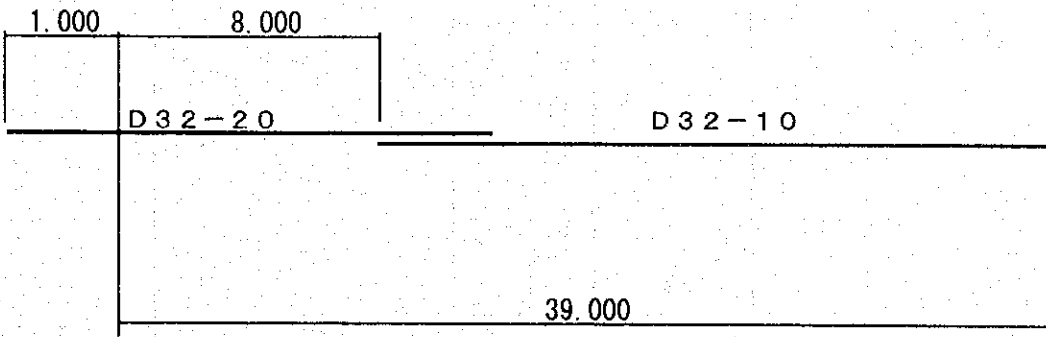
Pier P2R ~ P7R, P17L

Number of Pile	15		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.929	< 1.5
Bearing Capacity (tf)	Usual	178	< 265
	Earthquake	352	< 383
Pile		As = D32-20	1,784 < 2,700
		As = D32-10	2,288 < 2,700
Beam		As1 = D32-16 D32-16 As2 = D32-16 D32-16	1,750 < 1,800
Column		As = D25-68 (@125)	2,501 < 2,700

Foot i		<p>As2 = D29@125 D29@250</p> <p>As1 = D22@125 D22@250</p>	<p>1,794 < 1,800</p>
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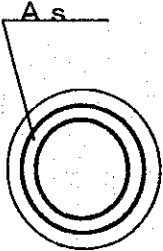
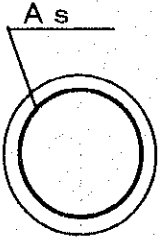
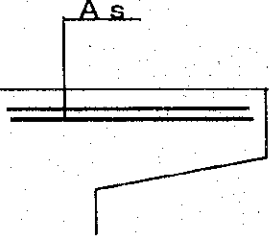
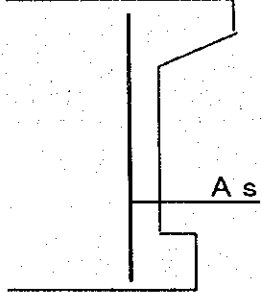


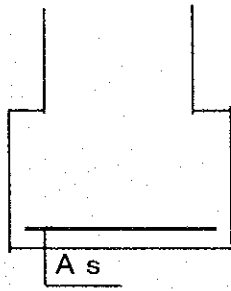
Pile

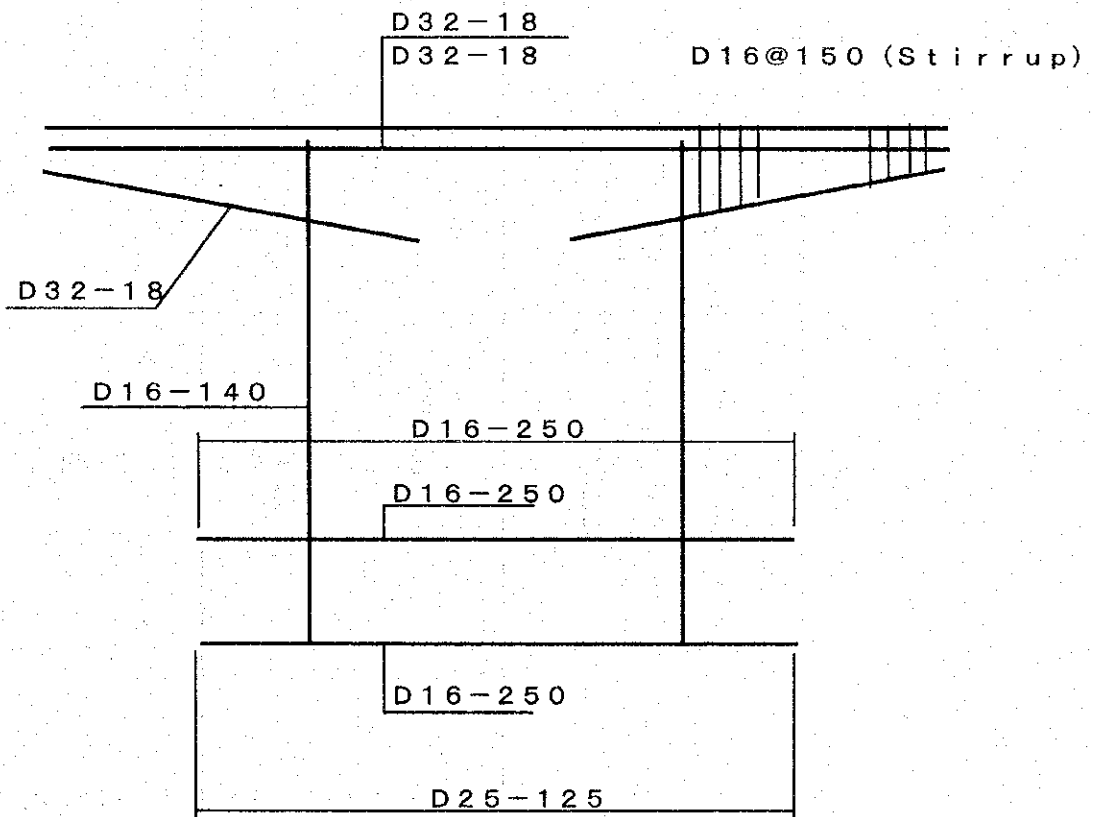


Phap Van Viaduct

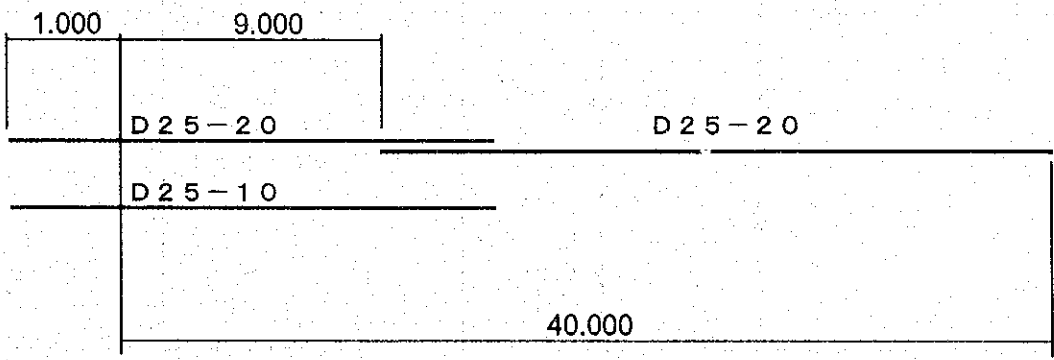
P4L

Number of Pile	9		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000 <	1.5
	Earthquake	1.153 <	1.5
Bearing Capacity (tf)	Usual	217 <	309
	Earthquake	422 <	449
Pile		As = D 25 - 20 D 25 - 10	2,547 < 2,700
		As = D 25 - 10	1,747 < 2,700
Beam		As = D 32 - 18 D 32 - 18 (@ 110)	1,652 < 1,800
Column		As = D16 - 140 (@ 125)	2,048 < 2,700

Foot i		As = D16@250	--- < 1,600
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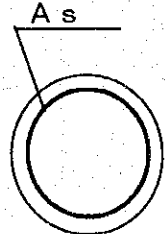
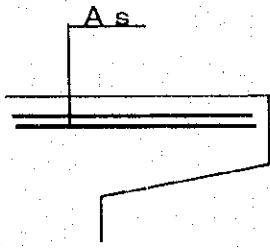
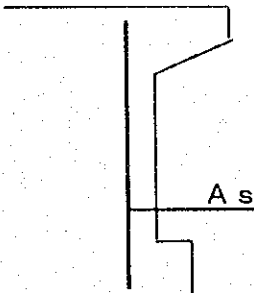


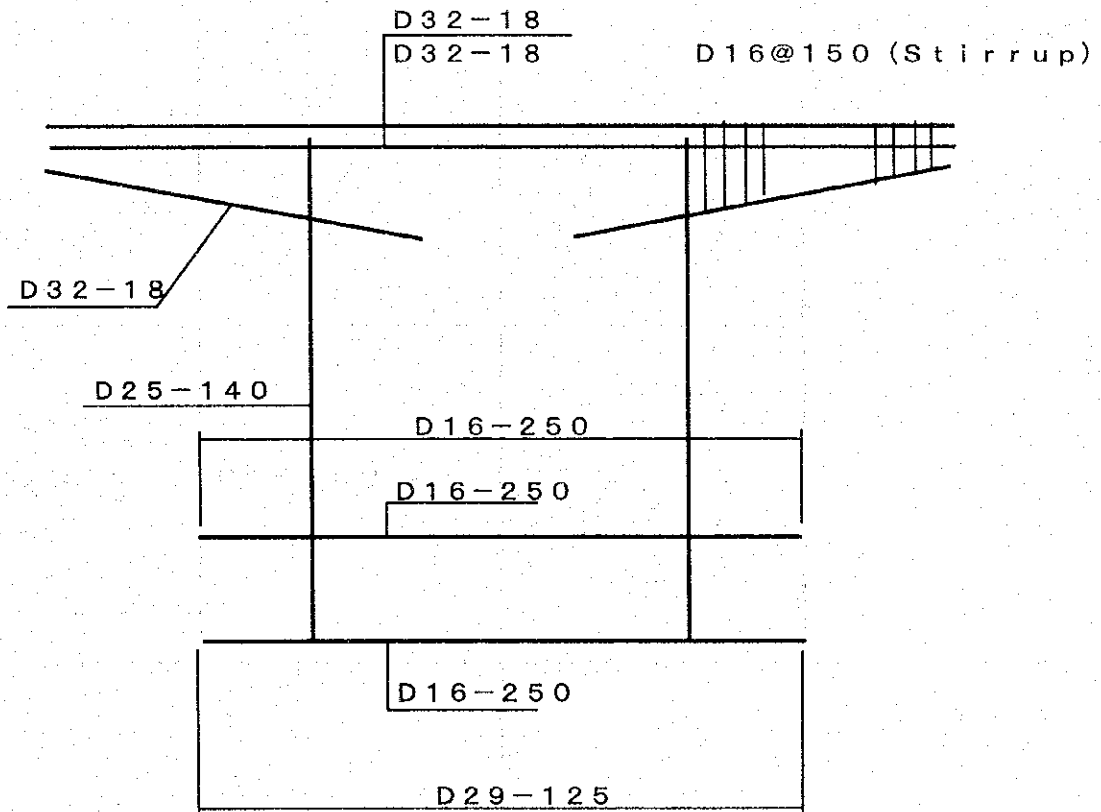
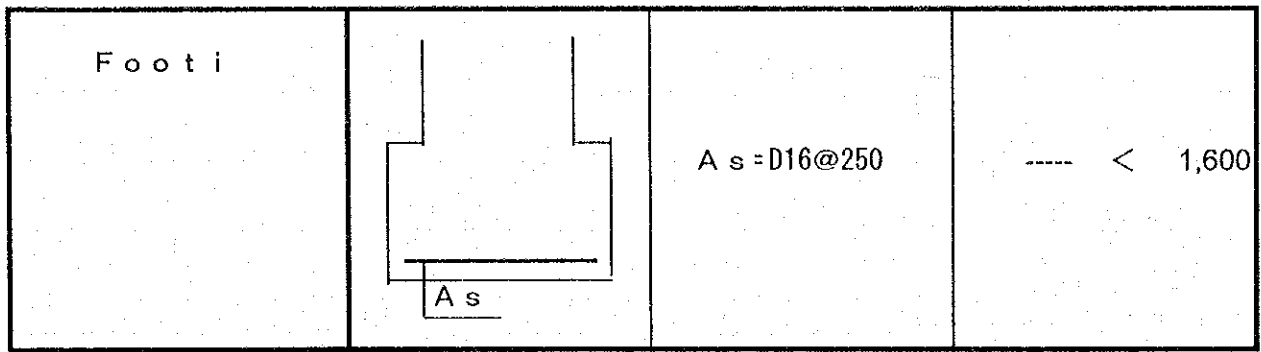
Pile



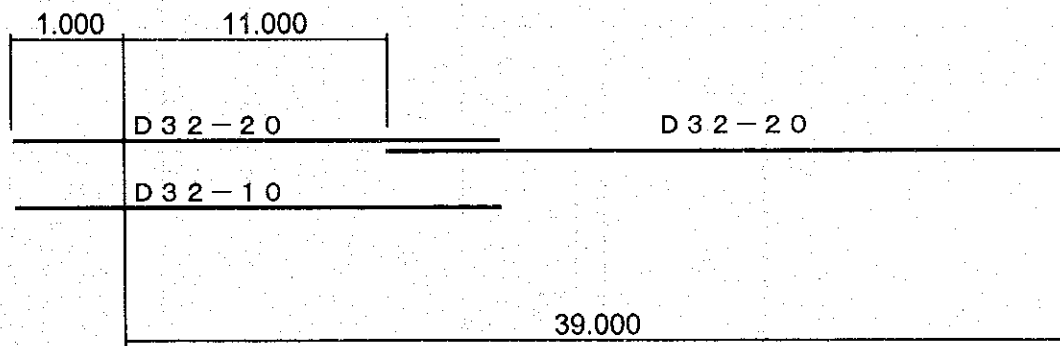
Phap Van Viaduct

Pier P1R, P12R~P16R, P12L, P13L,

Number of Pile	9		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.230	< 1.5
Bearing Capacity (tf)	Usual	224	< 339
	Earthquake	491	< 496
Pile		As = D32-20 D32-10	2,515 < 2,700
		As = D32-20	2,544 < 2,700
Beam		As = D32-18 D32-18 (@110)	1,584 < 1,800
Column		As = D25-140 (@125)	2,012 < 2,700

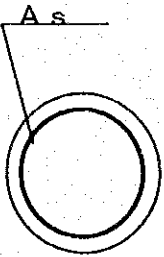
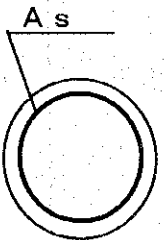
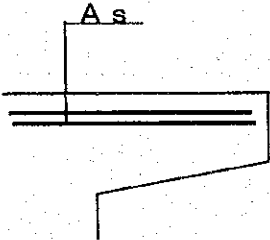
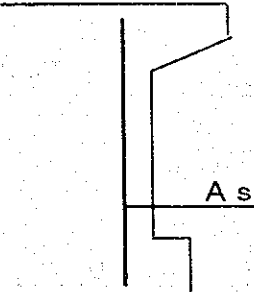


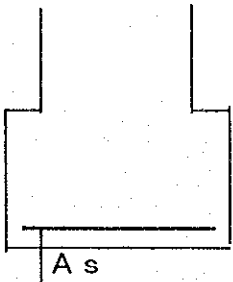
Pile

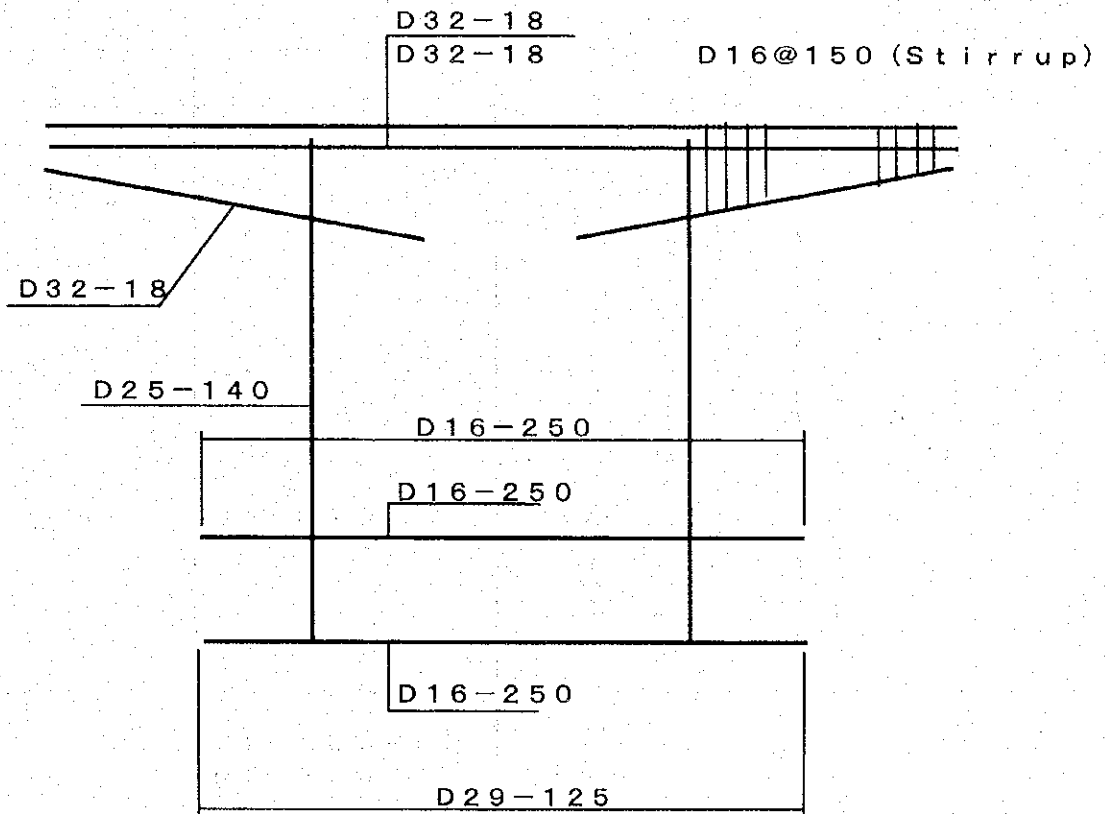


Phap Van Viaduct

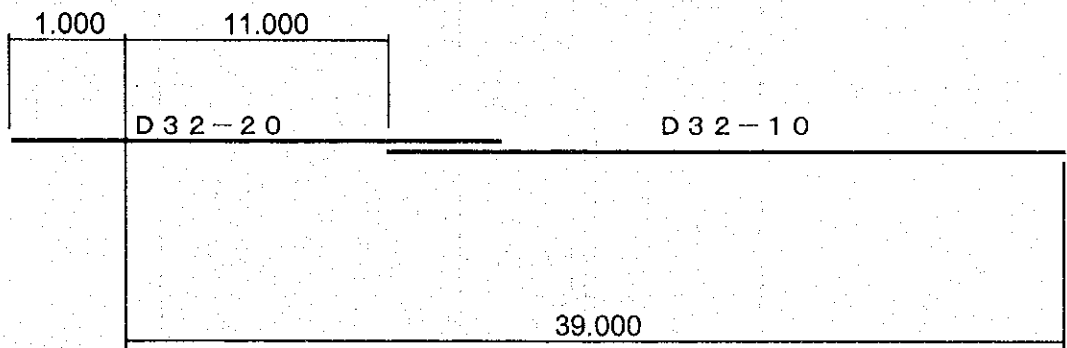
Pier P17R, P18R

Number of Pile	9		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.992	< 1.5
Bearing Capacity (tf)	Usual	228	< 448
	Earthquake	501	< 658
Pile		$A_s = D32 - 20$	2,438 < 2,700
		$A_s = D32 - 10$	2,267 < 2,700
Beam		$A_s = D32 - 18$ $D32 - 18$ (@110)	1,652 < 1,800
Column		$A_s = D25 - 140$ (@125)	2,152 < 2,700

Foot i		As = D16@250	----- < 1,600
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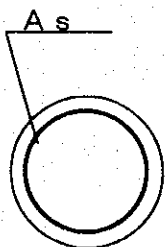
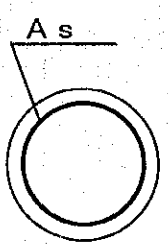
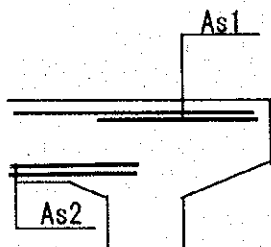
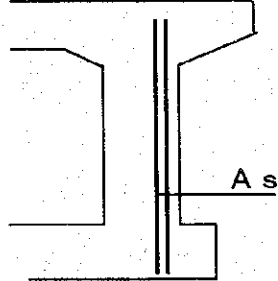


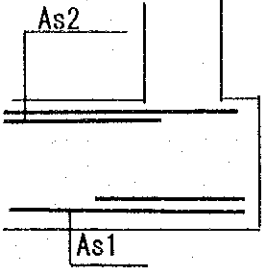
P i l e

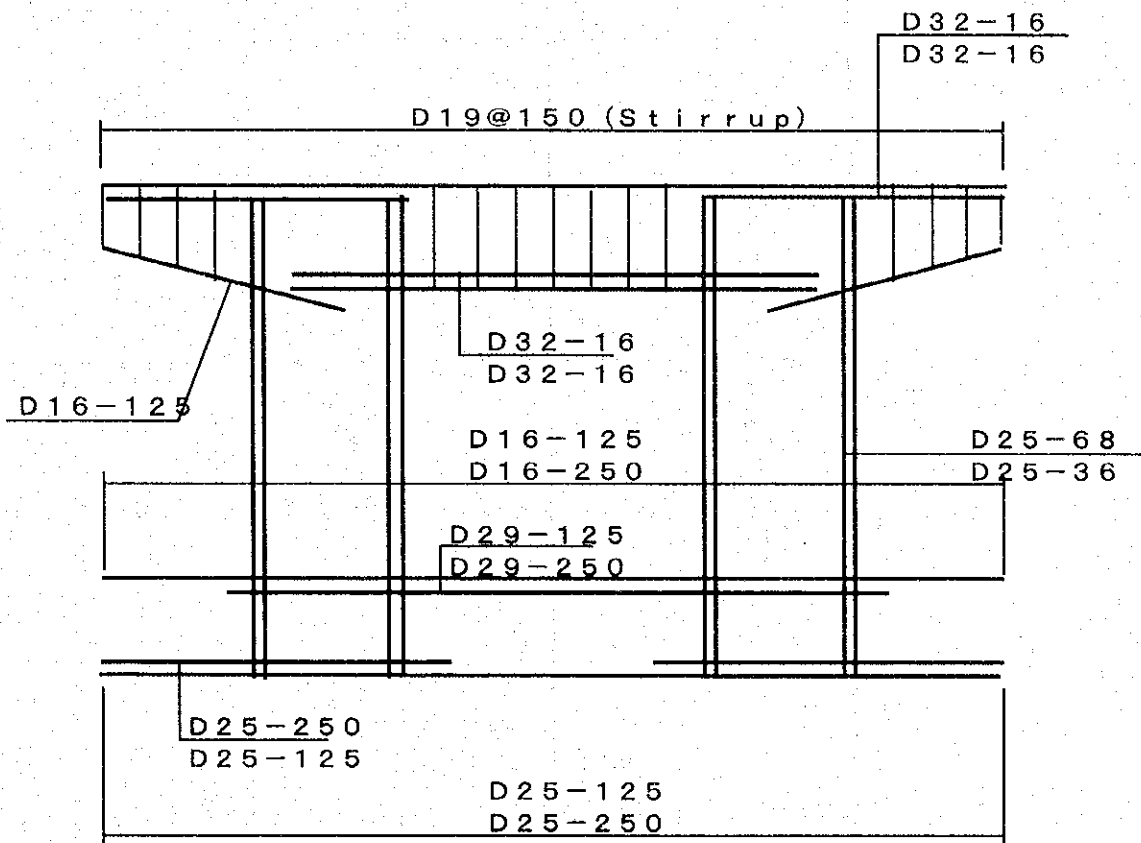


Phap Van Viaduct

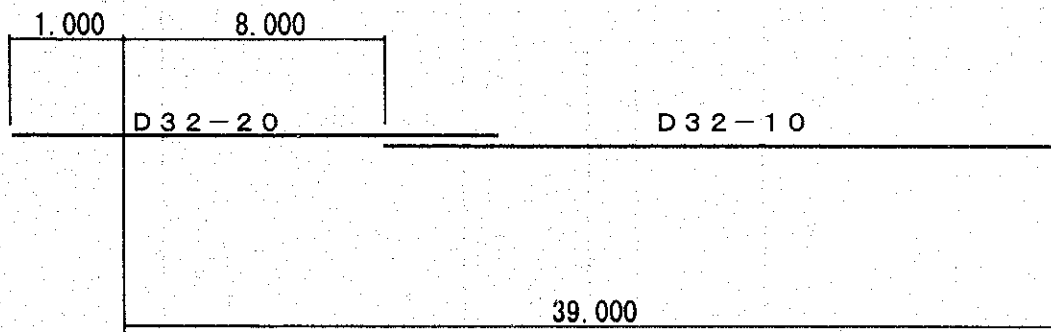
Pier P18L

Number of Pile	13		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.802	< 1.5
Bearing Capacity (tf)	Usual	203	< 448
	Earthquake	386	< 658
Pile		$A_s = D29 - 20$	2,143 < 2,700
		$A_s = D29 - 10$	2,410 < 2,700
Beam		$A_{s1} = D32 - 16$ $D32 - 16$ $A_{s2} = D32 - 16$ $D32 - 16$	1,764 < 1,800
Column		$A_s = D25 - 68$ (@ 125) $D25 - 36$ (@ 250)	2,137 < 2,700

Footi		<p>As2 = D29@125 D29@250</p> <p>As1 = D25@125 D25@250</p>	1,584 < 1,800
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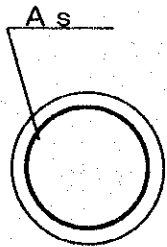
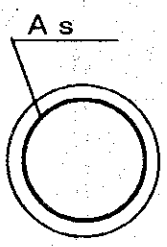
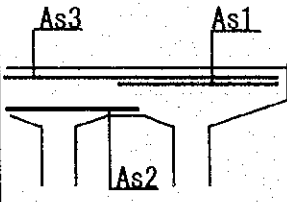
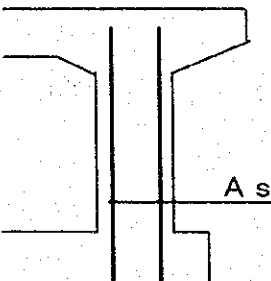


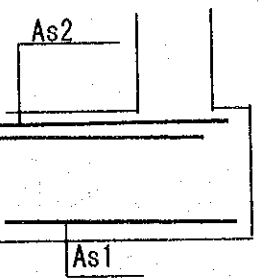
Pile

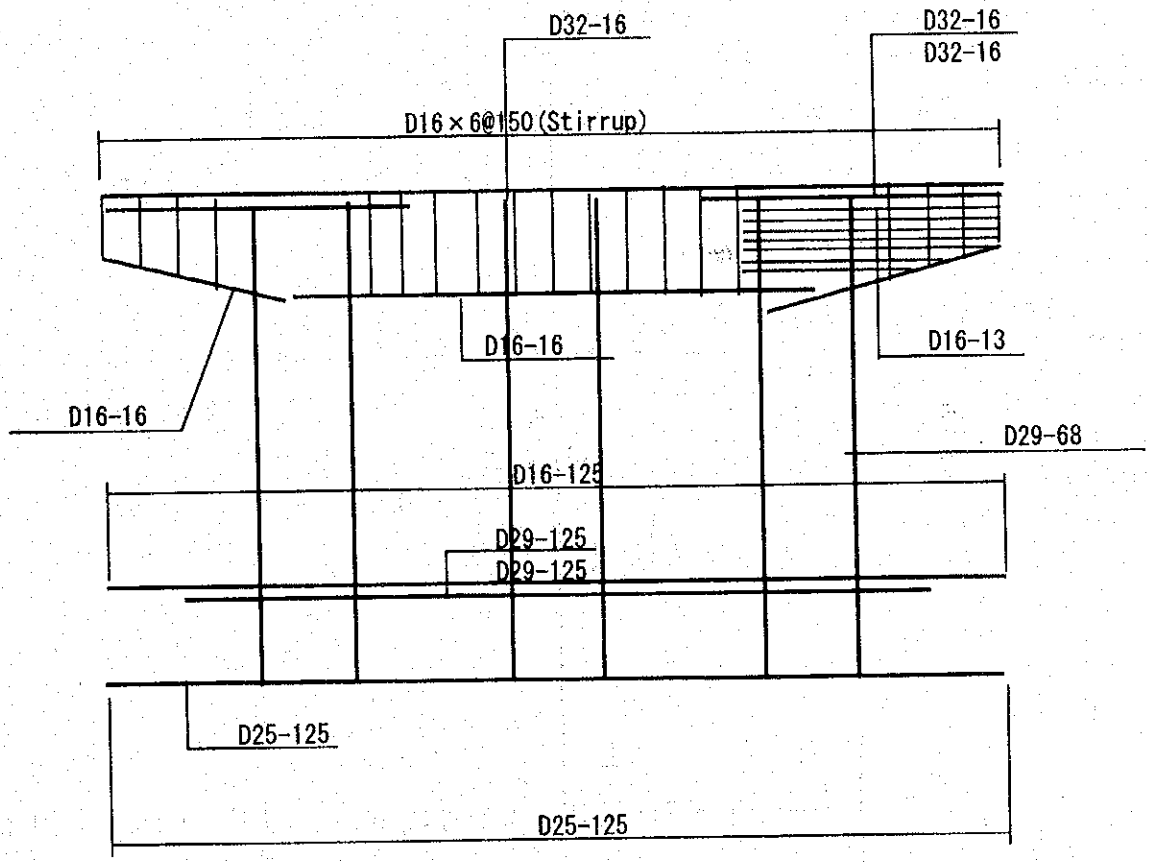


Phap Van Viaduct

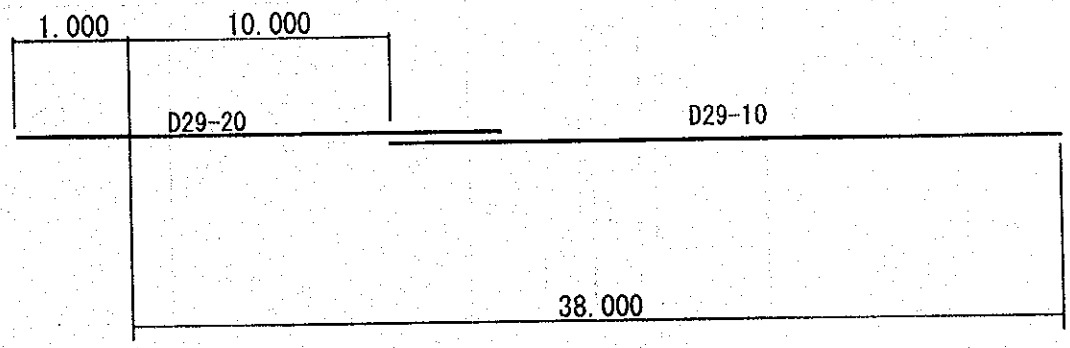
Pier P8R

Number of Pile	15		
Pile Length (m)	38.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.039	< 1.5
Bearing Capacity (tf)	Usual	187	< 268
	Earthquake	389	< 390
Pile		As = D29-20	2,544 < 2,700
		As = D29-10	2,058 < 2,700
Beam		As1 = D32-16 D32-16 As2 = D16-16 As3 = D32-16	1,638 < 1,800
Column		As = D29-68 (@125)	1,878 < 2,070

Footing		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>NH-1 P19 Refer < 1,600</p>
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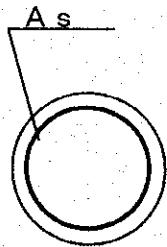
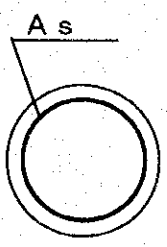
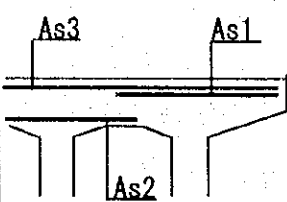
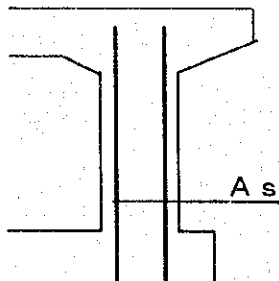


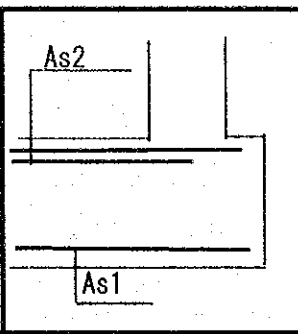
P i l e

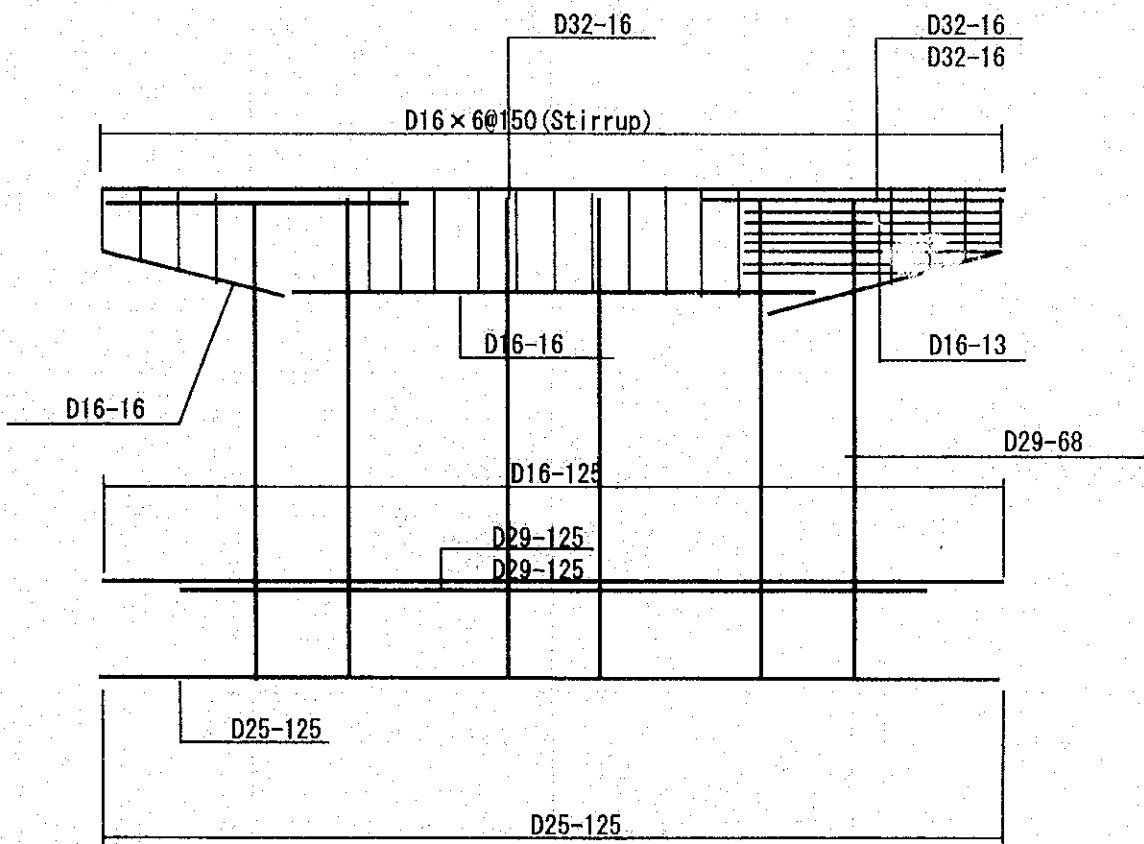


Phap Van Viaduct

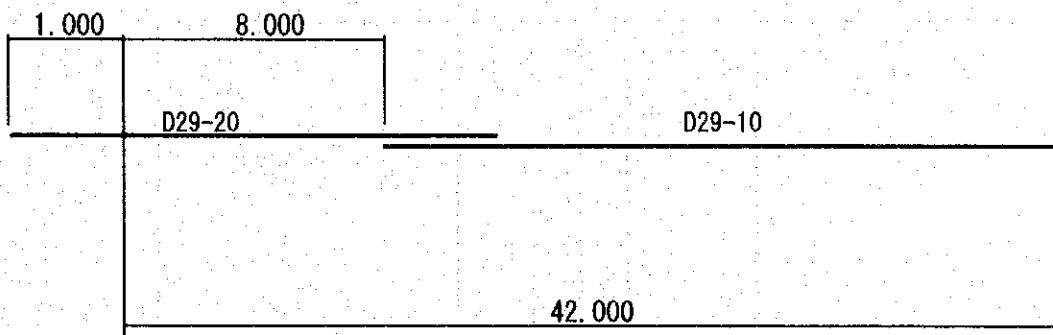
Pier P9L

Number of Pile	10		
Pile Length (m)	42.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.742	< 1.5
Bearing Capacity (tf)	Usual	271	< 420
	Earthquake	484	< 610
Pile		As = D29-20	1,841 < 2,700
		As = D29-10	1,757 < 2,700
Beam		As1 = D32-16 D32-16 As2 = D16-16 As3 = D32-16	1,638 < 1,800
Column		As = D29-68 (@125)	1,878 < 2,070

Footing		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>NH-5 P19L Refer < 1,800</p>
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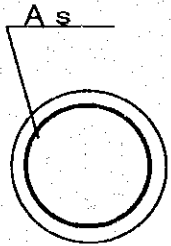
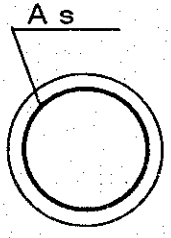
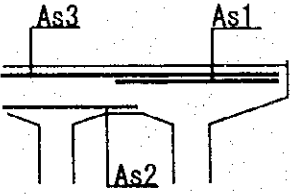
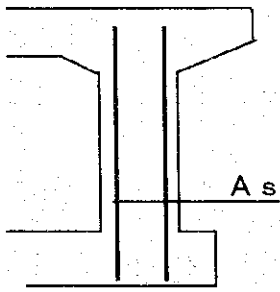


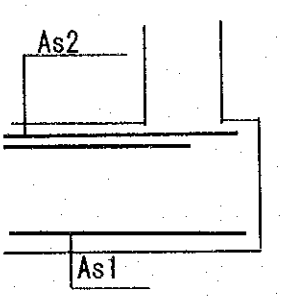
Pile

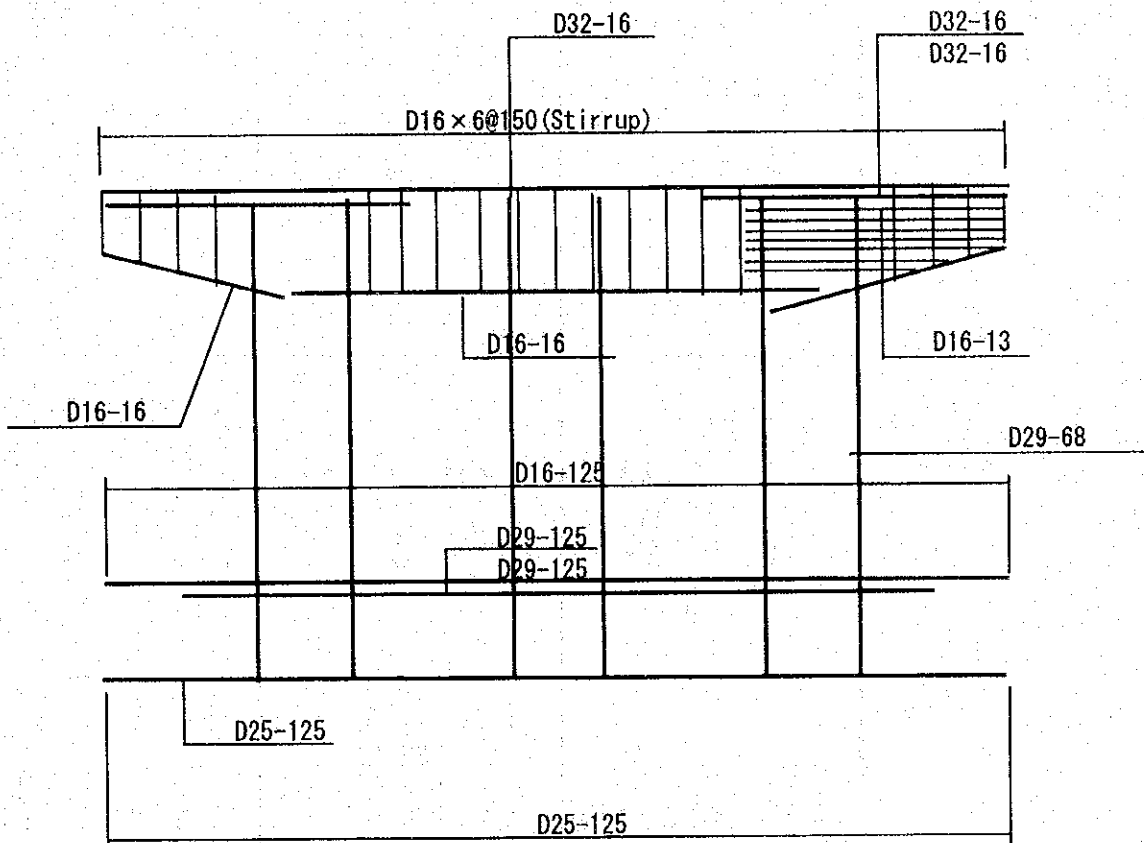


Phap Van Viaduct

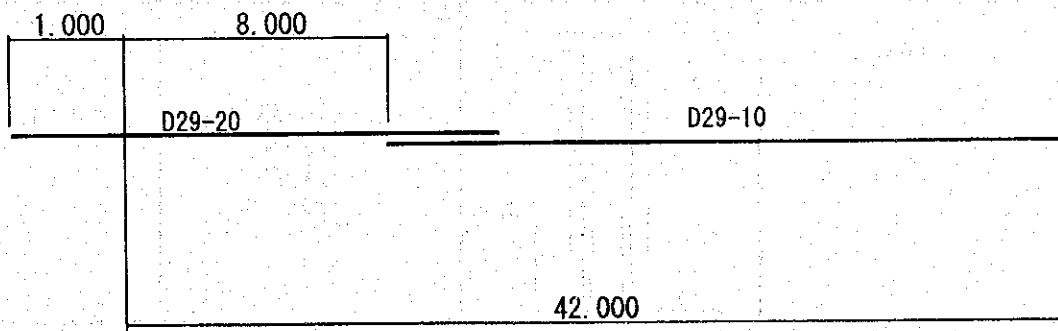
P i e r P 9 R · P 1 6 L

Number of Pile	10		
Pile Length (m)	42.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	0.742	< 1.5
Bearing Capacity (tf)	Usual	271	< 538
	Earthquake	484	< 796
P i l e		As = D29-20	1,841 < 2,700
		As = D29-10	1,757 < 2,700
B e e m		As1 = D32-16 D32-16 As2 = D16-16 As3 = D32-16	1,439 < 1,800
C o l u m n		As = D29-68 (@125)	1,878 < 2,070

<p>Footing</p>		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>NH-5 P19L Refer < 1,600</p>
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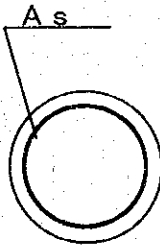
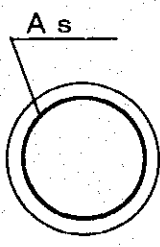
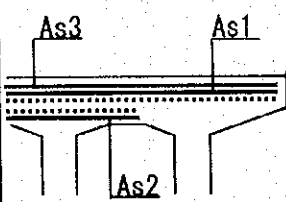
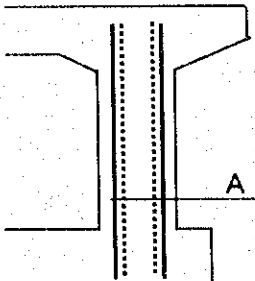


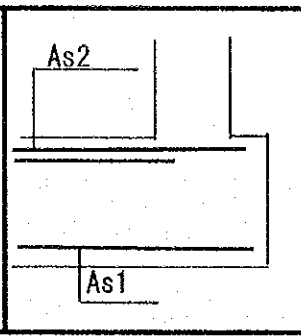
P i l e

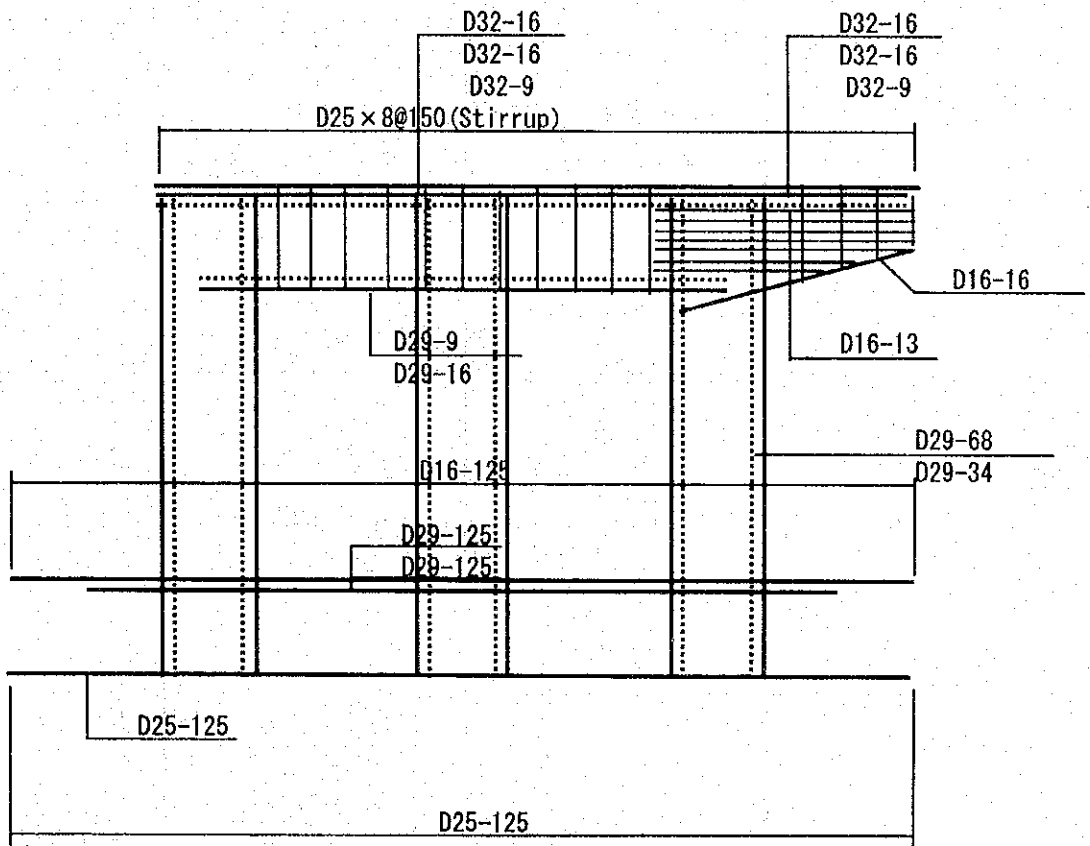


Phap Van Viaduct

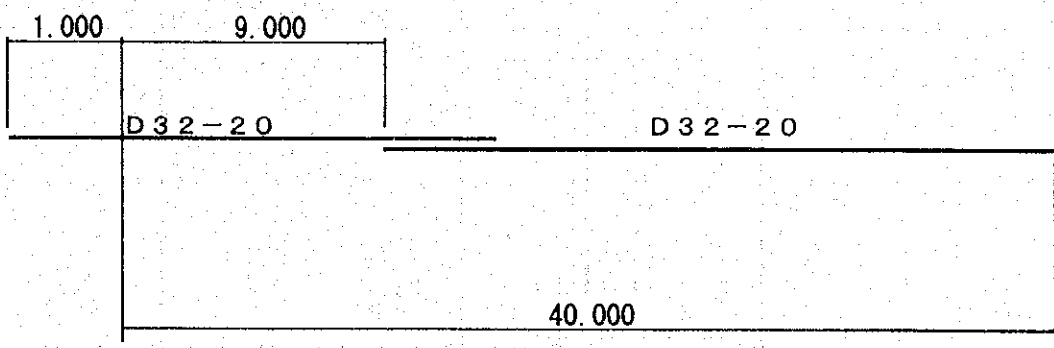
Pier P10L

Number of Pile	16		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.002	< 1.5
	Earthquake	1.279	< 1.5
Bearing Capacity (tf)	Usual	260	< 361
	Earthquake	437	< 528
Pile		As = D32-20	2,002 < 2,700
		As = D32-10	1,897 < 2,700
Beam		As1 = D32-16 D32-16 D32-9 As2 = D29-16 D29-9 As3 = D32-16 D32-16 D32-9	1,727 < 1,800
Column		As = D29-68 D29-34 (@125) (@250)	2,615 < 2,700

Footing		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>NH-5 P19L Refer < 1,600</p>
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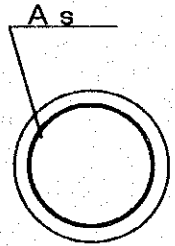
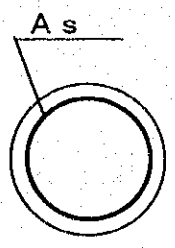
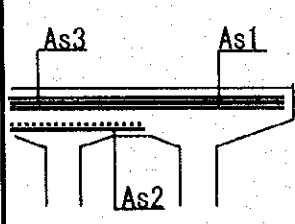
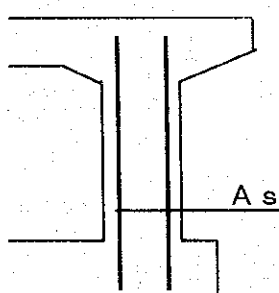


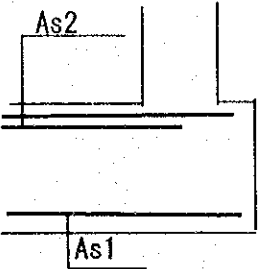
Pile

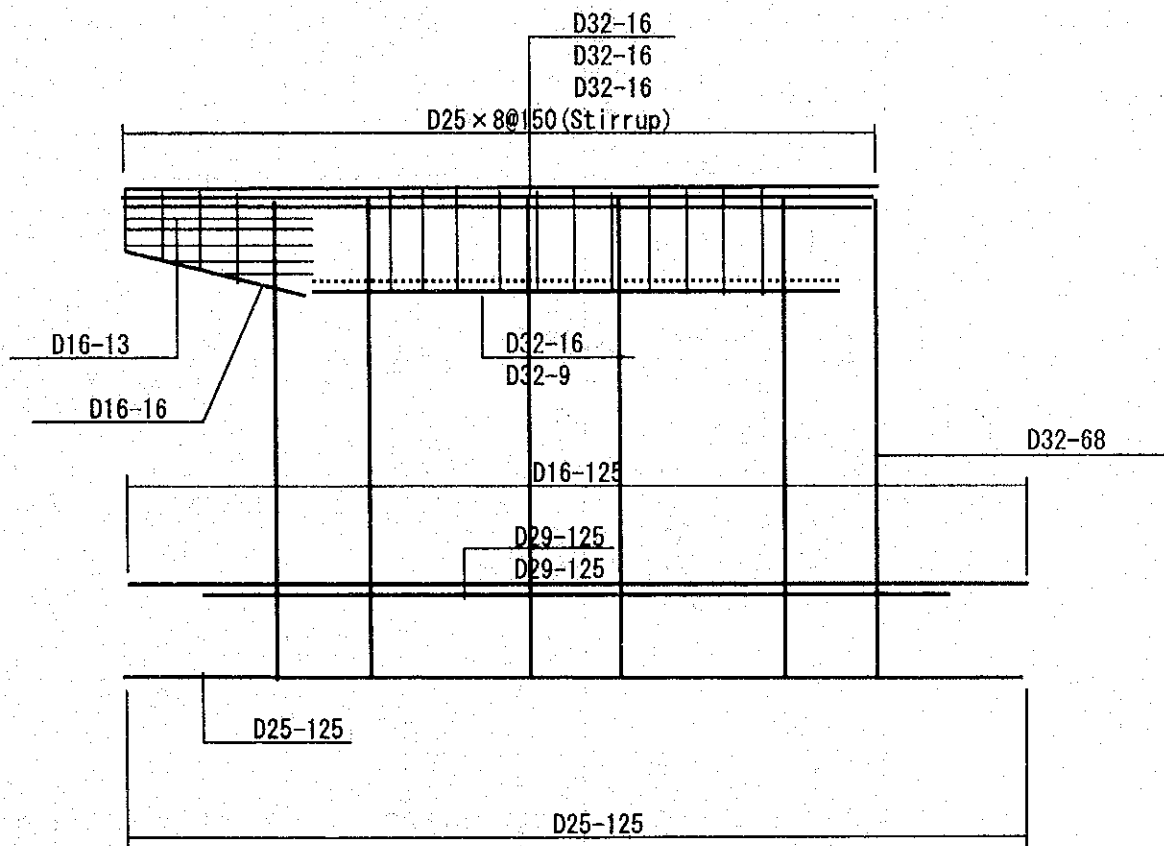


Phap Van Viaduct

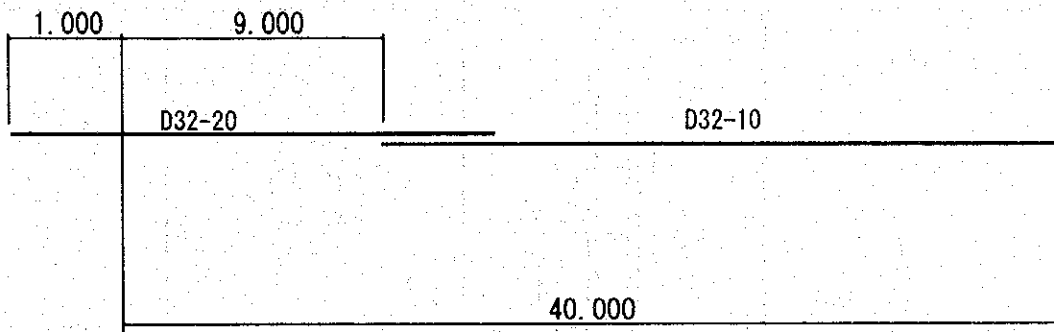
Pier P10R

Number of Pile	16		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	P10L Refer	< 1.5
	Earthquake	P10L Refer	< 1.5
Bearing Capacity (tf)	Usual	P10L Refer	< 538
	Earthquake	P10L Refer	< 796
Pile		As = D32-20	P10L Refer < 2,700
		As = D32-10	P10L Refer < 2,700
Beam		As1 = D32-16 D32-16 D32-16 As2 = D32-16 D32-9 As3 = D32-16 D32-16 D32-16	1,647 < 1,800
Column		As = D32-68 (@125)	2,434 < 2,700

<p>Footing</p>		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>NH-5 P19L Refer < 1,600</p>
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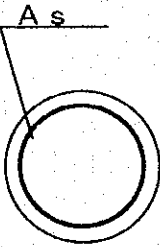
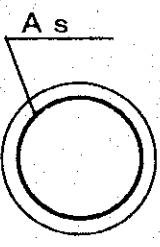
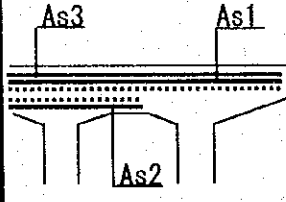
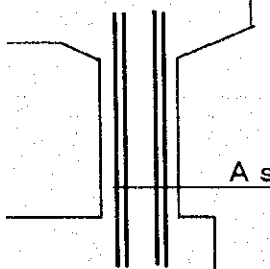


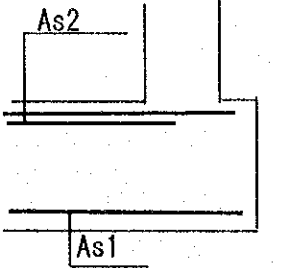
Pile

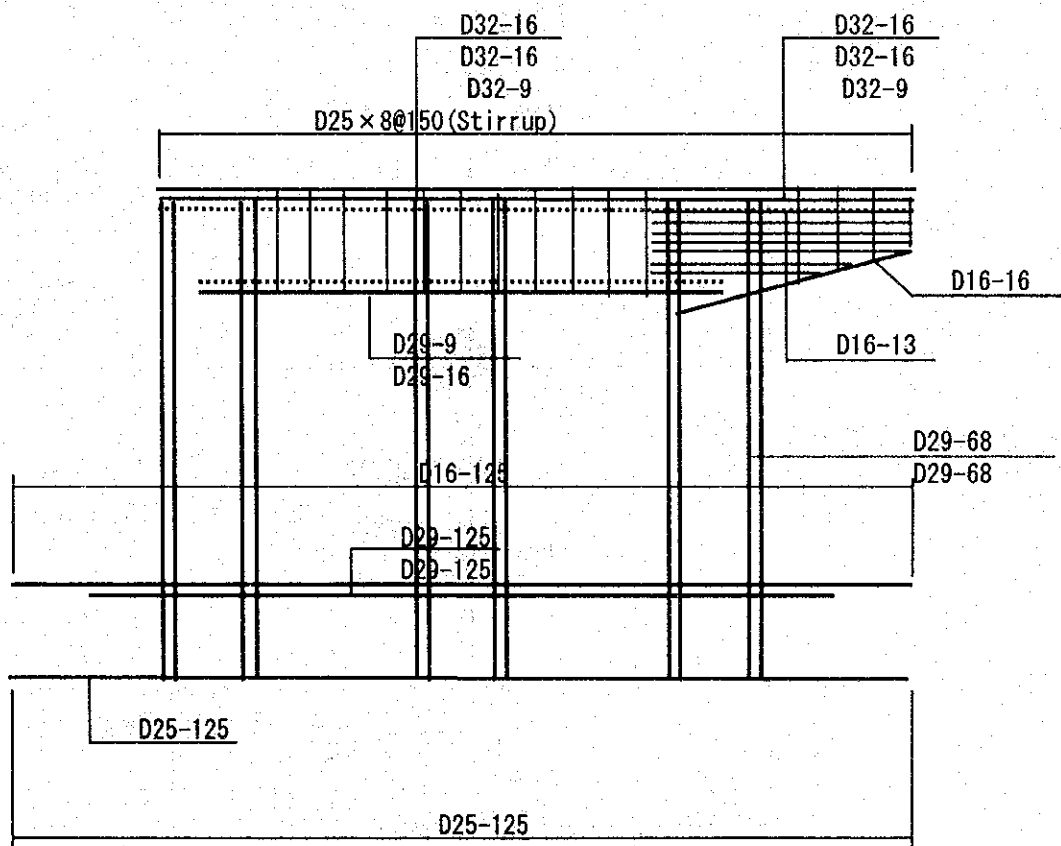


Phap Van Viaduct

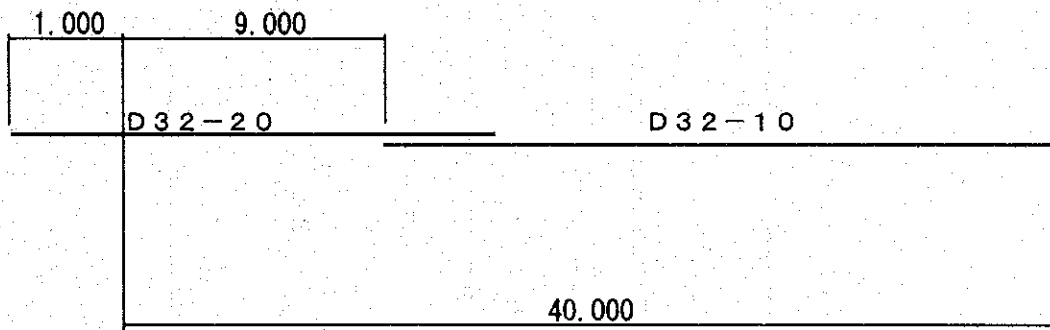
Pier P11L

Number of Pile	16		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	P10L Refer	< 1.5
	Earthquake	P10L Refer	< 1.5
Bearing Capacity (tf)	Usual	P10L Refer	< 538
	Earthquake	P10L Refer	< 796
Pile		As = D32-20	P10L Refer < 2,700
		As = D32-10	P10L Refer < 2,700
Beam		As1 = D32-16 D32-16 D32-9 As2 = D29-16 D29-9 As3 = D32-16 D32-16 D32-9	1,727 < 1,800
Column		As = D29-68 D29-68 (@125) (@125)	2,599 < 2,700

<p>Footing</p>		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>NH-5 P19L Refer < 1,600</p>
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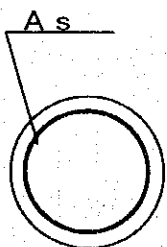
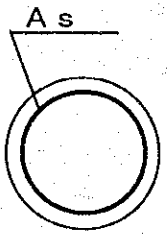
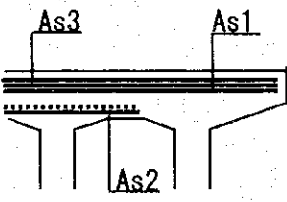
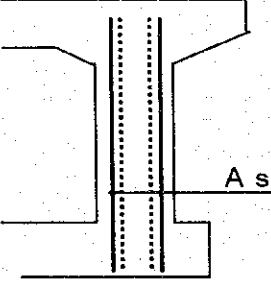


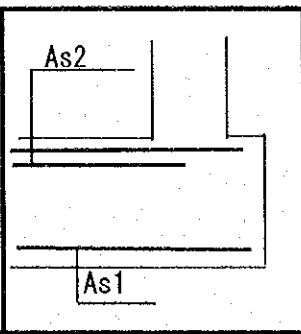
Pile

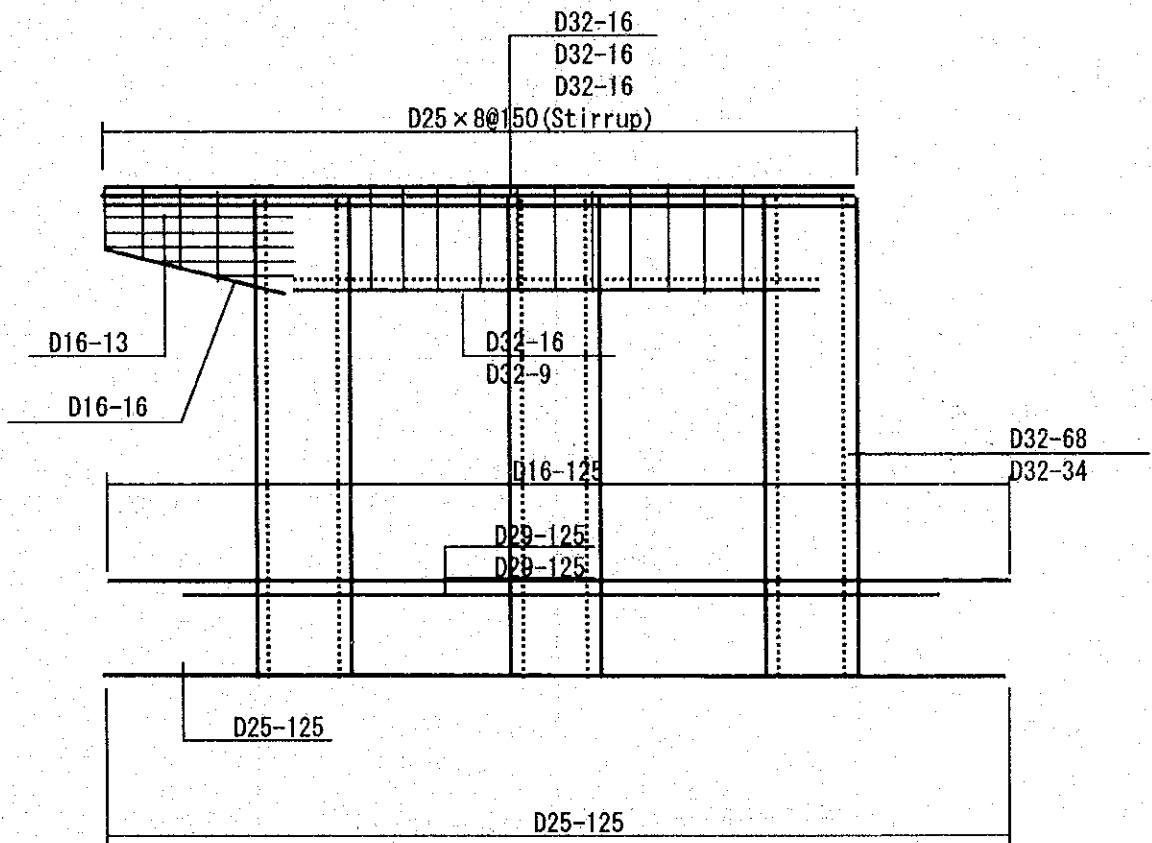


Phap Van Viaduct

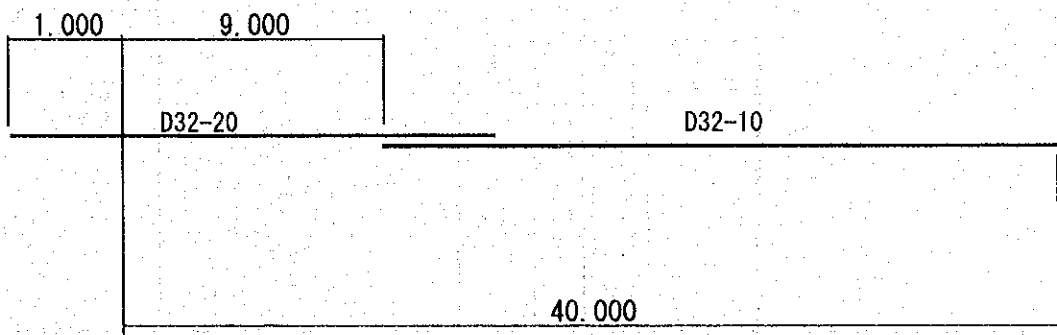
Pier P11R

Number of Pile	16		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	P10L Refer	< 1.5
	Earthquake	P10L Refer	< 1.5
Bearing Capacity (tf)	Usual	P10L Refer	< 538
	Earthquake	P10L Refer	< 796
Pile		As = D32-20	P10L Refer < 2,700
		As = D32-10	P10L Refer < 2,700
Beam		As1 = D32-16 D32-16 D32-16 As2 = D32-16 D32-9 As3 = D32-16 D32-16 D32-16	1,647 < 1,800
Column		As = D32-68 D32-34 (@125) (@250)	2,436 < 2,700

Footing		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>NH-5 P19L Refer < 1,600</p>
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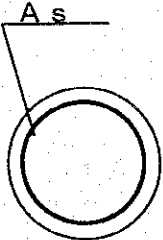
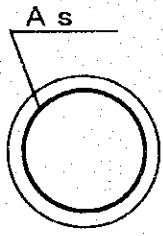
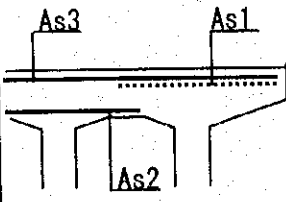
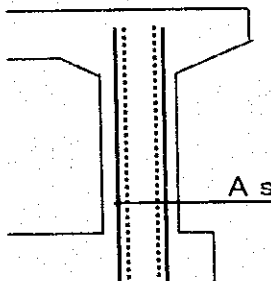


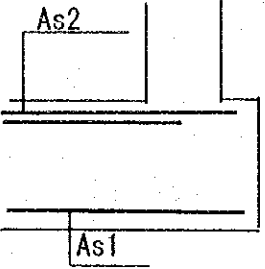
P i l e

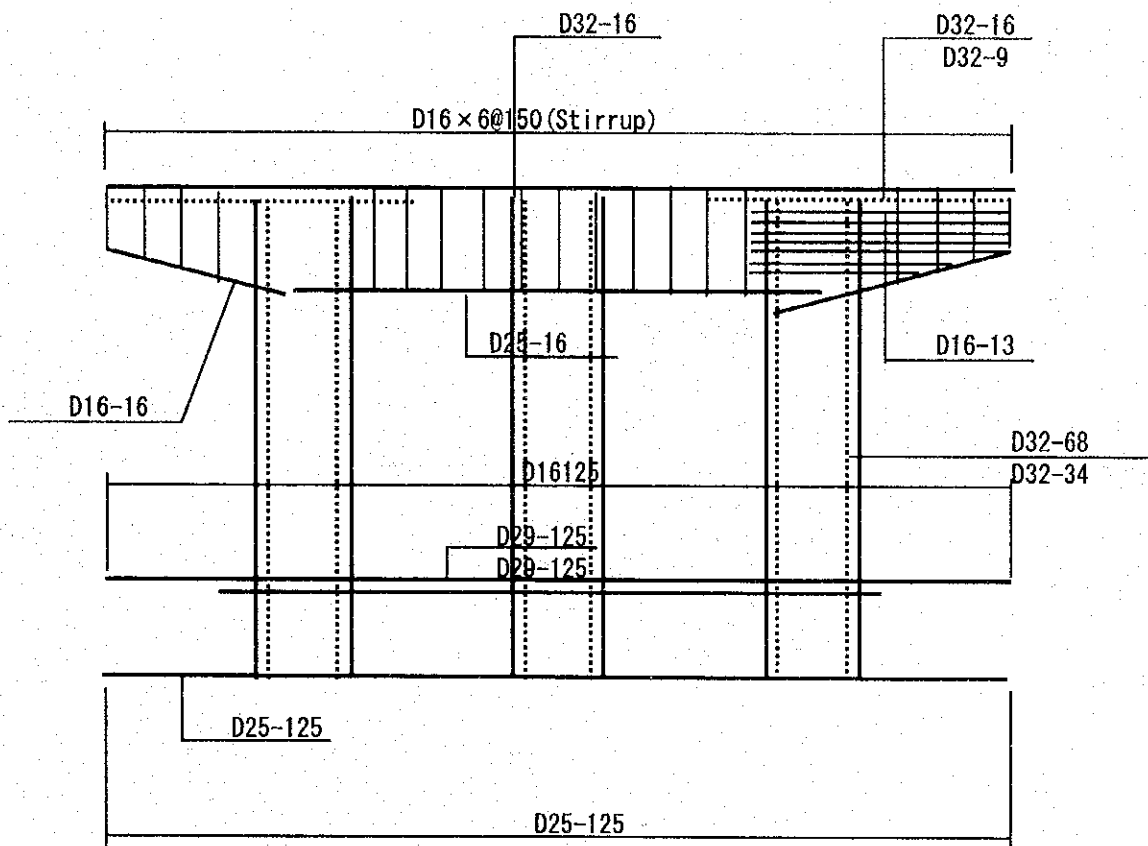


Phap Van Viaduct

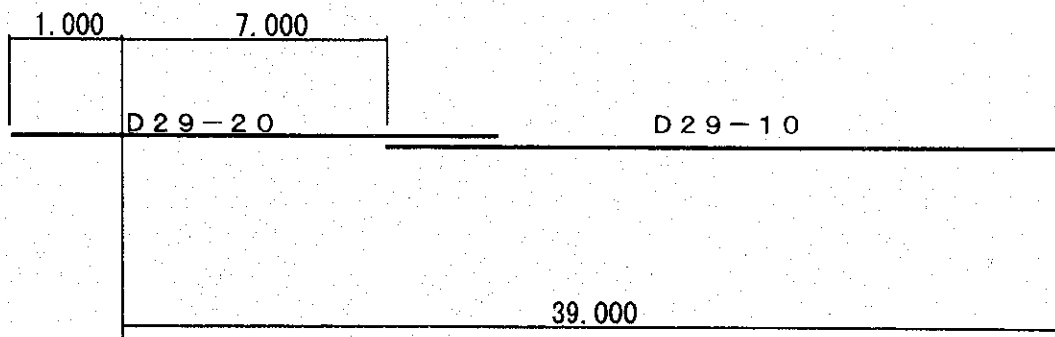
Pier P15L

Number of Pile	10		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.088	< 1.5
Bearing Capacity (tf)	Usual	305	< 378
	Earthquake	484	< 554
Pile		As = D29-20	2,289 < 2,700
		As = D29-10	1,433 < 2,700
Beam		As1 = D32-16 D32-9 As2 = D25-16 As3 = D32-16	NH-5 Refer < 1,800
Column		As = D32-68 D32-34 (@125) (@250)	NH-5 Refer < 2,070

<p>Footing</p>		<p>As2 = D29-125 D29-125</p> <p>As1 = D25-125</p>	<p>NH-5 Refer < 1,600</p>
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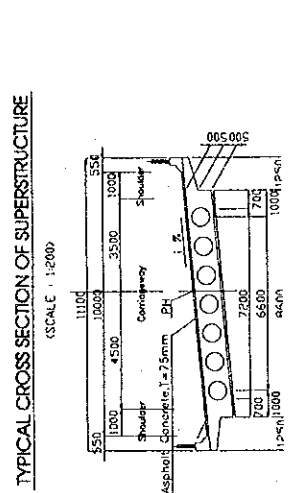


P i l e

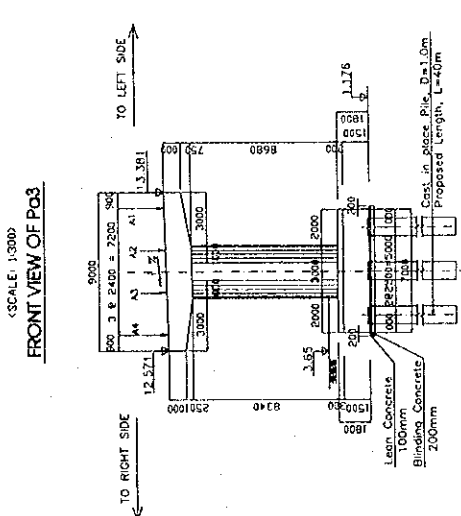


11. PHAP VAN CAU GIE INTERCHANGE RAMP BRIDGE

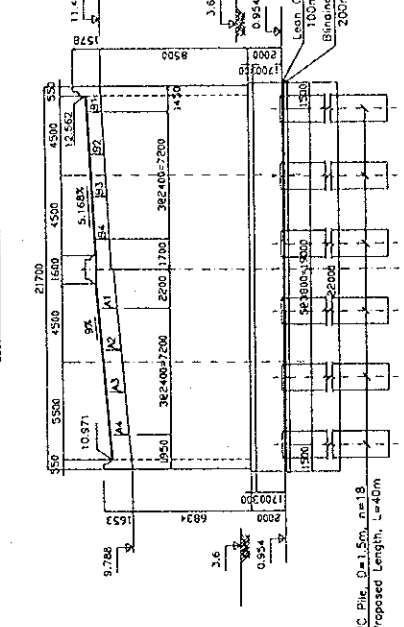
TYPICAL CROSS SECTION OF SUPERSTRUCTURE



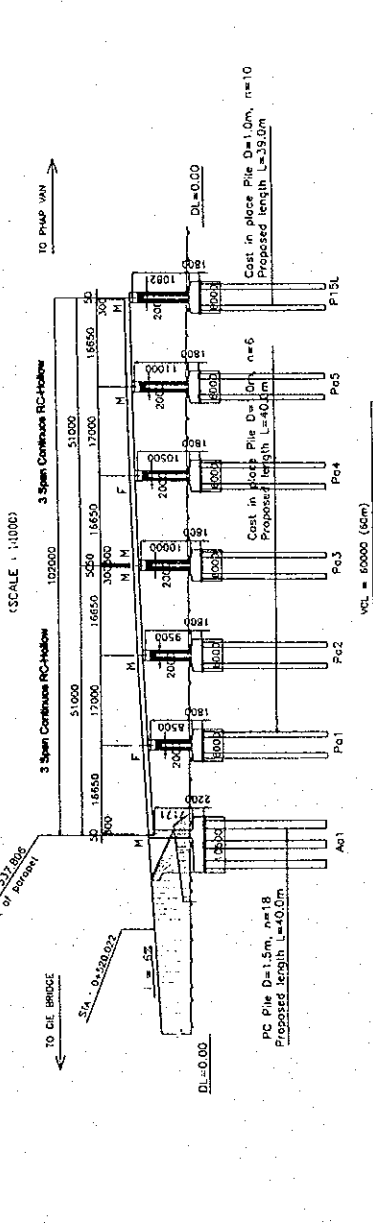
TYPICAL CROSS SECTION OF SUBSTRUCTURE



FRONT VIEW OF Aa1

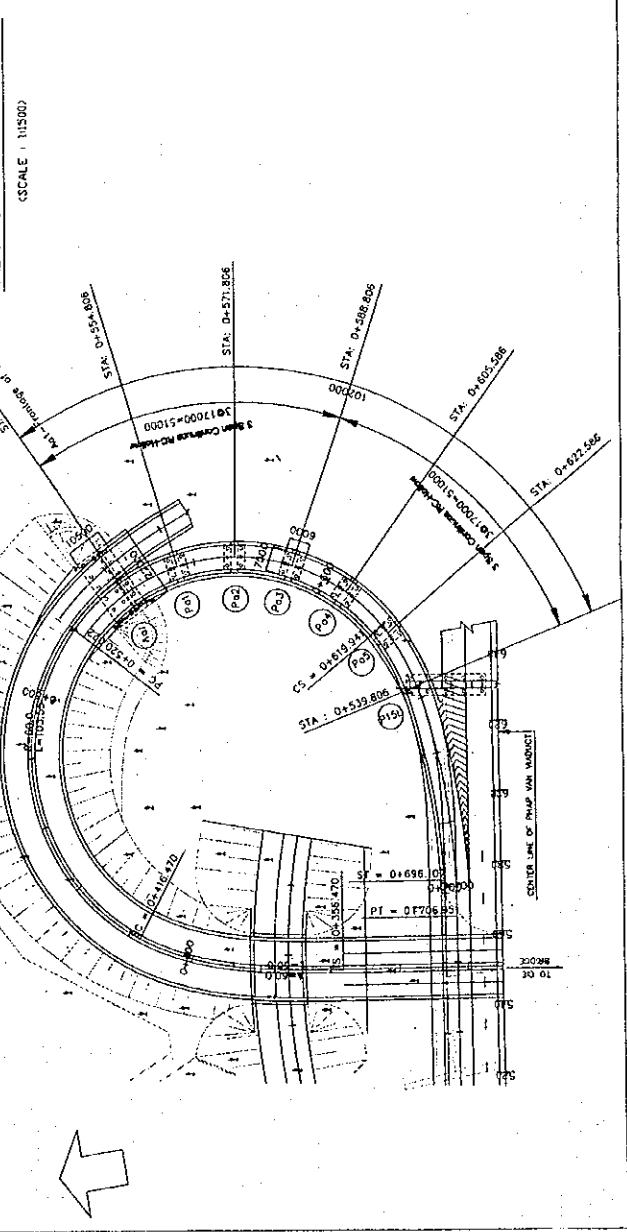


LONGITUDINAL BRIDGE



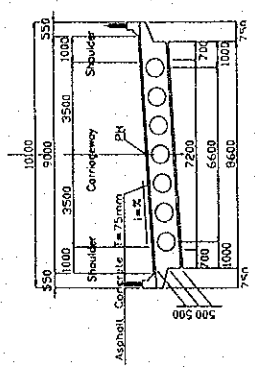
GRADE	ELEVATION	GROUND HEIGHT	STATION
	0+500	9.56	0+520.022
	0+537.806	3.65	0+537.806
	0+554.806	3.65	0+554.806
	0+560.00	12.80	0+560.00
	0+571.806	3.65	0+571.806
	0+588.806	3.68	0+588.806
	0+580.00	14.58	0+580.00
	0+605.806	3.68	0+605.806
	0+622.806	3.62	0+622.806
	0+639.806	3.3	0+639.806

PLAN OF RAMP A BRIDGE

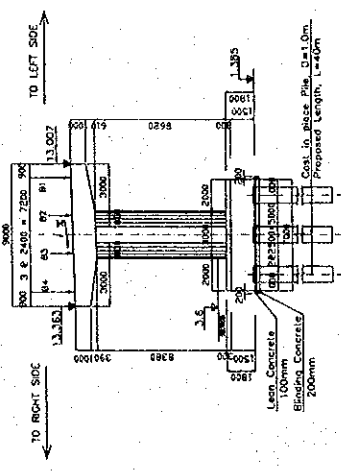


APPROVED BY	DATE
DESIGNED BY	DATE
CHECKED BY	DATE
NAME	DATE
INITIALS	DATE
PROJECT NO.	DATE
PROJECT NAME	DATE

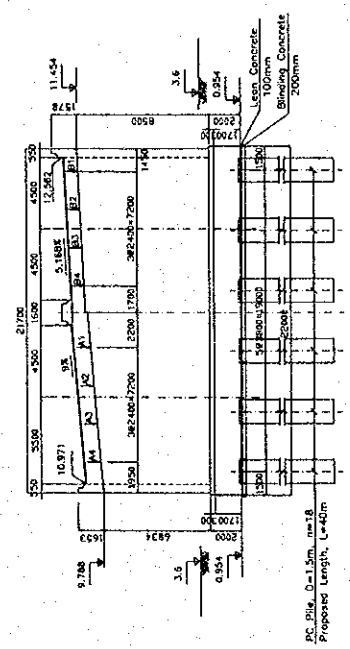
TYPICAL CROSS SECTION OF BRIDGE
TYPICAL CROSS SECTION OF SUPERSTRUCTURE
(SCALE: 1:2000)



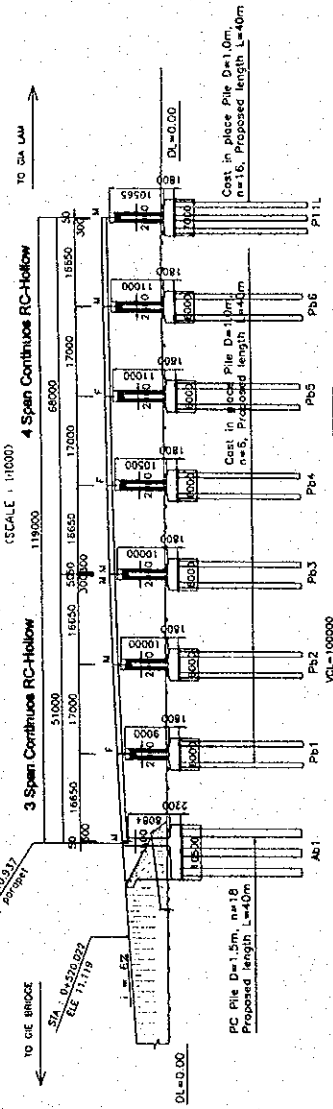
TYPICAL CROSS SECTION OF SUBSTRUCTURE
FRONT VIEW OF P53
(SCALE: 1:200)



FRONT VIEW OF AB1

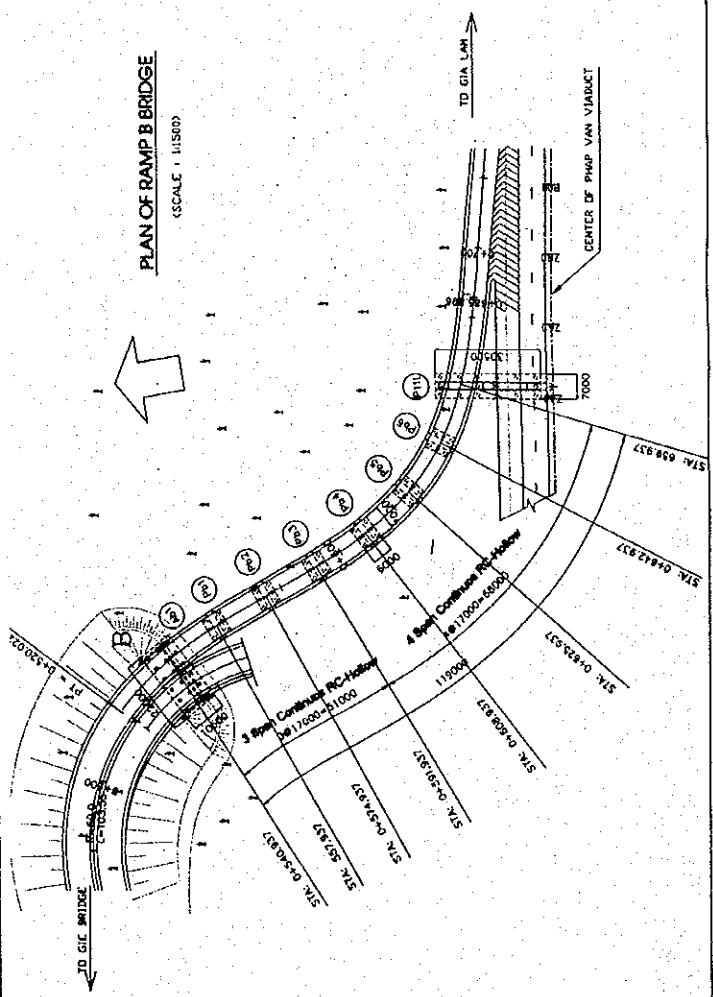


LONGITUDINAL BRIDGE
(SCALE: 1:10000)



GRADE	ELEVATION	GROUND HEIGHT	STATION
	11.119		0+520.022
		3.60	0+527.882
		3.60	0+540.937
		3.60	0+557.937
		3.60	0+574.937
	14.591	3.60	0+577.882
		3.60	0+581.937
		3.60	0+608.937
	14.96	3.70	0+627.882
		3.70	0+642.937
	15.165	3.80	0+659.937

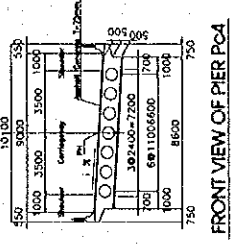
PLAN OF RAMP B BRIDGE
(SCALE: 1:10500)



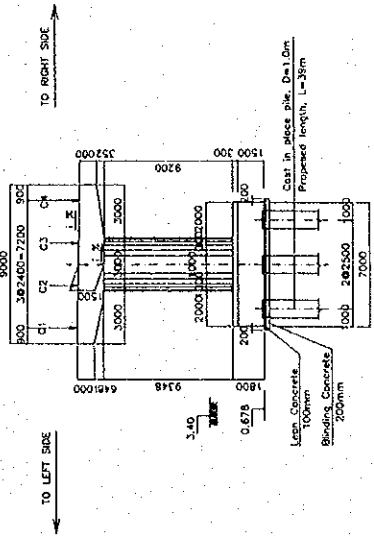
TYPICAL CROSS SECTION OF BRIDGE

(SCALE - 1/300)

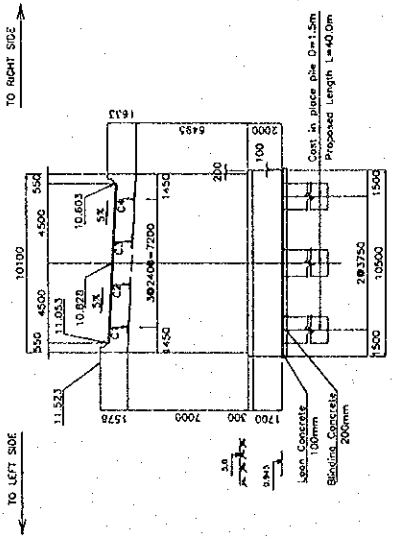
TYPICAL CROSS SECTION OF SUPERSTRUCTURE



FRONT VIEW OF PIER PCA

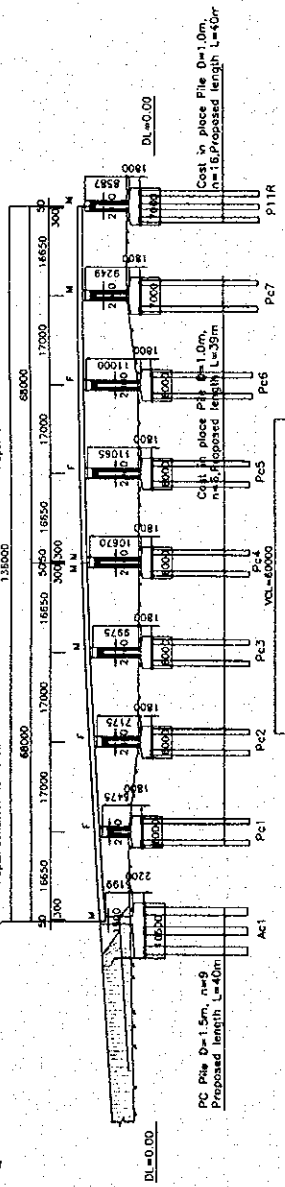


FRONT VIEW OF ABUTMENT AC1



LONGITUDINAL BRIDGE

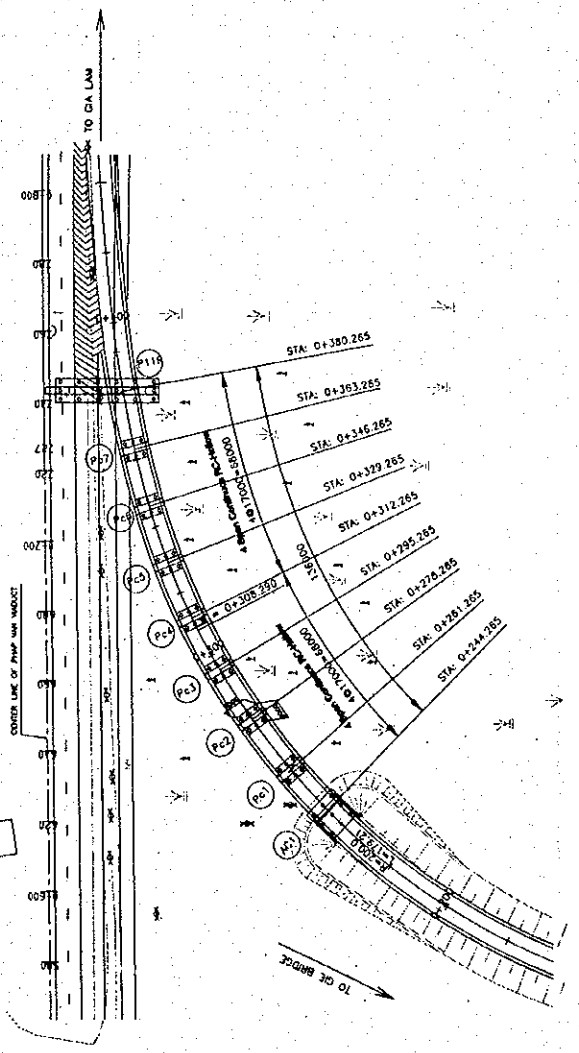
(SCALE - 1/1000)



GRADE	ELEVATION	GROUND HEIGHT	STATION
	0+220	9.375	9.375
	0+244.265	5.0	10.828
	0+261.265	5.3	11.846
	0+278.265	3.4	12.864
	0+280.00	12.968	
	0+295.265	3.4	13.772
	0+312.265	3.4	14.407
	0+329.265	3.4	14.768
	0+346.265	3.3	14.874
	0+363.265	5.4	14.925
	0+380.265	5.4	14.976

PLAN OF RAMP-C BRIDGE

(SCALE - 1/10500)

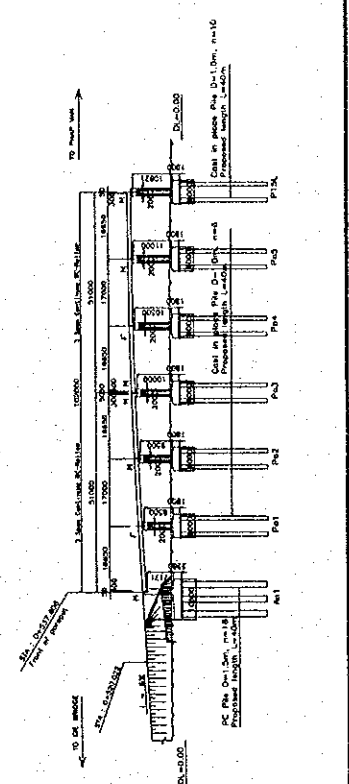
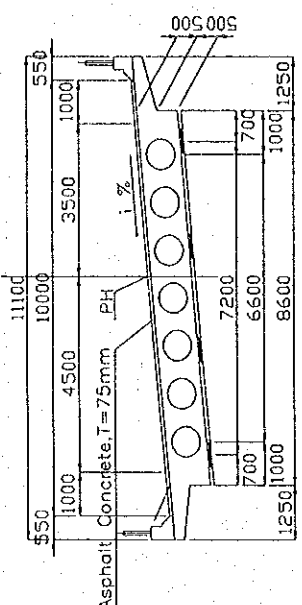


11.2 Superstructure

REINFORCED CONCRETE BRIDGE DESIGN SUMMARY

(from ST. 0+S37.806 to ST. 0+639.806)

Bridge Name	A-Ramp Bridge		Route	Phap Van Cau Gie Interchange	Road Alignment	R=55.5~J=65	Skew Angle	90 (69)	Roadway Width	Total Width	11.10 m	Seismic Coefficient	0.17				
Structural Type	RC-Hollow Slab		Bridge Length	102.000 m	Span Arrangement	2@ (16.65 + 17.00 + 16.65)		Effective Width	10.00 m			transverse	0.17				
Main Girder	Number of Girders	1 nos.	Girder Height	1.00 m	Maximum Displacement	mm (1/)											
	Girder Spacing	---	Height/Span Ratio	H/L = 1/17													
Crossbeam	Number of Crossbeams	---	Beam Spacing	---	Height	---											
	Deck Slab Depth	1,000 mm	Design Strength of Concrete	290 kgf/cm ²	Allowable Stress Increase Coefficient	1.0											
Deck Slab Design	Bending Moment	Primary Reinforcement	Stress	28 kgf/cm ²	Allowable Stress	90-kgf/cm ²											
	7.0 tf.m/m (cantilevered slab)	D16-CtC125	Reinforcing Bar	1,152 kgf/cm ²	Distribution Reinforcement	D13-CtC125											
Design Theory	Beam Theory																
Construction Method	Construction on Fixed Staging																
Design Of Main Girder	Span Center	Section Forces		Reinforcement Arrangement	Stress		Allowable Stress	Expansion Joint		Location		Type of Joint		Girder Clearance			
		Dead Load	446 tf.m	D32-84	Concrete Compressive Stress	49 kgf/cm ²	90 kgf/cm ²	Aa1		Rubber Joint		50 mm					
		Live Load	252 tf.m		Reinforcing Bar Tensile Stress	1,293 kgf/cm ²	1,800 kgf/cm ²	Pa3, P15L		Rubber Joint		100 mm					
	Intermediate Support	Total	698 tf.m					Items		Unit		Specification		Quantity		Quantity/Im ³ of Concrete	
		Shear Force	---	D13-ctc300 (stirrup)	Concrete Shear Stress	---	---	Concrete		m ³		f'c = 290 kgf/cm ²		743		---	
		Dead Load	635 tf.m	(D32-84)+(D32-28)	Concrete Compressive Stress	68 kgf/cm ²	90 kgf/cm ²	Reinforcing Bar		tf		SD295		133.8		180 kgf/m ³	
	Support Reaction	Live Load	165 tf.m		Reinforcing Bar Tensile Stress	1,211 kgf/cm ²	1,800 kgf/cm ²	External Formwork		m ²		---		1,546		---	
		Total	800 tf.m					Tube Formwork		m		φ = 700 mm		600		---	
		Shear Force	284 tf	D13-ctc300 (stirrup)	Average Shear Stress	8.59 kgf/cm ²	8.73 kgf/cm ²	Primary Materials		m		---		---		---	
	Support Reaction	Support Reaction		Aa1	Pa2	Pa3	Pa4	Pa5	Remarks								
Dead Load, Rd (tf)		144	396	144	396	144	396	3.5m Section Schedule		10000		10000		10000			
Live Load, Rl (tf)		68	136	68	136	68	136	3.5m Section Schedule		10000		10000		10000			
Support Reaction	Total Reaction (tf)		212	532	212	532	212	3.5m Section Schedule		10000		10000		10000			
	Support Condition		M	F	M	M	F	M	3.5m Section Schedule		10000		10000		10000		
Bearing	Type of Bearing		Moveable	Elastomeric Bearing													
			Fixed	Elastomeric Bearing													



(from ST. 0-540.937 to ST. 0-659.937)

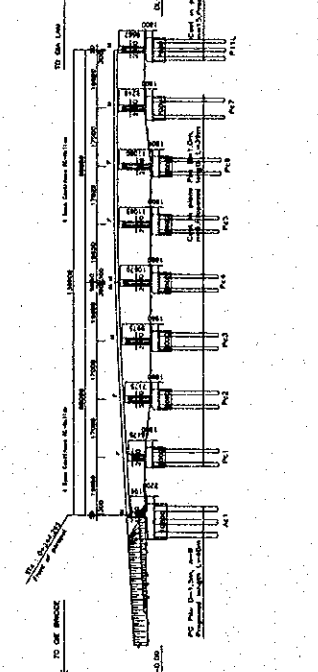
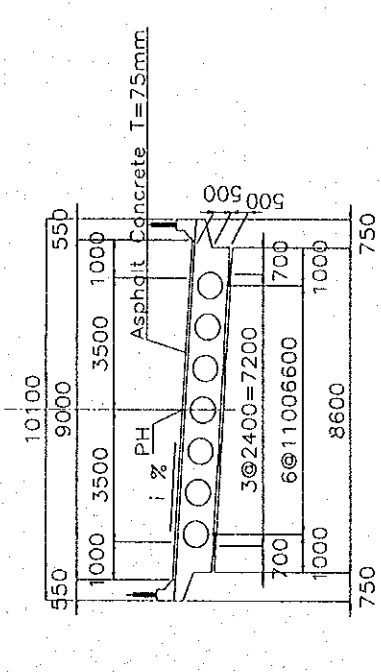
REINFORCED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name	B-Ramp Bridge		Route	Phap Van Cau Gie Interchange		Road Alignment	R-60-A-65	Skew Angle	90 (73)	Total Width	10.10 m	Seismic Coefficient	0.17
Structural Type	RC-Hollow Slab		Bridge Length	119.000 m		Span Arrangement	(16.65+17.00+16.65)+(16.65+2*17.00+16.65)	Effective Width	9.00 m	Effective Width	9.00 m	Seismic Coefficient	0.17
Main Girder	Number of Girders	1 nos.	Girder Height	1.00 m	Maximum Displacement	H/L = 1/17		Cross-section					
Crossbeam	Number of Crossbeams	--- nos.	Beam Spacing	--- m		Height	--- m						
Deck Slab Design	Deck Slab Depth	1,000 mm	Design Strength of Concrete	290 kgf/cm ²		Allowable Stress Increase Coefficient	1.0		Expansion Joint				
Bending Moment	Primary Reinforcement	D16-CtC125	Concrete Compression	28 kgf/cm ²		Allowable Stress	90 kgf/cm ²		Rubber Joint				
7.0 tf.m/m (cantilevered slab)	Reinforcing Bar	D16-CtC125	Reinforcing Bar Tensile	1,152 kgf/cm ²		Concrete Shear Stress	---		Rubber Joint				
Design Theory	Beam Theory		Stress	---		Concrete Compressive Stress	68 kgf/cm ²		Items				
Construction Method	Construction on Fixed Staging		Concrete Reinforcing Bar	1,800 kgf/cm ²		Reinforcing Bar Tensile Stress	1,211 kgf/cm ²		Concrete				
Section Forces	Dead Load	446 tf.m	Reinforcement Arrangement	D32-84		Concrete Shear Stress	---		Reinforcing Bar				
Span Center	Live Load	252 tf.m	Concrete	D32-84		Concrete Compressive Stress	68 kgf/cm ²		External Formwork				
	Total	698 tf.m	Stirrup	D13-ctc300 (stirrup)		Reinforcing Bar Tensile Stress	1,800 kgf/cm ²		Tube Formwork				
Intermediate Support	Shear Force	---	Concrete	D13-ctc300 (stirrup)		Average Shear Stress	8.59 kgf/cm ²		Primary Constructopn				
	Dead Load	635 tf.m	Concrete	D32-28		Concrete	---		Concrete				
Support	Live Load	165 tf.m	Concrete	D32-28		Concrete	---		Reinforcing Bar				
	Total	800 tf.m	Stirrup	D13-ctc300 (stirrup)		Reinforcing Bar	---		Formwork				
Support Reaction	Support Reaction	Ab1 Pb1 Pb2 Pb3 Pb4 Pb5 Pb6 P11L	Concrete	D13-ctc300 (stirrup)		Concrete	---		Quantity				
	Dead Load, Rd (tf)	131 361 361 131 129 257 304 375 129	Concrete	D13-ctc300 (stirrup)		Concrete	---		Quantity				
Support Reaction	Live Load, Rl (tf)	68 136 136 68 68 136 136 136 68	Concrete	D13-ctc300 (stirrup)		Concrete	---		Quantity				
	Total Reaction (tf)	199 497 497 199 197 411 440 511 197	Concrete	D13-ctc300 (stirrup)		Concrete	---		Quantity				
Support Condition	Support Condition	M F M M M F F M M	Concrete	D13-ctc300 (stirrup)		Concrete	---		Quantity				
	Support Condition	M F M M M F F M M	Concrete	D13-ctc300 (stirrup)		Concrete	---		Quantity				
Bearing	Type of Bearing	Movable	Elastomeric Bearing		Remarks								
		Fixed	Elastomeric Bearing										

REINFORCED CONCRETE BRIDGE DESIGN SUMMARY

(from ST. 0+244.265 to ST. 0+380.265)

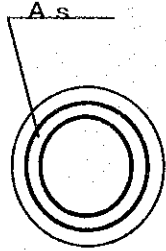
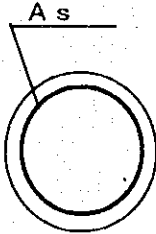
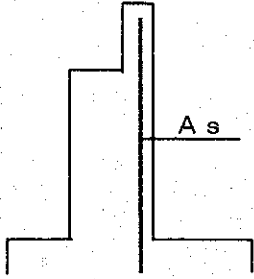
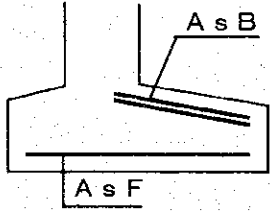
Bridge Name	C-Ramp Bridge	Route	Phap Van Cau Bie Interchange	Road Alignment	R=60~A=65	Skew Angle	90 (82)	Roadway Width	Total Width	10.10 m	Seismic Coefficient	0.17
Structural Type	RC-Hollow Slab	Bridge Length	136.000 m	Span Arrangement	2@ (16.65+2@17.00+16.65)	Effective Width	9.00 m	Effective Width	9.00 m	Seismic Coefficient	0.17	
Main Girder	Number of Girders	1 nos.	1.00 m	Maximum Displacement	---	mm (1/)						
	Girder Spacing	---	---	H/L = 1/17								
Crossbeam	Number of Crossbeams	---	---	Beam Spacing	---	m						
	Deck Slab Depth	1,000 mm	Design Strength of Concrete	Primary Reinforcement	Stress	Allowable Stress Increase Coefficient	1.0					
Deck Slab Design	Bending Moment	7.0 tf.m/m (cantilevered slab)	D16-C1C125	Concrete Compression Reinforcing Bar	28 kef/cm ²	90 kef/cm ²	D13-C1C125					
	Design Theory	Beam Theory		Reinforcing Bar	1,152 kef/cm ²	1,800 kef/cm ²						
Construction Method		Construction on Fixed Staging										
Span Center	Dead Load	446 tf.m	Reinforcement Arrangement		D32-84		Stress		Concrete Compressive Stress		49 kef/cm ²	90 kef/cm ²
	Live Load	252 tf.m					Reinforcimb Bar Tensile Stress		1,293 kef/cm ²		1,800 kef/cm ²	
Intermediate Support	Dead Load	635 tf.m	D13-ctc300 (stirrup)		Concrete Shear Stress		Concrete Compressive Stress		68 kef/cm ²		90 kef/cm ²	
	Live Load	165 tf.m	(032-84)-(032-28)		Reinforcimb Bar Tensile Stress		1,211 kef/cm ²		1,800 kef/cm ²			
Support Reaction	Dead Load, Rd (tf)	129	Pc1	Pc2	Pc3	Pc4	Pc5	Pc6	Pc7	P1R		
	Live Load, Rl (tf)	68	136	136	68	68	136	136	68	68		
Bearing	Total Reaction (tf)	197	511	440	197	197	511	440	511	197		
	Support Condition	M	F	F	M	M	F	F	M	M		
Type of Bearing		Elastomeric Bearing										
Type of Bearing		Elastomeric Bearing										



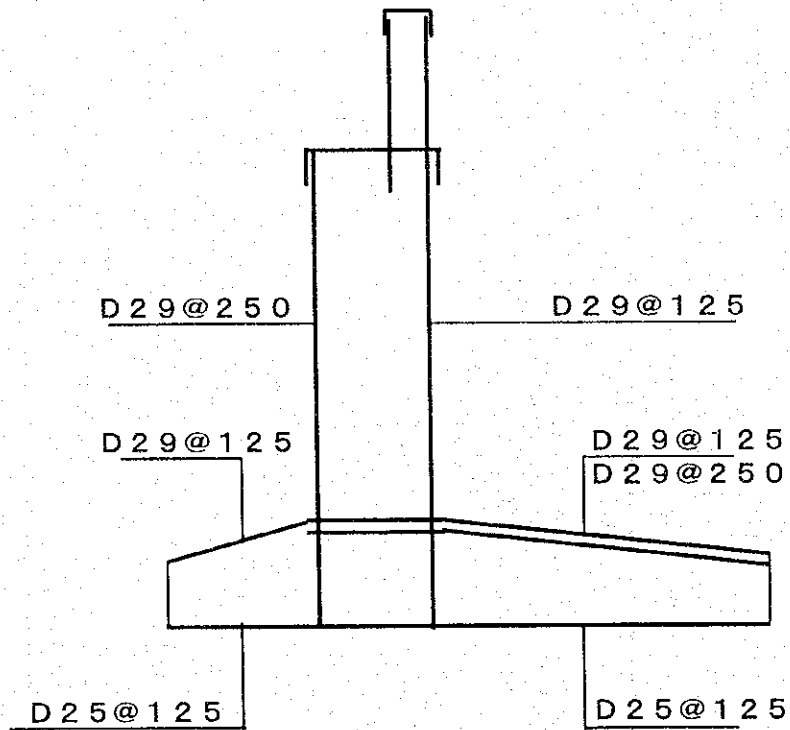
11.3 Substructure

A, B-Ramp

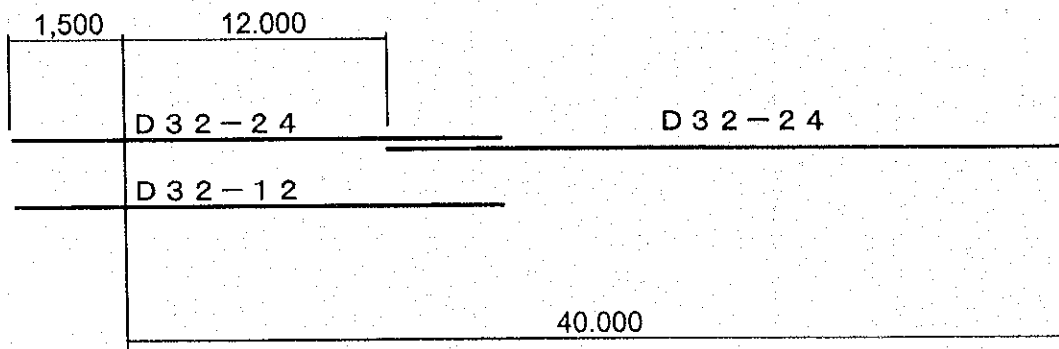
A a b 1

Number of Pile	18		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.836	< 1.5
	Earthquake	1.431	< 1.5
Bearing Capacity (tf)	Usual	336	< 611
	Earthquake	486	< 886
Pile		As = D 32 - 24 D 32 - 12	2,486 < 2,700
		As = D 32 - 24	1,807 < 2,700
Body		As = D 29 @ 125	2,287 < 2,700
Footing		AsF = D25@125 AsB = D29@125 D29@250	2,473 < 2,700

Body & Footing

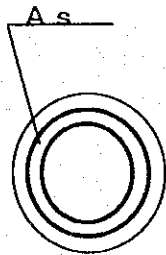
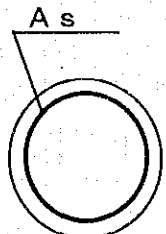
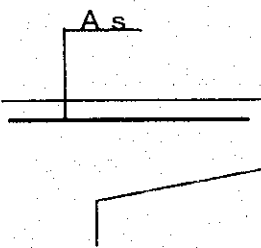
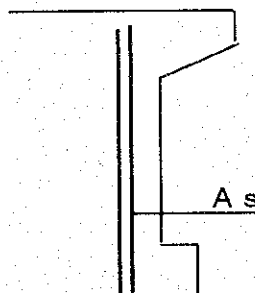


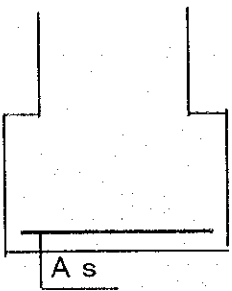
Pile

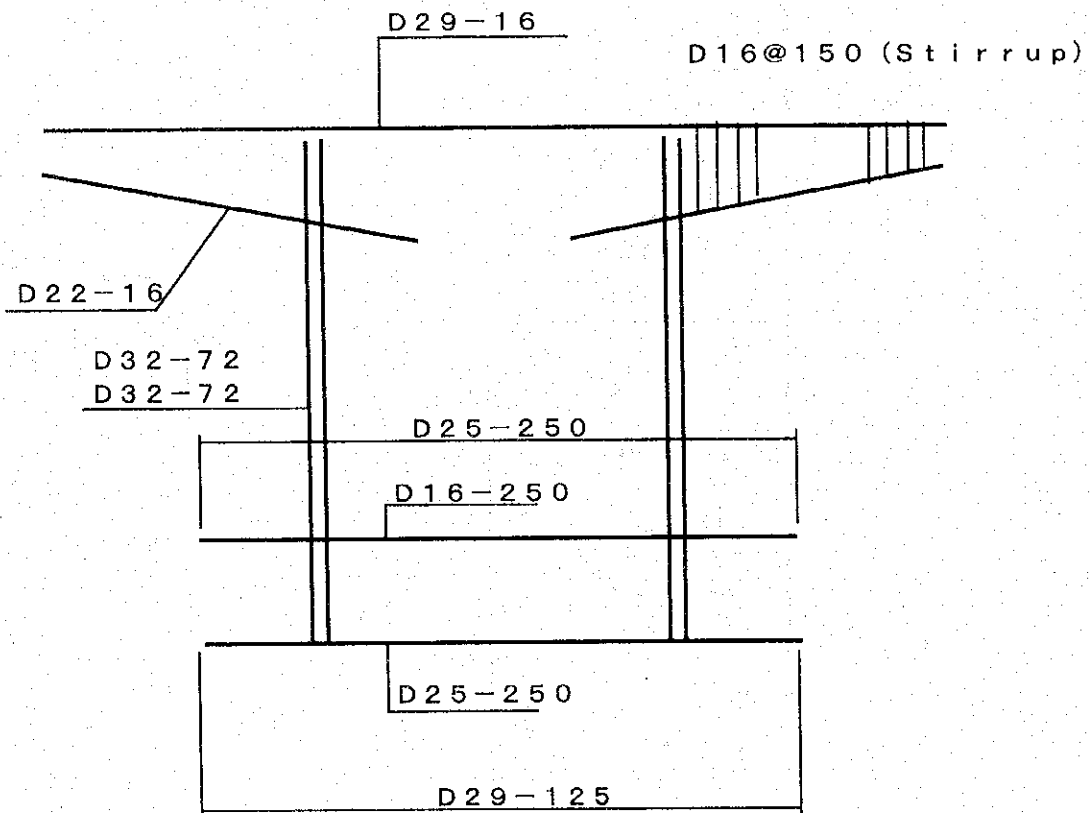


A-Ramp

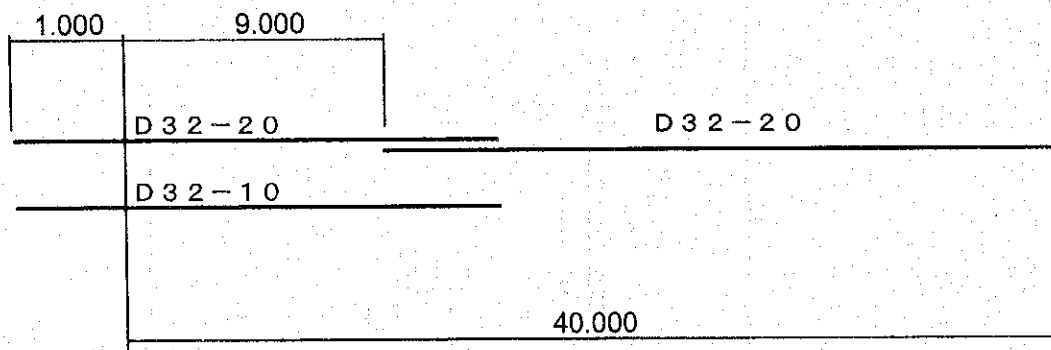
Pa 1 ~ Pa 5

Number of Pile	6		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.450	< 1.5
Bearing Capacity (tf)	Usual	159	< 348
	Earthquake	468	< 509
Pile		As = D 32 - 20 D 32 - 10	1,415 < 2,700
		As = D 32 - 10	812 < 2,700
Beam		As = D 29 - 16 (@ 125)	1,676 < 1,800
Column		As = D 32 - 72 D 32 - 72 (@ 125)	2,559 < 2,700

Footi		As = D25@250	2,622 < 2,700
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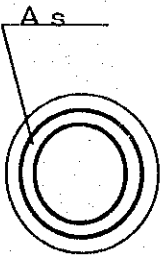
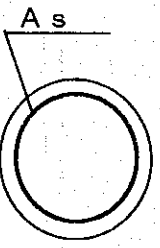
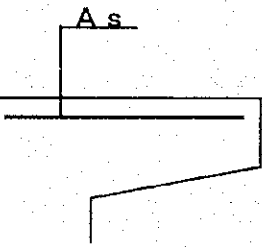
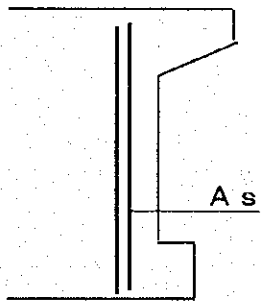


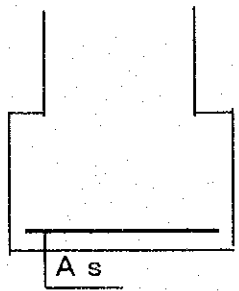
Pile

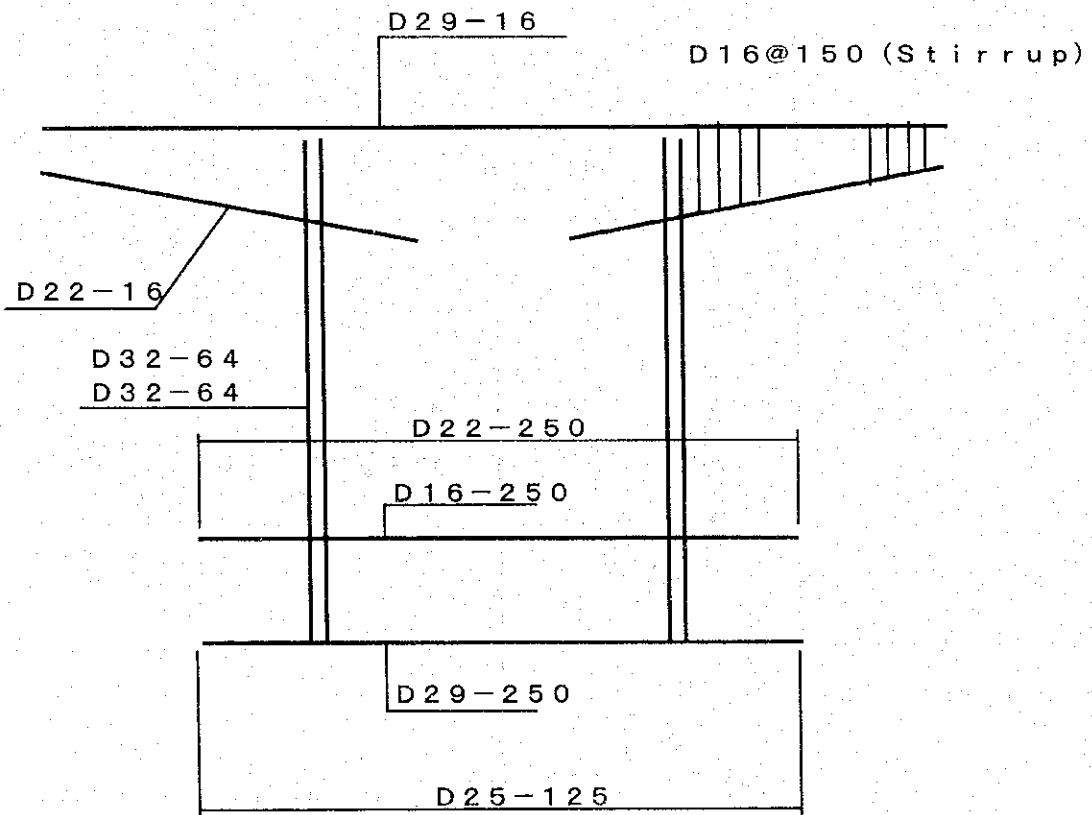


B-Ramp

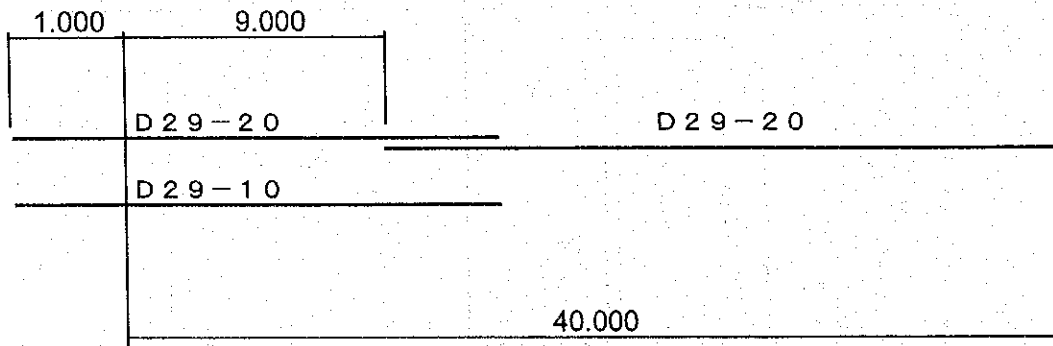
P b 1 ~ P b 6

Number of Pile	6		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000 <	1.5
	Earthquake	1.166 <	1.5
Bearing Capacity (tf)	Usual	143 <	353
	Earthquake	387 <	515
Pile		As = D 29 - 20 D 29 - 10	1,428 < 2,700
		As = D 29 - 10	665 < 2,700
Beam		As = D 29 - 16 (@ 125)	1,599 < 1,800
Column		As = D32 - 64 D32 - 64 (@ 125)	2,465 < 2,700

Foot i		A s = D29@250	2,223 < 2,700
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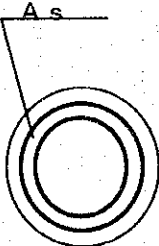
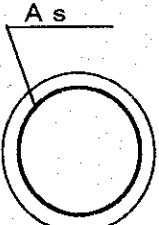
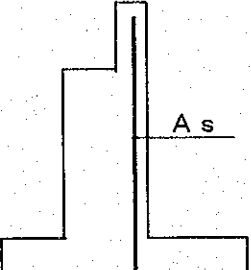
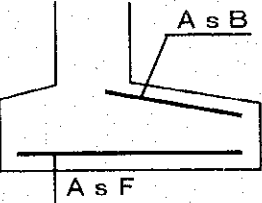


P i l e

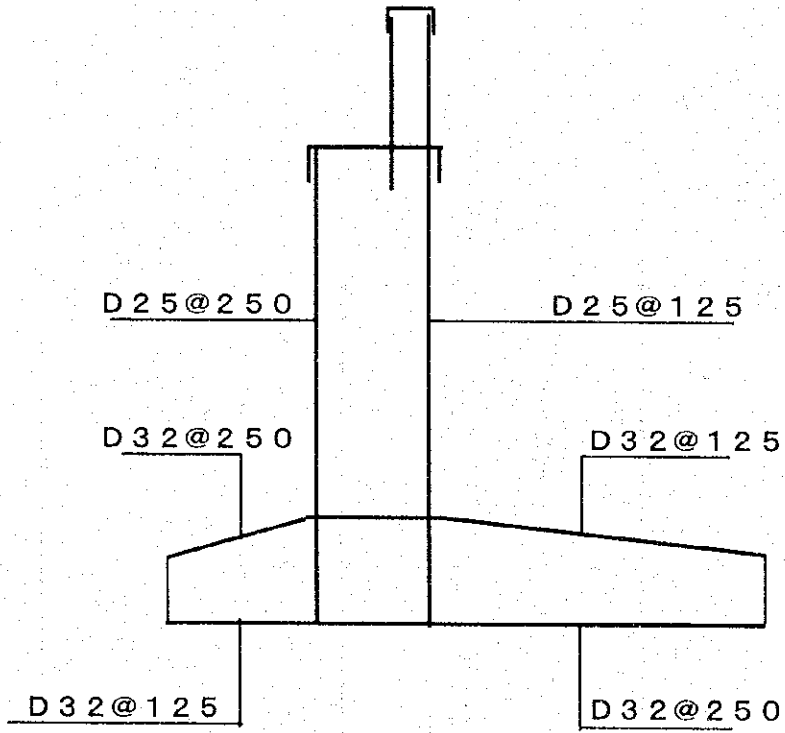


C-Ramp

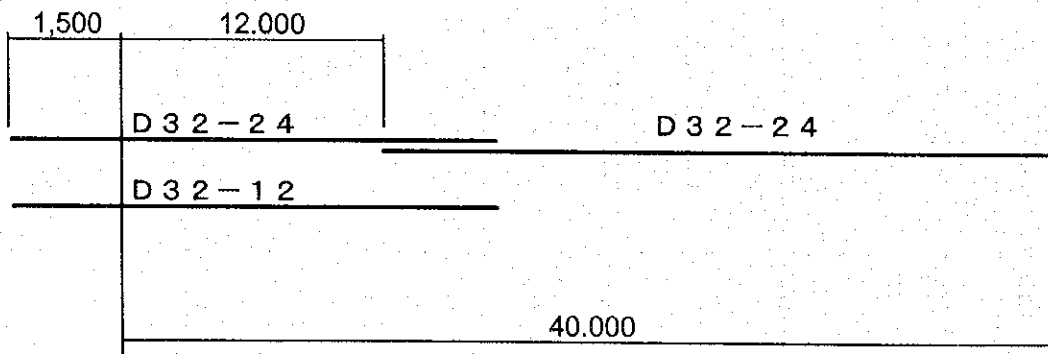
A c 1

Number of Pile	9		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.795 <	1.5
	Earthquake	1.417 <	1.5
Bearing Capacity (tf)	Usual	298 <	609
	Earthquake	425 <	896
Pile		As = D 32 - 24 D 32 - 12	2,304 < 2,700
		As = D 32 - 24	939 < 2,700
Body		As = D 25 @ 125	2,157 < 2,700
Footing		As F = D 32 @ 125 As B = D 32 @ 125	2,267 < 2,700

Body & Footing

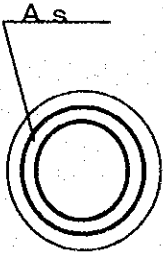
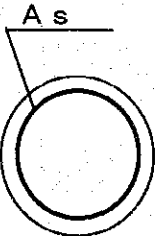
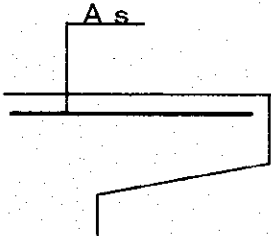
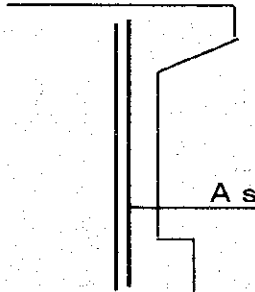


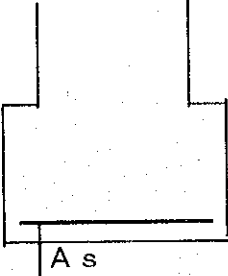
Pile

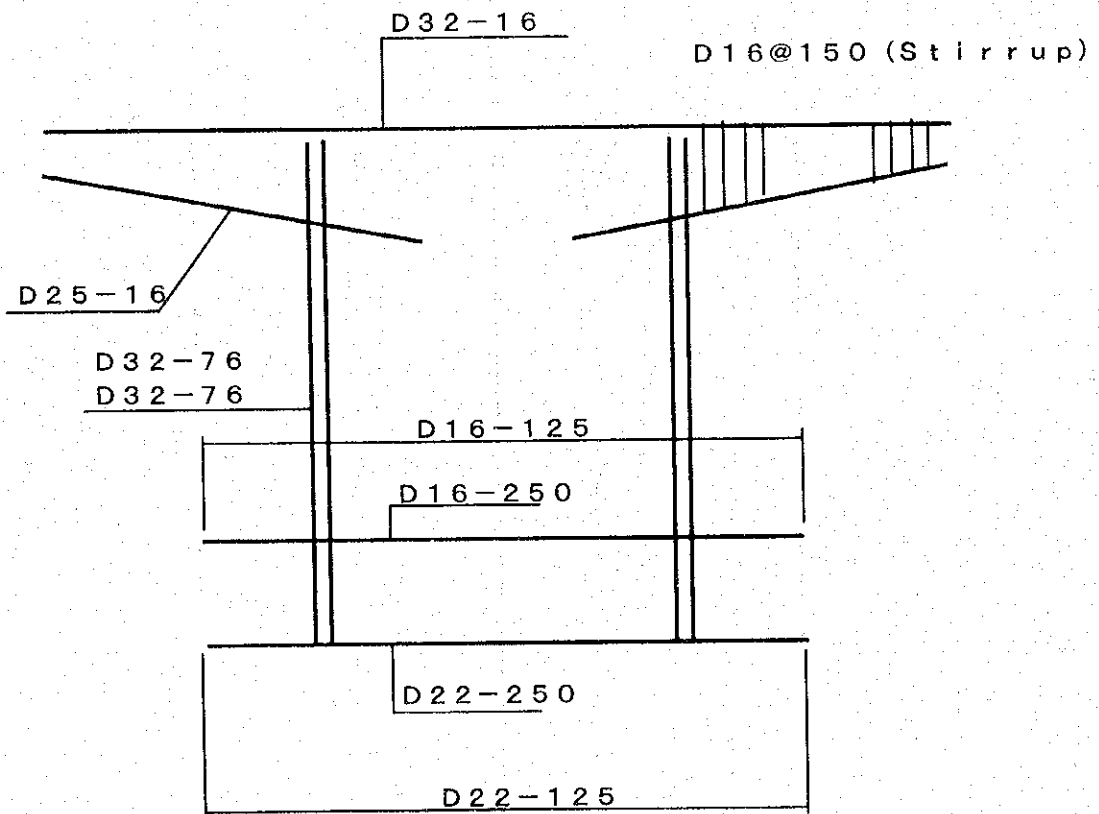


C-Ramp

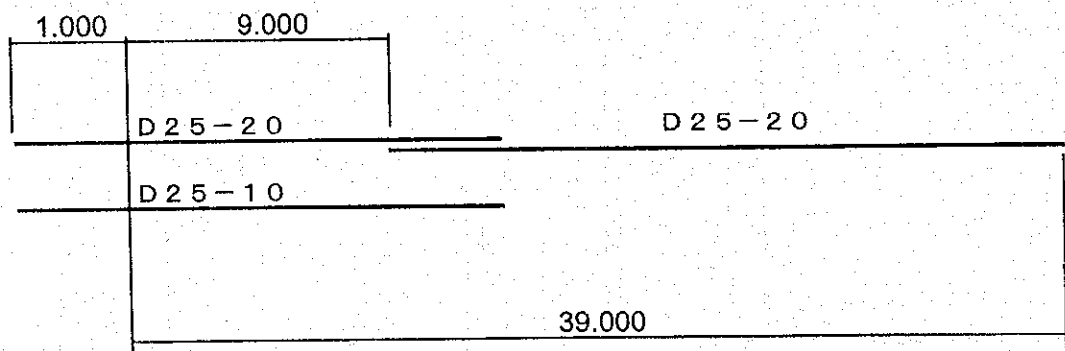
Pc 1 ~ Pc 5

Number of Pile	6		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.032	< 1.5
Bearing Capacity (t)	Usual	157	< 336
	Earthquake	366	< 496
Pile		As = D 25 - 20 D 25 - 10	2,256 < 2,700
		As = D 25 - 10	2,208 < 2,700
Beam		As = D 32 - 16 (@ 125)	1,497 < 1,800
Column		As = D 32 - 64 D 32 - 64 (@ 125)	2,176 < 2,700

Foot i		A s = D29@250	2,642 < 2,700
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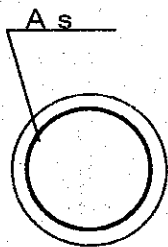
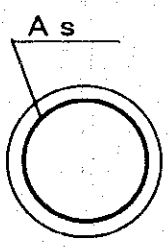
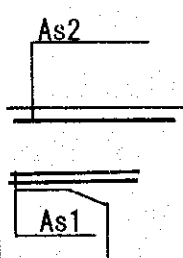
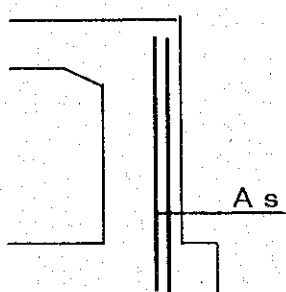


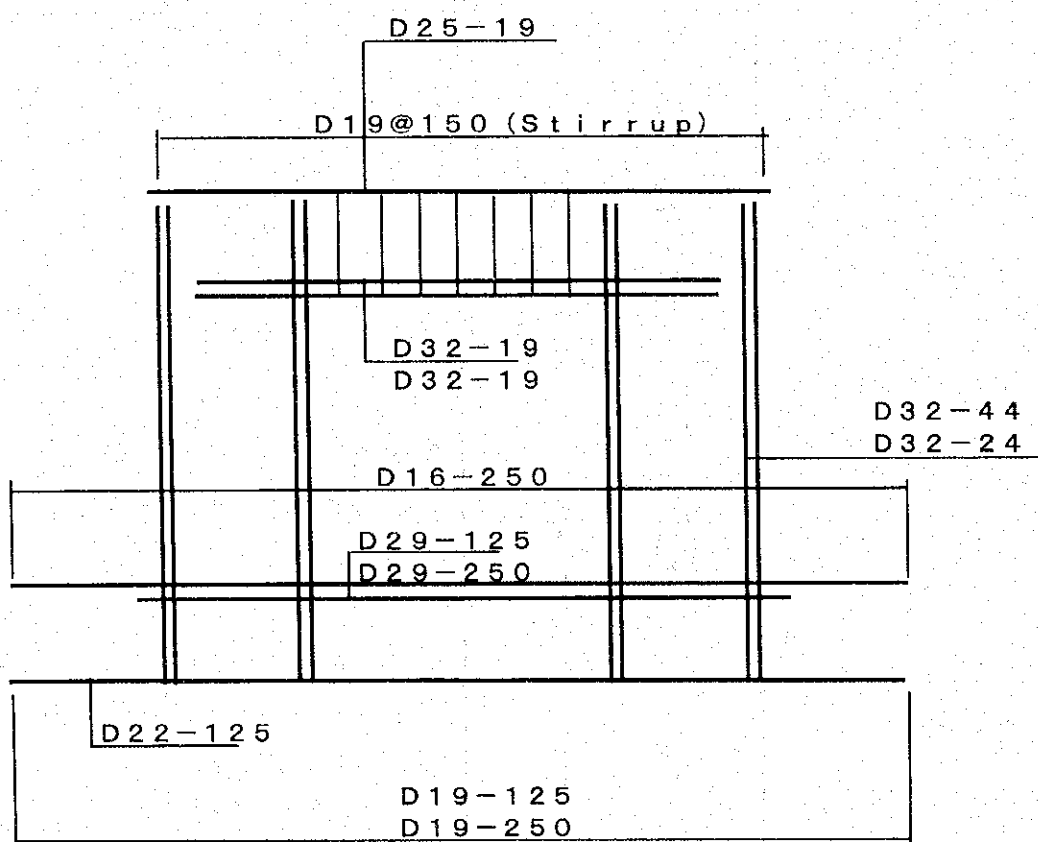
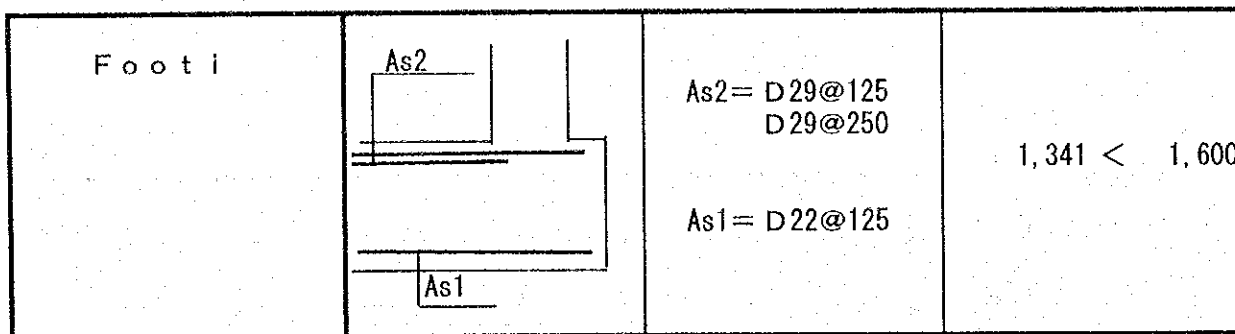
P i l e



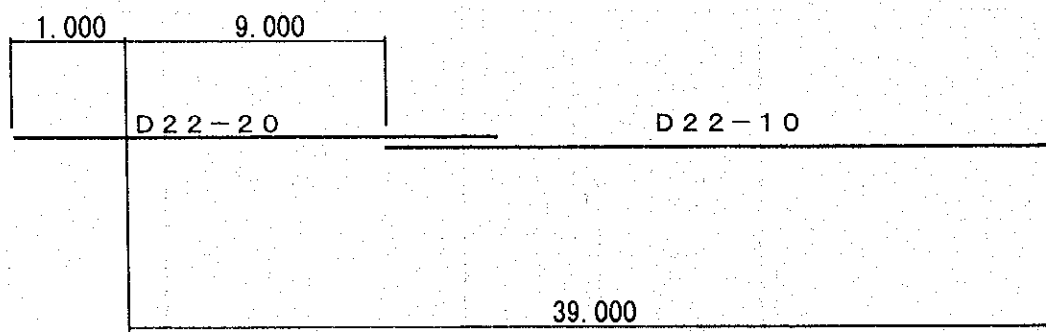
C-Ramp

P c 7

Number of Pile	8		
Pile Length (m)	39.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.012	< 1.5
	Earthquake	0.857	< 1.5
Bearing Capacity (tf)	Usual	189	< 334
	Earthquake	277	< 493
Pile		$A_s = D 22 - 20$	2,585 < 2,700
		$A_s = D 22 - 10$	1,119 < 2,700
Beam		$A_{s2} = D 25 - 18$ $A_{s1} = D 32 - 18$ $D 32 - 18$	1,753 < 1,800
Column		$A_s = D 32 - 44$ (@ 125) $D 32 - 24$	1,023 < 1,800

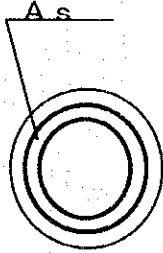
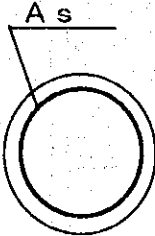
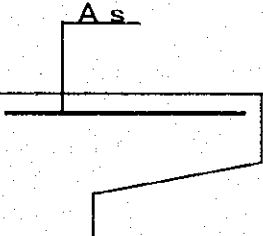
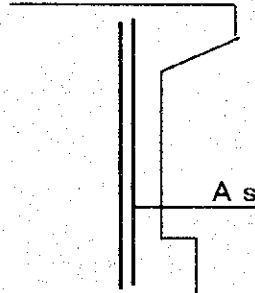


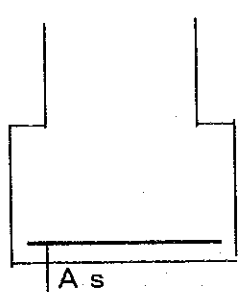
P i l e

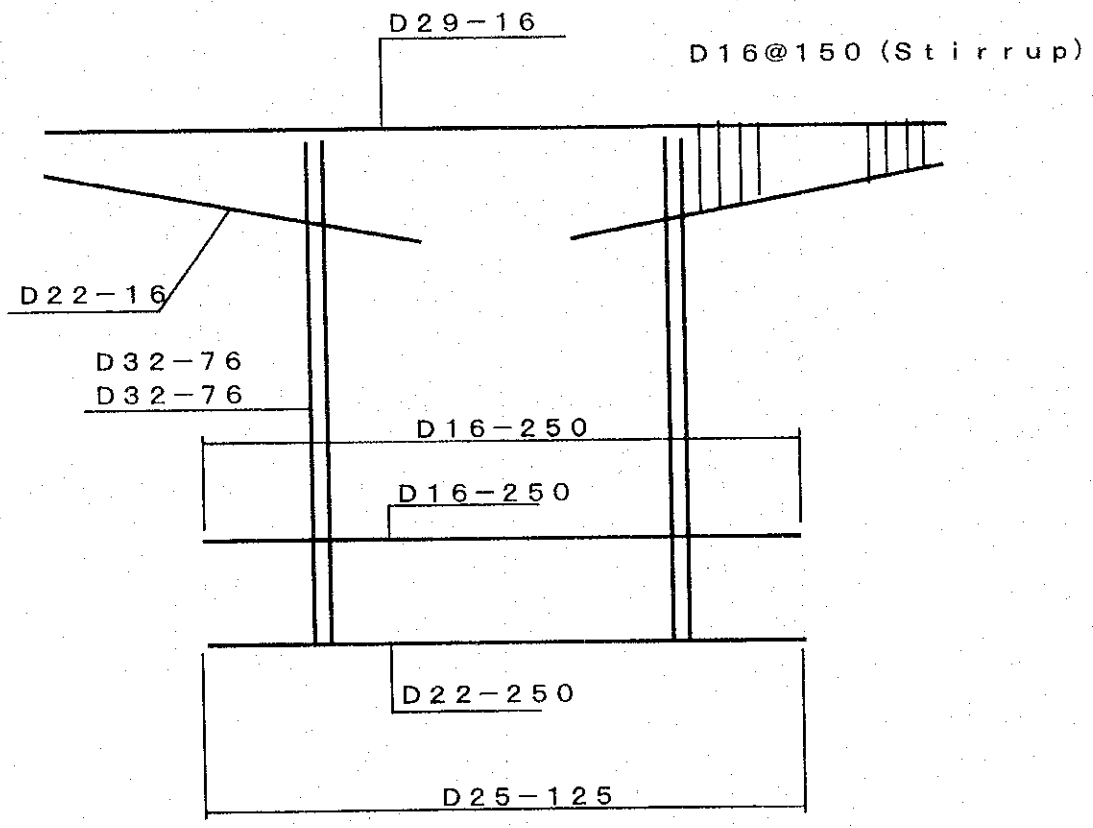


C-Ramp

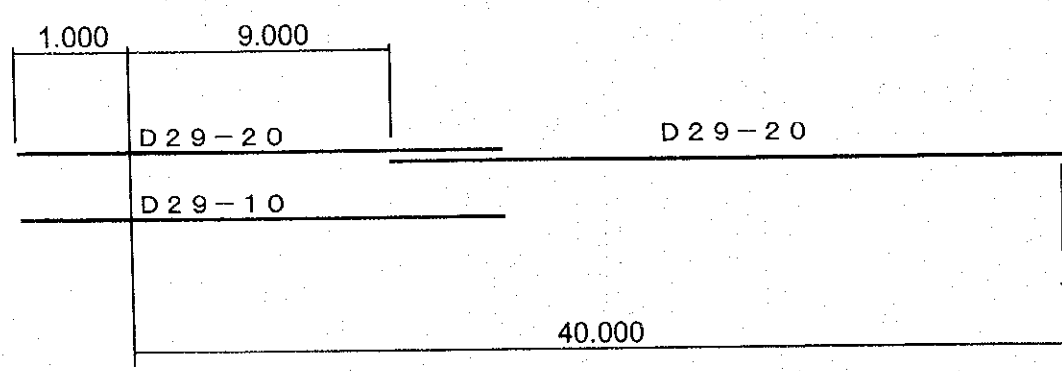
P c 6

Number of Pile	6		
Pile Length (m)	40.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.050	< 1.5
	Earthquake	1.427	< 1.5
Bearing Capacity (tf)	Usual	172	< 351
	Earthquake	430	< 518
P i l e		As = D 2 9 - 2 0 D 2 9 - 1 0	2,693 < 2,700
		As = D 2 9 - 1 0	2,574 < 2,700
B e e m		As = D 2 9 - 1 6 (@ 1 2 5)	1,599 < 1,800
C o l u m n		As = D 3 2 - 7 6 D 3 2 - 7 6 (@ 1 2 5)	2,497 < 2,700

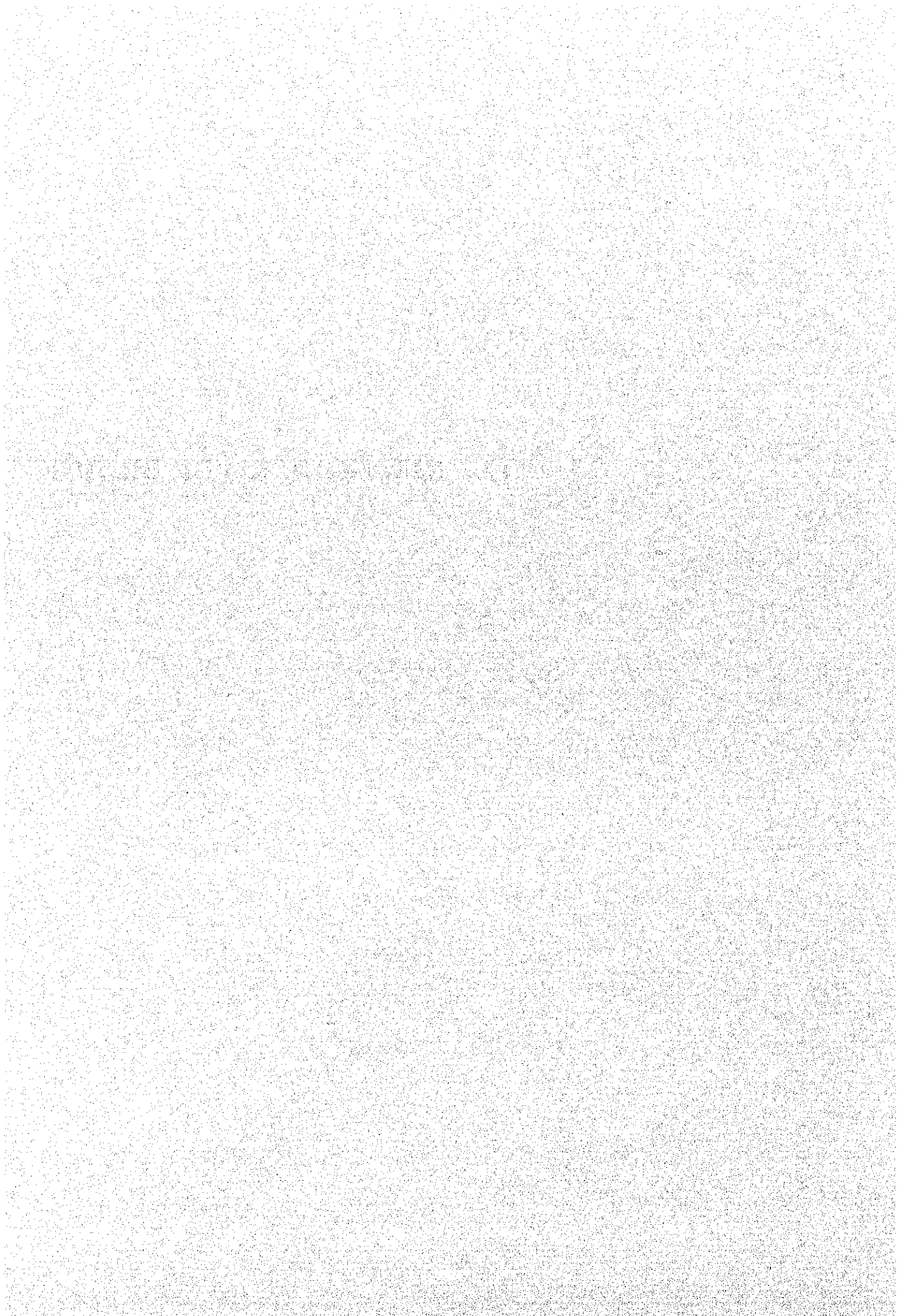
Footi		As = D22@250	2,331 < 2,700
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Pile



12. KIM NGUU RIVER BRIDGE

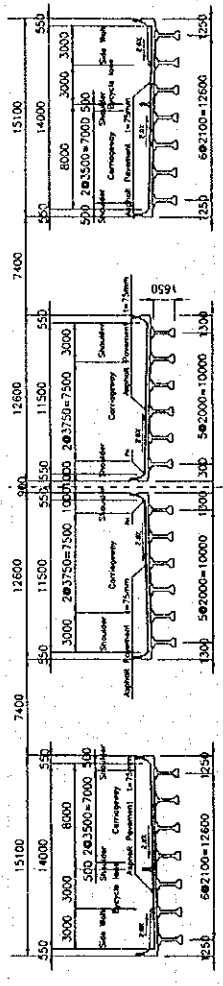


PACKAGE	SCALE	DRAWING No.	SHEET No.
3	1/2000	C-1-1-4	

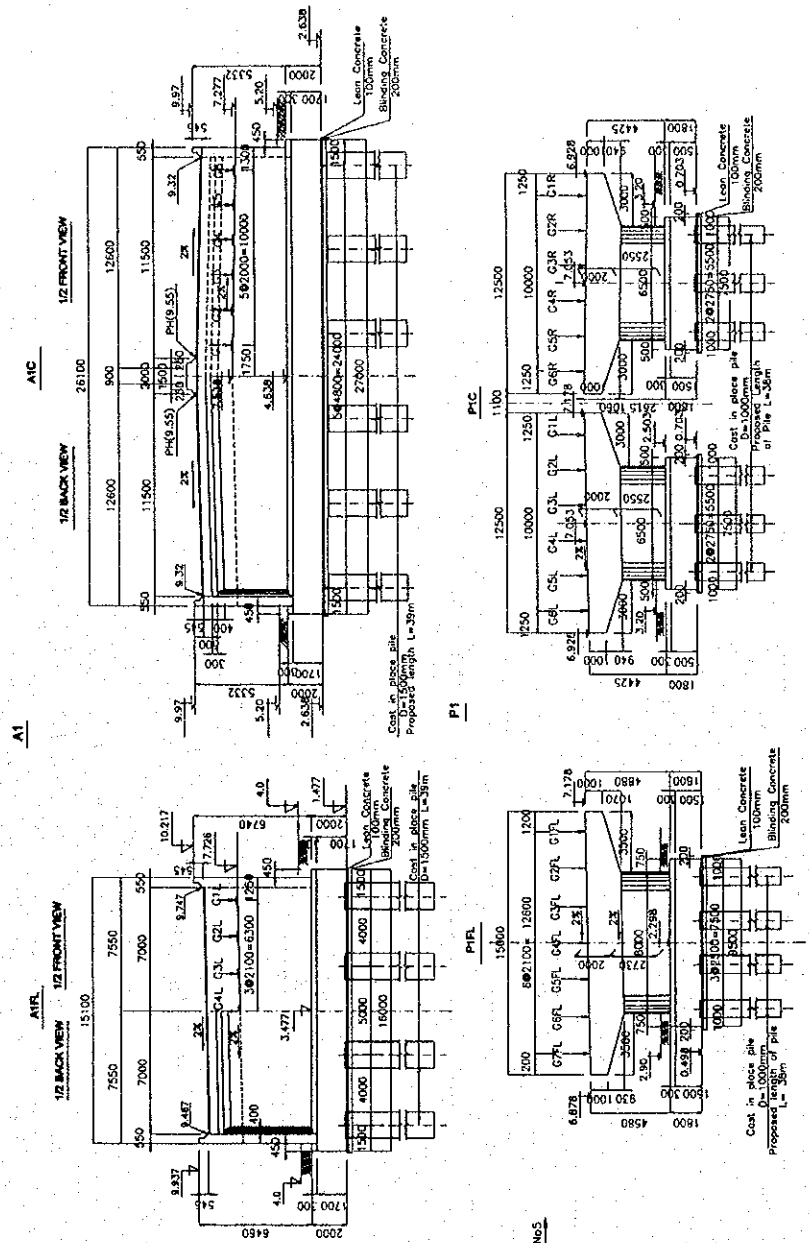
GENERAL VIEW OF HIGH ROAD RIVER BRIDGE

TYPICAL CROSS SECTION OF BRIDGE

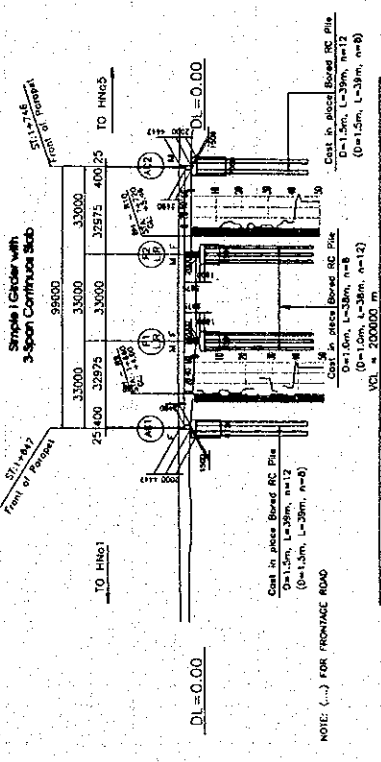
TYPICAL CROSS SECTION OF SUPERSTRUCTURE (S=1/400)



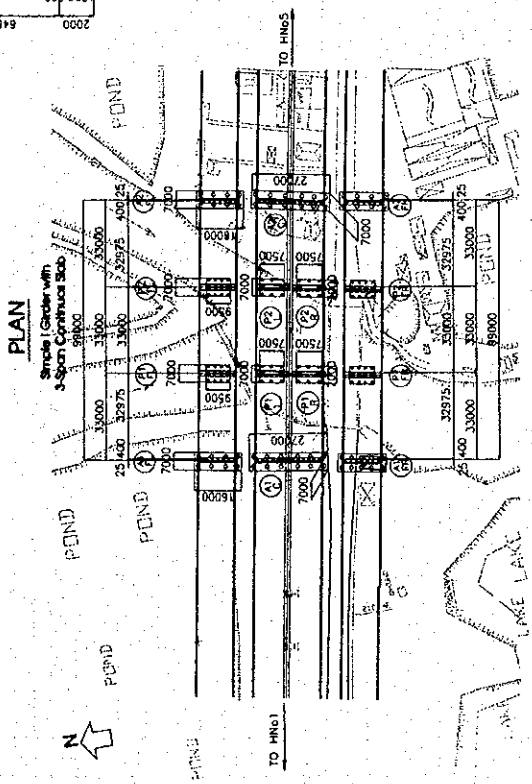
TYPICAL CROSS SECTION OF SUBSTRUCTURE (S=1/300)



PROFILE (TRAVELED WAY)



GRADE	ELEVATION	GROUND HEIGHT	STATION
9.98	6.50	9.98	1+580
9.98	9.55	9.55	1+647
9.98	4.80	9.98	1+660
9.98	9.18	9.98	1+680
9.98	9.74	9.74	1+713
9.98	9.46	9.74	1+720
9.98	9.74	9.74	1+746
9.98	9.68	9.68	1+780



APPROVED BY: [Signature]
 NAME: [Name]
 SHOWDATE: [Date]
 DATE: [Date]

REVISIONS:
 NO. 1: [Description]
 NO. 2: [Description]

PROJECT: HIGHWAY BRIDGE (THRU THE BRIDGE CONSTRUCTION PROJECT)
 CONTRACT NO.: [Number]
 DRAWING NO.: [Number]

NOTE: (1.) FOR FRONTAGE ROAD

Cast in place Bored RC Pile
 Dia=1.0m, L=38m, n=8
 (0=1.0m, L=38m, n=12)
 Vol. = 20000 m³

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
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 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

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 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
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Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

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 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
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 (0=1.5m, L=38m, n=8)

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 (0=1.5m, L=38m, n=8)

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 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

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 Dia=1.5m, L=38m, n=12
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Cast in place Bored RC Pile
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 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
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 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

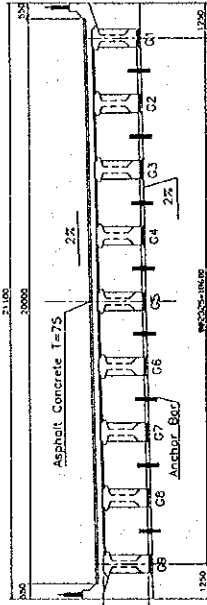
Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

Cast in place Bored RC Pile
 Dia=1.5m, L=38m, n=12
 (0=1.5m, L=38m, n=8)

12.2 Superstructure

PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

Bridge Name		Kim Nguu River		Routes		Hnaoi No. 3 Ring Road		Road Alignment		varies		Skew Angle		90 degrees		Roadway Width		Total Width		Seismic Coefficient		longitudinal		transverse	
Structural Type		Simple Span PC I-girder Bridge		Bridge Length		33.0		Span Arrangement		m		32.15		m		21.1		m		0.17		0.17			
Main Girder		Number of Girders		1 nos.		Girder Height		1.65		m		Maximum Displacement		mm (/ -)											
Crossbeam		Girder Spacing		2.325		Height/Span Ratio		H/L = 1/19.5 (constant girder height)				Crossbeam Height		1.57		m									
Structural Type		Reinforced Concrete Slab		Prestress Tendon		Reinforcement Arrangement		D19@125 (top & bottom)																	
Design Strength of Concrete		f'c = 290 kgf/cm ²		Allowable Stress Increase Coefficient																					
Bending Moment		Slab Depth		200		mm		concrete		78.5		kgf/cm ² rebar		1.188		kgf/cm ²									
+ve & -ve		3.029		tf. m/m																					
Design Theory		Beam Theory		Post-tensioned Precast Concrete Girder		Prestress Tendon		12T12.7 (SBPR7B)																	
Construction Method		Location		immediately after prestressing		at service load																			
Unfactored Bending Moment/Girder		combined stress		allowable stress		combined stress		allowable stress																	
girder weight only		24.1		kgf/cm ²		-15.0		kgf/cm ²		- kgf/cm ²		- kgf/cm ²		- kgf/cm ²		- kgf/cm ²									
total service load		181.5		kgf/cm ²		198.0		kgf/cm ²		110.7		kgf/cm ²		160.0		kgf/cm ²									
		- kgf/cm ²				- kgf/cm ²		-21.6		kgf/cm ²		-31.8		kgf/cm ²											
Shear Force Check Point at End Support		Unfactored Shear Force		101		tf		Factored Shear Force/Girder		159		tf		Diagonal Tension Stress		Stirrup		4-D19@125		not provided					
Support Reaction		Unit		Support 1 (= Support 2)																					
Dead Load, Rd		tf		71.7																					
Live Load, Rl		tf		20.7																					
Total Reaction		tf		92.4																					
Bearing Type		elastic bearing																							



Cross-section

Expansion Joint

Location

Type of Joint

Quantity/Girder

Quantity/In² of concrete

Items

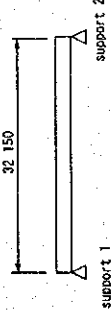
Unit

Specification

Remarks

1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)

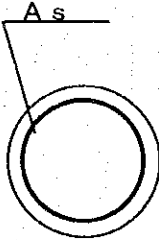
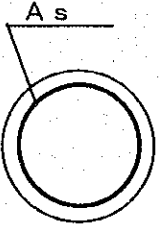
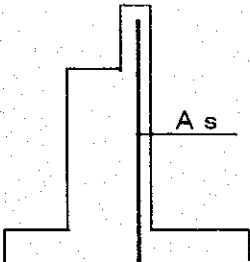
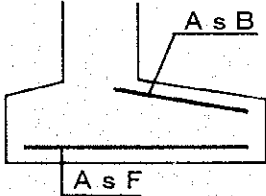
2. Nomenclature of supports are as follows.



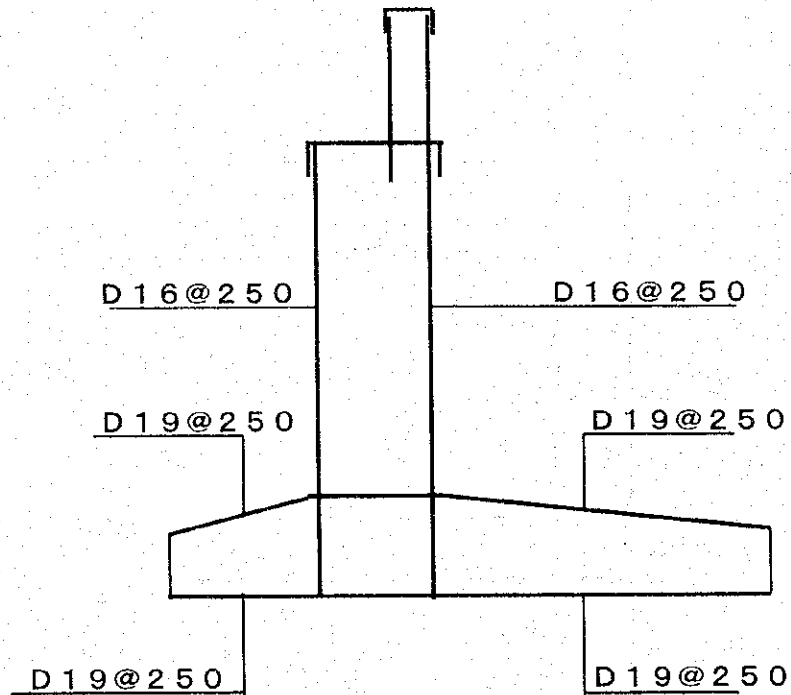
3. Quantity of prestressing tendon includes operation allowance of 1.5m/each.

12.3 Substructure
Kim Nguu River Bridge

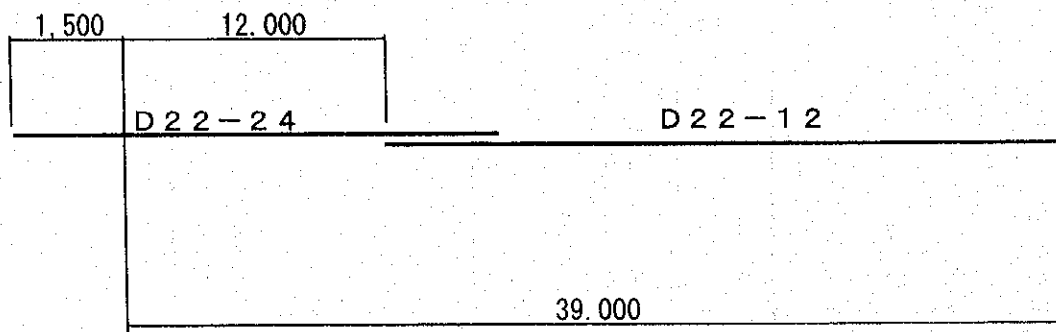
Abutment—Main (Fix)

Number of Pile	16		
Pile Length (m)	39.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.71	< 1.5
	Earthquake	1.23	< 1.5
Bearing Capacity (tf)	Usual	362	< 577
	Earthquake	437	< 831
Pile		$A_s = D22-24$	2,039 < 2,700
		$A_s = D22-12$	901 < 2,700
Body		$A_s = D16@250$	1,674 < 2,700
Footing		$A_s F = D19@250$ $A_s B = D22@250$	1,960 < 2,700

Body & Footing

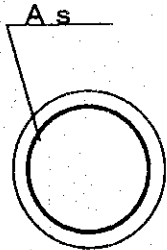
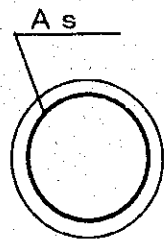
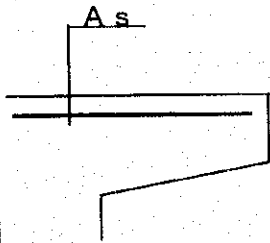



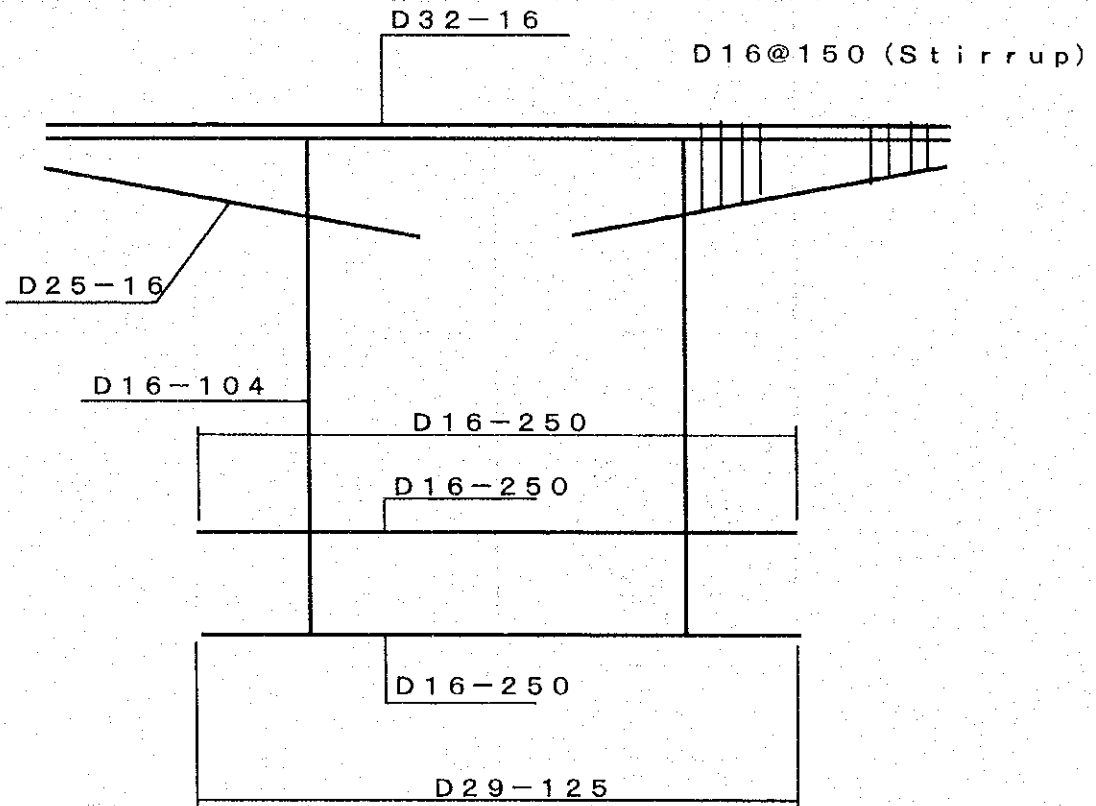
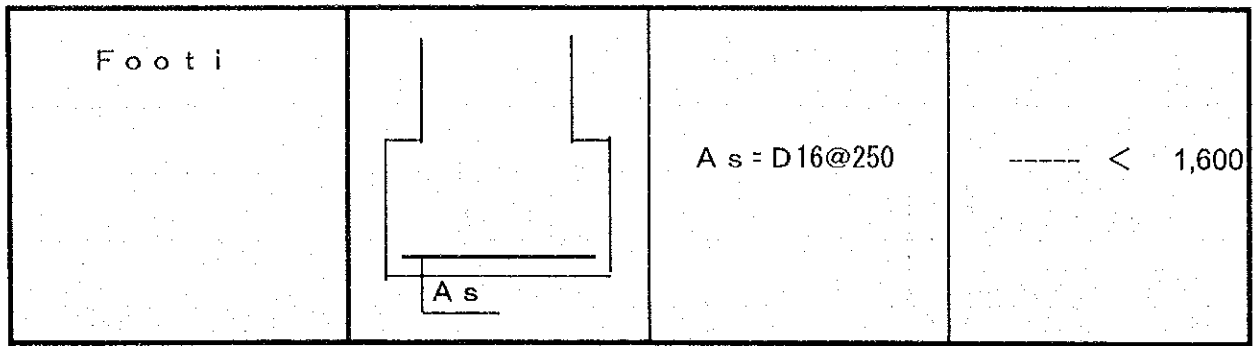
Pile



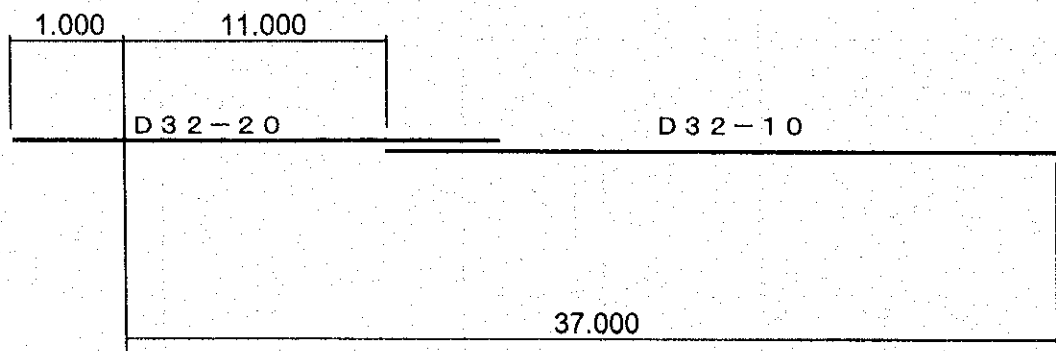
Kim Nguu River Bridge

Pier P1-P2 (Main)

Number of Pile	8		
Pile Length (m)	37.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.416	< 1.5
Bearing Capacity (tf)	Usual	195	< 318
	Earthquake	343	< 461
Pile		$A_s = D32 - 20$	2,145 < 2,700
		$A_s = D32 - 10$	2,327 < 2,700
Beam		$A_s = D32 - 16$	1,796 < 1,800
Column		$A_s = D16 - 104$ (@125)	----- < 2,700

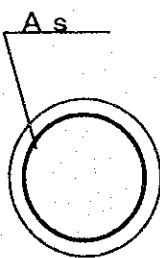
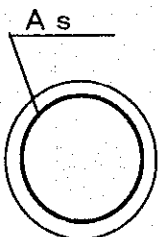
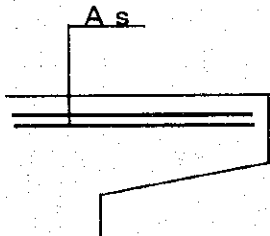
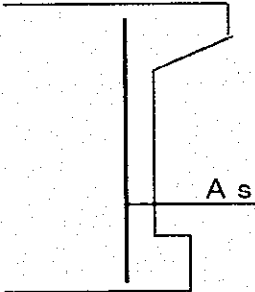


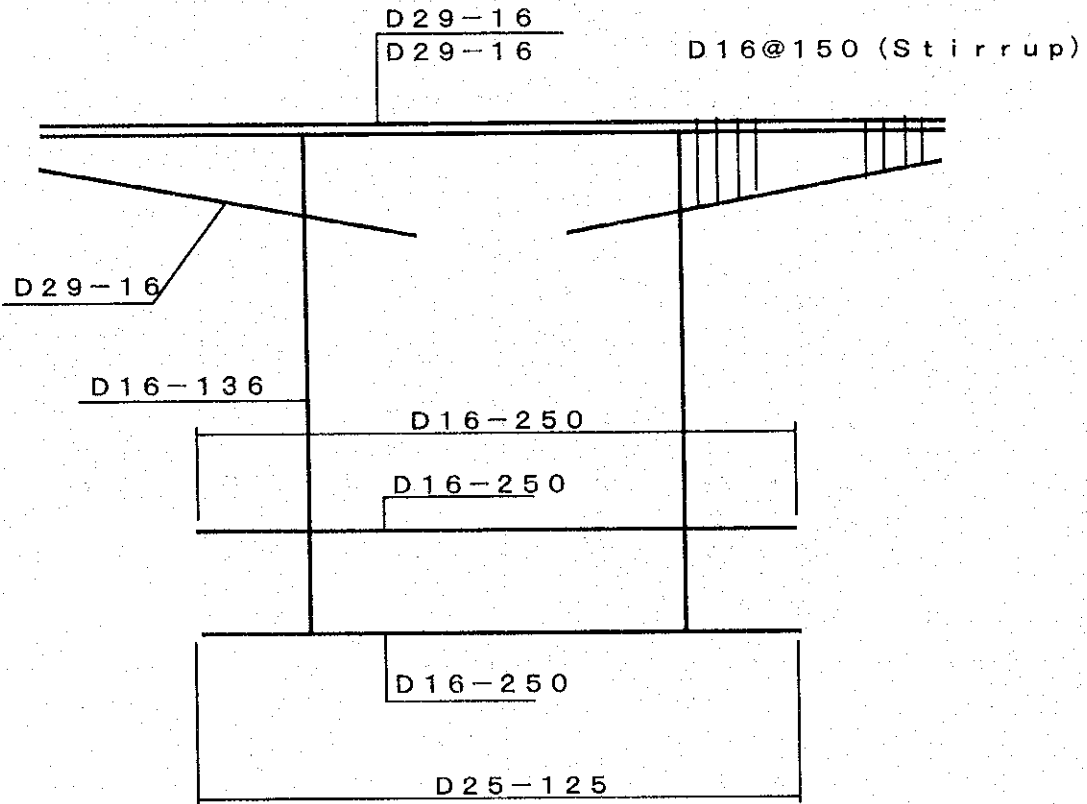
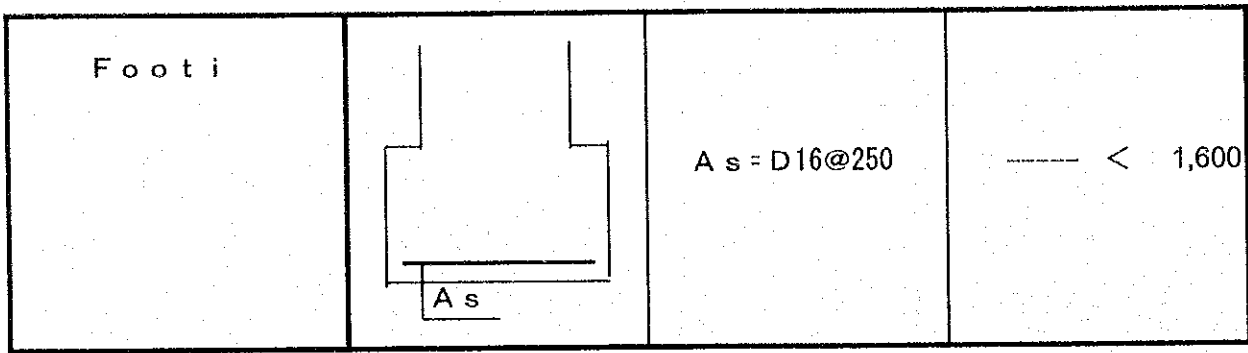
Pile



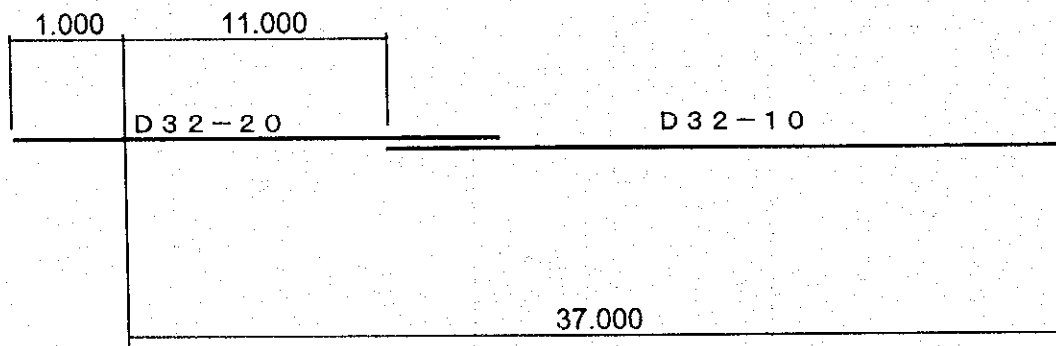
Kim Nguu River Bridge

Pier P1·P2 (Frontage)

Number of Pile	9		
Pile Length (m)	37.00		
Pile Diameter (m)	1.000		
Horizontal Displacement (cm)	Usual	0.000	< 1.5
	Earthquake	1.463	< 1.5
Bearing Capacity (tf)	Usual	210	< 319
	Earthquake	360	< 461
Pile		$A_s = D32-20$	2,293 < 2,700
		$A_s = D32-10$	1,866 < 2,700
Beam		$A_s = D29-16$ $D29-16$	1,487 < 1,800
Column		$A_s = D16-136$ (@125)	----- < 2,700

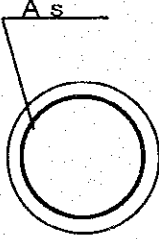
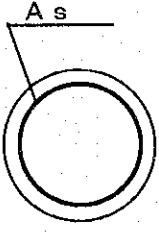
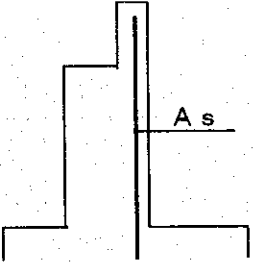
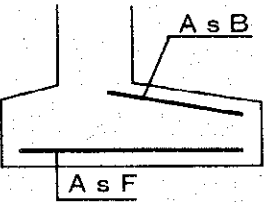


P i l e

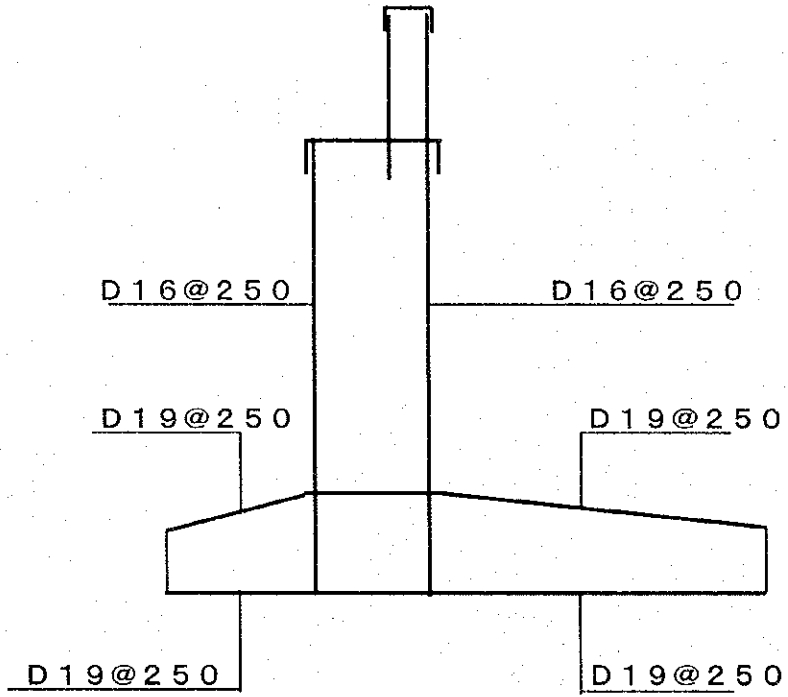


Kim Nguu River Bridge

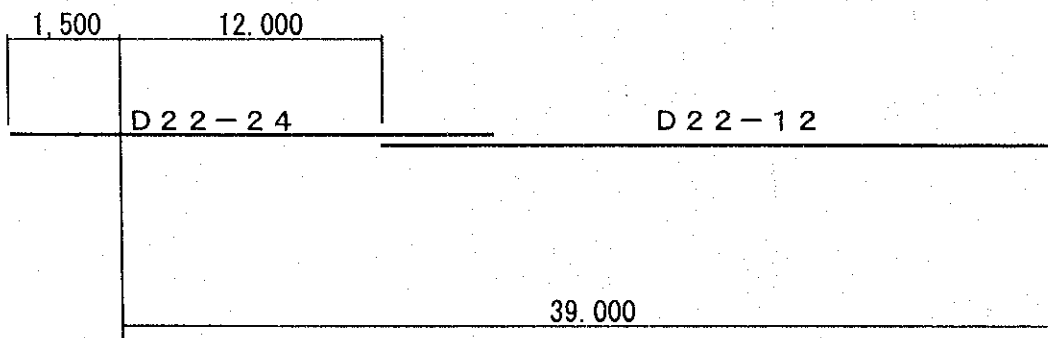
Abutment—Frontage (Fix)

Number of Pile	8		
Pile Length (m)	39.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.544	< 1.5
	Earthquake	1.167	< 1.5
Bearing Capacity (tf)	Usual	298	< 577
	Earthquake	384	< 831
Pile		$A_s = D22 - 24$	1,898 < 2,700
		$A_s = D22 - 12$	1,262 < 2,700
Body		$A_s = D16 @ 250$	2,636 < 2,700
Footing		$A_{sF} = D19 @ 250$ $A_{sB} = D22 @ 250$	1,996 < 2,700

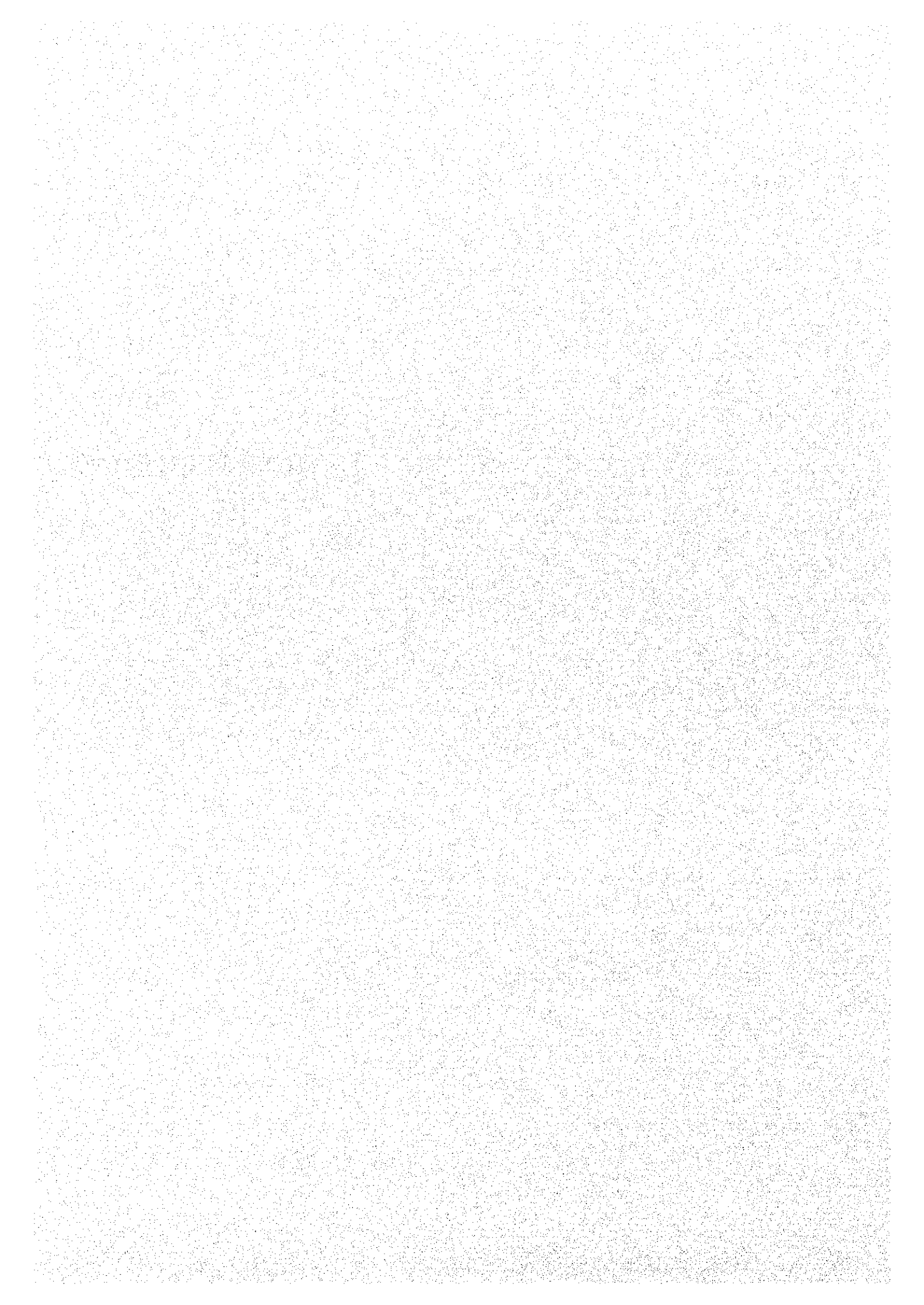
Body & Footing



Pile



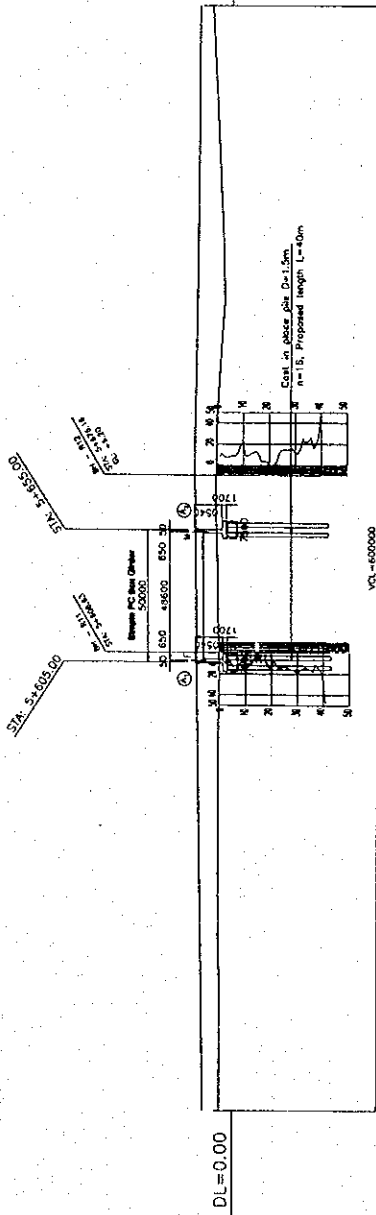
13. LINH NAM BRIDGE



PROJECT No.	3	SCALE	1/2000	DESIGNED No.	C-1-1-2	SHEET No.	
GENERAL VIEW OF LINH NAM ROAD BRIDGE							

THE GOVERNMENT OF THE SOCIALIST REPUBLIC OF VIETNAM	DESIGNED BY	
THIRD LIAISON PROJECTS IMPLEMENTATION UNIT, MINISTRY OF TRANSPORT	INVEST	
VIETNAM NATIONAL CONSTRUCTION COMPANY	CONSTRUCTION	
NO. 100 BRIDGE (THRU) THE BRIDGE CONSTRUCTION PROJECT	DATE	
PROJECT CONSULTANTS INFORMATION		

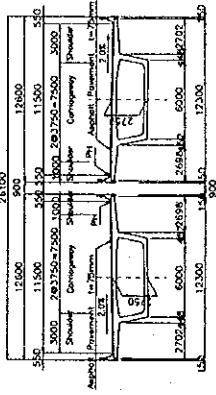
LONGITUDINAL OF BRIDGE



GRADE	ELEVATION	GROUND HEIGHT	STATION
	17.05		
	6.058	14.050	5+680.00
	6.075	14.029	5+655.00
	5.277	13.862	5+605.00

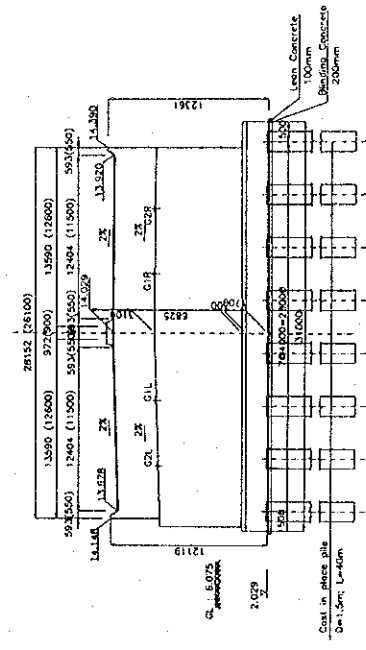
TYPICAL CROSS SECTION OF BRIDGE

(SCALE=1/400)

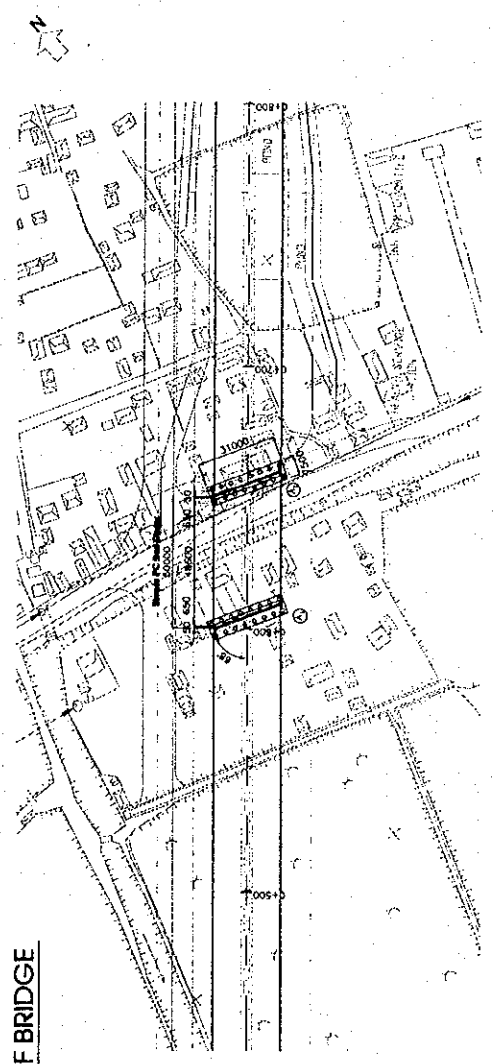


TYPICAL CROSS SECTION OF SUPERSTRUCTURE

TYPICAL CROSS SECTION OF SUBSTRUCTURE



PLAN OF BRIDGE

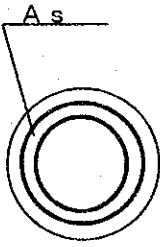
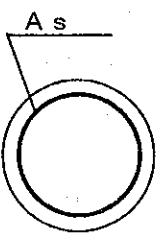
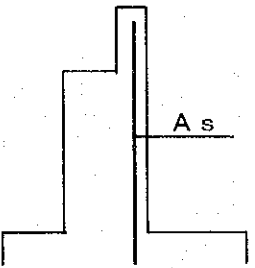
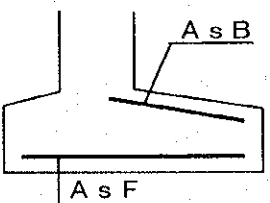


PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

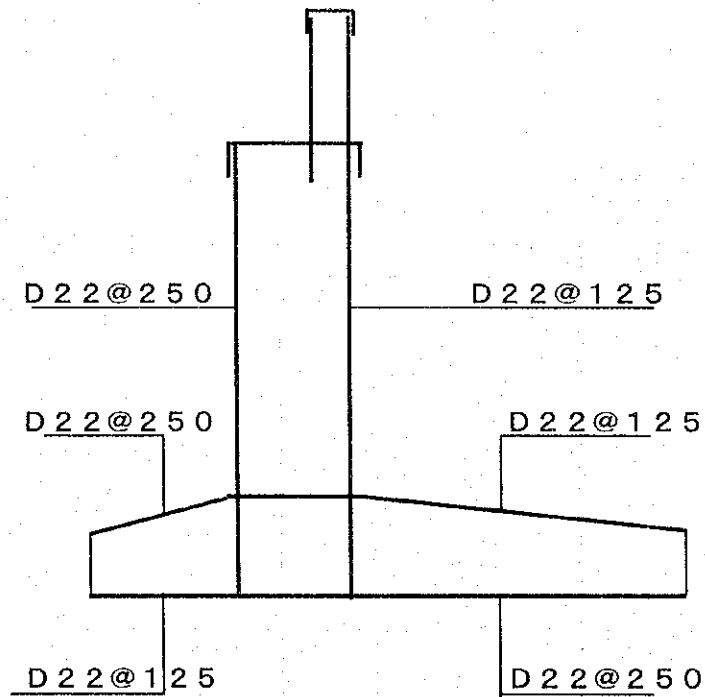
Bridge Name	Linh Nam Bridge		Route	Phaoi No.3 Ring Road		Skew Angle	68 degrees		Roadway Width	Total Width		Seismic Coefficient	11.5 m		longitudinal	0.17	
Structural Type	Simple Span PC Box Girder Bridge		Bridge Length	50.0 m		Span Arrangement	-		Effective Width	12.1 m		Seismic Coefficient	0.17		transverse	0.17	
Main Girder	Number of Girders	1 nos.		Girder Height	2.75 m		Maximum Displacement	-									
	Girder Spacing	-		Height/Span Ratio	H/L = 1/17.7 (constant girder height)		Crossbeam Height	2.0 m									
Crossbeam	Number of Crossbeams	2 nos./span		Crossbeam Spacing	16.0 m (approximately)		Crossbeam Height	2.0 m									
	Structural Type	Prestressing Tendon		4T15.2 (SBPR7B)	Tendon Spacing	500 mm											
Design Strength of Concrete	f'c = 400 kgf/cm ²		Allowable Stress Increase Coefficient		-												
Bending Moment	Slab Depth		Combined Stresses in Concrete														
	Cantilevered Slab	-13.89 tf.m/m	500 mm	top fiber	19.6 kgf/cm ²	bottom fiber	22.7 kgf/cm ²										
Span Center	10.41 tf.m/m	300 mm	top fiber	69.4 kgf/cm ²	bottom fiber	5.4 kgf/cm ²											
Design Theory	Beam Theory		Prestressing Tendon		12T15.2 (SBPR7B)												
Construction Method	Construction on Fixed Staging																
Unfactored Bending Moment	8.936 tf.m	Location	Immediately after prestressing		at service load												
			combined stress	allowable stress	combined stress	allowable stress											
Span Center	top fiber	bottom fiber	-	kgf/cm ²	89.3 kgf/cm ²	160.0 kgf/cm ²											
			-	kgf/cm ²	1.7 kgf/cm ²	-31.8 kgf/cm ²											
Shear Force Check Point at End Support	738 tf	Unfactored Shear Force	1.150 tf	Factored Shear Force	2-D19@125/web	Stirrup	Vertical Prestressing tendon										
Support Reaction	Unit	Support 1 (= Support 2)															
Dead Load, Rd	tf	691															
Live Load, Rl	tf	138															
Total Reaction	tf	829															
Bearing Capacity and Type	450tf x 2 pot bearing																
Expansion Joint			Location			Type of Joint			Girder Clearance								
PIL and P2L			Rubber joint			Quantity/bridge			75 mm (PIL) 100 mm (P2L)								
Items			Unit			Specification			Quantity/bridge			Quantity/m ³ of concrete					
Concrete			m ³			f'c = 400 kgf/cm ²			457			-					
External Formwork			m ²			-			852			1.85 m ² /m ³					
Internal Formwork			m ²			-			562			1.23 m ² /m ³					
Reinforcing Bar			kgf			SD395A (JIS G3112)			63,524			139.0 kgf/m ³					
longitudinal			kgf			12T15.2 (SBPR7B)			18,477			40.4 kgf/m ³					
transverse (deck slab)			kgf			3T15.2 (SBPR7B)			5,588			12.2 kgf/m ³					
transverse (crossbeam)			kgf			4T15.2 (SBPR7B)			635			1.39 kgf/m ³					
Total			kgf			-			24,700			-					
<p>1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1995)</p> <p>2. Nomenclature of supports are as follows.</p> <div style="text-align: center;"> </div> <p>3. Quantity of prestressing tendon does not include operation allowance.</p>																	
Remarks																	

13.2 Substructure
 LINH NAM BRIDGE

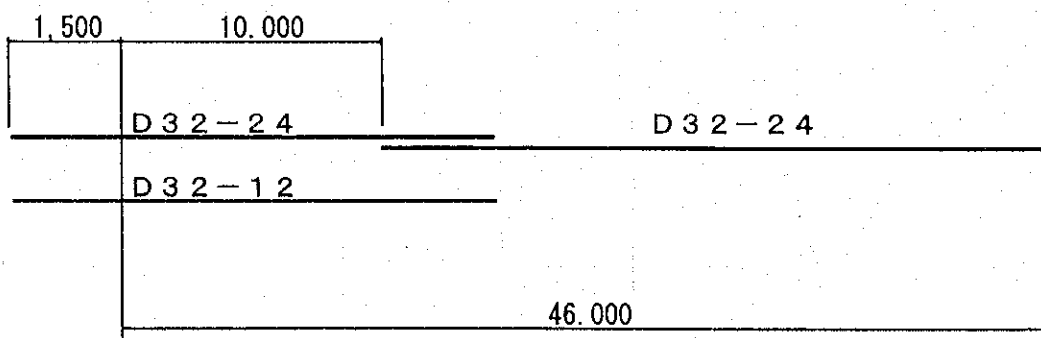
Abutment (Fix)

Number of Pile	16		
Pile Length (m)	46.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.486	< 1.5
	Earthquake	1.281	< 1.5
Bearing Capacity (tf)	Usual	430	< 837
	Earthquake	641	< 1,195
Pile		As = D32-24 D32-12	2,366 < 2,700
		As = D32-24	1,419 < 2,700
Body		As = D22@125	2,344 < 2,700
Footing		AsF = D22@125 AsB = D22@125	2,516 < 2,700

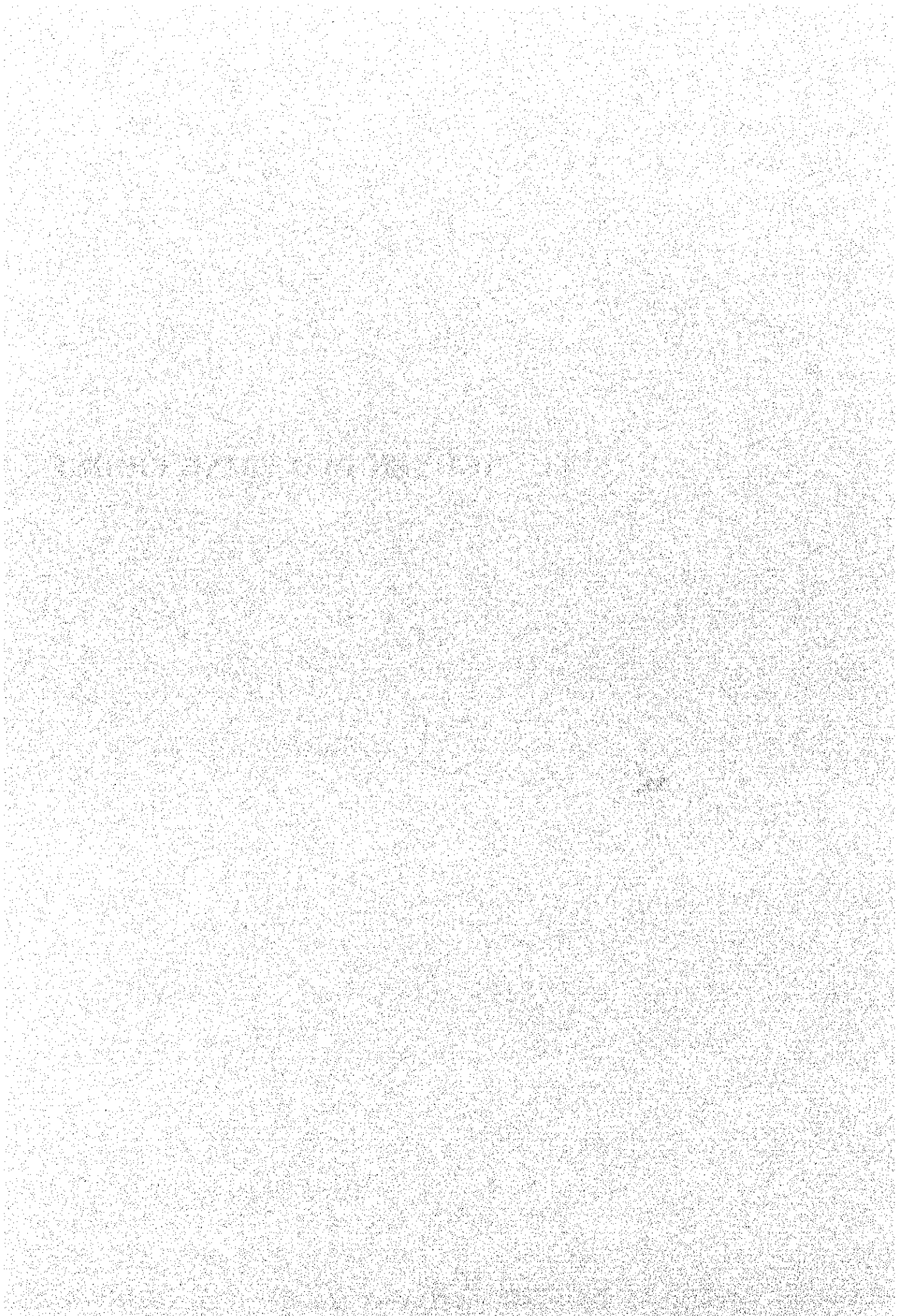
Body & Footing



Pile



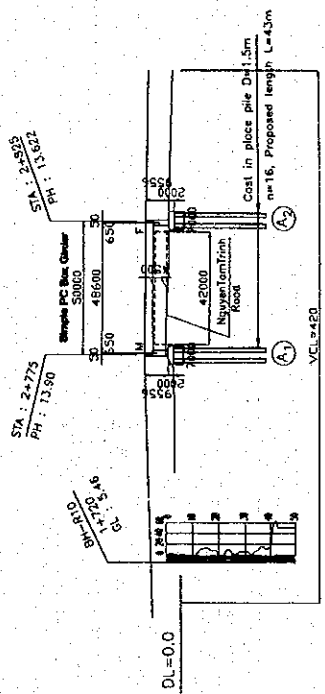
14. NGUYEN TAM TRINH BRIDGE



PROJECT No.	3
SCALE	1/2000
REVISION No.	C-1-1-1-1
DATE	

THE UNIVERSITY OF THE SOUTH CHINA SEA	REVISION BY	
Faculty of Engineering	NAME	
Department of Civil Engineering	REVISION	
Course: Highway Engineering	DATE	
Project: Nguyen Tam Trinh Bridge		

LONGITUDINAL OF BRIDGE

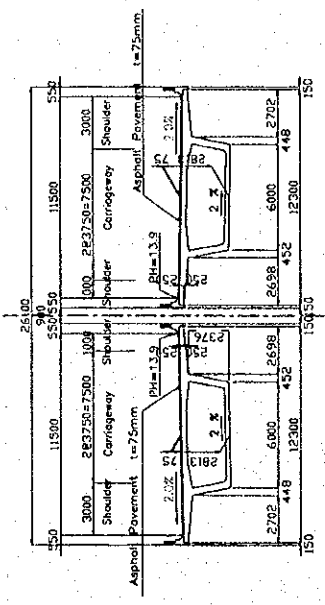


GRADE	ELEVATION (PH)	GROUND HEIGHT	STATION
16.85	13.83	13.90	2+775
	13.82	4.70	2+790
	13.622	3.56	2+825

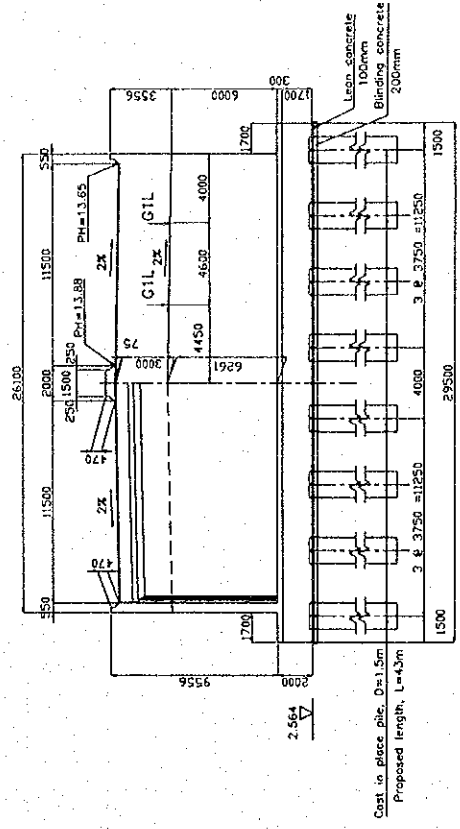
TYPICAL CROSS SECTION OF BRIDGE

(S=1/300)

TYPICAL CROSS SECTION OF SUPERSTRUCTURE

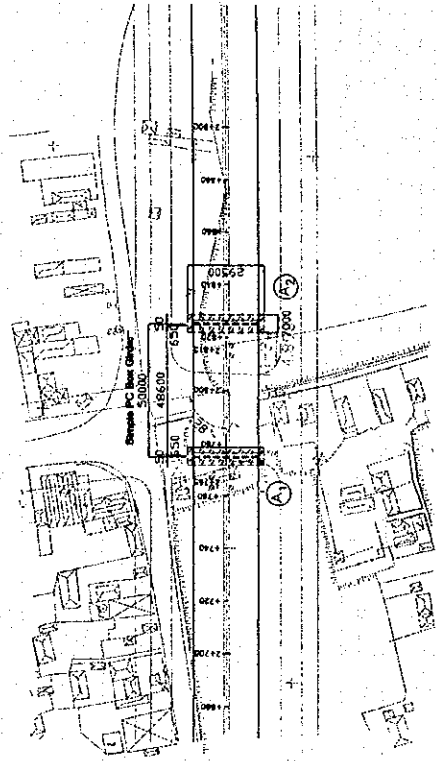


TYPICAL CROSS SECTION OF SUBSTRUCTURE



Cost in place pile D=1.5m
Proposed length L=4.3m

PLAN OF BRIDGE



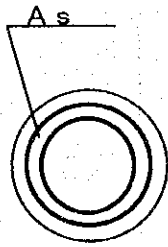
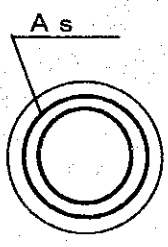
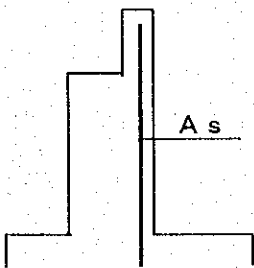
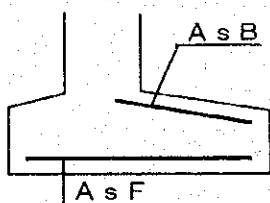
14.2 Superstructure

PRESTRESSED CONCRETE BRIDGE DESIGN SUMMARY

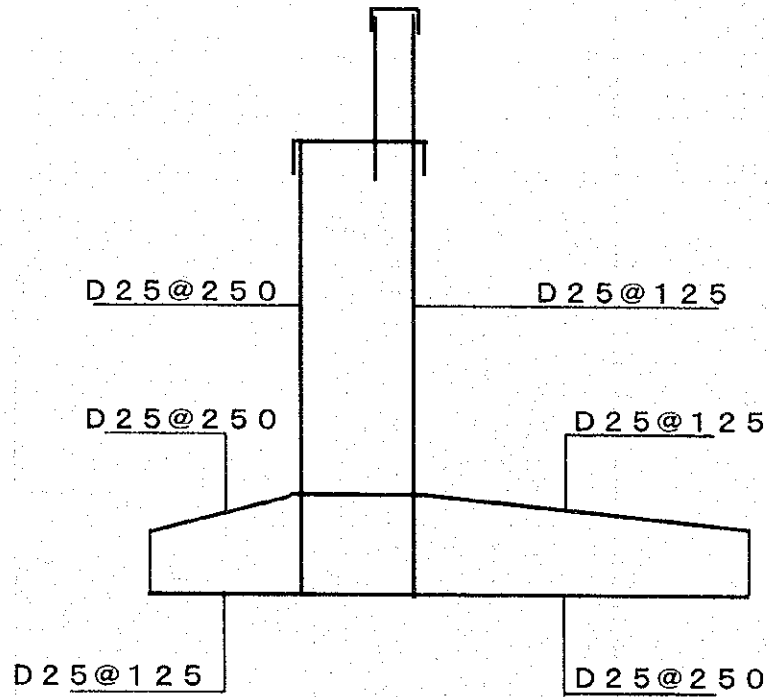
Bridge Name	Nguyen Tam Trinh Simple Span Box Girder		Route	Hanoi No. 3 Ring Road	Road Alignment	A = 575.5	Skew Angle	90 degrees	Roadway Width	Total Width	11.5 m	Seismic Coefficient	0.17							
Structural Type	Simple Span PC Box Girder Bridge		Bridge Length	50.0 m	Span Arrangement	48.6 m			Effective Width	12.1 m		Transverse	0.17							
Main Girder	Number of girders	1 nos.	Girder Height	2.75 m	Maximum Displacement	mm(1/-)														
	Girder Spacing	- m	Height/Span Ratio	H/A = 1/17.7 (constant girder height)	Crossbeam Height	2.0 m														
Crossbeam	Number of Crossbeams	2 nos./span	Crossbeam Spacing	16.0 m (approximately)	Crossbeam Height	2.0 m														
	Structural Type	Prestressed Concrete Slab	Prestressing Tendon	4T15.2 (SBPR7B)	Tendon Spacing	500 mm														
Design Strength of Concrete	f'c = 400 kgf/cm ²		Allowable Stress Increase Coefficient																	
Deck Slab Design	Bending Moment		Combined Stresses in Concrete																	
	Cantilevered Slab	-13.89 tf.m/m	500 mm	top fiber	19.6 kgf/cm ²	bottom fiber	22.7 kgf/cm ²													
	Span Center	10.41 tf.m/m	300 mm	top fiber	69.4 kgf/cm ²	bottom fiber	5.4 kgf/cm ²													
Design Theory	Beam Theory		Prestressing Tendon	12T15.2 (SBPR7B)																
Construction Method	Construction on Fixed Staging																			
Unfactored Bending Moment	Location	Immediately after prestressing		at service load																
		combined stress	allowable stress	combined stress	allowable stress															
Span Center	top fiber	-	kgf/cm ²	89.3 kgf/cm ²	160.0 kgf/cm ²															
	bottom fiber	-	kgf/cm ²	1.7 kgf/cm ²	-31.8 kgf/cm ²															
Shear Force Check Point at End Support	Unfactored Shear Force	Factored Shear Force		Diagonal Tension Stress		Stirrup		Vertical Prestressing Tendon												
		738 tf	1,150 tf	-	-	2-019#125/web	-	not provided												
Support Reaction	Unit	Support 1 (= Support 2)																		
Dead Load, Rd	tf	691																		
Live Load, Rl	tf	138																		
Total Reaction	tf	829																		
Bearing Capacity and Type	450x1 x 2 pot bearing																			
Expansion Joint													Location		Type of Joint		Girder Clearance			
Items													Unit		Specification		Quantity/bridge		Quantity/m ³ of concrete	
Concrete													m ³		f'c = 400 kgf/cm ²		487		-	
External Formwork													m ²		-		852		1.86 m ² /m ²	
Internal Formwork													m ²		-		562		1.23 m ² /m ²	
Reinforcing Bar													kgf		S0295A (JIS G3112)		60,795		133.0 kgf/m ³	
longitudinal													kgf		12T15.2 (SBPR7B)		18,477		40.4 kgf/m ³	
transverse (deck slab)													kgf		3T15.2 (SBPR7B)		5,182		11.3 kgf/m ³	
transverse (crossbeam)													kgf		4T15.2 (SBPR7B)		589		1.29 kgf/m ³	
Total													kgf		-		24,247		-	
Remarks																				
1. The design complies primarily with AASHTO Standard Specifications for Highway Bridges, 16th edition (1996)																				
2. Nomenclature of supports are as follows.																				
3. Quantity of prestressing tendon does not include operation allowance.																				
4. This design is also applied to Nguyen Tam Trinh Bridge.																				

14.3 Substructure
 NGUYEN TAN TRINH

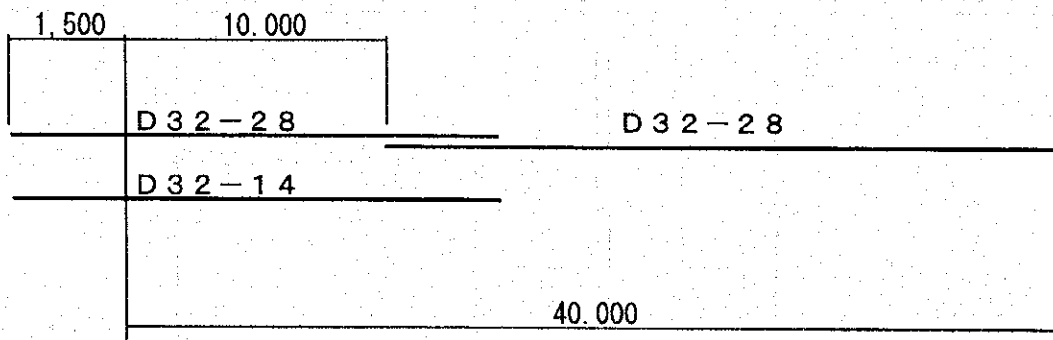
Abutment (Fix)

Number of Pile	16		
Pile Length (m)	40.00		
Pile Diameter (m)	1.500		
Horizontal Displacement (cm)	Usual	0.775 <	1.5
	Earthquake	1.454 <	1.5
Bearing Capacity (tf)	Usual	482 <	615
	Earthquake	714 <	873
Pile		As = D32-28 D32-14	2,355 < 2,700
		As = D32-14	2,222 < 2,700
Body		As = D25@125	2,571 < 2,700
Footing		AsF = D25@125 AsB = D25@125	2,401 < 2,700

Body & Footing



Pile



JICA