Checking Stress at service stage

Load Combinations for Checking Stress at service stage

	COMBINATION 11		COMBINATION 12		COMBINATION 13	
	Load type	**Factor**	**Load type**	**Factor**	**Load type**	**Factor**
	Girder Selfweight G_DC	1.00	Girder Selfweight G_DC	1.00	Girder Selfweight G_DC	1.00
	Slab+Dia. Selfweight S_D	1.00	Slab+Dia. Selfweight S_D	1.00	Slab+Dia. Selfweight S_D	1.00
	Surface + Railings DW	1.00	Surface + Railings DW	1.00	Surface + Railings DW	1.00
	Max. Live Load LL_MAX	0.80	Max. Live Load LL_MAX	0.00	Max. Live Load LL_MAX	0.00
	Min. Live Load LL_MIN	0.00	Min. Live Load LL_MIN	0.80	Min. Live Load LL_MIN	0.00
	Max. Impact IM_MAX	0.80	Max. Impact IM_MAX	0.00	Max. Impact IM_MAX	0.00
	Min. Impact IM_MIN	0.00	Min. Impact IM_MIN	0.80	Min. Impact IM_MIN	0.00
	Prestress PS	1.00	Prestress PS	1.00	Prestress PS	1.00

Section	N(T)	V(T)	M(T.m)	N(T)	V(T)	M(T.m)	N(T)	V(T)	M(T.m)
SEC-1	633.99	32.24	7.68	633.99	20.06	-5.35	633.99	20.41	-1.10
SEC-2	633.99	30.06	-18.01	633.99	18.26	-27.21	633.99	18.62	-26.79
SEC-3	644.24	17.56	74.65	644.24	4.35	27.33	644.24	6.43	27.71
SEC-4	653.03	18.10	93.26	653.03	4.99	36.10	653.03	7.41	37.05
SEC-5	661.26	16.20	123.20	661.26	3.12	45.14	661.26	6.49	48.61
SEC-6	661.23	13.25	189.62	661.23	3.44	92.58	661.23	6.77	96.26
SEC-7	656.44	1.27	221.06	656.44	-8.94	115.73	656.44	-3.83	120.96
SEC-8	661.23	-3.44	189.62	661.23	-13.25	92.58	661.23	-6.77	96.26
SEC-9	661.26	-3.12	123.20	661.26	-16.20	45.14	661.26	-6.49	48.61
SEC-10	653.03	-4.99	93.26	653.03	-18.10	36.10	653.03	-7.41	37.05
SEC-11	644.24	-4.35	74.65	644.24	-17.56	27.33	644.24	-6.43	27.71
SEC-12	633.99	-18.26	-18.01	633.99	-30.06	-27.21	633.99	-18.62	-26.79
SEC-13	633.99	-20.06	3.20	633.99	-32.24	-5.35	633.99	-20.41	-1.10

Stress checking at service stage (AASHTO 5.9.4.2)

Section	COMBINATION 11				COMBINATION 12				COMBINATION 13			
	$\sigma_t(T/m^2)$	Checking	$\sigma_b(T/m^2)$	Checking	$\sigma_t(T/m^2)$	Checking	$\sigma_b(T/m^2)$	Checking	$\sigma_t(T/m^2)$	Checking	$\sigma_b(T/m^2)$	Checking
SEC-1	387.71	OK	367.90	OK	375.93	OK	389.74	OK	379.78	OK	382.61	OK
SEC-2	387.31	OK	434.91	OK	379.00	OK	450.91	OK	379.38	OK	450.18	OK
SEC-3	640.99	OK	425.95	OK	601.79	OK	523.06	OK	602.11	OK	522.29	OK
SEC-4	664.22	OK	396.12	OK	616.93	OK	513.15	OK	617.71	OK	511.21	OK
SEC-5	696.12	OK	343.40	OK	631.70	OK	502.47	OK	634.56	OK	495.39	OK
SEC-6	750.35	OK	210.28	OK	670.54	OK	406.88	OK	673.58	OK	399.41	OK
SEC-7	771.83	OK	142.56	OK	685.25	OK	355.81	OK	689.55	OK	345.22	OK
SEC-8	750.35	OK	210.28	OK	670.54	OK	406.88	OK	673.58	OK	399.41	OK
SEC-9	696.12	OK	343.40	OK	631.70	OK	502.47	OK	634.56	OK	495.39	OK
SEC-10	664.22	OK	396.12	OK	616.93	OK	513.15	OK	617.71	OK	511.21	OK
SEC-11	640.99	OK	425.95	OK	601.79	OK	523.06	OK	602.11	OK	522.29	OK
SEC-12	387.31	OK	434.91	OK	379.00	OK	450.91	OK	379.38	OK	450.18	OK
SEC-13	383.66	OK	375.41	OK	375.93	OK	389.74	OK	379.78	OK	382.61	OK

Horizontal Shear at the interface between girder and deck slab (AASHTO 5.8.4):

Horizontal Shear per unit length of girder V_h due to Vertical Shear V_u	$V_h = V_u / d_e$	
Distance from the centroid of tensile steel to the midthickness of the deck	d_e	
Required area of reinforcement:	A_{vf}	
$A_{vf} >= \max \{0.35\ b_v / f_y ; (V_h - c\ b_v - \mu\ P_c) / \mu\ f_y\}$		
Width of the interface between the girder and the deck:	b_v=	600 mm
Yield strength of reinforcement	f_y=	390 MPa
Cohesion factor	c =	0.17 MPa
Friction factor	μ =	0.7
Permanent net compressive force normal to the shear plan	P_c=	58750 N

Section		SEC-1	SEC-2	SEC-3	SEC-4	SEC-5	SEC-6	SEC-7	SEC-8	SEC-9	SEC-10	SEC-11	SEC-12	SEC-13
d_e (mm)		1076	1155	1475	1542	1657	1782	1793	1782	1657	1542	1475	1155	1076
Interface Shear(N):														
Girder Selfweight G_DC		349173	320848	239289	210674	165110	73982	0	-73982	-165110	-210674	-239289	-320848	-349173
Slab+Dia. Selfweight S_D		218990	207799	153657	139138	108891	48396	0	-48396	-108891	-139138	-153657	-207799	-218990
Surface + Railings DW		163783	149699	86940	68669	30604	21850	-37563	-21850	-30604	-68669	-86940	-149699	-163783
Max. Live Load LL_MAX		109036	105463	102638	98500	89510	59694	47050	30638	31034	22344	19122	3279	3218
Min. Live Load LL_MIN		-3218	-3279	-19122	-22344	-31034	-30638	-47050	-59694	-89510	-98500	-102638	-105463	-109036
Max. Impact IM_MAX		35982	34803	33870	32505	29538	19699	15526	10110	10241	7373	6310	1082	1062
Min. Impact IM_MIN		-1062	-1082	-6310	-7373	-10241	-10110	-15526	-19699	-29538	-32505	-33870	-34803	-35982
Total	Max	876964	818612	616394	549487	423652	223621	25013	-103479	-263330	-388764	-454454	-673986	-727666
	Min	727666	673986	454454	388764	263330	103479	-100139	-223621	-423652	-549487	-616394	-818612	-876964
$A_{vf\ required}$ (mm2)		3061	2848	2107	1862	1401	668	216	668	1401	1862	2107	2848	3061
Area of Stirrups (mm^2)		3695 (D14@150)	3695 (D14@150)	3695 (D14@150)	924 (D14@300)	924 (D14@300)	924 (D14@300)	924 (D14@300)	924 (D14@300)	924 (D14@300)	924 (D14@300)	3695 (D14@150)	3695 (D14@150)	3695 (D14@150)
Area of Dowel bars (mm^2)		6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)	6371 (D24@150)
Total Connector Area (mm^2)		10066	10066	10066	7295	7295	7295	7295	7295	7295	7295	10066	10066	10066
Checking		OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Design of Deck Slab

Sumary of Bending Moment:

Bending Moment due to Live Load:

(a) Continuous Slab

1) Effective Span Length	1.700 m		
2) Load	10.000 T		
3) Impact Factor IM	33%		
4) Positive Moment	M=0.8*(1+IM)*(0.12S+0.07)	2.92	T.m/m
5) Negative Moment	M=-(1+IM)*(0.15S+0.125)*	-5.05	T.m/m

(2) Cantilever Slab

1) Effective Span Length	0.100 m < 0.5m --> ignore		
2) Load	10.000 T		
3) Impact Factor IM	33%		
4) Negative Moment	M=	0.00	T.m/m

Bending Moment due to Self-weight of Slab:

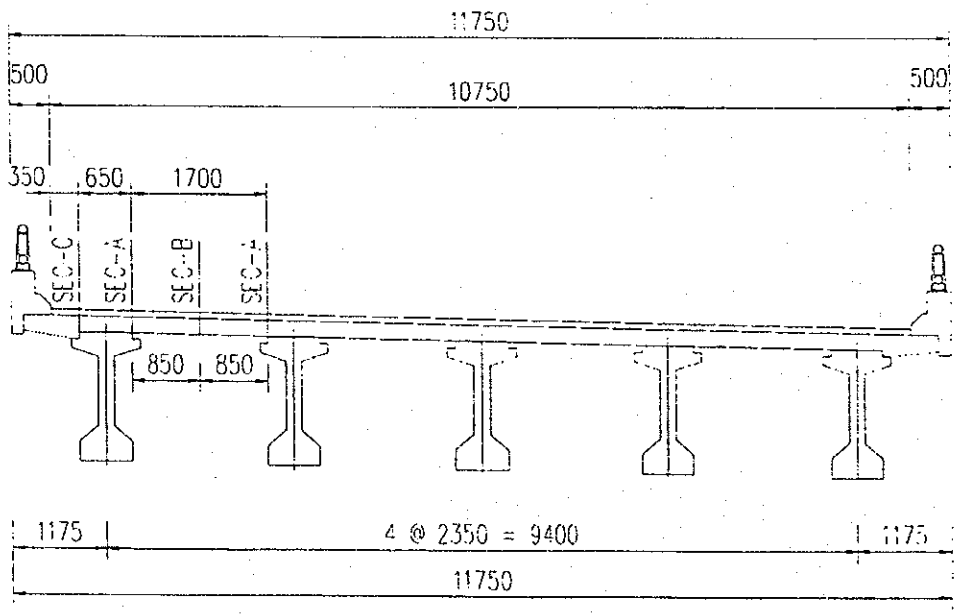
Section	A	B	C
Bending Moment (T.m)	-0.152	0.152	-0.150

Bending Moment due to Asphalt Concrete:

Section	A	B	C
Bending Moment (T.m)	-0.050	0.050	-0.030

Bending Moment due to Parapet & Railings:

Section	A	B	C
Bending Moment (T.m)	0.000	0.000	-0.424



Checking Nominal Flexural Strength of Deck Slab (Article 5.7.3.2.2 AASHTO)

			Section A	Section B	Section C
Sectional Properties					
	Depth of Slab	H	210 mm	210 mm	210 mm
	Width of Slab	ds	1000 mm	1000 mm	1000 mm
	Area of Tensile Reinforcement	A_{st}	1885 mm^2	1885 mm^2	1885 mm^2
	Distance from extreme compressive fibre to centroid of Tensile Reinforcement	d_{st}	162 mm	162 mm	162 mm
	Area of Compressive Reinforcement	A_{sc}	0 mm^2	0 mm^2	0 mm^2
	Distance from extreme compressive fibre to centroid of Compressive Reinforcement	d_{sc}	48 mm	48 mm	48 mm
Calculation of Mr	Stress block factor	β_1	0.76	0.76	0.76
	Distance from extreme compressive fibre to the Neutral Axis	c	28 mm	28 mm	28 mm
	Depth of equivalent stress block	a	22 mm	22 mm	22 mm
	Nominal Resistance	Mn	111,144,141 N.mm	111,144,141 N.mm	111,144,141 N.mm
	Flexural Resistance factor	φ	0.9	0.9	0.9
	Factored Resistance	Mr	100,029,726 N.mm	100,029,726 N.mm	100,029,726 N.mm
Checking	Factored Bending Moment due to External Loads	Mu	91,089,350 N.mm	53,663,150 N.mm	7,617,528 N.mm
			OK	OK	OK

Chapter 3

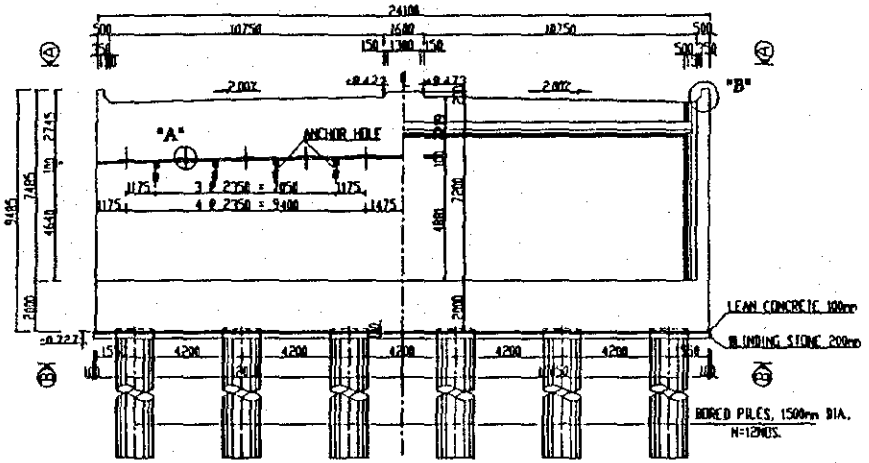
DESIGN SUMMARY OF SUBSTRUCTURES & FOUNDATIONS

3.1 ABUTMENT

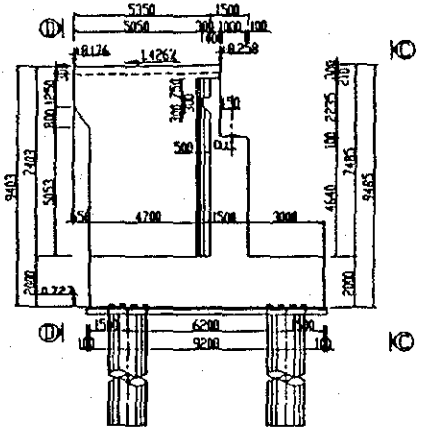
(1) ABUTMENT, TYPE A1

DETAIL OF ABUTMENT A2
(SCALE 1:200)

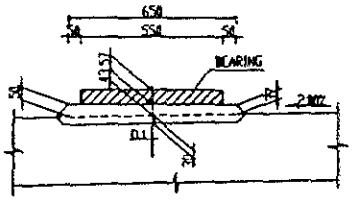
1/2C-C 1/2D-D



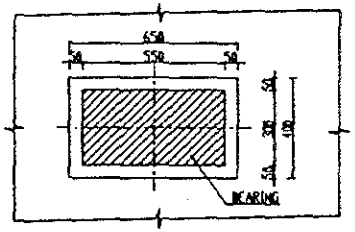
SIDE ELEVATION



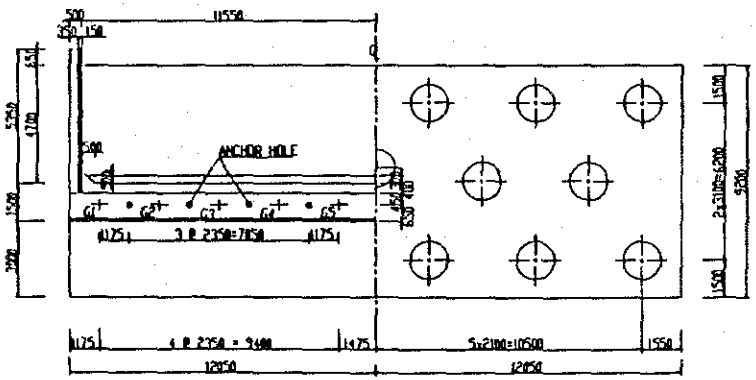
DETAIL"A"
(SCALE 1:20)



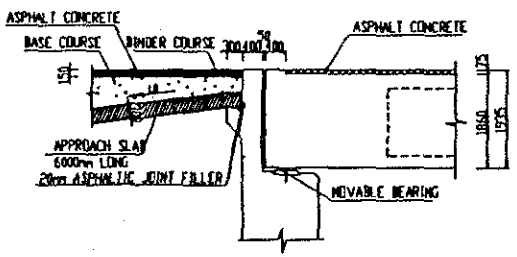
PLAN



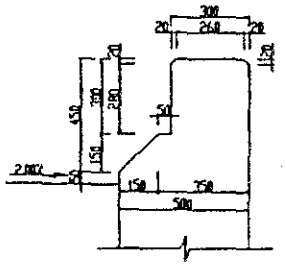
1/2A-A 1/2B-B



DETAIL OF BACK WALL
(SCALE 1:100)



DETAIL"B"
(SCALE 1:20)



DETAIL OF ANCHOR HOLE
(SCALE 1:50)

GIRDER BEARING SEAT ELEVATION OF EL1

ABUTMENT \ GIRDER PAD	G1	G2	G3	G4	G5
A1	+6.05	+6.18	+6.15	+6.20	+6.24

NOTE

FOR STANDARD STRUCTURAL NOTES SEE DRAWING NO.P1/BRI/0030.

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kameiani	K.Matsumoto	K. Enomoto	LAGE TRA VA BRIDGE ABUTMENTS ABUTMENT A2-GENERAL VIEW	P1/BRI/0290
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS LARGE TRAVA ABUTMENT A2 (H=9.2 M)

Abutment DC 1487 T e_x= -0.01 m e_y= 0.55 m

Nos	Items	Pz			Hx			My			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	
	Permanent load										
1	Superstructure - DC (n=0.9,1.25)	330	297	413				182	163	227	
2	Wearing surface - DW (n=0.65,1.5)	33	21	50				18	12	27	
3	Abutment - DC (n=0.9,1.25)	1,487	1,338	1,859				-17	-15	-21	
4	Horizontal earth pressure - EH (n=0.9,1.35)				525	379	872	1,610	1,163	2,674	
5	Horizontal earth pressure - E_{AE} (n=0.9,1.35)				660	487	1,074	2,023	1,495	3,295	
6	Vertical earth pressure - EV (n=0.9,1.35)	1,076	968	1,452				-2,259	-2,033	-3,050	
	Transient Loads										
7	Live load - LL(n= 0.5,1.75)	157	79	275				86	43	151	
	a- Main load	104	52	182				57	29	100	
	b- Sub load	53	27	93				29	15	51	
8	Dynamic load allowance - IM (n=0.5,1.75)	52	26	91				28	14	50	
	a- Main load	34	17	60				19	9	33	
	b- Sub load	17	9	31				10	5	17	
9	Live load surcharge - LS (n=0.9,1.35)				60	43	100	276	200	459	
10	Braking force - BR (n=0.5,1.75)				19	10	33	190	95	333	25% of Japanese Load - p1
11	Friction force - FR (n=1)										f=0.05
	a- Dead load				0			0			
	b- Dead load + Live load				0			0			
12	Earthquake - EQ (n=1)				215			675			12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My
1	4139	1005	850
2	2,625	972	1,260
3	4,139	389	-1,586
4	3,878	1,398	1,764
5	2,729	1,398	2,708

Combination 1 1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)
Combination 2 0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)
Combination 3 1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)
Combination 4 1.25DC + 1.5DW + 1.35EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + 1EQ
Combination 5 0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

Bridge name LARGE TRAVA - A2

Pile Type Dia = 1500 mm Length = 58.0 m

Bearing Capacity Qs = 12756 kN Qult = 18057 kN

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (kN)		Uplift Capacity (kN)		Remarks
	Actual	Allowable	Pmax	Allowable	Pmin	Allowable	
Strength I-1	12.2	30	4616	7963	2149	-5757	OK
Strength I-2	12	30	3468	7963	823	-5757	OK
Strength I-3	3.6	30	3470	7963	3295	-5757	OK
Extremme Event I-1	17.2	20	5056	7963	1282	-5757	O.K
Extremme Event I-2	17.8	20	4396	7963	64	-5757	OK

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) / A's = 8 cm2 (D=1.6cm, 4 Nos)
1	460	612	1363	1422	OK	ρs = As/Ac = 0.0020
2	434	578			OK	ρ min = 0.03 f'c/fy = 0.0018
3	203	270			OK	∴ ρs > ρ min ..... O.K
4	590	785			OK	c/de = 0.04
5	598	795			OK	∴ c/de < 0.42 ..... O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) / A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72	98	98	OK	ρs = As/Ac = 0.0031
						ρ min = 0.03 f'c/fy = 0.0018
						∴ ρs > ρ min ..... O.K
						c/de = 0.05
						∴ c/de < 0.42 ..... O.K

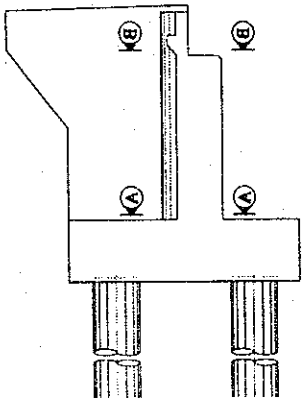
FOR SERVICE LIMIT STATE

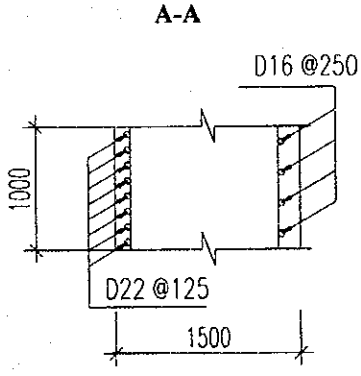
Cracking

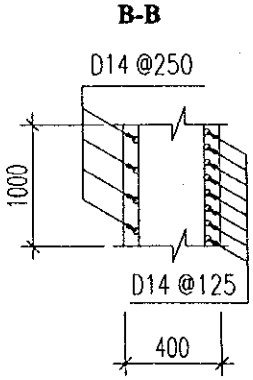
Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·f'y (MPa)	fsa < 0.6·f'y
1	72.28	159.4	98.8	229.5	OK

Stress

Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	$fr = 0.63\cdot(fc)^{0.5}$	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK







FOOTING

B abutment 24.10 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

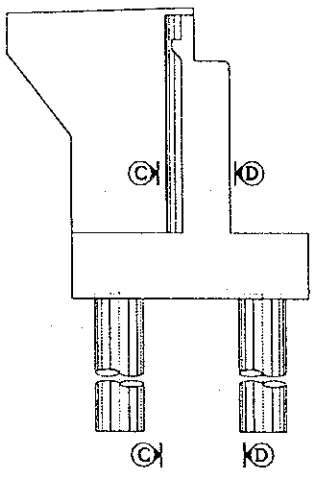
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	346	460			OK	ρs = As/Ac = 0.0020
2	847	1126			OK	ρ min = 0.03 f'c/fy = 0.0018
3	0	0	2422	2363	OK	∴ ρs > ρ min ---------- O.K
4	734	977			OK	c/de = 0.00
5	1187	1578			OK	∴ c/de < 0.42 ---------- O.K

SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

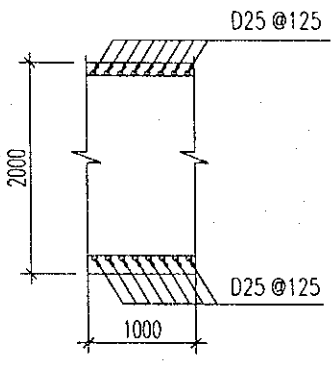
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	1085	1443			OK	ρs = As/Ac = 0.0020
2	664	883			OK	ρ min = 0.03 f'c/fy = 0.0018
3	571	760	2422	2363	OK	∴ ρs > ρ min ---------- O.K
4	1282	1705			OK	c/de = 0.00
5	1080	1436			OK	∴ c/de < 0.42 ---------- O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

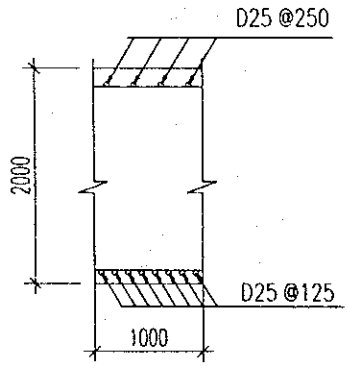
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 20 cm2 (D=2.5cm, 4 Nos)
1	1448	1926			OK	ρs = As/Ac = 0.0020
2	1096	1458			OK	ρ min = 0.03 f'c/fy = 0.0018
3	1020	1356	2422	2422	OK	∴ ρs > ρ min ---------- O.K
4	1612	2145			OK	c/de = 0.02
5	1443	1919			OK	∴ c/de < 0.42 ---------- O.K



C-C



D-D



PILE (1,1) SECTION

NOMINAL RESISTANCES

		Z=0 m		Z=11m		Z=18m		Remark
		Atual	Allowable	Atual	Allowable	Atual	Allowable	
Reinforcement	(mm)	30-D32		16-D28		16-D25		
Area As	(cm2)	241.27		98.52		78.54		
Combination 1	P (kN)	2149	6508	2149	11765	2149	30277	OK
	M (kN·m)	2081	6303	1035	5665	221	3110	OK
Combination 2	P (kN)	823	2044	823	2163	823	21643	OK
	M (kN·m)	1945	4829	1000	2629	211	5545	OK
Combination 3	P (kN)	3295	20793	3295	29652	3295	34301	OK
	M (kN·m)	1100	6942	400	3600	95	990	OK
Combination 4	P (kN)	1282	2240	1282	2480	1282	22726	O.K
	M (kN·m)	2806	4903	1439	2783	303	5373	O.K
Combination 5	P (kN)	65	97	65	68	65	300	O.K
	M (kN·m)	2661	3994	1439	1522	299	1385	O.K

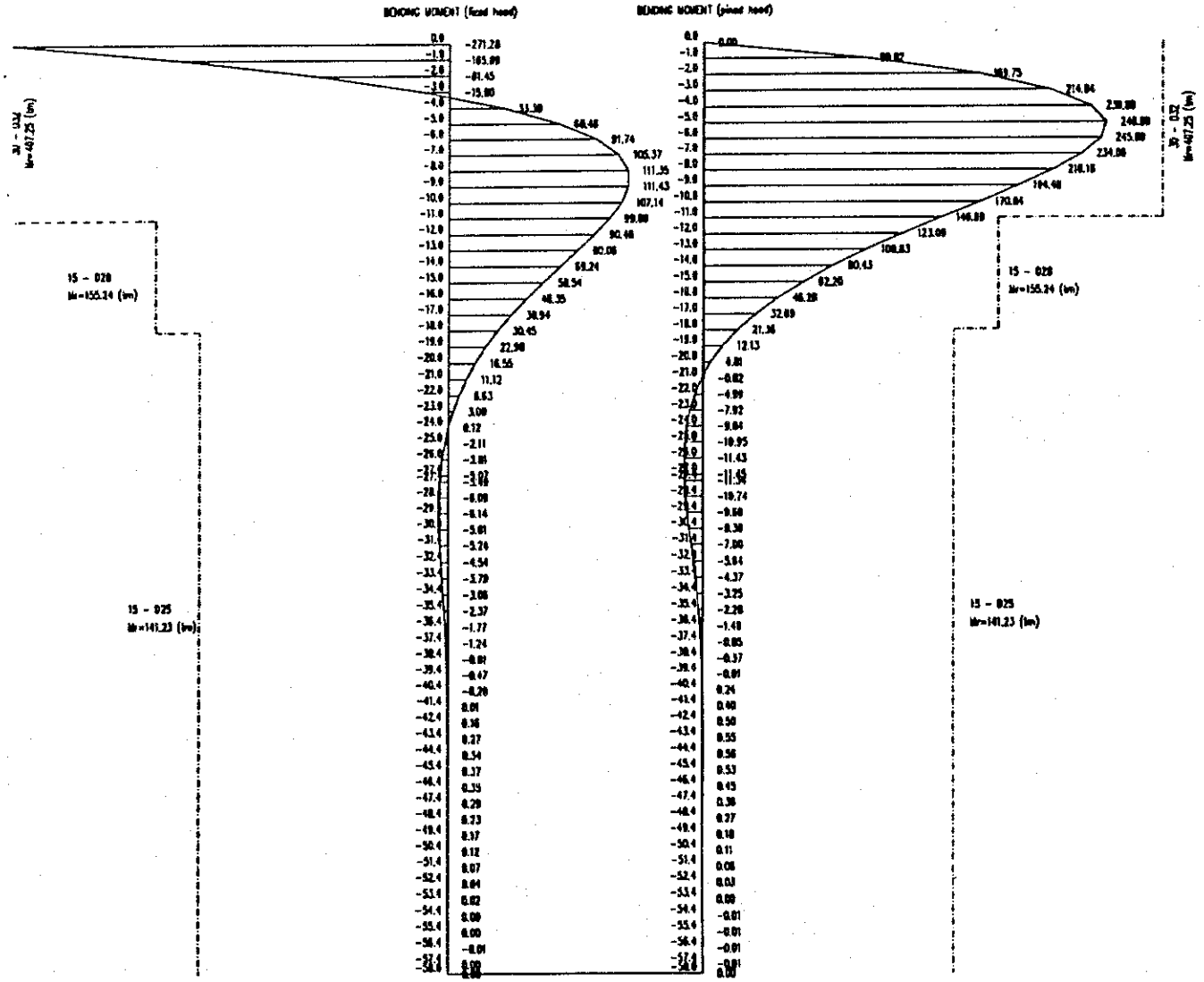
STRESS

	Stress of reinforcement δ s (MPa)		Stress of concrete δ c (MPa)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	135.3	220.6	8.41	12.26	OK
Combination 2	177.8	220.6	7.97	12.26	OK
Combination 3	-57.8	220.6	4.43	12.26	OK
Combination 4	252.1	294.2	11.49	14.71	OK
Combination 5	292.8	294.2	10.88	14.71	OK

STRESS OF PILE CAP

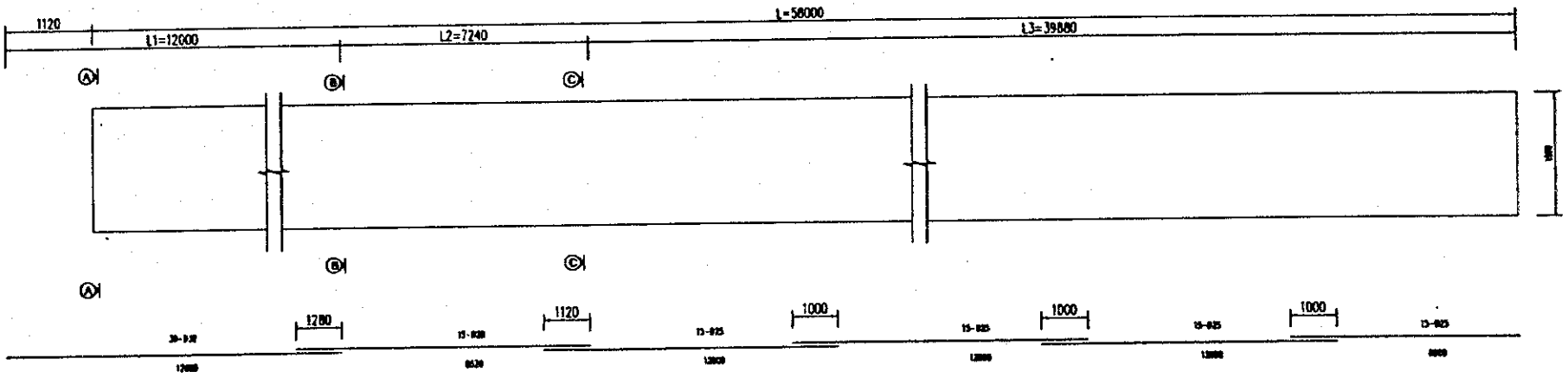
	Actual (MPa)		Allowable (MPa)	Remak
Vertical Bearing Pressure	σ cv =	2.86	σ ca=0.5x σ ck = 11.77	OK
Vertical Punching Shear	τ c =	0.25	τ a = 0.88	OK
Horizontal Bearing Pressure	σ ch =	6.92	σ 'ca=0.3x σ ck = 7.06	OK
Horizontal Bearing Pressure	τ c =	0.48	τ a = 0.88	OK

COMBINATION 5 : PILE (1,1)

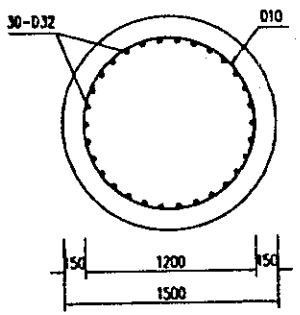


ABUTMENT A2 – LARGE TRA VA BRIDGE

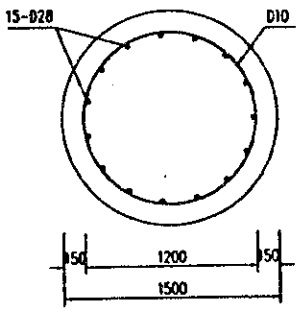
PILE PLAN OF ABUTMENT A2 - LARGE TRA VA BRIDGE



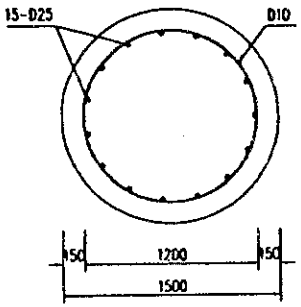
A - A



B - B



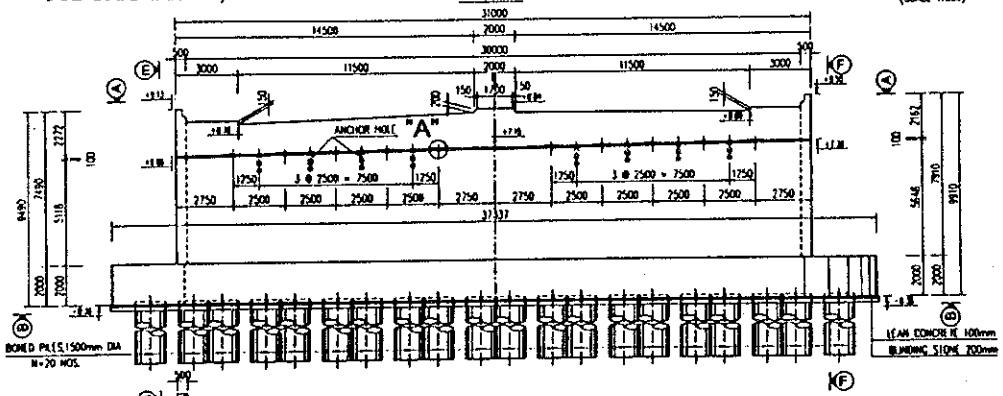
C - C

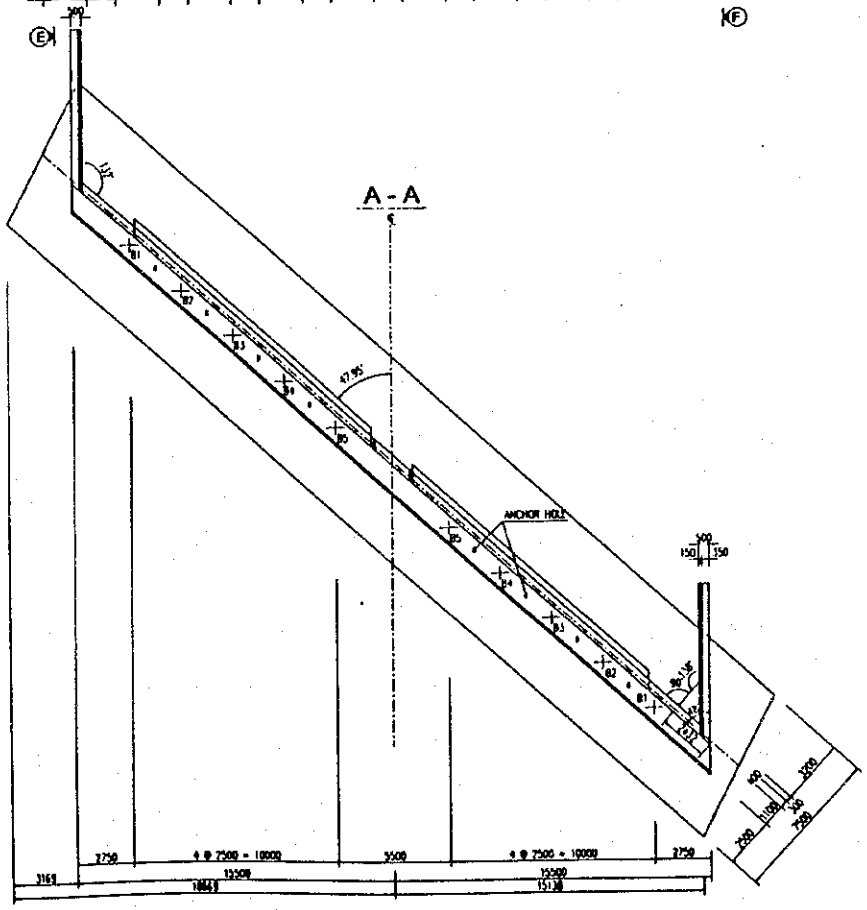


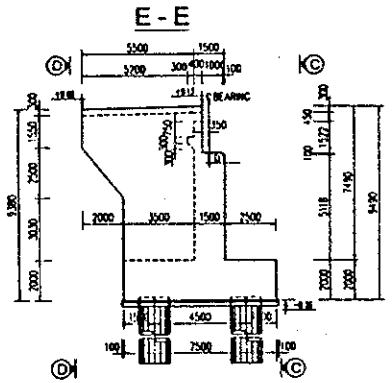
(2) *ABUTMENT, TYPE A2*

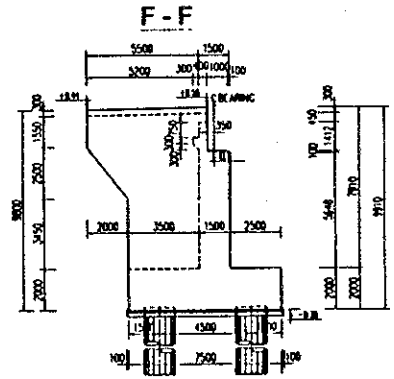
DETAIL OF ABUTMENT

(SCALE 1:250)









HOLLOW SLAB BEARING SEAT ELEVATION OF EL1

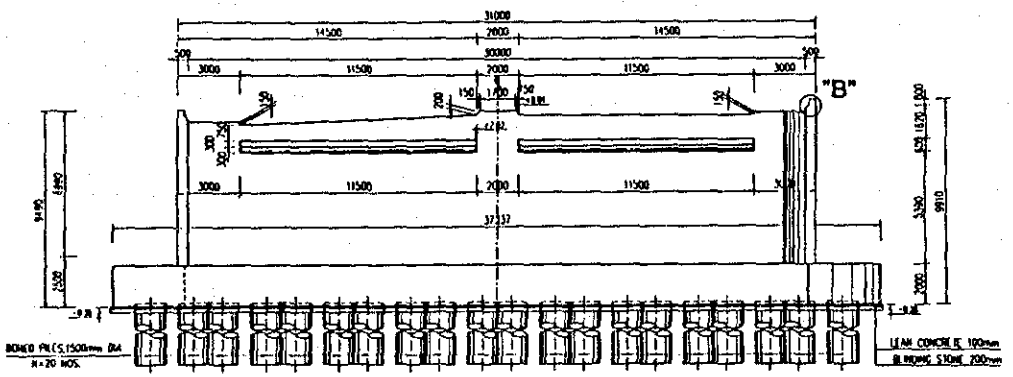
GROUT PAD / ABUTMENT TYPE	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
A1	+6.91	+6.96	+7.01	+7.06	+7.11	+7.16	+7.22	+7.26	+7.30	+7.34
A2	+6.91	+6.96	+7.01	+7.06	+7.11	+7.16	+7.22	+7.26	+7.30	+7.34

NOTES

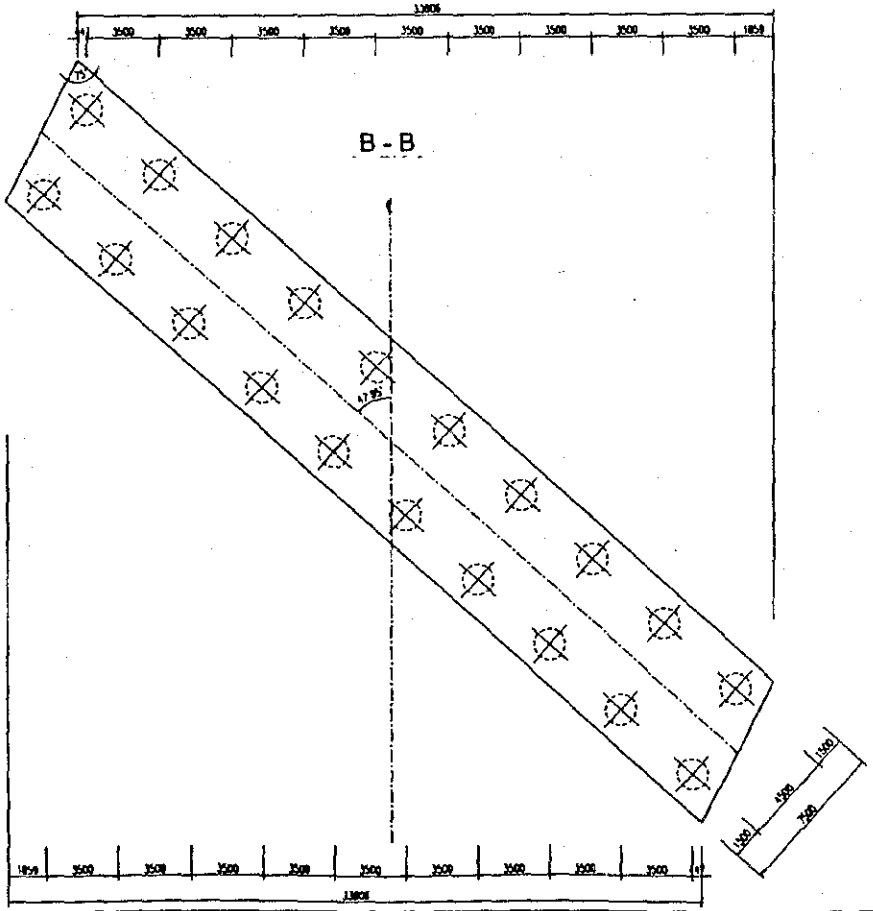
1. FOR STANDARD STRUCTURAL NOTES SEE DRAWING NO P3/BR8/0030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kamejima	K.Matsumoto	K. Enomoto	INTERCHANGE 3 FLYOVER BRIDGE ABUTMENTS ABUTMENT A1 & A2 - GENERAL VIEW SHEET1	P3/BR8/0360
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

D - D

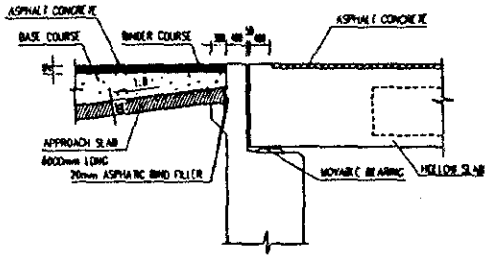


B - B



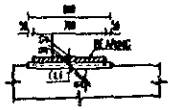
DETAIL OF BACK WALL

(SCALE 1:100)

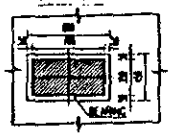


DETAIL "A"

(SCALE 1:50)

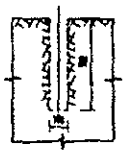


PLAN



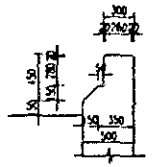
DETAIL OF ANCHOR HOLE

(SCALE 1:50)



DETAIL "B"

(SCALE 1:50)



NOTES

1. FOR STANDARD STRUCTURAL NOTES SEE DRAWING NO P3/BRB/0030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kamotani	K.Matsumoto	K. Enomoto	INTERCHANGE 3 FLYOVER BRIDGE ABUTMENTS ABUTMENT A1 & A2 - GENERAL VIEW-SHEET2	P3/BRB/0361
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS - NH91 ABUTMENT

Abutment DC 2718 T e_a= 0.09 m e_s= 0.5 m

D_{foun} = 2.5m

Nos	Items	Pz			Hx			My			Mx			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	n=1		n>1	
	Permanent load													
1	Superstructure - DC (n=0.9,1.25)	678	610	848				339	305	424				
2	Wearing surface - DW (n=0.65,1.5)	104	68	156				52	34	78				
3	Abutment - DC (n=0.9,1.25)	2,718	2,447	3,398				240	216	301				
4	Horizontal earth pressure - EH (n=0.9,1.35)				910	657	1,511	2,790	2,015	4,633				
5	Horizontal earth pressure - E_{AE} (n=0.9,1.35)				1,143	844	1,861	3,504	2,589	5,708				
6	Vertical earth pressure - EV (n=0.9,1.35)	2,133	1,920	2,880				-4,279	-3,851	-5,777				
	Trasient Loads													
7	Live load - LL(n= 0.5,1.75)	314	100	550				126	40	220	0	0	0	
8	Dynamic load allowance - IM (n=0.5,1.75)	104	33	181				41	13	73	0	0	0	
9	Live load surcharge - LS (n=0.9,1.35)				104	75	173	479	346	795				
10	Braking force - BR (n=0.5,1.75)				39	20	69	486	243	850				25% of Japanese Load - p1
11	Friction force - FR (n=1)													f=0.25
	a- Dead load				0			0						
	b- Dead load + Live load				0			0						
12	Earthquake - EQ (n=1)				404			1,516						12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My	
1	8012	1752	1596	
2	5044	1684	2132	
3	8012	664	-3172	
4	7414	2458	3340	
5	5177	2458	5019	

Combination 1 1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)

Combination 2 0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)

Combination 3 1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)

Combination 4 1.25DC + 1.5DW + 1.35EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + 1EQ

Combination 5 0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

Bridge name NH.91 BI.C - A1

Pile Type Dia = 1500 mm Length = 57.0 m

Bearing Capacity Qs = 15760 kN Qult = 21062 kN

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (kN)		Uplift Capacity (kN)		Remarks
	Actual	Allowable	Pmax	Allowable	Pmin	Allowable	
Strength I-1	12.7	30	5236	9493	2621	-6737	OK
Strength I-2	12.4	30	3834	9493	1112	-6737	OK
Strength I-3	3.6	30	4101	9493	3756	-6737	OK
Extremme Event I-1	18.2	20	5665	9493	1606	-6737	O.K
Extremme Event I-2	18.8	20	4865	9493	212	-6737	OK

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= φ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) / A's = 8 cm2 (D=1.6cm, 4 Nos)
1	522	695			OK	ρ s = As/Ac = 0.0020
2	370	492			OK	ρ min = 0.03 f'c/fy = 0.0018
3	94	125	1363	1422	OK	∴ ρ s > ρ min ..... O.K
4	555	738			OK	c/de = 0.04
5	556	739			OK	∴ c/de < 0.42 ..... O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= φ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) / A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72			OK	ρ s = As/Ac = 0.0031
						ρ min = 0.03 f'c/fy = 0.0018
			98	98		∴ ρ s > ρ min ..... O.K
						c/de = 0.05
						∴ c/de < 0.42 ..... O.K

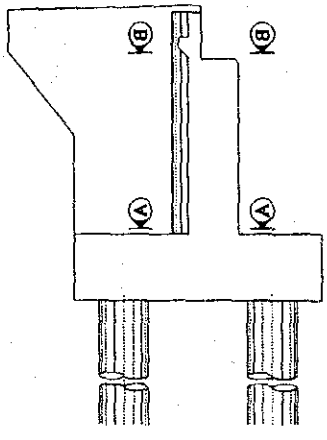
FOR SERVICE LIMIT STATE

Cracking

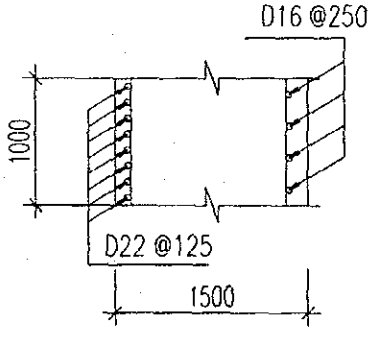
Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·f'y (MPa)	fsa < 0.6·f'y
1	72.28	159.4	98.8	229.5	OK

Stress

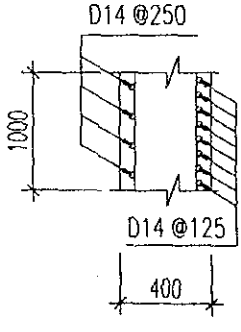
Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	fr = 0.63·(fc)$^{0.5}$	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK



A-A



B-B



FOOTING

B abutment 45.53 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

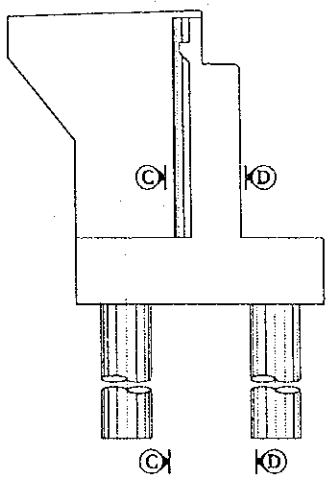
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	310	412	2422	2334	OK	ρs = As/Ac = 0.0020
2	867	1153			OK	ρ min = 0.03 f'c/fy = 0.0018
3	0	0			OK	∴ ρs > ρ min ..... O.K
4	755	1005			OK	c/de = 0.00
5	1263	1679			OK	∴ c/de < 0.42 ..... O.K

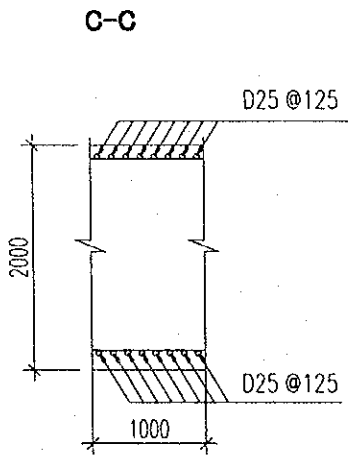
SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

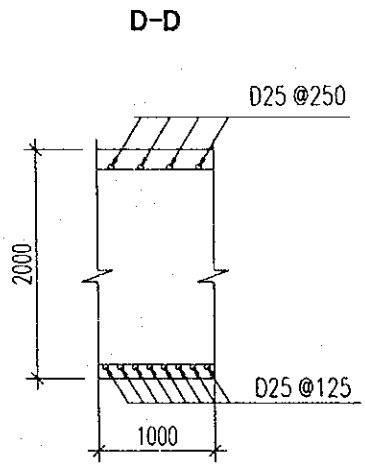
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	1201	1597	2422	2334	OK	ρs = As/Ac = 0.0020
2	341	454			OK	ρ min = 0.03 f'c/fy = 0.0018
3	702	934			OK	∴ ρs > ρ min ..... O.K
4	1389	1848			OK	c/de = 0.00
5	1143	1520			OK	∴ c/de < 0.42 ..... O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 20 cm2 (D=2.5cm, 4 Nos)
1	728	968	2422	2383	OK	ρs = As/Ac = 0.0020
2	364	484			OK	ρ min = 0.03 f'c/fy = 0.0018
3	478	636			OK	∴ ρs > ρ min ..... O.K
4	822	1093			OK	c/de = 0.02
5	764	1017			OK	∴ c/de < 0.42 ..... O.K







PILE (1,1) SECTION

NOMINAL RESISTANCES

		Unit	Z=0 m		Z=11m		Remark
			Atual	Allowable	Atual	Allowable	
Reinforcement		mm	32-D32		16-D25		
Area As		cm2	257.36		78.54		
Combination 1	P	kN	2621	8380	2621	13965	OK
	M	kN·m	2160	6906	1104	5885	OK
Combination 2	P	kN	1112	2964	1112	3320	OK
	M	kN·m	2021	5387	1061	3169	OK
Combination 3	P	kN	3756	22193	3756	29901	OK
	M	kN·m	1168	6902	419	3332	OK
Combination 4	P	kN	1606	2953	1606	3255	O.K
	M	kN·m	2928	5383	1549	3139	O.K
Combination 5	P	kN	212	331	213	218	O.K
	M	kN·m	2773	4319	1549	1590	O.K

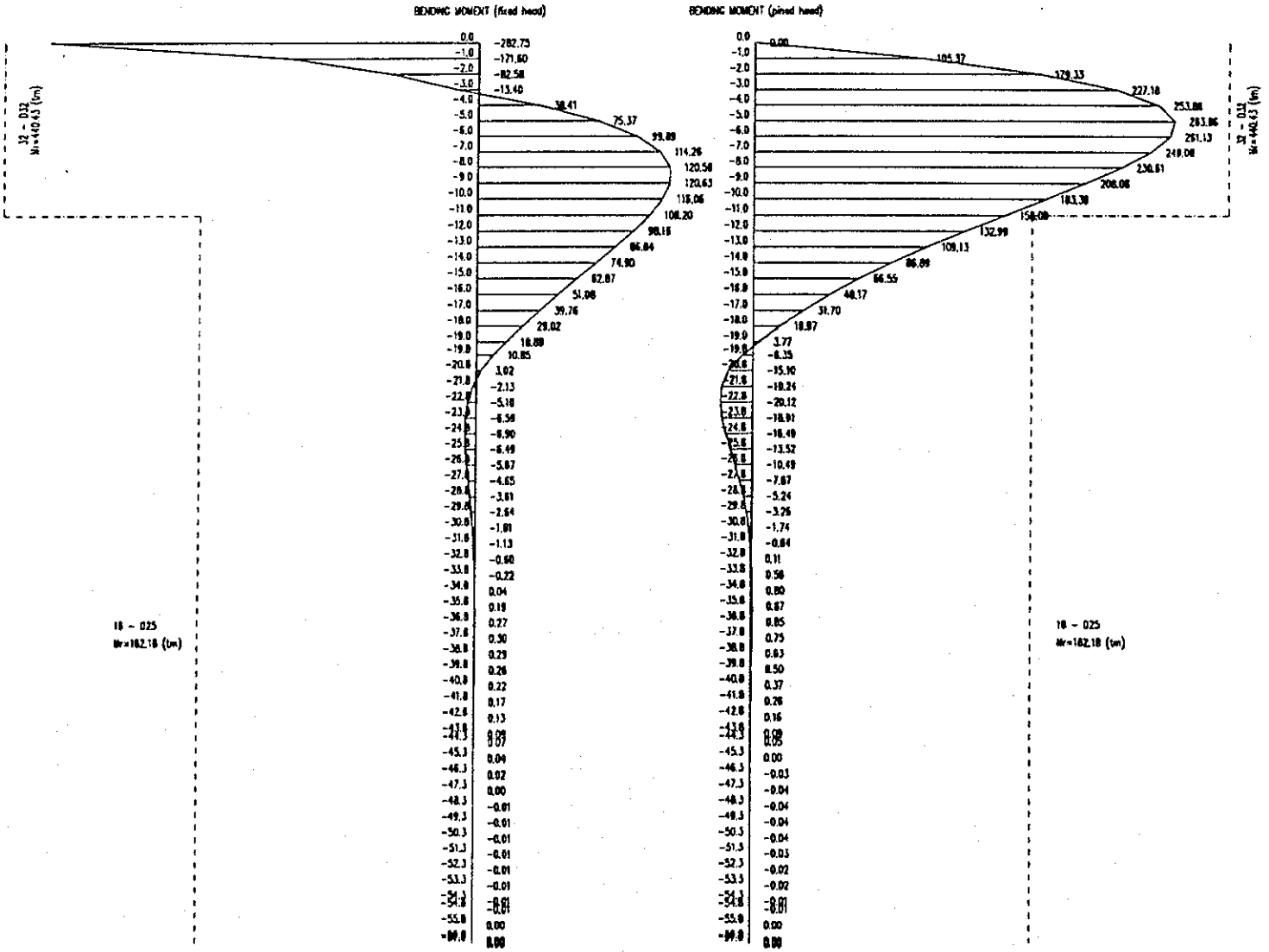
STRESS

	Stress of reinforcement δ s (MPa)		Stress of concrete δ c (MPa)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	119.0	220.6	8.45	12.26	OK
Combination 2	163.8	220.6	8.02	12.26	OK
Combination 3	-62.8	220.6	4.77	12.26	OK
Combination 4	237.5	294.2	11.61	14.71	OK
Combination 5	281.5	294.2	10.96	14.71	OK

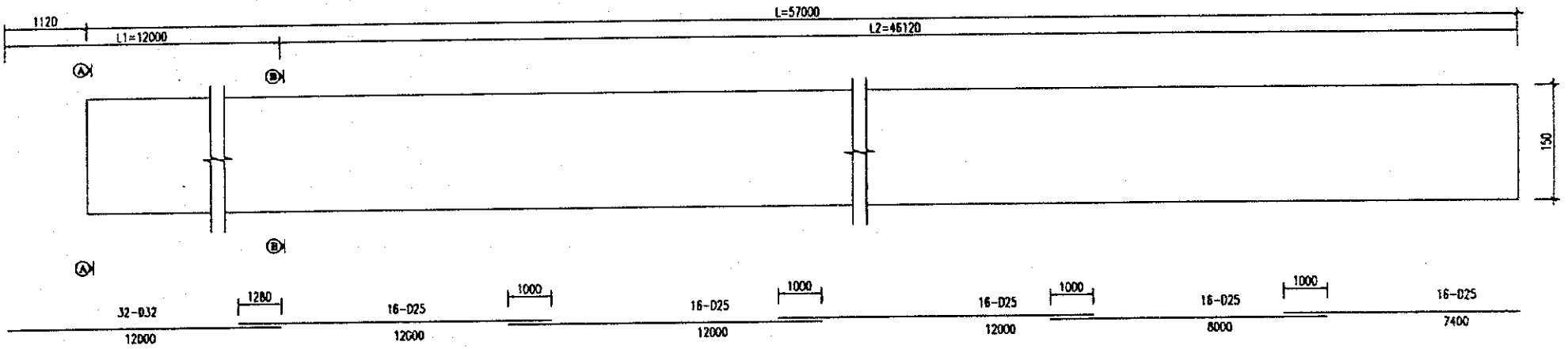
STRESS OF PILE CAP

	Actual (MPa)		Allowable (MPa)	Remak
Vertical Bearing Pressure	σ cv =	3.21	σ ca=0.5x σ ck = 17.65	OK
Vertical Punching Shear	τ c =	0.28	τ a = 0.88	OK
Horizontal Bearing Pressure	σ ch =	8.03	σ 'ca=0.3x σ ck = 10.59	OK
Horizontal Bearing Pressure	τ c =	0.50	τ a = 0.88	OK

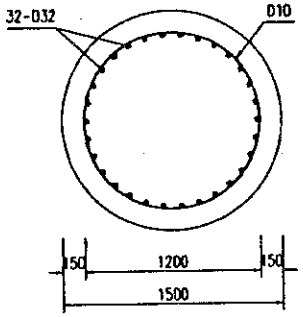
COMBINATION 5 : PILE (1,1)



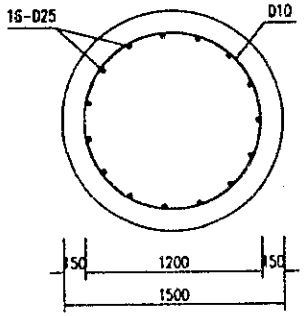
PILE PLAN OF ABUTMENT A1 - NH.91B.I.C BRIDGE



A - A



B - B

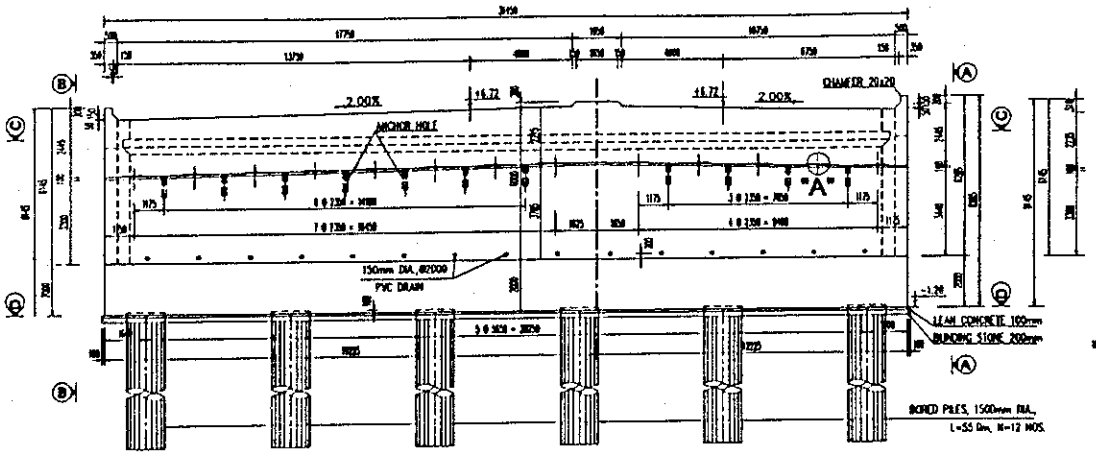


(3) ABUTMENT, TYPE A5

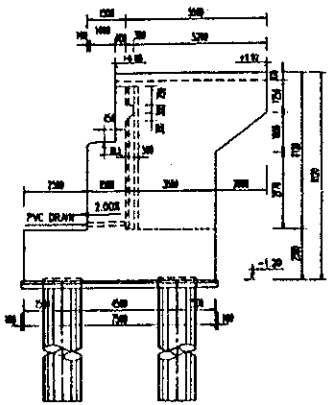
DETAIL OF ABUTMENT A2

(SCALE 1:200)

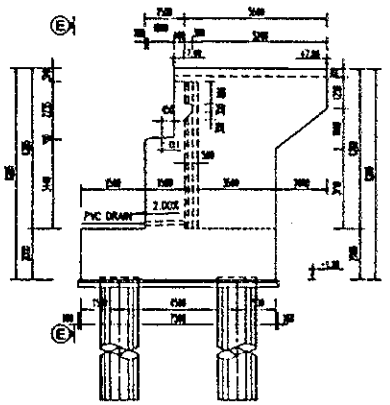
E - E



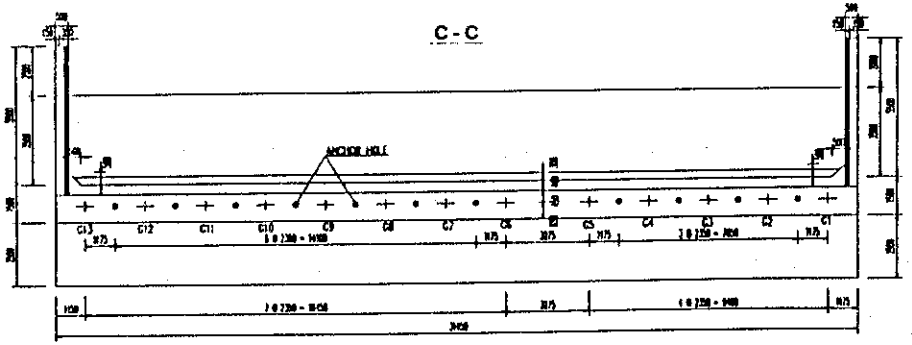
B - B



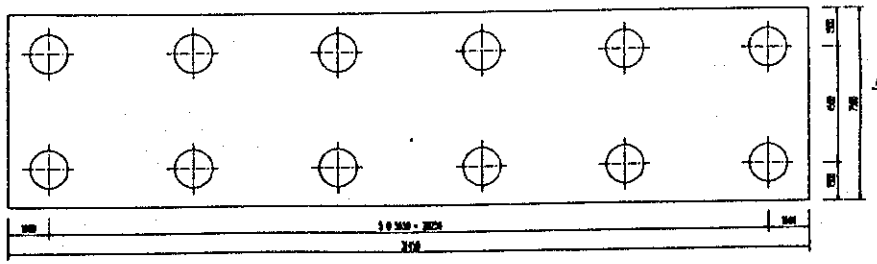
A - A



C - C



D - D

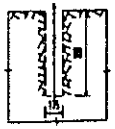


GIRDER BEARING SEAT ELEVATION OF EL1

ABUTMENT \ ORDUT PAD	C1,C10	C2,C9	C3,C8	C4,C7	C5	C6	C11	C12	C13
A2	+4.38	+4.41	+4.46	+4.50	+4.55	+4.55	+4.32	+4.27	+4.22

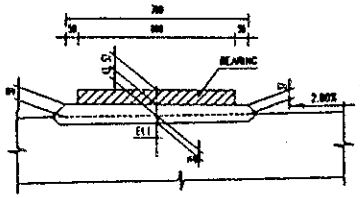
DETAIL OF ANCHOR HOLE

(SCALE 1:50)



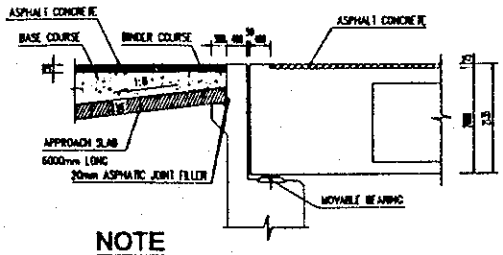
DETAIL "A"

(SCALE 1:20)

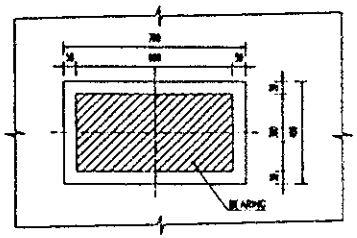


DETAIL OF BACK WALL

(SCALE 1:100)



PLAN



NOTE

FOR STANDARD STRUCTURAL NOTES SEE DRAWING NO. P3/BR2/0030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kanetani	K.Matsumoto	K. Enomoto	CAI TAC 2 BRIDGE ABUTMENTS GENERAL VIEW OF ABUTMENT A2	P3/BR2/0210
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS CAITAC2 ABUTMENT A2 (H=8M)

Abutment DC 1736 T e_x= 0.03 m e_z= 0.60 m

Nos	Items	Pz			Hx			My			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	
	Permanent load										
1	Superstructure - DC (n=0.9,1.25)	768	691	960				461	415	576	
2	Wearing surface - DW (n=0.65,1.5)	97	63	145				58	38	87	
3	Abutment - DC (n=0.9,1.25)	1,736	1,562	2,170				47	42	59	
4	Horizontal earth pressure - EH (n=0.9,1.35)				517	373	858	1,378	995	2,288	
5	Horizontal earth pressure - E_{AE} (n=0.9,1.35)				649	480	1,057	1,730	1,279	2,819	
6	Vertical earth pressure - EV (n=0.9,1.35)	1,243	1,119	1,678				-2,489	-2,240	-3,360	
	Transient Loads										
7	Live load - LL(n= 0.5,1.75)	333	166	582				200	100	349	
	a- Main load	185	93	324				111	56	195	
	b- Sub load	147	74	258				88	44	155	
8	Dynamic load allowance - IM (n=0.5,1.75)	110	55	192				66	33	115	
	a- Main load	61	31	107				37	18	64	
	b- Sub load	49	24	85				29	15	51	
9	Live load surcharge - LS (n=0.9,1.35)				68	49	113	272	196	452	
10	Braking force - BR (n=0.5,1.75)				59	30	104	576	288	1,008	25% of Japanese Load - p1
11	Friction force - FR (n=1)										f=0.05
	a- Dead load				0			0			
	b- Dead load + Live load				0			0			
12	Earthquake - EQ (n=1)				295			917			12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My
1	5728	1075	1574
2	3,435	971	995
3	5,728	319	-1,989
4	5,174	1,494	1,971
5	3,656	1,494	2,863

Combination 1 1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)
Combination 2 0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)
Combination 3 1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)
Combination 4 1.25DC + 1.5DW + 1.35EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + 1EQ
Combination 5 0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

Bridge name CAI TAC2 Bridge-A2

Pile Type Dia = 1500 mm Length = 55.0 m

Bearing Capacity Qs = 14281 kN Qult = 19583 kN

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (kN)		Uplift Capacity (kN)		Remarks
	Actual	Allowable	Pmax	Allowable	Pmin	Allowable	
Strength I-1	13.4	30	6194	8787	3168	-6188	OK
Strength I-2	11.8	30	4048	8787	1566	-6188	OK
Strength I-3	2.6	30	4955	8787	4407	-6188	OK
Extremme Event I-1	18.5	20	6267	8787	2189	-6188	O.K
Extremme Event I-2	19	20	5290	8787	686	-6188	OK

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) / A's = 8 cm2 (D=1.6cm, 4 Nos)
1	333	442	1363	1422	OK	ρs = As/Ac = 0.0020
2	257	342			OK	ρmin = 0.03 f'c/fy = 0.0018
3	48	64			OK	∴ ρs > ρmin ..... O.K
4	364	485			OK	c/de = 0.04
5	375	498			OK	∴ c/de < 0.42 ..... O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) / A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72	98	98	OK	ρs = As/Ac = 0.0031
						ρmin = 0.03 f'c/fy = 0.0018
						∴ ρs > ρmin ..... O.K
						c/de = 0.05
						∴ c/de < 0.42 ..... O.K

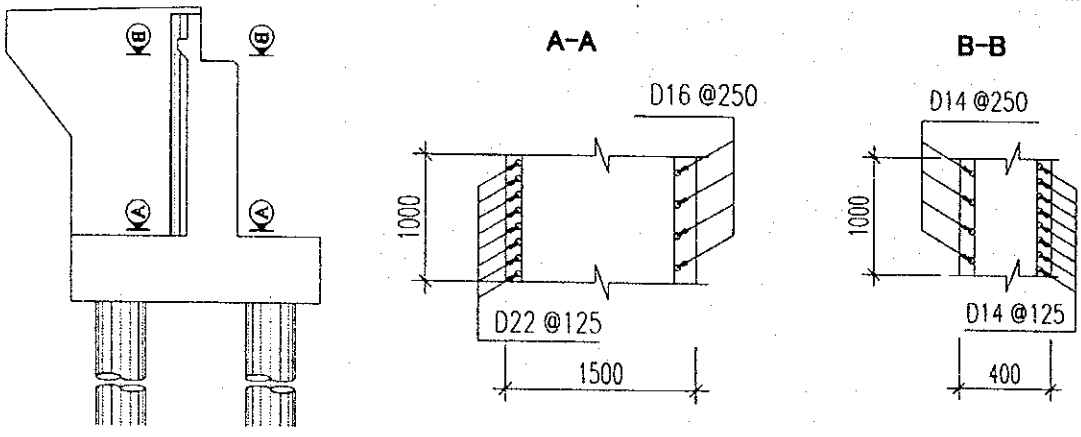
FOR SERVICE LIMIT STATE

Cracking

Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·f'y (MPa)	fsa < 0.6·f'y
1	72.28	159.4	98.8	229.5	OK

Stress

Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	$fr = 0.63\cdot(fc)^{0.5}$	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK



FOOTING

B abutment 31.36 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

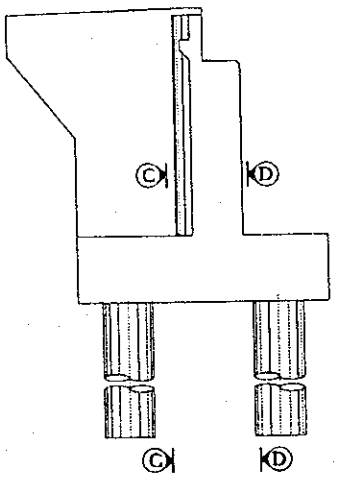
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= ϕ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 44 cm2 (D=2.7cm, 8 Nos)
1	0	0	2422	2344	OK	ρ s = As/Ac = 0.0020
2	468	622			OK	ρ min = 0.03 f'c/fy = 0.0018
3	0	0			OK	∴ ρ s > ρ min ..... O.K
4	295	392			OK	c/de = -0.01
5	861	1145			OK	∴ c/de < 0.42 ..... O.K

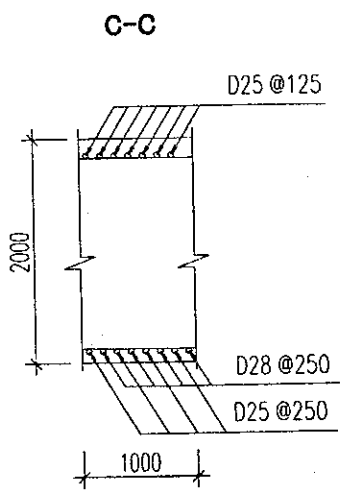
SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

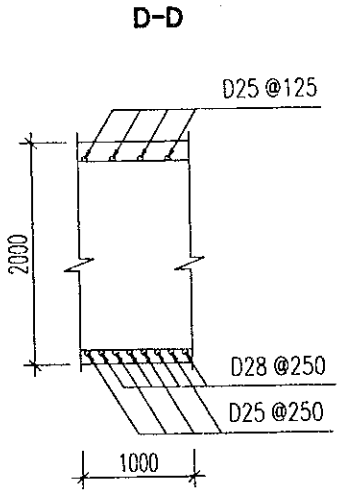
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= ϕ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 44 cm2 (D=2.7cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	1792	2383	2422	2677	OK	ρ s = As/Ac = 0.0022
2	939	1249			OK	ρ min = 0.03 f'c/fy = 0.0018
3	1239	1648			OK	∴ ρ s > ρ min ..... O.K
4	1825	2427			OK	c/de = 0.01
5	1493	1986			OK	∴ c/de < 0.42 ..... O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= ϕ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 44 cm2 (D=2.7cm, 8 Nos) / A's = 20 cm2 (D=2.5cm, 4 Nos)
1	1191	1584	2422	2422	OK	ρ s = As/Ac = 0.0020
2	766	1018			OK	ρ min = 0.03 f'c/fy = 0.0018
3	915	1216			OK	∴ ρ s > ρ min ..... O.K
4	1207	1606			OK	c/de = 0.02
5	1043	1387			OK	∴ c/de < 0.42 ..... O.K







PILE (1,1) SECTION

NOMINAL RESISTANCES

		Unit	Z=0 m		Z=11m		Remark
			Atual	Allowable	Atual	Allowable	
Reinforcement		mm	30-D32		16-D25		
Area As		cm2	241.27		78.54		
Combination 1	P	kN	3168	10622	3168	16718	OK
	M	kN·m	2118	7102	1111	5862	OK
Combination 2	P	kN	1566	4532	1566	6687	OK
	M	kN·m	1979	5728	1004	4284	OK
Combination 3	P	kN	4407	26385	4407	31823	OK
	M	kN·m	1009	6037	330	2382	OK
Combination 4	P	kN	2189	4111	2189	5435	O.K
	M	kN·m	2977	5591	1544	3834	O.K
Combination 5	P	kN	686	1068	686	725	O.K
	M	kN·m	2839	4415	1544	1630	O.K

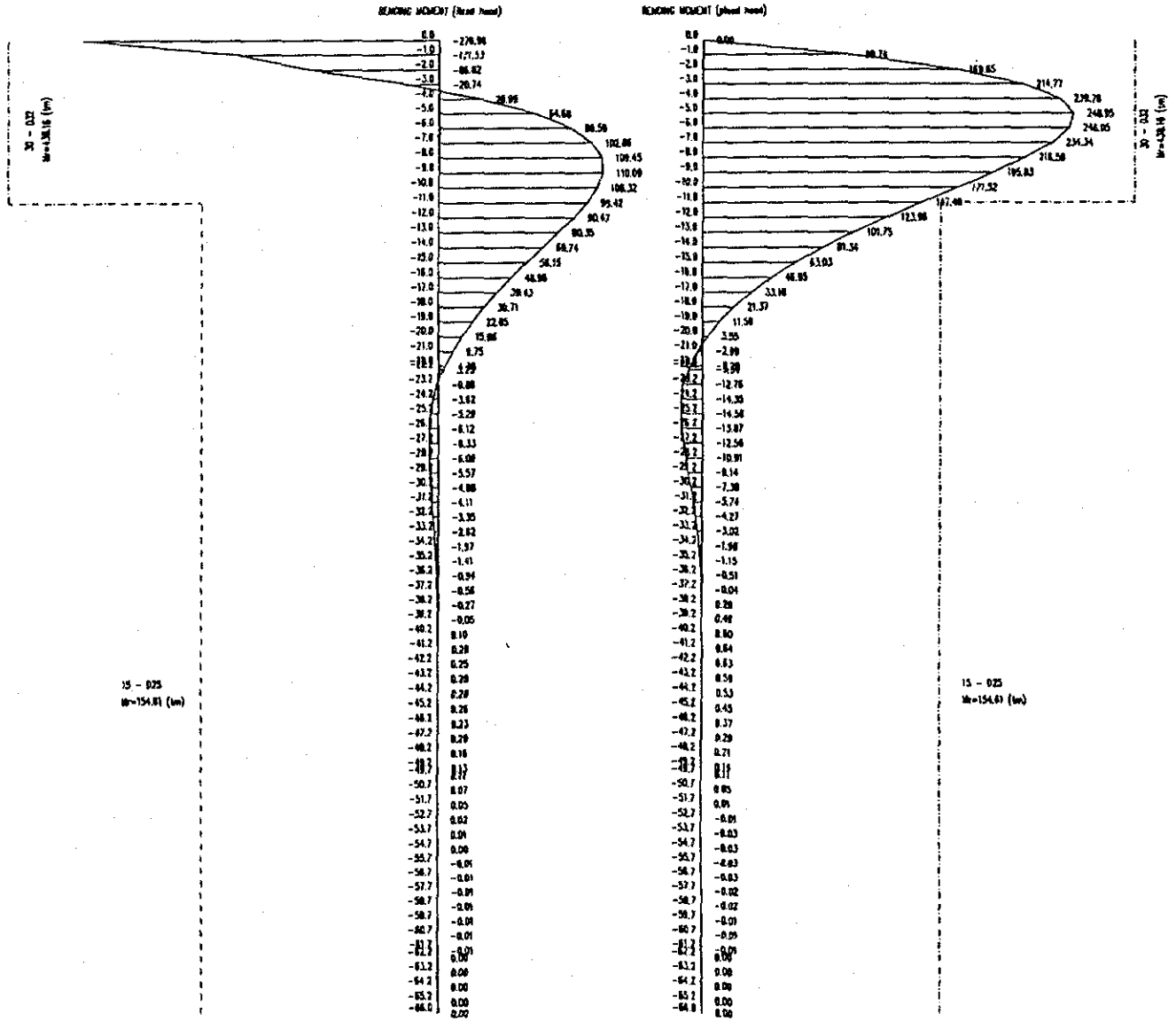
STRESS

	Stress of reinforcement δ s (MPa)		Stress of concrete δ c (MPa)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	-109.2	220.6	8.42	12.26	OK
Combination 2	148.6	220.6	8.06	12.26	OK
Combination 3	-64.0	220.6	4.75	12.26	OK
Combination 4	230.7	294.2	12.14	14.71	OK
Combination 5	283.3	294.2	11.63	14.71	OK

STRESS OF PILE CAP

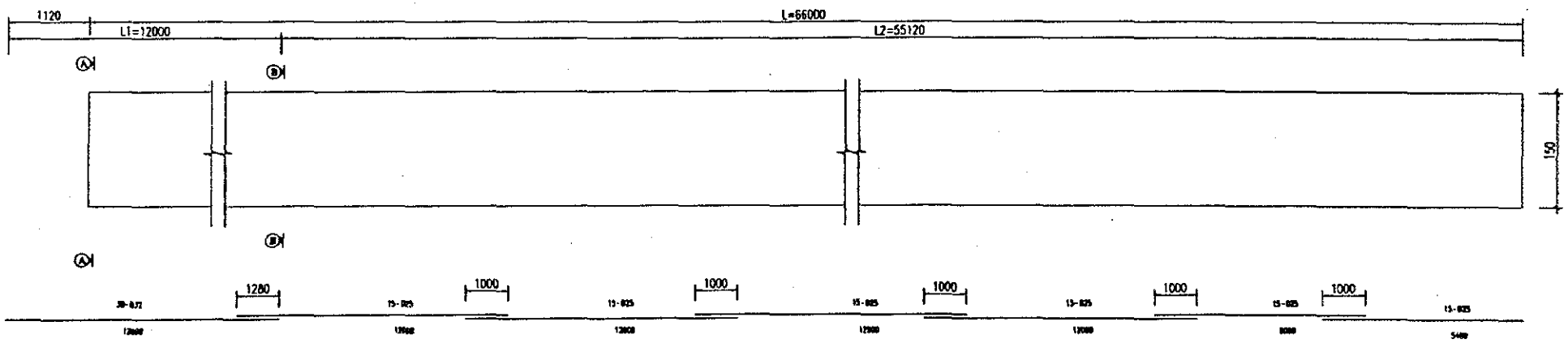
	Actual (MPa)		Allowable (MPa)	Remak
Vertical Bearing Pressure	σ cv =	3.55	σ ca=0.5x σ ck = 17.65	OK
Vertical Punching Shear	τ c =	0.31	τ a = 0.88	OK
Horizontal Bearing Pressure	σ ch =	8.14	σ 'ca=0.3x σ ck = 10.59	OK
Horizontal Bearing Pressure	τ c =	0.51	τ a = 0.88	OK

COMBINATION 5 : PILE (1,1)

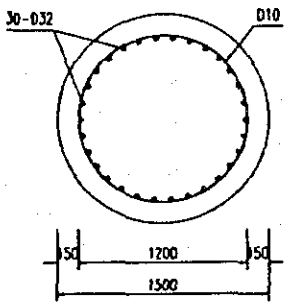


ABUTMENT A1 - SMALL TRA VA BRIDGE

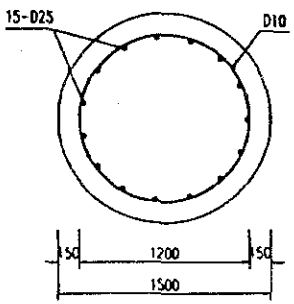
PILE PLAN OF ABUTMENT A1 - SMALL TRA VA BRIDGE



A - A



B - B

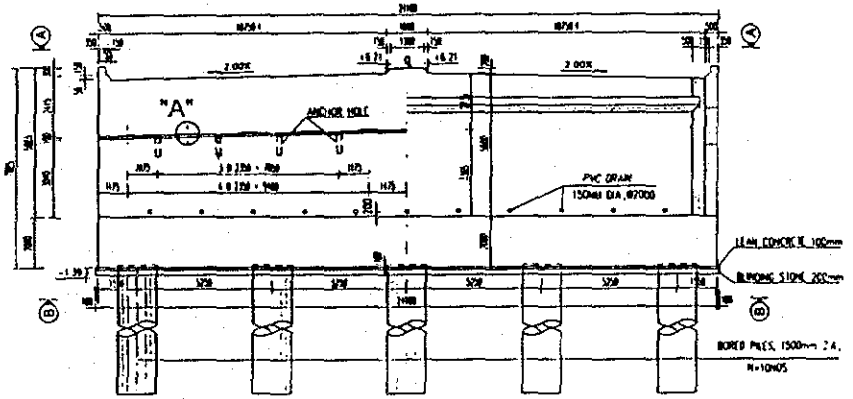


(4) ABUTMENT, TYPE A6

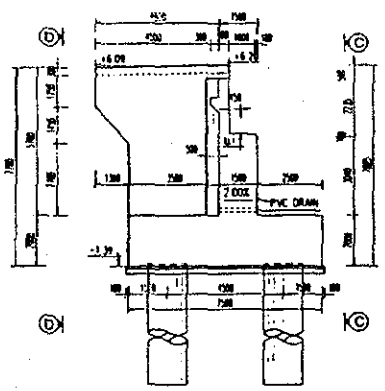
DETAIL OF ABUTMENT A1

(SCALE 1:200)

1/2 C - C　　1/2 D - D

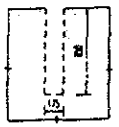


SIDE ELEVATION

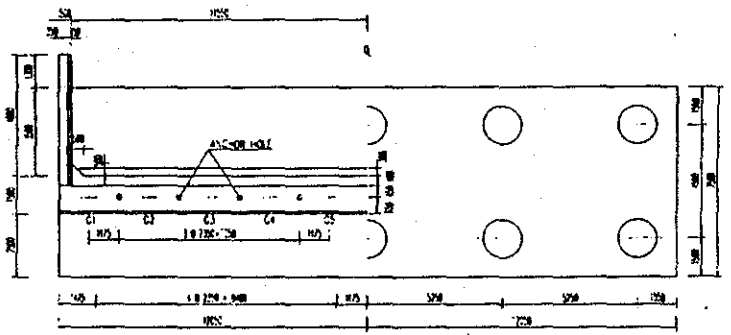


DETAIL OF ANCHOR HOLE

(SCALE 1:50)

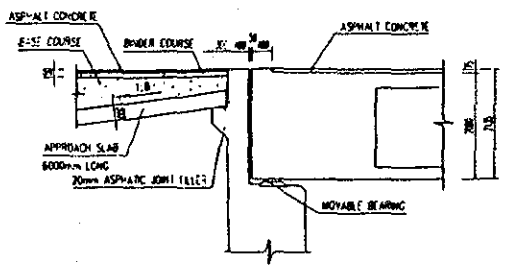


1/2 A - A　　1/2 B - B



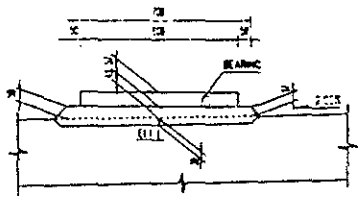
DETAIL OF BACK WALL

(SCALE 1:100)

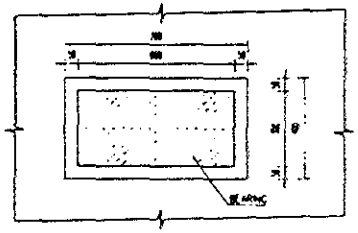


DETAIL "A"

(SCALE 1:20)



PLAN



GIRDER BEARING SEAT
ELEVATION OF EL1

ABUTMENT \ GROUT PAD	G1	G2	G3	G4	G5
A1	+3.37	+3.82	+3.87	+3.91	+3.96

NOTE

FOR STANDARD STRUCTURAL NOTES SEE DRAWING NO PJ/BRI/0030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kametani	K.Matsumoto	K. Enomoto	CAI TAC I BRIDGE ABUTMENTS GENERAL VIEW OF ABUTMENT A1	PJ/BRI/0250
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS - CAI TAC 1 ABUTMENT A1(H=7.6M)

Abutment DC 1313 T e_x= 0.00 m e_y= 0.6 m

Nos	Items	Pz			Hx			My			Mx			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	n=1		n>1	
	Permanent load													
1	Superstructure - DC (n=0.9,1.25)	699	629	874				420	378	524				
2	Wearing surface - DW (n=0.65,1.5)	70	45	104				42	27	63				
3	Abutment - DC (n=0.9,1.25)	1,313	1,182	1,641				-2	-1	-2				
4	Horizontal earth pressure - EH (n=0.9,1.35)				358	254	607	1,027	729	1,740				
5	Horizontal earth pressure - E_{AE} (n=0.9,1.35)				576	426	939	1,652	1,221	2,691				
6	Vertical earth pressure - EV (n=0.9,1.35)	893	804	1,205				-1,786	-1,607	-2,411				
	Transient Loads													
7	Live load - LL(n= 0.5,1.75)	271	136	474				163	81	285	422	211	738	
	a- Main load	217	109	380				130	65	228	570	285	997	
	b- Sub load	54	27	94				32	16	57	-148	-74	-260	
8	Dynamic load allowance - IM (n=0.5,1.75)	90	45	158				54	27	95	141	70	246	
	a- Main load	72	36	127				43	22	76	190	95	332	
	b- Sub load	18	9	31				11	5	19	-49	-24	-86	
9	Live load surcharge - LS (n=0.9,1.35)				44	31	74	189	134	319				
10	Braking force - BR (n=0.5,1.75)				24	12	43	263	132	461				25% of Japanese Load - p1
11	Friction force - FR (n=1)													f=0.05
	a- Dead load				0			0						
	b- Dead load + Live load				0			0						
12	Earthquake - EQ (n=1)				250			804						12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My	Mx
1	4456.7	723.8	1073.1	984.2
2	2,660	681	855	0
3	4,457	243	-1,044	984
4	4,005	1,275	2,229	281
5	2,840	1,275	2,851	281

Combination 1 1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)
Combination 2 0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)
Combination 3 1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)
Combination 4 1.25DC + 1.5DW + 1.35EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + 1EQ
Combination 5 0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

Bridge name CAI TAC 1 Bridge -A1

Pile Type Dia = 1500 mm Length = 51.0 m

Bearing Capacity Qs = 12505 kN Qult = 14891 kN

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (kN)		Uplift Capacity (kN)		Remarks
	Actual	Allowable	Pmax	Allowable	Pmin	Allowable	
Strength I-1	10.2	30	4521	6512	3226	-5492	OK
Strength I-2	9.3	30	3193	6512	1811	-5492	OK
Strength I-3	0.7	30	4803	6512	2945	-5492	OK
Extremme Event I-1	14.7	20	4848	6512	2497	-5492	O.K
Extremme Event I-2	15.4	20	4123	6512	1041	-5492	OK

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) / A's = 8 cm2 (D=1.6cm, 4 Nos)
1	237	315	1363	1422	OK	ρs = As/Ac = 0.0020
2	206	274			OK	ρ min = 0.03 f'c/fy = 0.0018
3	57	75			OK	∴ ρs > ρ min ..... O.K
4	283	377			OK	c/de = 0.04
5	293	390			OK	∴ c/de < 0.42 ..... O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) / A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72	98	98	OK	ρs = As/Ac = 0.0031
						ρ min = 0.03 f'c/fy = 0.0018
						∴ ρs > ρ min ..... O.K
						c/de = 0.05
						∴ c/de < 0.42 ..... O.K

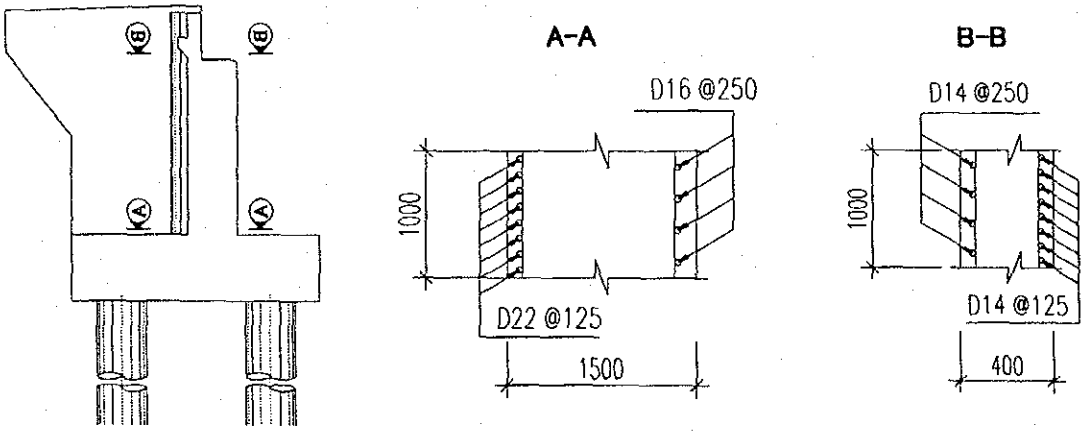
FOR SERVICE LIMIT STATE

Cracking

Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·fy (MPa)	fsa < 0.6·fy
1	72.28	159.4	98.8	229.5	OK

Stress

Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	$fr = 0.63 \cdot (fc)^{0.5}$	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK



FOOTING

B abutment 24.10 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

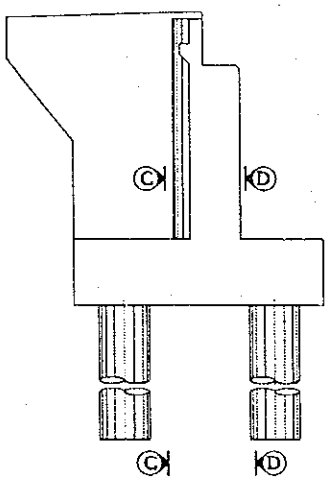
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=ϕMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	0	0			OK	ρs = As/Ac = 0.0020
2	377	502			OK	ρmin = 0.03 f'c/fy = 0.0018
3	12	16	2422	2363	OK	∴ ρs > ρmin ..... O.K
4	198	263			OK	c/de = 0.00
5	697	926			OK	∴ c/de < 0.42 ..... O.K

SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

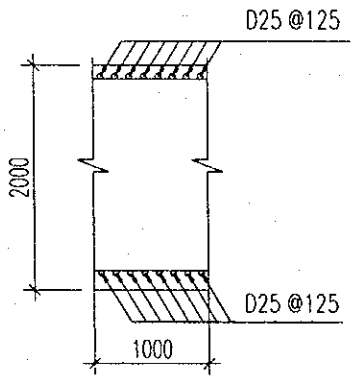
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=ϕMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	928	1234			OK	ρs = As/Ac = 0.0020
2	482	641			OK	ρmin = 0.03 f'c/fy = 0.0018
3	1045	1390	2422	2363	OK	∴ ρs > ρmin ..... O.K
4	1064	1415			OK	c/de = 0.00
5	868	1155			OK	∴ c/de < 0.42 ..... O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

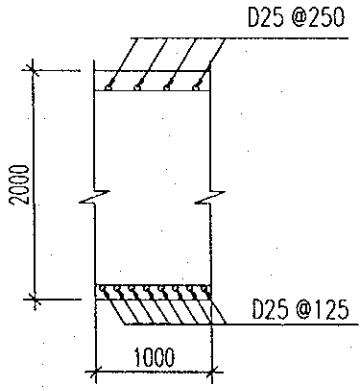
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=ϕMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 20 cm2 (D=2.5cm, 4 Nos)
1	662	881			OK	ρs = As/Ac = 0.0020
2	464	617			OK	ρmin = 0.03 f'c/fy = 0.0018
3	721	958	2422	2422	OK	∴ ρs > ρmin ..... O.K
4	730	971			OK	c/de = 0.02
5	657	873			OK	∴ c/de < 0.42 ..... O.K



C-C



D-D



PILE (1,1) SECTION

NOMINAL RESISTANCES

		Unit	Z=0 m		Z=11m		Remark
			Atual	Allowable	Atual	Allowable	
Reinforcement		mm	32-D28		16-D25		
Area As		cm2	197.04		78.54		
Combination 1	P	kN	3226	9889	3226	19832	OK
	M	kN·m	2138	6552	945	5811	OK
Combination 2	P	kN	1811	5398	1811	12396	OK
	M	kN·m	1838	5478	840	5754	OK
Combination 3	P	kN	2945	17198	2945	31210	OK
	M	kN·m	1174	6856	259	2745	OK
Combination 4	P	kN	2497	4598	2497	10284	O.K
	M	kN·m	2829	5210	1316	5421	O.K
Combination 5	P	kN	1041	1600	1041	2029	O.K
	M	kN·m	2635	4048	1316	2564	O.K

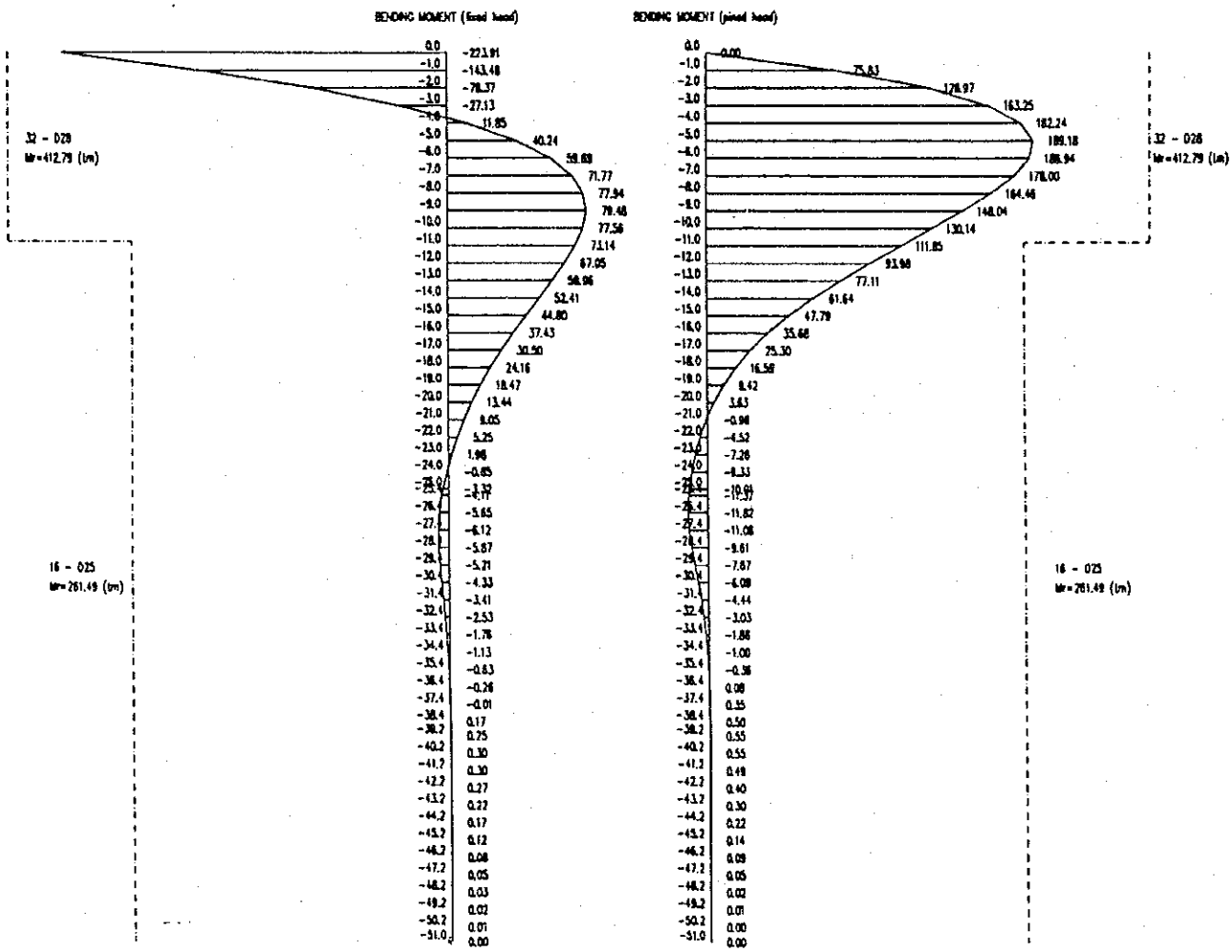
STRESS

	Stress of reinforcement δ s (MPa)		Stress of concrete δ c (MPa)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	111.6	220.6	8.94	12.26	OK
Combination 2	138.4	220.6	7.92	12.26	OK
Combination 3	-69.8	220.6	5.24	12.26	OK
Combination 4	227.1	294.2	12.25	14.71	OK
Combination 5	277.6	294.2	11.60	14.71	OK

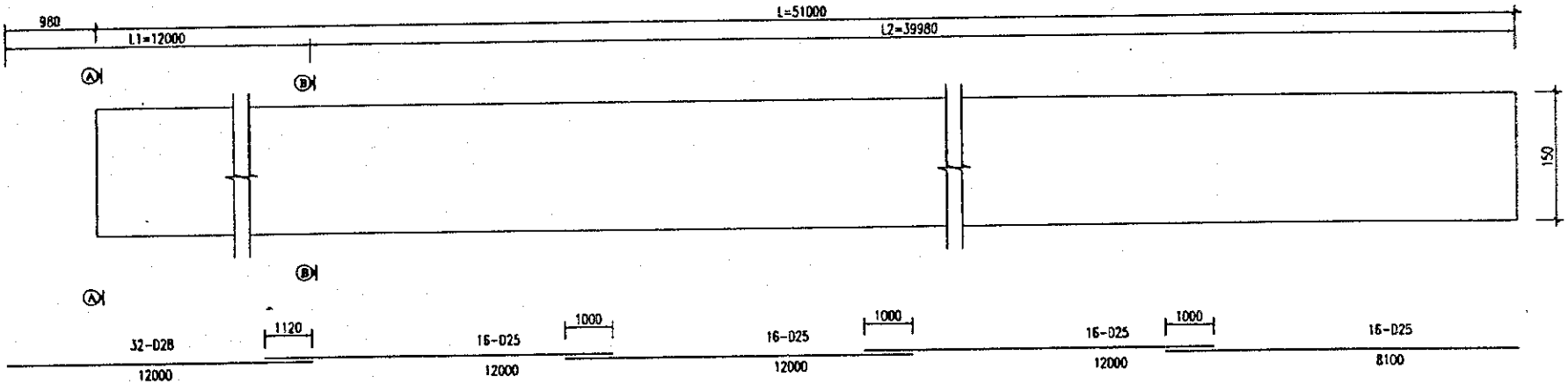
STRESS OF PILE CAP

	Actual (MPa)		Allowable (MPa)	Remak
Vertical Bearing Pressure	σ cv =	2.74	σ ca=0.5x σ ck = 17.65	OK
Vertical Punching Shear	τ c =	0.24	τ a = 0.88	OK
Horizontal Bearing Pressure	σ ch =	6.94	σ 'ca=0.3x σ ck = 10.59	OK
Horizontal Bearing Pressure	τ c =	0.43	τ a = 0.88	OK

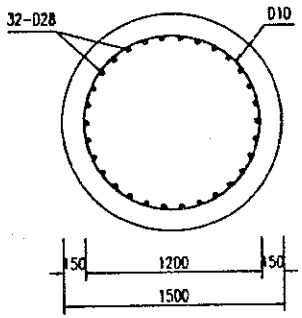
COMBINATION 5 : PILE (1,1)



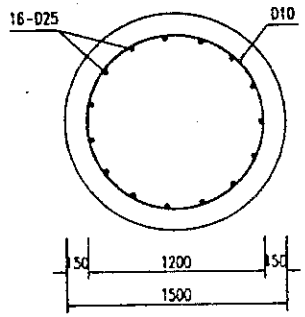
PILE PLAN OF ABUTMENT A1 - CAI TAC 1 BRIDGE



A - A



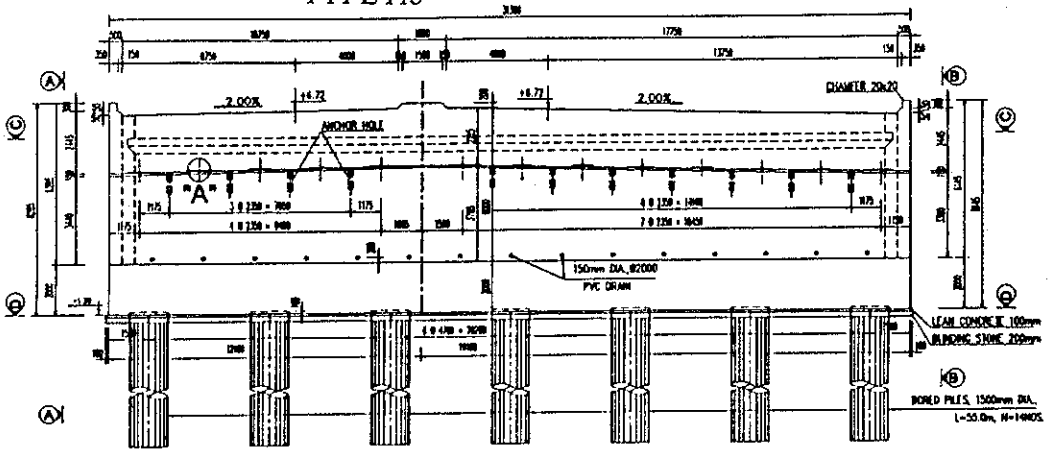
B - B



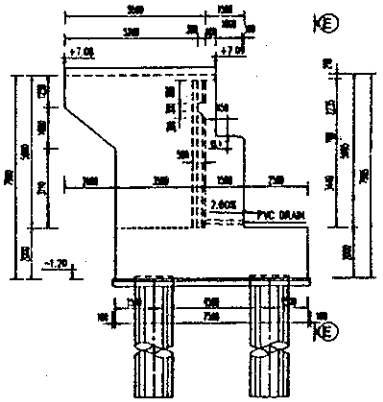
DETAIL OF ABUTMENT A1

(SCALE 1:200)

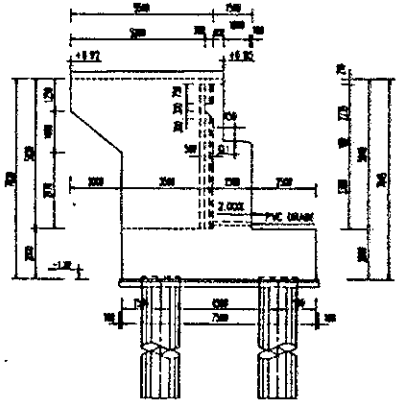
(5) *ABUTMENT, TYPE A8* E - E



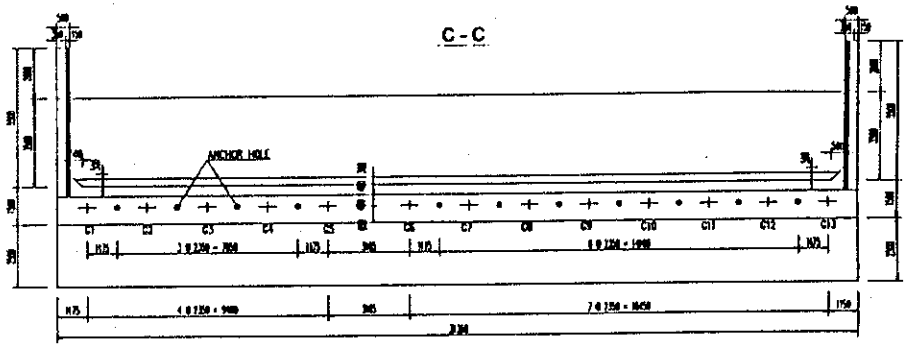
A - A



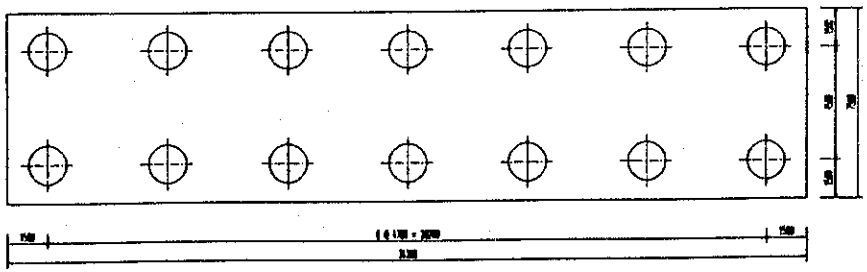
B - B



C - C



D - D

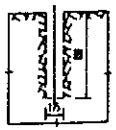


GIRDER BEARING SEAT ELEVATION OF EL1

ABUTMENT \ GROUT PAD	G1,G10	G2,G9	G3,G8	G4,G7	G5	G6	G11	G12	G13
A1	+4.36	+4.41	+4.48	+4.50	+4.55	+4.55	+4.32	+4.27	+4.22

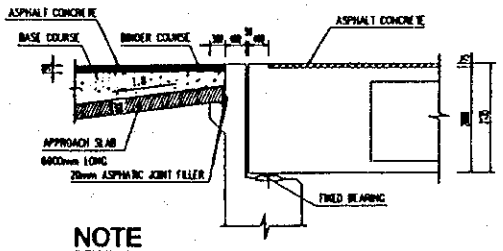
DETAIL OF ANCHOR HOLE

(SCALE 1:50)



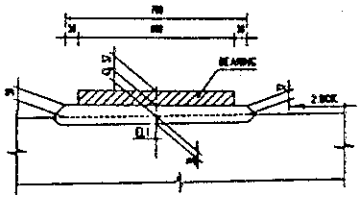
DETAIL OF BACK WALL

(SCALE 1:100)

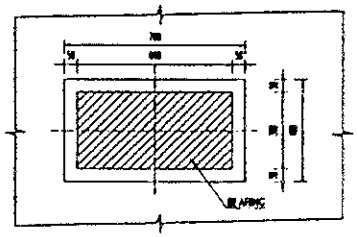


DETAIL "A"

(SCALE 1:20)



PLAN



NOTE

FOR STANDARD STRUCTURAL NOTES SEE DRAWING NO. P3/BR7/0030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kamctani	K.Matsumoto	K. Enomoto	CAI TAC 2 BRIDGE ABUTMENTS GENERAL VIEW OF ABUTMENT A1	P3/BR2/0200
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS CAITAC2 ABUTMENT A1 (H=8M)

Abutment DC 1718 T e_x= 0.02 m e_z= 0.60 m

Nos	Items	Pz			Hx			My			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	
	Permanent load										
1	Superstructure - DC (n=0.9,1.25)	768	691	960				461	415	576	
2	Wearing surface - DW (n=0.65,1.5)	97	63	145				58	38	87	
3	Abutment - DC (n=0.9,1.25)	1,718	1,546	2,148				43	39	54	
4	Horizontal earth pressure - EH (n=0.9,1.35)				517	373	858	1,378	995	2,288	
5	Horizontal earth pressure - E_{AE} (n=0.9,1.35)				649	480	1,057	1,730	1,279	2,819	
6	Vertical earth pressure - EV (n=0.9,1.35)	1,214	1,093	1,639				-2,431	-2,188	-3,281	
	Transient Loads										
7	Live load - LL(n= 0.5,1.75)	333	166	582				200	100	349	
	a- Main load	185	93	324				111	56	195	
	b- Sub load	147	74	258				88	44	155	
8	Dynamic load allowance - IM (n=0.5,1.75)	110	55	192				66	33	115	
	a- Main load	61	31	107				37	18	64	
	b- Sub load	49	24	85				29	15	51	
9	Live load surcharge - LS (n=0.9,1.35)				68	49	113	272	196	452	
10	Braking force - BR (n=0.5,1.75)				59	30	104	576	288	1,008	25% of Japanese Load - p1
11	Friction force - FR (n=1)										f=0.05
	a- Dead load				0			0			
	b- Dead load + Live load				0			0			
12	Earthquake - EQ (n=1)				379			1,363			12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My
1	5666	1075	1648
2	3,393	971	1,043
3	5,666	319	-1,916
4	5,113	1,579	2,490
5	3,614	1,579	3,358

Combination 1	1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)
Combination 2	0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)
Combination 3	1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)
Combination 4	1.25DC + 1.5DW + 1.35EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + 1EQ
Combination 5	0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

Bridge name **CAI TAC2 Bridge-A1**

Pile Type Dia = 1500 mm Length = 55.0 m

Bearing Capacity Qs = 14281 kN Quit = 19582 kN

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (kN)		Uplift Capacity (kN)		Remarks
	Actual	Allowable	Pmax	Allowable	Pmin	Allowable	
Strength I-1	10.5	30	5045	8787	2893	-6188	OK
Strength I-2	9.4	30	3256	8787	1497	-6188	OK
Strength I-3	2.4	30	4146	8787	3792	-6188	OK
Extremme Event I-1	15.5	20	5176	8787	1987	-6188	O.K
Extremme Event I-2	15.8	20	4305	8787	758	-6188	OK

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) A's = 8 cm2 (D=1.6cm, 4 Nos)
1	333	443			OK	ρs = As/Ac = 0.0020
2	257	342			OK	ρmin = 0.03 f'c/fy = 0.0018
3	49	65	1363	1422	OK	∴ ρs > ρmin ..... O.K
4	364	484			OK	c/de = 0.04
5	375	498			OK	∴ c/de < 0.42 ..... O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72			OK	ρs = As/Ac = 0.0031
						ρmin = 0.03 f'c/fy = 0.0018
			98	98		∴ ρs > ρmin ..... O.K
						c/de = 0.05
						∴ c/de < 0.42 ..... O.K

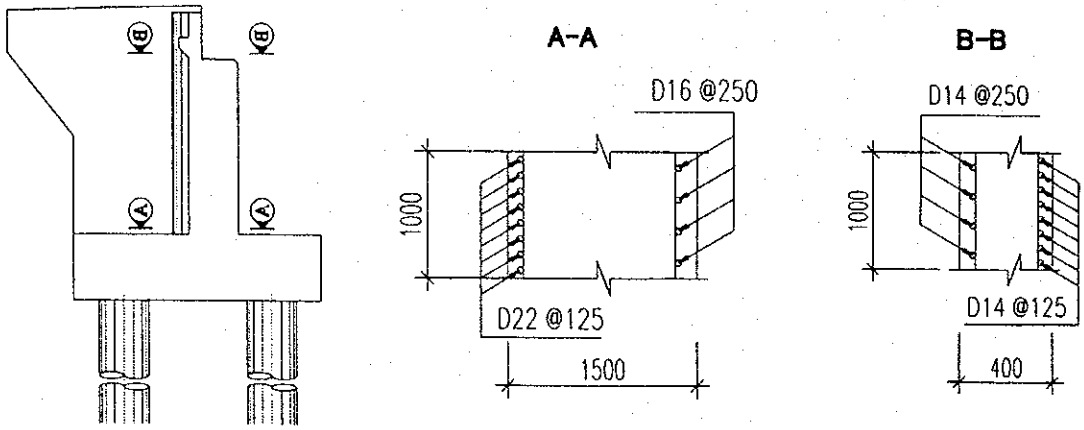
FOR SERVICE LIMIT STATE

Cracking

Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·f'y (MPa)	fsa < 0.6·f'y
1	72.28	159.4	98.8	229.5	OK

Stress

Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	fr = 0.63·(fc)^0.5	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK



FOOTING

B abutment 31.36 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

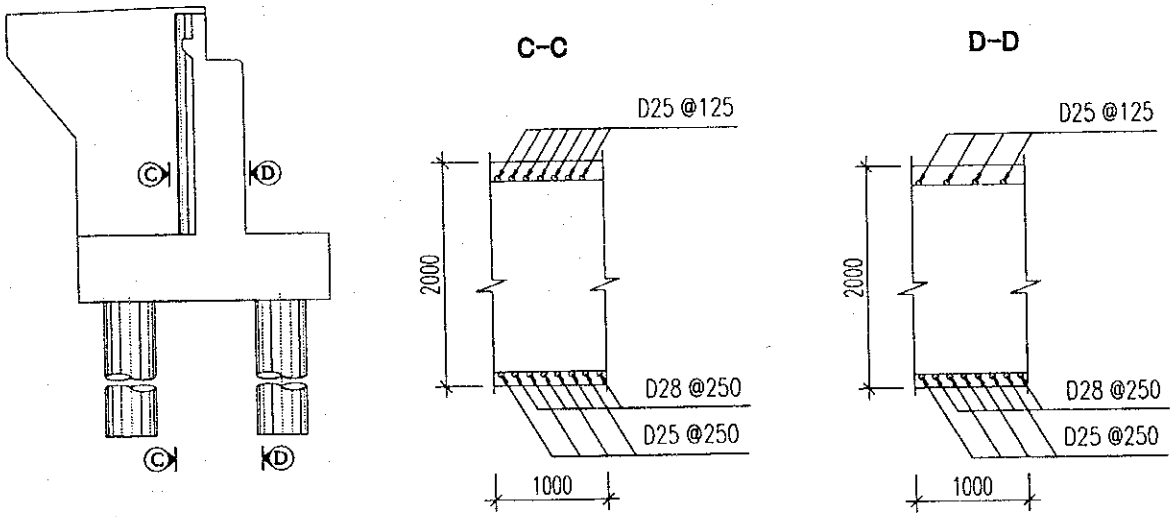
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= ϕ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 44 cm2 (D=2.7cm, 8 Nos)
1	0	0	2422	2344	OK	ρ s = As/Ac = 0.0020
2	499	664			OK	ρ min = 0.03 f'c/fy = 0.0018
3	0	0			OK	∴ ρ s > ρ min ..... O.K
4	385	512			OK	c/de = -0.01
5	829	1102			OK	∴ c/de < 0.42 ..... O.K

SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= ϕ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 44 cm2 (D=2.65cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	2475	3291	2422	2677	OK	ρ s = As/Ac = 0.0022
2	1781	2369			OK	ρ min = 0.03 f'c/fy = 0.0018
3	2073	2758			OK	∴ ρ s > ρ min ..... O.K
4	2533	3369			OK	c/de = 0.01
5	2250	2992			OK	∴ c/de < 0.42 ..... O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= ϕ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 44 cm2 (D=2.65cm, 8 Nos) / A's = 20 cm2 (D=2.5cm, 4 Nos)
1	934	1243	2422	2726	OK	ρ s = As/Ac = 0.0022
2	589	783			OK	ρ min = 0.03 f'c/fy = 0.0018
3	734	976			OK	∴ ρ s > ρ min ..... O.K
4	964	1282			OK	c/de = 0.03
5	823	1095			OK	∴ c/de < 0.42 ..... O.K



PILE (1,1) SECTION

NOMINAL RESISTANCES

		Unit	Z=0 m		Z=11m		Remark
			Atual	Allowable	Atual	Allowable	
Reinforcement		mm	32-D32		16-D25		
Area As		cm2	257.36		78.54		
Combination 1	P	kN	2893	10027	2893	18002	OK
	M	kN·m	2073	7184	952	5926	OK
Combination 2	P	kN	1497	4681	1497	8896	OK
	M	kN·m	1908	5968	860	5111	OK
Combination 3	P	kN	3792	27617	3792	31953	OK
	M	kN·m	811	5905	283	2382	OK
Combination 4	P	kN	1987	3685	1987	6049	O.K
	M	kN·m	3039	5637	1399	4259	O.K
Combination 5	P	kN	758	1198	758	1135	O.K
	M	kN·m	2969	4692	1399	2094	O.K

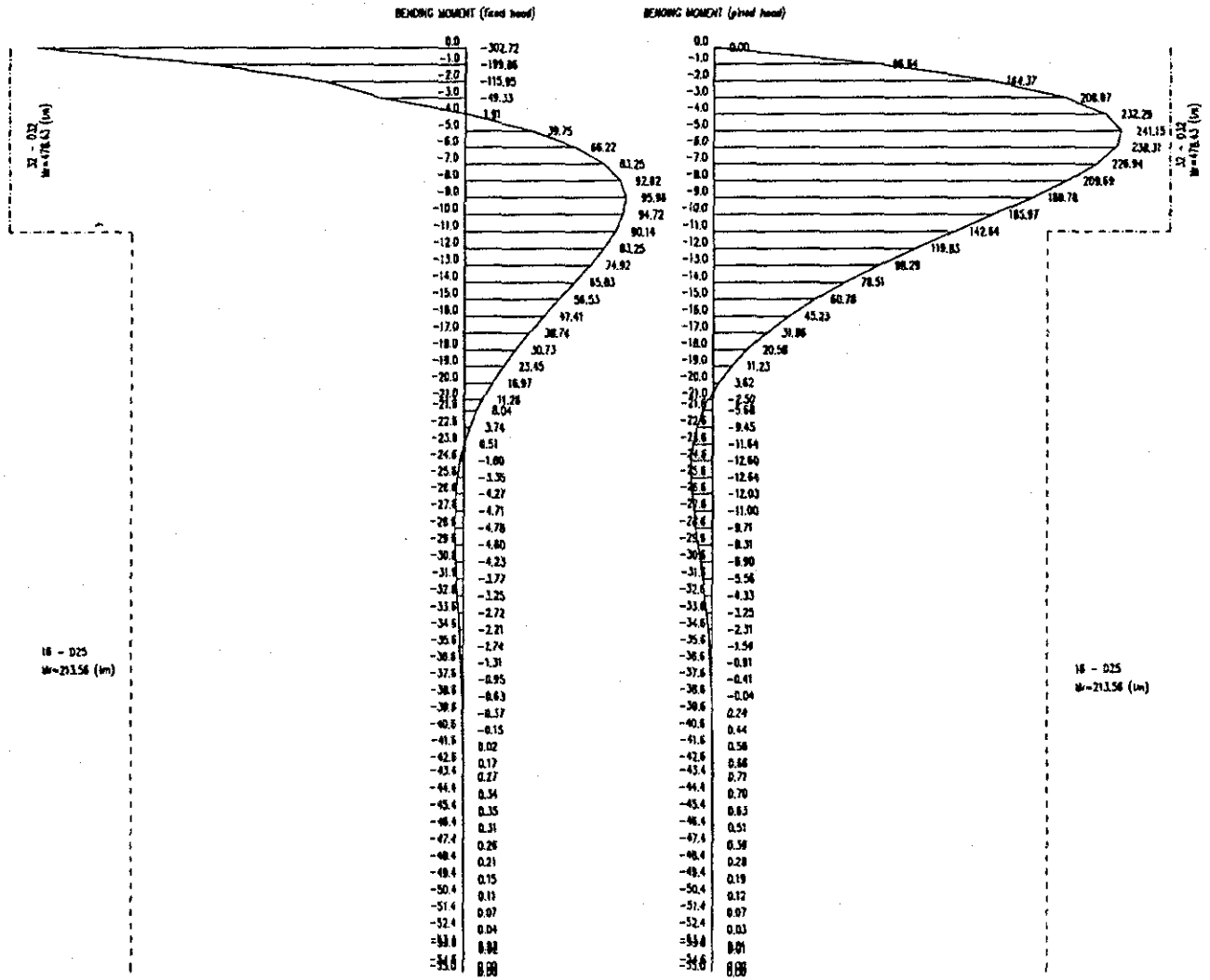
STRESS

	Stress of reinforcement δ s (MPa)		Stress of concrete δ c (MPa)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	-101.6	220.6	8.07	12.26	OK
Combination 2	136.4	220.6	7.55	12.26	OK
Combination 3	-52.0	220.6	3.84	12.26	OK
Combination 4	233.3	294.2	12.04	14.71	OK
Combination 5	278.0	294.2	11.77	14.71	OK

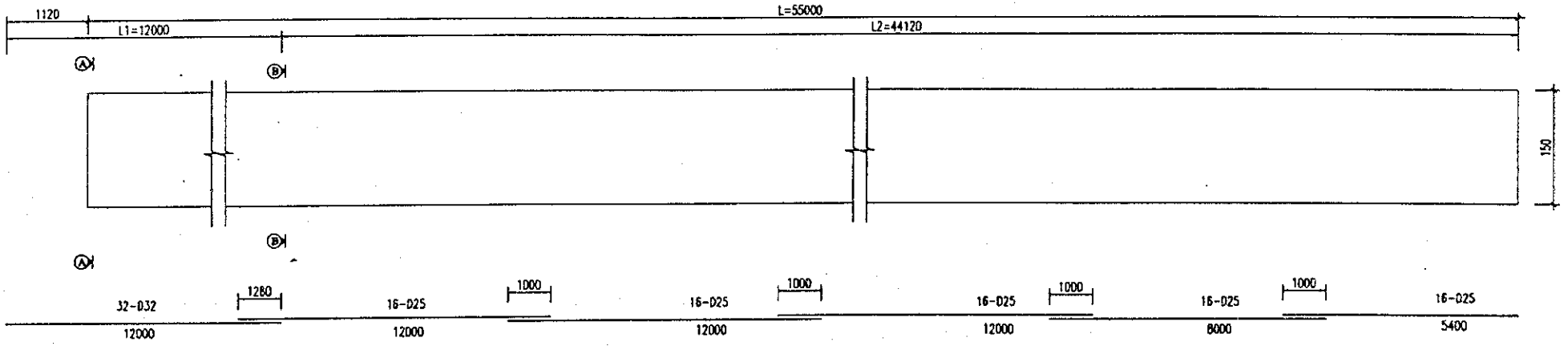
STRESS OF PILE CAP

	Actual (MPa)		Allowable (MPa)	Remak
Vertical Bearing Pressure	σ cv =	2.93	σ ca=0.5x σ ck = 17.65	OK
Vertical Punching Shear	τ c =	0.26	τ a = 0.88	OK
Horizontal Bearing Pressure	σ ch =	7.37	σ 'ca=0.3x σ ck = 10.59	OK
Horizontal Bearing Pressure	τ c =	0.46	τ a = 0.88	OK

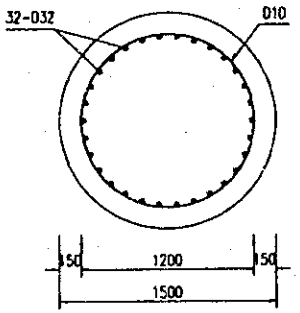
COMBINATION 5 : PILE (1,1)



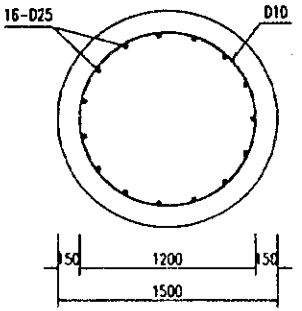
PILE PLAN OF ABUTMENT A1 - CAI TAC 2 BRIDGE



A - A



B - B

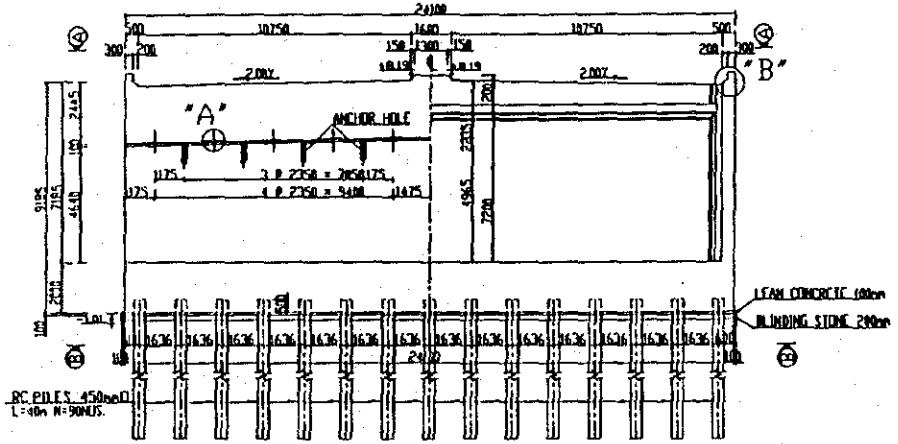


DETAIL OF ABUTMENT

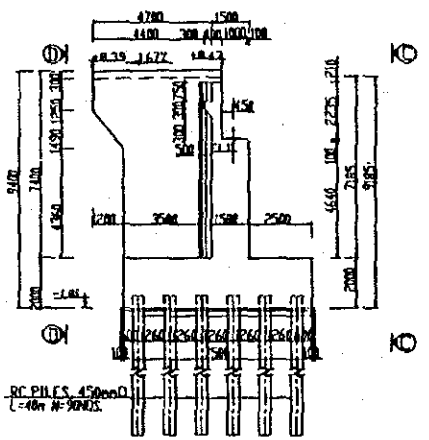
(SCALE 1:200)

(6) ABUTMENT, TYPE A2-DP

1/2C-C

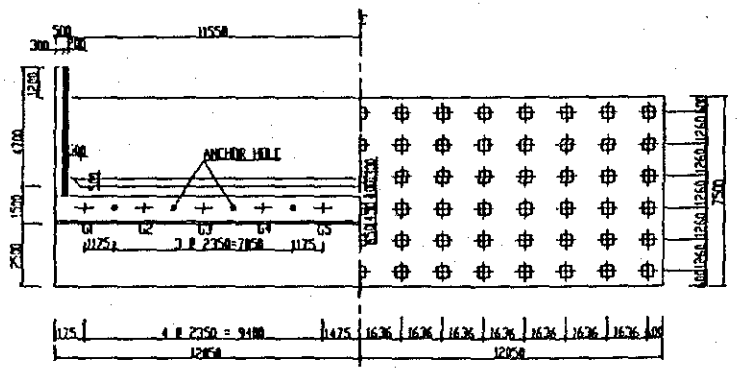


1/2D-D



SIDE ELEVATION

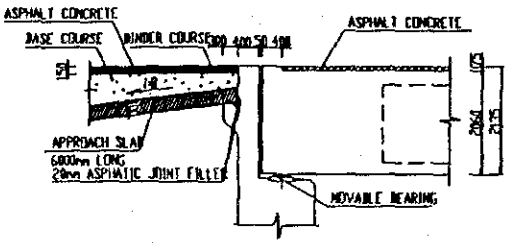
1/2A-A



1/2B-B

DETAIL OF BACK WALL

(SCALE 1:100)

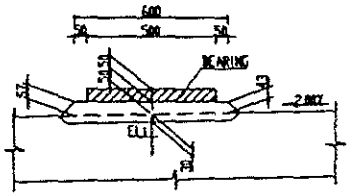


DETAIL OF ANCHOR HOLE

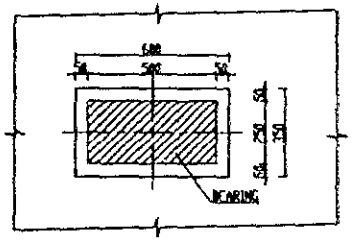
(SCALE 1:50)

DETAIL"A"

(SCALE 1:20)



PLAN



DETAIL"B"

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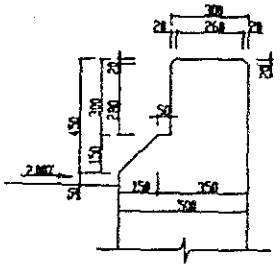


GIRDER BEARING SEAT

ELEVATION OF EL1

GIRDER PAD / ABUTMENT	G1	G2	G3	G4	G5
A1-A2	+5.95	+6.00	+6.05	+6.09	+6.14

NOTES

FOR STANDARD NOTES SEE DRAWING NO.P3/BR6/0030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kametani	K.Matsumoto	K. Enomoto	AP MY BRIDGE ABUTMENTS ABUTMENT A1&A2-GENERAL VIEW	P3/BR6/0040
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS LARGE TRAVA ABUTMENT A2 (H=9.2 M)

Abutment DC 1487 T e_x= -0.01 m e_y= 0.55 m

Nos	Items	Pz			Hx			My			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	
	Permanent load										
1	Superstructure - DC (n=0.9,1.25)	330	297	413				182	163	227	
2	Wearing surface - DW (n=0.65,1.5)	33	21	50				18	12	27	
3	Abutment - DC (n=0.9,1.25)	1,487	1,338	1,859				-17	-15	-21	
4	Horizontal earth pressure - EH (n=0.9,1.35)				525	379	872	1,610	1,163	2,674	
5	Horizontal earth pressure - E_{AE} (n=0.9,1.35)				660	487	1,074	2,023	1,495	3,295	
6	Vertical earth pressure - EV (n=0.9,1.35)	1,076	968	1,452				-2,259	-2,033	-3,050	
	Transient Loads										
7	Live load - LL(n= 0.5,1.75)	157	79	275				86	43	151	
	a- Main load	104	52	182				57	29	100	
	b- Sub load	53	27	93				29	15	51	
8	Dynamic load allowance - IM (n=0.5,1.75)	52	26	91				28	14	50	
	a- Main load	34	17	60				19	9	33	
	b- Sub load	17	9	31				10	5	17	
9	Live load surcharge - LS (n=0.9,1.35)				60	43	100	276	200	459	
10	Braking force - BR (n=0.5,1.75)				19	10	33	190	95	333	25% of Japanese Load - p1
11	Friction force - FR (n=1)										f=0.05
	a- Dead load				0			0			
	b- Dead load + Live load				0			0			
12	Earthquake - EQ (n=1)				215			675			12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My
1	4139	1005	850
2	2,625	972	1,260
3	4,139	389	-1,586
4	3,878	1,398	1,764
5	2,729	1,398	2,708

Combination 1 1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)
Combination 2 0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)
Combination 3 1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)
Combination 4 1.25DC + 1.5DW + 1.35EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + 1EQ
Combination 5 0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) / A's = 8 cm2 (D=1.6cm, 4 Nos)
1	460	612	1363	1422	OK	ρs = As/Ac = 0.0020
2	434	578			OK	ρ min = 0.03 f'c/fy = 0.0018
3	203	270			OK	∴ ρs > ρ min ——— O.K
4	590	785			OK	c/de = 0.04
5	598	795			OK	∴ c/de < 0.42 ——— O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) / A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72	98	98	OK	ρs = As/Ac = 0.0031
						ρ min = 0.03 f'c/fy = 0.0018
						∴ ρs > ρ min ——— O.K
						c/de = 0.05
						∴ c/de < 0.42 ——— O.K

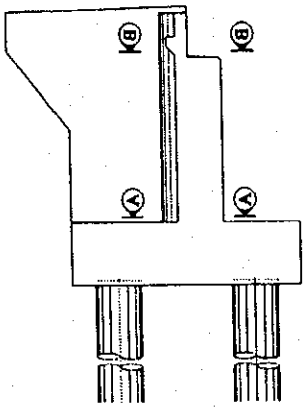
FOR SERVICE LIMIT STATE

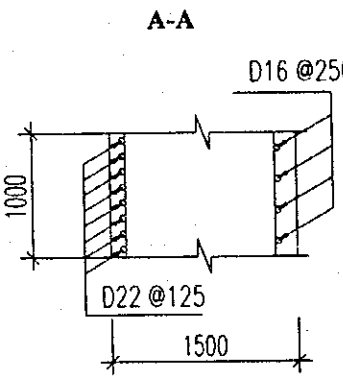
Cracking

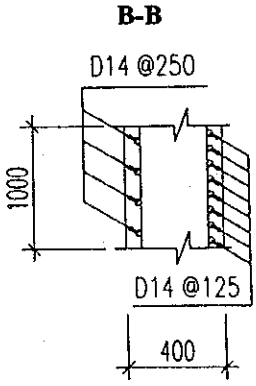
Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·fy (MPa)	fsa < 0.6·fy
1	72.28	159.4	98.8	229.5	OK

Stress

Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	$fr = 0.63\cdot(fc)^{0.5}$	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK







FOOTING

B abutment 24.10 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

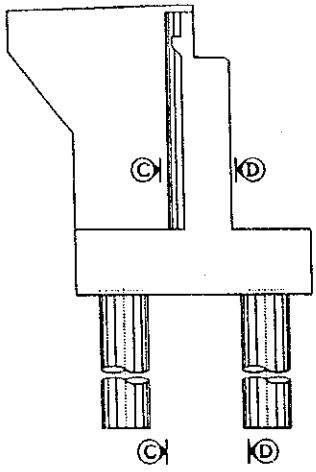
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	346	460	2422	2363	OK	ρs = As/Ac = 0.0020
2	847	1126			OK	ρ min = 0.03 f'c/fy = 0.0018
3	0	0			OK	∴ ρs > ρ min ——— O.K
4	734	977			OK	c/de = 0.00
5	1187	1578			OK	∴ c/de < 0.42 ——— O.K

SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

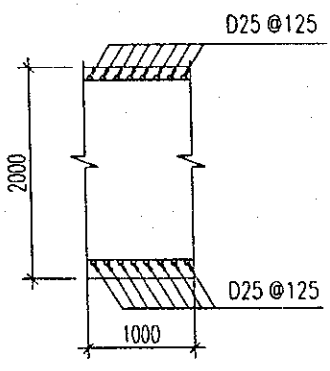
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	1085	1443	2422	2363	OK	ρs = As/Ac = 0.0020
2	664	883			OK	ρ min = 0.03 f'c/fy = 0.0018
3	571	760			OK	∴ ρs > ρ min ——— O.K
4	1282	1705			OK	c/de = 0.00
5	1080	1436			OK	∴ c/de < 0.42 ——— O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

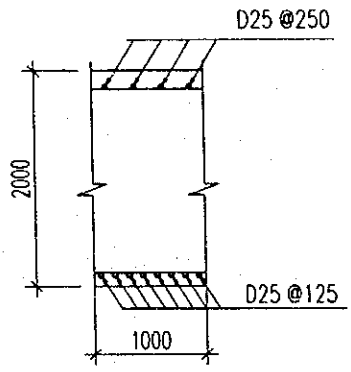
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 20 cm2 (D=2.5cm, 4 Nos)
1	1448	1926	2422	2422	OK	ρs = As/Ac = 0.0020
2	1096	1458			OK	ρ min = 0.03 f'c/fy = 0.0018
3	1020	1356			OK	∴ ρs > ρ min ——— O.K
4	1612	2145			OK	c/de = 0.02
5	1443	1919			OK	∴ c/de < 0.42 ——— O.K



C-C



D-D



Abutment Type A-2

STABILITY CALCULATION

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (T)		Uplift Capacity (T)		Remarks
	Actual	Allowable	P_{max}	Allowable	P_{min}	Allowable	
Strength - I-1	5.1	30	61.10	112	30.87	-89	O.K
Strength - I-2	5.0	30	47.02	112	11.32	-89	O.K
Strength - I-3	1.8	30	54.27	112	37.71	-89	O.K
Extremme Event - I-1	7.2	20	68.41	112	17.77	-89	O.K
Extremme Event - I-1	7.3	20	62.61	112	-1.96	-89	O.K

PILE SECTION

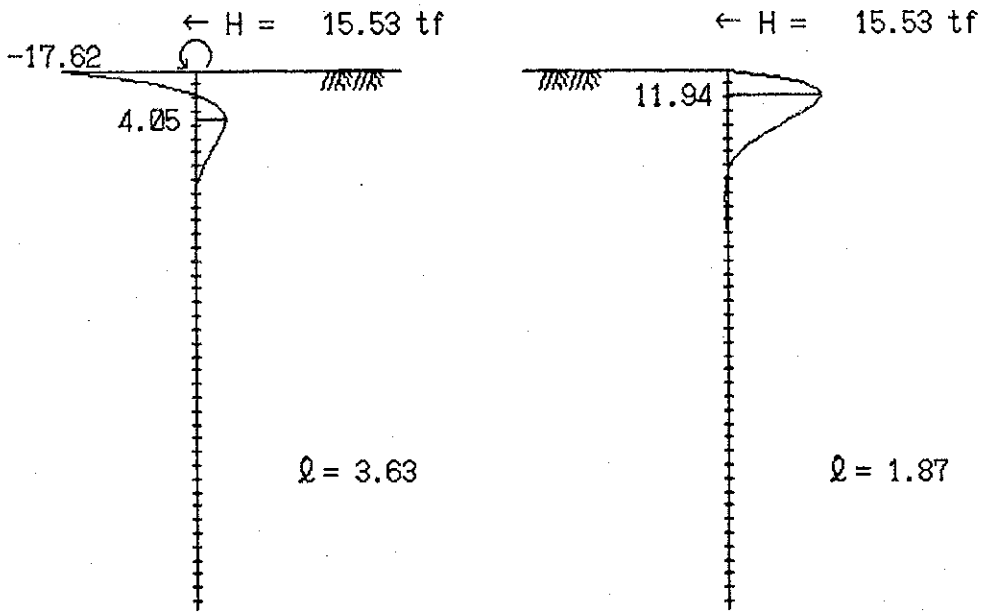
Checking stress

Load Combination	σ s (kg/cm2)		σ c (kg/cm2)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	1279.9	2250	98.1	125	OK
Combination 2	1532.4	2250	92.4	125	OK
Combination 3	-625.3	2250	47.5	125	OK
Combination 4	2180.1	3000	133.1	150	OK
Combination 5	2491.9	3000	130.5	150	OK

Notes : σ s Stress of reinforcement (kg/cm2)

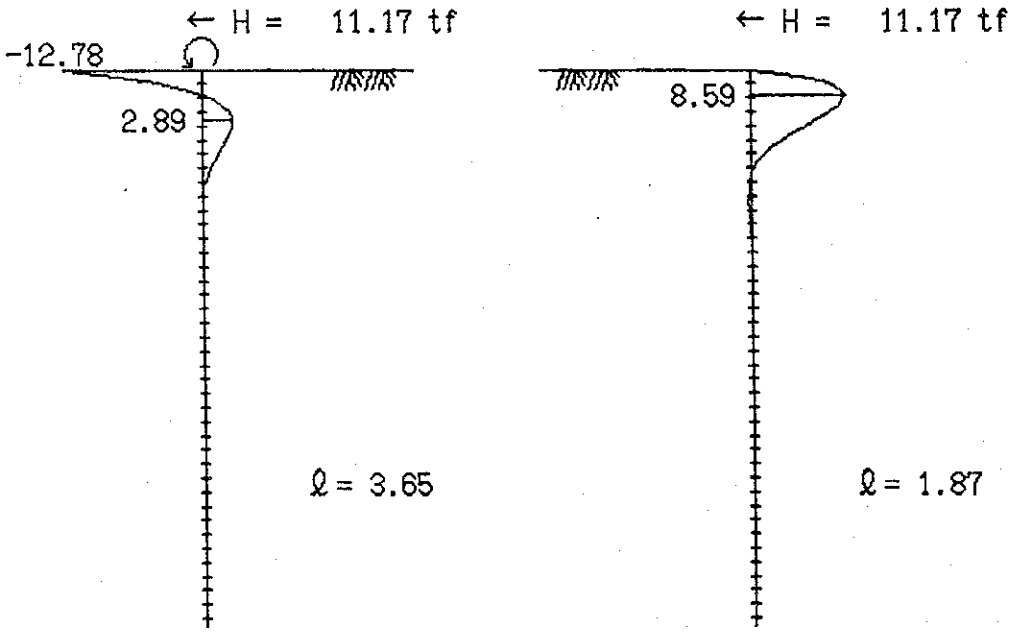
σ c Stress of concrete (kg/cm2)

<Longitudinal Direction, Extreme Event I-1>



(Pile Head: Rigid) (Pile Head: Hinge)

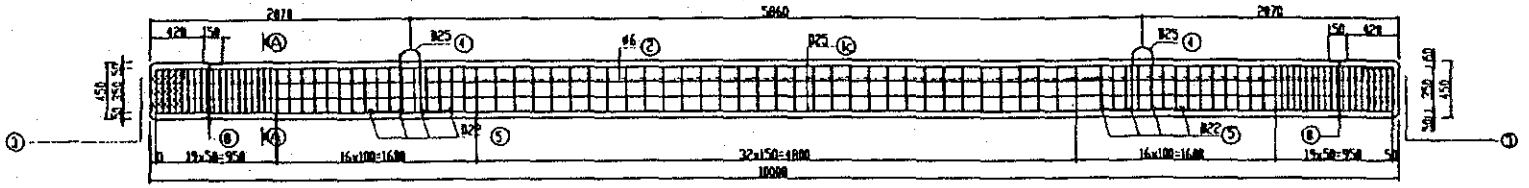
<Longitudinal Direction, Strength I>



(Pile Head: Rigid) (Pile Head: Hinge)

R.C.PILE-1 L=10M

SCALE 1:40



R.C.PILE-2 L=10M

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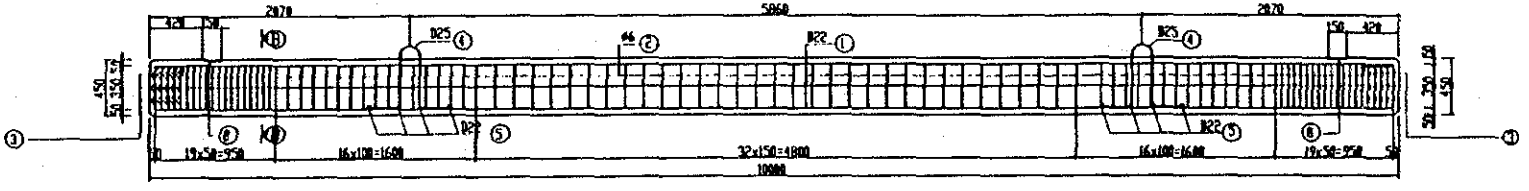

R.C.PILE-3 L=10M

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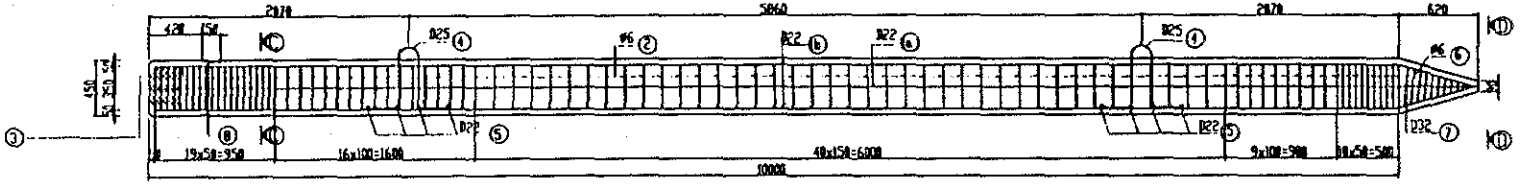
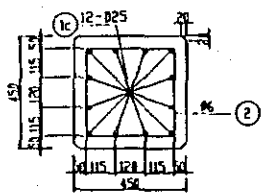


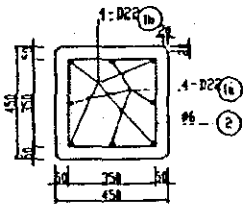
A-A

SCALE 1:20



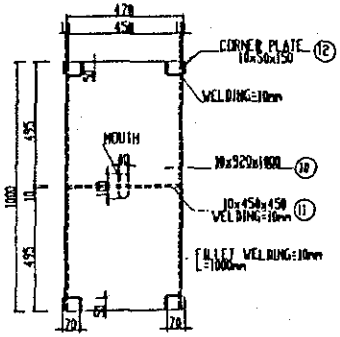
C-C

SCALE 1:20



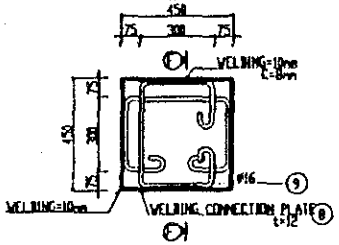
CONPLING BOX

SCALE 1:20



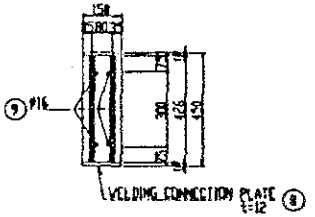
WELDING CONNECTION PLATE

SCALE 1:20



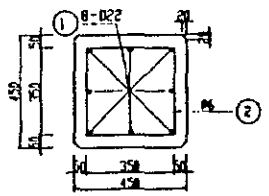
E-E

SCALE 1:20



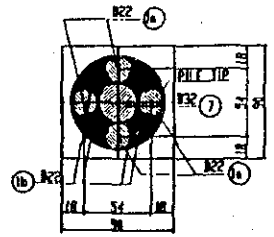
B-B

SCALE 1:20



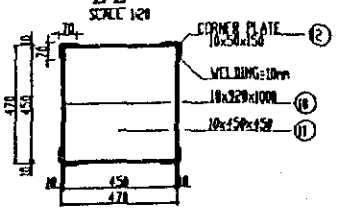
D-D

SCALE 1:4



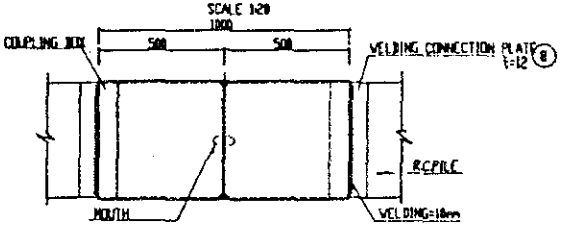
F-F

SCALE 1:20

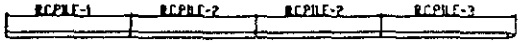


ELEVATION

SCALE 1:20



MARKING



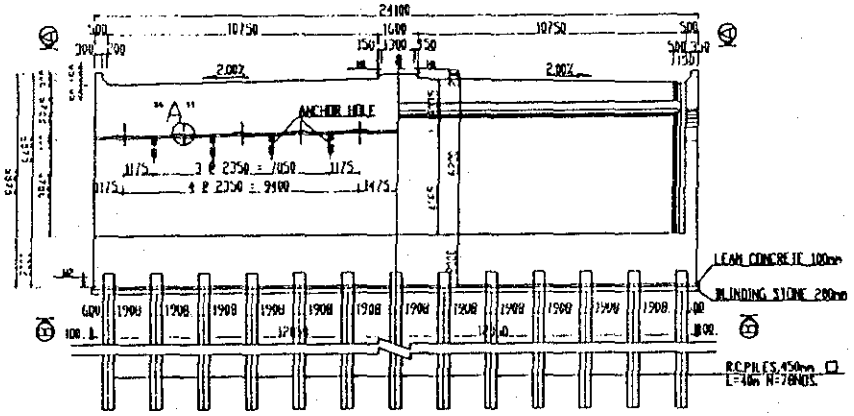
PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kaneteni	K.Matsumoto	K. Enomoto	AP MY BRIDGE ABUTMENTS ABUTMENTS A1&A2-RC PILE(450-L=40.0m-G) SHEET 1	F3/M&/0570
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

DETAIL OF ABUTMENT

(SCALE 1:200)

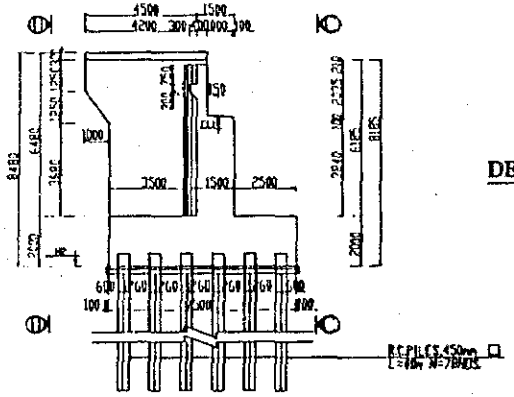
(7) ABUTMENT, TYPE A3-DP

1/2 C-C



1/2 D-D

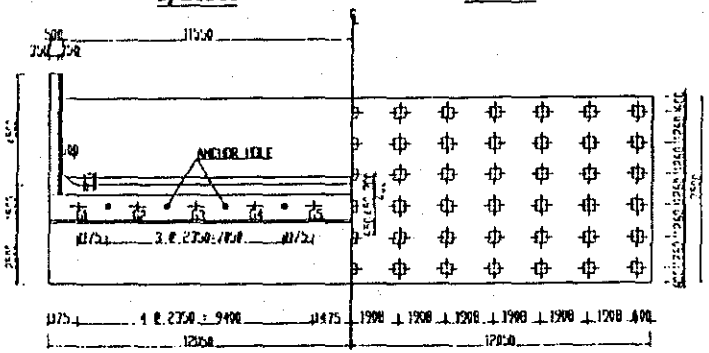
SIDE ELEVATION



DETAIL OF ANCHOR HOLE

(SCALE 1:50)

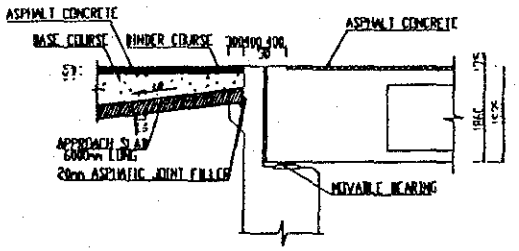
1/2 A-A



1/2 B-B

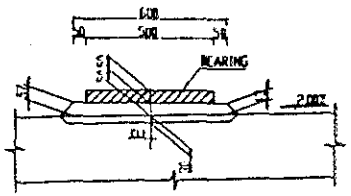
DETAIL OF BACK WALL

(SCALE 1:100)

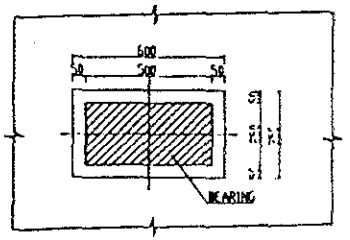


DETAIL "A"

(SCALE 1:20)



PLAN



GIRDER BEARING SEAT ELEVATION OF EL1

GIRDER PAD / ABUTMENT	G1	G2	G3	G4	G5
A1	+4.55	+4.60	+4.65	+4.69	+4.74
A2	+4.43	+4.48	+4.53	+4.57	+4.62

ELEVATION TABLE

ELEVATION / ABUTMENT	H1	H2
A1	+6.79	-1.41
A2	+6.67	-1.53

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF TIEN CAN THO BRIDGE	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kanetani	K.Matsumoto	K. Enomoto	CAI NAI BRIDGE ABUTMENTS GENERAL VIEW OF ABUTMENTS A1&A2	P3/BRS/0250
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS - SMALL TRA VA ABUTMENT A1 (H=8.2M)

Abutment DC 1390 T e_x= 0.05 m e_z= 0.60 m

Nos	Items	Pz			Hx			My			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	
	Permanent load										
1	Superstructure - DC (n=0.9,1.25)	369	332	461				221	199	277	
2	Wearing surface - DW (n=0.65,1.5)	63	41	95				38	25	57	
3	Abutment - DC (n=0.9,1.25)	1,390	1,251	1,738				63	57	79	
4	Horizontal earth pressure - EH (n=0.9,1.35)				417	301	693	1,140	823	1,894	
5	Horizontal earth pressure - E_{AE} (n=0.9,1.35)				524	387	853	1,432	1,058	2,333	
6	Vertical earth pressure - EV (n=0.9,1.35)	984	886	1,329				-1,969	-1,772	-2,658	
	Transient Loads										
7	Live load - LL(n= 0.5,1.75)	192	96	337				115	58	202	
	a- Main load	130	65	228				78	39	137	
	b- Sub load	62	31	109				37	19	65	
8	Dynamic load allowance - IM (n=0.5,1.75)	63	32	111				38	19	67	
	a- Main load	43	21	75				26	13	45	
	b- Sub load	21	10	36				12	6	22	
9	Live load surcharge - LS (n=0.9,1.35)				54	39	89	220	159	365	
10	Braking force - BR (n=0.5,1.75)				24	12	43	244	122	427	25% of Japanese Load - p1
11	Friction force - FR (n=1)										*f=0.05*
	a- Dead load				0			0			
	b- Dead load + Live load				0			0			
12	Earthquake - EQ (n=1)				210			611			12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My
1	4070	824	707
2	2,510	782	766
3	4,070	297	-1,422
4	3,751	1,164	1,261
5	2,638	1,164	2,016

Combination 1	1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)
Combination 2	0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)
Combination 3	1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)
Combination 4	1.25DC + 1.5DW + 1.35EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + 1EQ
Combination 5	0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= ϕ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) / A's = 8 cm2 (D=1.6cm, 4 Nos)
1	325	432			OK	ρ s = As/Ac = 0.0020
2	283	377			OK	ρ min = 0.03 f'c/fy = 0.0018
3	96	128	1363	1422	OK	∴ ρ s > ρ min ——— O.K
4	395	525			OK	c/de = 0.04
5	402	534			OK	∴ c/de < 0.42 ——— O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr= ϕ Mn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) / A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72			OK	ρ s = As/Ac = 0.0031
						ρ min = 0.03 f'c/fy = 0.0018
			98	98		∴ ρ s > ρ min ——— O.K
						c/de = 0.05
						∴ c/de < 0.42 ——— O.K

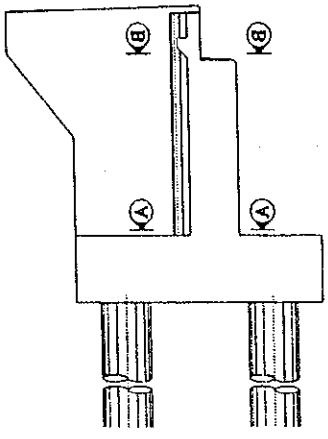
FOR SERVICE LIMIT STATE

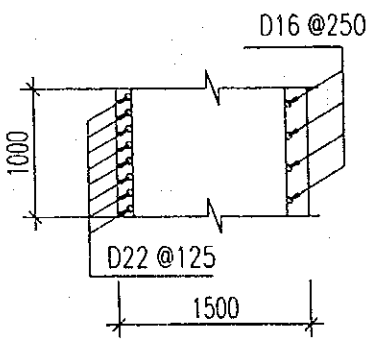
Cracking

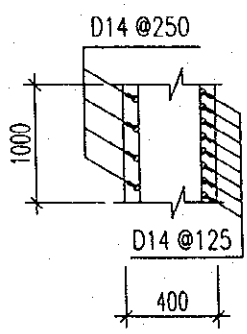
Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·f'y (MPa)	fsa < 0.6·f'y
1	72.28	159.4	98.8	229.5	OK

Stress

Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	fr = 0.63·(fc)$^{0.5}$	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK







FOOTING

B abutment 24.10 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

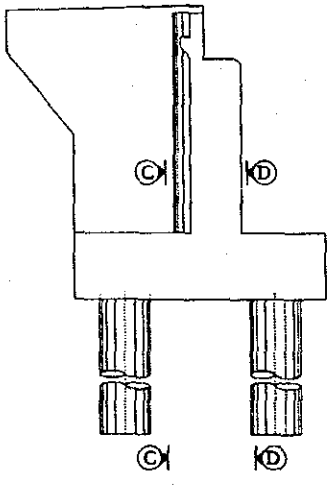
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) A's = 39 cm2 (D=2.5cm, 8 Nos)
1	172	229			OK	ρs = As/Ac = 0.0020
2	690	918			OK	ρmin = 0.03 f'c/fy = 0.0018
3	0	0	2422	2363	OK	∴ ρs > ρmin ——— O.K
4	550	731			OK	c/de = 0.00
5	1009	1342			OK	∴ c/de < 0.42 ——— O.K

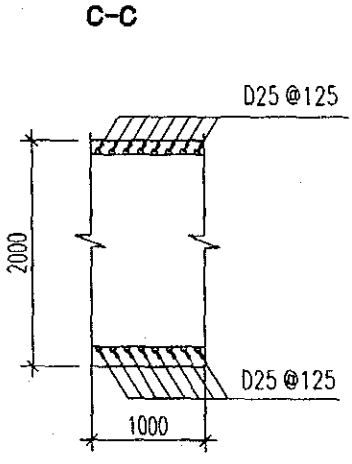
SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

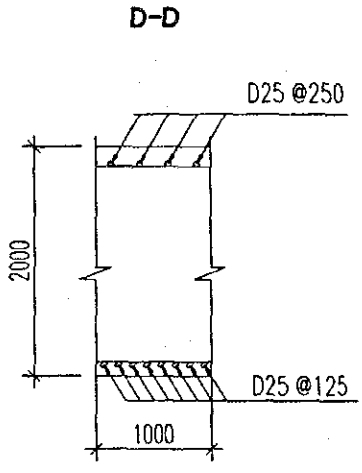
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) A's = 39 cm2 (D=2.5cm, 8 Nos)
1	1156	1538			OK	ρs = As/Ac = 0.0020
2	615	818			OK	ρmin = 0.03 f'c/fy = 0.0018
3	714	950	2422	2363	OK	∴ ρs > ρmin ——— O.K
4	1274	1695			OK	c/de = 0.00
5	1038	1380			OK	∴ c/de < 0.42 ——— O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) A's = 20 cm2 (D=2.5cm, 4 Nos)
1	852	1133			OK	ρs = As/Ac = 0.0020
2	593	788			OK	ρmin = 0.03 f'c/fy = 0.0018
3	630	838	2422	2422	OK	∴ ρs > ρmin ——— O.K
4	911	1211			OK	c/de = 0.02
5	804	1069			OK	∴ c/de < 0.42 ——— O.K







Abutment Type A-3

STABILITY CALCULATION

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (T)		Uplift Capacity (T)		Remarks
	Actual	Allowable	P_{max}	Allowable	P_{min}	Allowable	
Strength - I-1	4.9	30	66.57	111	37.79	-88	O.K
Strength - I-2	4.6	30	46.64	111	17.72	-88	O.K
Strength - I-3	1.6	30	61.27	111	43.09	-88	O.K
Extremme Event - I-1	6.9	20	70.64	111	25.53	-88	O.K
Extremme Event - I-1	7.0	20	62.80	111	4.84	-88	O.K

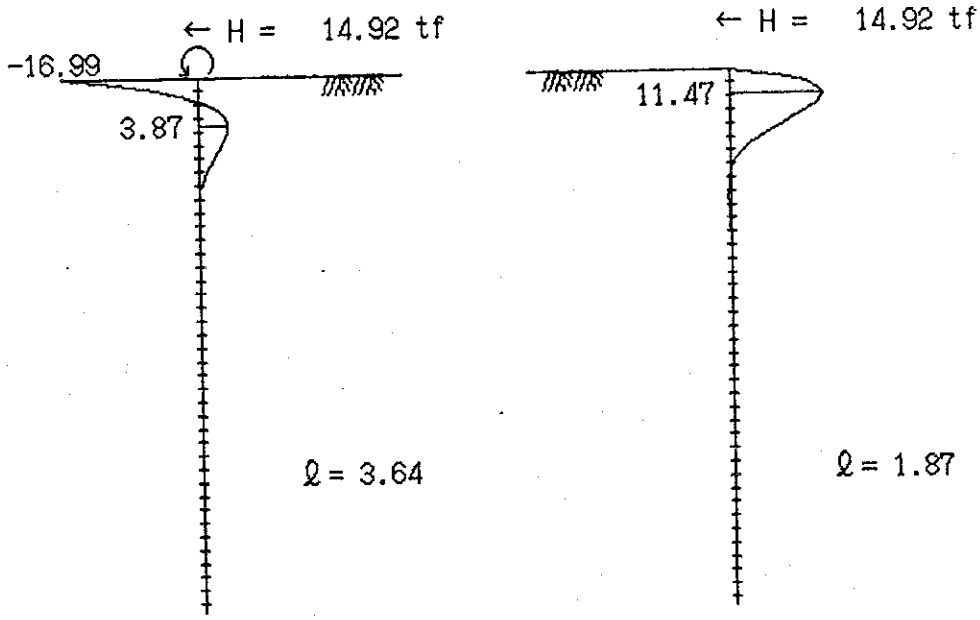
PILE SECTION

Checking stress

Load Combination	σ s (kg/cm2)		σ c (kg/cm2)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	1342.3	2250	105.3	125	OK
Combination 2	1657.3	2250	98.2	125	OK
Combination 3	-674.0	2250	50.4	125	OK
Combination 4	2479.1	3000	145.9	150	OK
Combination 5	2913.5	3000	143.4	150	OK

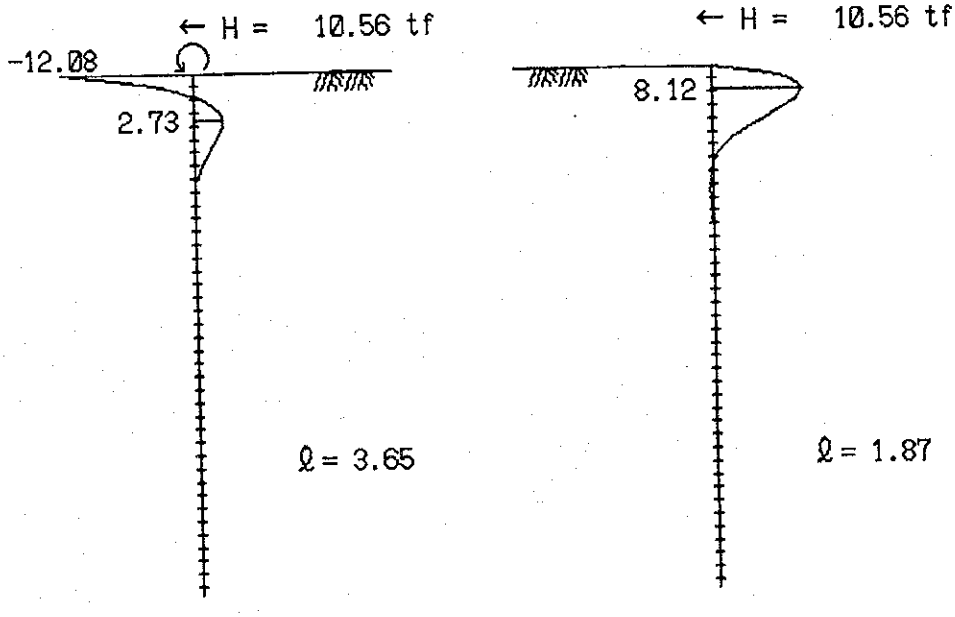
Notes : σ s Stress of reinforcement (kg/cm2)
σ c Stress of concrete (kg/cm2)

<Longitudinal Direction, Extreme Event I-1>



(Pile Head: Rigid) (Pile Head: Hinge)

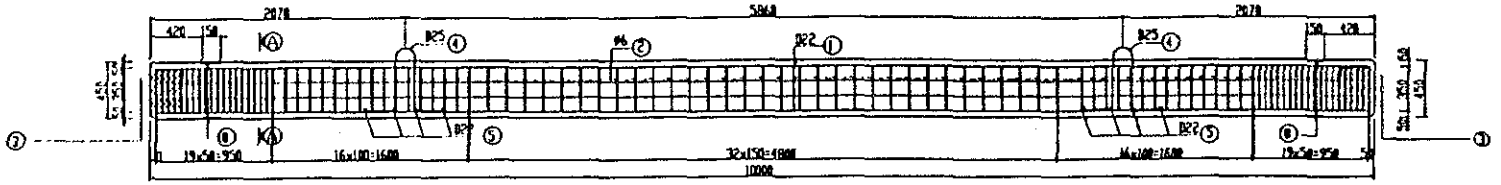
<Longitudinal Direction, Strength I>



(Pile Head: Rigid) (Pile Head: Hinge)

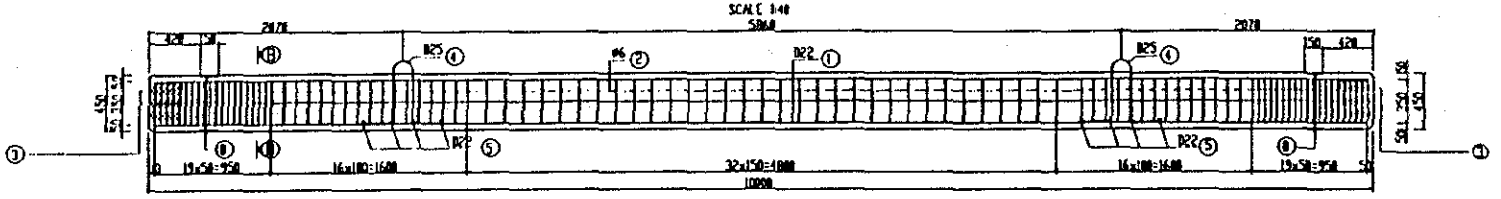
R.C.PILE-1 L=10M

SCALE 1:40



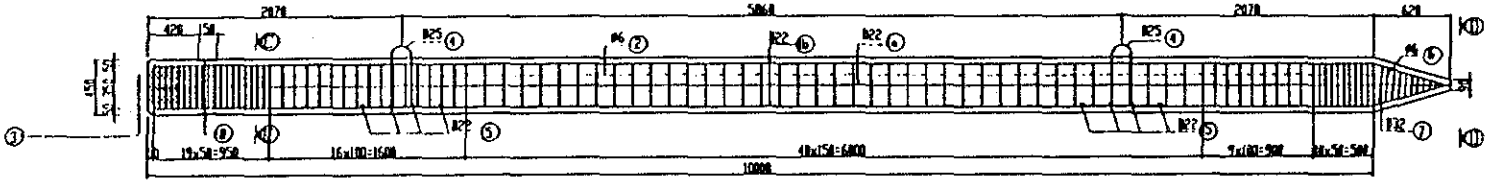
R.C.PILE-2 L=10M

SCALE 1:40



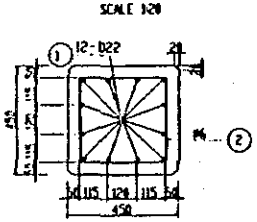
R.C.PILE-3 L=10M

SCALE 1:40



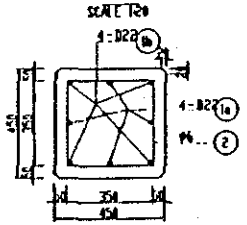
A-A

SCALE 1:20



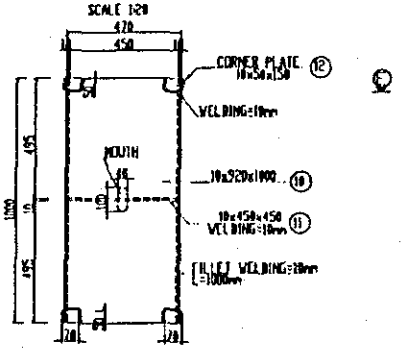
C-C

SCALE 1:20



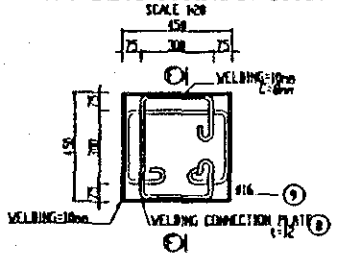
CONPLING BOX

SCALE 1:20



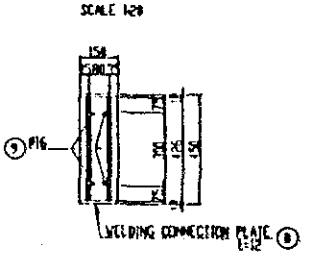
WELDING CONNECTION PLATE

SCALE 1:20



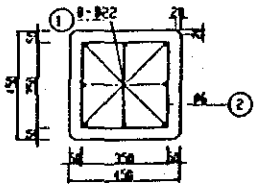
F-F

SCALE 1:20



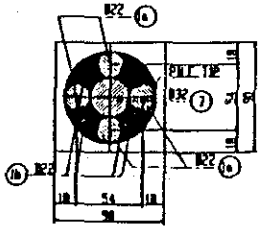
B-B

SCALE 1:20



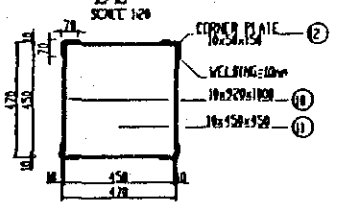
D-D

SCALE 1:4



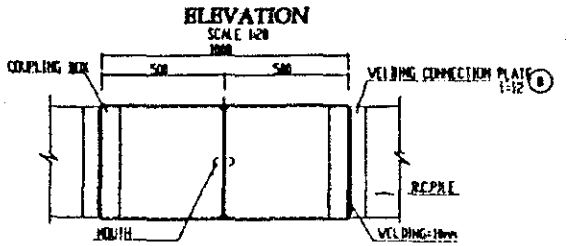
E-E

SCALE 1:20



ELEVATION

SCALE 1:20



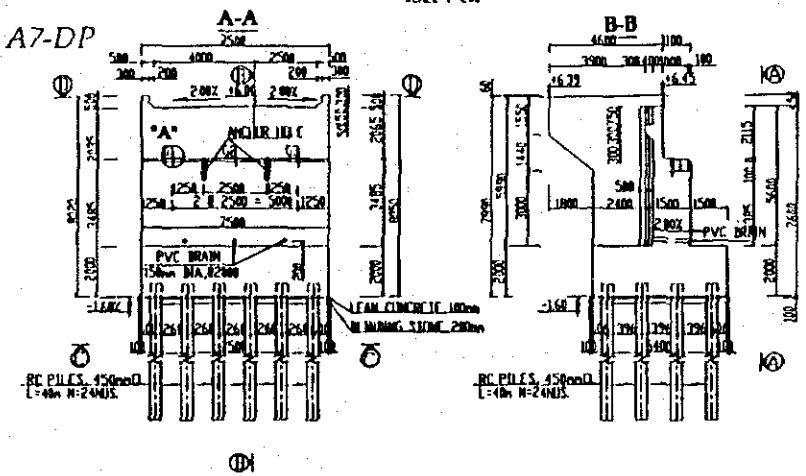
MARKING

PROJECT NAME	IMPLIMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF TIEU CAN 1 HO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kametani	K.Matsumoto	K. Enomoto	CAI NAI BRIDGE ABUTMENTS ABUTMENTS A1&A2-RC PILE(450-L=40.0m-SHEET 1	P3/BR5/02(6)
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

(8) *ABUTMENT,* *TYPE A7-DP*

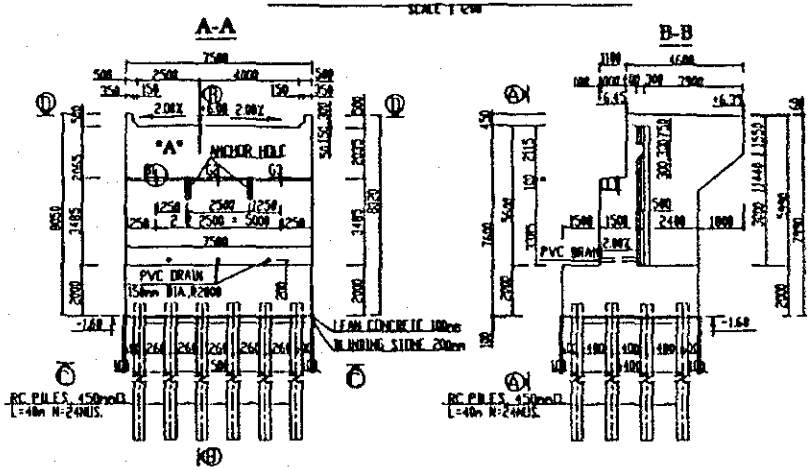
DETAIL OF ABUTMENT A1

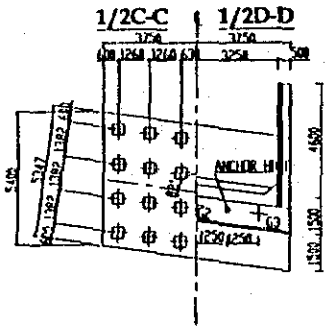
SCALE 1:200



DETAIL OF ABUTMENT A2

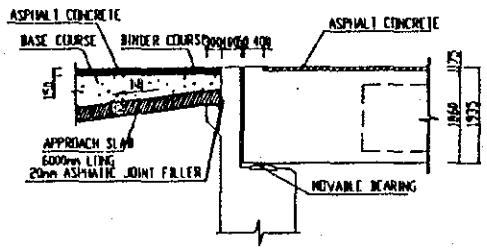
SCALE 1:200

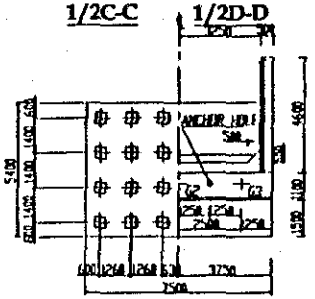




DETAIL OF BACK WALL

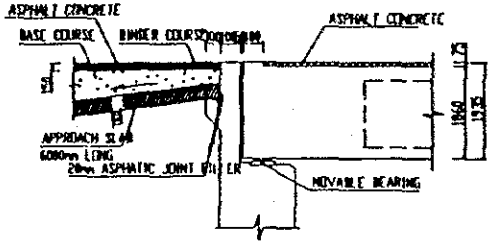
(SCALE 1:100)





DETAIL OF BACK WALL

(SCALE 1:100)

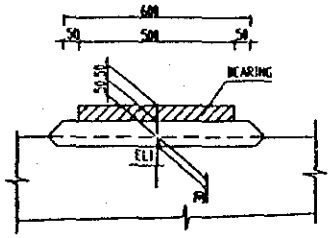


GIRDER BEARING SEAT ELEVATION OF EL1

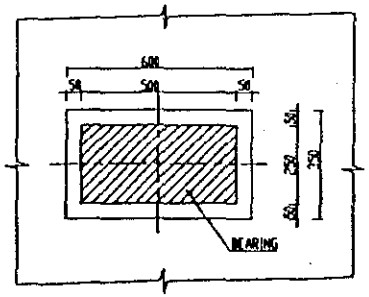
GROUT PAD / ABUTMENT TYPE	G1	G2	G3
A1	+3.89	+3.89	+3.89

DETAIL "A"

(SCALE 1:20)

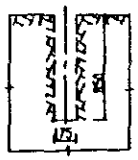


PLAN



DETAIL OF ANCHOR HOLE

(SCALE 1:30)



GIRDER BEARING SEAT ELEVATION OF EL1

GROUT PAD / ABUTMENT TYPE	G1	G2	G3
A1	+3.89	+3.89	+3.89

NOTE

FOR STANDARD STRUCTURAL NOTES SEE DRAWING NO.P3/BR9/8030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kametani	K.Matsumoto	K. Enomoto	RAMPWAY"D"BRIDGE-INTERCHANGE 3 ABUTMENTS GENERAL VIEW OF ABUTMENTS A1&A2	P3/BR9/8029
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS RAMWAYD ABUTMENT A1 (H=7.6M)

Abutment DC 362 T e_x= -0.11 m e_y= 0.45 m

Nos	Items	Pz			Hx			My			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	
	Permanent load										
1	Superstructure - DC (n=0.9,1.25)	136	122	170				61	55	77	
2	Wearing surface - DW (n=0.65,1.5)	30	20	45				14	9	20	
3	Abutment - DC (n=0.9,1.25)	362	326	453				-40	-36	-50	
4	Horizontal earth pressure - EH (n=0.9,1.35)				112	81	185	283	204	469	
5	Horizontal earth pressure - E_{AE} (n=0.9,1.35)				140	104	228	355	262	578	
6	Vertical earth pressure - EV (n=0.9,1.35)	195	175	263				-292	-263	-395	
	Transient Loads										
7	Live load - LL(n= 0.5,1.75)	84	42	148				38	19	66	
	a- Main load	71	36	125				32	16	56	
	b- Sub load	13	6	23				6	3	10	
8	Dynamic load allowance - IM (n=0.5,1.75)	28	14	49				13	6	22	
	a- Main load	24	12	41				11	5	19	
	b- Sub load	4	2	7				2	1	3	
9	Live load surcharge - LS (n=0.9,1.35)				15	11	26	59	42	97	
10	Braking force - BR (n=0.5,1.75)				18	9	32	169	85	296	25% of Japanese Load - p1
11	Friction force - FR (n=1)										f=0.05
	a- Dead load				0			0			
	b- Dead load + Live load				0			0			
12	Earthquake - EQ (n=1)				60			201			12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My
1	1127	242	603
2	643	211	331
3	1,127	60	-310
4	987	323	638
5	700	323	751

Combination 1 1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)
Combination 2 0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)
Combination 3 1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)
Combination 4 1.25DC + 1.5DW + 1.35EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + 1EQ
Combination 5 0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (kN)		Uplift Capacity (kN)		Remarks
	Actual	Allowable	Pmax	Allowable	Pmin	Allowable	
Strength I-1	13.6	30	4315	7061	1211	-4913	OK
Strength I-2	11.2	30	2689	7061	464	-4913	OK
Strength I-3	1.8	30	2947	7061	2579	-4913	OK
Extremme Event I-1	17.6	20	4285	7061	555	-4913	O.K
Extremme Event I-2	18	20	3721	7061	-289	-4913	OK

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) / A's = 8 cm2 (D=1.6cm, 4 Nos)
1	138	184	1363	1422	OK	ρs = As/Ac = 0.0020
2	98	130			OK	ρ min = 0.03 f'c/fy = 0.0018
3	25	33			OK	∴ ρs > ρ min —— O.K
4	143	191			OK	c/de = 0.04
5	144	191			OK	∴ c/de < 0.42 —— O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) / A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72	98	98	OK	ρs = As/Ac = 0.0031
						ρ min = 0.03 f'c/fy = 0.0018
						∴ ρs > ρ min —— O.K
						c/de = 0.05
						∴ c/de < 0.42 —— O.K

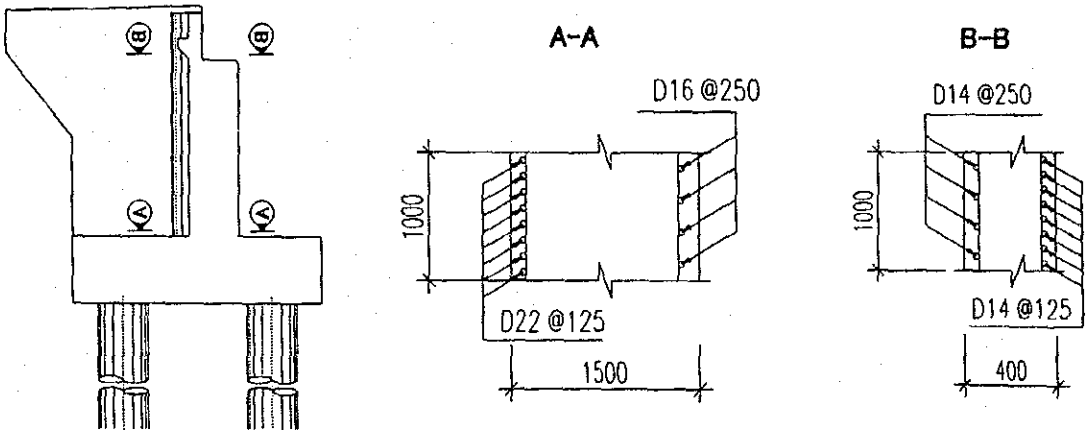
FOR SERVICE LIMIT STATE

Cracking

Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·f'y (MPa)	fsa < 0.6·f'y
1	72.28	159.4	98.8	229.5	OK

Stress

Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	$fr = 0.63\cdot(fc)^{0.5}$	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK



FOOTING

B abutment 7.50 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

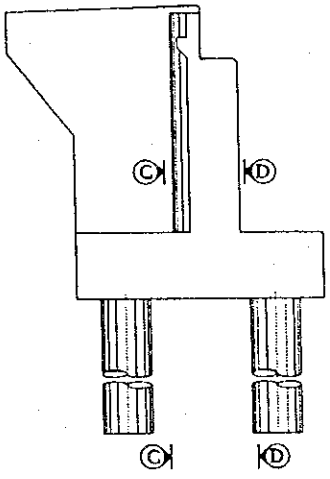
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	224	298	2422	2363	OK	ρs = As/Ac = 0.0020
2	407	542			OK	ρ min = 0.03 f'c/fy = 0.0018
3	0	0			OK	∴ ρs > ρ min ——— O.K
4	434	577			OK	c/de = 0.00
5	648	862			OK	∴ c/de < 0.42 ——— O.K

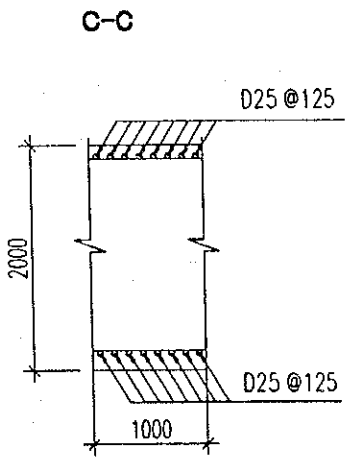
SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

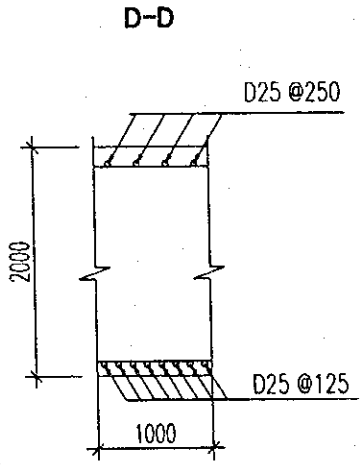
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 39 cm2 (D=2.5cm, 8 Nos)
1	907	1206	2422	2363	OK	ρs = As/Ac = 0.0020
2	442	588			OK	ρ min = 0.03 f'c/fy = 0.0018
3	469	624			OK	∴ ρs > ρ min ——— O.K
4	897	1193			OK	c/de = 0.00
5	773	1027			OK	∴ c/de < 0.42 ——— O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) / A's = 20 cm2 (D=2.5cm, 4 Nos)
1	1182	1572	2422	2422	OK	ρs = As/Ac = 0.0020
2	717	954			OK	ρ min = 0.03 f'c/fy = 0.0018
3	744	990			OK	∴ ρs > ρ min ——— O.K
4	1173	1560			OK	c/de = 0.02
5	1048	1394			OK	∴ c/de < 0.42 ——— O.K







Abutment Type A-7

STABILITY CALCULATION

Longitudinal direction

Load Combination	Displacement δ (mm)		Bearing Capacity (T)		Uplift Capacity (T)		Remarks
	Actual	Allowable	P_{max}	Allowable	P_{min}	Allowable	
Strength - I-1	5.1	30	77.40	95	16.51	-76	O.K
Strength - I-2	4.3	30	46.69	95	6.90	-76	O.K
Strength - I-3	0.9	30	55.10	95	38.82	-76	O.K
Extremme Event - I-1	6.6	20	76.06	95	6.19	-76	O.K
Extremme Event - I-1	6.7	20	67.96	95	-9.63	-76	O.K

PILE SECTION

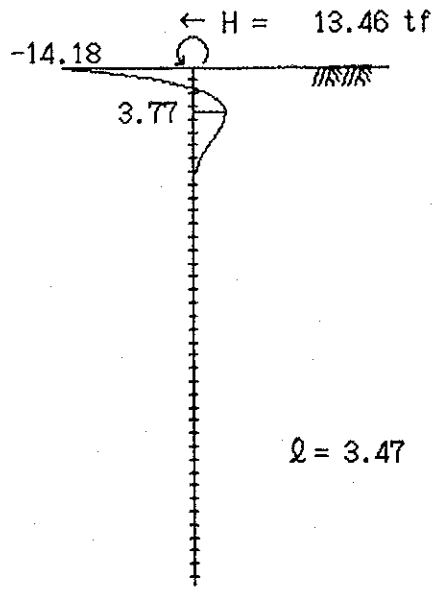
Checking stress

Load Combination	σ s (kg/cm2)		σ c (kg/cm2)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	1496.4	2250	93.2	125	OK
Combination 2	1539.6	2250	81.5	125	OK
Combination 3	-540.5	2250	39.9	125	OK
Combination 4	2415.1	3000	123.3	150	OK
Combination 5	2753.9	3000	120.8	150	OK

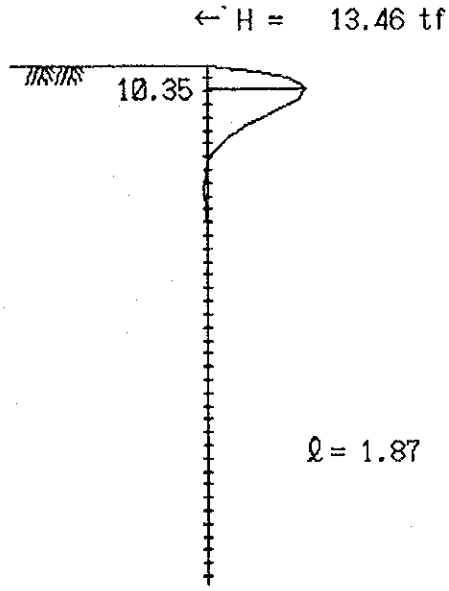
Notes : σ s Stress of reinforcement (kg/cm2)

σ c Stress of concrete (kg/cm2)

<Longitudinal Direction, Extreme Event I-1>

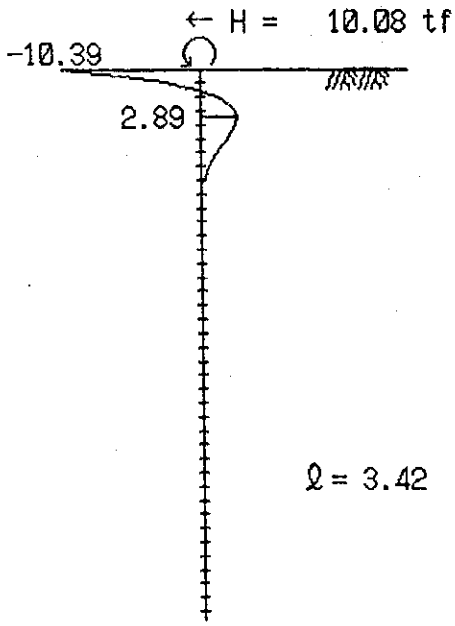


(Pile Head: Rigid)



(Pile Head: Hinge)

<Longitudinal Direction, Strength I>



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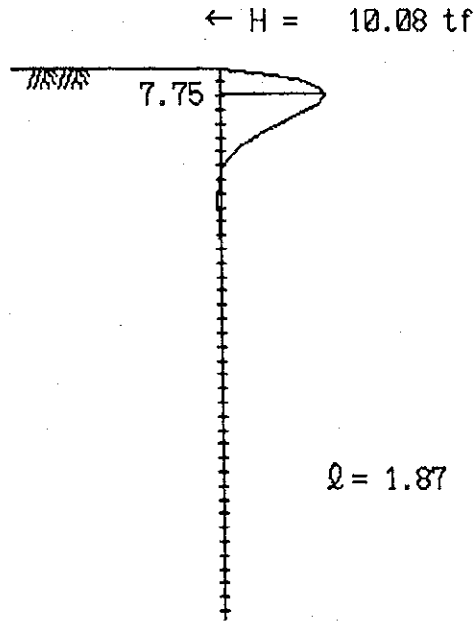
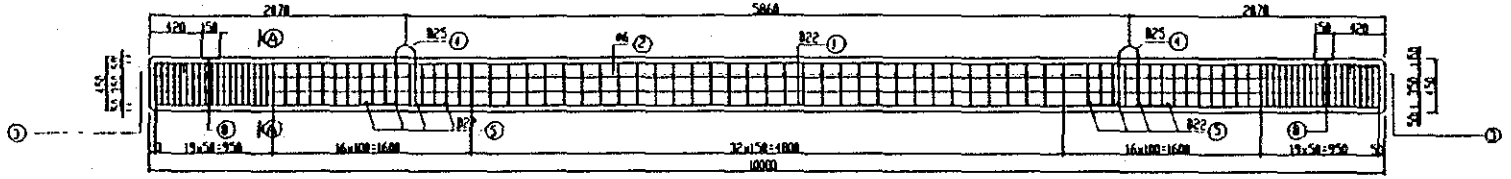


(Pile Head: Hinge)

R.C.PILE-1 L=10M

SCALE 1:40



R.C.PILE-2 L=10M

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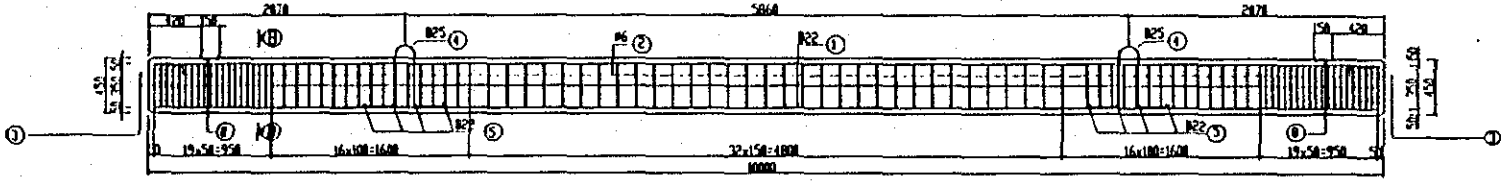

R.C.PILE-3 L=10M

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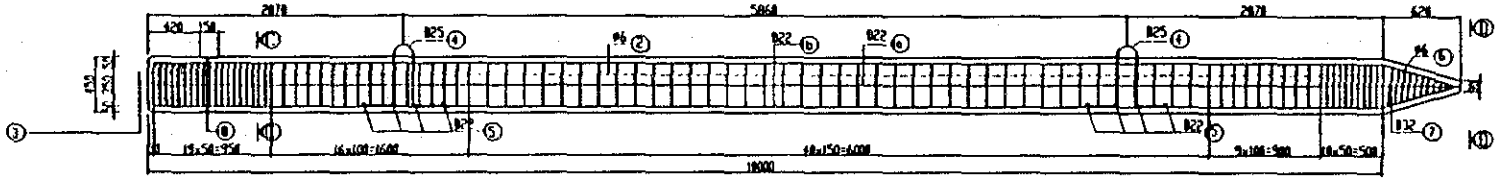
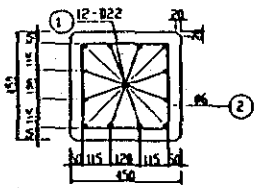


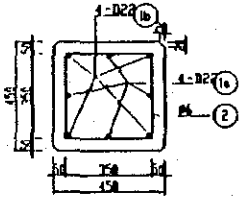
A-A

SCALE 1:20



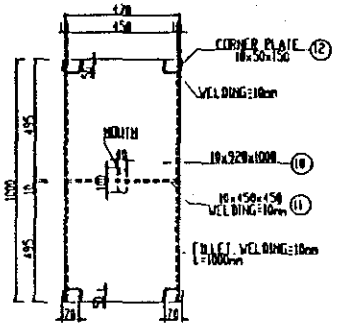
C-C

SCALE 1:20



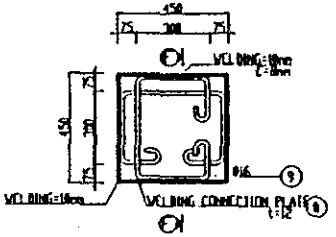
CONPLING BOX

SCALE 1:20



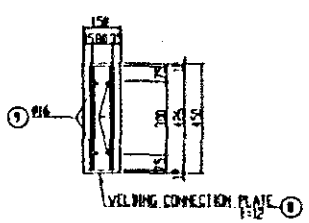
WELDING CONNECTION PLATE

SCALE 1:20



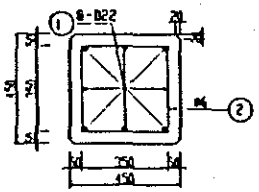
F-F

SCALE 1:20



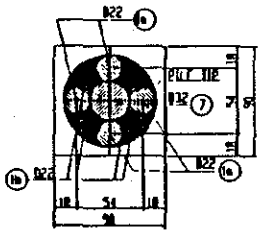
B-B

SCALE 1:20



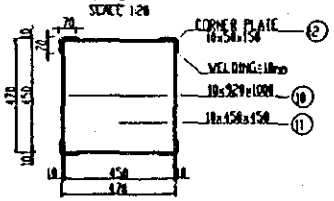
D-D

SCALE 1:4



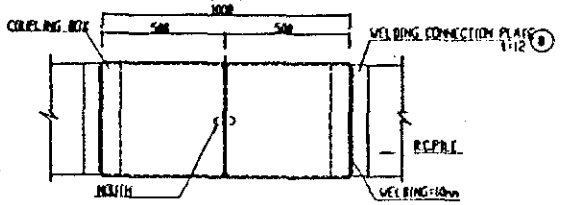
E-E

SCALE 1:20



ELEVATION

SCALE 1:20



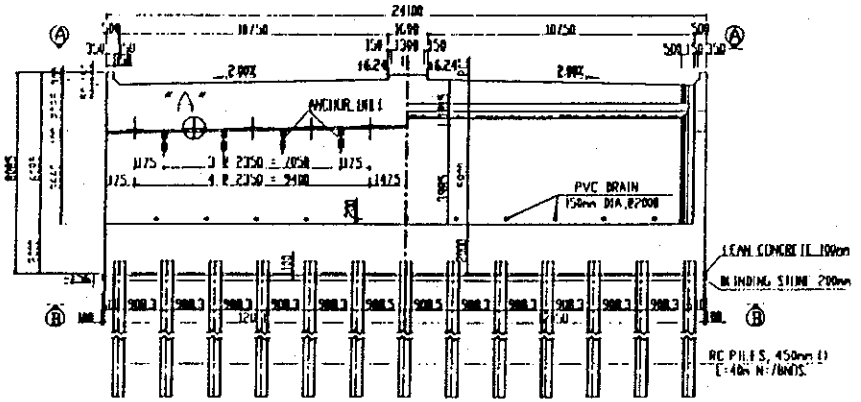
MARKING

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kametani	K.Matsumoto	K. Enomoto	RAMPWAY"D"BRIDGE-INTERCHANGE 3 ABUTMENTS ABUTMENTS A1&A2-RC PILE(450-L=40.0m-SHEET 1	PS/B05/0380
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

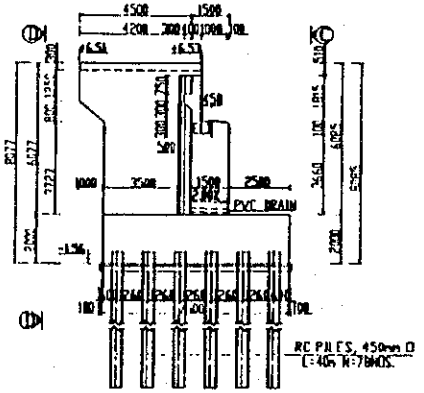
DETAIL OF ABUTMENT

(9) ABUTMENT, TYPE A9-DP

1/2 C-C **1/2 D-D**



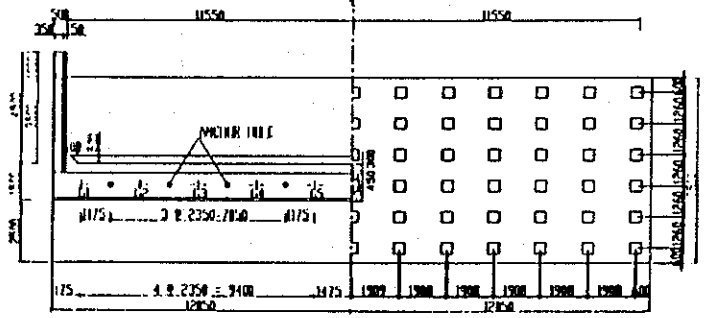
SIDE ELEVATION



DETAIL OF ANCHOR HOLE

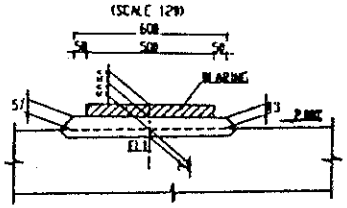
(SCALE 1:50)

1/2 A-A **1/2 B-B**



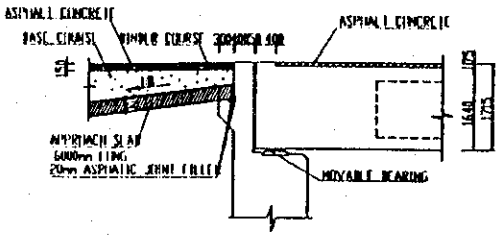
DETAIL "A"

(SCALE 1:20)

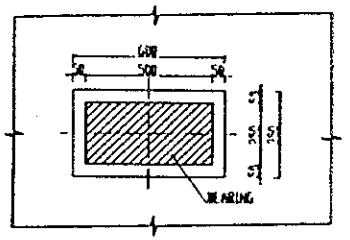


DETAIL OF BACK WALL

(SCALE 1:100)



PLAN



GIRDER BEARING SEAT ELEVATION OF EL1

GIRDER P/N / ABUTMENT	G1	G2	G3	G4	G5
A1-A2	+4.25	+4.29	+4.34	+4.39	+4.43

NOTE

FOR STANDARD STRUCTURAL NOTES SEE DRAWING No. P3/BR4/8030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kametani	K.Matsuzoto	K. Enomoto	BA MANG BRIDGE ABUTMENTS GENERAL VIEW OF ABUTMENTS A1&A2	P3/BR4/8180
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	5/10/2000		

2. LOAD COMBINATIONS BAMANG ABUTMENT A1 (H=7,8M)

Abutment DC 1350 T e_x= 0.03 m e_y= 0.60 m

Nos	Items	Pz			Hx			My			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	
	Permanent load										
1	Superstructure - DC (n=0.9,1.25)	451	406	564				271	243	338	
2	Wearing surface - DW (n=0.65,1.5)	50	33	76				30	20	45	
3	Abutment - DC (n=0.9,1.25)	1,350	1,215	1,687				44	39	54	
4	Horizontal earth pressure - EH (n=0.9,1.35)				377	273	627	981	709	1,630	
5	*Horizontal earth pressure* - E_{AE} (n=0.9,1.35)				474	350	772	1,233	911	2,008	
6	Vertical earth pressure - EV (n=0.9,1.35)	922	830	1,244				-1,783	-1,604	-2,407	
	Transient Loads										
7	Live load - LL(n= 0.5,1.75)	257	129	450				154	77	270	
	a- Main load	184	92	322				110	55	193	
	b- Sub load	73	37	128				44	22	77	
8	Dynamic load allowance - IM (n=0.5,1.75)	85	42	149				51	25	89	
	a- Main load	61	30	106				36	18	64	
	b- Sub load	24	12	42				15	7	25	
9	Live load surcharge - LS (n=0.9,1.35)				51	37	85	199	143	330	
10	Braking force - BR (n=0.5,1.75)				49	24	85	488	244	853	25% of Japanese Load - p1
11	*Friction force - FR (n=1)*										f=0.05
	a- Dead load				0			0			
	b- Dead load + Live load				0			0			
12	Earthquake - EQ (n=1)				262			921			12% of Dead load

LOAD COMBINATION TABLE

Load combinations	Pz	Hx	My
1	4170	797	1203
2	2,483	711	657
3	4,170	224	-1,611
4	3,742	1,143	1,636
5	2,654	1,143	2,303

Combination 1 1.25DC + 1.5DW + 1.35EV + 1.35EH + 1.75LL + 1.75IM + 1.35LS + 1.75BR + 1FR(b)
Combination 2 0.9DC + 0.65DW + 0.9EV + 1.35EH + 1.35LS + 1FR(a)
Combination 3 1.25DC + 1.5DW + 1.35EV + 0.9EH + 1.75LL + 1.75IM + 0.9LS - 1.75BR - 1FR(b)
Combination 4 1.25DC + 1.5DW + 1.35EV + *1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b)* + 1EQ
Combination 5 0.9DC + 0.65DW + 0.9EV + 1.35EAE + 0.5LL + 0.5IM + 1.35LS + 0.5BR + 1FR(b) + EQ

WALL

Section A-A (h = 150 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 30 cm2 (D=2.2cm, 8 Nos) / A's = 8 cm2 (D=1.6cm, 4 Nos)
1	325	432			OK	ρ s = As/Ac = 0.0020
2	232	309			OK	ρ min = 0.03 f'c/fy = 0.0018
3	57	75	1363	1422	OK	∴ ρ s > ρ min ——— O.K
4	341	453			OK	c/de = 0.04
5	348	463			OK	∴ c/de < 0.42 ——— O.K

Section B-B (h = 40 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 12 cm2 (D=1.4cm, 8 Nos) / A's = 6 cm2 (D=1.4cm, 4 Nos)
1	54	72			OK	ρ s = As/Ac = 0.0031
						ρ min = 0.03 f'c/fy = 0.0018
			98	98		∴ ρ s > ρ min ——— O.K
						c/de = 0.05
						∴ c/de < 0.42 ——— O.K

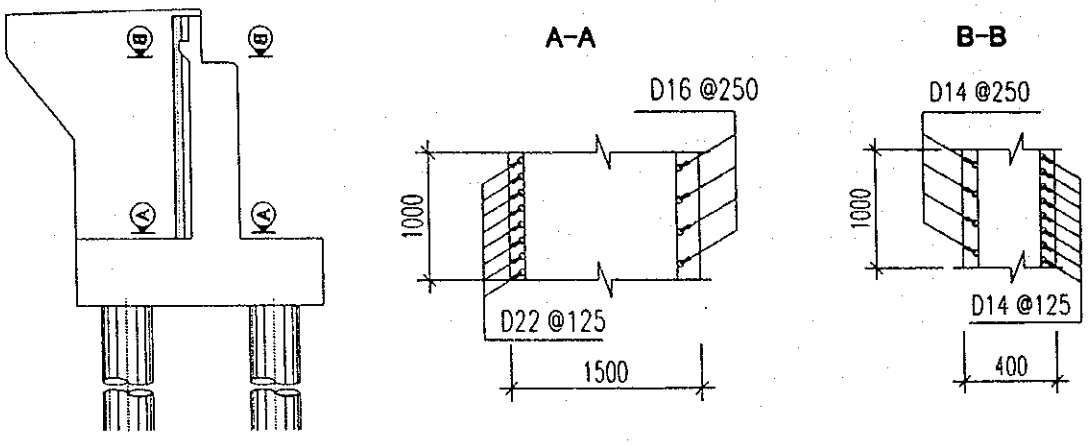
FOR SERVICE LIMIT STATE

Cracking

Combination	M (kN·m)	fsa (MPa)	fs (MPa)	0.6·fy (MPa)	fsa < 0.6·fy
1	72.28	159.4	98.8	229.5	OK

Stress

Actual			Allowable			Remark
fc tensile	=	1.31 (MPa)	fr = 0.63·(fc)$^{0.5}$	=	3.03 (MPa)	OK
fc compress	=	1.34 (MPa)	fca = 0.4fc	=	9.41 (MPa)	OK
fs	=	4.92 (MPa)	fsa = 0.6fy	=	229.48 (MPa)	OK



FOOTING

B abutment 24.10 (m)

SECTION C-C TOP FIBRE (h = 200 cm , b = 100 cm)

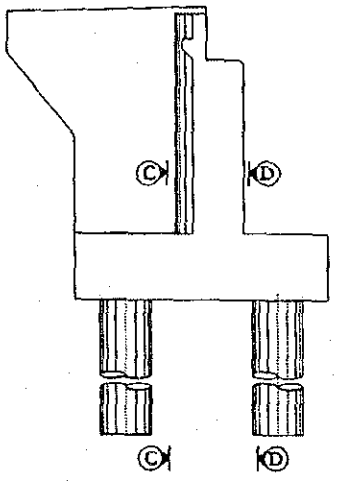
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) A's = 39 cm2 (D=2.5cm, 8 Nos)
1	380	506	2422	2295	OK	ρs = As/Ac = 0.0020
2	841	1118			OK	ρmin = 0.03 f'c/fy = 0.0018
3	0	0			OK	∴ ρs > ρmin ——— O.K
4	786	1045			OK	c/de = 0.00
5	1220	1623			OK	∴ c/de < 0.42 ——— O.K

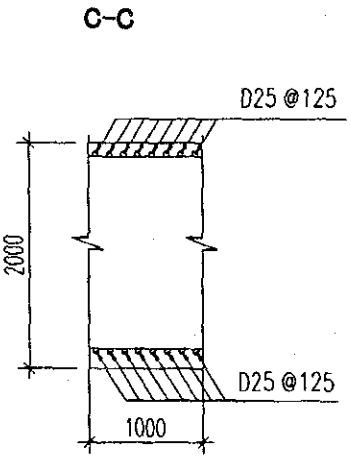
SECTION C-C BOTTOM FIBRE (h = 200 cm , b = 100 cm)

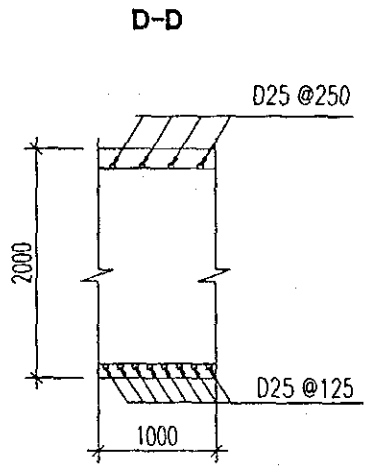
Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) A's = 39 cm2 (D=2.5cm, 8 Nos)
1	1125	1496	2422	2295	OK	ρs = As/Ac = 0.0020
2	423	562			OK	ρmin = 0.03 f'c/fy = 0.0018
3	687	913			OK	∴ ρs > ρmin ——— O.K
4	1182	1573			OK	c/de = 0.00
5	942	1252			OK	∴ c/de < 0.42 ——— O.K

SECTION D-D BOTTOM FIBRE (h = 200 cm , b = 100 cm)

Combination	M (kN·m)	1.33M (kN·m)	1.2Mcr (kN·m)	Mr=φMn (kN·m)	1.33M < 1.2Mcr or Mr	As = 39 cm2 (D=2.5cm, 8 Nos) A's = 20 cm2 (D=2.5cm, 4 Nos)
1	755	1004	2422	2383	OK	ρs = As/Ac = 0.0020
2	456	606			OK	ρmin = 0.03 f'c/fy = 0.0018
3	535	712			OK	∴ ρs > ρmin ——— O.K
4	783	1042			OK	c/de = 0.02
5	715	951			OK	∴ c/de < 0.42 ——— O.K







Abutment Type A-9

STABILITY CALCULATION

Longitudinal direction

Load Combination	acement δ (mm)		Bearing Capacity (T)		Uplift Capacity (T)		Remarks
	Actual	Allowable	P_{max}	Allowable	P_{min}	Allowable	
Strength - I-1	4.8	30	71.80	116	35.13	-92	O.K
Strength - I-2	4.2	30	44.65	116	19.02	-92	O.K
Strength - I-3	1.1	30	64.90	116	42.02	-92	O.K
Extremme Event - I-1	6.8	20	73.51	116	22.44	-92	O.K
Extremme Event - I-1	6.9	20	65.24	116	2.81	-92	O.K

PILE SECTION

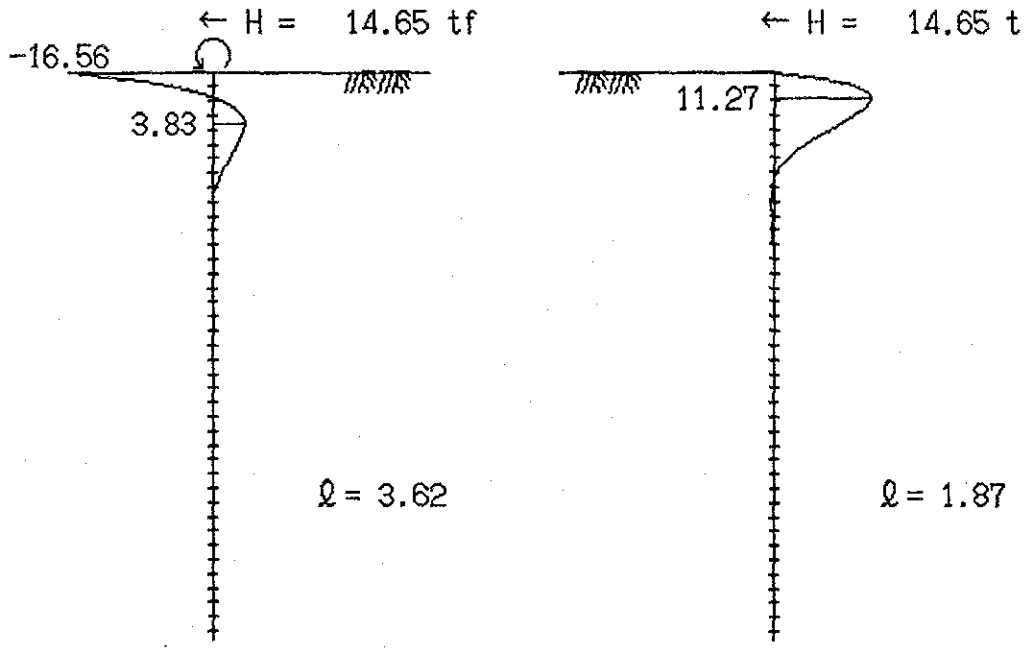
Checking stress

Load Combination	σ s (kg/cm2)		σ c (kg/cm2)		Remark
	Actual	Allowable	Actual	Allowable	
Combination 1	1299.9	2250	101.4	125	OK
Combination 2	1444.3	2250	89.6	125	OK
Combination 3	-623.7	2250	45.9	125	OK
Combination 4	2472.0	3000	142.7	150	OK
Combination 5	2888.9	3000	140.3	150	OK

Notes : σ s Stress of reinforcement (kg/cm2)

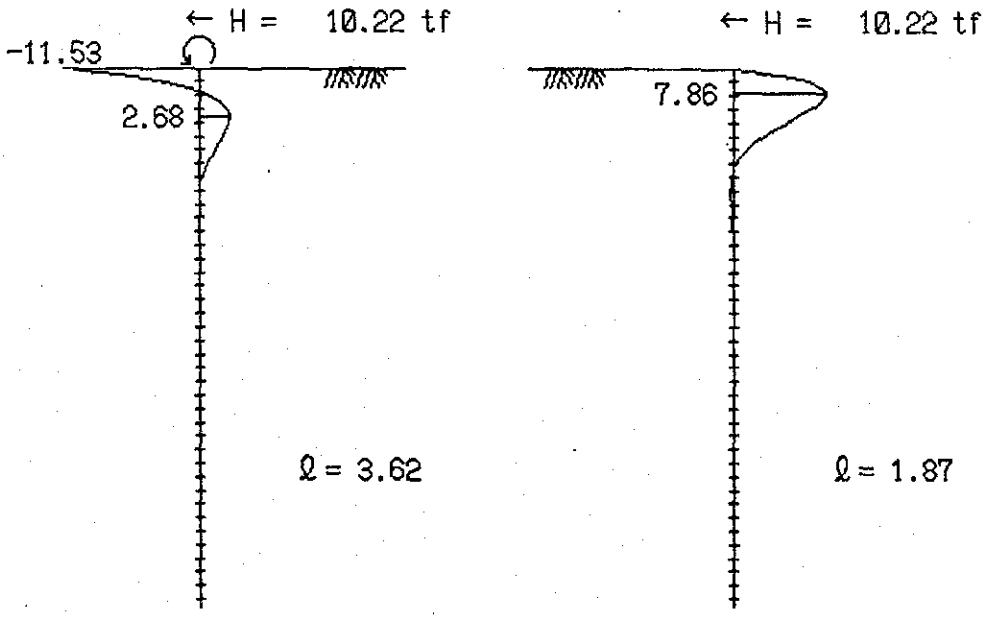
σ c Stress of concrete (kg/cm2)

<Longitudinal Direction, Extreme Event I-1>



(Pile Head: Rigid) (Pile Head: Hinge)

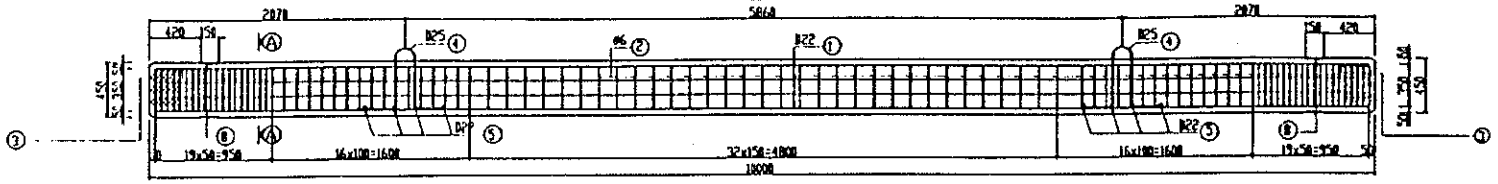
<Longitudinal Direction, Strength I>



(Pile Head: Rigid) (Pile Head: Hinge)

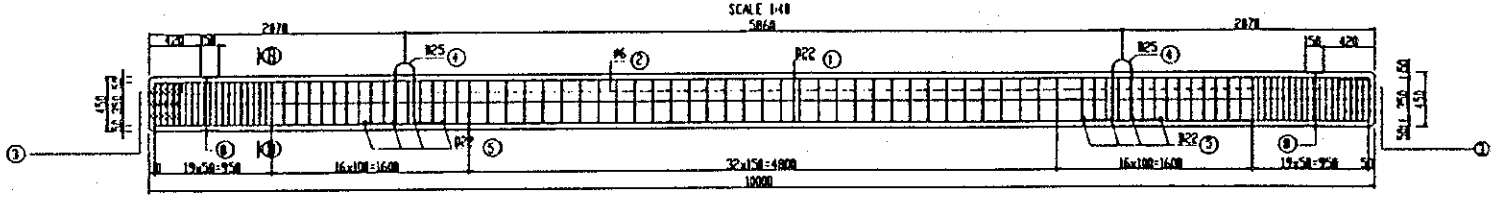
R.C.PILE-1 L=10M

SCALE 1:40



R.C.PILE-2 L=10M

SCALE 1:40



R.C.PILE-3 L=10M

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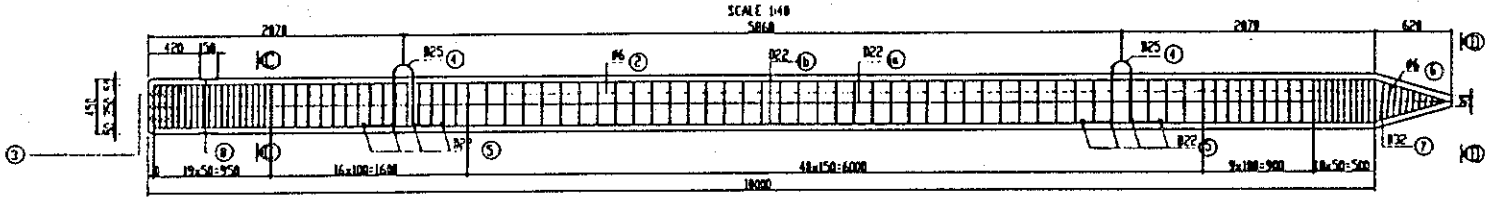
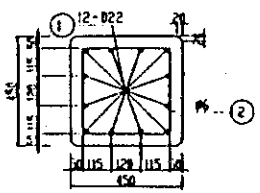


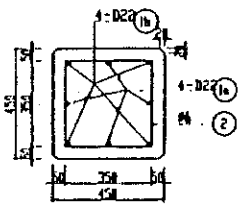
A-A

SCALE 1:20



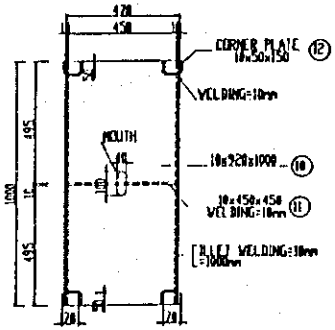
C-C

SCALE 1:20



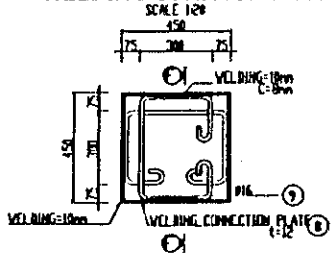
CONPLING BOX

SCALE 1:20



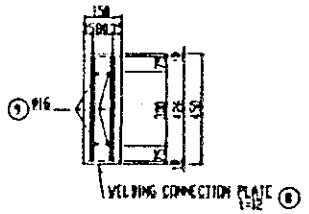
WELDING CONNECTION PLATE

SCALE 1:20



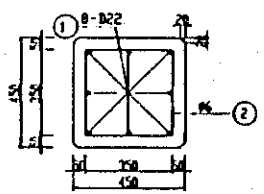
F-F

SCALE 1:20



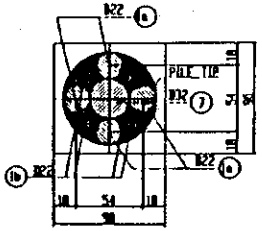
B-B

SCALE 1:20



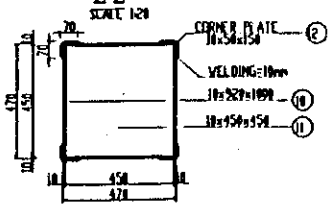
D-D

SCALE 1:4



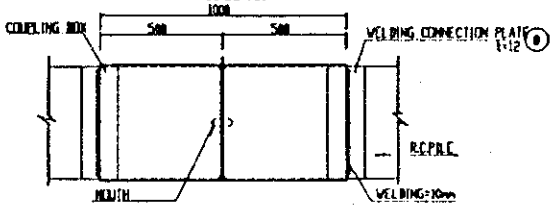
E-E

SCALE 1:20

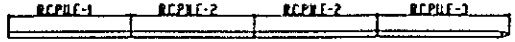


ELEVATION

SCALE 1:20



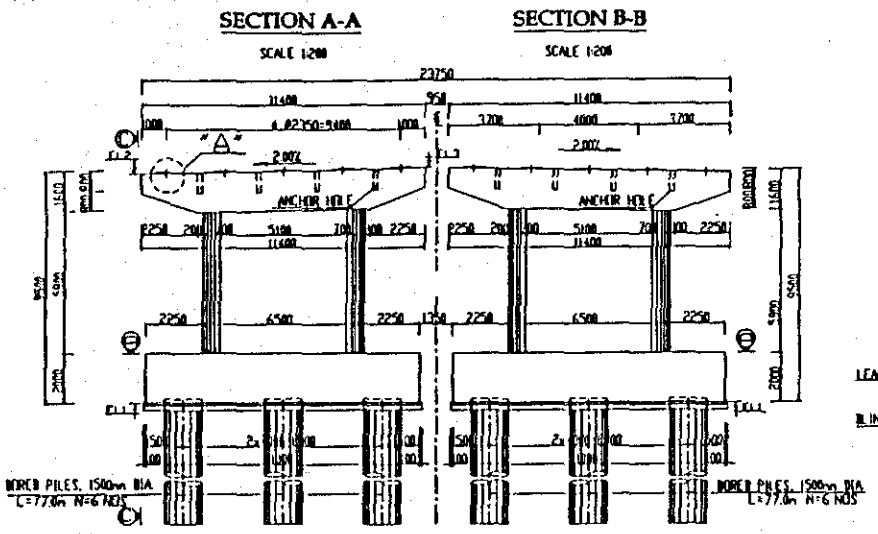
MARKING

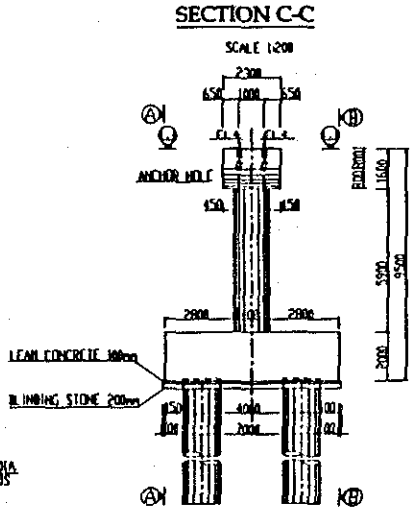


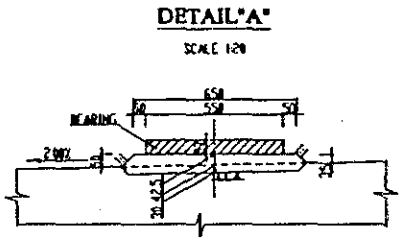
PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kametani	K.Matsumoto	K. Enomoto	BA MANG BRIDGE ABUTMENTS ABUTMENTS A1&A2-RC PILE:Ø450-L=40.0m-SHEET 1	P3/BM4/0190
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	3/10/2000		

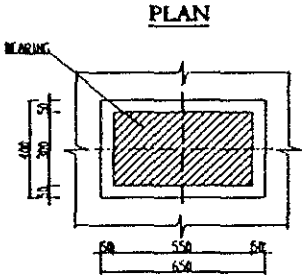
3.2 PIERS

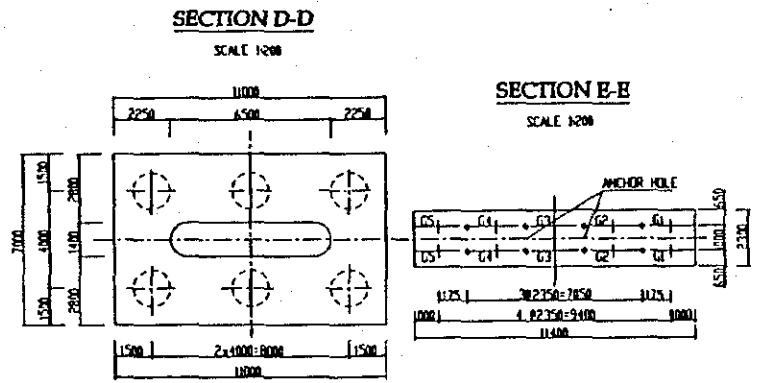
(1) PIER, TYPE P2











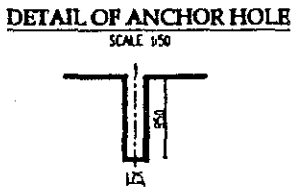


TABLE OF ELEVATION

DIRECTION	PIERS	EL.1	EL.2	EL.3	EL.4				
					G1	G2	G3	G4	G5
HO CHI MINH CITY - CA MAU	P1	-1.94	+7.45	+7.68	+7.63	+7.57	+7.49	+7.44	+7.37
	P6	-1.76	+7.62	+7.86	+7.81	+7.75	+7.67	+7.62	+7.55
CA MAU - HO CHI MINH CITY	P1	-2.05	+7.34	+7.57	+7.52	+7.45	+7.38	+7.32	+7.26
	P6	-0.65	+8.73	+8.96	+8.91	+8.85	+8.77	+8.72	+8.65

NOTES:

FOR STANDARD STRUCTURAL NOTES SEE DRAWING NO.P1/BR3/0030

PROJECT NAME	IMPLEMENTATION AGENCY	EXECUTING AGENCY	JICA STUDY TEAM		PREPARED BY	CHECKED BY	APPROVED BY	DRAWING TITLE	DWG NO.
DETAILED DESIGN OF TRA ON TRO BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	SOCIALIST REPUBLIC OF VIET NAM MINISTRY OF TRANSPORT (MOT) MY THUAN PROJECT MANAGEMENT UNIT	NIPPON KOEI CO.,LTD.	NAME	T. Kamotani	K. Matsumoto	K. Enomoto	TRA ON BRIDGE PIERS PIER P1&P6-GENERAL VIEW	P1/BR3/0040
				SIGNATURE					
				DATE	20/9/2000	29/9/2000	3/10/2000		

2. LOAD COMBINATIONS - TRA ON PIER 1

Nos	Items	Pz			Hx			My			Hy			Mx			Notes
		n=1	n<1	n>1	n=1	N<1	n>1	n=1	n<1	n>1	n=1	n<1	n>1	n=1		n>1	
	Permanent load																
1	Superstructure - Continuous span	363	301	416				127	105	146							
2	Superstructure - Simple span	379	333	483				-247	-216	-314							
3	Pier	565	509	706													
	Transient Loads																
4	***Live load - each spans***																
	a- Continuous span																
	+ Live load - LL(n= 0.5,1.75)	157	78	274				55	27	96							
	+ Live load - LL(n= 0.8,1.35)	157	125	212				55	44	74							
	+ Dynamic load allowance - IM (n=0.5,1.75)	52	26	90				18	9	32							
	+ Dynamic load allowance - IM (n=0.8,1.35)	52	41	70				18	14	24							
	b- Simple span																
	+ Live load - LL(n= 0.5,1.75)	131	66	229				-85	-43	-149							
	+ Live load - LL(n= 0.8,1.35)	131	105	177				-85	-68	-115							
	+ Dynamic load allowance - IM (n=0.5,1.75)	43	22	76				-28	-14	-49							
	+ Dynamic load allowance - IM (n=0.8,1.35)	43	35	58				-28	-23	-38							
5	***Live load - Both spans***																
	a- Continuous span																
	+ Live load - LL(n= 0.5,1.75)	58	29	101				20	10	35							
	+ Live load - LL(n= 0.8,1.35)	58	46	78				20	16	27							
	+ Dynamic load allowance - IM (n=0.5,1.75)	19	10	33				7	3	12							
	+ Dynamic load allowance - IM (n=0.8,1.35)	19	15	26				7	5	9							
	b- Simple span																
	+ Live load - LL(n= 0.5,1.75)	131	66	229				-85	-43	-149							
	+ Live load - LL(n= 0.8,1.35)	131	105	177				-85	-68	-115							
	+ Dynamic load allowance - IM (n=0.5,1.75)	43	22	76				-28	-14	-49							
	+ Dynamic load allowance - IM (n=0.8,1.35)	43	35	58				-28	-23	-38							
6	Braking force - BR (n=0.5,1.75)				-19	-9	-33	-188	-94	-330							25% of
	Braking force - BR (n=0.8,1.35)				-19	-15	-25	-188	-151	-254							