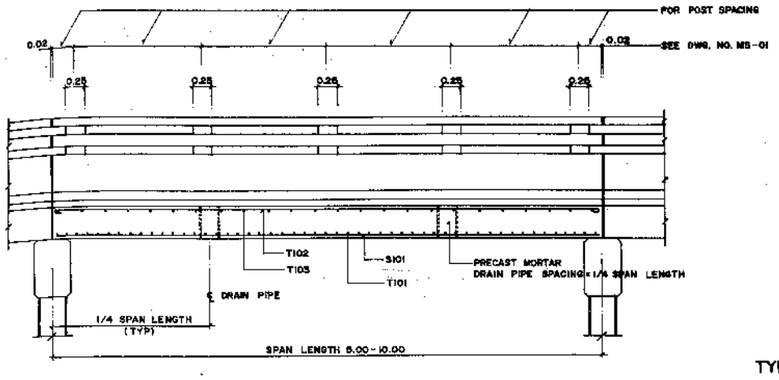
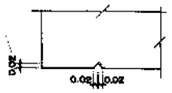
PART 2

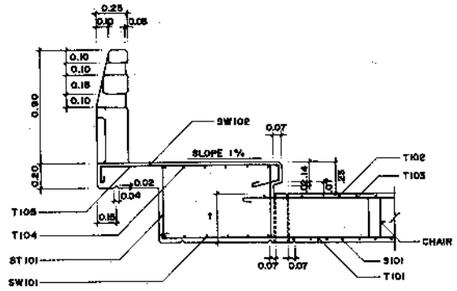
STANDARD DRAWINGS FOR STRUCTURAL WORK



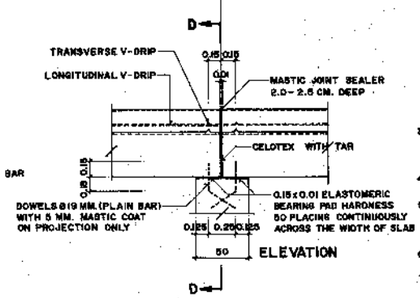
SECTION A - A
SCALE 1 : 40



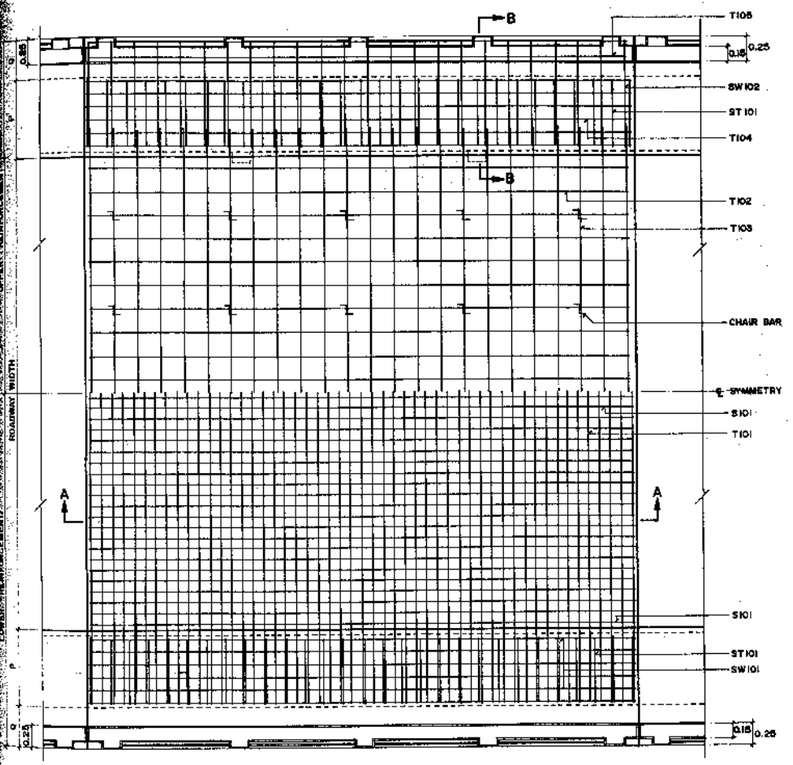
TYPICAL WATER DRIP DETAIL

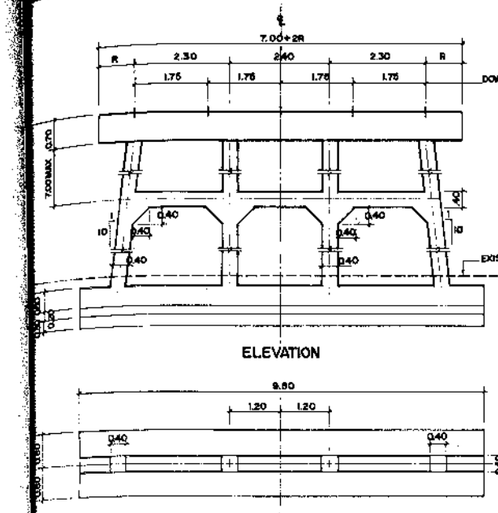


SECTION B - B
SCALE 1 : 25

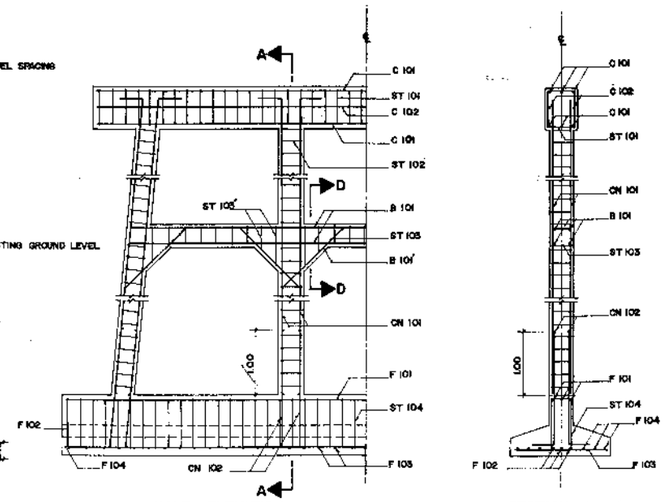


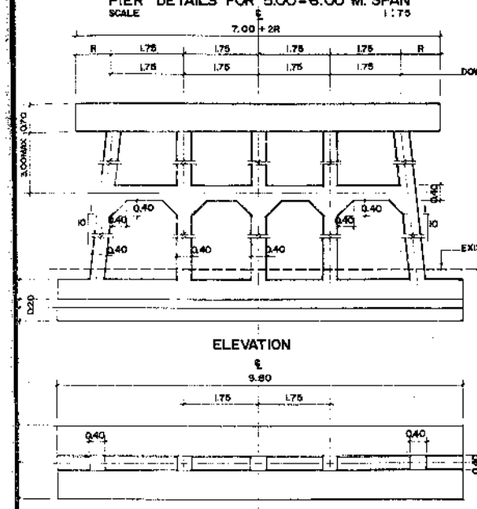
EXPANSION JOINT DETAILS
SCALE 1 : 25


B
T105
0.25
0.15
SW102
ST 101
T104
B
T102
T103
CHAIR BAR
℄ SYMMETRY
S101
T101
ST101
SW101
0.15
0.25
A
A
0.85
0.80
0.50
0.25
0.25
0.25
0.25
0.25

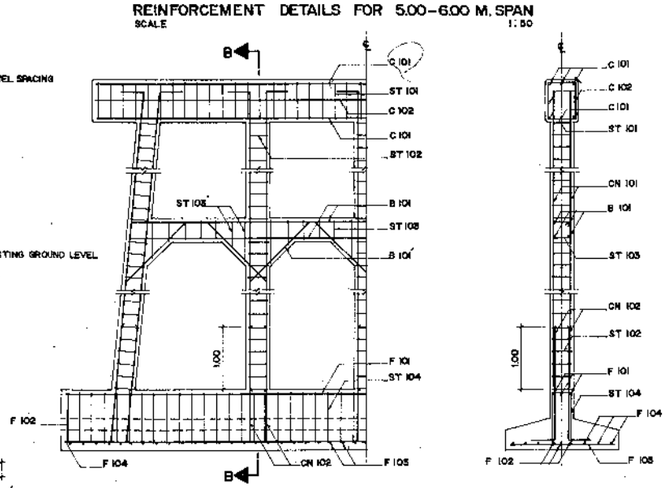


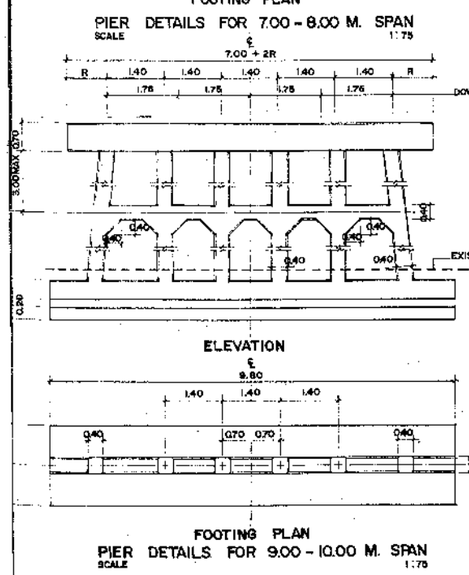
PIER DETAILS FOR 5.00-6.00 M. SPAN
SCALE 1:75





PIER DETAILS FOR 7.00-8.00 M. SPAN
SCALE 1:75





PIER DETAILS FOR 9.00-10.00 M. SPAN
SCALE 1:75

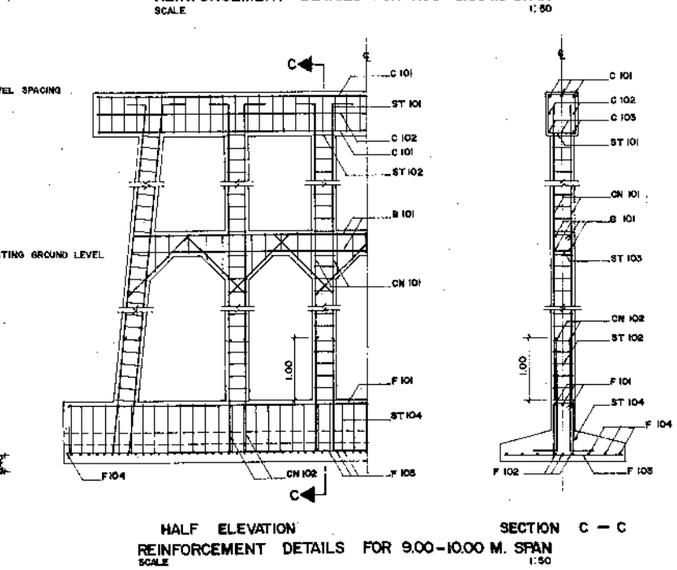
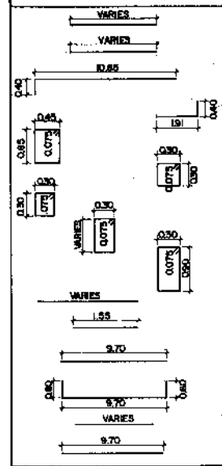


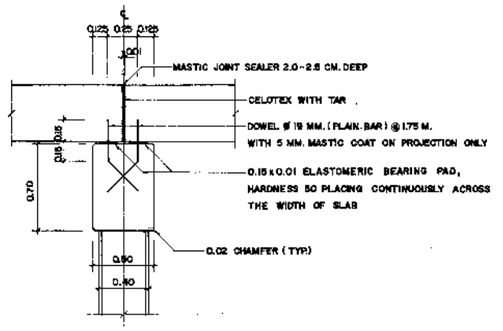
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS

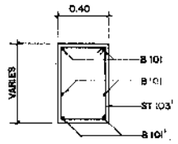


BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
	⌀	@	NO.	L	⌀	@	NO.	L	⌀	@	NO.	L	⌀	@	NO.	L	⌀	@	NO.	L	⌀	@	NO.	L
C 101	6	—	6	—	6	—	6	—	6	—	6	—	6	—	6	—	6	—	6	—	6	—	6	—
C 102	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—
CN 101	8	—	16	11.25	8	—	16	11.25	8	—	20	11.25	8	—	20	11.25	8	—	24	11.25	8	—	24	11.25
CN 102	8	—	16	2.31	8	—	16	2.31	8	—	20	2.31	8	—	20	2.31	8	—	24	2.31	8	—	24	2.31
ST 101	3	.20	—	2.35	3	.20	—	2.35	3	.20	—	2.35	3	.20	—	2.35	3	.20	—	2.35	3	.20	—	2.35
ST 102	3	.20	192	1.35	3	.20	192	1.35	3	.20	240	1.35	3	.20	240	1.35	3	.20	288	1.35	3	.20	288	1.35
ST 103	3	.25	36	1.35	3	.25	36	1.35	3	.25	28	1.35	3	.25	24	1.35	3	.25	16	1.35	3	.25	16	1.35
ST 103'	3	.25	24	—	3	.25	24	—	3	.25	32	—	3	.25	32	—	3	.25	40	—	3	.25	40	—
ST 104	3	.20	48	2.55	3	.20	49	2.55	3	.20	49	2.55	3	.20	49	2.55	3	.20	49	2.55	3	.20	49	2.55
B 101	8	—	8	—	8	—	8	—	8	—	8	—	8	—	8	—	8	—	16	—	8	—	8	—
B 101'	6	—	24	1.55	6	—	24	1.55	6	—	32	1.55	6	—	32	1.55	6	—	40	1.55	6	—	40	1.55
F 101	8	—	3	9.70	8	—	3	9.70	8	—	3	9.70	8	—	3	9.70	8	—	3	9.70	8	—	3	9.70
F 102	8	—	3	10.90	8	—	3	10.90	8	—	3	10.90	8	—	3	10.90	8	—	3	10.90	8	—	3	10.90
F 103	4	.25	38	1.50	4	.25	39	1.50	4	.20	48	1.70	4	.20	48	1.70	4	.125	78	1.90	4	.125	78	1.90
F 104	4	—	6	9.70	4	—	6	9.70	4	—	6	9.70	4	—	6	9.70	4	—	6	9.70	4	—	6	9.70

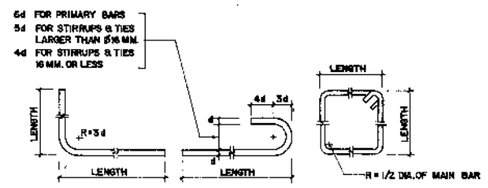
⌀ 3 = ⌀ 3/8" OR 9 MM., ⌀ 4 = ⌀ 1/2" OR 12 MM., ⌀ 6 = ⌀ 3/4" OR 20 MM., ⌀ 8 = ⌀ 1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BARS.



CAP BEAM DETAILS
SCALE 1:25



SECTION D – D
SCALE 1:25



DEFORMED BAR PLAIN BAR

BAR BENDING DETAIL
NOT TO SCALE

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUN LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEED 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEED 3.0 M., ADDITION BRACING SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, WHERE A CLEAR COVER OF 2.5 CM SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg/CM.^{2} FOR A 15x15x15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOW :

PORTLAND CEMENT	350	Kg.
SAND	0.45	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MIX	10	CM.

6. REBARS ⌀ 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETER OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATION OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIER HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPED FROM DOH DWG. NO. 3AD5 - 106 - 14/23.

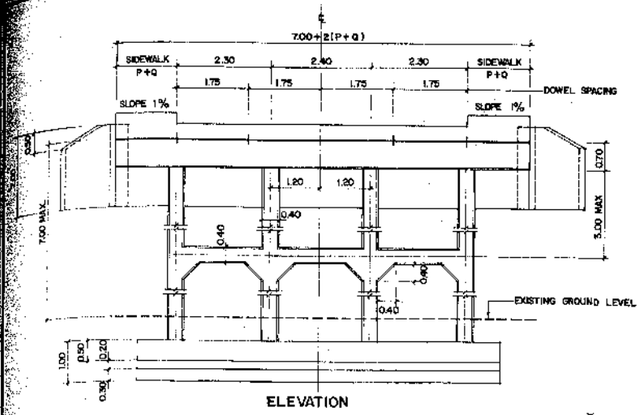
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

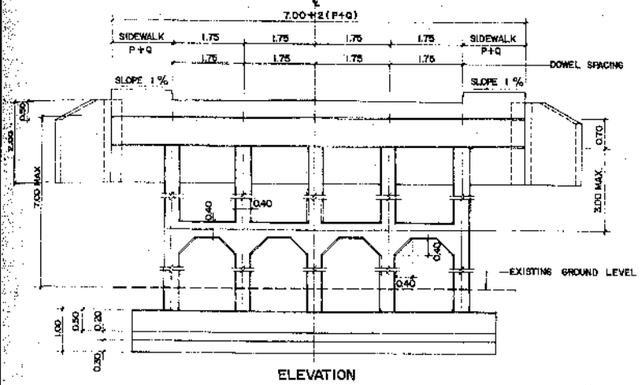
7.00 M. ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTING PIER DETAILS

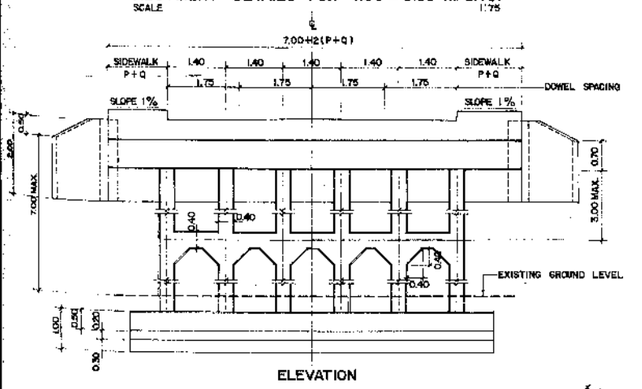
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST - 02
		SHEET NO. 115

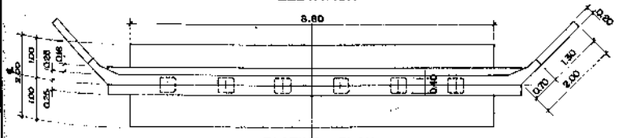


ABUTMENT DETAILS FOR 5.00 – 6.00 M. SPAN
SCALE 1:75

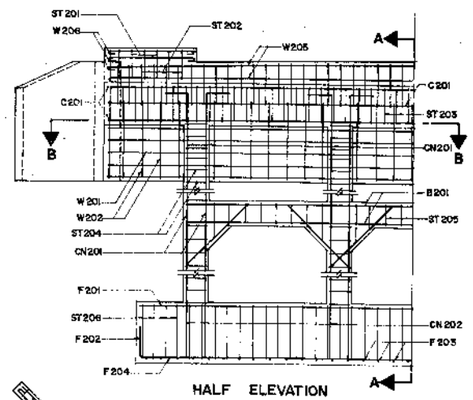


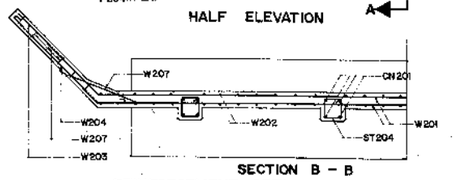
ABUTMENT DETAILS FOR 7.00 – 8.00 M. SPAN
SCALE 1:75



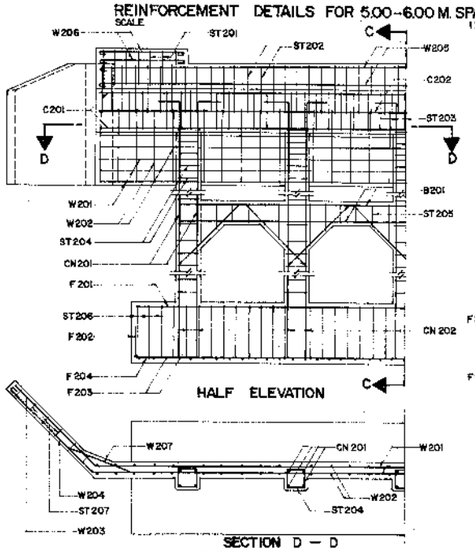


ABUTMENT DETAILS FOR 9.00 – 10.00 M. SPAN
SCALE 1:75

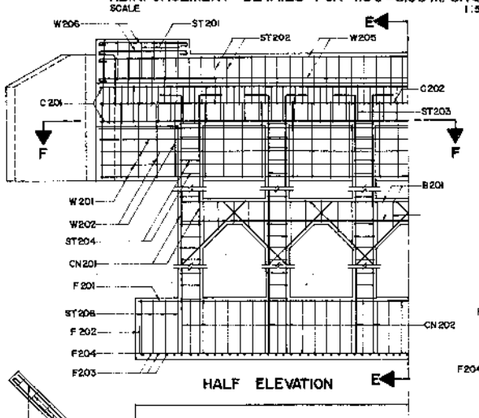




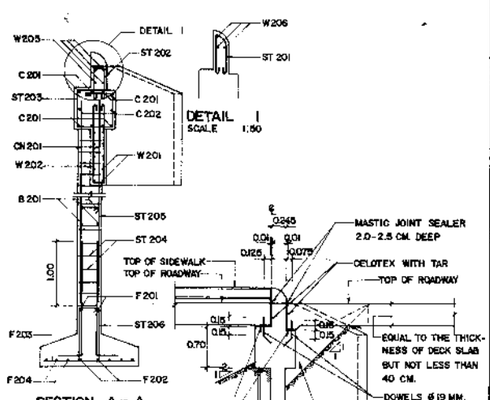
REINFORCEMENT DETAILS FOR 5.00–6.00 M. SPAN
SCALE 1:50



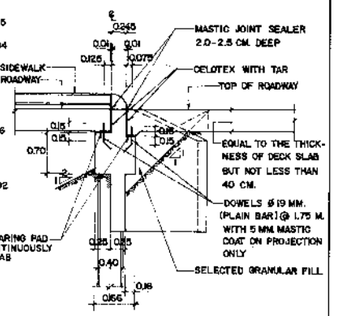
REINFORCEMENT DETAILS FOR 7.00–8.00 M. SPAN
SCALE 1:50



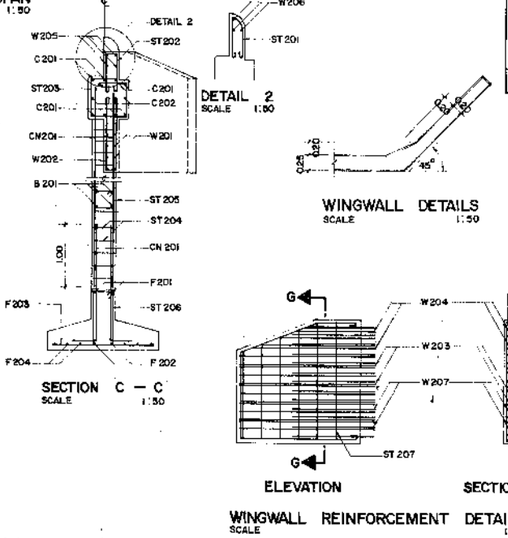
REINFORCEMENT DETAILS FOR 9.00–10.00 M. SPAN
SCALE 1:50



SCALE 1:50



ABUTMENT HEAD DETAILS
SCALE 1:50



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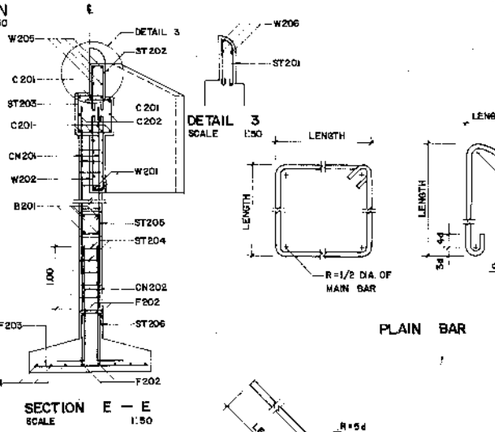
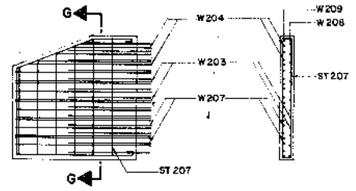


SCALE 1:50



WINGWALL REINFORCEMENT DETAILS
SCALE 1:50

BAR BENDING DETAILS
NOT TO SCALE

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	a	NO.	L	#	a	NO.	L	#	a	NO.	L	#	a	NO.	L	#	a	NO.	L	#	a	NO.	L
	C 201	3	–	8	–	3	–	8	–	3	–	8	–	3	–	8	–	3	–	8	–	3	–	8	–
	C 202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST 201	2		–	1.215	2		–	1.295	2		–	1.355	2		–	1.435	2		–	1.515	2		–	1.635
	ST 202	3	.20	–	1.745	3	.20	–	1.795	3	.20	–	1.845	3	.20	–	1.895	3	.20	–	1.945	3	.20	–	1.995
	ST 203	3	.20	–	–	3	.20	–	–	3	.20	–	–	3	.20	–	–	3	.20	–	–	3	.20	–	–
	ST 204	3	.20	156	1.35	3	.20	166	1.35	3	.20	195	1.35	3	.20	195	1.35	3	.20	234	1.35	3	.20	234	1.35
	ST 205	3	.25	30	1.35	3	.25	30	1.35	3	.25	15	1.35	3	.25	15	1.35	3	.25	10	1.35	3	.25	10	1.35
	ST 205'	3	.25	24	–	3	.25	24	–	3	.25	32	–	3	.25	32	–	3	.25	40	–	3	.25	40	–
	ST 206	3	.20	44	2.55	3	.20	44	2.55	3	.20	44	2.55	3	.20	44	2.55	3	.20	44	2.55	3	.20	44	2.55
	ST 207	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–
	B 201	8	–	8	7.30	8	–	8	7.30	8	–	8	7.30	8	–	8	7.30	8	–	8	7.30	8	–	8	7.30
	B 201'	6	–	24	1.55	6	–	24	1.55	6	–	32	1.55	6	–	32	1.55	6	–	40	1.55	6	–	40	1.55
	CN 201	8	–	16	9.25	8	–	16	9.25	8	–	20	9.25	8	–	20	9.25	8	–	24	9.25	8	–	24	9.25
	CN 202	8	–	16	2.31	8	–	16	2.31	8	–	20	2.31	8	–	20	2.31	8	–	24	2.31	8	–	24	2.31
	F 201	8	–	2	8.70	8	–	2	8.70	8	–	2	8.70	8	–	2	8.70	8	–	2	8.70	8	–	2	8.70
	F 202	8	–	2	9.90	8	–	2	9.90	8	–	2	9.90	8	–	2	9.90	8	–	2	9.90	8	–	2	9.90
	F 203	4	.25	35	1.50	4	.25	35	1.50	4	.20	44	1.70	4	.20	44	1.70	4	.125	70	1.90	4	.125	70	1.90
	F 204	4	–	6	8.70	4	–	6	8.70	4	–	6	8.70	4	–	6	8.70	4	–	6	8.70	4	–	6	9.70
	W 201	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–
	W 202	2	.30	–	2.70	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.40	2	.30	–	2.30
	W 203	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–
	W 204	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–
	W 205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
	W 206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
	W 207	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15
	W 208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
	W 209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

#2 = Ø 1/4" OR 6 MM., #3 = Ø 3/8" OR 9 MM., #4 = Ø 1/2" OR 12 MM., #8 = Ø 1" OR 25 MM., NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1 : 3 : 6 VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON / M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M. A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACKWALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM.^{2} FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 . TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOW :

PORTLAND CEMENT	350	KG.
SAND	0.45	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MAX.	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 . GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH. DWG. NO. 3AD5–106–14/4.

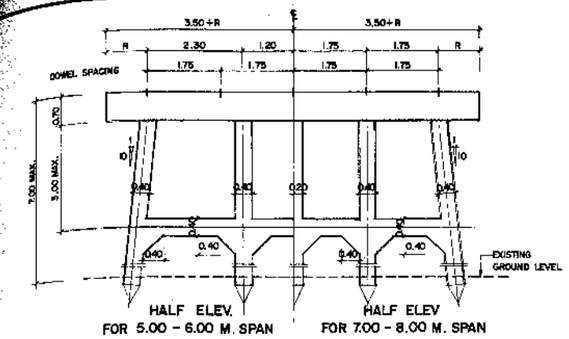
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

7.00 M. ROADWAY WIDTH SLAB BRIDGE

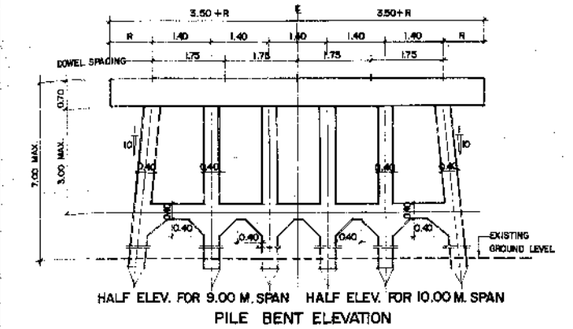
SPREAD FOOTING ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : FOR (DIRECTOR GENERAL)		DWG. NO. ST-03
		SHEET NO. 116



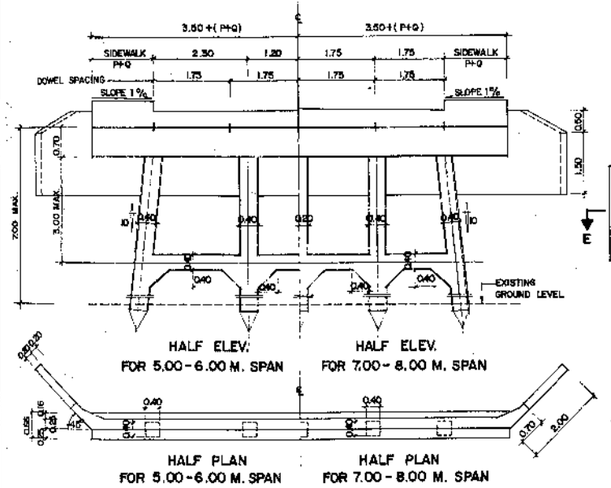
HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV FOR 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN HALF ELEV. FOR 10.00 M. SPAN

PILE BENT ELEVATION

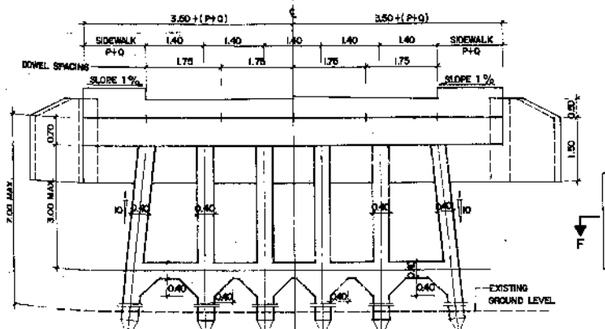


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

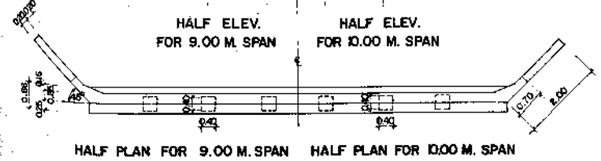
HALF PLAN FOR 5.00 - 6.00 M. SPAN

HALF PLAN FOR 7.00 - 8.00 M. SPAN



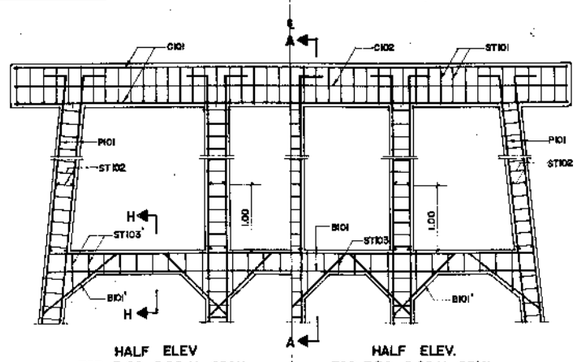
HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN



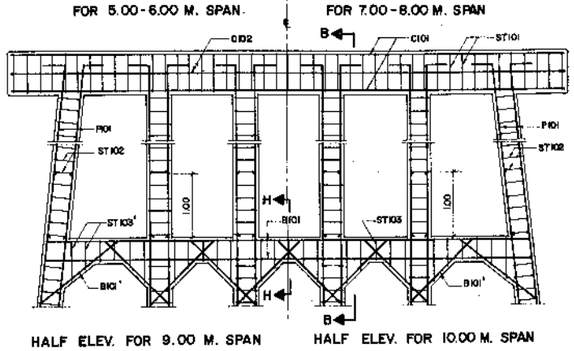
HALF PLAN FOR 9.00 M. SPAN HALF PLAN FOR 10.00 M. SPAN

ABUTMENT DETAILS



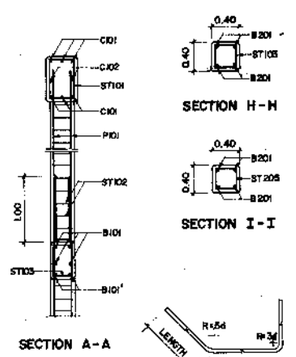
HALF ELEV FOR 5.00-6.00 M. SPAN

HALF ELEV. FOR 7.00-8.00 M. SPAN

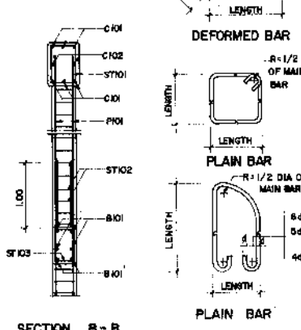


HALF ELEV. FOR 9.00 M. SPAN HALF ELEV. FOR 10.00 M. SPAN

PILE BENT REINFORCEMENT DETAILS



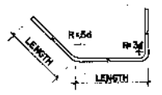
SECTION A-A



SECTION B-B

SECTION H-H

SECTION I-I



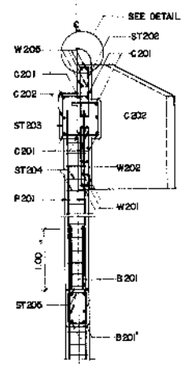
DEFORMED BAR

PLAIN BAR

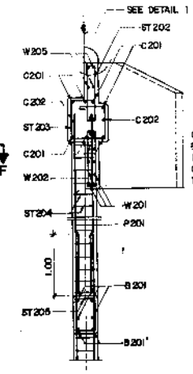
PLAIN BAR

BAR BENDING DETAILS

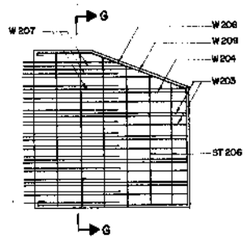
NOT TO SCALE



SECTION C-C

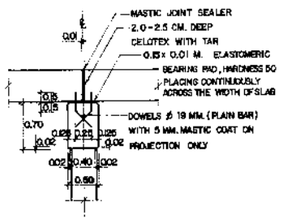


SECTION D-D



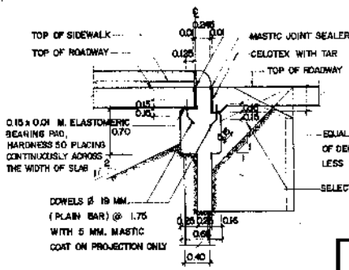
WINGWALL. REFORCEMENT DETAILS

SCALE 1:50



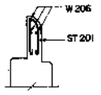
CAP BEAM DETAILS

SCALE 1:50



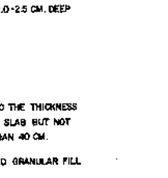
ABUTMENT HEAD DETAILS

SCALE 1:50

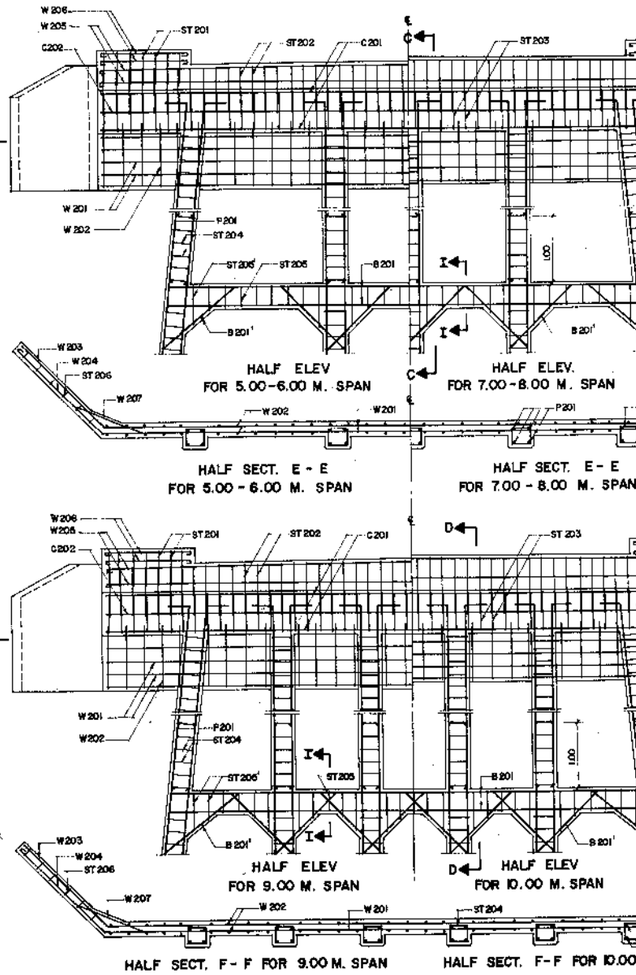


DETAIL 1

SCALE 1:50



SECTION G-G



HALF ELEV FOR 5.00-6.00 M. SPAN

HALF ELEV. FOR 7.00-8.00 M. SPAN

HALF ELEV FOR 9.00 M. SPAN

HALF ELEV FOR 10.00 M. SPAN

ABUTMENT REINFORCEMENT DETAILS

SCALE 1:50

HALF SECT. E-E FOR 5.00-6.00 M. SPAN

HALF SECT. E-E FOR 7.00-8.00 M. SPAN

HALF SECT. F-F FOR 9.00 M. SPAN

HALF SECT. F-F FOR 10.00 M. SPAN

TABLE OF REINFORCEMENT

	BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
PILE BENT	VARIES / VARIES / 1.55 / VARIES / .40	C101	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
		C102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
		ST101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
		ST102	3	0.20	86	1.35	3	0.20	86	1.35	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	84	1.35	3	0.20	84	1.35
		ST103	3	0.25	15	1.35	3	0.25	15	1.35	3	0.25	10	1.35	3	0.25	10	1.35	3	0.25	7	1.35	3	0.25	7	1.35
		ST103'	3	0.25	12	–	3	0.25	12	–	3	0.25	16	–	3	0.25	16	–	3	0.25	20	–	3	0.25	20	–
		B101	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
		B101'	8	–	12	1.55	8	–	12	1.55	8	–	16	1.55	8	–	16	1.55	8	–	20	1.55	8	–	20	1.55
		P101	8	–	16	3.75	8	–	16	3.75	8	–	20	3.75	8	–	20	3.75	8	–	24	3.75	8	–	24	3.75
ABUTMENT	VARIES / VARIES / .195 / .195 / 45 / 65 / 30 / 30 / 30 / 30 / VARIES / .15 / 3.35 / .40 / VARIES / 20 / VARIES / 80 / VARIES / .40 / VARIES / .05 .425 .05 / VARIES / .05 / .05 / VARIES / .05 / .80 / 1.35 / .675 .675 / 1.36 .136 / .47 .47 / 1.45 1.45 / 1.95 1.95	C201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
		C202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
		ST201	2	0.20	–	1.215	2	0.20	–	1.295	2	0.20	–	1.355	2	0.20	–	1.435	2	0.20	–	1.515	2	0.20	–	1.635
		ST202	3	0.20	–	1.745	3	0.20	–	1.795	3	0.20	–	1.845	3	0.20	–	1.895	3	0.20	–	1.945	3	0.20	–	1.995
		ST203	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–
		ST204	3	0.20	56	1.35	3	0.20	56	1.35	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	84	1.35	3	0.20	84	1.35
		ST205	3	0.25	15	1.35	3	0.25	15	1.35	3	0.25	10	1.35	3	0.25	10	1.35	3	0.25	7	1.35	3	0.25	7	1.35
		ST205'	3	0.25	12	–	3	0.25	12	–	3	0.25	16	–	3	0.25	16	–	3	0.25	20	–	3	0.25	20	–
		ST206	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
		B201	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
		B201'	8	–	12	1.55	8	–	12	1.55	8	–	16	1.55	8	–	16	1.55	8	–	20	1.55	8	–	20	1.55
		P201	8	–	16	3.75	8	–	16	3.75	8	–	20	3.75	8	–	20	3.75	8	–	24	3.75	8	–	24	3.75
		W204	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
		W202	2	0.30	–	2.70	2	0.30	–	2.80	2	0.30	–	2.80	2	0.30	–	2.80	2	0.30	–	2.80	2	0.30	–	2.80
		W203	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–
		W204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
		W205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
		W206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
		W207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
		W208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
		W209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

2= ø 1/4" OR 6 MM., 3= ø 3/8" OR 9 MM., 4= ø 1/2" OR 12 MM., 6= ø 3/4" OR 20 MM., 8= ø 1" OR 25 MM., NO= TOTAL AMOUNT OF BARS, L= TOTAL LENGTH OF EACH BAR

NOTE :

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS FOR PILE DETAILS SEE DWG.NO. MS-02, MS-03
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM, SHALL BE PROVIDED
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M. AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM. FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS.

PORTLAND CEMENT	350	KG.
SAND	0.43	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MAX	10	CM.

5. REBARS # 4 OR LARGER SHALL BE TIS. 24 GRADE SD30 DEFORMED BARS, OTHERS SHALL BE TIS. 20 GRADE SR. 24 PLAIN BARS UNLESS OTHERWISE INDICATED
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFROMING TO TIS. 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HEIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
10. ALL DIAMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3A05-106-14/9

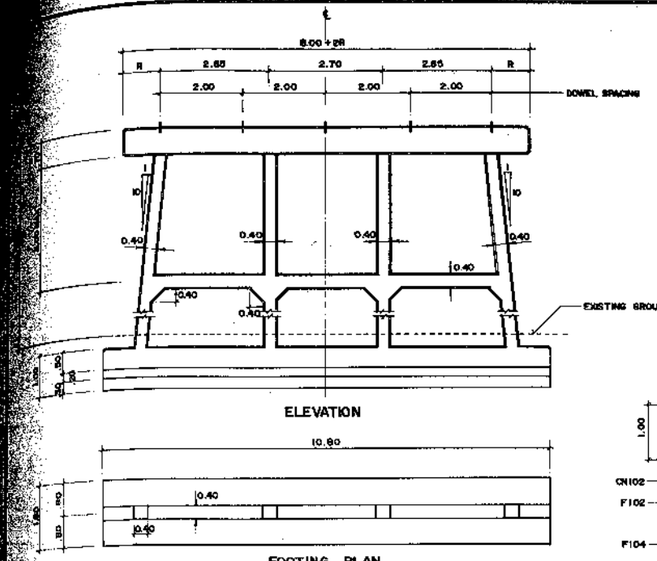
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

7.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-04
		SHEET NO. 117

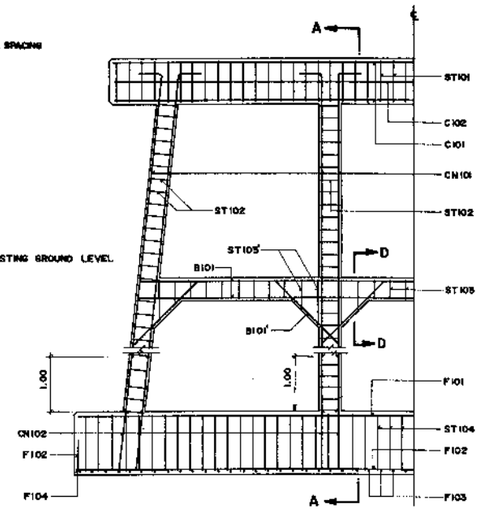


ELEVATION

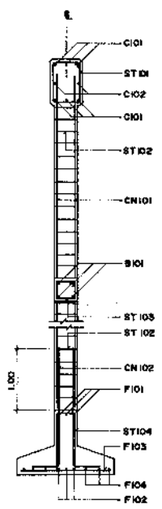
FOOTING PLAN

PIER DETAILS FOR 5.00 - 6.00 M. SPAN

SCALE 1 : 75



HALF ELEVATION



SECTION A - A

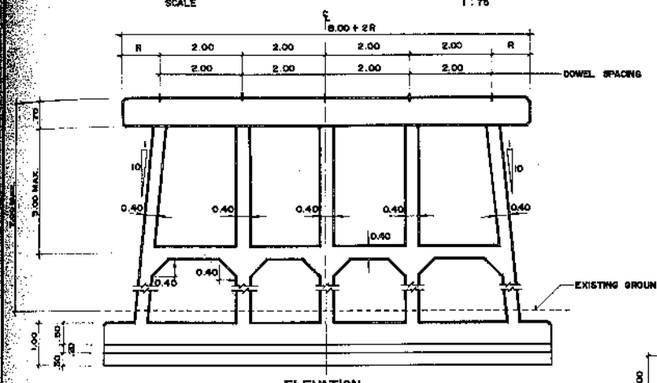
REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN

SCALE 1 : 50

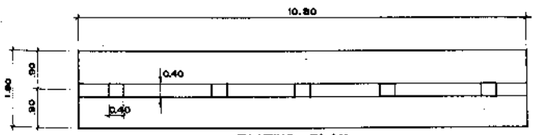
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	NO.	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
			#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
	1	C101	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-
	2	C102	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
	3	CN101	8	-	16	11.25	8	-	16	11.25	8	-	20	11.25	8	-	20	11.25	8	-	24	11.25	8	-	24	11.25
	4	CN102	8	-	18	2.31	8	-	16	2.31	8	-	20	2.31	8	-	20	2.31	8	-	24	2.31	8	-	24	2.31
	5	ST101	3	.20	-	2.35	3	.20	-	2.35	3	.20	-	2.35	3	.20	-	2.35	3	.20	-	2.35	3	.20	-	2.35
	6	ST102	3	.20	192	1.35	3	.20	192	1.35	3	.20	240	1.35	3	.20	240	1.35	3	.20	288	1.35	3	.20	288	1.35
	7	ST103	3	.25	42	1.35	3	.25	42	1.35	3	.25	34	1.35	3	.25	34	1.35	3	.25	26	1.35	3	.25	26	1.35
	8	ST105	3	.25	24	-	3	.25	24	-	3	.25	32	-	3	.25	32	-	3	.25	40	1.35	3	.25	40	-
	9	ST104	3	.20	54	2.55	3	.20	54	2.55	3	.20	54	2.55	3	.20	54	2.55	3	.20	54	2.55	3	.20	54	2.55
	10	B101	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
	11	B101'	6	-	24	1.55	6	-	24	1.55	6	-	32	1.55	6	-	32	1.55	6	-	40	1.55	6	-	40	1.55
	12	F101	8	-	3	10.70	8	-	3	10.70	8	-	3	10.70	8	-	3	10.70	8	-	3	10.70	8	-	3	10.70
	13	F102	6	-	3	11.90	8	-	3	11.90	8	-	3	11.90	8	-	3	11.90	8	-	3	11.90	8	-	3	11.90
	14	F103	4	.25	43	1.50	4	.25	43	1.50	4	.20	54	1.70	4	.20	64	1.70	4	.125	86	1.90	4	.125	86	1.90
	15	F104	4	-	6	10.70	4	-	6	10.70	4	-	6	10.70	4	-	6	10.70	4	-	6	10.70	4	-	6	10.70

3 = Ø 3/8" OR 9 MM., # 4 = Ø 1/2" OR 12 MM., # 6 = Ø 3/4" OR 20 MM., # 8 = Ø 1" OR 25 MM. NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR



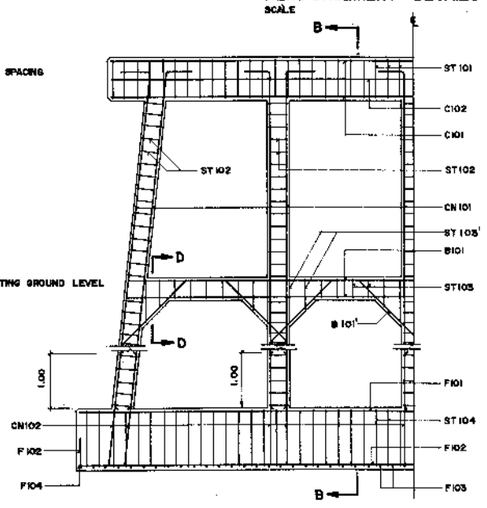
ELEVATION



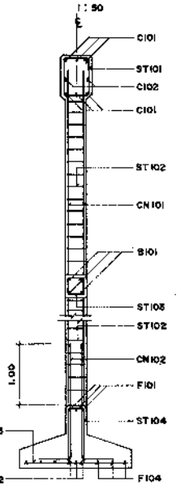
FOOTING PLAN

PIER DETAILS FOR 7.00 - 8.00 M. SPAN

SCALE 1 : 75



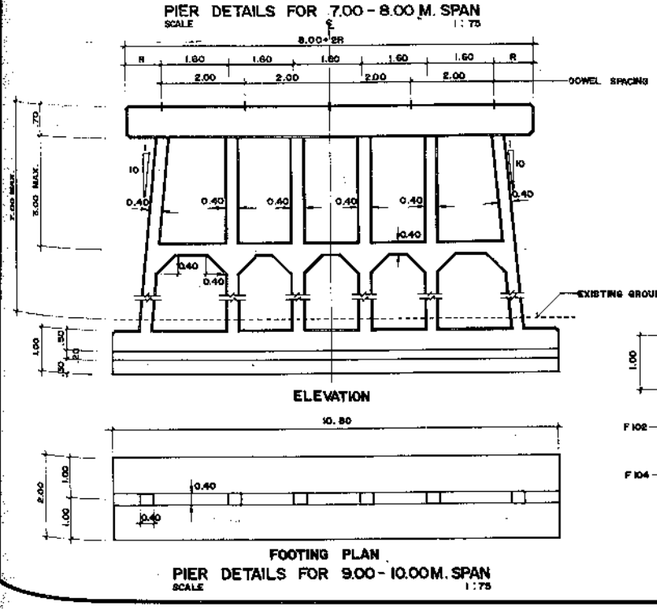
HALF ELEVATION



SECTION B - B

REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN

SCALE 1 : 50

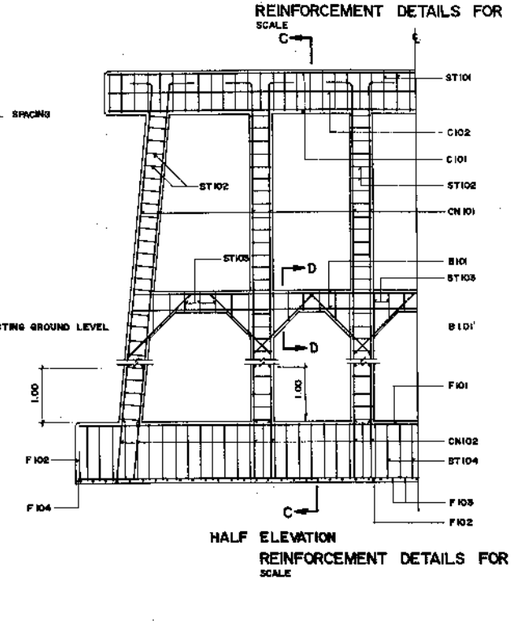


ELEVATION

FOOTING PLAN

PIER DETAILS FOR 9.00 - 10.00 M. SPAN

SCALE 1 : 75



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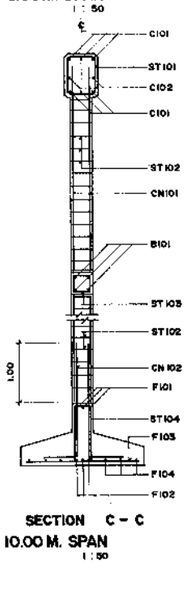
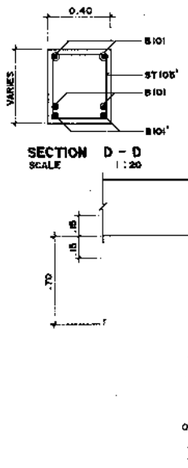


SECTION C - C

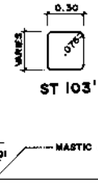
REINFORCEMENT DETAILS FOR 9.00 - 10.00 M. SPAN

SCALE 1 : 50

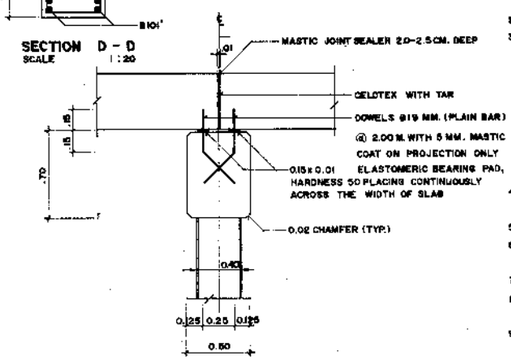


SECTION D - D

SCALE 1 : 20

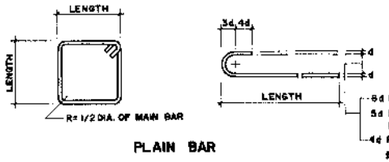


ST 103'

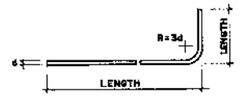


CAP BEAM DETAILS

SCALE 1 : 25



PLAIN BAR



DEFORMED BAR

BAR BENDING DETAILS

NOT TO SCALE

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL ARROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M. ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM AT WHICH CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M.
6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS. 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM.^{2} FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.45	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MAX.	10	CM.

12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3A05-106-14/6.

KINGDOM OF THAILAND

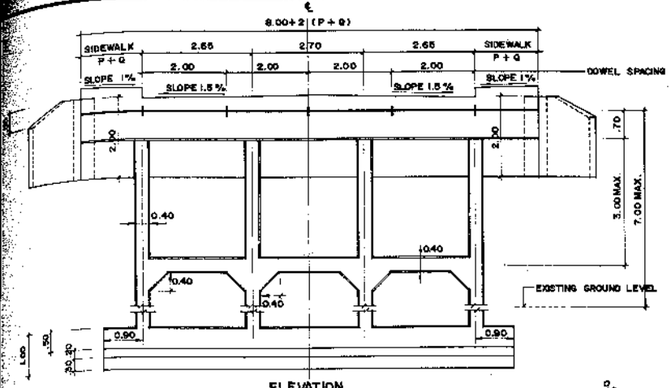
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

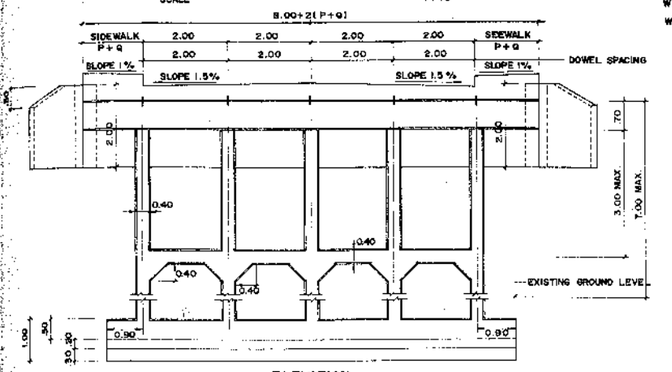
8.00 M. ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTING PIER DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Bunyapa (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
		DWG. NO. ST-05
APPROVED : For (DIRECTOR GENERAL)		SHEET NO. 116



DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1 : 75



DETAILS FOR 7.00 - 8.00 M. SPAN
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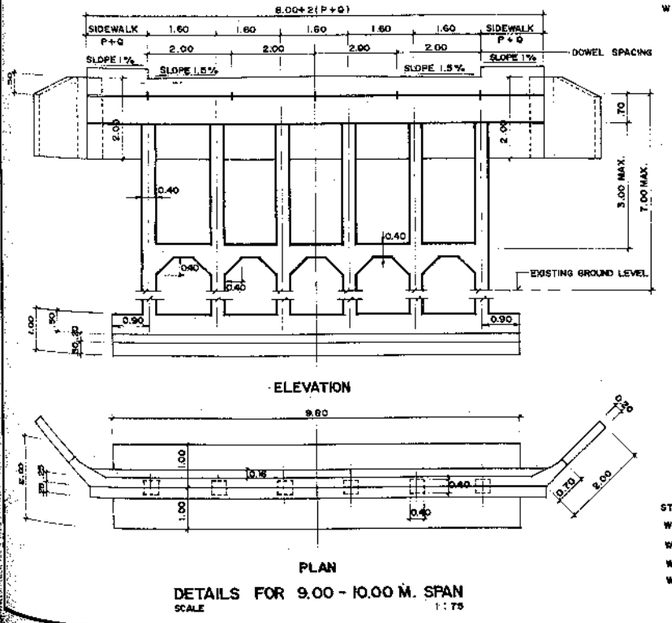
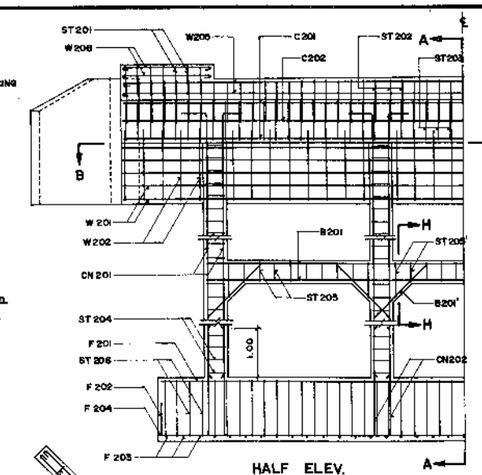
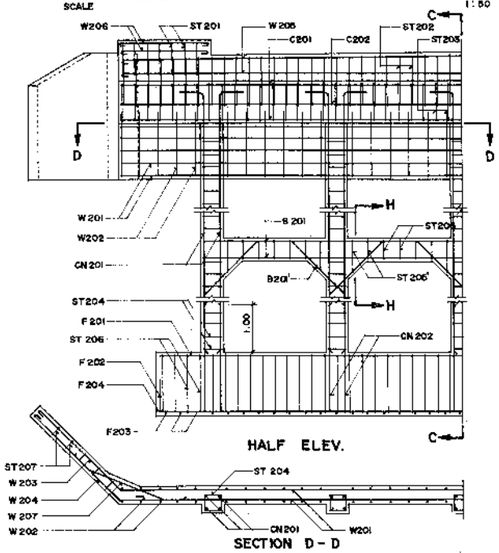


DETAILS FOR 9.00 - 10.00 M. SPAN
SCALE 1 : 75



REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1 : 50



REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN
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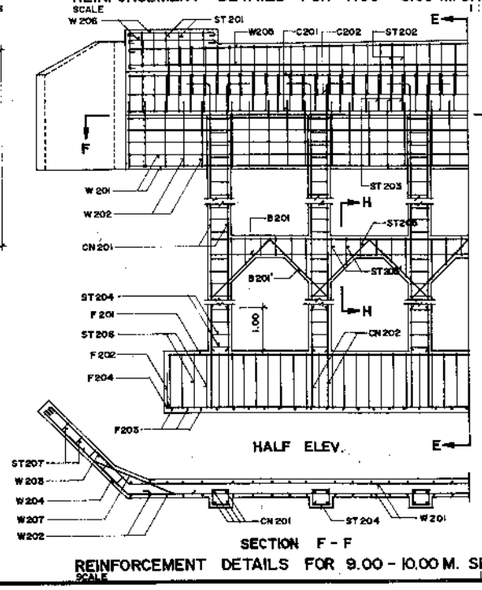
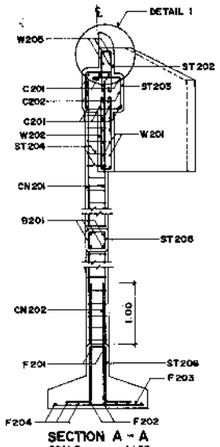
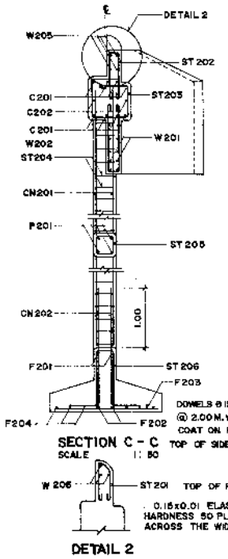


REINFORCEMENT DETAILS FOR 9.00 - 10.00 M. SPAN
SCALE 1 : 50





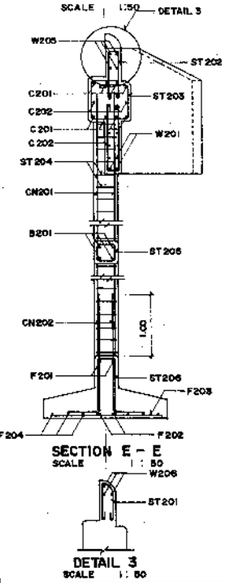
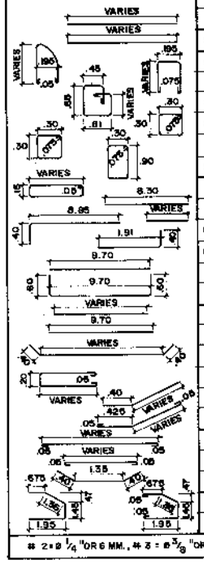


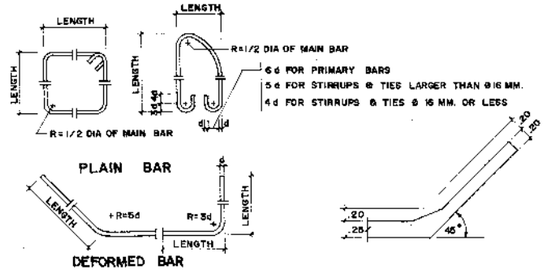
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS



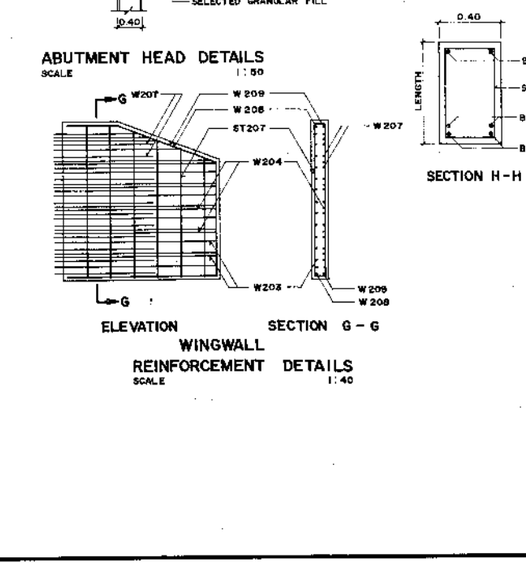
BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
C201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
C202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
ST201	2	.20	–	1.215	2	.20	–	1.295	2	.20	–	1.355	2	.20	–	1.435	2	.20	–	1.515	2	.20	–	1.595
ST202	3	.20	–	1.745	3	.20	–	1.795	3	.20	–	1.845	3	.20	–	1.895	3	.20	–	1.945	3	.20	–	1.995
ST203	3	.20	–	–	3	.20	–	–	3	.20	–	–	3	.20	–	–	3	.20	–	–	3	.20	–	–
ST204	3	.20	156	1.35	3	.20	156	1.35	3	.20	195	1.35	3	.20	195	1.35	3	.20	234	1.35	3	.20	234	1.35
ST205	3	.25	36	1.35	3	.25	36	1.35	3	.25	24	1.35	3	.25	24	1.35	3	.25	20	1.35	3	.25	20	1.35
ST205'	3	.25	24	–	3	.25	24	–	3	.25	32	–	3	.25	32	–	3	.25	40	–	3	.25	40	–
ST206	3	.20	49	2.55	3	.20	49	2.55	3	.20	49	2.55	3	.20	49	2.55	3	.20	49	2.55	3	.20	49	2.55
ST207	2	.30	12	–	2	.30	12	–	2	.30	12	2.95	2	.30	12	–	2	.30	12	–	2	.30	12	–
B201	8	–	6	8.30	8	0.30	8	8.30	8	–	6	8.30	8	–	0.8	8.30	8	–	0.8	8.30	8	–	0.8	8.30
B201'	6	–	24	1.55	6	–	24	1.55	6	–	32	1.55	6	–	32	1.55	6	–	40	1.55	6	–	40	1.55
CN 201	8	–	16	9.25	8	–	16	9.25	8	–	20	9.25	8	–	20	9.25	8	–	24	9.25	8	–	24	9.25
CN 202	8	–	16	2.31	8	–	16	2.31	8	–	20	2.31	8	–	20	2.31	8	–	24	2.31	8	–	24	2.31
F 201	8	–	2	9.70	8	–	2	9.70	8	–	2	9.70	8	–	2	9.70	8	–	2	9.70	8	–	2	9.70
F 202	8	–	2	10.90	8	–	2	10.90	8	–	2	10.90	8	–	2	10.90	8	–	2	10.90	8	–	2	10.90
F 203	4	.25	39	1.50	4	.25	39	1.50	4	.20	49	1.70	4	.20	49	1.70	4	.125	78	1.90	4	125	78	1.90
F 204	4	–	6	9.70	4	–	6	9.70	4	–	6	9.70	4	–	6	9.70	4	–	6	9.70	4	–	6	9.70
W 201	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–
W 202	2	.30	–	2.75	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.30
W 203	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–
W 204	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–
W 205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
W 206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
W 207	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15
W 208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
W 209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

2 = Ø 1/4 " OR 6 MM., # 3 = Ø 3/8 " OR 9 MM., # 4 = 1/2 " OR 12 MM., # 6 = 3/4 " OR 20 MM., # 8 = Ø1 OR 20 MM., TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR



BAR BENDING DETAILS
NOT TO SCALE

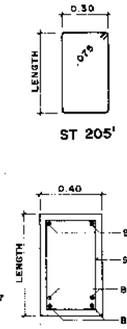
WINGWALL DETAILS
SCALE 1 : 50



ABUTMENT HEAD DETAILS
SCALE 1 : 50

ELEVATION SECTION G - G

WINGWALL
REINFORCEMENT DETAILS
SCALE 1:40



NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2.
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS AT WHICH CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.0 M.
6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS.15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM.^{2} FOR A .15x.15x.15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.45	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MAX.	10	CM.

12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3A05-108-14/68.

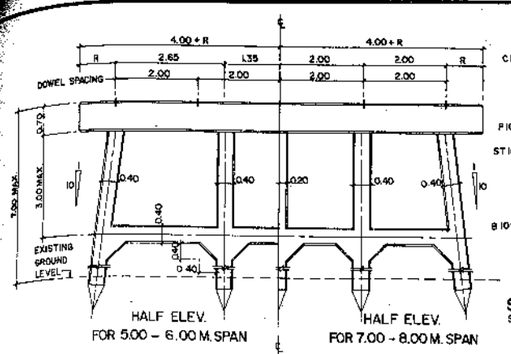
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

8.00 M. ROADWAY WIDTH SLAB BRIDGE

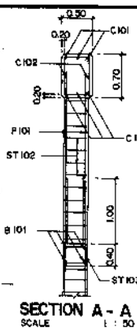
SPREAD FOOTING ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE	JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE	AS SHOWN
APPROVED : for (DIRECTOR GENERAL)		DWG. NO.	ST-08
		SHEET NO.	119

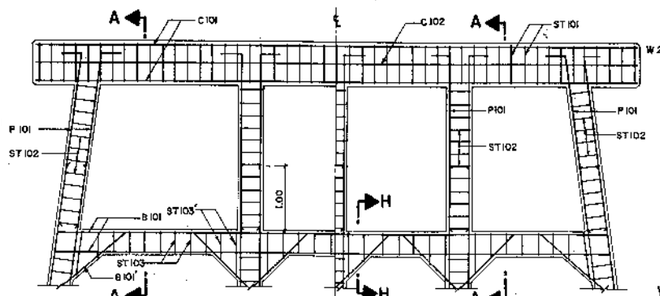


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

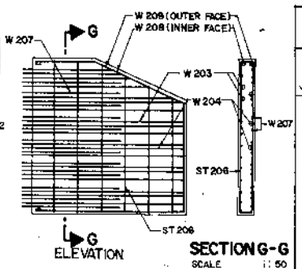


SECTION A - A
SCALE 1 : 50



HALF ELEV. FOR 5.00 - 6.00 M. SPAN

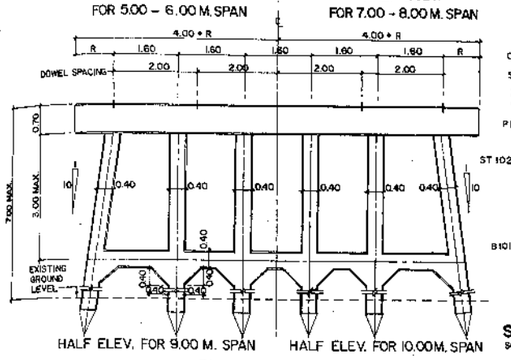
HALF ELEV. FOR 7.00 - 8.00 M. SPAN



ELEVATION

SECTION G-G
SCALE 1 : 50

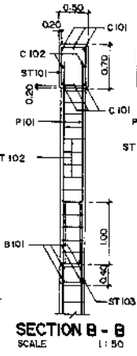
WINGWALL REINFORCEMENT DETILS
SCALE 1 : 50



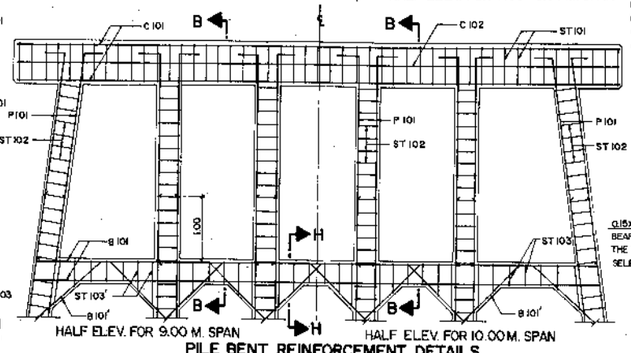
HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

PILE BENT ELEVATION
SCALE 1 : 75



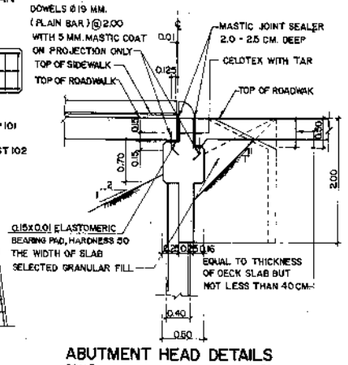
SECTION B - B
SCALE 1 : 50



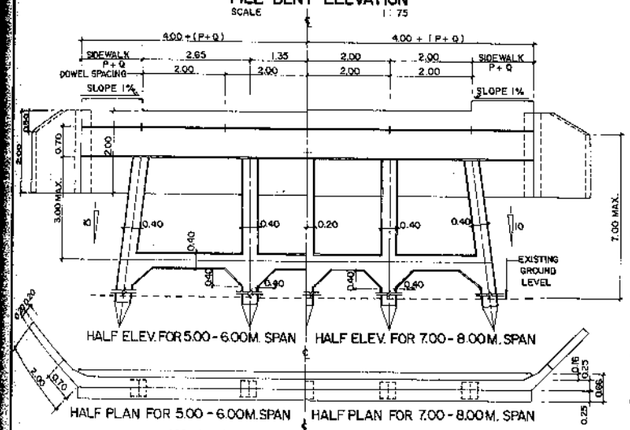
HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

PILE BENT REINFORCEMENT DETAILS
SCALE 1 : 50

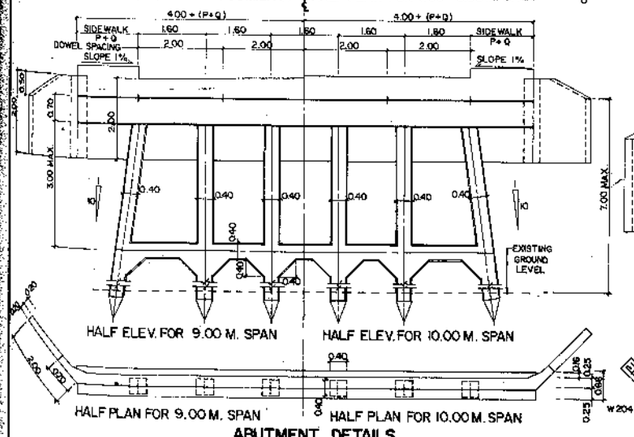


ABUTMENT HEAD DETAILS
SCALE 1 : 50



HALF ELEV. FOR 5.00 - 6.00 M. SPAN

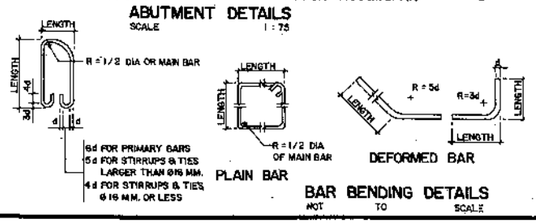
HALF ELEV. FOR 7.00 - 8.00 M. SPAN



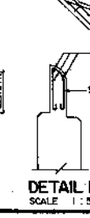
HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

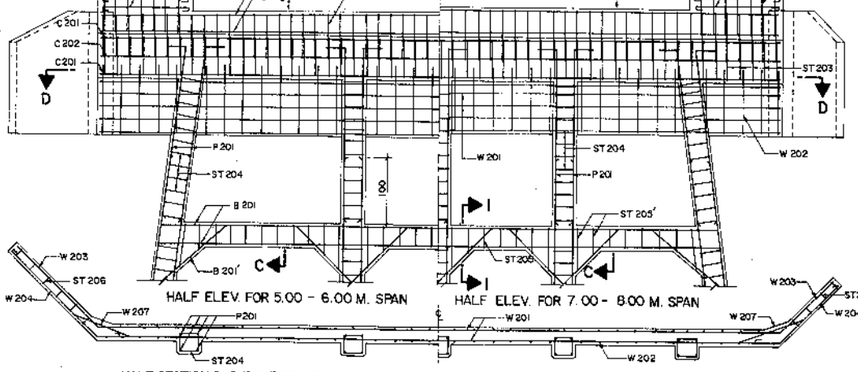
ABUTMENT DETAILS
SCALE 1 : 75



BAR BENDING DETAILS
NOT TO SCALE



DETAIL I.
SCALE 1 : 50

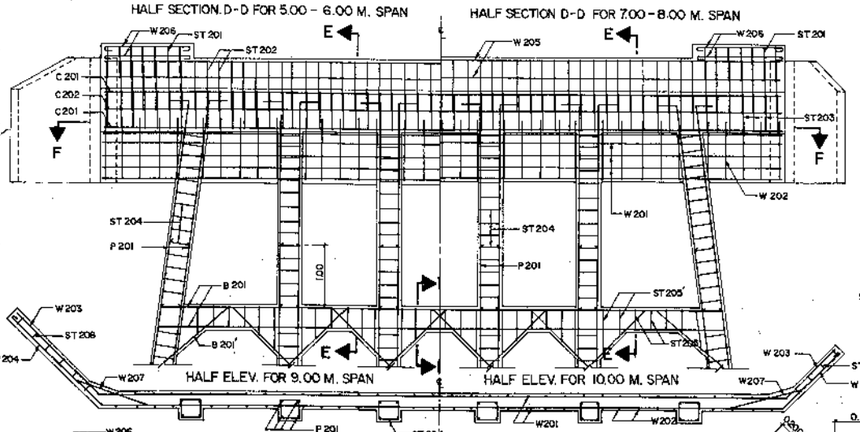


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

HALF SECTION D-D FOR 5.00 - 6.00 M. SPAN

HALF SECTION D-D FOR 7.00 - 8.00 M. SPAN



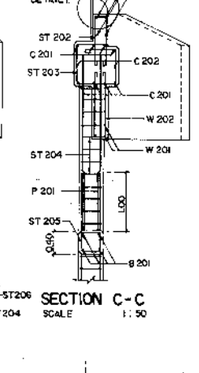
HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

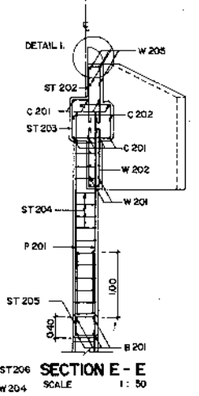
HALF SECTION F-F FOR 9.00 M. SPAN

HALF SECTION F-F FOR 10.00 M. SPAN

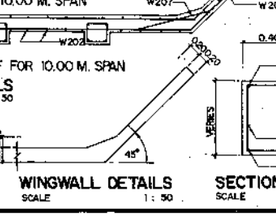
ABUTMENT REINFORCEMENT DETAILS
SCALE 1 : 50



SECTION C - C
SCALE 1 : 50



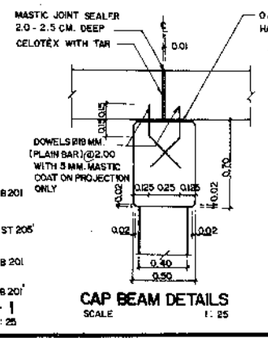
SECTION E - E
SCALE 1 : 50



WINGWALL DETAILS
SCALE 1 : 50

SECTION H - H
SCALE 1 : 25

SECTION I - I
SCALE 1 : 25



CAP BEAM DETAILS
SCALE 1 : 25

TABLE OF REINFORCEMENT

	BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
			ø	@	NO	L	ø	@	NO	L	ø	@	NO	L	ø	@	NO	L	ø	@	NO	L	ø	@	NO	L
PILE BENT	VARIES	C 101	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-
	VARIES	C 102	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
		ST101	3	0.20		2.35	3	0.20		2.35	3	0.20		2.35	3	0.20		2.35	3	0.20		2.35	3	0.20		2.35
		ST 102	3	0.20	56	1.35	3	0.20	56	1.35	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	84	1.35	3	0.20	84	1.35
		ST103	3	0.25	20	1.35	3	0.25	20	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	12	1.35	3	0.25	12	1.35
		ST103'	3	0.25	12	-	3	0.25	12	-	3	0.25	16	-	3	0.25	16	-	3	0.25	20	-	3	0.25	20	-
		B 101	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-
		B 101'	8	-	12	1.55	8	-	12	1.55	8	-	16	1.55	8	-	16	1.55	8	-	20	1.55	8	-	20	1.55
		P 101	8		16	3.75	8		16	3.75	8		20	3.75	8		20	3.75	8		24	3.75	8		24	3.75
ABUTMENT	VARIES VARIES	C 201	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
		C 202	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
		ST201	2	0.20	-	1.815	2	0.20	-	1.295	2	0.20	-	1.355	2	0.20	-	1.435	2	0.20	-	1.515	2	0.20	-	1.635
		ST202	3	0.20	-	1.745	3	0.20	-	1.795	3	0.20	-	1.845	3	0.20	-	1.895	3	0.20	-	1.945	3	0.20	-	1.995
		ST203	3	0.20	-	-	3	0.20	-	-	3	0.20	-	-	3	0.20	-	-	3	0.20	-	-	3	0.20	-	-
		ST204	3	0.20	56	1.35	3	0.20	56	1.35	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	84	1.35	3	0.20	84	1.35
		ST205	3	0.25	20	1.35	3	0.25	20	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	12	1.35	3	0.25	12	1.35
		ST205'	3	0.25	12	-	3	0.25	12	-	3	0.25	18	-	3	0.25	16	-	3	0.25	20	-	3	0.25	20	-
		ST206	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-
		B 201	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-
		B 201'	8	-	12	1.55	8	-	12	1.55	8	-	16	1.55	8	-	16	1.55	8	-		1.55	8	-		1.55
		P 201	8	-	16	3.75	8	-	16	3.75	8	-	20	3.75	8	-	20	3.75	8	-	24	3.75	8	-	24	3.75
		W 201	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-
		W 202	2	0.30	-	2.70	2	0.30	-	2.60	2	0.30	-	2.60	2	0.30	-	2.50	2	0.30	-	2.40	2	0.30	-	2.30
		W 203	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-
		W 204	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-
		W 205	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	14	-
		W 206	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-
		W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
		W 208	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435
		W 209	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535

= 2 = ø1/4" OR 6MM. # = 3 = ø3/8" OR 9 MM. # = 4 = ø1/2" OR 12MM. # = 6 = ø3/4" OR 20 MM. # = 8 = ø1" OR 25 MM., NO= TOTAL AMOUNT OF BARS, L= TOTAL LENGTH OF EACH BAR.

NOTES :

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS. FOR PILE DETAIL SEE DWG. NO. MS-02, MS-03
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M, AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE GROUND LEVEL EXCEEDS 3.0 M, ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/CM^2 FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I. PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350 KG.
SAND	0.45 M^3
CRUSHED ROCK OR GRAVEL	0.86 M^3
CONCRETE SLUMP MAX	10 CM.

5. REBARS ø 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
10. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3A05-105-14/7

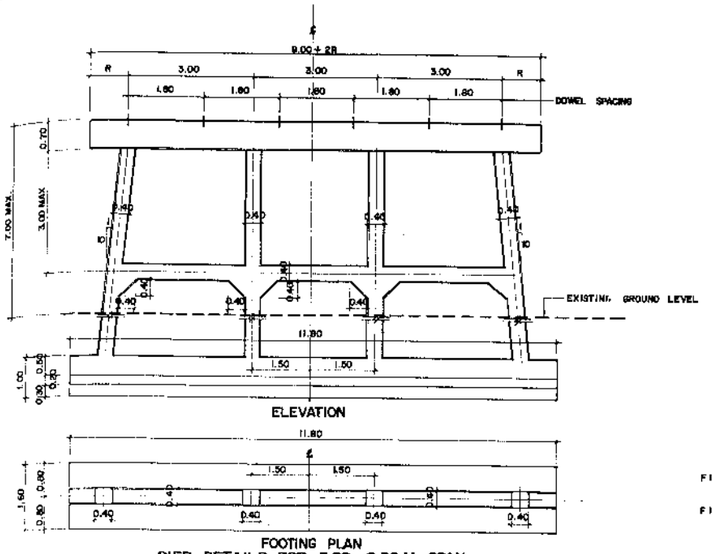
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

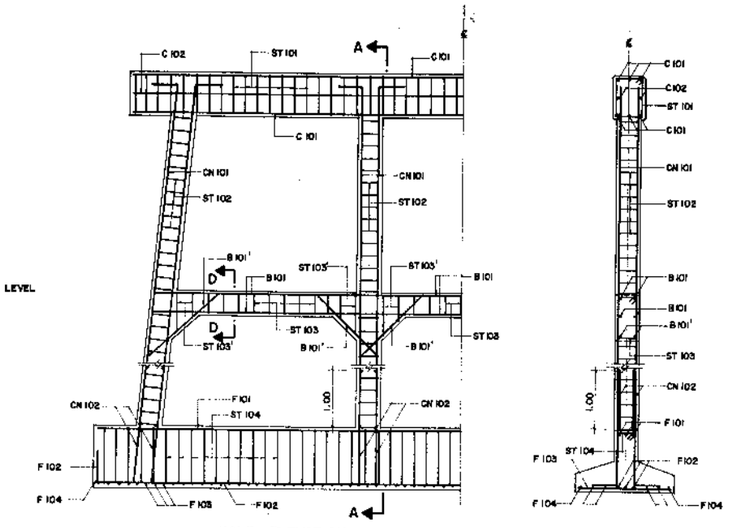
8.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

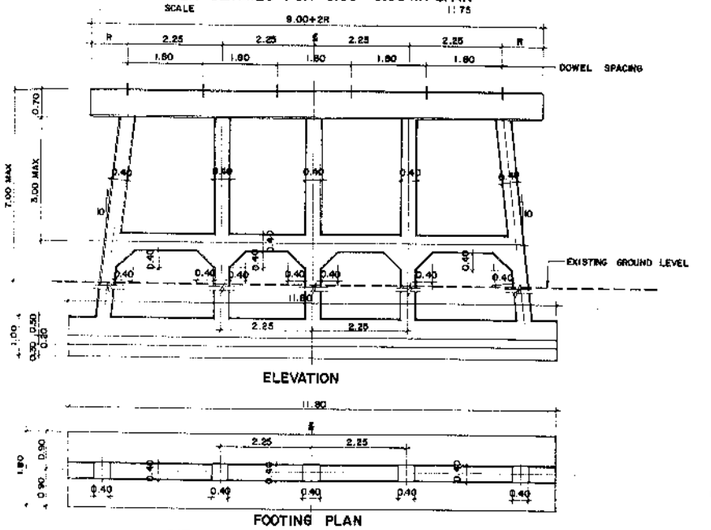
DESIGNED : DOH CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN.
		DWG. NO. ST-07
APPROVED : (DIRECTOR GENERAL)		SHEET NO. 120



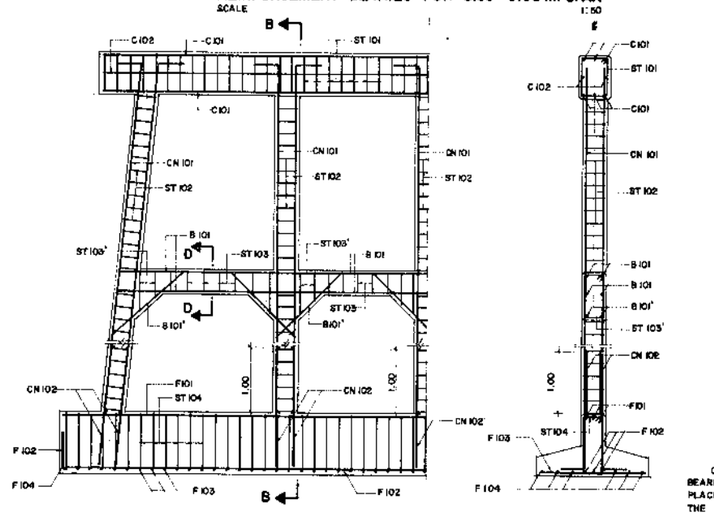
PIER DETAILS FOR 5.00 – 6.00 M. SPAN
SCALE 1:75



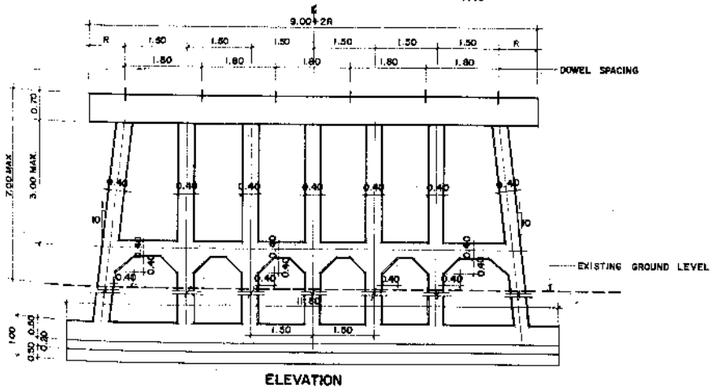
REINFORCEMENT DETAILS FOR 5.00–6.00 M. SPAN
SCALE 1:50



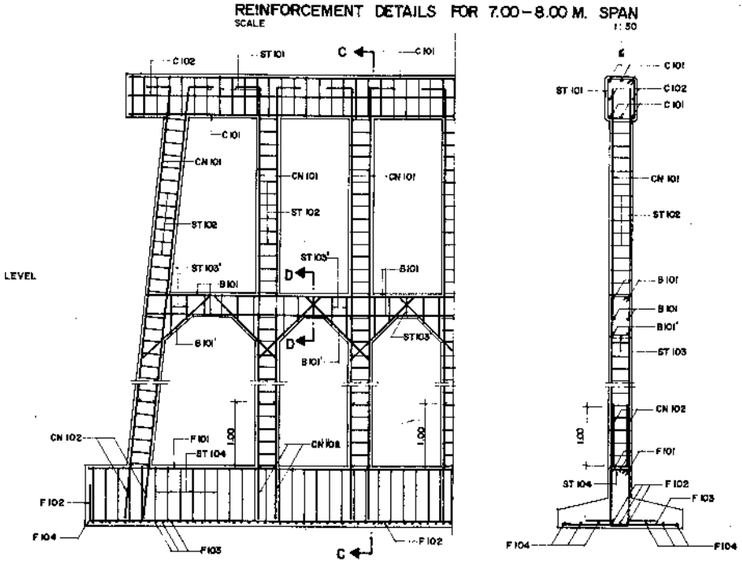
PIER DETAILS FOR 7.00 – 8.00 M. SPAN
SCALE 1:75



REINFORCEMENT DETAILS FOR 7.00 – 8.00 M. SPAN
SCALE 1:50



PIER DETAILS FOR 9.00 – 10.00 M. SPAN
SCALE 1:75

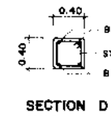


REINFORCEMENT DETAILS FOR 9.00 – 10.00 M. SPAN
SCALE 1:50

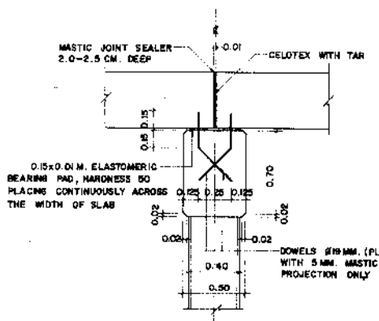
TABLE OF REINFORCEMENT

BAR BEDDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
	C 101	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	CN 101	8	–	16	11.25	8	–	16	11.25	8	–	20	11.25	8	–	20	11.25	8	–	28	11.25	8	–	28	11.25
	CN 102	8	–	16	2.31	8	–	16	2.31	8	–	20	2.31	8	–	20	2.31	8	–	28	2.31	8	–	28	2.31
	ST 101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
	ST 102	3	0.20	192	1.35	3	0.20	192	1.35	3	0.20	240	1.35	3	0.20	240	1.35	3	0.20	336	1.35	3	0.20	336	1.35
	ST 103	3	0.25	48	1.35	3	0.25	48	1.35	3	0.25	42	1.35	3	0.25	42	1.25	3	0.25	36	1.25	3	0.25	36	1.35
	ST 103'	3	–	24	–	3	–	24	–	3	–	32	–	3	–	32	–	3	–	48	–	3	–	48	–
	ST 104	3	0.20	59	2.55	3	0.20	59	2.55	3	0.20	59	2.55	3	0.20	59	2.55	3	0.20	59	2.55	3	0.20	59	2.55
	B 101	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	B 101'	6	–	24	1.55	6	–	24	1.55	6	–	32	1.55	6	–	32	1.55	6	–	48	1.55	6	–	48	1.55
	F 101	8	–	3	11.70	8	–	3	11.70	8	–	3	11.70	8	–	3	11.70	8	–	3	11.70	8	–	3	11.70
	F 102	8	–	3	12.90	8	–	3	12.90	8	–	3	12.90	8	–	3	12.90	8	–	3	12.90	8	–	3	12.90
	F 103	4	0.25	47	1.50	4	0.25	47	1.50	4	0.20	59	1.70	4	0.20	59	1.70	4	0.125	94	1.90	4	0.125	94	1.90
	F 104	4	–	6	11.70	4	–	6	11.70	4	–	6	11.70	4	–	6	11.70	4	–	6	11.70	4	–	6	11.70

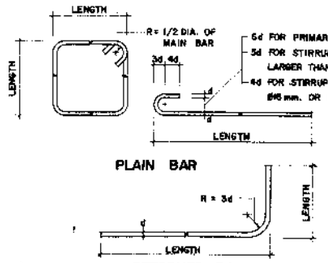
#3 = Ø3/8" OR 9 MM., #4 = Ø1/2" OR 12 MM., #6 = Ø3/4" OR 19 MM., #8 = Ø1" OR 25 MM., NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR.



SECTION D – D
SCALE 1:75



CAP BEAM DETAIL
SCALE 1:25



BAR BONDING DETAILS
NOT TO SCALE

NOTES

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.50 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2.
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES:
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.00 M. A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.00 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.00 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERNAL NOT MORE THE 3.00 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG/m^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/cm^2 FOR A 0.15x0.15x0.15 m. CUBE AT 28 DAYS. CEMENT SHALL BE TIS.15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWING:

PORTLAND CEMENT	350 KG.	CRUSHED ROCK OR GRAVEL	0.85 M^3
SAND	0.43 M^3	CONCRETE SLUM MAX.	10 CM.

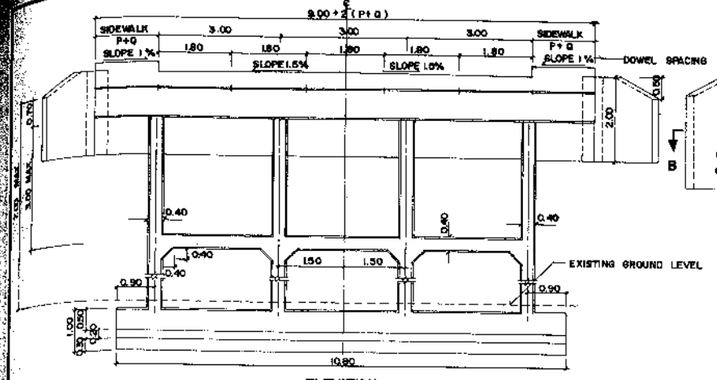
6. REBAR #4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.00 M. PIER HIGHER THAN 7.00 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.00 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

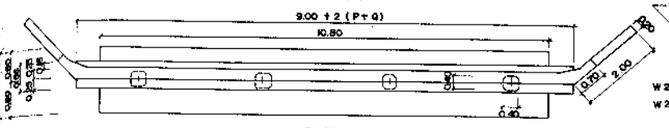
STANDARD DRAWING

9.00 M. ROADWAY WIDTH SLAB BRIDGE
SPREAD FOOTING PIER DETAILS

DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: FOR (DIRECTOR GENERAL)		DWG. NO. ST – 08
		SHEET NO. 121

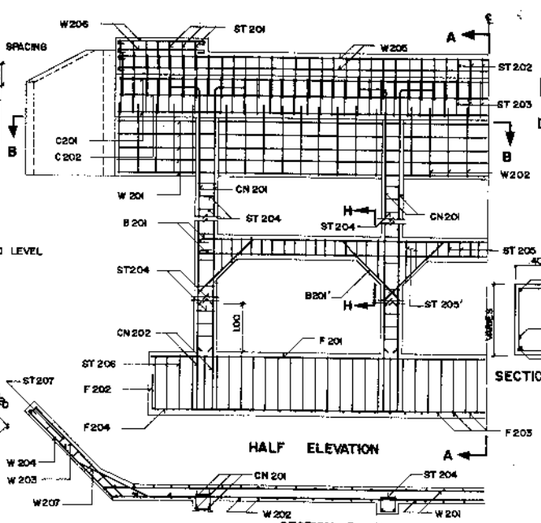


ELEVATION



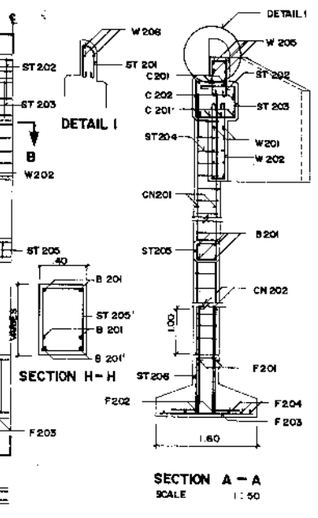
PLAN

ABUTMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1 : 75



HALF ELEVATION

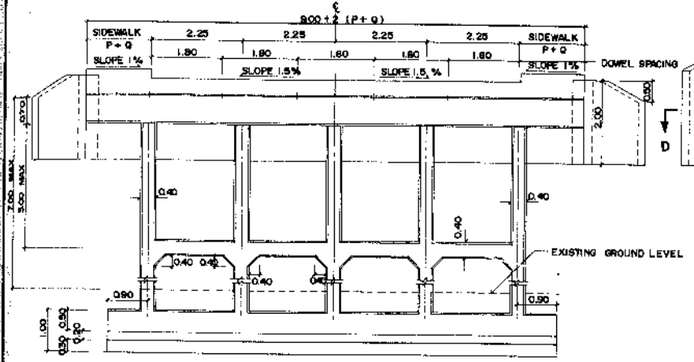
SECTION B - B



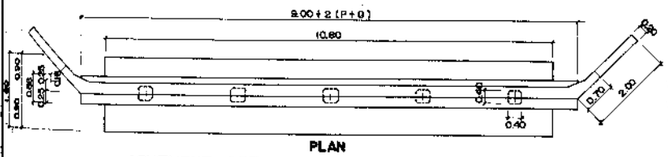
SECTION A - A
SCALE 1 : 50

SECTION H - H

REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1 : 50

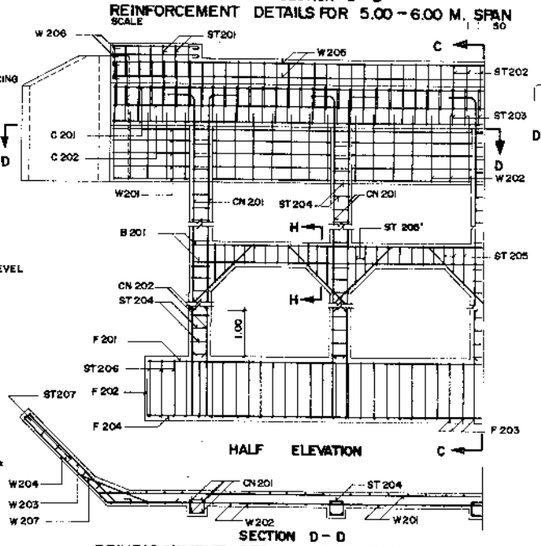


ELEVATION



PLAN

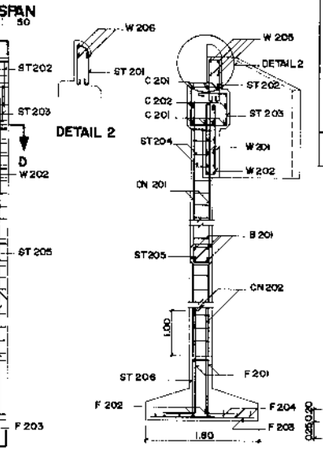
ABUTMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1 : 75



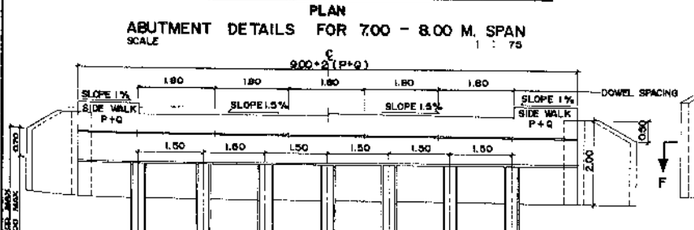
HALF ELEVATION

SECTION D - D

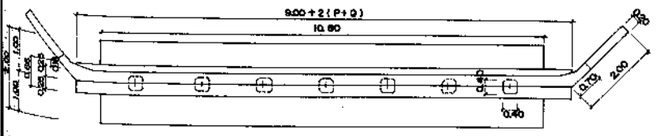
REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1 : 50



SECTION C - C
SCALE 1 : 50

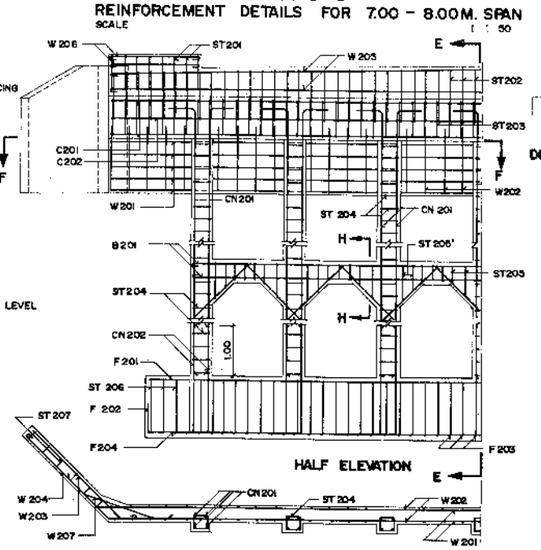


ELEVATION



PLAN

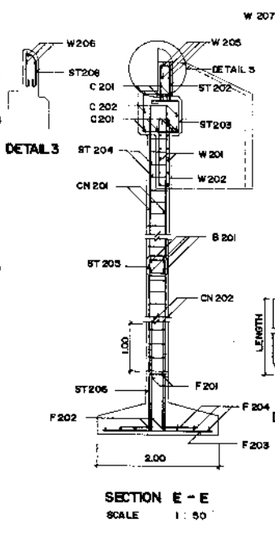
ABUTMENT DETAILS FOR 9.00 - 10.00 M. SPAN
SCALE 1 : 75



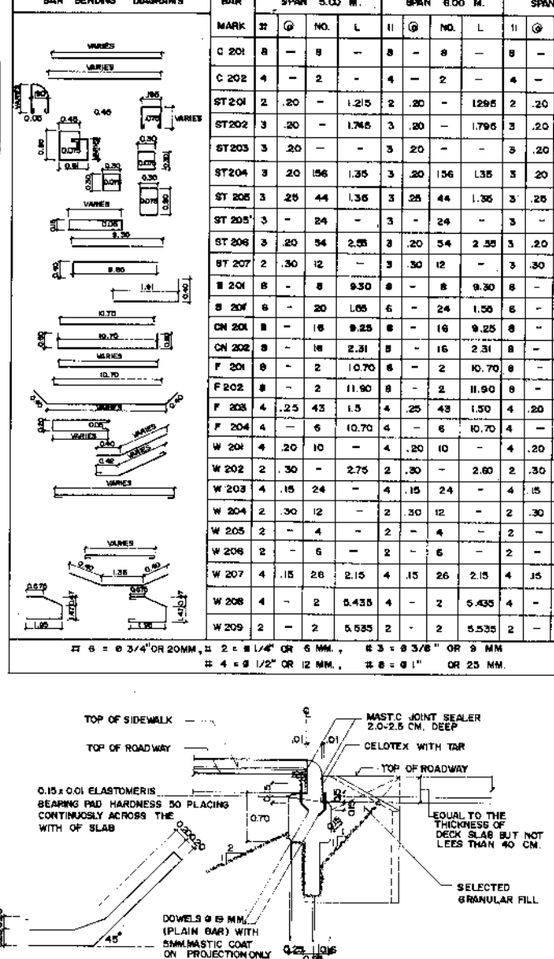
HALF ELEVATION

SECTION F - F

REINFORCEMENT DETAILS FOR 9.00 - 10.00 M. SPAN
SCALE 1 : 50

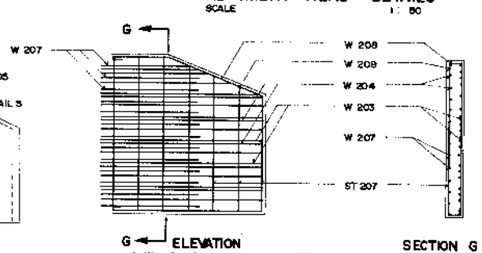


SECTION E - E
SCALE 1 : 50



WINGWALL DETAILS
SCALE 1 : 50

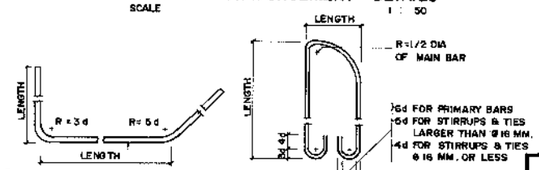
ABUTMENT HEAD DETAILS
SCALE 1 : 50



G ELEVATION G

SECTION G - G

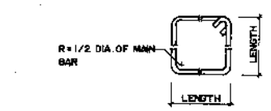
WINGWALL REINFORCEMENT DETAILS
SCALE 1 : 50



DEFORMED BAR

PLAIN BAR

BAR BENDING DETAILS
SCALE



BAR BENDING DIAGRAMS

TABLE OF REINFORCEMENT

BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
C 201	8	—	8	—	8	—	8	—	8	—	8	—	8	—	8	—	8	—	8	—	6	—	6	—
C 202	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—
ST 201	2	.20	—	1.215	2	.20	—	1.295	2	.20	—	1.355	2	.20	—	1.435	2	.20	—	1.515	2	.20	—	1.635
ST 202	3	.20	—	1.745	3	.20	—	1.795	3	.20	—	1.845	3	20	—	1.895	3	.20	—	1.945	3	.20	—	1.995
ST 203	3	.20	—	—	3	20	—	—	3	.20	—	—	3	.20	—	—	3	20	—	—	3	20	—	—
ST 204	3	.20	156	1.35	3	.20	156	1.35	3	20	195	1.35	3	.20	195	1.35	3	20	273	1.35	3	.20	273	1.35
ST 205	3	.25	44	1.35	3	.25	44	1.35	3	.25	32	1.35	3	.25	32	1.35	3	.25	12	1.35	3	.25	12	1.35
ST 205'	3	—	24	—	3	—	24	—	3	—	32	—	3	—	32	—	3	—	48	—	3	—	48	—
ST 206	3	.20	54	2.55	3	.20	54	2.55	3	.20	54	2.55	3	.20	54	2.55	3	.20	54	2.55	3	.20	54	2.55
ST 207	2	.30	12	—	3	.30	12	—	3	.30	12	—	3	.30	12	—	3	.30	12	—	3	.30	12	—
B 201	8	-	8	9.30	8	-	8	9.30	8	-	8	9.30	8	-	8	9.30	8	-	8	9.30	8	-	8	9.30
B 201'	8	-	20	1.65	8	-	24	1.55	8	-	32	1.55	8	-	32	1.55	8	-	48	1.55	8	-	48	1.55
CN 201	8	-	16	9.25	8	-	16	9.25	8	-	20	9.25	8	-	20	9.25	8	-	28	9.25	8	-	28	9.25
CN 202	8	-	16	2.31	8	-	16	2.31	8	-	20	2.31	8	-	20	2.31	8	-	28	2.31	8	-	28	2.31
F 201	8	-	2	10.70	8	-	2	10.70	8	-	2	10.70	8	-	2	10.70	8	-	2	10.70	8	-	2	10.70
F 202	8	-	2	11.90	8	-	2	11.90	8	-	2	11.90	8	-	2	11.90	8	-	2	11.90	8	-	2	11.90
F 203	4	.25	43	1.5	4	.25	43	1.50	4	.20	54	1.70	4	.20	54	1.70	4	.125	86	1.90	4	.125	86	1.90
F 204	4	—	6	10.70	4	—	6	10.70	4	—	6	10.70	4	—	6	10.70	4	—	6	10.70	4	—	6	10.75
W 201	4	.20	10	—	4	.20	10	—	4	.20	10	—	4	.20	10	—	4	20	10	—	4	20	10	—
W 202	2	.30	—	2.75	2	.30	—	2.60	2	.30	—	2.80	2	.30	—	2.50	2	.30	—	2.40	2	.30	—	2.30
W 203	4	.15	24	—	4	.15	24	—	4	.15	24	—	4	.15	24	—	4	.15	24	—	4	.15	24	—
W 204	2	.30	12	—	2	.30	12	—	2	.30	12	—	2	.30	12	—	2	.30	12	—	2	.30	12	—
W 205	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—
W 206	2	—	6	—	2	—	6	—	2	—	6	—	2	—	6	—	2	—	6	—	2	—	6	—
W 207	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15
W 208	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435
W 209	2	—	2	5.535	2	-	2	5.535	2	—	2	5.535	2	—	2	5.535	2	—	2	5.535	2	-	2	5.535

6 = Ø 3/4" OR 20MM., # 2 = Ø 1/4" OR 6 MM., # 3 = Ø 3/8" OR 9 MM.
4 = Ø 1/2" OR 12 MM., # 8 = Ø 1" OR 25 MM.

NO. = TOTAL AMOUNT OF BARS
L. = TOTAL LENGTH OF EACH BAR

NOTES

1. THE BOTTOM OF FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUN CEMENT CONTENT OF 350 KG./m^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./Cm^2 FOR A 15 x 15 x 15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :
   PORTLAND CEMENT 350 KG., CRUSHED ROCK OR GRAVEL 0.86 m^3
   SAND 0.46 m^3, CONCRETE SLUMP MAX. 10 Cm.
6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS. OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS. 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATION OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. THE PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3A05-106-14/17.

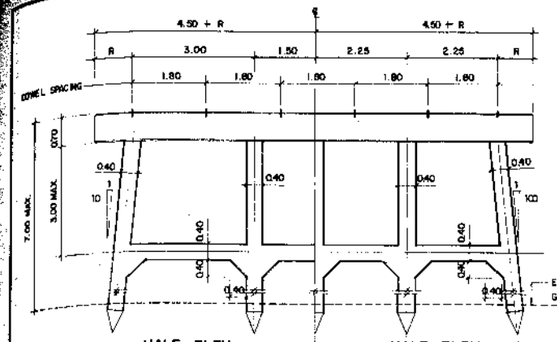
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

9.00 M. ROADWAY WIDTH SLAB BRIDGE

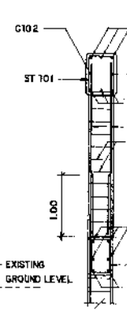
SPREAD FOOTING ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-09
		SHEET NO. 122

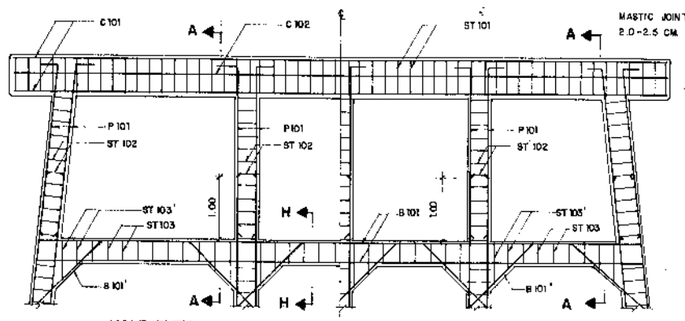


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

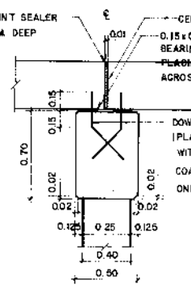


SECTION A - A

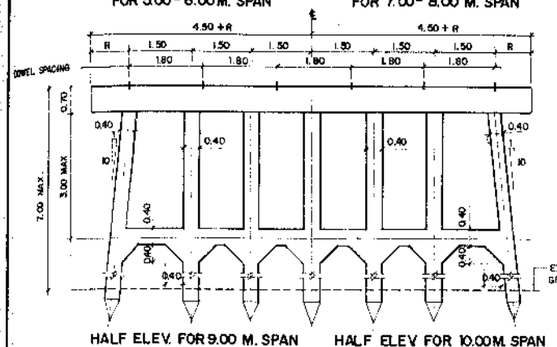


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN



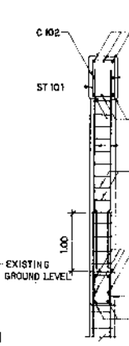
CAP BEAM DETAILS
SCALE 1:25



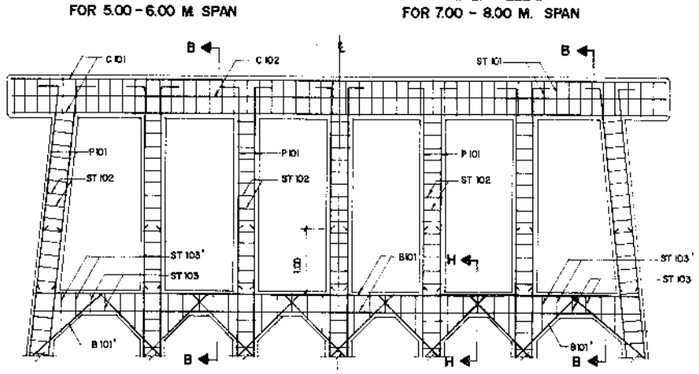
HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV FOR 10.00 M. SPAN

PILE BENT ELEVATION
SCALE 1:75



SECTION B - B



HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. 10.00 M. SPAN

PILE BENT REINFORCEMENT DETAILS
SCALE 1:50

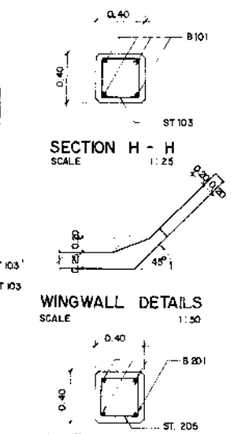
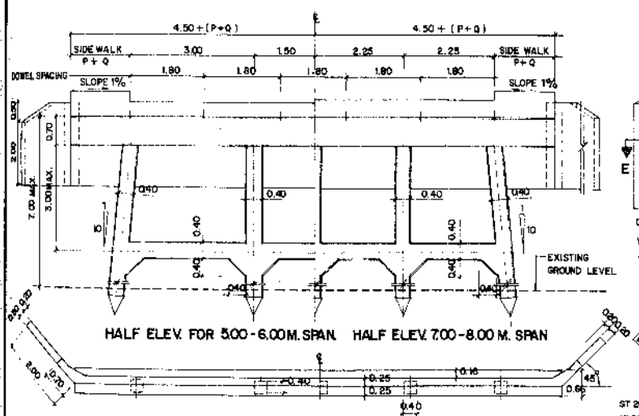


TABLE OF REINFORCEMENT

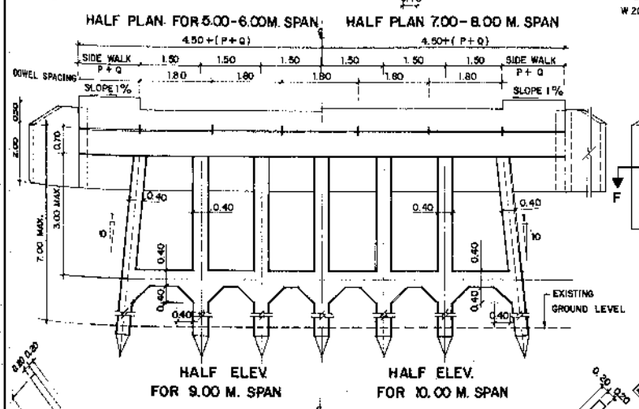
BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
VARIES	C101	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
VARIES	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
PILE BENT	ST101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
	ST102	3	0.20	56	1.35	3	0.20	56	1.35	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	98	1.35	3	0.20	98	1.35
	ST103	3	0.25	24	1.35	3	0.25	24	1.35	3	0.25	18	1.35	3	0.25	18	1.35	3	0.25	8	1.35	3	0.25	8	1.35
VARIES	ST103'	3	0.25	12	–	3	0.25	12	–	3	0.25	18	–	3	0.25	16	–	3	0.25	24	–	3	0.25	24	–
1.55	B101	8	–	4		8	–	4		8	–	4		8	–	4		8	–	4		8	–	4	
VARIES	B101'	8	–	12	1.55	8	–	12	1.55	8	–	16	1.55	8	–	16	1.55	8	–	24	1.55	8	–	24	1.55
	P101	8	–	16	3.75	8	–	16	3.75	8	–	20	3.75	8	–	20	3.75	8	–	24	3.75	8	–	24	3.75
VARIES	C 201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
VARIES	C 202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
ABUTMENT	ST201	2	0.20	–	1.215	2	0.20	–	1.295	2	0.20	–	1.355	2	0.20	–	1.435	2	0.20	–	1.515	2	0.20	–	1.635
	ST202	3	0.20	–	1.745	3	0.20	–	1.795	3	0.20	–	1.845	3	0.20	–	1.895	3	0.20	–	1.945	3	0.20	–	1.995
	ST203	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–
	ST204	3	0.20	56	1.35	3	0.20	56	1.35	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	98	1.35	3	0.20	98	1.35
	ST205	3	0.25	24	1.35	3	0.25	24	1.35	3	0.25	18	1.35	3	0.25	18	1.35	3	0.25	8	1.35	3	0.25	8	1.35
VARIES	ST205'	3	0.25	12	–	3	0.25	12	–	3	0.25	16	–	3	0.25	16	–	3	0.25	24	–	3	0.25	24	–
VARIES	ST206	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
1.55	B201	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
VARIES	B 201'	6	–	12	1.55	6	–	12	1.55	6	–	16	1.55	6	–	16	1.55	6	–	24	1.55	6	–	24	1.55
	P 201	8	–	16	3.75	8	–	16	3.75	8	–	20	3.75	8	–	20	3.75	8	–	24	3.75	8	–	24	3.75
VARIES	W201	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
	W202	2	0.30	–	2.70	2	0.30	–	2.60	2	0.30	–	2.60	2	0.30	–	2.30	2	0.30	–	2.40	2	0.30	–	2.30
VARIES	W203	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–
VARIES	W204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
VARIES	W205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
1.35	W 206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
1.95	W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
	W208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
1.95	W 209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

2= ø 1/4" OR 6 MM., # 3= ø 3/8" OR 9 MM., # 4= ø 1/2" OR 12 MM., # 6= ø 3/4" OR 20 MM., # 8= ø 1" OR 25 MM., NO.= TOTAL AMOUNT OF BARS, L= TOTAL LENGTH OF EACH BARS



HALF ELEV. FOR 5.00 - 6.00 M. SPAN

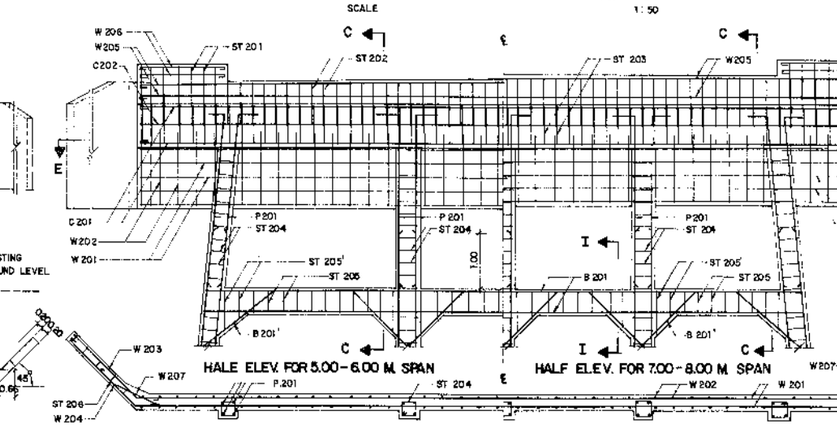
HALF ELEV. 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN

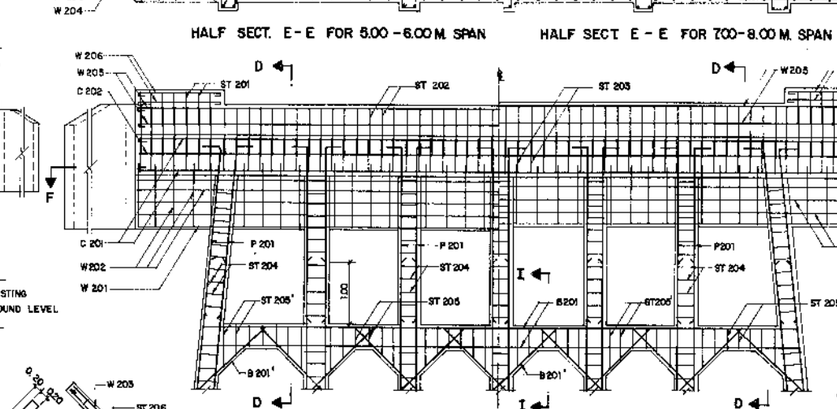
HALF ELEV. FOR 10.00 M. SPAN

ABUTMENT DETAILS
SCALE 1:75



HALE ELEV. FOR 5.00 - 6.00 M SPAN

HALF ELEV. FOR 7.00 - 8.00 M SPAN



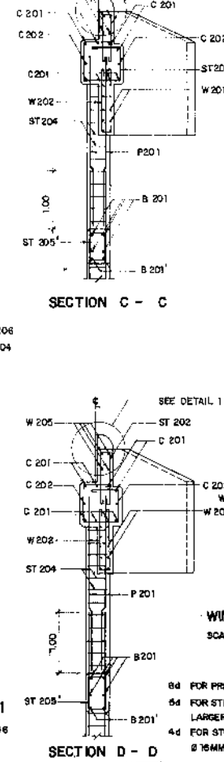
HALF SECT. E-E FOR 5.00 - 6.00 M. SPAN

HALF SECT E - E FOR 7.00 - 8.00 M SPAN

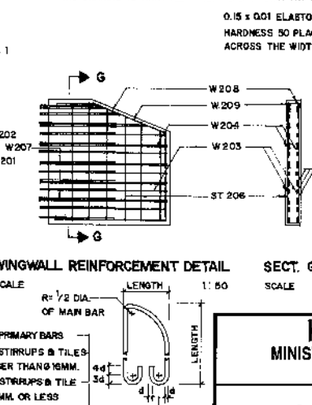
HALF SECT. F - F FOR 9.00 M. SPAN

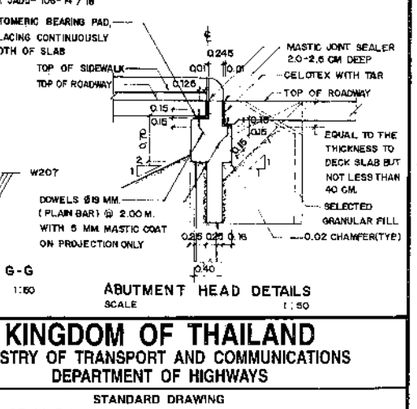
HALF SECT. F - F FOR 10.00 M SPAN

ABUTMENT REINFORCEMENT DETAILS
SCALE 1:50



BAR BENDING DETAILS
SCALE TO SCALE





ABUTMENT HEAD DETAILS
SCALE 1:50

NOTES:

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS FOR PILE DETAILS SEE DWG NOS. MS - 02 , MS - 03.
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVALL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE CLEAR COVER OF 2.5 CM SHALL BE PROVIDED.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM.^{2} FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX. DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350 KG.	CRUSHED ROCK OR GRAVEL	0.86 M^3
SAND	0.43 M^3	CONCRETE SLUMP MAX.	10 CM.

5. REBAR # 4 OR LARGER SHALL BE T.I.S. 24 GRADE SD 30 DEFORMED BARS , OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS.15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
10. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12. THIS DRAWING IS ADAPTED FROM D.O.H. DWG. NO. 3AD5 - 105 - 14 / 18

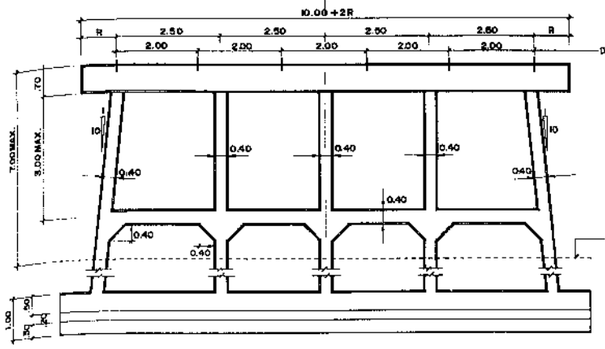
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

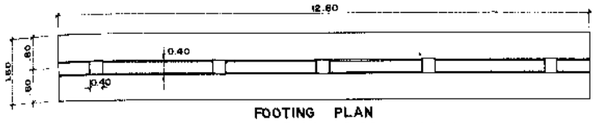
9.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

DESIGNER : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Buranapeepar (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST - 10
		SHEET NO. 123



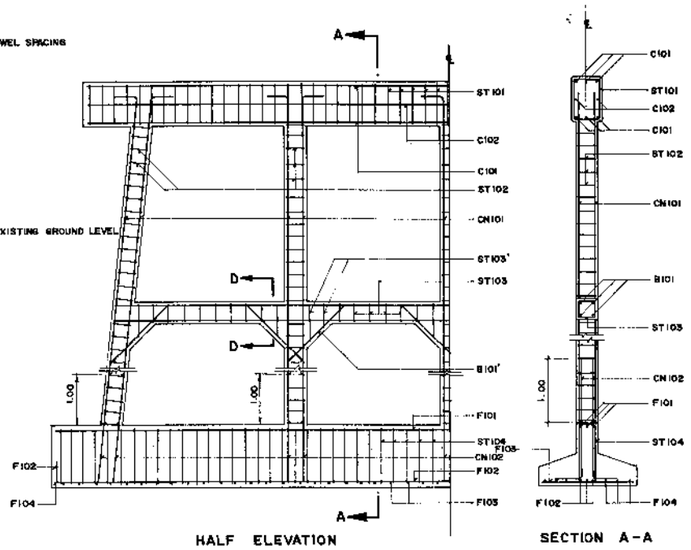
ELEVATION



FOOTING PLAN

PIER DETAILS FOR 5.00 - 6.00 M. SPAN

SCALE 1:75

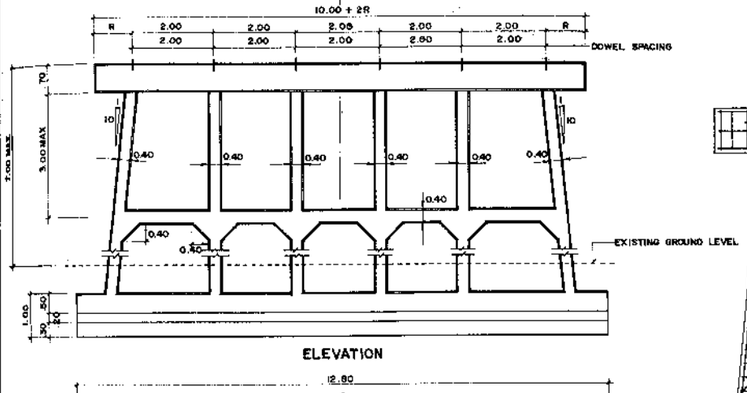


HALF ELEVATION

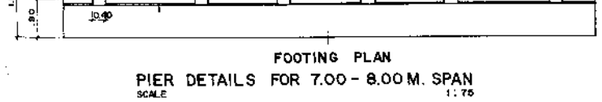
SECTION A-A

REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN

SCALE 1:50



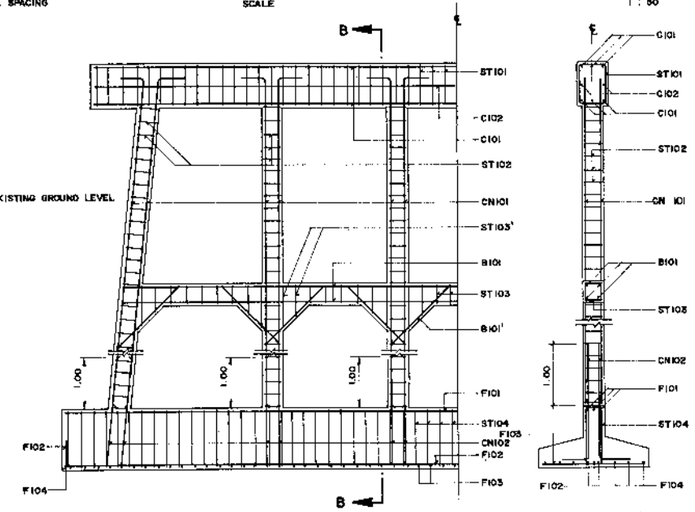
ELEVATION



FOOTING PLAN

PIER DETAILS FOR 7.00 - 8.00 M. SPAN

SCALE 1:75

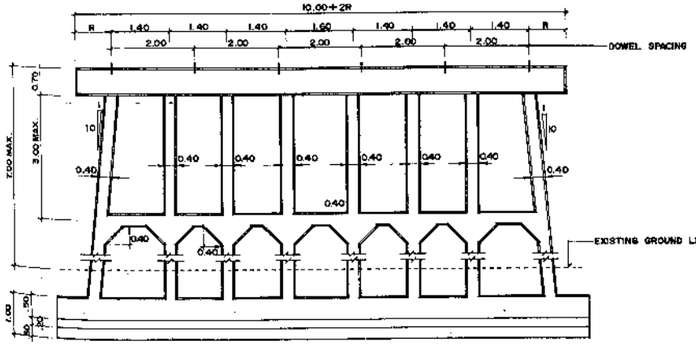


HALF ELEVATION

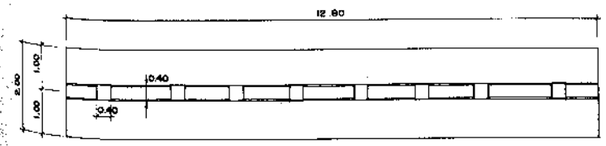
SECTION B - B

REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN

SCALE 1:50



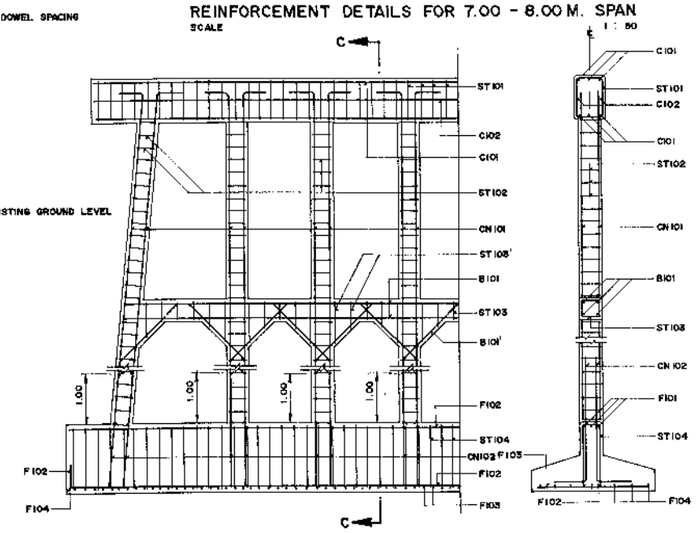
ELEVATION



FOOTING PLAN

PIER DETAILS FOR 9.00 - 10.00 M. SPAN

SCALE 1:75



HALF ELEVATION

SECTION C - C

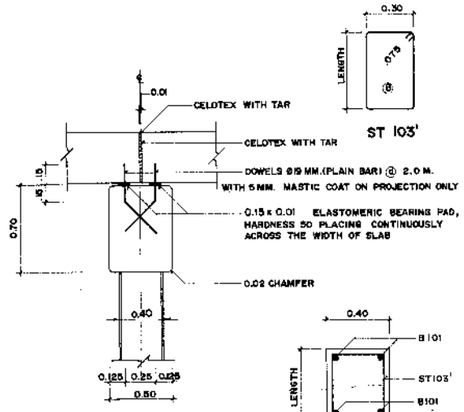
REINFORCEMENT DETAILS FOR 9.00 - 10.00 M. SPAN

SCALE 1:50

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	NO.	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
			#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
	1	C101	6	-	6	-	8	-	6	-	6	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-
	2	C102	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
VARIES (1)	3	CN101	6	-	20	11.25	6	-	20	11.25	6	-	24	11.25	6	-	24	11.25	8	-	32	11.25	8	-	32	11.25
VARIES (2)	4	CN102	6	-	20	2.31	6	-	20	2.31	6	-	24	2.31	6	-	24	2.31	8	-	32	2.31	8	-	32	2.31
10.85 (3) 0.40	5	ST101	3	0.20	59	2.35	3	0.20	59	2.35	3	0.20	59	2.35	3	0.20	59	2.35	3	0.20	59	2.35	3	0.20	59	2.35
(4) 0.40 1.91	6	ST102	3	0.20	240	1.35	3	0.20	240	1.35	3	0.20	288	1.35	3	0.20	288	1.35	3	0.20	384	1.35	3	0.20	384	1.35
(5) 0.75 0.65 0.65	7	ST103	3	0.25	60	1.35	3	0.25	60	1.35	3	0.25	48	1.35	3	0.25	48	1.35	3	0.25	36	1.35	3	0.25	36	1.35
(6) 0.30 0.75 0.30 (7) 0.75	8	ST103'	3	0.25	24	-	3	0.25	24	-	3	0.25	32	-	3	0.25	32	-	3	0.25	40	-	3	0.25	40	-
0.30 (8) 0.75 0.90	9	ST104	3	0.20	64	2.55	3	0.20	64	2.55	3	0.20	64	2.55	3	0.20	64	2.55	3	0.20	64	2.55	3	0.20	64	2.55
	10	B101	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
1.50 (9) VARIES (10) 12.70	11	B101'	6	-	24	1.55	6	-	24	1.55	6	-	32	1.55	6	-	32	1.55	6	-	40	1.55	6	-	40	1.55
(11) 0.60 0.60 (12) 12.70	12	F101	8	-	3	12.70	8	-	3	12.70	8	-	3	12.70	8	-	3	12.70	8	-	3	12.70	8	-	3	12.70
	13	F102	8	-	3	13.90	8	-	3	13.90	8	-	3	13.90	8	-	3	13.90	8	-	3	13.90	8	-	3	13.90
(13) VARIES (14) 12.70	14	F103	4	0.25	51	1.50	4	0.25	51	1.50	4	0.20	64	1.70	4	0.20	64	1.70	4	0.125	102	1.90	4	0.125	102	1.90
	15	F104	4	-	6	12.70	4	-	6	12.70	4	-	6	12.70	4	-	6	12.70	4	-	6	12.70	4	-	6	12.70

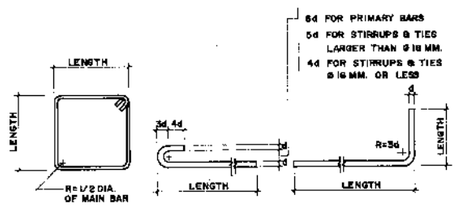
3 = Ø 3/8" OR 9 MM. , # 4 = Ø 1/2" OR 12 MM. , # 6 = Ø 3/4" OR 20MM. , # 8 = 1" OR 25 MM. , NO. = TOTAL AMOUNT OF BARS , L = TOTAL LENGTH OF EACH BAR



CAP BEAM DETAILS

SCALE 1:25

SECTION D - D



PLAIN BAR DEFORMED BAR

BAR BENDING DETAILS

NOT TO SCALE

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1 : 3 : 6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES.
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOF OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL 3.0 M. ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM AT WHICH CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. ALL DIMENSION SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
6. REBARS #4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS. 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATION OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.0 M.
12. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg/M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg/CM.^{2} FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	Kg.
SAND	0.45	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MIX.	10	CM.

13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3 AD 5-108-14/19.

KINGDOM OF THAILAND

MINISTRY OF TRANSPORT AND COMMUNICATIONS

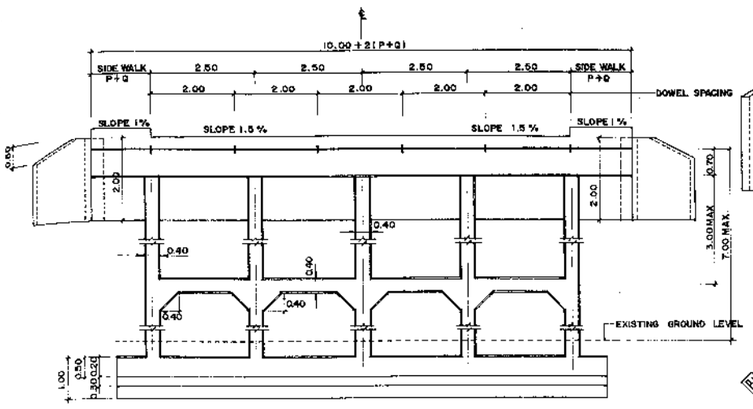
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

10.00 M. ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTING PIER DETAILS

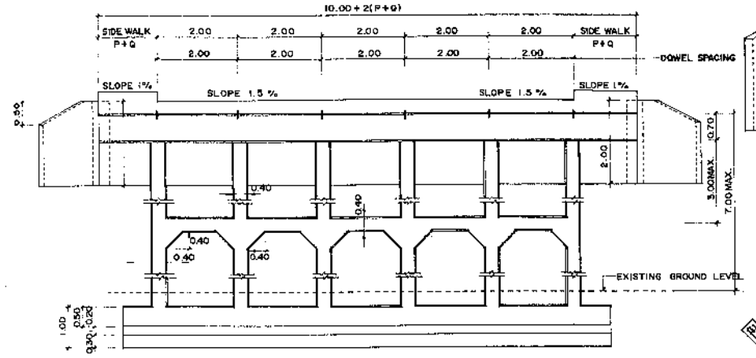
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : FOR (DIRECTOR GENERAL)		DWG. NO. ST - 11
		SHEET NO. 124



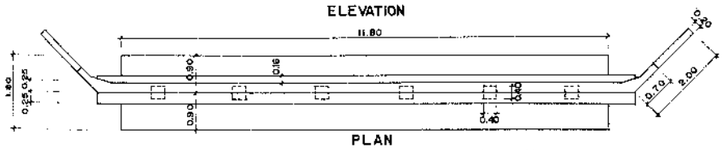
ELEVATION

PLAN

DETAILS FOR 5.00-6.00M. SPAN
SCALE 1:75

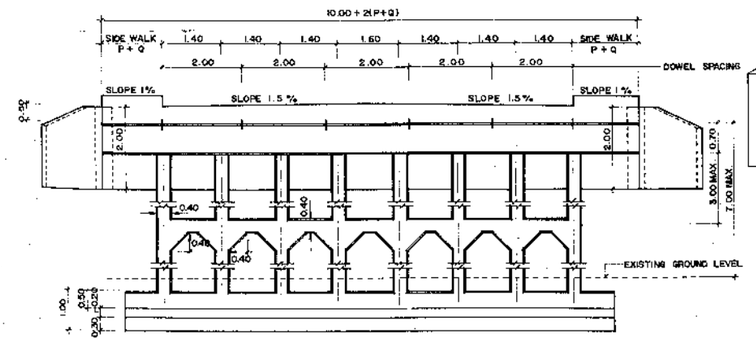


ELEVATION

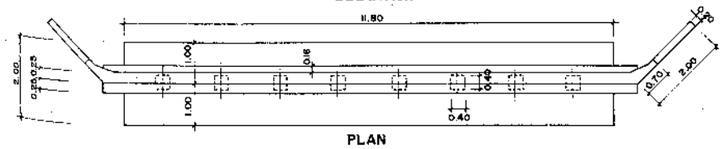


PLAN

DETAILS FOR 7.00-8.00M. SPAN
SCALE 1:75

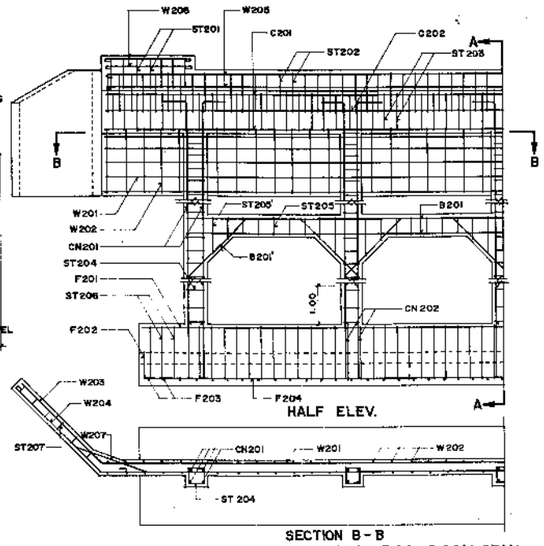


ELEVATION

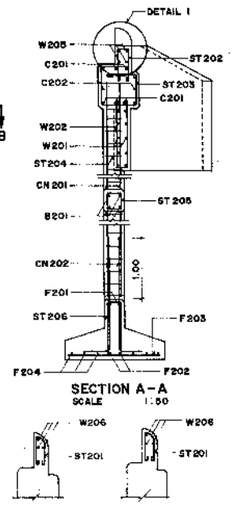


PLAN

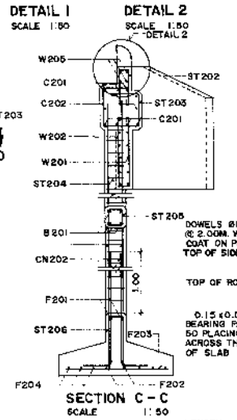
DETAILS FOR 9.00-10.00M. SPAN
SCALE 1:75



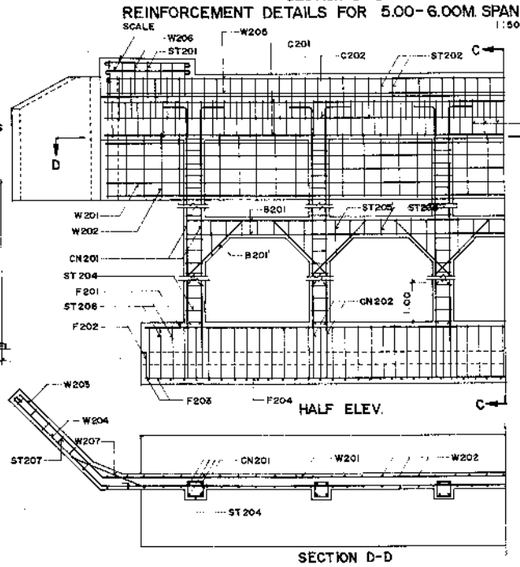
REINFORCEMENT DETAILS FOR 5.00-6.00M SPAN
SCALE 1:50



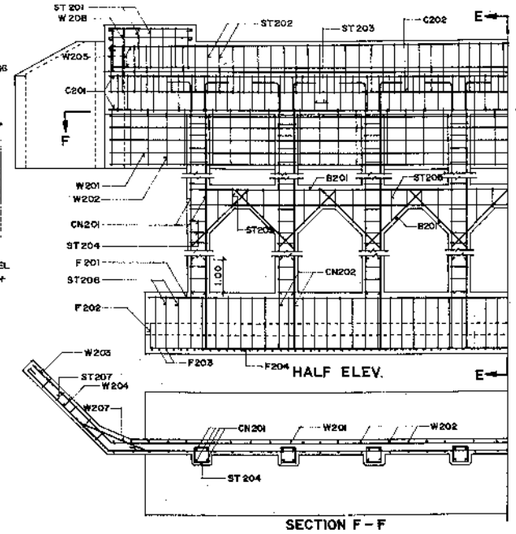
DETAIL 1
SCALE 1:50



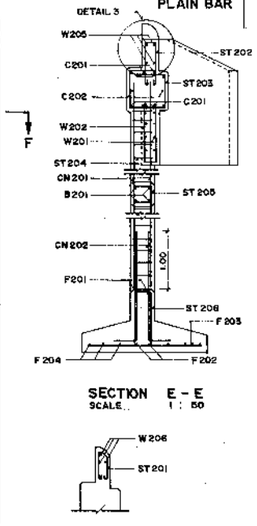
DETAIL 2
SCALE 1:50



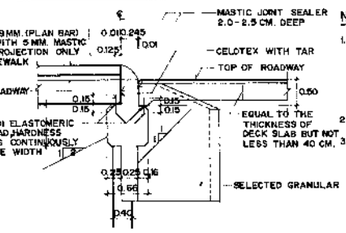
REINFORCEMENT DETAILS FOR 7.00-8.00M. SPAN
SCALE 1:50



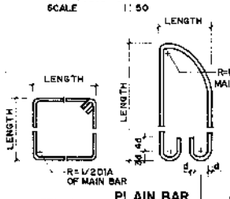
REINFORCEMENT DETAILS FOR 9.00-10.00M. SPAN
SCALE 1:50



DETAIL 3
SCALE 1:50

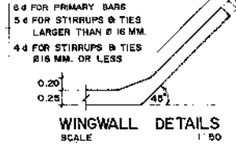


ABUTMENT HEAD DETAILS
SCALE 1:50

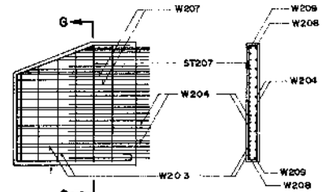


DEFORMED BAR BENDING DETAILS
NOT SCALE

6d FOR PRIMARY BARS
5d FOR STIRRUPS @ TIES LARGER THAN Ø 16 MM.
4d FOR STIRRUPS @ TIES Ø16 MM. OR LESS



WINGWALL DETAILS
SCALE 1:50



ELEVATION SECTION G-G WINGWALL REINFORCEMENT DETAILS
SCALE 1:50

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	NO.	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
			#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
	1.	C201	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
	2.	C202	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
	3.	ST201	2	0.20	-	1.216	2	0.20	-	1.295	2	0.20	-	13.58	2	0.20	-	14.35	2	0.20	-	15.15	2	0.20	-	16.35
	4.	ST202	3	0.20	65	1.745	3	0.20	65	1.795	3	0.20	65	18.45	3	0.20	65	18.95	3	0.20	65	19.45	3	0.20	85	19.95
	5.	ST203	3	0.20	64	-	3	0.20	64	-	3	0.20	64	-	3	0.20	64	-	3	0.20	64	-	3	0.20	64	-
	6.	ST204	3	0.20	195	1.35	3	0.20	195	1.35	3	0.20	234	1.35	3	0.20	234	1.35	3	0.20	312	1.35	3	0.20	312	1.35
	7.	ST205	3	0.25	40	1.35	3	0.25	40	1.35	3	0.25	30	1.35	3	0.25	30	1.35	3	0.25	16	1.35	3	0.25	16	1.35
	8.	ST205'	3	0.25	32	-	3	0.25	32	-	3	0.25	40	-	3	0.25	40	-	3	0.25	56	-	3	0.25	56	-
	9.	ST206	3	0.20	59	2.55	3	0.20	59	2.55	3	0.20	59	2.55	3	0.20	59	2.55	3	0.20	59	2.55	3	0.20	59	2.55
	10.	ST207	2	0.35	12	-	2	0.35	12	-	2	0.35	12	-	2	0.35	12	-	2	0.35	2	-	2	0.35	12	-
	11.	B201	8	-	8	10.30	8	-	8	10.30	8	-	8	10.30	8	-	8	10.30	8	-	8	10.30	8	-	8	10.30
	12.	B201'	6	-	32	1.55	6	-	32	1.55	6	-	40	1.55	6	-	40	1.55	6	-	56	1.55	6	-	56	1.55
	13.	CN201	8	-	20	9.25	8	-	20	9.25	8	-	24	9.25	8	-	24	9.25	8	-	32	9.25	8	-	32	9.25
	14.	CN202	8	-	20	2.31	8	-	20	2.31	8	-	24	2.31	8	-	24	2.31	8	-	32	2.31	8	-	32	2.31
	15.	F201	8	-	2	11.70	8	-	2	11.70	8	-	2	11.70	8	-	2	11.70	8	-	2	11.70	8	-	2	11.70
	16.	F202	8	-	2	12.90	8	-	2	12.90	8	-	2	12.90	8	-	2	12.90	8	-	2	12.90	8	-	2	12.90
	17.	F203	4	0.25	47	1.50	4	0.25	4	1.50	4	0.20	59	1.70	4	0.20	59	1.70	4	0.125	94	1.90	4	0.125	94	1.90
	18.	F204	4	-	8	11.70	4	-	8	11.70	4	-	8	11.70	4	-	8	11.70	4	-	8	11.70	4	-	8	11.70
	19.	W201	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-
	20.	W202	2	0.35	38	2.70	2	0.35	38	2.60	2	0.35	38	2.60	2	0.35	38	2.60	2	0.35	38	2.40	2	0.35	38	2.60
	21.	W203	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-
	22.	W204	2	0.35	12	-	2	0.35	12	-	2	0.35	12	-	2	0.35	12	-	2	0.35	2	-	2	0.35	12	-
	23.	W205	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-
	24.	W206	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-
	25.	W207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
	26.	W208	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435
	27.	W209	2	-	2	5.535	2	-	2	5.585	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535

= 2 = 1/4" OR 6 MM. # 3 = 3/8" OR 9 MM. # 4 = 1/2" OR 12 MM. # 8 = 1" OR 25 MM. NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES:
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M. A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M. ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS AT WHICH CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.0 M.
6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS. 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL THE TOP OF CAP BEAM SHALL BE 7.0 M PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM^2 FOR A 15 x 15 x 15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MIX.	10	CM.

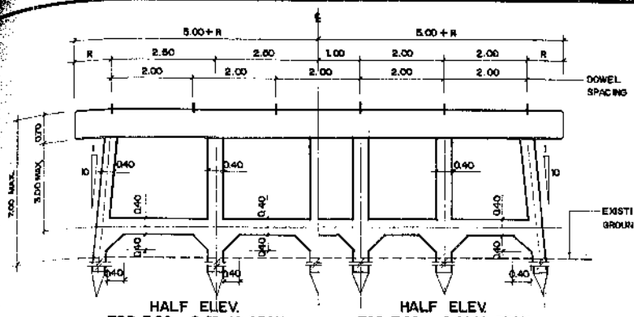
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3A05-106-14/19.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

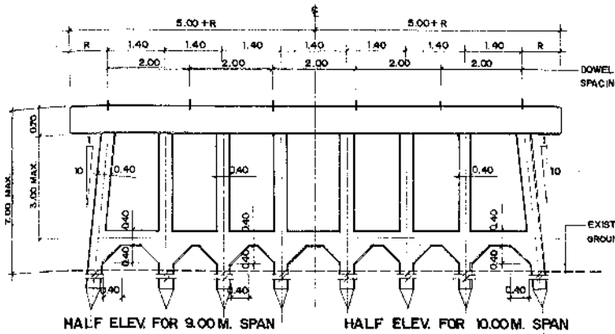
10.00 M. ROADWAY WIDTH SLAB BRIDGE
SPREAD FOOTING ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE	JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE	AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO.	ST-12
		SHEET NO.	125



HALF ELEV. FOR 5.00 - 6.00 M. SPAN

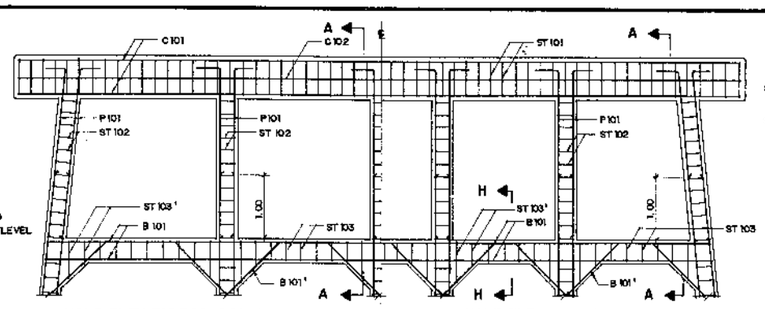
HALF ELEV. FOR 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN

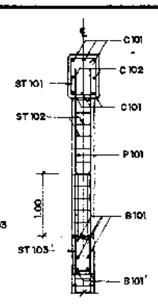
HALF ELEV. FOR 10.00 M. SPAN

PILE BENT ELEVATION
SCALE 1:75

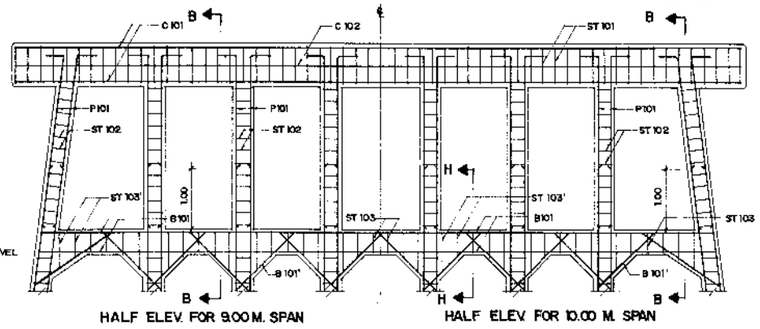


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

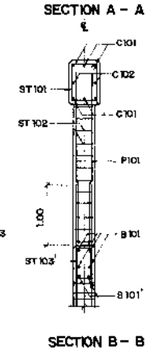


SECTION A - A



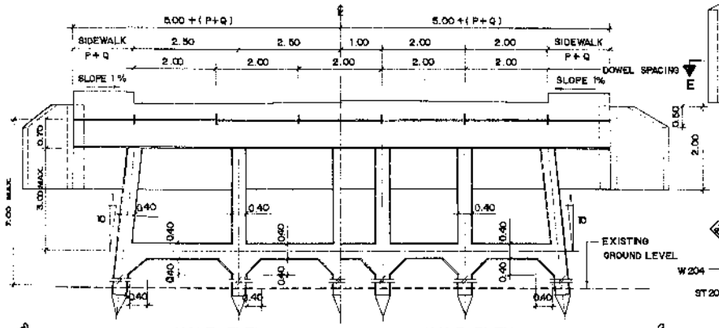
HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN



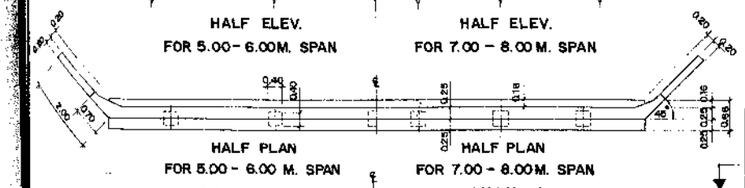
SECTION B - B

PILE BENT REINFORCEMENT DETAILS
SCALE 1:50



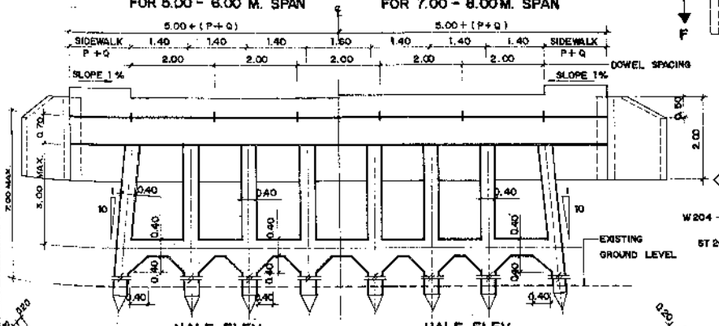
HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN



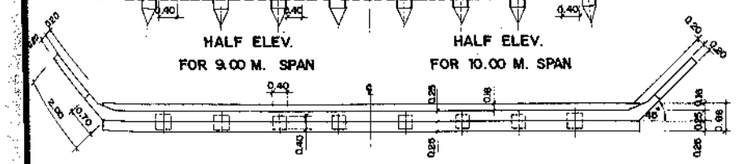
HALF PLAN FOR 5.00 - 6.00 M. SPAN

HALF PLAN FOR 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN

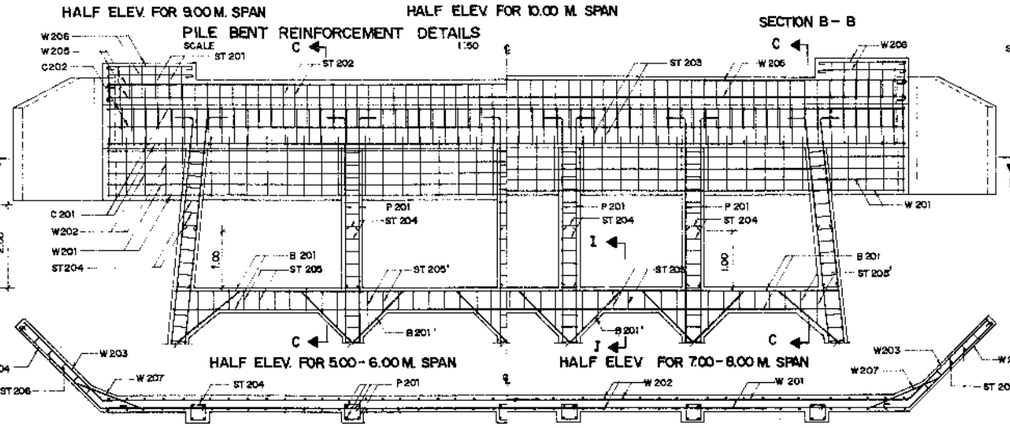
HALF ELEV. FOR 10.00 M. SPAN



HALF PLAN FOR 9.00 M. SPAN

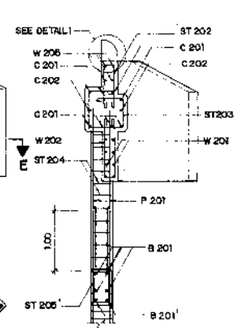
HALF PLAN FOR 10.00 M. SPAN

ABUTMENT DETAILS
SCALE 1:75

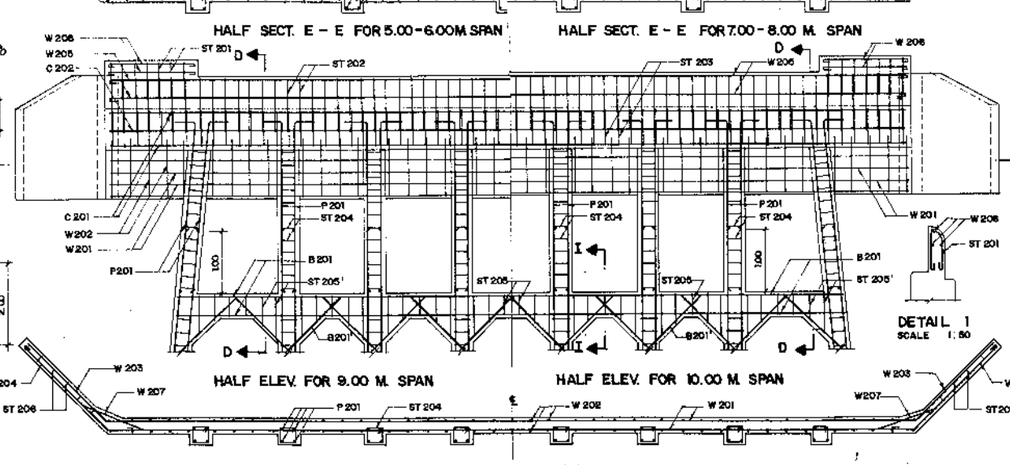


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV FOR 7.00 - 8.00 M. SPAN



SECTION C - C



HALF SECT. E - E FOR 5.00 - 6.00 M. SPAN

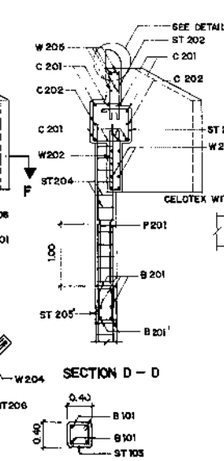
HALF SECT. E - E FOR 7.00 - 8.00 M. SPAN

HALF ELEV. FOR 9.00 M. SPAN

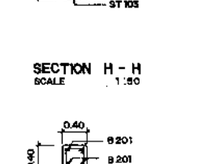
HALF ELEV. FOR 10.00 M. SPAN

HALF SECT. F - F FOR 9.00 M. SPAN

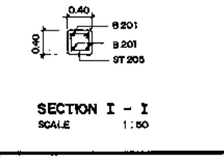
HALF SECT. F - F FOR 10.00 M. SPAN



SECTION D - D

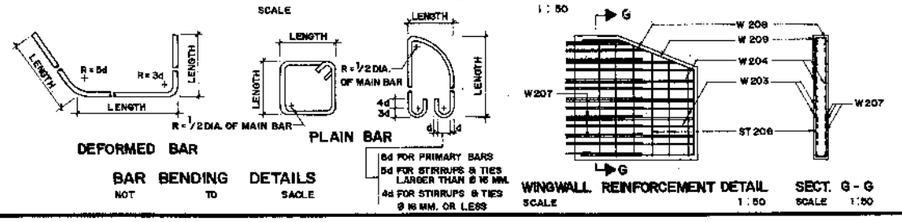


SECTION H - H
SCALE 1:50



SECTION I - I
SCALE 1:50

ABUTMENT REINFORCEMENT DETAILS
SCALE 1:50



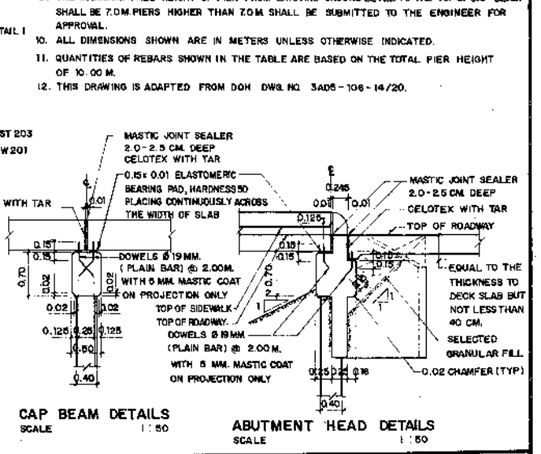
WINGWALL REINFORCEMENT DETAIL
SCALE 1:50

SECT. G - G
SCALE 1:50

DEFORMED BAR

PLAIN BAR

BAR BENDING DETAILS
NOT TO SACLE



CAP BEAM DETAILS
SCALE 1:50

ABUTMENT HEAD DETAILS
SCALE 1:50

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
PILE BENT	C 101	8	–	8	–	8	–	8	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST 101	3	0.20	59	2.35	3	0.20	59	2.35	3	0.20	59	2.35	3	0.20	59	2.35	3	0.20	59	2.35	3	0.20	58	2.35
	ST 102	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	84	1.35	3	0.20	84	1.35	3	0.20	112	1.35	3	0.20	112	1.35
	ST 103	3	0.25	22	1.35	3	0.25	22	1.35	3	0.25	18	1.35	3	0.25	18	1.35	3	0.25	10	1.35	3	0.25	10	1.35
	ST 103'	3	0.25	16	–	3	0.25	16	–	3	0.25	20	–	3	0.25	20	–	3	0.25	28	–	3	0.25	28	–
	B 101	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
	B 101'	8	–	16	1.55	8	–	16	1.55	8	–	20	1.55	8	–	20	1.55	8	–	28	1.55	8	–	28	1.55
	P 101	8	–	20	3.75	8	–	20	3.75	8	–	24	3.75	8	–	24	3.75	8	–	32	3.75	8	–	32	3.75
ABUTMENT	C 201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	C 202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST 201	2	0.20	14	1.215	2	0.20	14	1.295	2	0.20	14	1.355	2	0.20	14	1.435	2	0.20	14	1.515	2	0.20	14	1.635
	ST 202	3	0.20	65	1.745	3	0.20	65	1.795	3	0.20	65	1.845	3	0.20	65	1.895	3	0.20	65	1.945	3	0.20	65	1.995
	ST 203	3	0.20	65	–	3	0.20	65	–	3	0.20	65	–	3	0.20	65	–	3	0.20	65	–	3	0.20	65	–
	ST 204	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	84	1.35	3	0.20	84	1.35	3	0.20	112	1.35	3	0.20	112	1.35
	ST 205	3	0.25	22	1.35	3	0.25	22	1.35	3	0.25	18	1.35	3	0.25	18	1.35	3	0.25	10	1.35	3	0.25	10	1.35
	ST 205'	3	0.25	16	–	3	0.25	16	–	3	0.25	20	–	3	0.25	20	–	3	0.25	28	–	3	0.25	28	–
	ST 206	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
	B 201	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
	B 201'	8	–	16	1.55	8	–	16	1.55	8	–	20	1.55	8	–	20	1.55	8	–	28	1.55	8	–	20	1.55
	P 201	8	–	20	3.75	8	–	20	3.75	8	–	24	3.75	8	–	24	3.75	8	–	32	3.75	8	–	32	3.75
	W 201	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
	W 202	2	0.30	41	2.70	2	0.30	41	2.80	2	0.30	41	2.80	2	0.30	41	2.80	2	0.30	41	2.80	2	0.30	41	2.80
	W 203	4	0.15	24	–	4	0.15	24	–	2	0.15	24	–	2	0.15	24	–	2	0.15	24	–	2	0.15	24	–
	W 204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
	W 205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
	W 206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
	W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
	W 208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
	W 209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

2 = Ø 1/4" OR 6 MM, # 3 = Ø 3/8" OR 9 MM, # 4 = Ø 1/2" OR 12 MM, # 5 = Ø 3/4" OR 20 MM, # 8 = Ø 1" OR 25 MM, NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

NOTES:

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS. FOR PILE DETAILS SEE DWG. NO S. MS - 02 , MS - 03.
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES:
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/CM.^{2} FOR A 0.15 x 0.15 x 0.15 M CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS:

PORTLAND CEMENT	350 KG.	CRUSHED ROCK OR GRAVEL	0.86 M.^{3}
SAND	0.43 M.^{3}	CONCRETE SLUMP MAX.	10 CM.

5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE 3030 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULFHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
10. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3405 - 106 - 14/20.

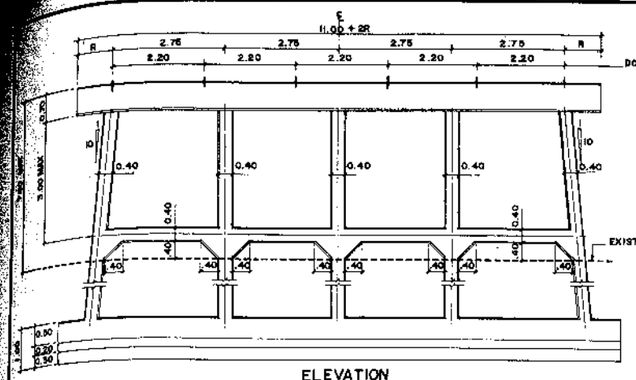
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

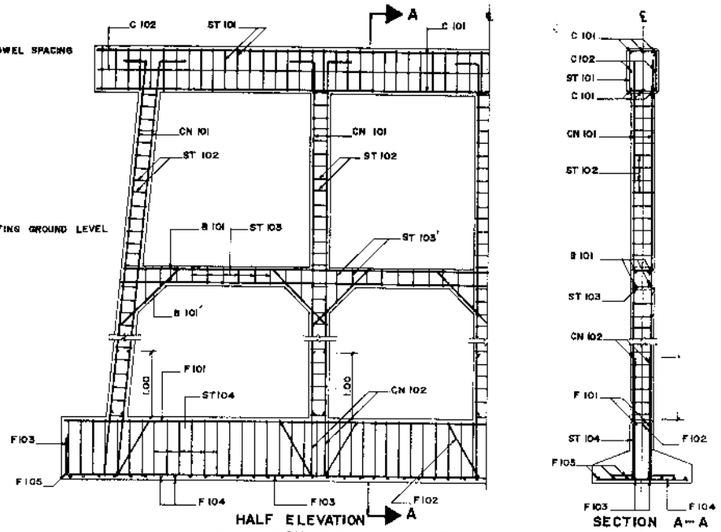
10.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

DESIGNER: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: (DIRECTOR GENERAL)		DWG. NO. ST - 13
		SHEET NO. 126



PIER DETAILS FOR 5.00 – 6.00 M. SPAN
SCALE 1 : 75

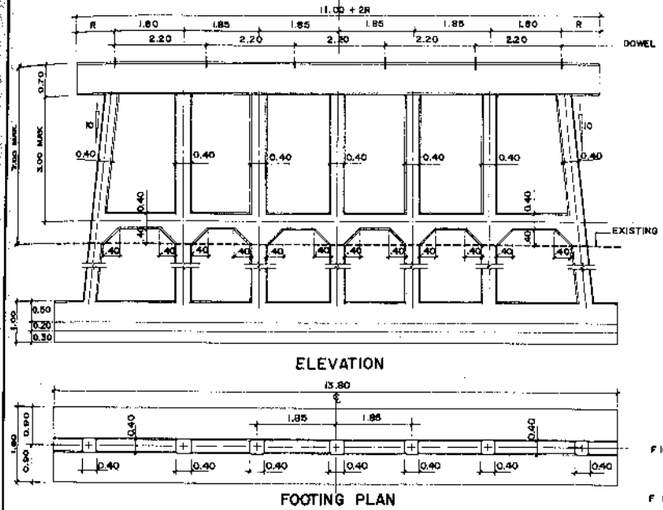


REINFORCEMENT DETAILS FOR 5.00 – 6.00 M. SPAN
SCALE 1 : 50

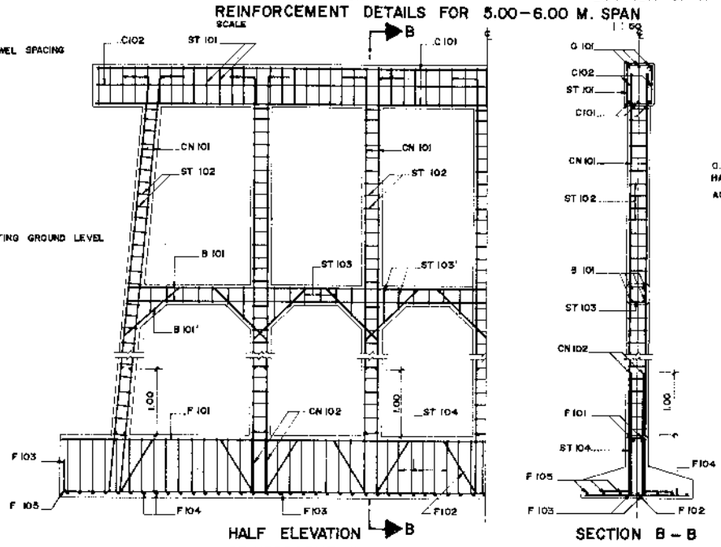
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M				SPAN 7.00 M				SPAN 8.00 M.				SPAN 9.00 M				SPAN 10.00 M			
		#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
	C 101	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	CN 101	8	–	20	11.25	8	–	20	11.25	8	–	28	11.25	8	–	28	11.25	8	–	32	11.25	8	–	36	11.25
	CN 102	8	–	20	2.31	8	–	20	2.31	8	–	28	2.31	8	–	28	2.31	8	–	32	2.31	8	–	36	2.31
	ST 101	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35
	ST 102	3	0.20	240	1.35	3	0.20	240	2.35	3	0.20	336	2.35	3	0.20	336	1.35	3	0.20	384	1.35	3	0.20	432	1.35
	ST 103	3	0.25	88	1.35	3	0.25	88	1.35	3	0.25	42	1.35	3	0.25	42	1.35	3	0.25	34	1.35	3	0.25	22	1.35
	ST 103'	3	0.25	32	–	3	0.25	32	–	3	0.25	48	–	3	0.25	48	–	3	0.25	56	–	3	0.25	64	–
	ST 104	3	0.20	69	2.55	3	0.20	69	2.55	3	0.20	69	2.55	3	0.20	69	2.55	3	0.20	69	2.55	3	0.20	69	2.55
	B 101	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	B 101'	6	–	32	1.55	6	–	32	1.55	6	–	48	1.55	5	–	48	1.55	6	–	56	1.55	6	–	64	1.55
	F 101	8	–	2	13.70	8	–	2	13.70	8	–	2	13.70	8	–	2	13.70	8	–	2	13.70	8	–	2	13.70
	F 102	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–
	F 103	8	–	2	14.90	8	–	2	14.90	8	–	2	14.90	8	–	2	14.90	8	–	2	14.90	8	–	2	14.90
	F 104	4	0.25	56	1.50	4	0.25	55	1.50	4	0.20	69	1.70	4	0.20	69	1.70	4	0.125	110	1.90	4	0.125	110	1.90
	F 105	4	–	6	13.70	4	–	6	13.70	4	–	6	13.70	4	–	6	13.70	4	–	6	13.70	4	–	6	13.70

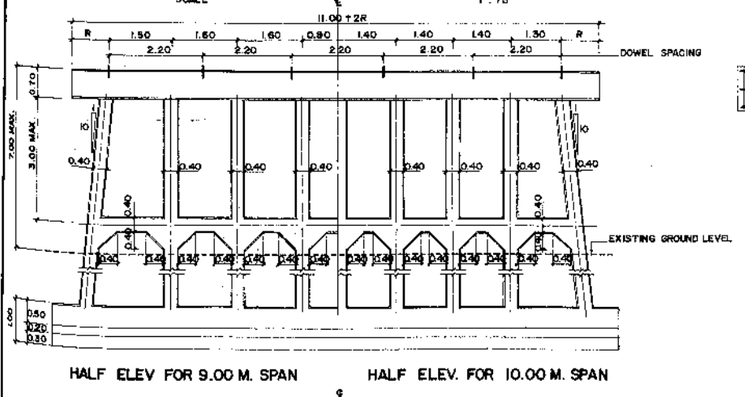
3 = Ø 3/8" OR 9 MM., # 4 = Ø 1/2" OR 12 MM, # 5 = Ø 3/4" OR 20 MM., # 8 = Ø 1" OR 25 MM., NO = TOTAL AMOUNT OF BAR, L = TOTAL LENGTH OF EAGH BAR.



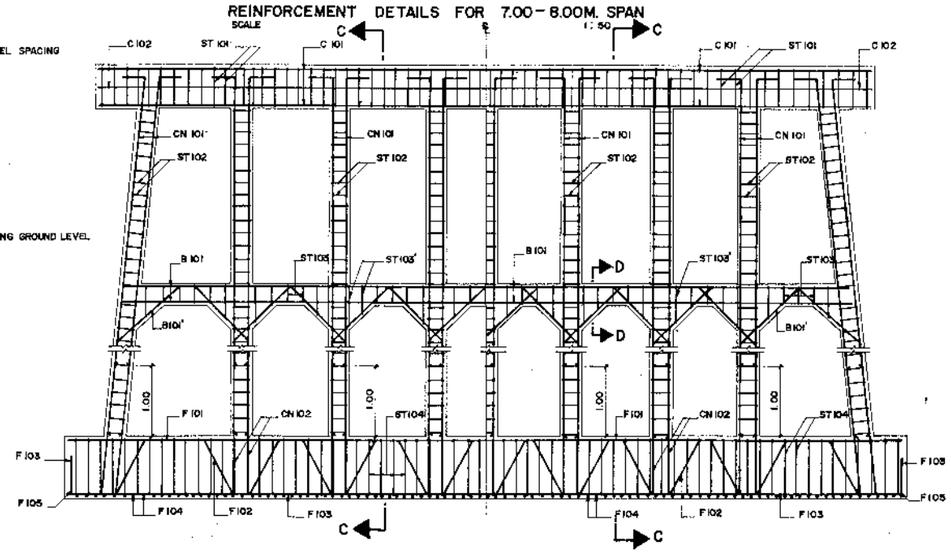
PIER DETAILS FOR 7.00 – 8.00 M. SPAN
SCALE 1 : 75



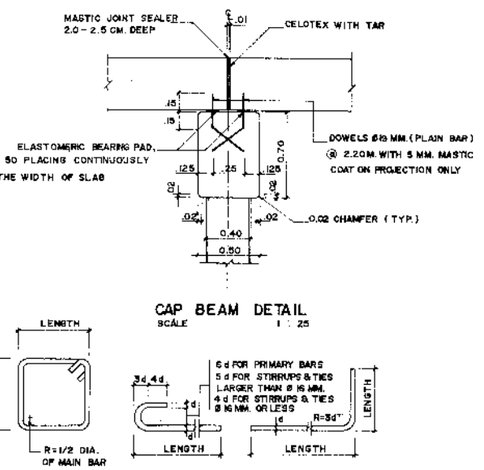
REINFORCEMENT DETAILS FOR 7.00 – 8.00M. SPAN
SCALE 1 : 50



DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1 : 75



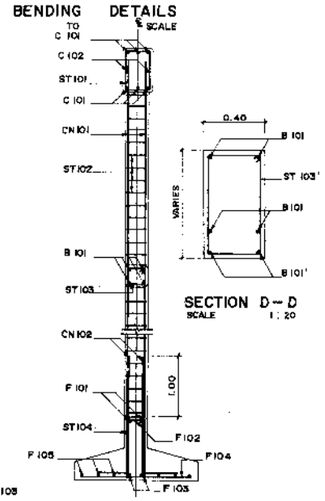
REINFORCEMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1 : 50



CAP BEAM DETAIL
SCALE 1 : 25

PLAIN BAR DEFORMED BAR

BAR BENDING DETAILS
NOT TO SCALE



NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1 : 3 : 6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEED 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BAEM, AT WHICH A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg./CM.^{2} FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	Kg.
SAND	0.46	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MAX.	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.00 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG NO. 3AD5-106-14/21.

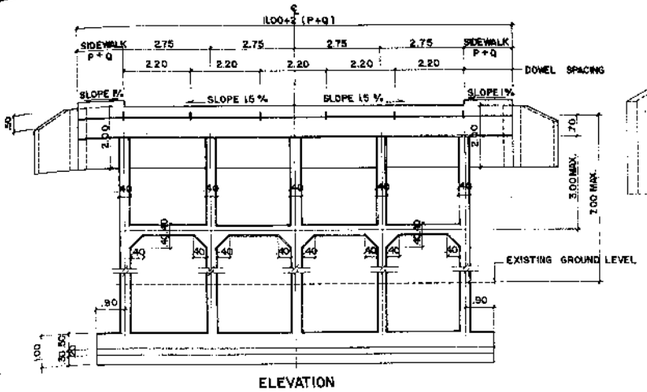
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

11.00 M. ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTING PIER DETAILS

DESIGNED : DOH. & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST – 14
		SHEET NO. 127

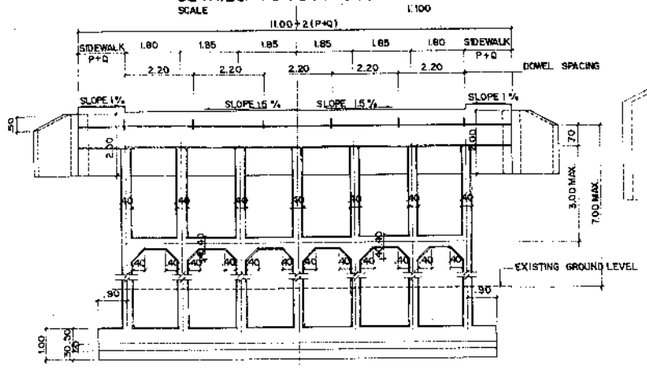


ELEVATION

PLAN

DETAILS FOR 5.00 6.00M. SPAN

SCALE 1:100

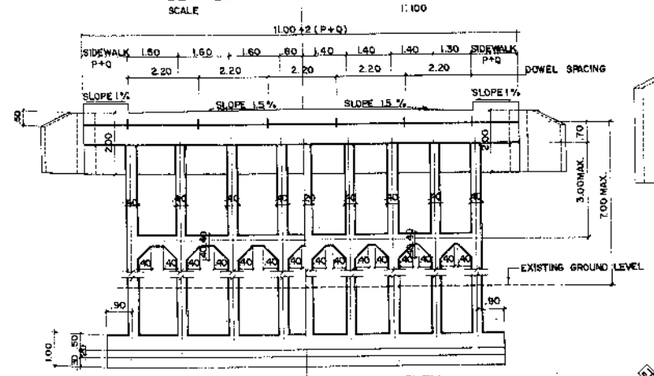


ELEVATION

PLAN

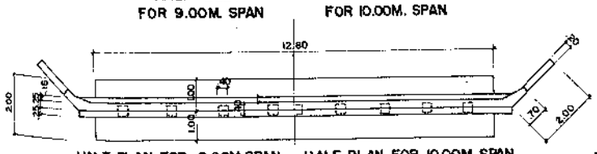
DETAILS FOR 7.00 8.00 M. SPAN

SCALE 1:100



HALF ELEV. FOR 9.00M. SPAN

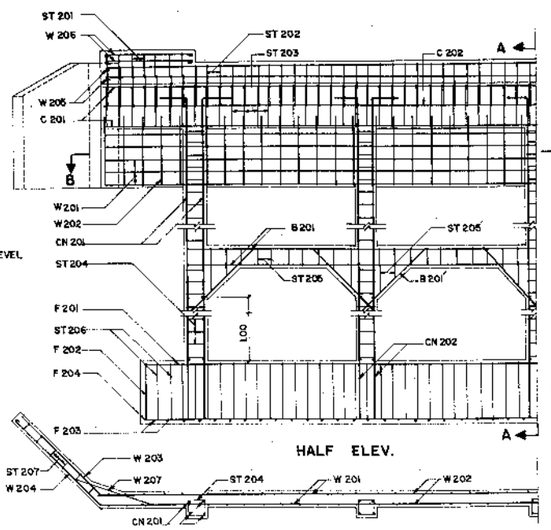
HALF ELEV. FOR 10.00M. SPAN



HALF PLAN FOR 9.00M.SPAN HALF PLAN FOR 10.00M. SPAN

DETAILS FOR 9.00M. & 10.00 M. SPAN

SCALE 1:100



HALF ELEV.

SECTION B-B

REINFORCEMENT DETAILS FOR 5.00-6.00 M. SPAN

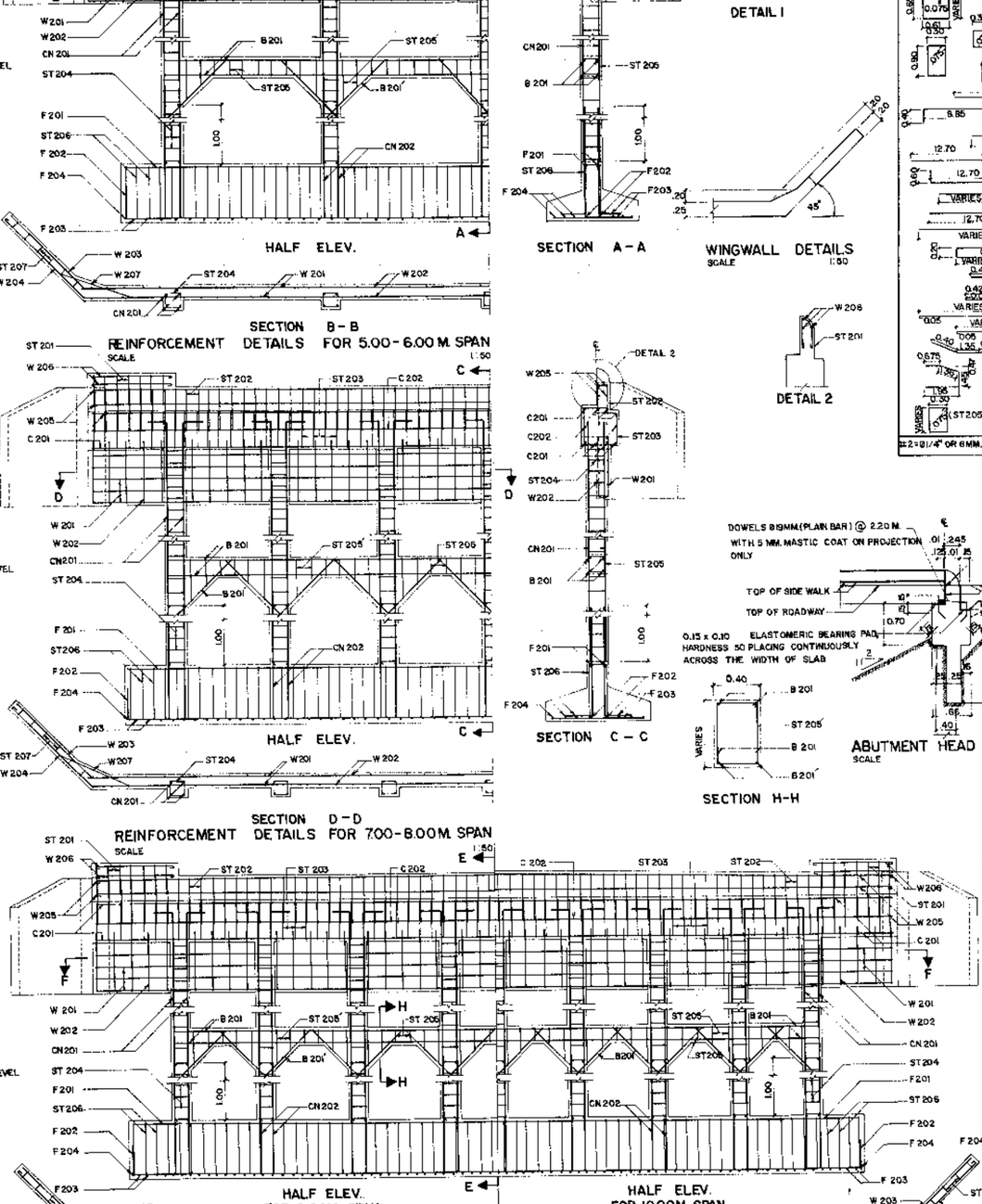
SCALE 1:50

HALF ELEV.

SECTION D-D

REINFORCEMENT DETAILS FOR 7.00-8.00 M. SPAN

SCALE 1:50



HALF ELEV. FOR 9.00M. SPAN

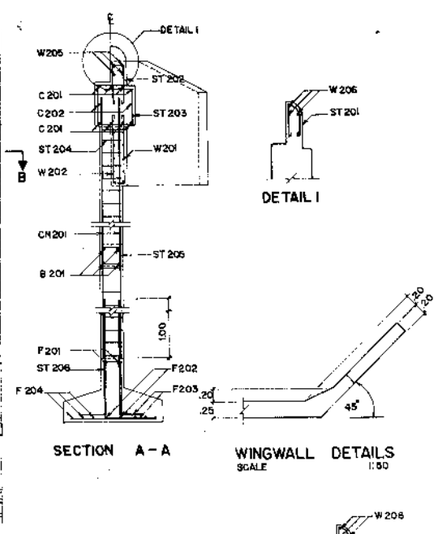
HALF ELEV. FOR 10.00M. SPAN

HALF SECT. F-F FOR 10.00M. SPAN

HALF SECT. F-F FOR 10.00M. SPAN

REINFORCEMENT DETAILS FOR 9.00M. & 10.00 M. SPAN

SCALE 1:50



SECTION A-A

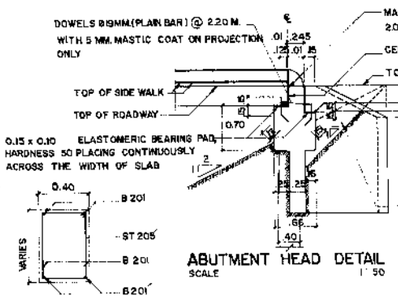
DETAIL 1

WINGWALL DETAILS

SCALE 1:50

DETAIL 2

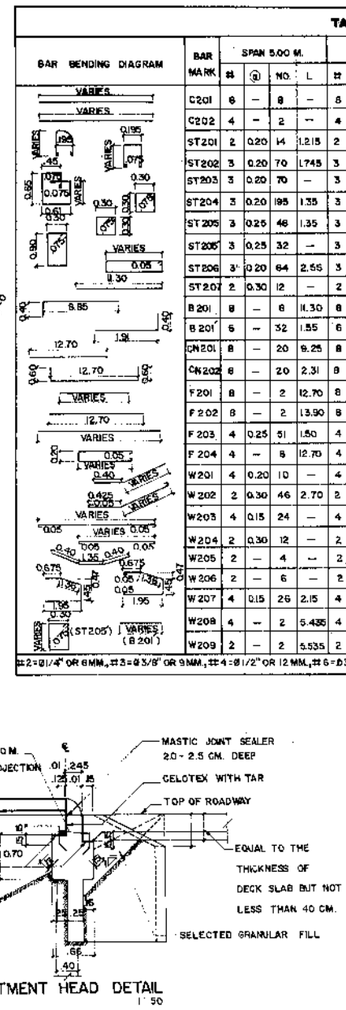
SECTION C-C



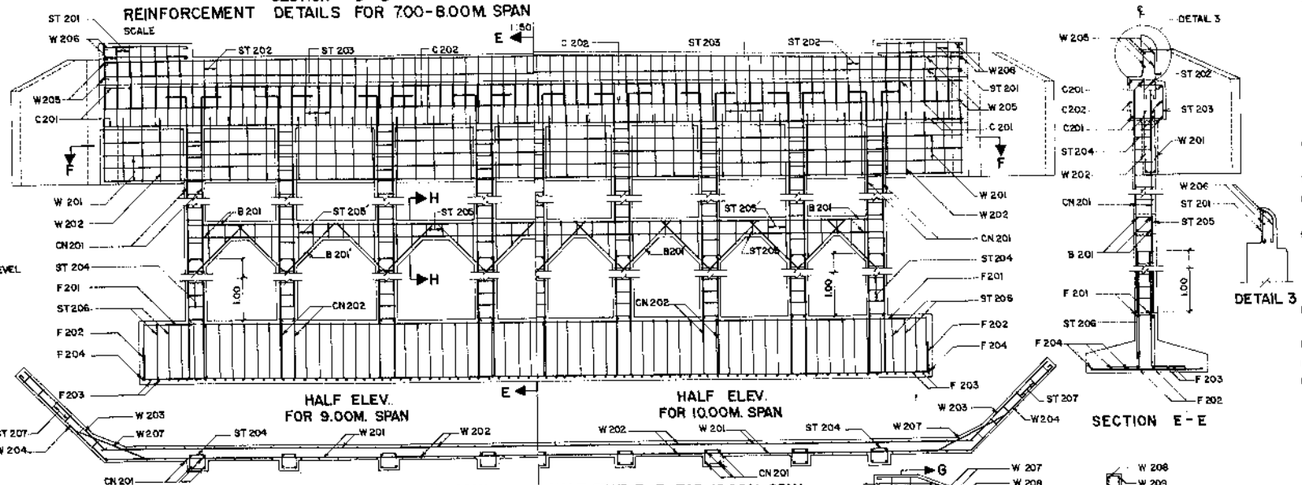
SECTION H-H

ABUTMENT HEAD DETAIL

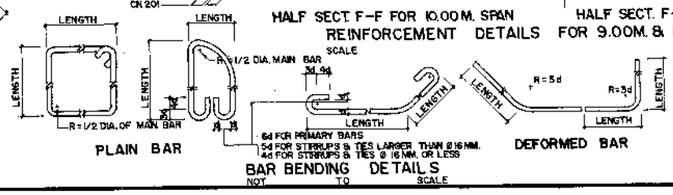
SCALE 1:50



DETAIL 3

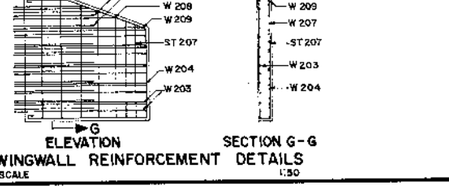


SECTION E-E



BAR BENDING DETAILS

NOT TO SCALE



ELEVATION SECTION G-G

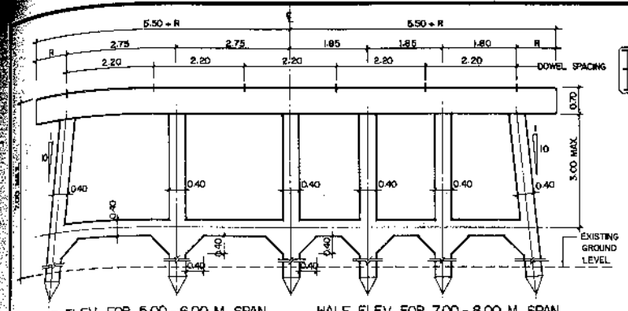
WINGWALL REINFORCEMENT DETAILS

SCALE 1:50

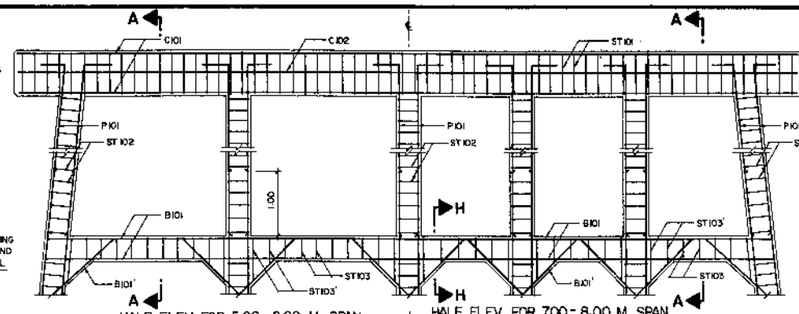
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAM

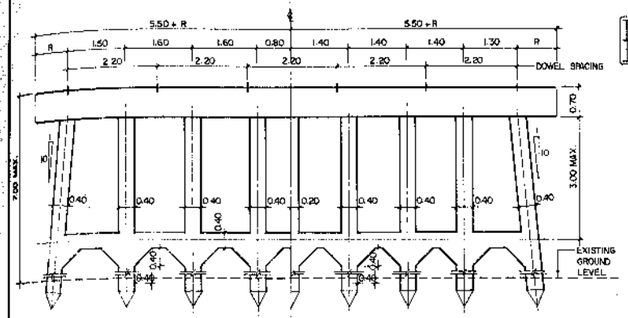
VARIES
.195
.45
.075
.30
.30
.30



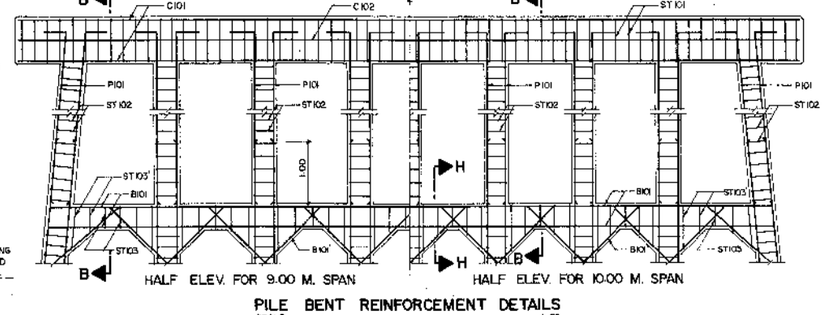
HALF ELEV. FOR 5.00 - 6.00 M. SPAN



HALF ELEV. FOR 7.00 - 8.00 M. SPAN

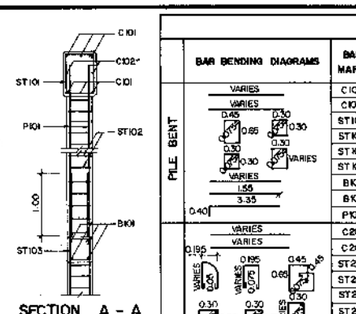


HALF ELEV. FOR 9.00 M. SPAN

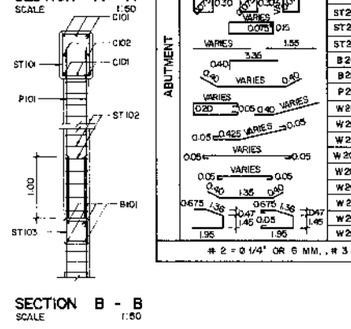


HALF ELEV. FOR 10.00 M. SPAN

PILE BENT ELEVATION
SCALE 1:75



SECTION A - A
SCALE 1:50



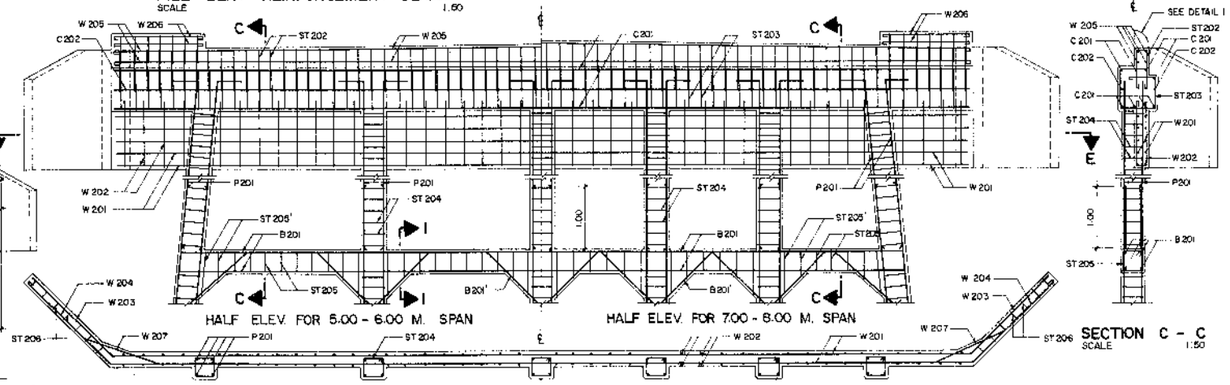
SECTION B - B
SCALE 1:50

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO	L	SPAN 6.00 M. #	@	NO	L	SPAN 7.00 M. #	@	NO	L	SPAN 8.00 M. #	@	NO	L	SPAN 9.00 M. #	@	NO	L	SPAN 10.00 M. #	@	NO	L
PILE BENT	C101	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-
	C102	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
	ST101	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35
	ST102	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	98	1.35	3	0.20	98	1.35	3	0.20	112	1.35	3	0.20	112	1.35
	ST103	3	0.25	26	1.35	3	0.25	26	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	10	1.35	3	0.25	10	1.35
	ST103'	3	0.25	16	-	3	0.25	16	-	3	0.25	24	-	3	0.25	24	-	3	0.25	28	-	3	0.25	32	-
	B101	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-
	B101'	8	-	16	1.55	8	-	16	1.55	8	-	24	1.55	8	-	24	1.55	8	-	28	1.55	8	-	32	1.55
	P101	8	-	20	3.75	8	-	20	3.75	8	-	28	3.75	8	-	28	3.75	8	-	32	3.75	8	-	36	3.75
ABUTMENT	C201	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
	C202	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
	ST201	2	0.20	14	1.215	2	0.20	14	1.295	2	0.20	14	1.355	2	0.20	14	1.435	2	0.20	14	1.515	2	0.20	14	1.635
	ST202	3	0.20	70	1.745	3	0.20	70	1.795	3	0.20	70	1.845	3	0.20	70	1.895	3	0.20	70	1.945	3	0.20	70	1.995
	ST203	3	0.20	70	-	3	0.20	70	-	3	0.20	70	-	3	0.20	70	-	3	0.20	70	-	3	0.20	70	-
	ST204	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	98	1.35	3	0.20	98	1.35	3	0.20	112	1.35	3	0.20	126	1.35
	ST205	3	0.25	26	1.35	3	0.25	26	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	10	1.35	3	0.25	10	1.35
	ST205'	3	0.25	16	-	3	0.25	16	-	3	0.25	24	-	3	0.25	24	-	3	0.25	28	-	3	0.25	32	-
	ST206	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-
	B201	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-
	B201'	8	-	16	1.55	8	-	16	1.55	8	-	24	1.55	8	-	24	1.55	8	-	28	1.55	8	-	32	1.55
	P201	8	-	20	3.75	8	-	20	3.75	8	-	24	3.75	8	-	24	3.75	8	-	28	3.75	8	-	36	3.75
	W201	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-
	W202	2	0.30	47	2.70	2	0.30	47	2.60	2	0.30	47	2.60	2	0.30	47	2.50	2	0.30	47	2.40	2	0.30	46	2.50
	W203	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-
	W204	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-
	W205	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-
	W206	2	-	6	-	2	-	6	-	2	-	8	-	2	-	6	-	2	-	6	-	2	-	6	-
	W207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
	W208	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435
	W209	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535

2 = Ø 1/4" OR 6 MM., # 3 = Ø 3/8" OR 9 MM., # 4 = Ø 1/2" OR 12 MM., # 6 = Ø 1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

PILE BENT REINFORCEMENT DETAILS
SCALE 1:50

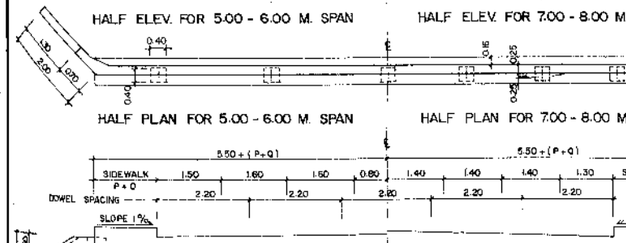


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

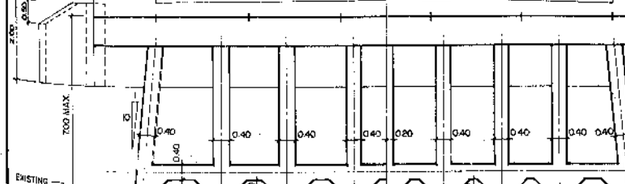
HALF PLAN FOR 5.00 - 6.00 M. SPAN

HALF PLAN FOR 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN



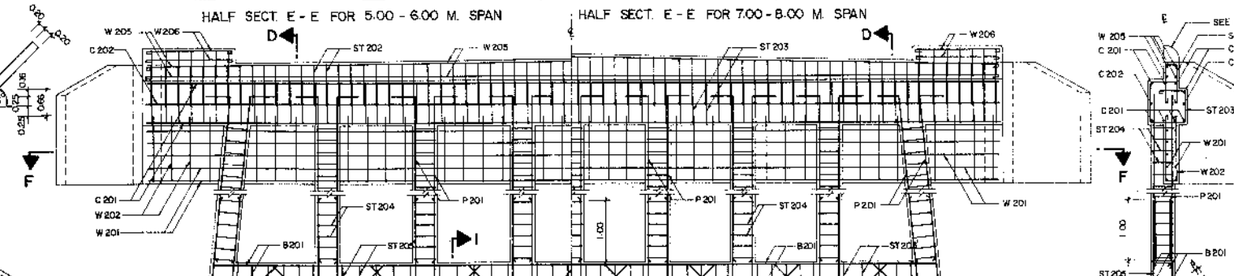
HALF PLAN FOR 9.00 M. SPAN

HALF PLAN FOR 10.00 M. SPAN

ABUTMENT DETAILS
SCALE 1:75

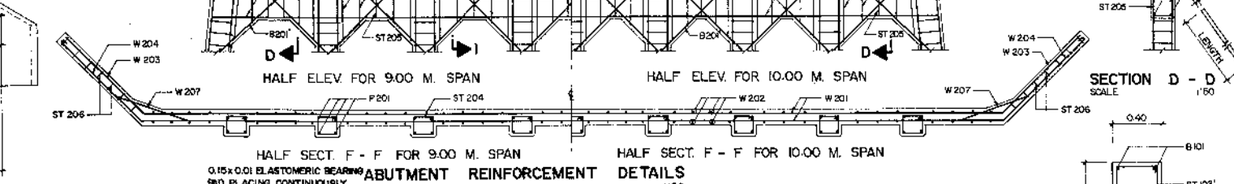
HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN



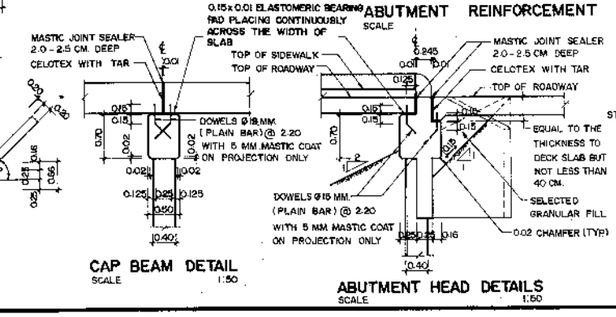
HALF SECT. E - E FOR 5.00 - 6.00 M. SPAN

HALF SECT. E - E FOR 7.00 - 8.00 M. SPAN

HALF SECT. F - F FOR 9.00 M. SPAN

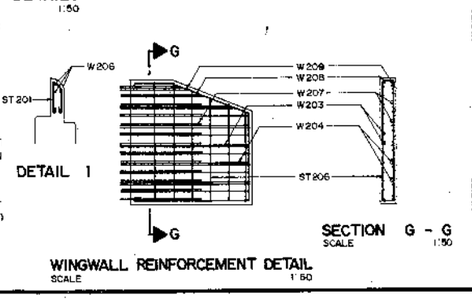
HALF SECT. F - F FOR 10.00 M. SPAN

ABUTMENT REINFORCEMENT DETAILS
SCALE 1:50



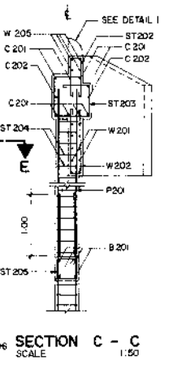
CAP BEAM DETAIL
SCALE 1:50

ABUTMENT HEAD DETAILS
SCALE 1:50

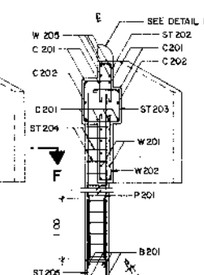


DETAIL 1

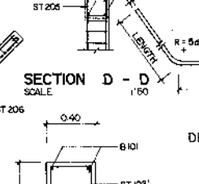
WINGWALL REINFORCEMENT DETAIL
SCALE 1:50



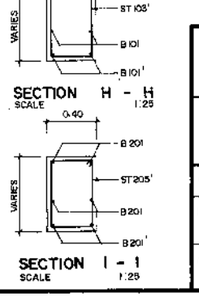
SECTION C - C
SCALE 1:50



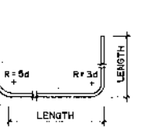
SECTION D - D
SCALE 1:50

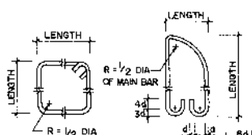


SECTION H - H
SCALE 1:25



SECTION I - I
SCALE 1:25





DEFORMED BAR PLAIN BAR

BAR BENDING DETAILS
NOT TO SCALE

6d FOR PRIMARY BARS
5d FOR STIRRUPS & TIES LARGER THAN Ø 16 MM
4d FOR STIRRUPS & TIES Ø 16 MM. OR LESS

NOTES :

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS. FOR PILE DETAILS SEE DWG. NO. MS-02, MS-03.
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES
   a) IF THE DISTANCE FROM EXISTING CANAL BED TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE CANAL BED EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM SHALL BE PROVIDED
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/CM^2 FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MAX.	10	CM.

5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFORMING TO TIS.15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
10. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3AD5-KB-14/22

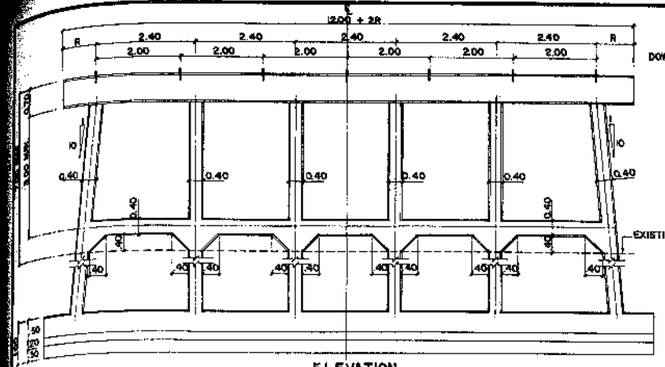
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

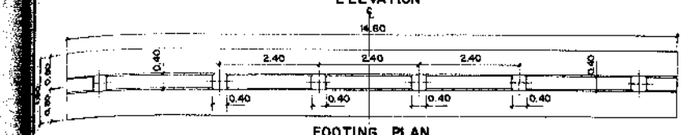
11.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

DESIGNED : DOH. & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : FOR (DIRECTOR GENERAL)		DWG. NO. ST - 16
		SHEET NO. 129

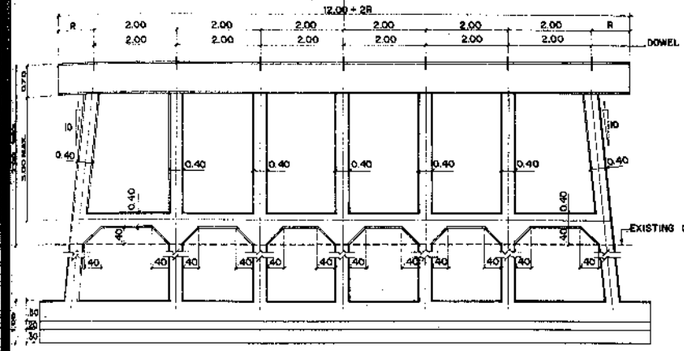


ELEVATION

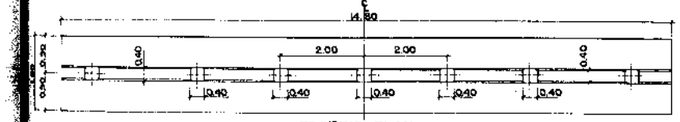


FOOTING PLAN

PIER DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1 : 75

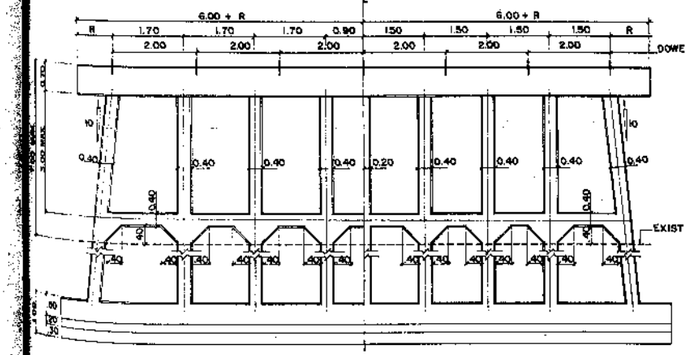


ELEVATION



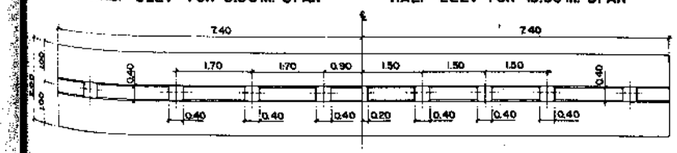
FOOTING PLAN

PIER DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1 : 75



HALF ELEV FOR 9.00 M. SPAN

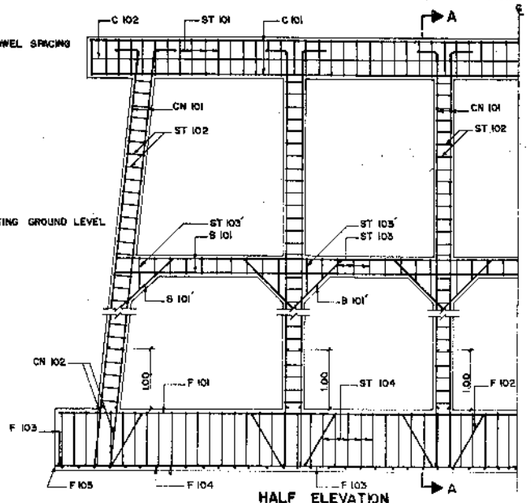
HALF ELEV FOR 10.00 M. SPAN



HALF PLAN FOR 9.00 M. SPAN

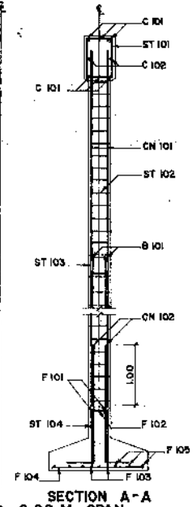
HALF PLAN FOR 10.00 M. SPAN

PIER DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1 : 75

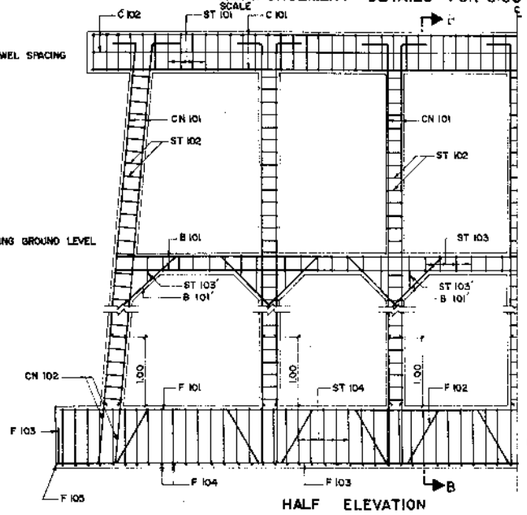


HALF ELEVATION

REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN

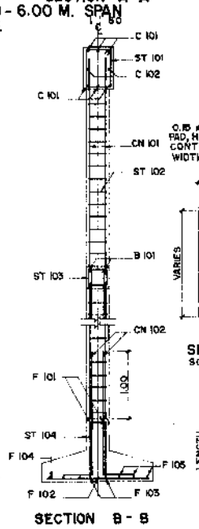


SECTION A-A

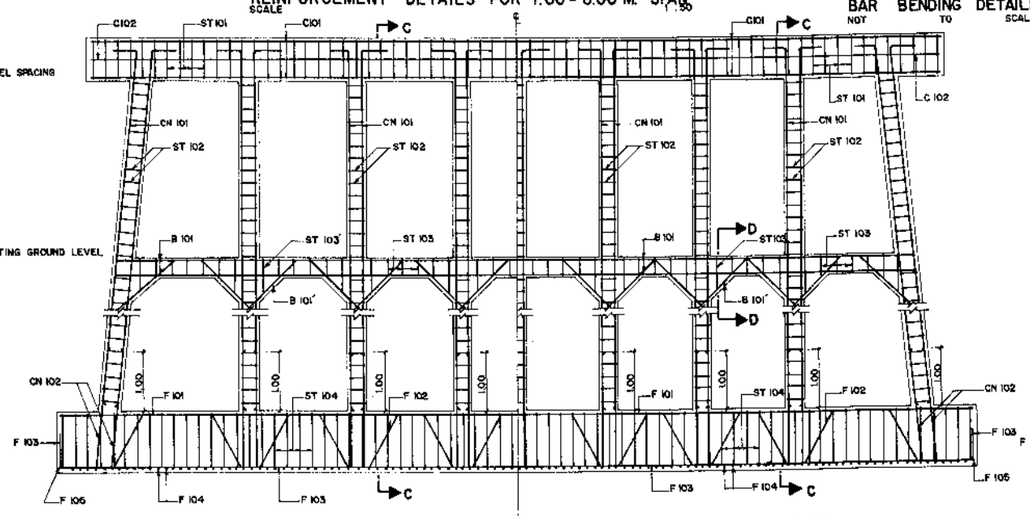


HALF ELEVATION

REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1 : 50



SECTION B - B



HALF ELEVATION FOR 9.00 M. SPAN

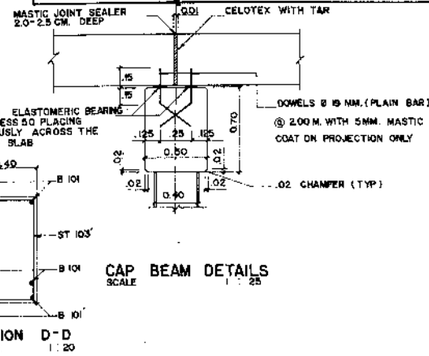
HALF ELEVATION FOR 10.00 M. SPAN

REINFORCEMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1 : 50

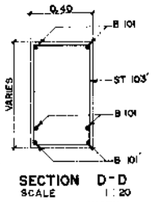
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		⌀	@	NO.	L	⌀	@	NO	L	⌀	@	NO	L	⌀	@	NO	L	⌀	@	NO	L	⌀	@	NO	L
	C 101	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	CN 101	8	–	24	11.25	8	–	24	11.25	8	–	28	11.25	8	–	28	11.25	8	–	32	11.25	8	–	36	11.25
	CN 102	8	–	24	2.31	8	–	24	2.31	8	–	28	2.31	8	–	28	2.31	8	–	32	2.31	8	–	36	2.31
	ST 101	3	0.20	69	2.35	3	0.20	69	2.35	3	0.20	69	2.35	3	0.20	69	2.35	3	0.20	69	2.35	3	0.20	69	2.35
	ST 102	3	0.20	288	1.35	3	0.20	288	1.35	3	0.20	336	1.35	3	0.20	336	1.35	3	0.20	384	1.35	3	0.20	432	1.35
	ST 103	3	0.25	56	1.35	3	0.25	56	1.35	3	0.25	46	1.35	3	0.25	46	1.35	3	0.25	36	1.35	3	0.25	26	1.35
	ST 103'	3	0.25	40	–	3	0.25	40	–	3	0.25	48	–	3	0.25	48	–	3	0.25	56	–	3	0.25	64	–
	ST 104	3	0.20	74	2.55	3	0.20	74	2.55	3	0.20	74	2.55	3	0.20	74	2.55	3	0.20	74	2.55	3	0.20	74	2.55
	B 101	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	B 101'	6	–	40	1.55	6	–	40	1.55	6	–	48	1.55	6	–	48	1.55	6	–	56	1.55	6	–	64	1.55
	F 101	8	–	2	14.70	8	–	2	14.70	8	–	2	14.70	8	–	2	14.70	8	–	2	14.70	8	–	2	14.70
	F 102	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–
	F 103	8	–	2	15.90	8	–	2	15.90	8	–	2	15.90	8	–	2	15.90	8	–	2	15.90	8	–	2	15.90
	F 104	4	0.25	58	1.50	4	0.25	58	1.50	4	0.20	74	1.70	4	0.20	74	1.70	4	0.125	118	1.90	4	0.125	118	1.90
	F 105	4	–	6	14.70	4	–	6	14.70	4	–	6	14.70	4	–	6	14.70	4	–	6	14.70	4	–	6	14.70

⌀1 = ⌀ 3/8" OR 9 MM., ⌀4 = ⌀ 1/2" OR 12 MM., ⌀6 = ⌀ 3/4" OR 20 MM., ⌀8 = ⌀ 1" OR 25 MM., NO= TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

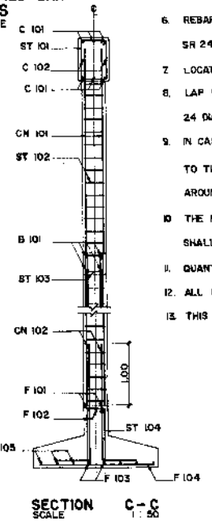


CAP BEAM DETAILS
SCALE 1 : 25



SECTION D-D
SCALE 1 : 20

BAR BENDING DETAILS
SCALE NOT TO



SECTION C - C
SCALE 1 : 50

NOTES:

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1 : 3 : 6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES:
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, AT WHICH CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg/CM^2 FOR A .15x.15x.15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS:

PORTLAND CEMENT	350	Kg.
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MAX.	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETER OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AN ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
11. QUANTITIES OF REBARS SHOW IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M.
12. ALL DIMENSION SHOW ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3AD5-106-14/8.

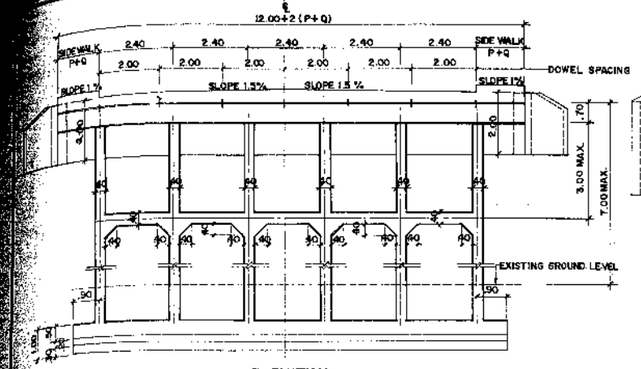
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

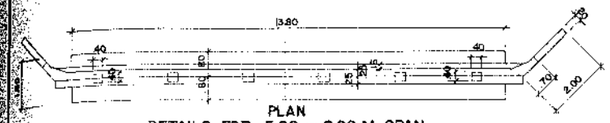
12.00 ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTION PIER DETAILS

DESIGNED : DOH. & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST. - 17
		SHEET NO. 130



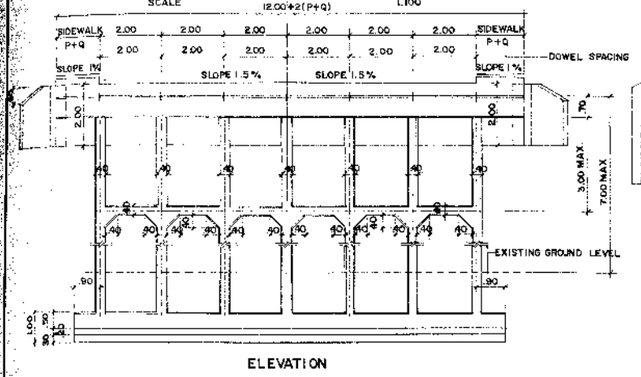
ELEVATION



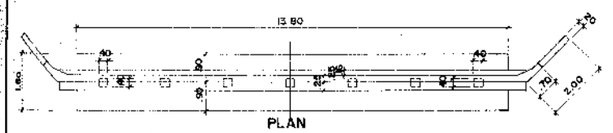
PLAN

DETAILS FOR 5.00 – 6.00 M. SPAN

SCALE 12.00+2(P+Q) 1:100



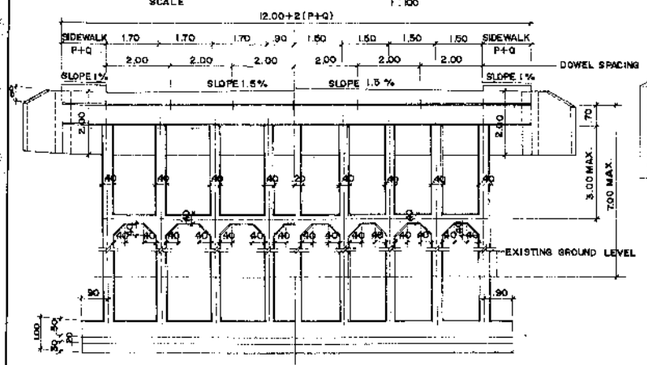
ELEVATION



PLAN

DETAILS FOR 7.00 – 8.00 M. SPAN

SCALE 1:100

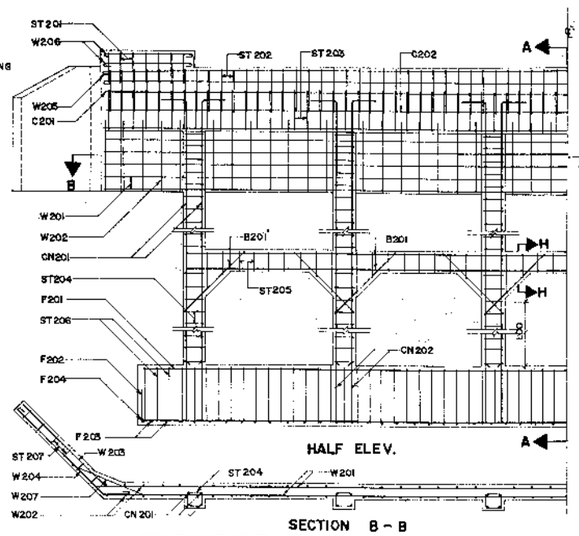


HALF ELEV. FOR 9.00 M. SPAN HALF ELEV. FOR 10.00 M. SPAN

HALF PLAN FOR 9.00 M. SPAN HALF PLAN FOR 10.00 M. SPAN

DETAILS FOR 9.00 M & 10.00 M. SPAN

SCALE 1:100

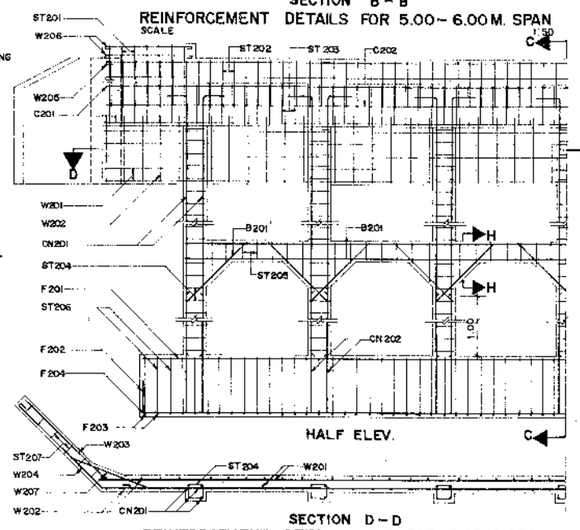


HALF ELEV.

SECTION B – B

REINFORCEMENT DETAILS FOR 5.00 – 6.00 M. SPAN

SCALE 1:50

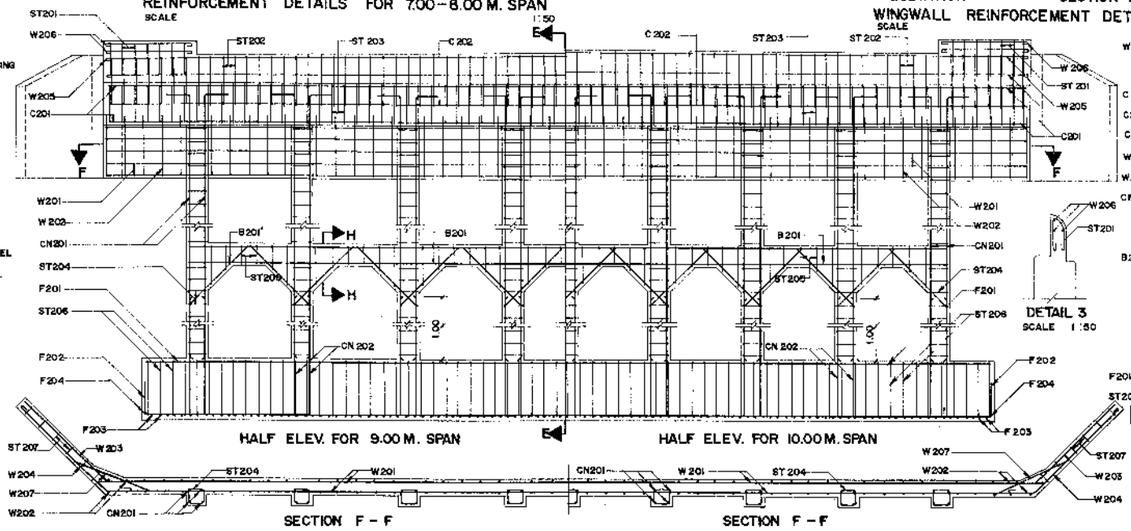


HALF ELEV.

SECTION D – D

REINFORCEMENT DETAILS FOR 7.00 – 8.00 M. SPAN

SCALE 1:50

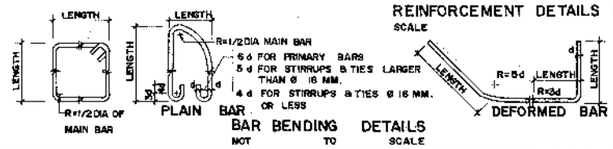


HALF ELEV. FOR 9.00 M. SPAN HALF ELEV. FOR 10.00 M. SPAN

SECTION F – F SECTION F – F

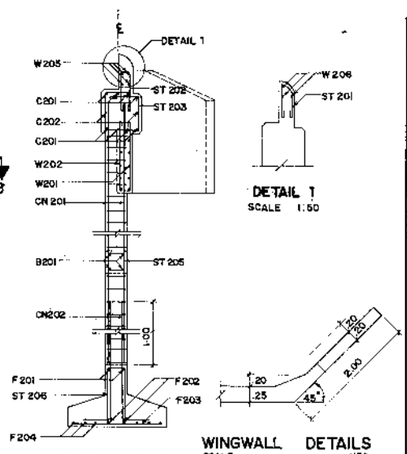
REINFORCEMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN

SCALE 1:50



BAR BENDING DETAILS

NOT TO SCALE



SECTION A – A

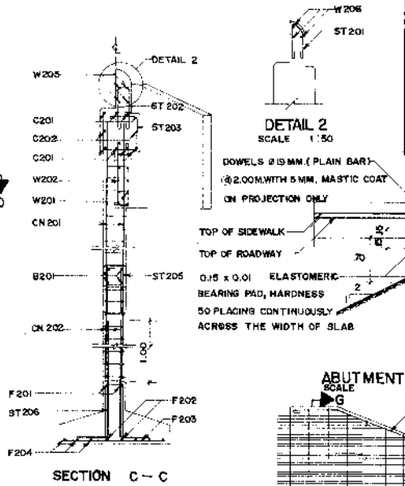
SCALE 1:50

DETAIL 1

SCALE 1:50

WINGWALL DETAILS

SCALE 1:50



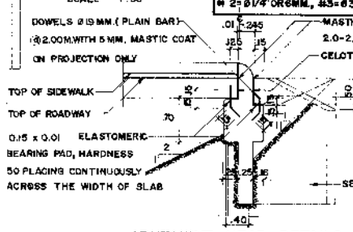
SECTION C – C

SCALE 1:50

DETAIL 2

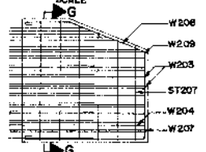
SCALE 1:50

DOWELS Ø 19 MM. (PLAIN BAR) @ 2.00 M. WITH 5 MM. MASTIC COAT ON PROJECTION ONLY

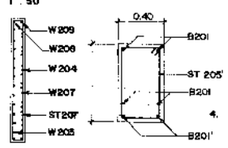


ABUTMENT HEAD DETAILS

SCALE 1:50



ELEVATION



SECTION G – G

SECTION H – H

WINGWALL REINFORCEMENT DETAILS

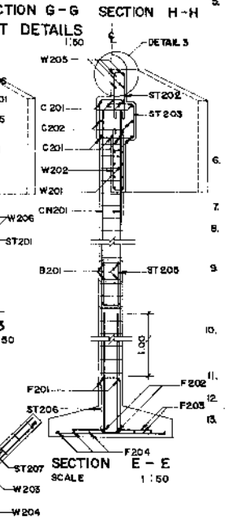
SCALE 1:50

HALF ELEV. FOR 9.00 M. SPAN HALF ELEV. FOR 10.00 M. SPAN

SECTION F – F SECTION F – F

REINFORCEMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN

SCALE 1:50



SECTION E – E

SCALE 1:50

DETAIL 3

SCALE 1:50

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
	C201	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–
	C202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST201	2	.20	14	–	2	.20	14	–	2	.20	14	–	2	.20	14	–	2	.30	14	–	2	.20	14	–
	ST202	3	.20	75	–	3	.20	75	–	3	.20	75	–	3	.20	75	–	3	.20	75	–	3	.20	75	–
	ST 203	3	.20	75	–	3	.20	75	–	3	.20	75	–	3	.20	75	–	3	.20	75	–	3	.20	75	–
	ST204	3	.20	234	1.35	3	.20	234	1.35	3	.20	273	1.35	3	.20	273	1.35	3	.20	312	1.35	3	.20	351	1.35
	ST205	3	.25	50	1.35	3	.25	50	1.35	3	.25	36	1.35	3	.25	36	1.35	3	.25	30	1.35	3	.25	26	1.35
	ST 205'	3	.25	40	–	3	.25	40	–	3	.25	48	–	3	.25	48	–	3	.25	56	–	3	.25	64	–
	ST206	3	.20	69	2.55	3	.20	69	2.55	3	.20	69	2.55	3	.20	69	2.55	3	.20	69	2.55	3	.20	69	2.55
	ST 207	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–
	B201	8	–	8	12.30	8	–	8	12.30	8	–	8	12.30	8	–	8	12.30	8	–	8	12.30	8	–	8	12.30
	B201'	6	–	40	1.55	6	–	40	1.55	6	–	48	1.55	6	–	48	1.55	6	–	56	1.55	6	–	64	1.55
	CN201	8	–	24	9.25	8	–	24	9.25	8	–	28	9.25	8	–	28	9.25	8	–	32	9.25	8	–	36	9.25
	CN202	8	–	24	2.31	8	–	24	2.31	8	–	28	2.31	8	–	28	2.31	8	–	32	2.31	8	–	36	2.31
	F 201	8	–	2	13.70	6	–	2	13.70	8	–	2	13.70	8	–	2	13.70	8	–	2	13.70	8	–	2	13.70
	F 202	8	–	2	14.90	6	–	2	14.90	8	–	2	14.90	8	–	2	14.90	8	–	2	14.90	8	–	2	14.90
	F 203	4	.25	55	1.50	4	.25	55	1.50	4	.20	69	1.70	4	.20	69	1.70	4	.25	110	1.90	4	.25	110	1.90
	F204	4	–	6	13.70	4	–	6	13.70	4	–	6	13.70	4	–	6	13.70	4	–	6	13.70	4	–	6	13.70
	W201	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–
	W202	2	.30	–	2.70	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.50	2	.30	–	2.40	2	.30	24	2.30
	W203	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–
	W204	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–
	W205	2	–	4	15.05	2	–	4	15.05	2	–	4	15.05	2	–	4	15.05	2	–	2	15.05	2	–	4	15.05
	W206	2	–	6	1.55	2	–	6	1.55	2	–	6	1.55	2	–	6	1.55	2	–	6	1.55	2	–	6	1.55
	W207	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15
	W208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
	W209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	4	–	2	5.535

2=Ø1/4" OR 6MM., #3=Ø3/8" OR 9 MM., #4=Ø1/2" OR 12 MM., #5=Ø5/8" OR 20 MM., #8=Ø1" OR 25 MM., NO=TOTAL AMOUNT OF BARS, L=TOTALL LENGTH OF EACH BARS

NOTES.

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON./M^2
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS AT WHICH A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 kg./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 kg. /CM^2 FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS IS TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS

PORTLAND CEMENT	350	kg.
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MAX.	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPES CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUN LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3AD5-106-14/8

KINGDOM OF THAILAND

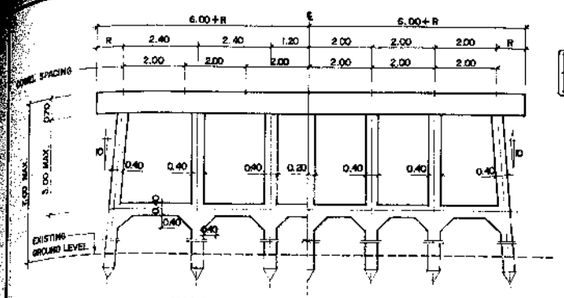
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

12.00 M. ROADWAY WIDTH SLAB BRIDGE

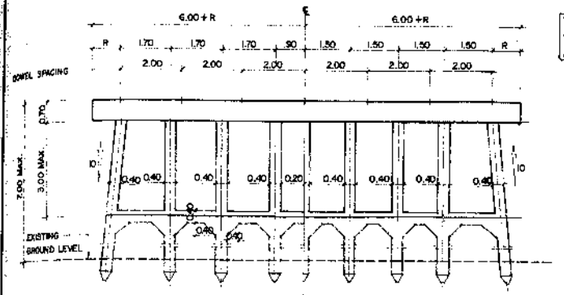
SPREAD FOOTING ABUTMENT. DETAILS

DESIGNED : DOH. & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-18
		SHEET NO. 131



HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

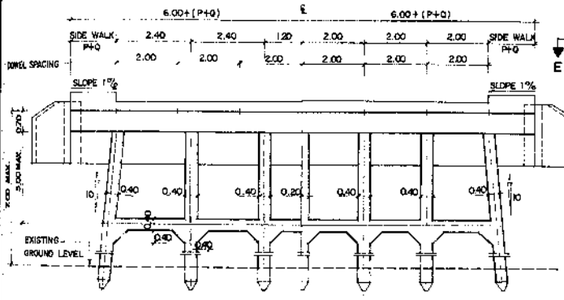


HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

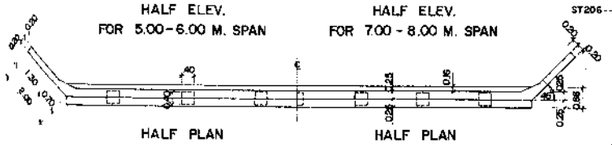
PILE BENT ELEVATION

SCALE 1:100



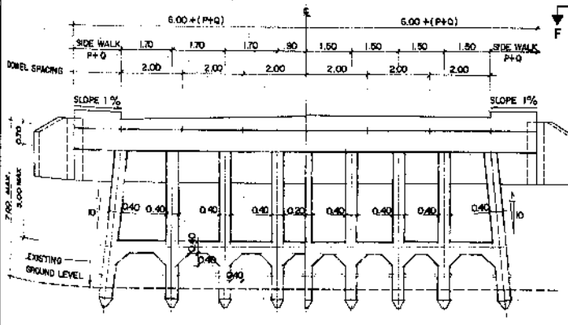
HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN



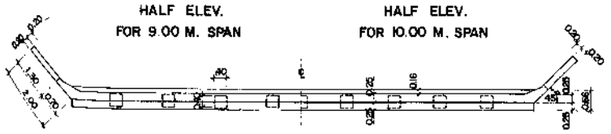
HALF PLAN FOR 5.00 - 6.00 M. SPAN

HALF PLAN FOR 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

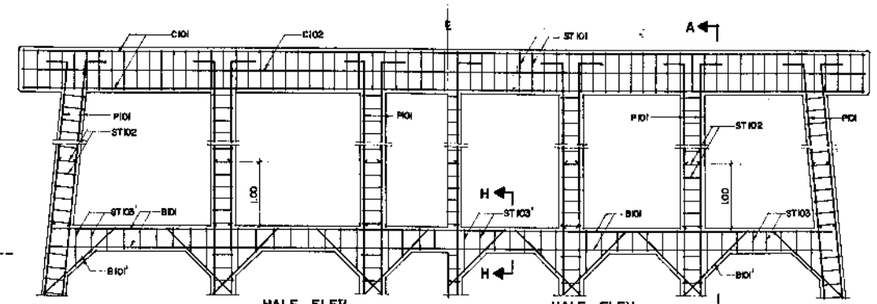


HALF PLAN FOR 9.00 M. SPAN

HALF PLAN FOR 10.00 M. SPAN

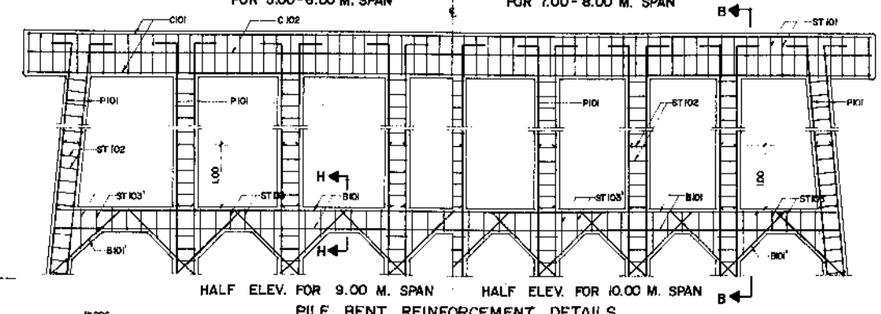
ABUTMENT DETAILS

SCALE 1:100



HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

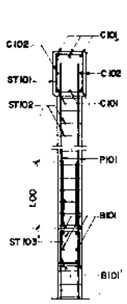


HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

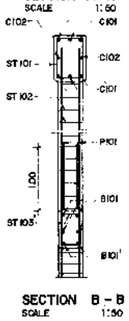
PILE BENT REINFORCEMENT DETAILS

SCALE 1:50



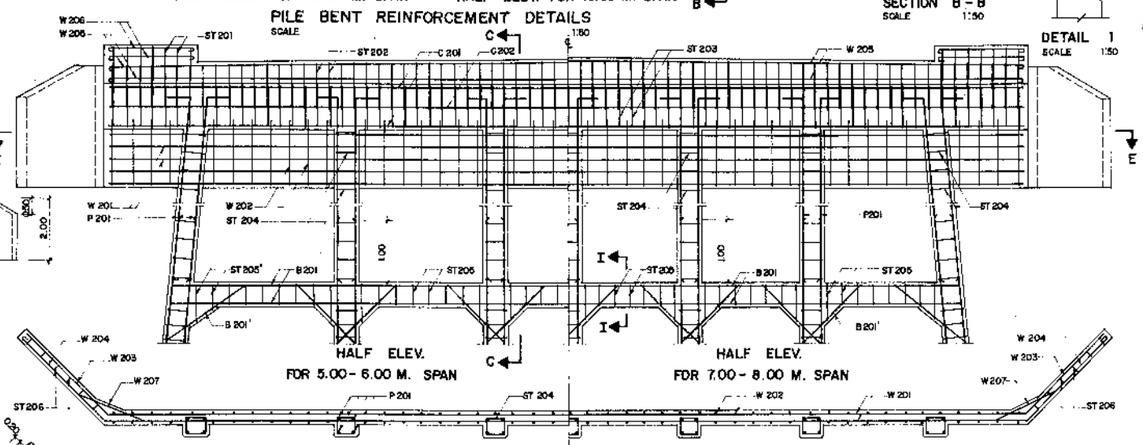
SECTION A - A

SCALE 1:50



SECTION B - B

SCALE 1:50

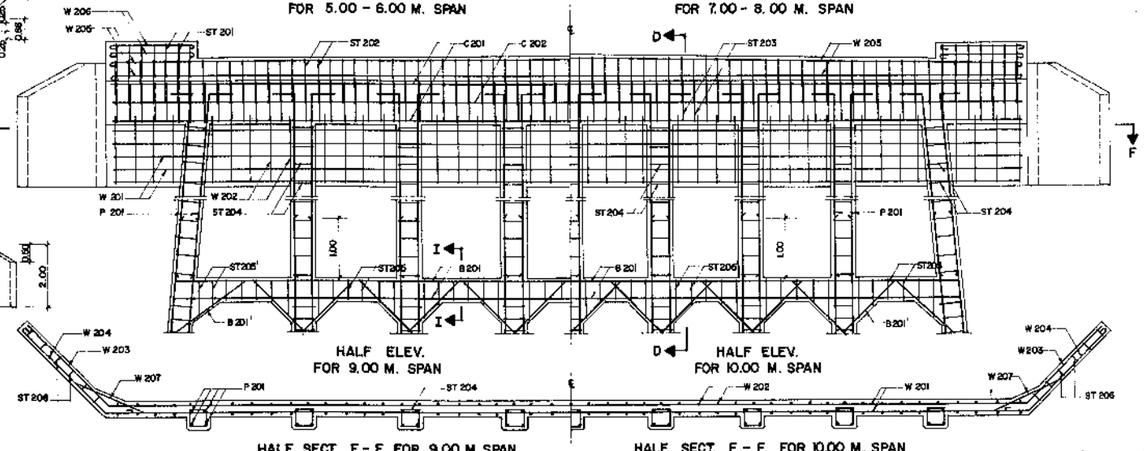


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

HALF SECT. E - E FOR 5.00 - 6.00 M. SPAN

HALF SECT. E - E FOR 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN

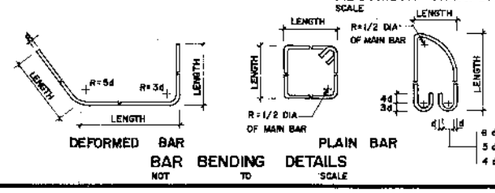
HALF ELEV. FOR 10.00 M. SPAN

HALF SECT. F - F FOR 9.00 M. SPAN

HALF SECT. F - F FOR 10.00 M. SPAN

ABUTMENT REINFORCEMENT DETAILS

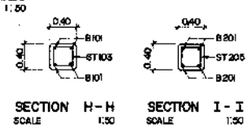
SCALE 1:50



DEFORMED BAR PLAIN BAR

BAR BENDING DETAILS

NOT TO SCALE

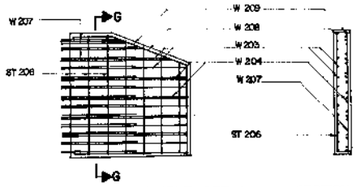


SECTION H - H

SCALE 1:50

SECTION I - I

SCALE 1:50



WINGWALL REINFORCEMENT DETAIL

SCALE 1:50

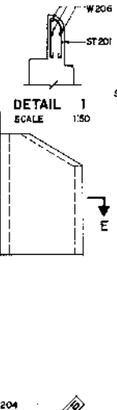
SECTION G-G

SCALE 1:50

TABLE OF REINFORCEMENT

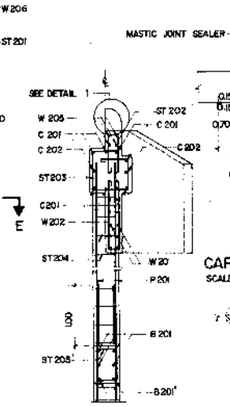
	BAR BENDING DIAGRAMS	BAR	SPAN 5.00 M.			SPAN 6.00 M.			SPAN 7.00 M.			SPAN 8.00 M.			SPAN 9.00 M.			SPAN 10.00 M.		
		MARK	#	@	NO. L	#	@	NO. L	#	@	NO. L	#	@	NO. L	#	@	NO. L	#	@	NO. L
PILE BENT		C 101	8	–	6 –	8	–	6 –	8	–	6 –	8	–	6 –	8	–	6 –	8	–	6 –
		C 102	4	–	2 –	4	–	2 –	4	–	2 –	4	–	2 –	4	–	2 –	4	–	2 –
		ST 101	3	0.20	- 2.35	3	0.20	– 2.35	3	0.20	– 2.35	3	0.20	– 2.35	3	0.20	– 2.35	3	0.20	– 2.35
		ST 102	3	0.20	84 1.55	3	0.20	84 1.55	3	0.20	98 1.55	3	0.20	98 1.55	3	0.20	112 1.55	3	0.20	125 1.55
		ST 103	3	0.20	31 1.55	3	0.25	31 1.55	3	0.25	20 1.55	3	0.25	20 1.55	3	0.25	16 1.55	3	0.25	10 1.55
		ST 103'	3	0.25	16 –	3	0.25	16 –	3	0.25	24 –	3	0.25	24 –	3	0.25	28 –	3	0.25	32 –
		B101	8	–	4 –	8	–	4 –	8	–	4 –	8	–	4 –	8	–	4 –	8	–	4 1.35
		B 101'	6	–	16 1.55	6	–	16 1.55	6	–	24 1.55	6	–	24 1.55	6	–	28 1.55	6	–	32 1.55
		PI01	8	–	24 3.75	8	–	24 3.75	8	–	28 3.75	8	–	28 3.75	8	–	32 3.75	8	–	36 3.75
ABUTMENT		C 201	9	–	8 –	8	–	8 –	8	–	8 –	8	–	8 –	8	–	8 –	8	–	8 –
		C 202	4	–	2 –	4	–	2 –	4	–	2 –	4	–	2 –	4	–	2 –	4	–	2 –
		ST 201	2	0.20	– 1.215	2	0.20	– 1.295	2	0.20	– 1.355	2	0.20	– 1.435	2	0.20	– 1.515	2	0.20	– 1.615
		ST 202	3	0.20	– 1.745	3	0.20	– 1.795	3	0.20	– 1.845	3	0.20	– 1.895	3	0.20	– 1.945	3	0.20	– 1.995
		ST 203	3	0.20	– –	3	0.20	– –	3	0.20	– –	3	0.20	– –	3	0.20	– –	3	0.20	– –
		ST 204	3	0.20	84 1.35	3	0.20	84 1.35	3	0.20	98 1.35	3	0.20	98 1.35	3	0.20	112 1.35	3	0.20	125 1.35
		ST 205	3	0.25	1.35	3	0.25	1.35	3	0.25	1.35	3	0.25	1.35	3	0.25	1.35	3	0.25	1.35
		ST 205'	3	0.25	16 –	3	0.25	16 –	3	0.25	24 –	3	0.25	24 –	3	0.25	28 –	3	0.25	32 –
		ST 206	3	0.30	12 –	3	0.30	12 –	3	0.30	12 –	3	0.30	12 –	3	0.30	12 –	3	0.30	12 –
		B201	8	–	4 –	8	–	4 –	8	–	4 –	8	–	4 –	8	–	4 –	8	–	4 –
		B 201'	8	–	16 1.55	6	–	16 1.55	6	–	24 1.55	6	–	24 1.55	6	–	28 1.55	–	–	32 1.55
		P 201	8	–	24 3.75	8	–	24 3.75	8	–	28 3.75	8	–	28 3.75	8	–	32 3.75	8	–	36 3.75
		W 201	4	0.20	10 –	4	0.20	10 –	4	0.20	10 –	4	0.20	10 –	4	0.20	10 –	4	0.20	10 –
		W 202	2	0.30	– 2.70	2	0.30	– 2.80	2	0.30	– 2.80	2	0.30	– 2.90	2	0.30	– 2.90	2	0.30	– 2.90
		W 203	4	0.15	24 –	4	0.15	24 –	4	0.15	24 –	4	0.15	24 –	4	0.15	24 –	4	0.15	24 –
		W 204	2	0.30	12 –	2	0.30	12 –	2	0.30	12 –	2	0.30	12 –	2	0.30	12 –	2	0.30	12 –
		W 205	2	–	4 –	2	–	4 –	2	–	4 –	2	–	4 –	2	–	4 –	2	–	4 –
		W 206	2	–	6 –	2	–	6 –	2	–	6 –	2	–	6 –	2	–	6 –	2	–	6 –
		W 207	4	0.15	26 2.15	4	0.15	26 2.15	4	0.15	26 2.15	4	0.15	26 2.15	4	0.15	26 2.15	4	0.15	26 2.15
		W 208	4	–	2 5.435	4	–	2 5.435	4	–	2 5.435	4	–	2 5.435	4	–	2 5.435	4	–	2 5.435
		W 209	2	–	2 5.535	2	–	2 5.535	2	–	2 5.535	2	–	2 5.535	2	–	2 5.535	2	–	2 5.535

2 = Ø 1/4" OR 6 MM., # 3 = Ø 3/8" OR 9 MM., # 4 = Ø 1/2" OR 12 MM., # 5 = Ø 3/4" OR 20 MM., # 8 = Ø 1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR



DETAIL 1

SCALE 1:50

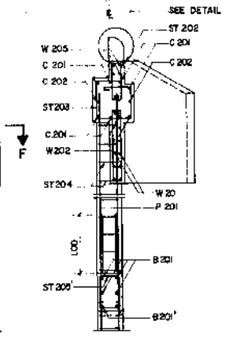


CAP BEAM DETAILS

SCALE 1:50

ABUTMENT HEAD DETAILS

SCALE 1:50



SECTION D - D

SCALE 1:50

SECTION C - C

SCALE 1:50

NOTES :

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS FOR PILE DETAILS SEE DWG.NO. MS-02,MS-03
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES
   a. IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b. IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACING SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M. AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM. FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS CEMENT SHALL SHALL BE TIS 15 TYPE 1 PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350 KG.
SAND	0.43 M^3
CRUSHED ROCK OR GRAVEL	0.86 M^3
CONCRETE SLUMP MAX.	10 CM.

5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD.30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR.24 PLAIN BARS UNLESS OTHERWISE INDICATED
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFIOMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATION OF REBARS
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HEIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
10. ALL DIAMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12. THIS DRAWING IS ADAPTED FROM DOH. DWG. NO. 3AD5-IDG-14/9

KINGDOM OF THAILAND

MINISTRY OF TRANSPORT AND COMMUNICATIONS

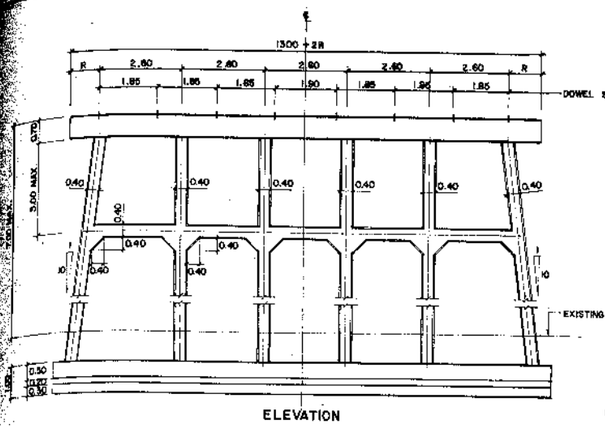
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

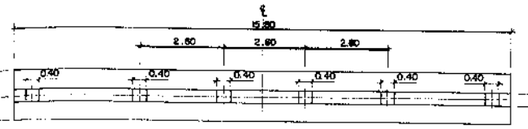
12.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-19
		SHEET NO. 132



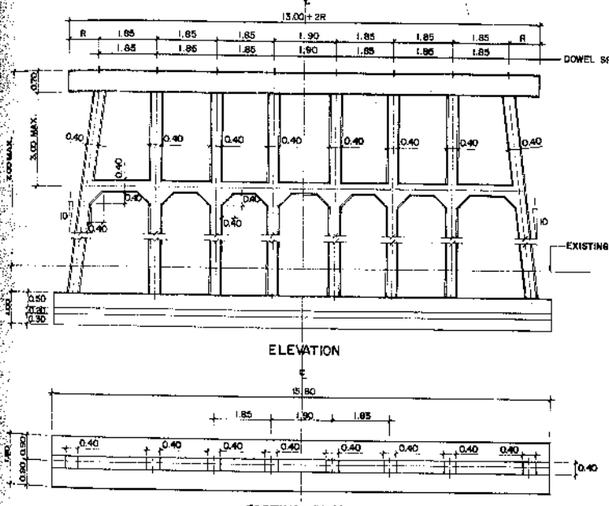
ELEVATION



FOOTING PLAN

PIER DETAIL FOR 5.00 – 6.00 M. SPAN

SCALE 1 : 100

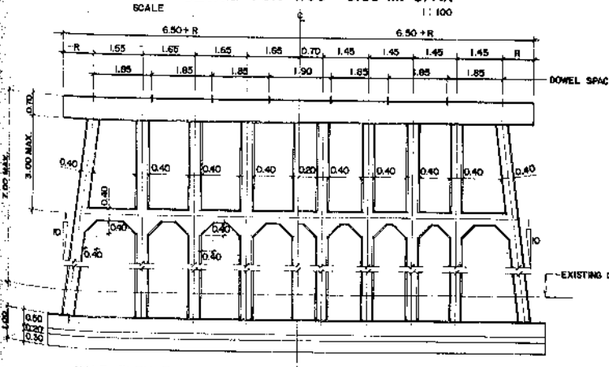


ELEVATION

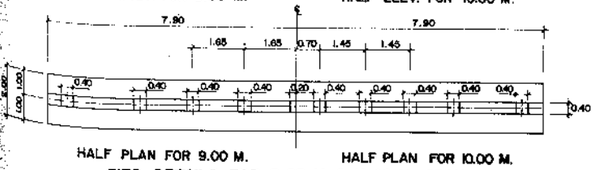
FOOTING PLAN

PIER DETAIL FOR 7.00 – 8.00 M. SPAN

SCALE 1 : 100



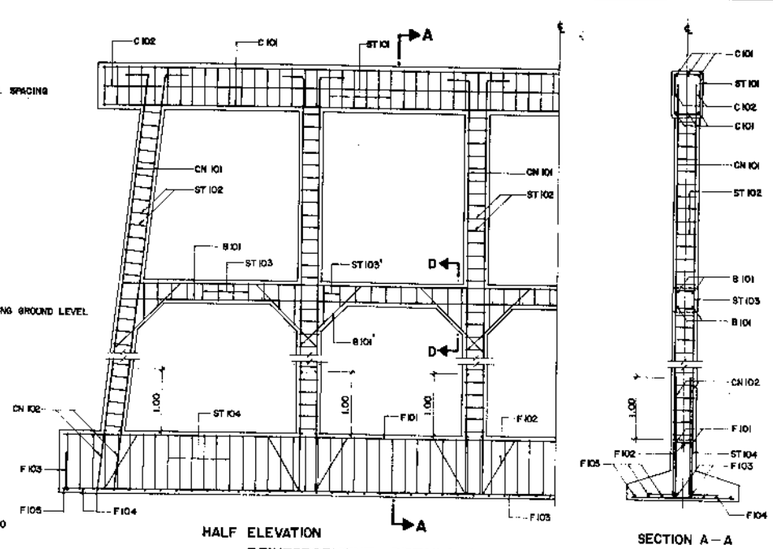
HALF ELEV. FOR 9.00 M. HALF ELEV. FOR 10.00 M.



HALF PLAN FOR 9.00 M. HALF PLAN FOR 10.00 M.

PIER DETAILS FOR 9.00 M. & 10.00 M. SPAN

SCALE 1 : 100

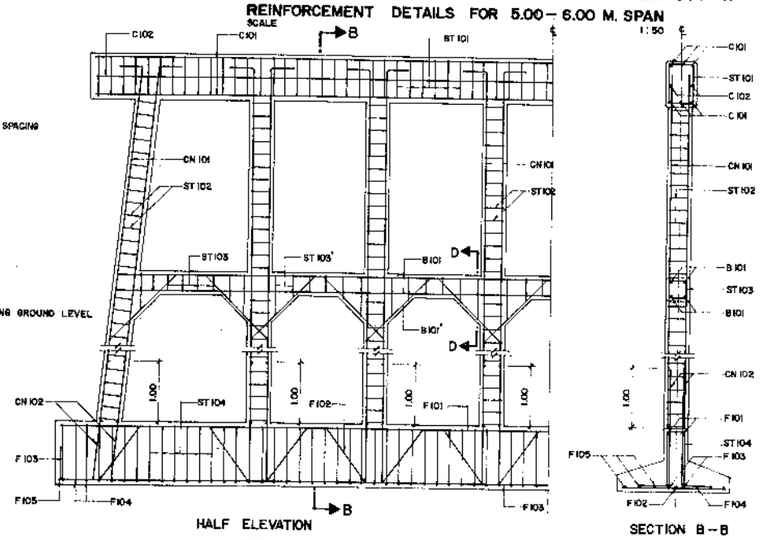


HALF ELEVATION

SECTION A – A

REINFORCEMENT DETAILS FOR 5.00 – 6.00 M. SPAN

SCALE 1 : 50

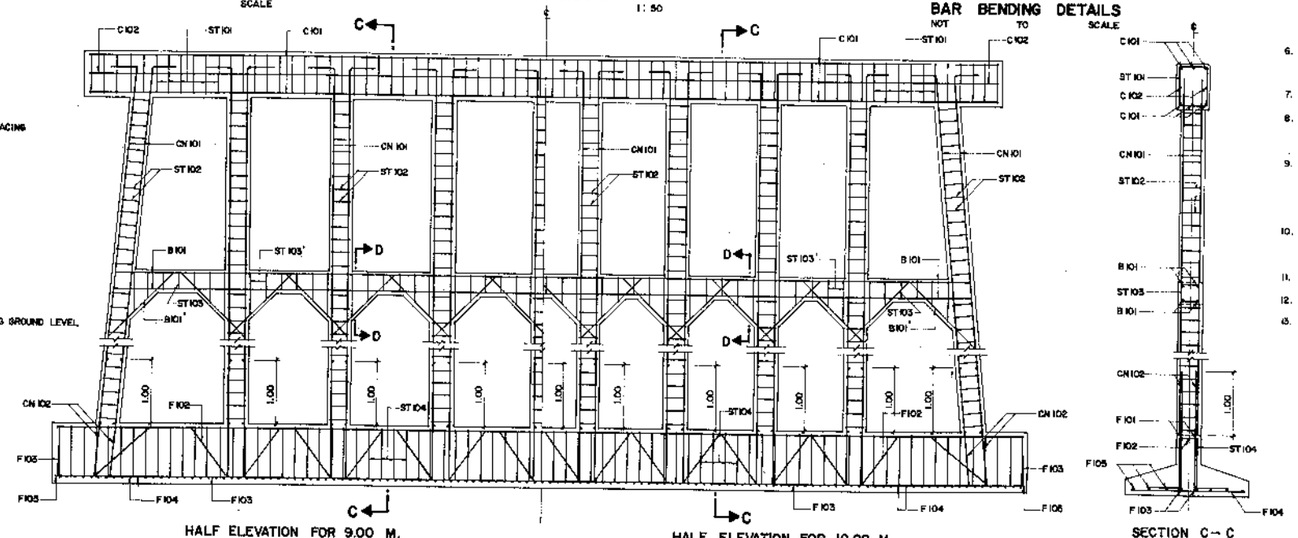


HALF ELEVATION

SECTION B – B

REINFORCEMENT DETAILS FOR 7.00 – 8.00 M. SPAN

SCALE 1 : 50



HALF ELEVATION FOR 9.00 M. HALF ELEVATION FOR 10.00 M.

REINFOREMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN

SCALE 1 : 50

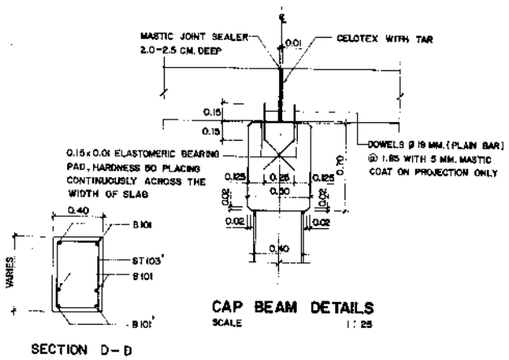
SECTION C – C

SCALE 1 : 50

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAM	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
	C 101	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–
	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	CN 101	6	–	24	11.25	6	–	24	11.25	6	–	32	11.25	6	–	32	11.25	6	–	36	11.25	6	–	40	11.25
	CN 102	6	–	24	2.31	6	–	24	2.31	6	–	32	2.31	6	–	32	2.31	6	–	36	2.31	6	–	40	2.31
	ST 101	3	0.20	74	2.35	3	0.20	74	2.35	3	0.20	74	2.35	3	0.20	74	2.35	3	0.20	74	2.35	3	0.20	74	2.35
	ST 102	3	0.20	288	1.35	3	0.20	288	1.35	3	0.20	384	1.35	3	0.20	384	1.35	3	0.20	432	1.35	3	0.20	480	1.35
	ST 103	3	0.25	78	1.35	3	0.25	78	1.35	3	0.25	66	1.35	3	0.25	66	1.35	3	0.25	55	1.35	3	0.25	55	1.35
	ST 103'	3	–	24	–	3	–	24	–	3	–	32	–	3	–	32	–	3	–	48	–	3	–	48	–
	ST 104	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55
	B 101	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	B 101'	8	–	24	1.55	8	–	24	1.55	8	–	32	1.55	8	–	32	1.55	8	–	48	1.55	8	–	48	1.55
	F 101	8	–	2	15.70	8	–	2	15.70	8	–	2	15.70	8	–	2	15.70	8	–	2	15.70	8	–	2	15.70
	F 102	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–
	F 103	8	–	2	16.90	8	–	2	16.90	8	–	2	16.90	8	–	2	16.90	8	–	2	16.90	8	–	2	16.90
	F 104	4	0.25	63	1.50	4	0.25	63	1.50	4	0.20	79	1.70	4	0.20	79	1.70	4	0.125	126	1.90	4	0.125	126	1.90
	F 105	4	–	6	15.70	4	–	6	15.70	4	–	6	15.70	4	–	6	15.70	4	–	6	15.70	4	–	6	15.70

3 = ø 3/8" OR 9 MM., # 4 = ø 1/2" OR 12 MM., # 6 = ø 3/4" OR 20 MM., # 8 = ø 1" OR 25 MM., NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

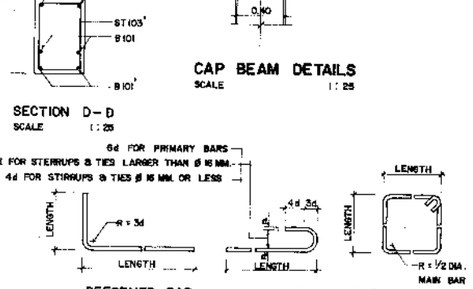


CAP BEAM DETAILS

SCALE 1 : 25

SECTION D – D

SCALE 1 : 25



DEFORMED BAR PLAIN BAR

BAR BENDING DETAILS

NOT TO SCALE

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEED 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEED 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg./CM.^{2} FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	Kg.
SAND	0.48	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MIX.	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3405 – 106 – H/23.

KINGDOM OF THAILAND

MINISTRY OF TRANSPORT AND COMMUNICATIONS

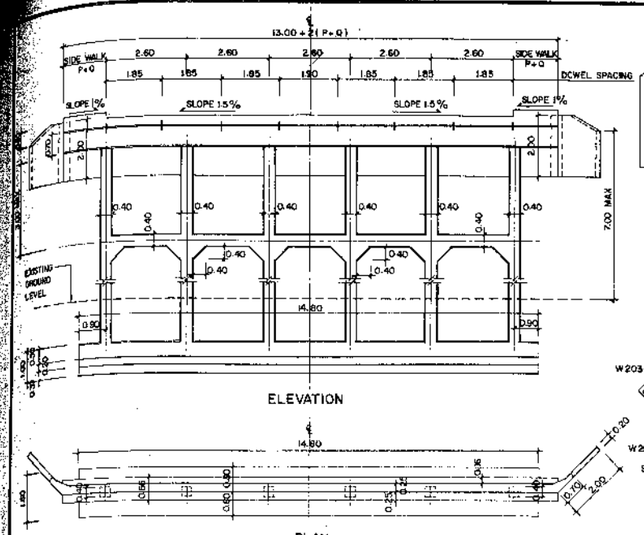
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

13.00 ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTING PIER DETAILS

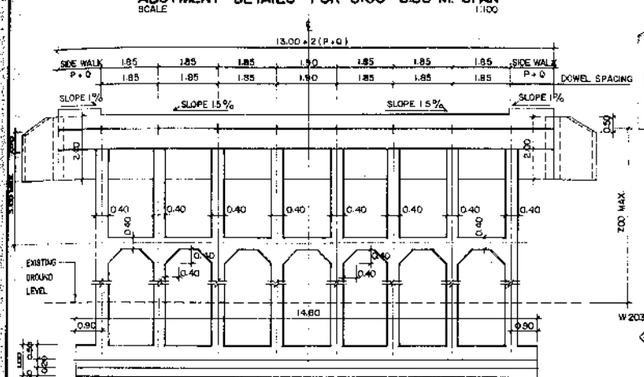
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE	JULY 1994
SUBMITTED : P. Buranagy (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE	AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO.	ST – 20
		SHEET NO.	133



ELEVATION

PLAN

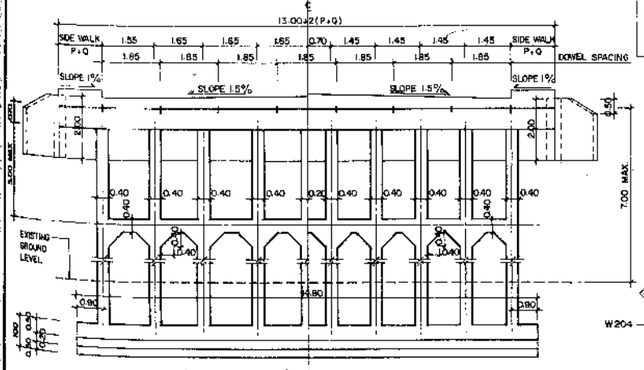
ABUTMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1:100



ELEVATION

PLAN

ABUTMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1:100

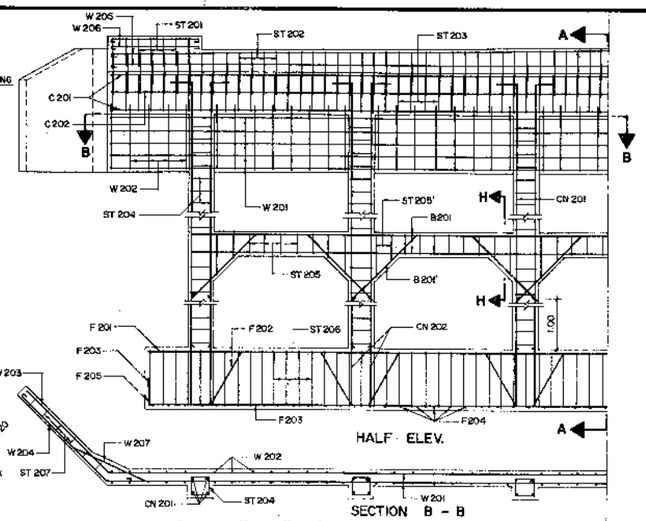


HALF ELEV. FOR 9.00 M. HALF ELEV. FOR 10.00 M.

PLAN

HALF PLAN FOR 9.00 M. HALF PLAN FOR 10.00 M.

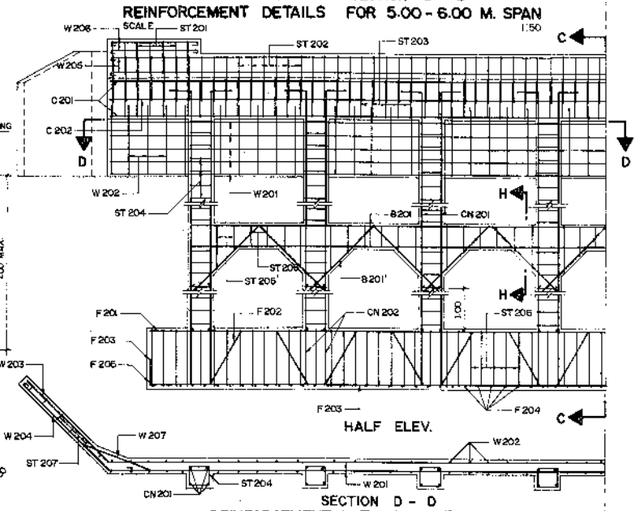
ABUTMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1:100



HALF ELEV.

SECTION B - B

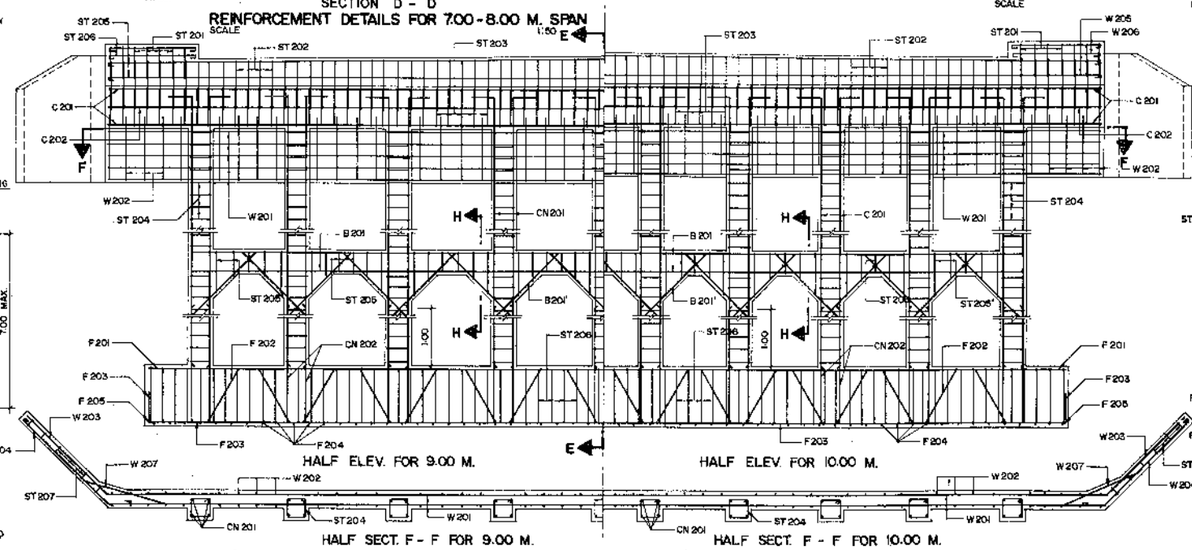
REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1:50



HALF ELEV.

SECTION D - D

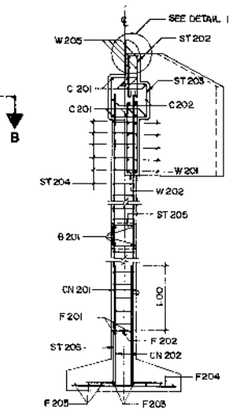
REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1:50



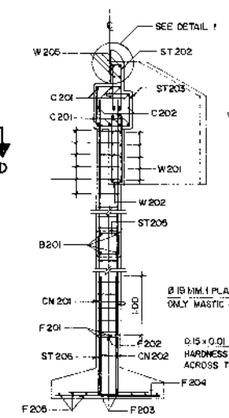
HALF ELEV. FOR 9.00 M. HALF ELEV. FOR 10.00 M.

HALF SECT. F - F FOR 9.00 M. HALF SECT. F - F FOR 10.00 M.

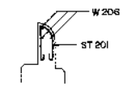
REINFORCEMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1:50



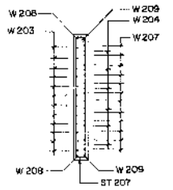
SECTION A - A
SCALE 1:50



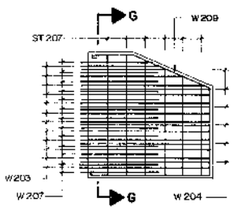
SECTION C - C
SCALE 1:50



DETAIL 1
SCALE 1:50

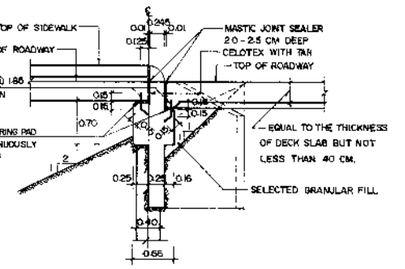


SECTION G - G
SCALE 1:50

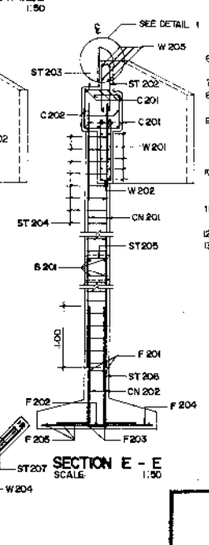


ELEVATION WINGWALL

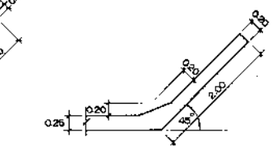
REINFORCEMENT DETAILS
SCALE 1:50



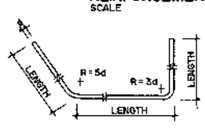
ABUTMENT HEAD DETAILS
SCALE 1:50



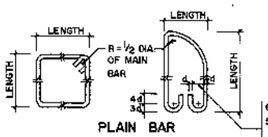
SECTION E - E
SCALE 1:50



WINGWALL DETAILS
SCALE 1:50



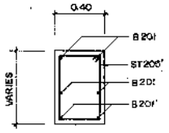
DEFORMED BAR



PLAIN BAR

6d FOR PRIMARY BARS
5d FOR STIRRUPS & TIES LARGER THAN Ø 16 MM.
4d FOR STIRRUPS & TIES Ø 16 MM. OR LESS

BAR BENDING DETAILS
NOT TO SCALE



SECTION H - H
SCALE 1:25

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.			SPAN 6.00 M.			SPAN 7.00 M.			SPAN 8.00 M.			SPAN 9.00 M.			SPAN 10.00 M.		
		#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L
	C 201	8	-	6	-	8	-	6	-	8	-	8	-	8	-	8	-	8	-	8	-
	C 202	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
	ST 201	2	0.20	14	1.215	2	0.20	14	1.290	2	0.30	14	1.355	2	0.20	14	1.435	2	0.20	14	1.515
	ST 202	3	0.20	80	1.745	3	0.20	80	1.790	3	0.20	80	1.845	3	0.20	80	1.895	3	0.20	80	1.945
	ST 203	3	0.20	80	-	3	0.20	80	-	3	0.20	80	-	3	0.20	80	-	3	0.20	80	-
	ST 204	3	0.20	234	1.35	3	0.20	234	1.35	3	0.20	312	1.35	3	0.20	312	1.35	3	0.20	351	1.35
	ST 205	3	0.25	50	1.35	3	0.25	50	1.35	3	0.25	30	1.35	3	0.25	50	1.35	3	0.25	20	1.35
	ST 205'	3	-	40	-	3	-	56	-	3	-	56	-	3	-	64	-	3	-	72	-
	ST 206	3	0.20	74	2.55	3	0.20	74	2.55	3	0.20	74	2.55	3	0.20	74	2.55	3	0.20	74	2.55
	ST 207	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-
	B 201	8	-	8	13.30	8	-	8	13.30	8	-	8	13.30	8	-	8	13.30	8	-	8	13.30
	B 201'	6	-	40	1.55	6	-	40	1.55	6	-	56	1.55	6	-	56	1.55	6	-	72	1.55
	CN 201	8	-	24	9.25	8	-	24	9.25	8	-	32	9.25	8	-	32	9.25	8	-	36	9.25
	CN 202	8	-	24	2.31	8	-	24	2.31	8	-	32	2.31	8	-	32	2.31	8	-	36	2.31
	F 201	8	-	2	14.70	8	-	2	14.70	8	-	2	14.70	8	-	2	14.70	8	-	2	14.70
	F 202	8	-	1	-	8	-	1	-	8	-	1	-	8	-	1	-	8	-	1	-
	F 203	8	-	2	15.50	8	-	2	15.50	8	-	2	15.50	8	-	2	15.50	8	-	2	15.50
	F 204	4	0.25	59	1.50	4	0.25	59	1.50	4	0.20	73	1.70	4	0.20	73	1.70	4	0.25	118	1.90
	F 205	4	-	6	14.70	4	-	6	14.70	4	-	8	14.70	4	-	6	14.70	4	-	6	14.70
	W 201	4	0.20	10	15.90	4	0.20	10	15.90	4	0.20	10	15.90	4	0.20	10	15.90	4	0.20	10	15.90
	W 202	2	0.30	53	2.70	2	0.30	53	2.60	2	0.30	83	2.60	2	0.30	53	2.50	2	0.30	53	2.40
	W 203	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-
	W 204	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-
	W 205	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-
	W 206	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-
	W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
	W 208	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435
	W 209	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535

#2 = Ø1/4" OR 6 MM., #3 = Ø3/8" OR 9 MM., #4 = Ø1/2" OR 12 MM., #8 = Ø1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

NOTES :

1 THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME
2 SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M²
3 HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M , AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M , ADDITIONAL BRACING SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4 CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM , BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
5 CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M³ AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM² FOR A 15 x 15 x 15 CM. CUBE AT 28 DAYS CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.45	M³
CRUSHED ROCK OR GRAVEL	0.86	M³
CONCRETE SLUMP MAX.	10	CM.

6 REBARS #4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED
7 LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY ENGINEER
8 LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS
9 IN CASE OF SALINE PROTECTION , HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM , BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS
10 THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANALBED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
11 QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12 ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
13 THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3AD5-106-14/23[9]

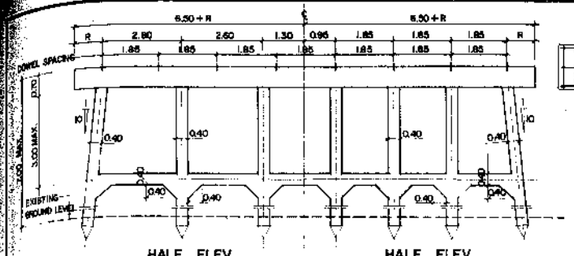
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

13.00 M. ROADWAY WIDTH SLAB BRIDGE

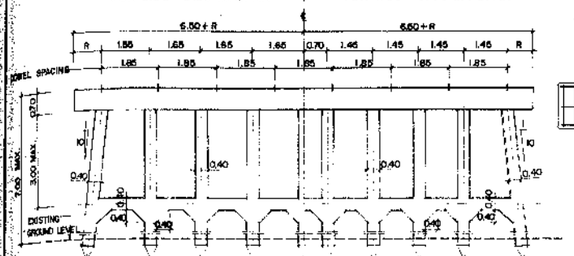
SPREAD FOOTING ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-21
		SHEET NO. 134



HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

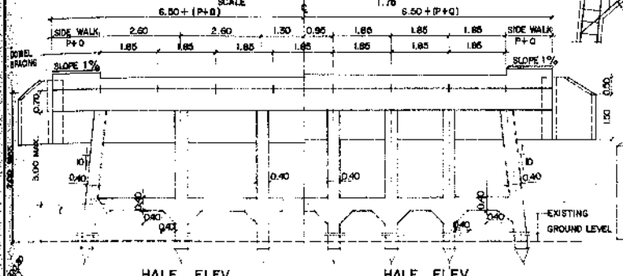


HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

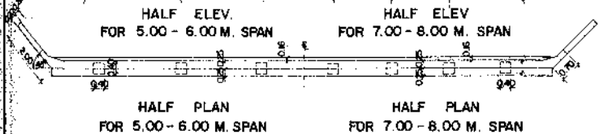
PILE BENT ELEVATION

SCALE 1:75



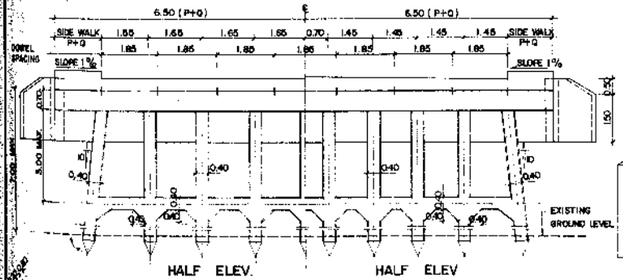
HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV FOR 7.00 - 8.00 M. SPAN



HALF PLAN FOR 5.00 - 6.00 M. SPAN

HALF PLAN FOR 7.00 - 8.00 M. SPAN



HALF ELEV. FOR 9.00 M. SPAN

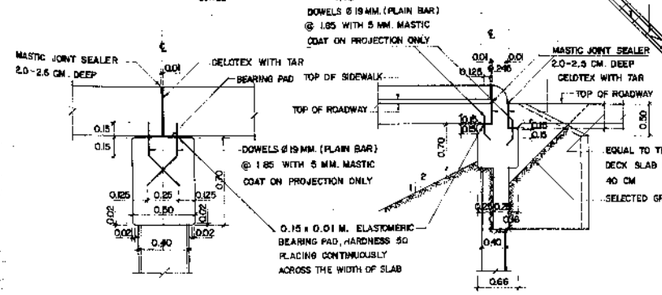
HALF ELEV FOR 10.00 M. SPAN

HALF PLAN FOR 9.00 M. SPAN

HALF PLAN FOR 10.00 M. SPAN

ABUTMENT DETAILS

SCALE 1:75

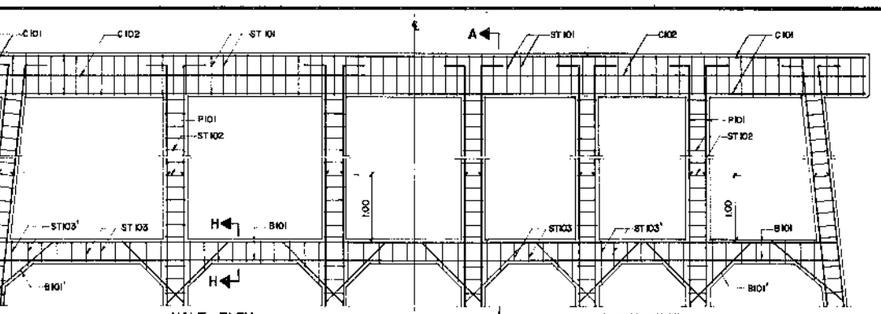


CAP BEAM DETAILS

SCALE 1:25

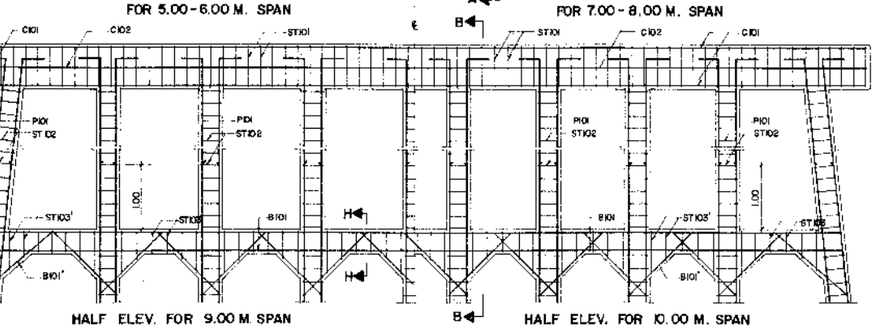
ABUTMENT HEAD DETAILS

SCALE 1:50



HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV. FOR 7.00 - 8.00 M. SPAN

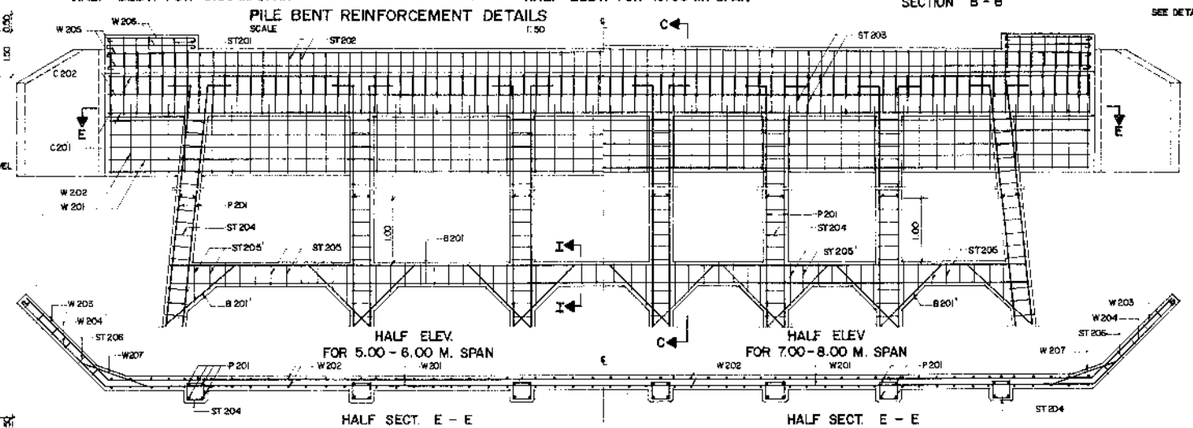


HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

PILE BENT REINFORCEMENT DETAILS

SCALE 1:50

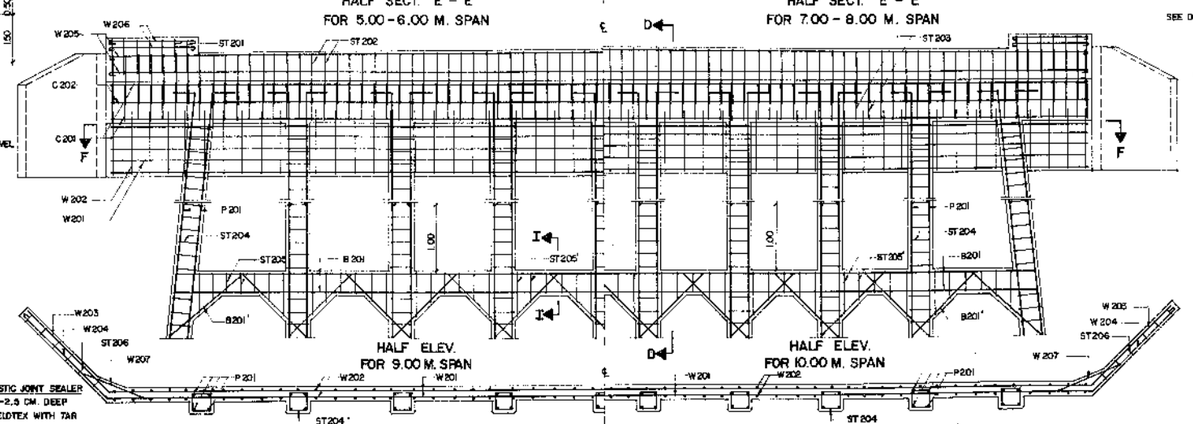


HALF ELEV. FOR 5.00 - 6.00 M. SPAN

HALF ELEV FOR 7.00 - 8.00 M. SPAN

HALF SECT. E - E FOR 5.00 - 6.00 M. SPAN

HALF SECT. E - E FOR 7.00 - 8.00 M. SPAN



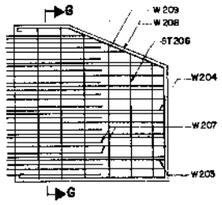
HALF ELEV. FOR 9.00 M. SPAN

HALF ELEV. FOR 10.00 M. SPAN

HALF SECT. F - F FOR 9.00 M. SPAN

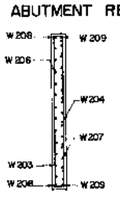
HALF SECT. F - F FOR 10.00 M. SPAN

ABUTMENT REINFORCEMENT DETAILS

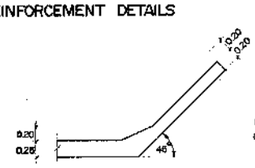


WINGWALL REINFORCEMENT DETAILS

SCALE 1:40

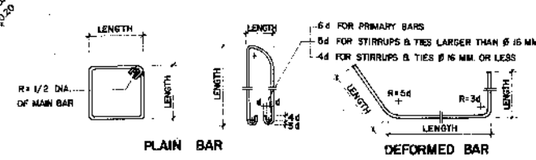


SECTION G - G



WINGWALL DETAILS

SCALE 1:50

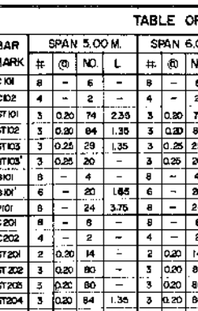


PLAIN BAR

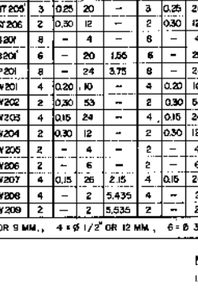
DEFORMED BAR

BAR BENDING DETAILS

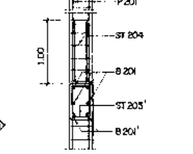
NOT TO SCALE



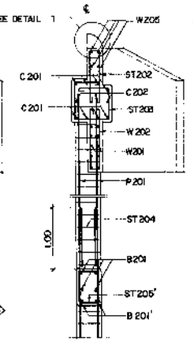
SECTION A-A



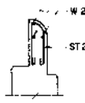
SECTION B - B



SECTION C - C

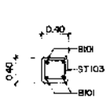


SECTION D - D

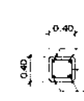


DETAIL 1

SCALE 1:50



SECTION H-H



SECTION I - I

TABLE OF REINFORCEMENT

	BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
PILE BENT		C101	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
		C102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
		ST101	3	0.20	74	2.35	3	0.20	74	2.35	3	0.20	74	2.35	3	0.20	74	2.35	3	0.20	74	2.35	3	0.20	74	2.35
		ST102	3	0.20	84	1.35	3	0.20	84	1.35	3	0.20	112	1.35	3	0.20	112	1.35	3	0.20	126	1.35	3	0.20	140	1.35
		ST103	3	0.25	29	1.35	3	0.25	29	1.35	3	0.25	19	1.35	3	0.25	19	1.35	3	0.25	19	1.35	3	0.25	11	1.35
		ST103'	3	0.25	20	–	3	0.25	20	–	3	0.25	28	–	3	0.25	28	–	3	0.25	32	–	3	0.25	36	–
		B101	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
		B101'	6	–	20	1.65	6	–	20	1.85	6	–	28	1.55	6	–	28	1.55	6	–	32	1.55	6	–	36	1.55
		P101	8	–	24	3.75	8	–	24	3.75	8	–	32	3.75	8	–	32	3.75	8	–	36	3.75	8	–	40	3.75
ABUTMENT		C201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
		C202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
		ST201	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–
		ST202	3	0.20	80	–	3	0.20	80	–	3	0.20	60	–	3	0.20	60	–	3	0.20	80	–	3	0.20	80	–
		ST203	3	0.20	80	–	3	0.20	80	–	3	0.20	80	–	3	0.20	80	–	3	0.20	80	–	3	0.20	80	–
		ST204	3	0.20	84	1.35	3	0.20	84	1.35	3	0.20	112	1.35	3	0.20	112	1.35	3	0.20	126	1.35	3	0.20	140	1.35
		ST205	3	0.25	29	1.35	3	0.25	29	1.35	3	0.25	19	1.35	3	0.25	19	1.35	3	0.25	19	1.35	3	0.25	11	1.35
		ST206	3	0.25	20	–	3	0.25	20	–	3	0.25	28	–	3	0.25	28	–	3	0.25	32	–	3	0.25	36	–
		ST206	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
		B201	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
		B201'	6	–	20	1.55	6	–	20	1.55	6	–	28	1.55	6	–	28	1.55	6	–	32	1.55	6	–	36	1.55
		P201	8	–	24	3.75	8	–	24	3.75	8	–	32	3.75	8	–	32	3.75	8	–	36	3.75	8	–	40	3.75
		W201	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
		W202	2	0.30	53	–	2	0.30	53	–	2	0.30	53	–	2	0.30	53	–	2	0.30	53	–	2	0.30	63	–
		W203	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–
		W204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
		W205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
		W206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
		W207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
		W208	4	–	2	5.435	4	–	2	5.436	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.436
		W209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

2 = Ø 1/4" OR 6 MM., 3 = Ø 3/8" OR 9 MM., 4 = Ø 1/2" OR 12 MM., 6 = Ø 3/4" OR 20 MM., 8 = Ø 1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

NOTE :

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS FOR PILE DETAILS SEE DWG. NO. MS-02, MS-03
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M. AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM. FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS CEMENT SHELL BE TIS 15 TYPE I PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350 KG.
SAND	0.43 M^3
CRUSHED ROCK OR GRAVEL	0.86 M^3
CONCRETE SLUMP MAX	10 CM.

5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD.30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR. 24 PLAIN BARS UNLESS OTHERWISE INDICATED
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFROMING TO TIS. 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HEIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
10. ALL DIAMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3AD5-106-14/24

KINGDOM OF THAILAND

MINISTRY OF TRANSPORT AND COMMUNICATIONS

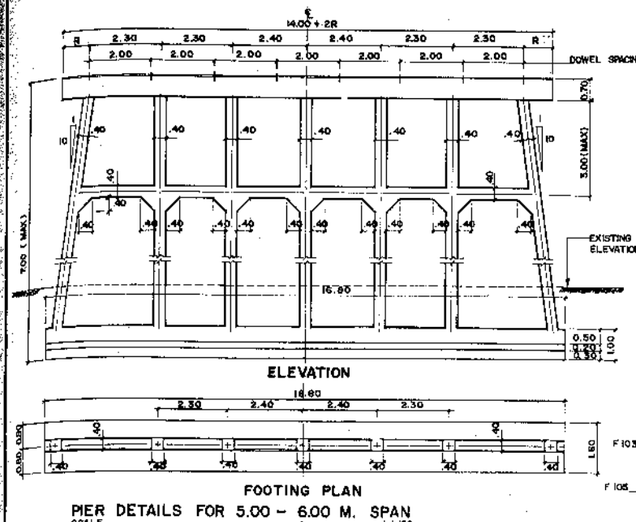
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

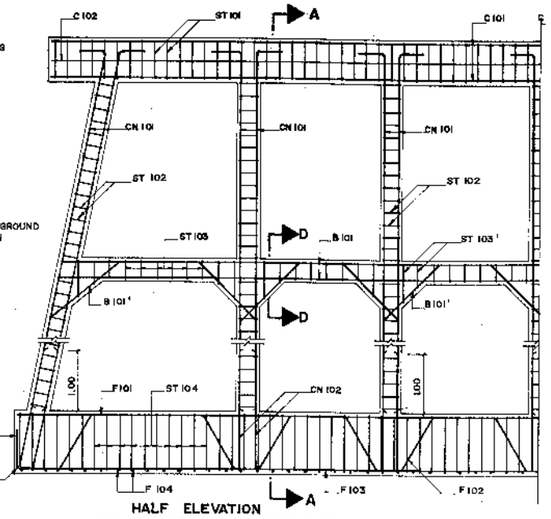
13.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-22
		SHEET NO. 135



PIER DETAILS FOR 5.00 – 6.00 M. SPAN
SCALE 1 : 100



REINFORCEMENT DETAILS FOR 5.00–6.00 M SPAN
SCALE 1 : 50

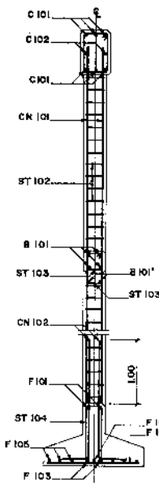
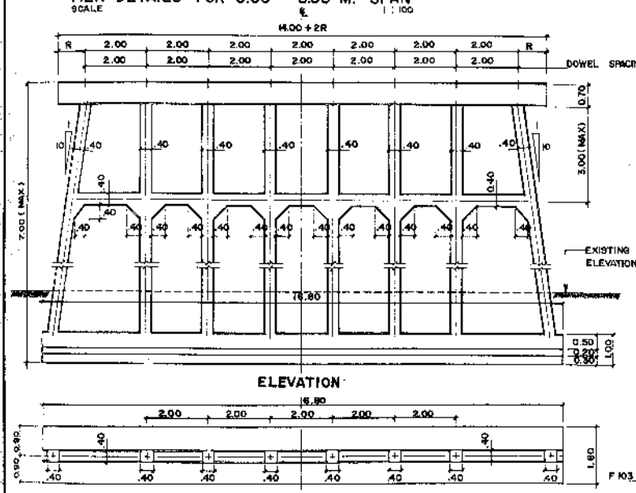


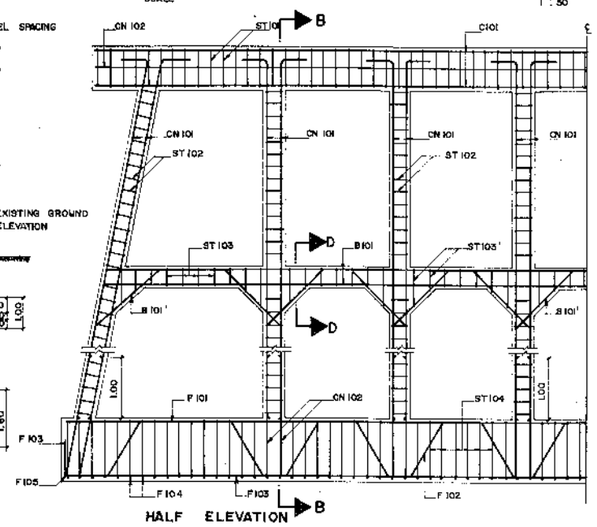
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
	C 101	8	–	6	15.75	8	–	6	15.75	8	–	6	15.75	8	–	6	15.75	8	–	6	15.75	8	–	6	15.75
	C 102	4	–	2	15.75	4	–	2	15.75	4	–	2	15.75	4	–	2	15.75	4	–	2	15.75	4	–	2	15.75
	CN 101	8	–	28	11.25	8	–	28	11.25	8	–	32	11.25	8	–	32	11.25	8	–	36	11.25	8	–	40	11.25
	CN 102	8	–	28	2.31	8	–	28	2.31	8	–	32	2.31	8	–	32	2.31	8	–	36	2.31	8	–	40	2.31
	ST 101	3	0.20	79	2.35	3	0.20	79	2.35	3	0.20	79	2.35	3	0.20	79	2.35	3	0.20	79	2.35	3	0.20	79	2.35
	ST 102	3	0.20	336	1.35	3	0.20	336	1.35	3	0.20	384	1.35	3	0.20	384	1.35	3	0.20	432	1.35	3	0.20	480	1.35
	ST 103	3	0.25	62	1.35	3	0.25	62	1.35	3	0.25	52	1.35	3	0.25	52	1.35	3	0.25	42	1.35	3	0.26	28	1.35
	ST 103'	3	–	46	–	3	–	46	–	3	–	56	–	3	–	56	–	3	–	64	–	3	–	72	–
	ST 104	3	0.20	84	2.60	3	0.20	84	2.60	3	0.20	84	2.60	3	0.20	84	2.60	3	0.20	84	2.60	3	0.20	84	2.60
	B 101	8	–	6	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	B 101'	6	–	46	1.55	6	–	46	1.55	6	–	56	1.55	6	–	56	1.55	6	–	64	1.55	6	–	72	1.55
	F 101	8	–	2	16.75	8	–	2	16.75	8	–	2	16.75	8	–	2	16.75	8	–	2	16.75	8	–	2	16.75
	F 102	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–
	F 103	8	–	2	17.95	8	–	2	17.95	8	–	2	17.95	8	–	2	17.95	8	–	2	17.95	8	–	2	17.95
	F 104	4	0.25	67	1.55	4	0.25	67	1.55	4	0.20	84	1.75	4	0.20	84	1.75	4	0.225	134	1.95	4	0.225	134	1.95
	F 105	4	–	6	16.75	4	–	6	16.75	4	–	6	16.75	4	–	6	16.75	4	–	6	16.75	4	–	8	16.75

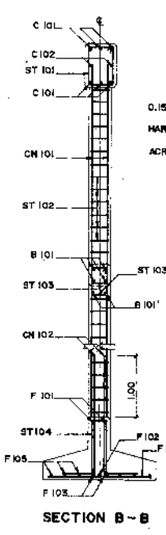
3 = Ø 3/8" OR 9 MM., # 4 = Ø 1/2" OR 12 MM., # 6 = Ø 3/4" OR 20 MM., # 8 = Ø 1" OR 25 MM., NO= TOTAL AMOUNT OF BARS., L = TOTAL LENGTH OF EACH BAR.

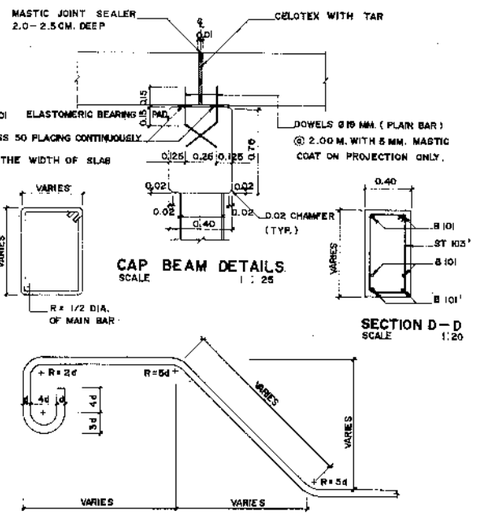


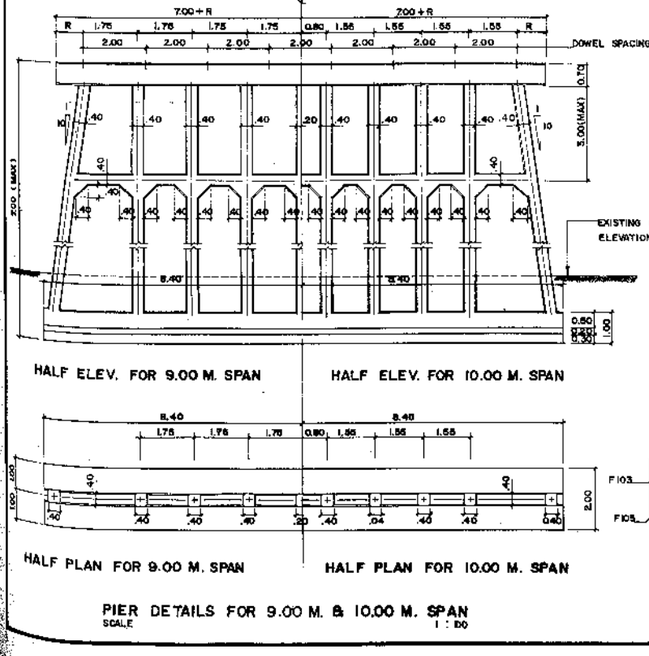
PIER DETAILS FOR 7.00 – 8.00 M. SPAN
SCALE 1 : 100



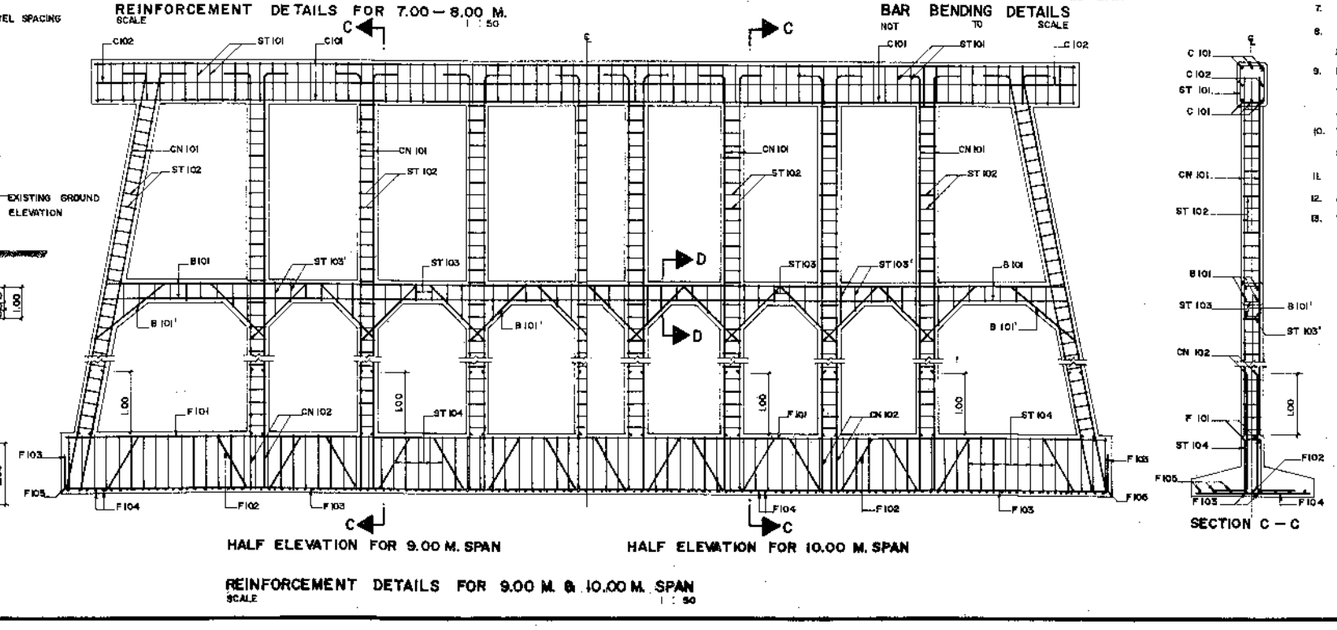
REINFORCEMENT DETAILS FOR 7.00 – 8.00 M.
SCALE 1 : 50







PIER DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1 : 100



REINFORCEMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1 : 50

NOTES:

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, AT WHICH A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg./CM.^{2} FOR A .15 x.15 x.15 M. CUBE AT 28 DAYS, CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	Kg.
SAND	0.45	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MAX.	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3AD5 – 106 – 14/10

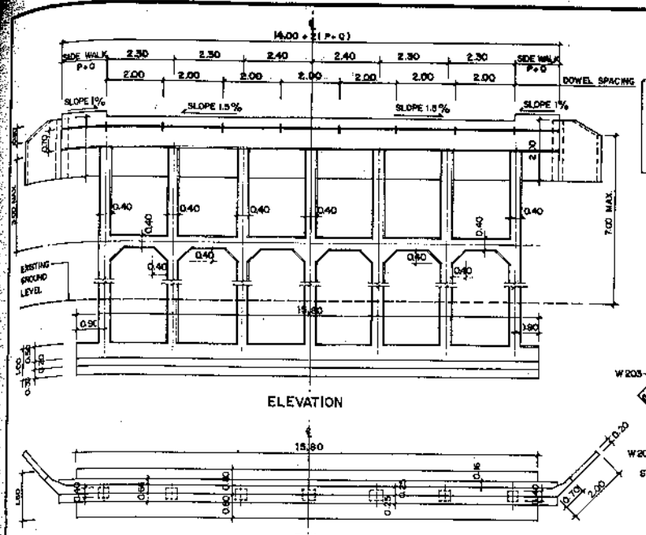
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

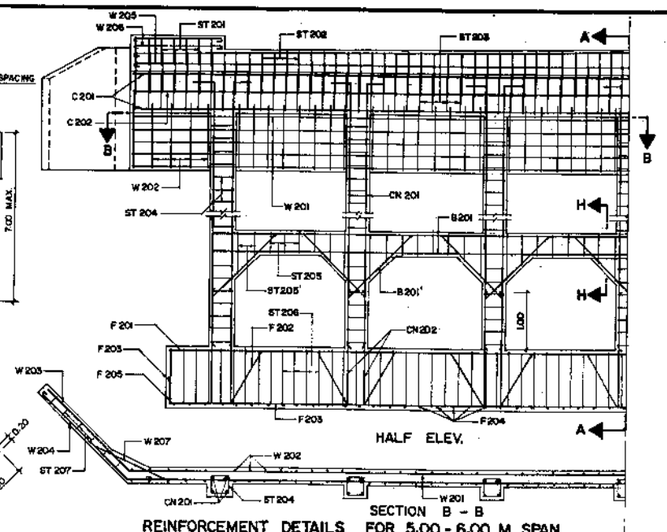
14.00 M. ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTING PIER DETAILS

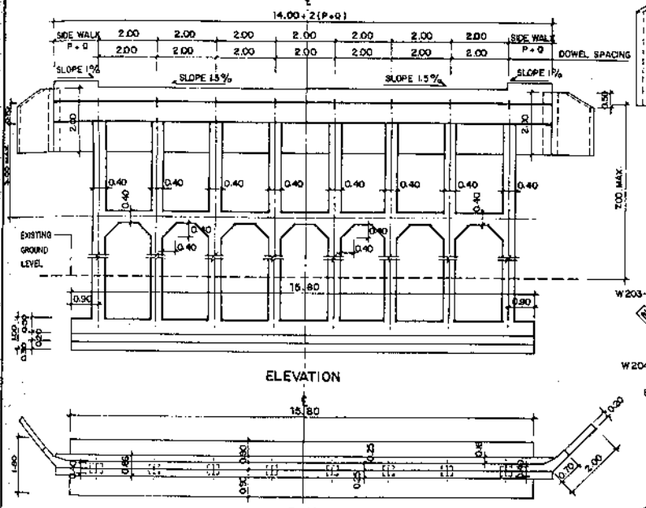
DESIGNED : DOH. & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-23
		SHEET NO. 136



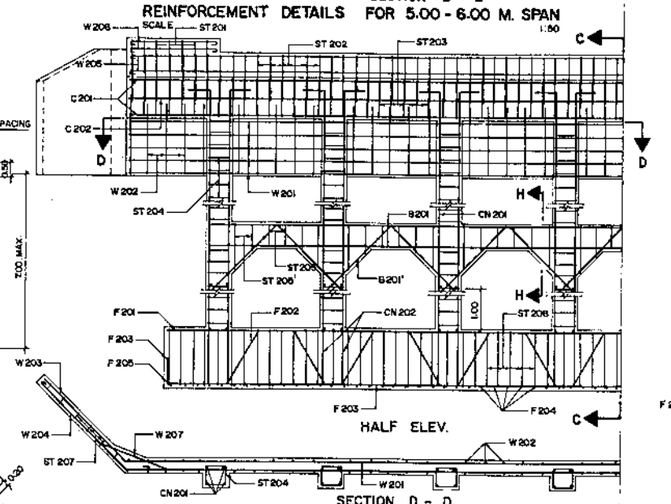
ABUTMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1:100



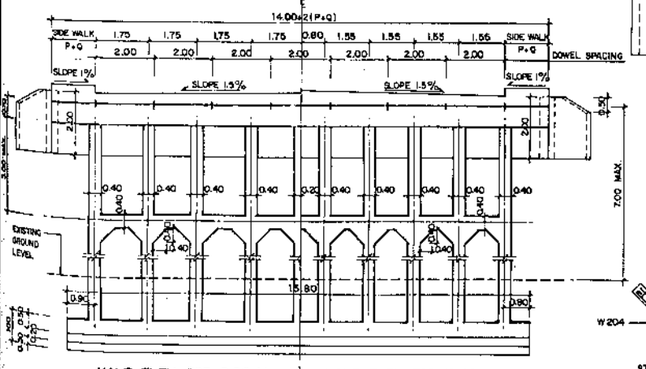
REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1:50



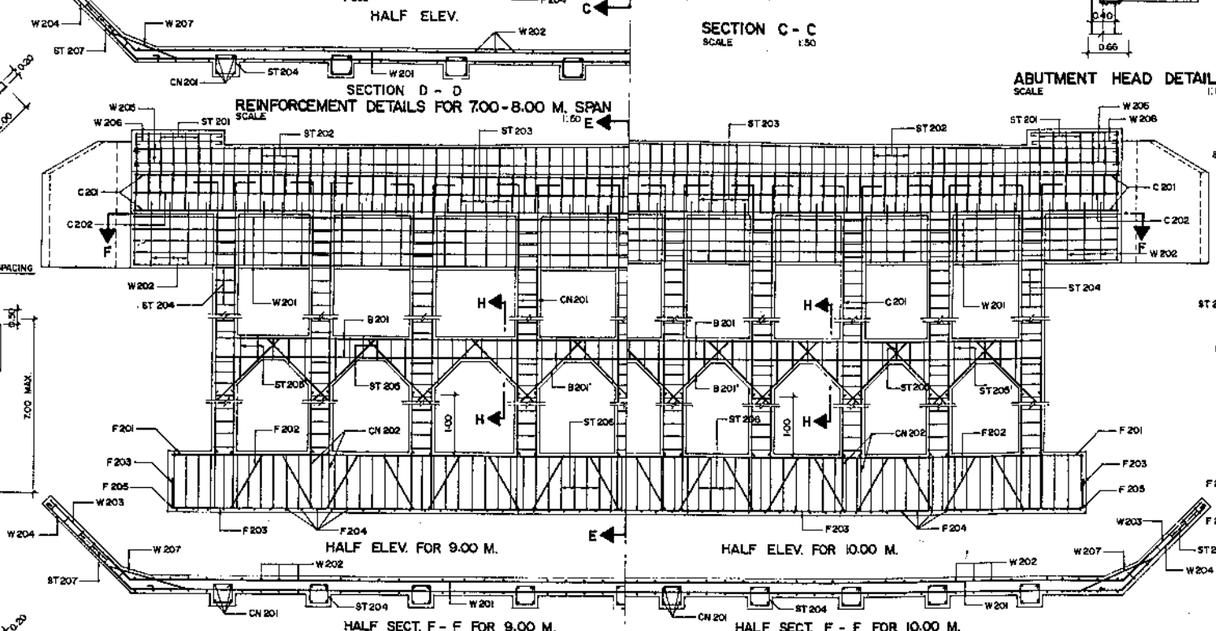
ABUTMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1:100



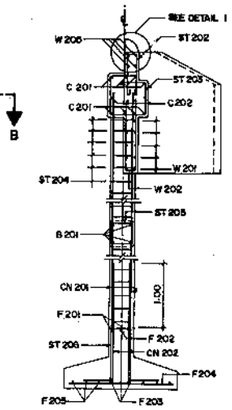
REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1:50



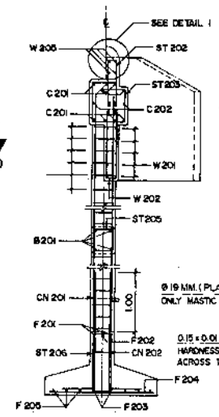
ABUTMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1:100



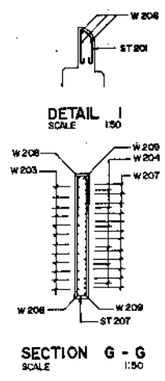
REINFORCEMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1:50



SECTION A - A
SCALE 1:50

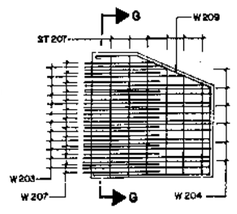


SECTION C - C
SCALE 1:50

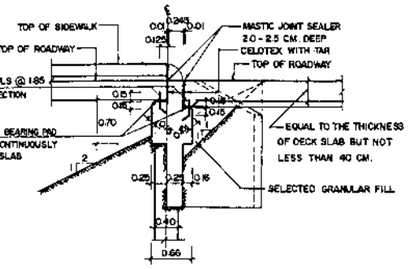


DETAIL I
SCALE 1:50

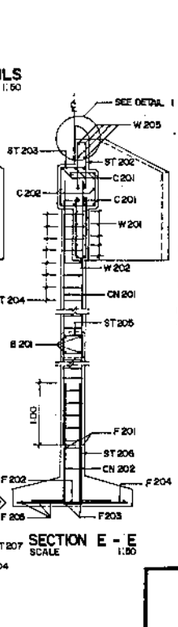
SECTION G - G
SCALE 1:50



ELEVATION WINGWALL
SCALE 1:50



ABUTMENT HEAD DETAILS
SCALE 1:50



SECTION E - E
SCALE 1:50

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAM	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L
	C 201	6	-	8	-	6	-	8	-	6	-	8	-	5	-	6	-	8	-	6	-	6	-	8	-
	C 202	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
	ST 204	2	0.30	14	1.215	2	0.30	14	1.290	2	0.30	14	1.355	2	0.20	14	1.435	2	0.20	14	1.515	2	0.20	14	1.635
	ST 202	3	0.20	85	1.745	3	0.20	85	1.790	3	0.20	85	1.845	3	0.20	85	1.895	3	0.20	85	1.945	3	0.20	85	1.995
	ST 203	3	0.20	85	-	3	0.20	85	-	3	0.20	85	-	3	0.20	85	-	3	0.20	85	-	3	0.20	85	-
	ST 204	3	0.20	273	1.35	3	0.20	273	1.35	3	0.25	312	1.35	3	0.20	312	1.35	3	0.25	351	1.35	3	0.20	390	1.35
	ST 205	3	0.25	54	1.35	3	0.25	54	1.35	3	0.25	34	1.35	3	0.25	34	1.35	3	0.25	24	1.35	3	0.25	22	1.35
	ST 205'	3	-	48	-	3	-	48	-	3	-	64	-	3	-	64	-	5	-	72	-	3	-	80	-
	ST 206	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55
	ST 207	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-
	B 201	8	-	8	14.30	8	-	8	14.30	8	-	8	14.30	8	-	8	14.30	6	-	8	14.30	8	-	8	14.30
	B 201'	6	-	48	1.55	6	-	48	1.55	6	-	64	1.55	6	-	64	1.55	6	-	72	1.55	6	-	80	1.55
	CN 201	8	-	28	9.25	8	-	28	9.25	8	-	32	9.25	8	-	32	9.25	8	-	36	9.25	8	-	40	9.25
	CN 202	8	-	28	2.31	8	-	28	2.31	8	-	32	2.31	8	-	32	2.31	8	-	36	2.31	8	-	40	2.31
	F 201	8	-	2	15.70	8	-	2	15.70	8	-	2	15.70	8	-	2	15.70	8	-	2	15.70	8	-	2	15.70
	F 202	8	-	1	-	8	-	1	-	8	-	1	-	8	-	1	-	8	-	1	-	8	-	1	-
	F 203	8	-	2	16.50	8	-	2	16.50	8	-	2	16.50	8	-	2	16.50	8	-	2	16.50	8	-	2	16.50
	F 204	4	0.25	63	1.50	4	0.25	63	1.50	4	0.20	78	1.70	4	0.20	78	1.70	4	0.25	126	1.90	4	0.25	126	1.90
	F 205	4	-	6	15.70	4	-	6	15.70	4	-	6	15.70	4	-	6	15.70	4	-	6	15.70	4	-	6	15.70
	W 201	4	0.20	10	16.90	4	0.20	10	16.90	4	0.20	10	16.90	4	0.20	10	16.90	4	0.20	10	16.90	4	0.20	10	16.90
	W 202	2	0.30	56	2.70	2	0.30	56	2.60	2	0.30	56	2.60	2	0.30	56	2.60	2	0.30	56	2.60	2	0.30	56	2.30
	W 203	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-
	W 204	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-
	W 205	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-
	W 206	2	-	6	-	2	-	6	-	2	-	8	-	2	-	6	-	2	-	6	-	2	-	6	-
	W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
	W 208	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435
	W 209	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535

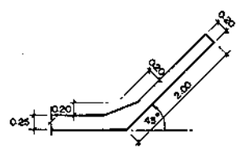
#2 = 6 MM. OR 1/4", #3 = 9 MM. OR 3/8", #4 = 12 MM. OR 1/2", #5 = 16 MM. OR 5/8", #6 = 20 MM. OR 3/4", #8 = 25 MM. OR 1", NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

NOTES :

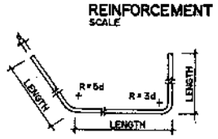
1 THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2 SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2
3 HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACING SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4 CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
5 CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM^2 FOR A 15 x 15 x 15 CM. CUBE AT 28 DAYS CEMENT SHALL BE TIS 15 TYPE 1 PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRET SLUMP MAX.	10	CM.

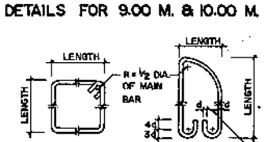
6 REBARS IN #4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED
7 LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY ENGINEER
8 LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS
9 IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS
10 THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANALBED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
11 QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12 ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
13 THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3405-106-14/23"



WINGWALL DETAILS
SCALE 1:50



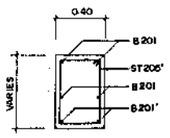
DEFORMED BAR



PLAIN BAR

BAR BENDING DETAILS
NOT TO SCALE

8d FOR PRIMARY BARS
5d FOR STIRRUPS & TIES LARGER THAN Ø 16 MM.
4d FOR STIRRUPS & TIES Ø 16 MM. OR LESS



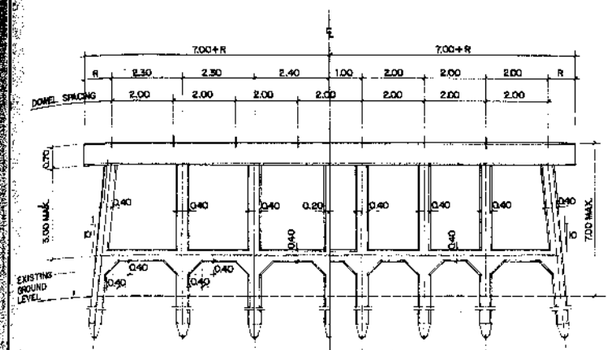
SECTION H - H
SCALE 1:25

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

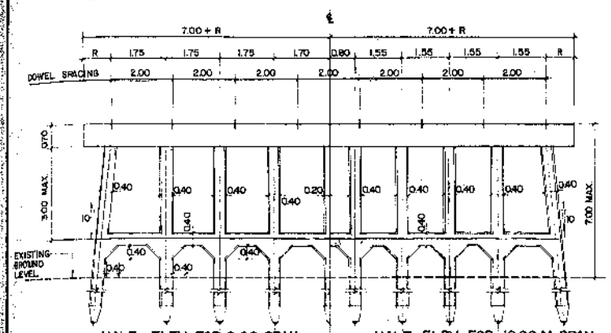
STANDARD DRAWING

14.00 M. ROADWAY WIDTH SLAB BRIDGE
SPREAD FOOTING ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE : JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-24
		SHEET NO. 137

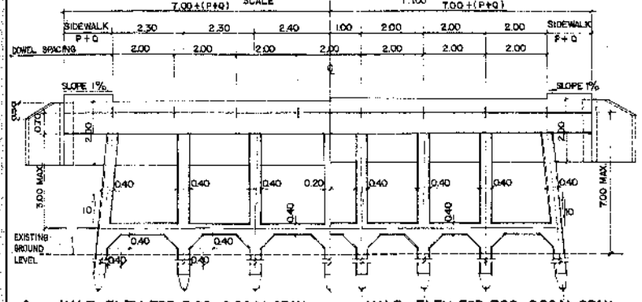


HALF ELEV. FOR 5.00-6.00 M. SPAN HALF ELEV. FOR 7.00-8.00 M. SPAN



HALF ELEV. FOR 9.00 SPAN HALF ELEV. FOR 10.00 M. SPAN

PILE BENT ELEVATION
SCALE 1:100



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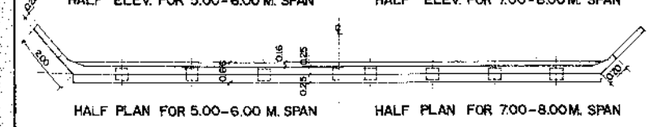
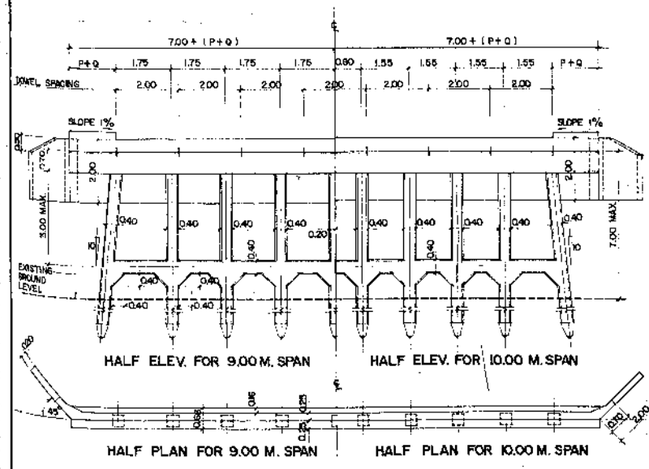


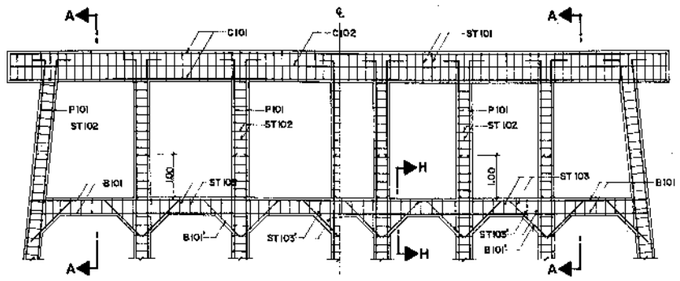
HALF PLAN FOR 5.00-6.00 M. SPAN HALF PLAN FOR 7.00-8.00 M. SPAN



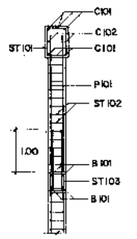
HALF ELEV. FOR 9.00 M. SPAN HALF ELEV. FOR 10.00 M. SPAN

HALF PLAN FOR 9.00 M. SPAN HALF PLAN FOR 10.00 M. SPAN

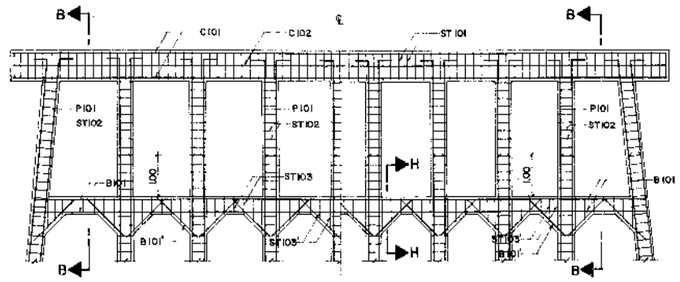
ABUTMENT DETAILS
SCALE 1:100



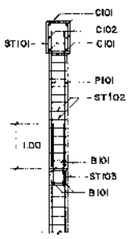
HALF ELEV. FOR 5.00-6.00 M. SPAN HALF ELEV. FOR 7.00-8.00 M. SPAN



SECTION A - A
SCALE 1:75

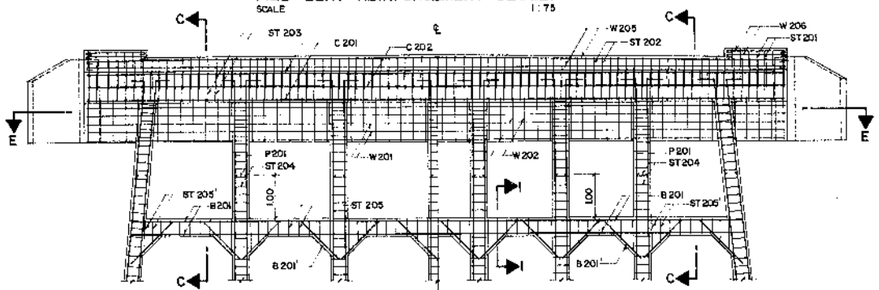


HALF ELEV. FOR 9.00 M. SPAN HALF ELEV. FOR 10.00 M. SPAN

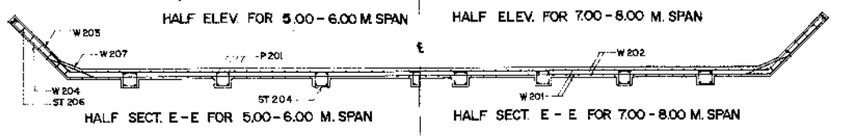


SECTION B - B
SCALE 1:75

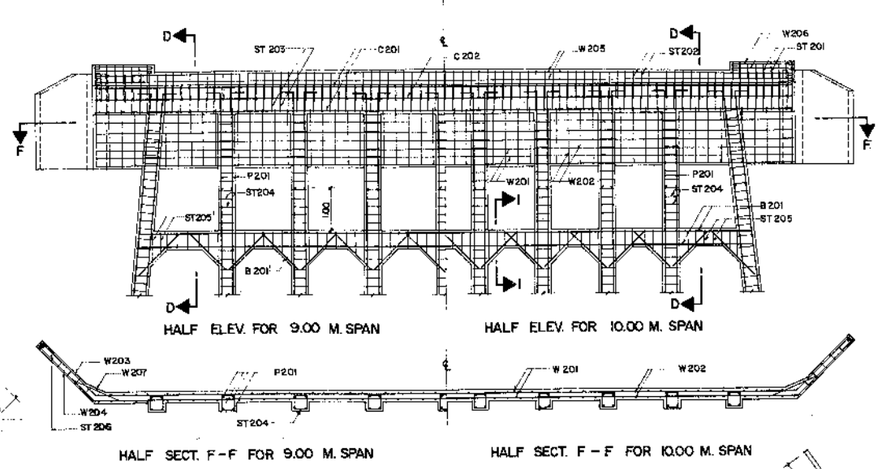
PILE BENT REINFORCEMENT DETAILS
SCALE 1:75



HALF ELEV. FOR 5.00-6.00 M. SPAN HALF ELEV. FOR 7.00-8.00 M. SPAN



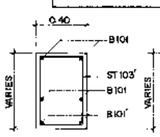
HALF SECT. E-E FOR 5.00-6.00 M. SPAN HALF SECT. E - E FOR 7.00-8.00 M. SPAN



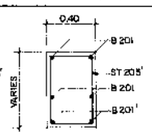
HALF ELEV. FOR 9.00 M. SPAN HALF ELEV. FOR 10.00 M. SPAN

HALF SECT. F-F FOR 9.00 M. SPAN HALF SECT. F - F FOR 10.00 M. SPAN

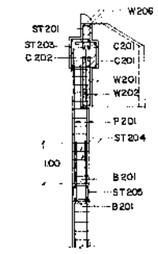
ABUTMENT REINFORCEMENT DETAILS
SCALE 1:75



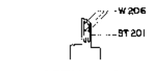
SECTION H-H
SCALE 1:25



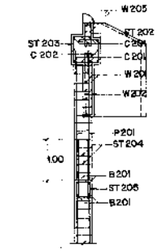
SECTION I - I
SCALE 1:25



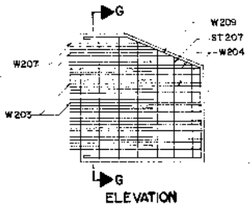
SECTION C - C
SCALE 1:75



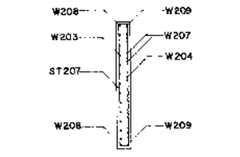
DETAIL 1



SECTION D - D
SCALE 1:75

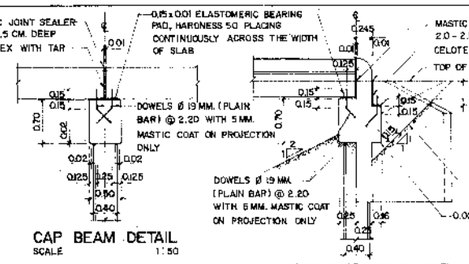


ELEVATION



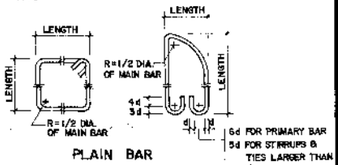
SECTION G - G

WINGWALL REINFORCEMENT DETAILS
SCALE 1:50



CAP BEAM DETAIL
SCALE 1:50

ABUTMENT HEAD DETAILS
SCALE 1:50



BAR BENDING DETAILS NOT TO SCALE

6d FOR PRIMARY BAR
3d FOR STIRRUPS & TIES LARGER THAN Ø 16 MM.
4d FOR STIRRUPS & TIES Ø16MM. OR LESS

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS		BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
			#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
PILE BENT		C101	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-
		C102	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
		ST101	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35	3	0.20	64	2.35
		ST102	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	98	1.35	3	0.20	98	1.35	3	0.20	112	1.36	3	0.20	112	1.35
		ST103	3	0.25	26	1.35	3	0.25	26	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	10	1.35	3	0.25	10	1.35
		ST 103'	3	0.25	16	-	3	0.25	16	-	3	0.25	24	-	3	0.25	24	-	3	0.25	28	-	3	0.25	32	-
		B 101	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-
		B 101'	8	-	16	1.55	8	-	16	1.55	8	-	24	1.55	8	-	24	1.55	8	-	28	1.55	8	-	32	1.55
		P101	8	-	20	3.75	8	-	20	3.75	8	-	28	3.75	8	-	28	3.75	8	-	32	3.75	8	-	36	3.75
ABUTMENT		C 201	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
		C 202	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
		ST 201	2	0.20	14	1.215	2	0.20	14	1.295	2	0.20	14	1.355	2	0.20	14	1.435	2	0.20	14	1.515	2	0.20	14	1.635
		ST 202	3	0.20	70	1.745	3	0.20	70	1.795	3	0.20	70	1.645	3	0.20	70	1.895	3	0.20	70	1.945	3	0.20	70	1.995
		ST 203	3	0.20	70	-	3	0.20	70	-	3	0.20	70	-	3	0.20	70	-	3	0.20	70	-	3	0.20	70	-
		ST 204	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	98	1.35	3	0.20	98	1.39	3	0.20	112	1.35	3	0.20	126	1.35
		ST 205	3	0.25	26	1.35	3	0.25	26	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	10	1.35	3	0.25	10	1.35
		ST 205'	3	0.25	16	-	3	0.25	16	-	3	0.25	24	-	3	0.25	24	-	3	0.25	28	-	3	0.25	32	-
		ST 206	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-	3	0.30	12	-
		B 201	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-	8	-	4	-
		B 201'	8	-	16	1.55	8	-	16	1.55	8	-	24	1.55	8	-	24	1.55	8	-	28	1.55	8	-	32	1.55
		P 201	8	-	20	3.75	8	-	20	3.75	8	-	24	3.75	8	-	24	3.75	8	-	32	3.75	8	-	36	3.75
		W 201	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-	4	0.20	10	-
		W 202	2	0.30	47	2.70	2	0.30	47	2.80	2	0.30	47	2.80	2	0.30	47	2.80	2	0.30	47	2.40	2	0.30	46	2.50
		W 203	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-	4	0.15	24	-
		W 204	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-	2	0.30	12	-
		W 205	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-
		W 206	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-	2	-	6	-
		W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
		W 208	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435	4	-	2	5.435
		W 209	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535	2	-	2	5.535

#2 = Ø 1/4" OR 6 MM., #3 = Ø 3/8" OR 9 MM., #4 = Ø 1/2" OR 12 MM., #8 = Ø 1" OR 25 MM.; NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

NOTES :

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT EFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS. FOR PILE DETAILS SEE DWG. NO. MS-02 , MS-03 .
2. HORIZONTAL CROSS BRACING BETWEEN COLUMN SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCE
   a) IF THE DISTANCE FROM EXISTING CANAL BED TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE CANAL BED EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM^2 FOR A 0.15x0.15x0.15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS A FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MAX	10	CM.

5. REBARS #4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFORMING TO TIS. 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
10. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
12. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3A05-106-14/11.

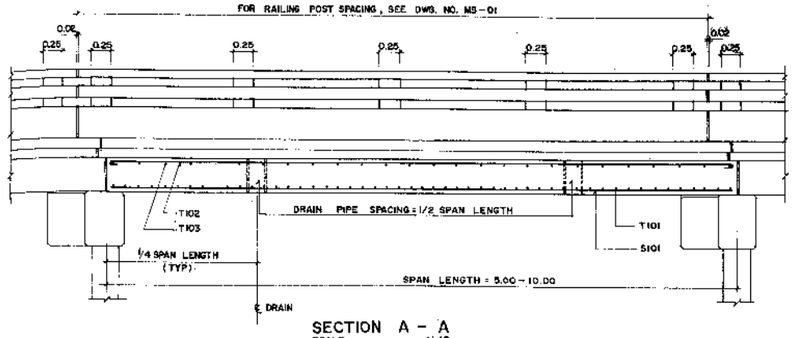
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

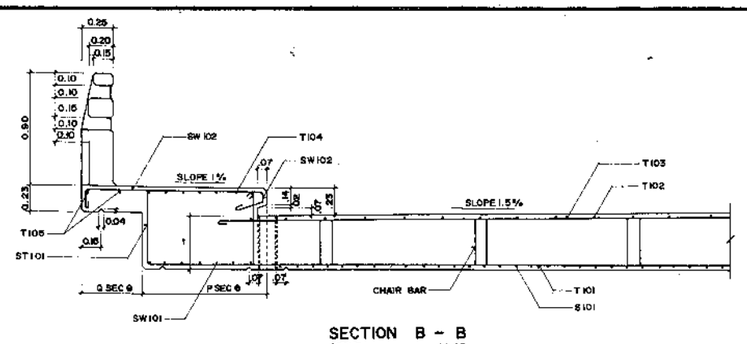
14.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

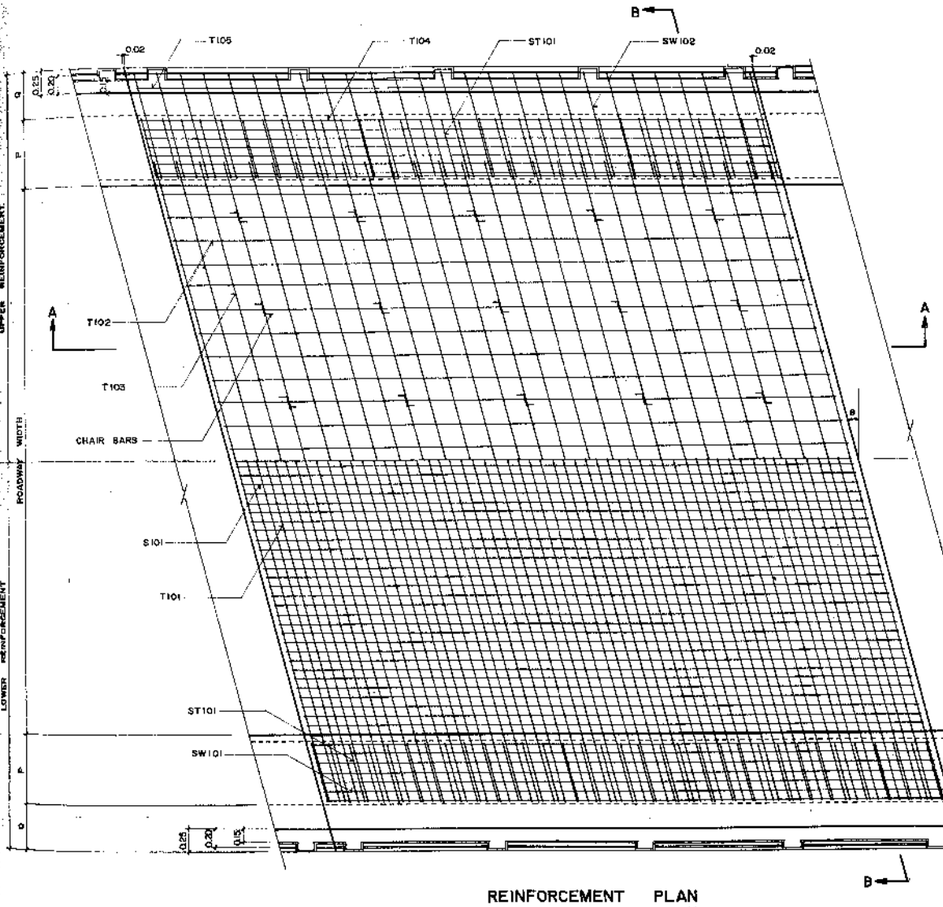
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : For (DIRECTOR GENERAL)		DWG. NO. ST-26
		SHEET NO. 138



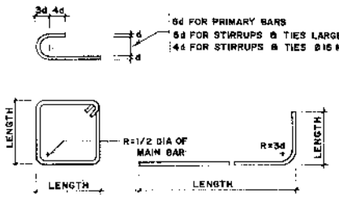
SECTION A - A
SCALE 1:40



SECTION B - B
SCALE 1:25

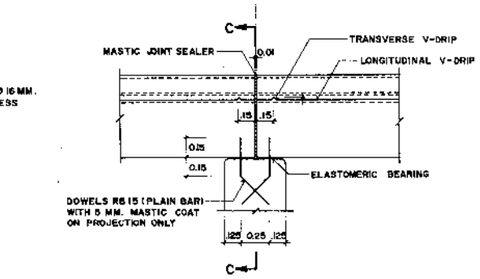


REINFORCEMENT PLAN
SCALE 1:40

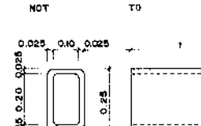


PLAIN BAR DEFORMED BAR

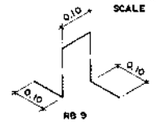
BAR BENDING DIAGRAMS
NOT TO SCALE



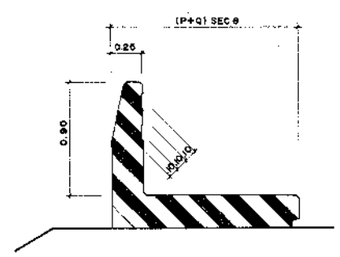
EXPANSION JOINT DETAILS
SCALE 1:25



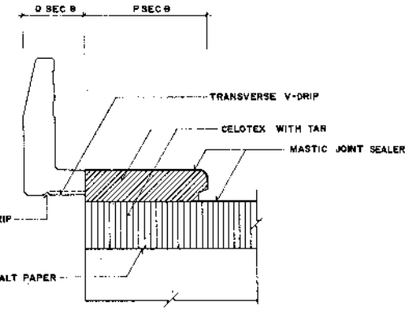
PRECAST MORTAR DRAIN PIPE
SCALE 1:12.5



CHAIR BAR



PAINTING AT BRIDGE END
SCALE 1:25



SECTION C - C
SCALE 1:25

NOTES :

1. DESIGN STRESSES :
   a) CONCRETE, fc = 70 KSC.
   b) STEEL , fc = 1,400 KSC. (DEFORMED BARS) .
   fs = 1,200 KSC. (PLAIN ROUND BARS)
2. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg/M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg/CM^2 FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15- TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.43	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MAX.	10	CM.

3. CLEAR CONCRETE COVER FOR TOP REINFORCEMENT IN SLAB BRIDGE SHALL BE 3.5 CM. ELSEWHERE OF SLAB BRIDGE AND SIDEWALK POSTS AND RAILING SHALL BE 2.5 CM.
4. ALL CONCRETE EXPOSED CORNERS SHALL HAVE A 2 CM. CHAMFER UNLESS OTHERWISE INDICATED.
5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS20 GRADE SR24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMMING TIS 15 SHALL BE USED AND, WITH THE EXCEPTION OF COLUMNS AND BRACING, ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. ALL MATERIALS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER.
10. PAINTING SHALL BE PROVIDED ON ALL SURFACES AT BRIDGE ENDS WHICH ARE EXPOSED TO TRAFFIC. WHITE AND BLACK COLOURS SHALL BE PAINTED ALTERNATELY ; WHITE COLOUR SHALL BE LIGHT REFLECTED TYPE.
11. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
12. BAR MARK S101 MAY BE TAKEN OUT ONE BAR ON EACH SIDE OF THE BRIDGE WHEREVER THEY PASS THROUGH DRAIN PIPES. IF THE LOCATIONS OF THESE BARS ARE NEAR V-DRIP SUCH THAT CONCRETE COVER IS NOT ADEQUATE, THEY SHALL BE PLACED ON TOP OF ST101. OTHER BARS WHICH PASS THROUGH DRAIN PIPES SHALL BE BENT ALONG THE PIPES.
13. THE SKEW ANGLE (θ) IS THE ANGLE IN DEGREES BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY.
14. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3805 - 106 - M/1A.

TABLE OF SLAB THICKNESS

SPAN	5.00	6.00	7.00	8.00	9.00	10.00
SLAB THICKNESS, t	0.32	0.36	0.39	0.43	0.47	0.53

TABLE OF SEC θ

θ DEGREE	0	5	10	15	20	25	30
SEC θ	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547

TABLE OF SIDEWALK AND EDGE BEAM REINFORCEMENT

WIDTH OF SIDEWALK	P	Q	R	BAR MARK	BAR BENDING DIAGRAMS	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00M.				SPAN 9.00 M.				SPAN 10.00M.				REMARK
						#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	
0.50	0.50	-	0.50	SW101	VARIES	8	-	6	4.95	8	-	6	5.95	8	-	8	6.95	8	-	8	7.95	8	-	10	8.95	8	-	12	9.95	NO = TOTAL AMOUNT OF BARS L = TOTAL LENGTH OF EACH BAR #4 = Ø 1/2" OR 12 MM. #8 = Ø 1" OR 25 MM.
				T104	VARIES	4	-	6	4.95	4	-	6	5.95	4	-	8	6.95	4	-	8	7.95	4	-	10	8.95	4	-	12	8.95	
				T105	———	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.00	0.50	0.50	0.50	SW101	VARIES	8	-	6	4.95	8	-	8	5.95	8	-	10	6.95	8	-	12	7.95	8	-	14	8.95	8	-	16	9.95	
				T104	VARIES	4	-	6	4.95	4	-	8	5.95	4	-	10	6.95	4	-	12	7.95	4	-	12	8.95	4	-	12	9.95	
				T105	VARIES	4	-	6	4.95	4	-	8	5.95	4	-	8	6.95	4	-	8	7.95	4	-	8	8.95	4	-	8	9.95	
1.50	1.00	0.50	1.00	SW101	VARIES	8	-	8	4.95	8	-	10	5.95	8	-	12	6.95	8	-	16	7.95	8	-	18	8.95	8	-	20	9.95	
				T104	VARIES	4	-	8	4.95	4	-	10	5.95	4	-	12	6.95	4	-	12	7.95	4	-	12	8.95	4	-	12	9.95	
				T105	VARIES	4	-	6	4.95	4	-	6	5.95	4	-	8	6.95	4	-	8	7.95	4	-	8	8.95	4	-	8	9.95	

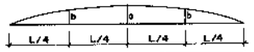
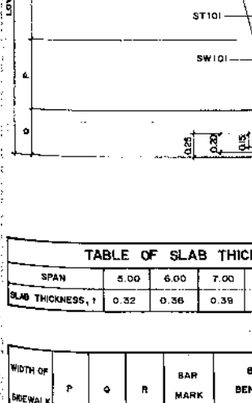


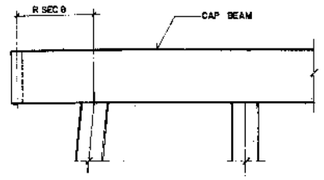
TABLE OF DEAD LOAD CAMBER

SPAN	CAMBER	
	a	b
5.00	0.0022	0.0016
6.00	0.0034	0.0025
7.00	0.0054	0.0040
8.00	0.0076	0.0054
9.00	0.0103	0.0074
10.00	0.0122	0.0086

TABLE OF SLAB REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.				REMARK
		#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	
	S101	8	0.15	4	4.95	8	0.15	-	5.95	8	0.13	-	6.95	8	0.12	-	7.95	8	0.10	-	8.95	8	0.09	-	9.95	NO. = TOTAL AMOUNT OF BARS L = TOTAL LENGTH OF EACH BAR
	ST101	3	0.25	42	-	3	0.25	50	-	3	0.25	58	-	3	0.25	66	-	3	0.25	74	-	3	0.25	82	-	
	SW102	4	0.20	51	-	4	0.20	63	-	4	0.20	72	-	4	0.20	81	-	4	0.20	93	-	4	0.20	102	-	
	T101	4	0.15	34	-	4	0.15	41	-	4	0.14	51	-	4	0.14	58	-	4	0.13	70	-	4	0.11	92	-	
	T102	3	0.30	-	5.10	3	0.30	-	6.10	3	0.30	-	7.10	3	0.30	-	8.10	3	0.30	-	9.10	3	0.30	-	10.10	
	T103	3	0.30	17	-	3	0.30	21	-	3	0.30	24	-	3	0.30	27	-	3	0.30	31	-	3	0.30	34	-	

3 = #3/8" OR 9 MM. , # 4 = Ø 1/2" OR 12 MM. , # 8 = Ø 1" OR 25 MM.



OVERHANGING CAP BEAM DETAIL
NOT TO SCALE

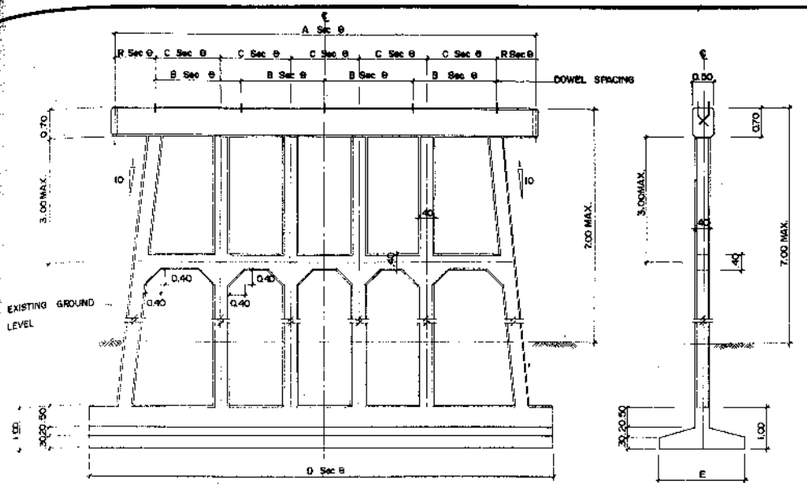
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

0° - 30° SKEW RC. SLAB BRIDGE

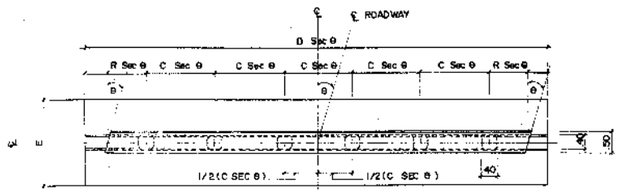
BRIDGE REINF., PLAN., SECTIONS AND DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-26
		SHEET NO. 139



TRANSVERSE ELEVATION

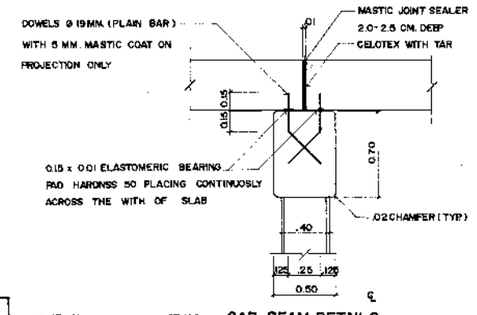
LONGITUDINAL ELEVATION



PLAN

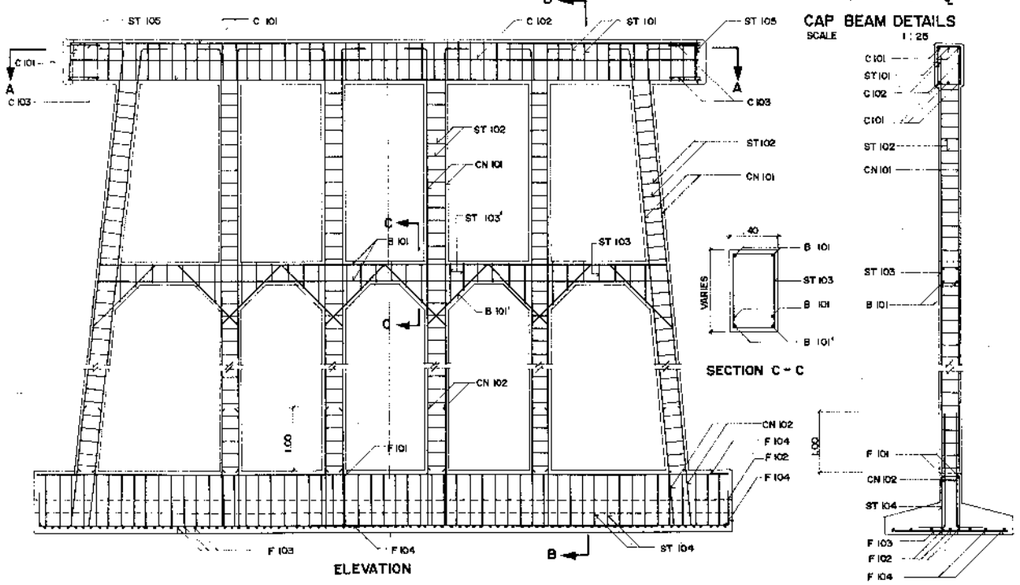
PIER DETAILS

SCALE 1:75



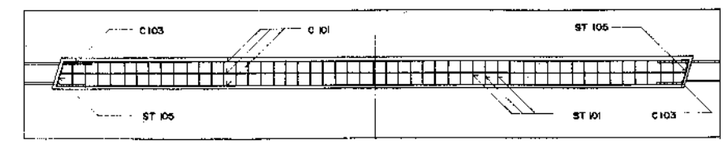
CAP BEAM DETAILS

SCALE 1:25



ELEVATION

SECTION B - B

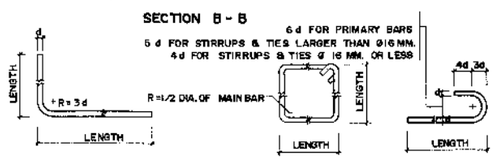


SECTION A - A

REINFORCEMENT DETAILS

SCALE 1:50

SECTION C - C



DEFORMED BAR PLAIN BAR

BAR BENDING DETAILS

NOT TO SCALE

TABLE OF Sec θ

θ, DEGREE	0	5	10	15	20	25	30
SEC θ	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547

TABLE OF PIER DIMENSIONS

ROADWAY WIDTH M.	LENGTH OF CAP BEAM A Sec θ M.	DOWEL SPACING B Sec θ M.	SPAN 6.00 M. COL. SPG. C Sec θ M.	SPAN 6.00 M. NO. OF COLUMN	SPAN 6.00 M. COL. SPG. C Sec θ M.	SPAN 7.00 M. NO. OF COLUMN	SPAN 7.00 M. COL. SPG. C Sec θ M.	SPAN 8.00 M. NO. OF COLUMN	SPAN 8.00 M. COL. SPG. C Sec θ M.	SPAN 9.00 M. NO. OF COLUMN	SPAN 9.00 M. COL. SPG. C Sec θ M.	SPAN 10.00 M. NO. OF COLUMN	SPAN 10.00 M. COL. SPG. C Sec θ M.
6.00	(6.0 + 2R) Sec θ	2.00 Sec θ	2.00 Sec θ	4	2.00 Sec θ	4	1.50 Sec θ	5	1.50 Sec θ	5	1.20 Sec θ	6	1.20 Sec θ	6
7.00	(7.0 + 2R) Sec θ	1.75 Sec θ	2.30 Sec θ & 2.40 Sec θ	4	2.30 Sec θ & 2.40 Sec θ	4	1.75 Sec θ	5	1.75 Sec θ	5	1.40 Sec θ	6	1.40 Sec θ	6
8.00	(8.0 + 2R) Sec θ	2.00 Sec θ	2.65 Sec θ & 2.70 Sec θ	4	2.65 Sec θ & 2.70 Sec θ	4	2.00 Sec θ	5	2.00 Sec θ	5	1.60 Sec θ	6	1.60 Sec θ	6
9.00	(9.0 + 2R) Sec θ	1.80 Sec θ	3.00 Sec θ	4	3.00 Sec θ	4	2.25 Sec θ	5	2.25 Sec θ	5	1.50 Sec θ	7	1.50 Sec θ	7
10.00	(10.0 + 2R) Sec θ	2.00 Sec θ	2.50 Sec θ	5	2.50 Sec θ	5	2.00 Sec θ	6	2.00 Sec θ	6	1.40 Sec θ	8	1.40 Sec θ	8
11.00	(11.0 + 2R) Sec θ	2.20 Sec θ	2.75 Sec θ	5	2.75 Sec θ	5	1.80 Sec θ & 1.85 Sec θ	7	1.80 Sec θ & 1.85 Sec θ	7	1.50 Sec θ & 1.60 Sec θ	8	1.30 Sec θ & 1.40 Sec θ	9
12.00	(12.0 + 2R) Sec θ	2.00 Sec θ	2.40 Sec θ	6	2.40 Sec θ	6	2.00 Sec θ	7	2.00 Sec θ	7	1.70 Sec θ & 1.80 Sec θ	8	1.50 Sec θ	9
13.00	(13.0 + 2R) Sec θ	1.95 Sec θ & 1.80 Sec θ	2.60 Sec θ	6	2.60 Sec θ	6	1.85 Sec θ & 1.90 Sec θ	8	1.85 Sec θ & 1.90 Sec θ	8	1.55 Sec θ & 1.65 Sec θ	9	1.40 Sec θ & 1.45 Sec θ	10
14.00	(14.0 + 2R) Sec θ	2.00 Sec θ	2.30 Sec θ & 2.40 Sec θ	7	2.30 Sec θ & 2.40 Sec θ	7	2.00 Sec θ	8	2.00 Sec θ	8	1.75 Sec θ	9	1.55 Sec θ & 1.60 Sec θ	10

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
VARIES	C 101	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-
VARIES	C 102	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
0.50 / 0.50 / 0.35	C 103	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-
10.85 / 0.40 / 1.91	CN 101	8	-	-	11.25	8	-	-	11.25	8	-	-	11.25	8	-	-	11.25	8	-	-	11.25	8	-	-	11.25
	CN 102	8	-	-	2.31	8	-	-	2.31	8	-	-	2.31	8	-	-	2.31	8	-	-	2.31	8	-	-	2.31
0.65 / 0.075 0.075 / 0.45	ST 101	3	0.20	-	2.35	3	0.20	-	2.35	3	0.20	-	2.35	3	0.20	-	2.35	3	0.20	-	2.35	3	0.20	-	2.35
0.30 / 0.075 0.075 / 0.30 / 0.30	ST 102	3	0.20	-	1.35	3	0.20	-	1.35	3	0.20	-	1.35	3	0.20	-	1.35	3	0.20	-	1.35	3	0.20	-	1.35
0.30 / 0.075 0.075 / 0.90	ST 103	3	0.25	-	1.35	3	0.25	-	1.35	3	0.25	-	1.35	3	0.25	-	1.35	3	0.25	-	1.35	3	0.25	-	1.35
	ST 103'	3	-	-	-	3	-	-		3	-	-	-	3	-	-	-	3	-	-	-	3	-	-	-
0.25 / 0.075 0.075 / 0.85	ST 104	3	0.20	-	2.55	3	0.20	-	2.55	3	0.20	-	2.55	3	0.20	-	2.55	3	0.20	-	2.55	3	0.20	-	2.55
VARIES	ST 105	3	-	2	1.95	3	-	2	1.95	3	-	2	1.95	3	-	2	1.95	3	-	2	1.95	3	-	2	1.95
VARIES	B 101	8	-	8	-	8	-	8	-	8	-	6	-	8	-	8	-	8	-	8	-	8	-	8	-
VARIES	B 101'	6	-	-	1.55	6	-	-	1.55	6	-	-	1.55	6	-	-	1.55	6	-	-	1.55	6	-	-	1.55
VARIES	F 101	8	-	3	-	8	-	3	-	8	-	3	-	8	-	3	-	8	-	3	-	8	-	3	-
0.60 / VARIES / 0.60	F 102	8	-	3	-	8	-	3	-	8	-	3	-	8	-	3	-	8	-	3	-	8	-	3	-
VARIES	F 103	4	0.25	-	1.65	4	0.25	-	1.65	4	0.20	-	1.75	4	0.20	-	1.75	4	0.25	-	1.95	4	0.25	-	1.95
VARIES	F 104	4	-	6	-	4	-	6	-	4	-	6	-	4	-	6	-	4	-	6	-	4	-	6	-

3 = Ø 3/8" OR 9 MM. # 4 = Ø 1/2" OR 12 MM. # 8 = Ø 1 OR 25 MM. NO. = TOTAL AMOUNT OF BARS L = TOTAL LENGTH OF EACH BAR

TABLE OF FOOTING DIMENSIONS

ROADWAY WIDTH M.	LENGTH OF FOOTING D Sec θ, M	WIDTH OF FOOTING, E SPAN 5.00 - 6.00 M.	SPAN 7.00 - 8.00 M.	SPAN 9.00 - 10.00 M.
6.00	8.80 Sec θ	1.60	1.80	2.00
7.00	9.80 Sec θ	1.80	1.80	2.00
8.00	10.80 Sec θ	1.80	1.80	2.00
9.00	11.80 Sec θ	1.80	1.80	2.00
10.00	12.80 Sec θ	1.80	1.80	2.00
11.00	13.80 Sec θ	1.60	1.80	2.00
12.00	14.80 Sec θ	1.80	1.80	2.00
13.00	15.80 Sec θ	1.60	1.80	2.00
14.00	16.80 Sec θ	1.60	1.80	2.00

NOTES

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITION OF LEAN CONCRETE SHALL BE 1: 3: 6 - BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES:
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M. AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M. ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg/m^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg/Cm^2 FOR A .15 x .15 x 15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS:
   PORTLAND CEMET 350 Kg.
   SAND 0.45 m^3
   CRUSHED ROCK OR GRAVEL 0.86 m^3
   CONCRETE SLUMP MIX 10 Cm.
6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
11. THE SKEW ANGLE (θ) IS THE ANGLE IN DEGREES BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY
12. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M.
13. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
14. THIS DRAWING MAY BE USED IN COMBINATION WITH ONE OF THE FOLLOWING DRAWINGS BELOW WHICHEVER IS APPLICABLE.
    DWG. NOS. ST-02, ST-05, ST-06
15. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3805-108-14/2.

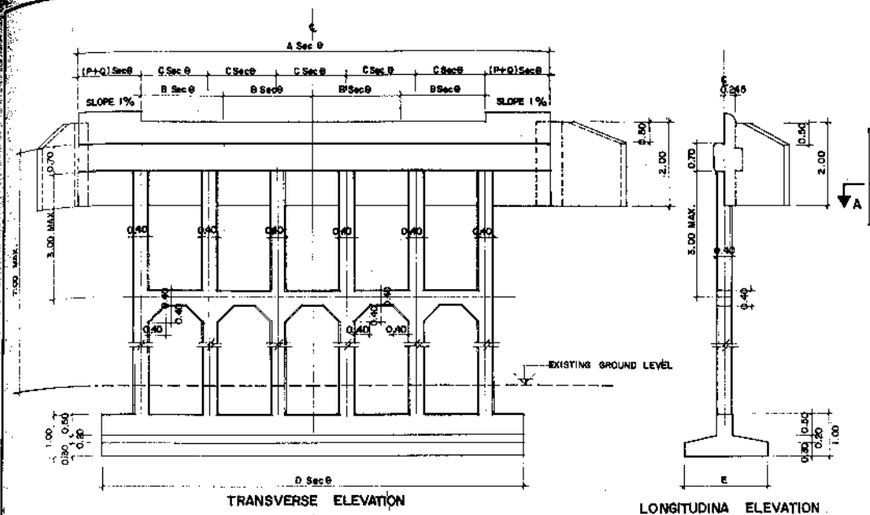
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

0° - 30° SKEW R.C. SLAB BRIDGE

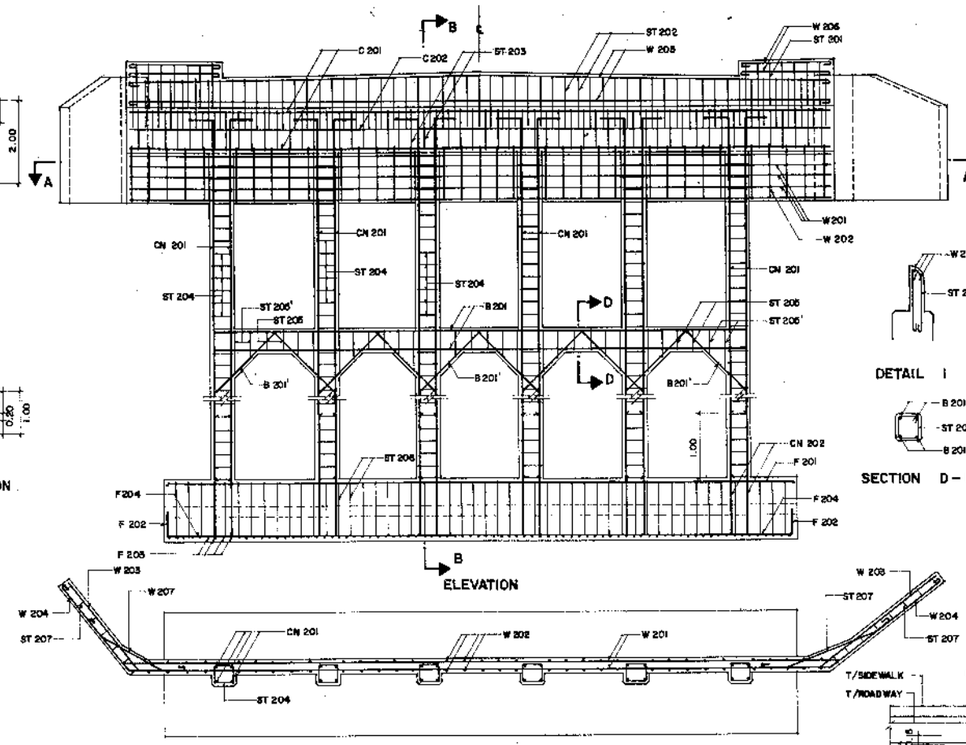
SPREAD FOOTING PIER DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-27
		SHEET NO. 140

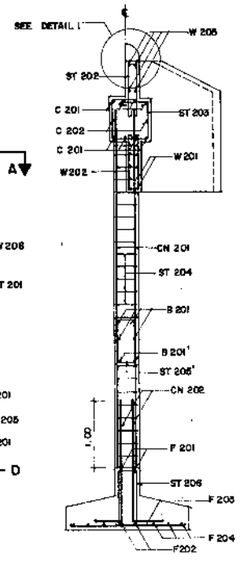


TRANSVERSE ELEVATION

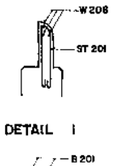
LONGITUDINA ELEVATION



ELEVATION

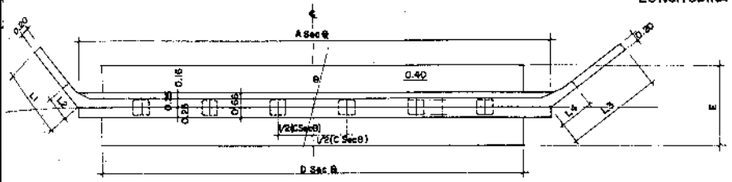


SECTION B – B



DETAIL I

SECTION D – D



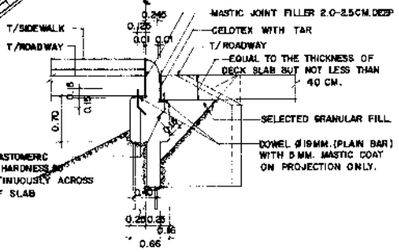
PLAN

ABUTMENT DETAILS

SECTION A – A

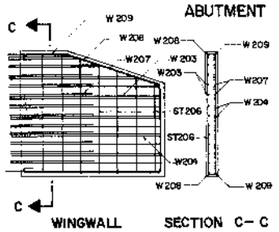
REINFORCEMENT DETAILS

SCALE 1:50



ABUTMENT HEAD DETAILS

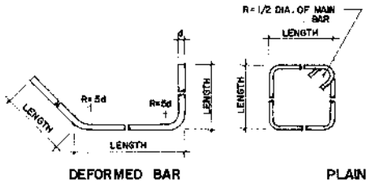
SCALE 1:50



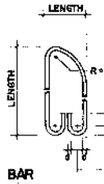
WINGWALL SECTION C – C

REINFORCEMENT DETAILS

SCALE 1:50



DEFORMED BAR

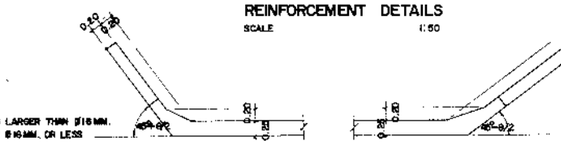


PLAIN BAR

BAR BENDING DETAILS

NOT TO SCALE

6d FOR PRIMARY BARS.
5d FOR STIRRUPS & TIES LARGER THAN Ø16MM.
4d FOR STIRRUPS & TIES Ø16MM. OR LESS



WINGWALL DETAILS

SCALE 1:50

NOTES:

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PERPARED, 10 CM THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON / M^2.
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES:
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M. AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 CM. ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHEREA CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg/CM^2 FOR A 15X15X15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMAT MIX DESIGN PER CUBIC METER IS AS FOLLOWS:

PORTLAND CEMENT	350	Kg.
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MIX.	10	C.M.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE 50, 30 DEFORMED BARS OTHERS SHALL BE TIS. 20 GRAD SR 24 PLAIN BARS UNLESS OTHERS SHALL BE TIS. 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OR REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OR SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USES AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS H GHER THAN 7.00 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. THE SKEW ANGLE (θ) IS THE ANGLE IN DEGREES BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY
12. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
13. ALL DIMENSIONS SHOWN ARE IN METER UNLESS OTHERWISE INDICATED.
14. THIS DRAWING MAY BE USED IN COMBINATION WITH ONE OF THE FOLLOWING DRAWINGS BELOW WHICHEVER IS APPLICABLE:
    DWG. NOS. ST-03, ST-06, ST-09, ST-12, ST-15, ST-18, ST-21, ST-24.
15. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3305-106-14/24.

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
	C 201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	C 202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST 201	2	.20	–	1.215	2	.20	–	1.295	2	.20	–	1.355	2	.20	–	1.435	2	.20	–	1.515	2	.20	–	1.635
	ST 202	3	.20	–	1.745	3	.20	–	1.795	3	.20	–	1.845	3	.20	–	1.895	3	.20	–	1.945	3	.20	–	1.995
	ST 203	3	.20	–	3.155	3	.20	–	3.195	3	.20	–	3.225	3	.20	–	3.265	3	.20	–	3.265	3	.20	–	3.365
	ST 204	3	.20	–	1.35	3	.20	–	1.35	3	.20	–	1.35	3	.20	–	1.35	3	.20	–	1.35	3	.20	–	1.35
	ST 205	3	.20	–	1.35	3	.25	–	1.35	3	.25	–	1.35	3	.25	–	1.35	3	.25	–	1.35	3	.25	–	1.35
	ST 205'	3	–	–	–	3	–	–	–	3	–	–	–	3	–	–	–	3	–	–	–	3	–	–	–
	ST 206	3	.20	–	2.55	3	.20	–	–	3	.20	–	–	3	.20	–	2.59	3	.20	–	2.55	3	.20	–	2.55
	ST 207	2	.30	–	–	2	.30	–	–	2	.30	–	–	2	.30	–	–	2	.30	–	–	2	.30	–	–
	B 201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	B 201'	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55
	CN 201	8	–	–	9.25	8	–	–	9.25	8	–	–	9.25	8	–	–	9.25	8	–	–	9.25	8	–	–	9.25
	CN 202	8	–	–	2.31	8	–	–	2.31	8	–	–	2.31	8	–	–	2.31	8	–	–	2.31	8	–	–	2.31
	F 201	8	–	2	–	8	–	2	–	8	–	2	–	8	–	2	–	8	–	2	–	8	–	2	–
	F 202	8	–	2	–	8	–	2	–	8	–	2	–	8	–	2	–	8	–	2	–	8	–	2	–
	F 203	4	.25	–	1.55	4	.25	–	1.55	4	.20	–	1.75	4	.20	–	1.75	4	.125	–	1.95	4	.125	–	1.95
	F 204	4	–	6	–	4	–	6	–	4	–	6	–	4	–	6	–	4	–	6	–	4	–	6	–
	W 201	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–	4	.20	10	–
	W 202	2	.30	–	2.70	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.60	2	.30	–	2.30
	W 203	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	25	–
	W 204	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	12	–	2	.30	–	–
	W 205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
	W206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
	W207	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15
	W208	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	W209	2	–	2	–	2	–	2	–	2	–	2	–	2	–	2	–	2	–	2	–	2	–	2	–

= 2 × Ø 1/4" OR 6 MM., # 3 × Ø 3/8" OR 9 MM., # 4 × Ø 1/2" OR 12 MM., # 8 × Ø 1" OR 25 MM. NO = TOTAL L = TOTAL AMOUNT OF BARS LENGTH OF EACH BARS

TABLE OF ABUTMENT DIMENSIONS

ROADWAY WIDTH M.	LENGTH OF ABUTMENT HEAD A Sec θ M.	DOWEL SPACING B Sec θ M.	SPAN 5.00 M. COL. SPC. C Sec θ M.	SPAN 5.00 M. NO. OF COL.	SPAN 6.00 M. COL. SPC. C Sec θ M.	SPAN 6.00 M. NO. OF COL.	SPAN 7.00 M. COL. SPC. C Sec θ M.	SPAN 7.00 M. NO. OF COL.	SPAN 8.00 M. COL. SPC. C Sec θ M.	SPAN 8.00 M. NO. OF COL.	SPAN 9.00 M. COL. SPC. C Sec θ M.	SPAN 9.00 M. NO. OF COL.	SPAN 10.00 M. COL. SPC. C Sec θ M.	SPAN 10.00 M. NO. OF COL.
6.00	(6.0+2(P+Q)) Sec θ	2.00 Sec θ	2.00 Sec θ	4	2.00 Sec θ	4	1.50 Sec θ	5	1.50 Sec θ	5	1.20 Sec θ	6	1.20 Sec θ	6
7.00	(7.0+2(P+Q)) Sec θ	1.75 Sec θ	2.30 Sec θ & 2.40 Sec θ	4	2.30 Sec θ & 2.40 Sec θ	4	1.75 Sec θ	5	1.75 Sec θ	5	1.40 Sec θ	6	1.40 Sec θ	6
8.00	(8.0+2(P+Q)) Sec θ	2.00 Sec θ	2.65 Sec θ & 2.70 Sec θ	4	2.65 Sec θ & 2.70 Sec θ	4	2.00 Sec θ	5	2.00 Sec θ	5	1.60 Sec θ	6	1.60 Sec θ	6
9.00	(9.0+2(P+Q)) Sec θ	1.80 Sec θ	3.00 Sec θ	4	3.00 Sec θ	4	2.25 Sec θ	5	2.25 Sec θ	5	1.50 Sec θ	7	1.50 Sec θ	7
10.00	(10.0+2(P+Q)) Sec θ	2.00 Sec θ	2.50 Sec θ	5	2.50 Sec θ	5	2.00 Sec θ	6	2.00 Sec θ	6	1.40 Sec θ	8	1.40 Sec θ	8
11.00	(11.0+2(P+Q)) Sec θ	2.20 Sec θ	2.75 Sec θ	5	2.75 Sec θ	5	1.80 Sec θ & 1.85 Sec θ	7	1.80 Sec θ & 1.85 Sec θ	7	1.50 Sec θ & 1.60 Sec θ	8	1.30 Sec θ & 1.40 Sec θ	9
12.00	(12.0+2(P+Q)) Sec θ	2.00 Sec θ	2.40 Sec θ	6	2.40 Sec θ	6	2.00 Sec θ	7	2.00 Sec θ	7	1.70 Sec θ & 1.80 Sec θ	8	1.50 Sec θ	9
13.00	(13.042(P+Q)) Sec θ	1.85 Sec θ & 1.90 Sec θ	2.60 Sec θ	6	2.60 Sec θ	6	1.85 Sec θ & 1.90 Sec θ	8	1.80 Sec θ & 1.90 Sec θ	8	1.55 Sec θ & 1.65 Sec θ	9	1.40 Sec θ & 1.45 Sec θ	10
14.00	(14.0 (2P+Q)) Sec θ	2.00 Sec θ	2.30 Sec θ & 2.40 Sec θ	7	2.30 Sec θ & 2.40 Sec θ	7	2.00 Sec θ	8	2.00 Sec θ	8	1.75 Sec θ	9	1.55 Sec θ & 1.60 Sec θ	10

TABLE OF FOOTING DIMENSIONS

ROADWAY WIDTH M	LENGTH OF FOOTING D Sec θ, M.	WIDTH OF FOOTING, E SPAN 5.00 – 6.00 M.	SPAN 7.00 – 8.00 M.	SPAN 9.00 – 10.00 M.
6.00	7.80 Sec θ	1.60	1.80	2.00
7.00	8.80 Sec θ	1.80	1.80	2.00
8.00	9.80 Sec θ	1.60	1.80	2.00
9.00	10.80 Sec θ	1.60	1.80	2.00
10.00	11.80 Sec θ	1.80	1.80	2.00
10.00	12.80 Sec θ	1.60	1.80	2.00
11.00	13.80 Sec θ	1.60	1.80	2.00
13.00	14.80 Sec θ	1.60	1.80	2.00
14.00	15.80 Sec θ	1.80	1.80	2.00

LENGTH OF WINGWALL

L1 = 1.414 Sec (45° – θ/2) L3 = 1.414 Sec (45° + θ/2)

L2 = 0.50 Sec (45° – θ/2) L4 = 0.50 Sec (45° + θ/2)

TABLE OF Sec θ OR Sec (45° ± θ/2)

θ OR 45° ± θ/2	0	5	10	15	20	25	30	35	40	45	50	55	60
Sec θ OR Sec 45±θ/2	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547	1.2208	1.3054	1.4142	1.5557	1.7434	2.0000

KINGDOM OF THAILAND

MINISTRY OF TRANSPORT AND COMMUNICATIONS

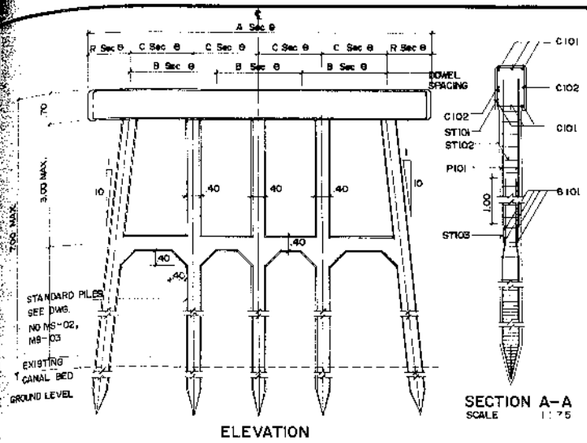
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

0°– 30° SKEW RC. SLAB BRIDGE

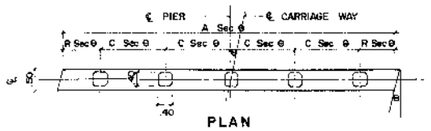
SPREAD FOOTING ABUTMENT DETAILS

DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: FOR (DIRECTOR GENERAL)		DWG. NO. ST-28
		SHEET NO. 14



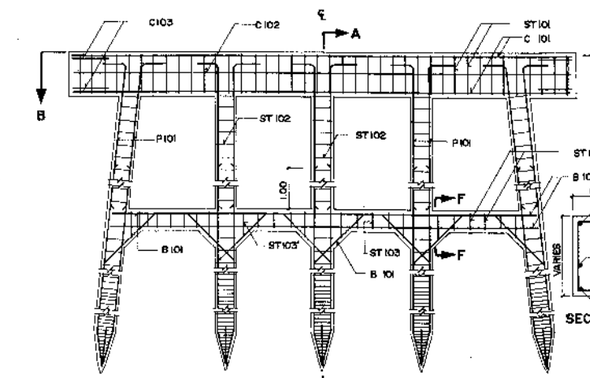
ELEVATION

SECTION A-A
SCALE 1:75

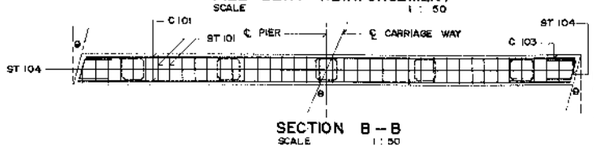


PLAN

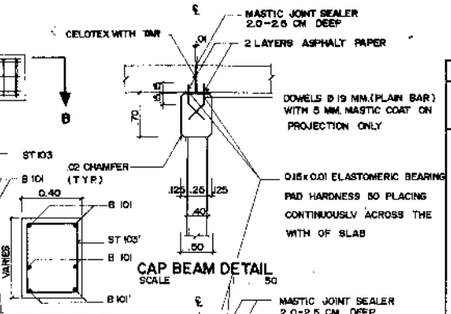
PILE BENT DETAILS
SCALE 1:75



PILE BENT REINFORCEMENT
SCALE 1:50

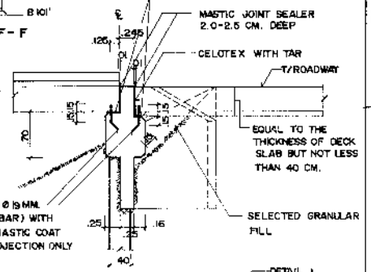


SECTION B-B
SCALE 1:50

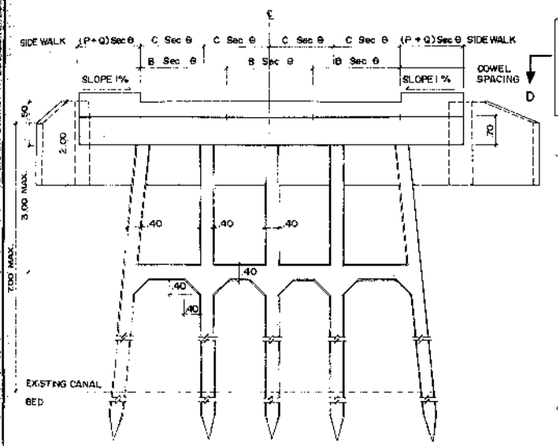


SECTION F-F

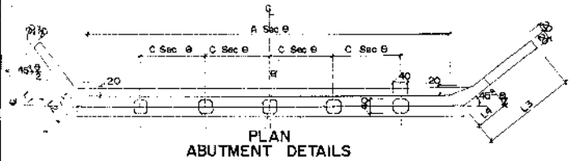
CAP BEAM DETAIL
SCALE 1:50



ABUTMENT HEAD DETAILS
SCALE 1:50

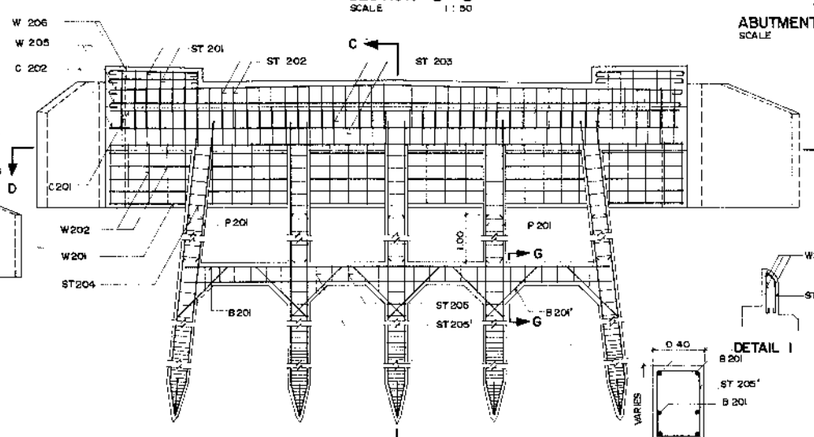


ELEVATION

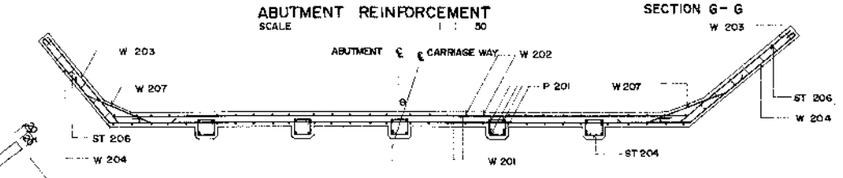


PLAN

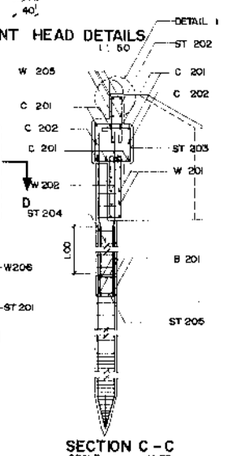
ABUTMENT DETAILS
SCALE 1:75



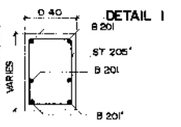
ABUTMENT REINFORCEMENT
SCALE 1:50



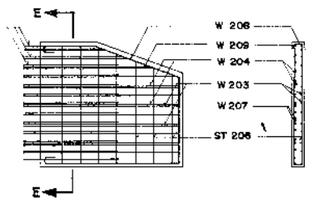
SECTION D-D
SCALE 1:50



SECTION C-C
SCALE 1:50



SECTION G-G



WINGWALL REINFORCEMENT DETAILS
SCALE 1:50

SECTION E-E
SCALE 1:50

TABLE OF REINFORCEMENT

	BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
PILE BENT	VARIES	C 101	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-
		C 102	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
		C 103	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-
		ST 101	3	.20	-	2.35	3	.20	-	2.35	3	.20	-	2.35	3	.20	-	2.35	3	.20	-	2.35	3	20	-	2.35
		ST 102	3	.20	-	1.35	3	.20	-	1.35	3	.20	-	1.35	3	.20	-	1.35	3	.20	-	1.35	3	.20	-	1.35
		ST 103	3	.25	-	1.35	3	.25	-	1.35	3	.25	-	1.35	3	.25	-	1.35	3	.25	-	1.35	3	.25	-	1.35
		ST 103'	3	.25	-	-	3	.25	-	-	3	.25	-	-	3	.25	-	-	3	.25	-	-	3	.25	-	-
		ST 104	3	-	2	2.55	3	-	2	2.55	3	-	2	2.55	3	-	2	2.55	3	-	2	2.55	3	-	2	2.55
	VARIES 1.60	B 101	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
		B 101'	6	-	-	1.60	6	-	-	1.60	6	-	-	1.60	6	-	-	1.60	6	-	-	1.60	6	-	-	1.60
	VARIES	P 101	8	-	-	3.75	8	-	-	3.75	8	-	-	3.75	-	-	-	3.75	-	-	-	3.75	-	-	-	3.75
ABUTMENT	VARIES	C 201	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
		C 202	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
		ST 201	2	.20	-	1.215	2	.20	-	1.295	2	.20	-	1.355	2	.20	-	1.435	2	.20	-	1.515	2	.20	-	1.636
		ST 202	3	.20	-	1.745	3	.20	-	1.795	3	.20	-	1.845	3	.20	-	1.895	3	.20	-	1.945	3	.20	-	1.995
		ST 203	3	.20	-	-	3	.20	-	-	3	.20	-	-	3	.20	-	-	3	.20	-	-	3	.20	-	-
		ST 204	3	.20	-	1.35	3	.20	-	1.35	3	.20	-	1.35	3	.20	-	1.35	3	.20	-	1.35	3	.20	-	1.35
		ST 205	3	.25	-	1.35	3	.25	-	1.35	3	.25	-	1.35	3	.25	-	1.35	3	.25	-	1.35	3	.25	-	1.35
		ST 205'	3	.25	-	-	3	.25	-	-	3	.25	-	-	3	.25	-	-	3	.25	-	-	3	.25	-	-
		ST 206	2	.30	-	-	2	.30	-	-	2	.30	-	-	2	.30	-	-	2	.30	-	-	2	.30	-	-
		B 201	8	-	6	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
		B 201'	6	-	-	1.55	6	-	-	1.55	6	-	-	1.55	6	-	-	1.55	6	-	-	1.55	6	-	-	1.55
		P 201	8	-	-	3.75	8	-	-	3.75	8	-	-	3.75	8	-	-	3.75	8	-	-	3.75	8	-	-	3.75
		W 201	4	.20	10	-	4	.20	10	-	4	.20	10	-	4	.20	10	-	4	.20	10	-	4	.20	10	-
		W 202	2	.30	-	2.75	2	.30	-	2.60	2	.30	-	2.60	2	.30	-	2.50	2	.30	-	2.40	2	.30	-	2.30
		W 203	4	.15	24	-	4	.15	24	-	4	.15	24	-	4	.15	24	-	4	.15	24	-	4	.15	24	-
		W 204	2	.30	12	-	2	.30	12	-	2	.30	12	-	2	.30	12	-	2	.30	12	-	2	.30	12	-
		W 205	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-
		W 206	2	-	8	-	2	-	8	-	2	-	8	-	2	-	8	-	2	-	8	-	2	-	8	-
		W 207	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15	4	.15	26	2.15
		W 208	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
		W 209	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-

2 = Ø4.44" OR 6 MM., # 3 = 3/8" OR 9 MM., # 4 = 1 1/2" OR 12 MM., # 6 = Ø3.46" OR 20 MM. NO. = TOTAL AMOUNT OF BARS L = TOTAL LENGTH OF EACH BARS

NOTES.

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT ITS CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS. FOR PILE DETAILS SEE DWG. NO. NS-02, MS-03.
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES:
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 8.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
4. CONCRETE SHALL HAVE MINIMUM CEMENT CONTENT OF 350 KG/m^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/m^2 FOR A .15 x .15 x .15 m. CUBE AT 28 DAYS.
   CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS:
   PORTLAND CEMENT 350 KG, CRUSHED ROCK GRAVEL 0.96 m^3
   SAND 0.43 m^3, CONCRETE SLUMP MAX 10 Cm
5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BAR, OTHERS SHALL BE TIS 20 GRADE SR24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETER OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS. 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
10. THE SKEW ANGLE(θ) IS THE ANGLE IN DEGREES BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY.
11. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
12. THIS DRAWING MAY BE USED IN COMBINATION WITH ONE OF THE FOLLOWING DRAWINGS BELOW WHICHEVER IS APPLICABLE: DWG. NOS. ST-07, ST-10
13. THIS DRAWING IS ADAPTED FROM DOH DWG NO. 3805-108-14/3

TABLE OF PIER AND ABUTMENT DIMENSIONS

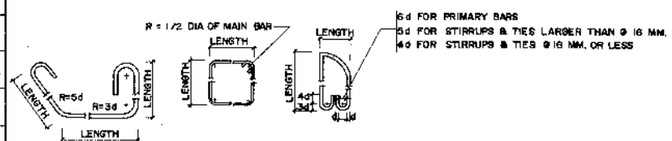
ROADWAY WIDTH M	LENGTH OF PILE BENT A Sec θ M	LENGTH OF ABUTMENT HEAD A Sec θ M	DOWEL SPACING B Sec θ M	SPAN 5.00 M COL. SPG. C Sec θ M	SPAN 5.00 M NO. OF COLUMN	SPAN 6.00 M COL. SPG. C Sec θ M	SPAN 6.00 M NO. OF COLUMN	SPAN 7.00 M COL. SPG. C Sec θ M	SPAN 7.00 M NO. OF COLUMN	SPAN 8.00 M COL. SPG. C Sec θ M	SPAN 8.00 M NO. OF COLUMN	SPAN 9.00 M COL. SPG. C Sec θ M	SPAN 9.00 M NO. OF COLUMN	SPAN 10.00 M COL. SPG. C Sec θ M	SPAN 10.00 M NO. OF COLUMN
6.00	(6.0 - 2R) Sec θ	(6.0 + 2(P+Q)) Sec θ	2.00 Sec θ	2.00 Sec θ	4	2.00 Sec θ	4	1.50 Sec θ	5	1.50 Sec θ	5	1.20 Sec θ	6	1.20 Sec θ	6
7.00	(7.0 + 2R) Sec θ	(7.0 + 2(P+Q)) Sec θ	1.75 Sec θ	2.30 Sec θ & 2.40 Sec θ	4	2.30 Sec θ & 2.40 Sec θ	4	1.75 Sec θ	5	1.75 Sec θ	5	1.40 Sec θ	6	1.40 Sec θ	6
8.00	(8.0 + 2R) Sec θ	(8.0 + 2(P+Q)) Sec θ	2.00 Sec θ	2.65 Sec θ & 2.70 Sec θ	4	2.65 Sec θ & 2.70 Sec θ	4	2.00 Sec θ	5	2.00 Sec θ	5	1.60 Sec θ	6	1.60 Sec θ	6
9.00	(9.0 + 2R) Sec θ	(9.0 + 2(P+Q)) Sec θ	1.80 Sec θ	3.00 Sec θ	4	3.00 Sec θ	4	2.25 Sec θ	5	2.25 Sec θ	5	1.50 Sec θ	7	1.50 Sec θ	7
10.00	(10.0 + 2R) Sec θ	(10.0 + 2(P+Q)) Sec θ	2.00 Sec θ	2.50 Sec θ	5	2.50 Sec θ	5	2.00 Sec θ	6	2.00 Sec θ	6	1.40 Sec θ	8	1.40 Sec θ	8
11.00	(11.0 + 2R) Sec θ	(11.0 + 2(P+Q)) Sec θ	2.20 Sec θ	2.75 Sec θ	5	2.75 Sec θ	5	1.80 Sec θ & 1.85 Sec θ	7	1.80 Sec θ & 1.85 Sec θ	7	1.50 Sec θ & 1.60 Sec θ	8	1.30 Sec θ & 1.40 Sec θ	9
12.00	(12.0 + 2R) Sec θ	(12.0 + 2(P+Q)) Sec θ	2.00 Sec θ	2.40 Sec θ	6	2.40 Sec θ	6	2.00 Sec θ	7	2.00 Sec θ	7	1.70 Sec θ & 1.80 Sec θ	8	1.50 Sec θ	9
13.00	(13.0 + 2R) Sec θ	(13.0 + 2(P+Q)) Sec θ	1.85 Sec θ & 1.90 Sec θ	2.60 Sec θ	6	2.60 Sec θ	6	1.85 Sec θ & 1.90 Sec θ	8	1.85 Sec θ & 1.90 Sec θ	8	1.55 Sec θ & 1.65 Sec θ	9	1.40 Sec θ & 1.45 Sec θ	10
14.00	(14.0 + 2R) Sec θ	(14.0 + 2(P+Q)) Sec θ	2.00 Sec θ	2.30 Sec θ & 2.40 Sec θ	7	2.30 Sec θ & 2.40 Sec θ	7	2.00 Sec θ	8	2.00 Sec θ	8	1.75 Sec θ	9	1.55 Sec θ & 1.60 Sec θ	10

LENGTH OF WINGWALL

L1 = 1.414 Sec (45° - θ/2), L3 = 1.414 Sec (45° + θ/2)
L2 = 0.50 Sec (45° - θ/2), L4 = 0.50 Sec (45° + θ/2)

TABLE OF Sec θ OR Sec (45° ± θ/2)

θ OR 45° ± θ/2 DEGREE	0	5	10	15	20	25	30	35	40	45	50	55	60
Sec θ OR Sec 45° ± θ/2	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547	1.2208	1.3064	1.4142	1.5557	1.7434	2.0000



DEFORMED BAR PLAIN BAR

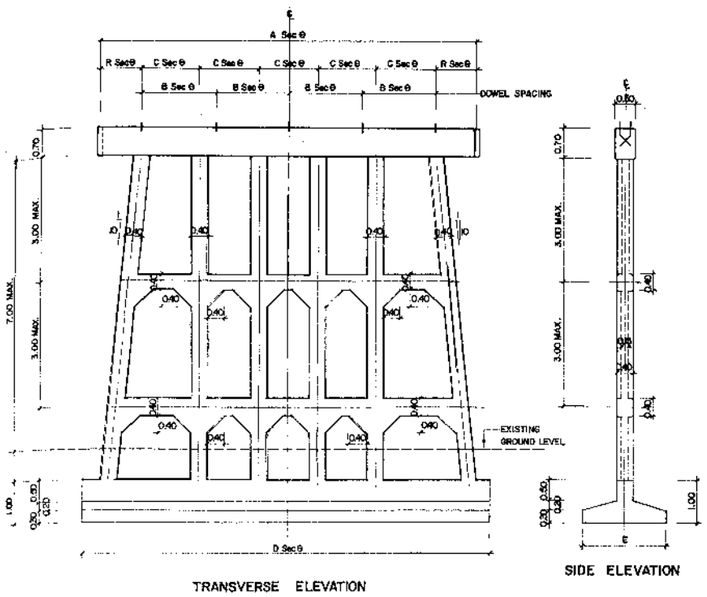
BAR BENDING DETAILS
NOT TO SCALE

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

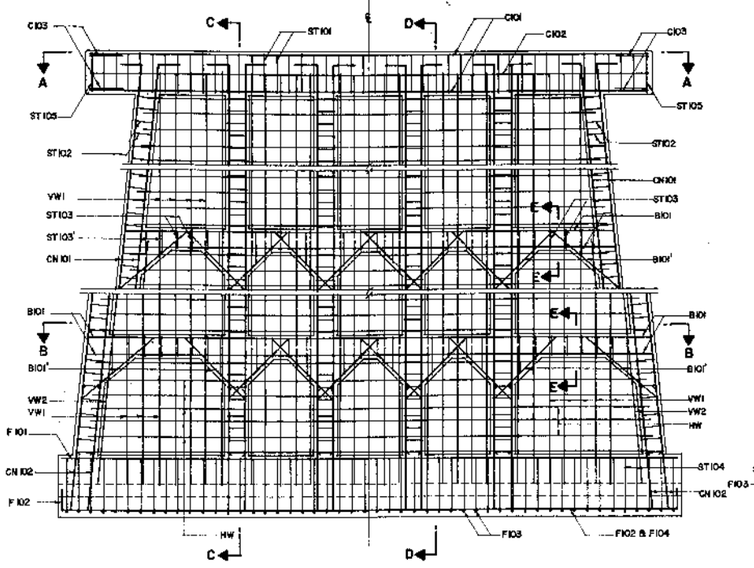
0°-30° SKEW R.C. SLAB BRIDGE
PILE BENT AND ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED : KT	DATE JULY 1994
SUBMITTED : P. Bramporn (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-29
		SHEET NO. 142

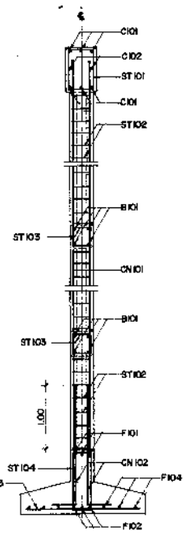


TRANSVERSE ELEVATION

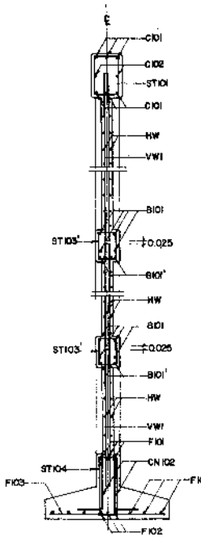
SIDE ELEVATION



ELEVATION



SECTION C - C
SCALE 1:50



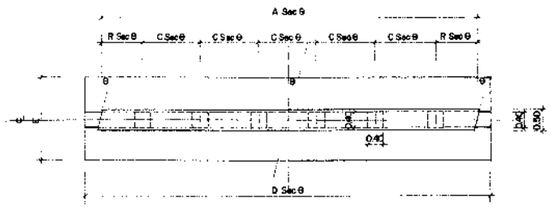
SECTION D - D
SCALE 1:50

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON / M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, AND DIAPHRAGMS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M. AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM. FOR A 0.15 0.15 0.15 M. CUBE AT 28 DAYS CEMENT SHALL BE TIS 15 TYPE 1 PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

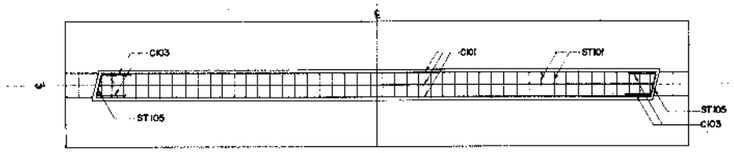
PORTLAND CEMENT	350	KG.
SAND	0.43	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MAX	10	CM.

6. REBARS ⌀ 4 OR LARGER SHALL BE TIS. 24-GRADE SD.30 DEFORMED BARS, OTHERS SHALL BE TIS. 20. GRADE SR. 24 PLAIN BARS UNLESS OTHERWISE INDICATED
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETER OF BIGGER BAR FOR DEFORMED BARS
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFROMING TO TIS. 15 SHALL BE USED AND ADDITION CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM AND DIAPHRAGMS WITHOUT ALTERING THE LOCATIONS OF REBARS
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HEIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.00 M.
12. THE SKEW ANGLE (θ) IS ANGLE IN DEGREES BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY
13. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
14. THIS DRAWING MAY BE USED IN COMBINATION WITH ONE OF THE FOLLOWING DRAWINGS BELOW WHICHEVER IS APPLICABLE DWG. NO. ST-02, ST-05 , ST-08
15. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 38D-106-14/4

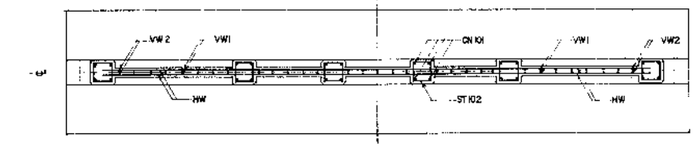


PLAN

PIER DETAILS
SCALE 1:75

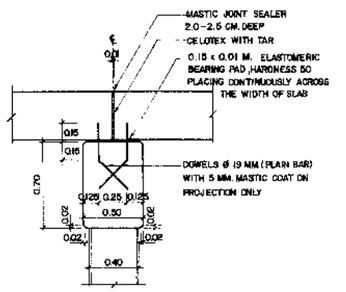


SECTION A - A

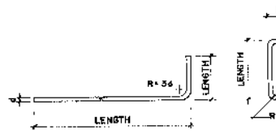


SECTION B - B

PIER REINFORCEMENT DETAILS
SCALE 1:50

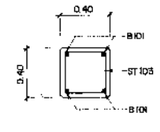


CAP BEAM DETAILS
SCALE 1:25



DEFORMED BAR PLAIN BAR

BAR BENDING DETAILS
NOT TO SCALE



SECTION E - E
SCALE 1:25

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
VARIES	C101	8	–	6	–	8	–	6	–	8	–	6	–
VARIES	C102	4	–	2	–	4	–	2	–	4	–	2	–
50, 50, 35	C103	4	–	4	–	4	–	4	–	4	–	4	–
10.85, 40	CN101	8	–	–	11.25	8	–	–	11.25	8	–	–	11.25
1.91, 40	CN102	6	–	–	2.31	6	–	–	2.31	6	–	–	2.31
45, 65, 30, 30	ST101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
	ST102	3	0.20	–	1.35	3	0.20	–	1.35	3	0.20	–	1.35
	ST103	3	0.25	–	1.35	3	0.25	–	1.35	3	0.25	–	1.35
30, 30, 30, 30, 50	ST103'	3	0.25	–	–	3	0.25	–	–	3	0.25	–	–
28, 65, VARIES, 30	ST104	3	0.20	–	2.55	3	0.20	–	2.55	3	0.20	–	2.55
	ST105	3	–	2	1.95	3	–	2	1.95	3	–	2	1.95
VARIES, 1.55	B101	8	–	12	–	8	–	12	–	8	–	12	–
VARIES	B101'	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55
.60, VARIES, .50	F101	8	–	3	–	8	–	3	–	8	–	3	–
VARIES	F102	8	–	3	–	8	–	3	–	8	–	3	–
VARIES	F103	4	0.20	–	1.70	4	0.125	–	1.90	4	0.125	–	1.90
VARIES	F104	4	–	6	–	4	–	6	–	4	–	6	–
.10, .10, VARIES, .075	VW1	4	0.25	–	–	4	0.25	–	–	4	0.25	–	–
.10, .10, VARIES, .075	VW2	4	–	6	–	4	–	6	–	4	–	6	–
VARIES	HW	4	0.25	–	–	4	0.25	–	–	4	0.25	–	–

#3=Ø 3/8" OR 9 MM. #4=Ø 1/2" OR 12 MM. #6 =Ø 3/4" OR 20MM. #8= Ø 1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L= TOTAL LENGTH OF EACH BAR

TABLE OF Sec. θ

θ	0	5	10	15	20	25	30
Sec θ	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547

TABLE OF PIER DIMENSIONS

ROADWAY WIDTH M.	LENGTH OF CAP BEAM A Sec θ , M.	DOWEL SPACING B Sec θ, M.	SPAN 8.00 M. COLUMN SPACING C Sec θ , M.	SPAN 8.00 M. NO. OF COLUMNS	SPAN 9.00 M. COLUMN SPACING C Sec θ , M.	SPAN 9.00 M. NO. OF COLUMNS	SPAN 10.00 M. COLUMN SPACING C Sec θ , M.	SPAN 10.00 M. NO. OF COLUMNS
6.00	(6.0+2R) Sec θ	2.00 Sec θ	1.50 Sec θ	5	1.20 Sec θ	6	1.20 Sec θ	6
7.00	(7.0+2R) Sec θ	1.75 Sec θ	1.75 Sec θ	5	1.40 Sec θ	6	1.40 Sec θ	6
8.00	(8.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	5	1.60 Sec θ	6	1.60 Sec θ	6
9.00	(9.0+2R) Sec θ	1.80 Sec θ	2.25 Sec θ	5	1.50 Sec θ	7	1.50 Sec θ	7
10.00	(10.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	6	1.40 Sec θ	6	1.40 Sec θ	8
11.00	(11.0+2R) Sec θ	2.20 Sec θ	1.80 Sec θ 1.85 Sec θ	7	1.50 Sec θ 1.60 Sec θ	8	1.30 Sec θ 1.40 Sec θ	9
12.00	(12.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	7	1.70 Sec θ 1.80 Sec θ	8	1.50 Sec θ	9
13.00	(13.0+2R) Sec θ	1.85 Sec θ 1.90 Sec θ	1.85 Sec θ 1.90 Sec θ	8	1.55 Sec θ 1.65 Sec θ	9	1.40 Sec θ 1.45 Sec θ	10
14.00	(14.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	8	1.75 Sec θ	9	1.55 Sec θ 1.60 Sec θ	10

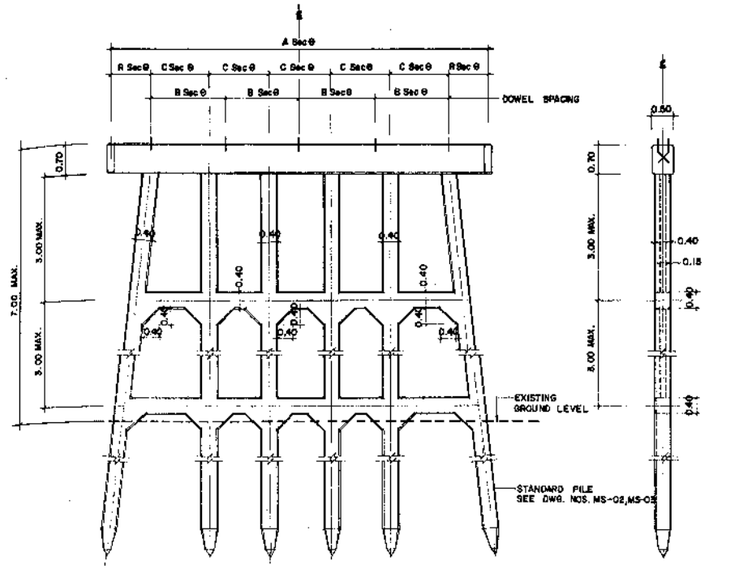
TABLE OF FOOTING DIMENSIONS

ROADWAY WIDTH M.	LENGTH OF FOOTING D Sec. θ , M.	WIDTH OF FOOTING, E , M. SPAN 8.00 M.	SPAN 9.00 M.	SPAN 10.00 M.
6.00	8.80 Sec.θ	1.80	2.00	2.00
7.00	9.90 Sec.θ	1.80	2.00	2.00
8.00	10.80 Sec.θ	1.80	2.00	2.00
9.00	11.80 Sec.θ	1.80	2.00	2.00
10.00	12.80 Sec.θ	1.80	2.00	2.00
11.00	13.80 Sec.θ	1.80	2.00	2.00
12.00	14.80 Sec.θ	1.80	2.00	2.00
13.00	15.80 Sec.θ	1.80	2.00	2.00
14.00	16.80 Sec.θ	1.80	2.00	2.00

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

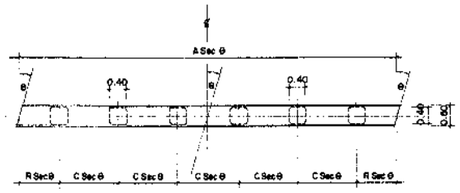
STANDARD DRAWING
0°-30° SKEW R.C. SLAB BRIDGE
WALL BRACING PIER DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : HRH (DIRECTOR GENERAL)		DWG. NO. ST-30
		SHEET NO. 143



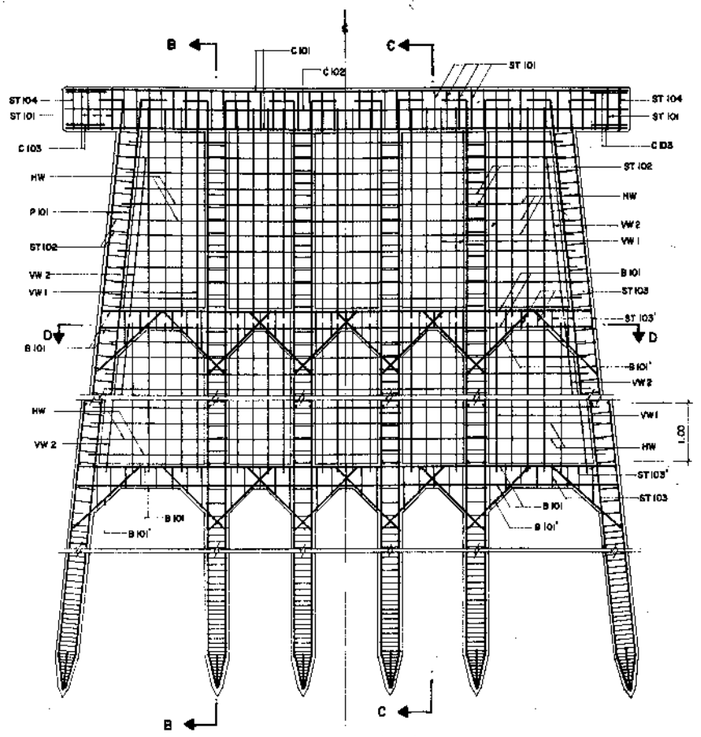
TRANSVERSE ELEVATION
SCALE 1:75

SIDE ELEVATION
SCALE 1:75

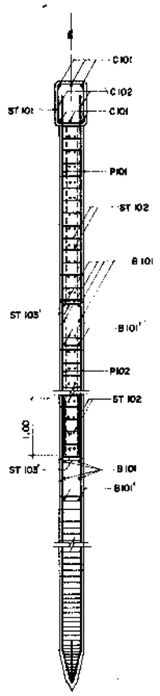


PLAN

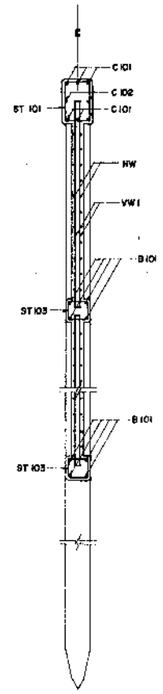
PILE BENT DETAILS
SCALE 1:75



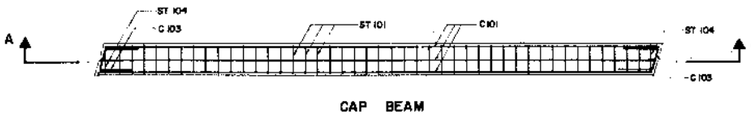
SECTION A – A



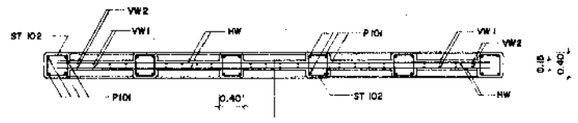
SECTION B – B



SECTION C – C

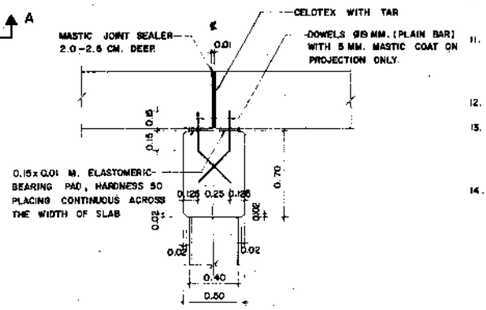


CAP BEAM

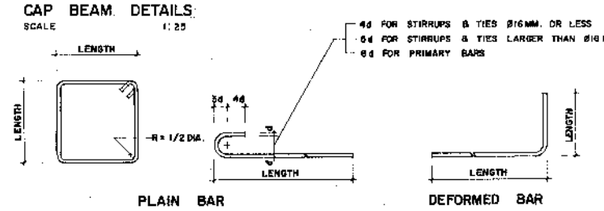


SECTION D – D

REINFORCEMENT DETAILS
SCALE 1:50



CAP BEAM DETAILS
SCALE 1:25



PLAIN BAR DEFORMED BAR

BAR BENDING DETAILS
NOT TO SCALE

NOTES

1. EACH PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 90 TONS FOR PILE DETAIL ...E DWG. NOS. MS-02, MS-03.
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.00 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.00 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL 3.00 M. ADDITIONAL BRACING SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.00 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM AND DIAPHRAMS WHERE A CLEAR COVER OF 7.5 CM. SHALL BE PROVIDED.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG/m.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/cm.^{2} FOR A 0.15×0.15×0.15 m. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT.
   A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.43	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP MAX.	10	CM.

5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETER OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM AND DIAPHRAGMS WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.00 M. PIERS HIGHER THAN 7.00 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
10. THE SKEW ANGLE (θ) IS THE ANGLE IN DEGREES BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY.
11. QUANTITIES AND LENGTH OF REBARS SHOWN ARE BASED ON THE CONDITION THAT THE DISTANCE BETWEEN THE BOTTOM OF CAP BEAM TO THE CENTERLINE OF THE TOP CROSS BRACING IS 3.00 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING MAY BE USED IN COMBINATION WITH ONE OF THE FOLLOWING DRAWING BELOW WHICHEVER IS APPLICABLE :
    DWG. NOS. ST-04, ST-07, ST-10
14. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3 BD-106-14/5

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
	C101	8	–	6	–	8	–	8	–	8	–	6	–
	C102	4	–	2	–	4	–	2	–	4	–	2	–
	C103	4	–	4	–	4	–	4	–	4	–	4	–
	ST101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
	ST102	3	0.20	–	1.35	3	0.20	–	1.35	3	0.20	–	1.35
	ST103	3	0.25	–	1.35	3	0.25	–	1.35	3	0.25	–	1.35
	ST103'	3	0.25	–	–	3	0.25	–	–	3	0.25	–	–
	ST104	3	–	2	1.95	3	–	2	1.95	3	–	2	1.95
	B101	8	–	8	–	8	–	8	–	8	–	8	–
	B101'	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55
	P101	8	–	–	3.75	8	–	–	3.75	8	–	–	3.75
	P102	8	–	–	–	8	–	–	–	8	–	–	–
	VW1	4	0.25	–	6.975	4	0.25	–	6.975	4	0.25	–	6.975
	VW2	4	–	2	5.675	4	–	2	5.675	4	–	2	5.675
	HW	4	0.25	–	–	4	0.25	–	–	4	0.25	–	–

# 3 = Ø3/8" OR 9 MM., # 4 = Ø1/2" OR 12 MM., # 6 = Ø3/4" OR 20 MM., # 8 = 1" OR 25 MM.
NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR.

TABLE OF SEC θ

θ DEGREE	0	5	10	15	20	25	30
Sec θ	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547

TABLE OF PILE BENT DETAILS

CARRIAGE WAY	LENGTH OF CAP BEAM A Sec θ, M.	DOWELS SPACING B Sec θ, M.	SPAN 8.00 M. COL. SPG. C Sec θ, M.	SPAN 8.00 M. NO. OF COLUMN	SPAN 9.00 M. COL. SPG. C Sec θ, M.	SPAN 9.00 M. NO. OF COLUMN	SPAN 10.00 M. COL. SPG C Sec θ, M.	SPAN 10.00 M. NO. OF COLUMN
6.00	(6.0+2R) Sec θ	2.00 Sec θ	1.50 Sec θ	5	1.20 Sec θ	6	1.20 Sec θ	6
7.00	(7.0+2R) Sec θ	1.75 Sec θ	1.75 Sec θ	5	1.40 Sec θ	6	1.40 Sec θ	6
8.00	(8.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	5	1.60 Sec θ	6	1.60 Sec θ	6
9.00	(9.0+2R) Sec θ	1.90 Sec θ	2.25 Sec θ	5	1.50 Sec θ	7	1.80 Sec θ	7
10.00	(10.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	5	1.40 Sec θ	8	1.40 Sec θ	8
11.00	(11.0+2R) Sec θ	2.20 Sec θ	1.90 Sec θ & 1.85 Sec θ	7	1.50 Sec θ & 1.60 Sec θ	8	1.30 Sec θ & 1.40 Sec θ	9
12.00	(12.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	7	1.70 Sec θ & 1.80 Sec θ	8	1.60 Sec θ	9
13.00	(13.0+2R) Sec θ	1.85 Sec θ & 1.90 Sec θ	1.85 Sec θ & 1.90 Sec θ	8	1.55 Sec θ & 1.65 Sec θ	9	1.40 Sec θ & 1.45 Sec θ	10
14.00	(14.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	8	1.75 Sec θ	9	1.55 Sec θ & 1.60 Sec θ	10

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

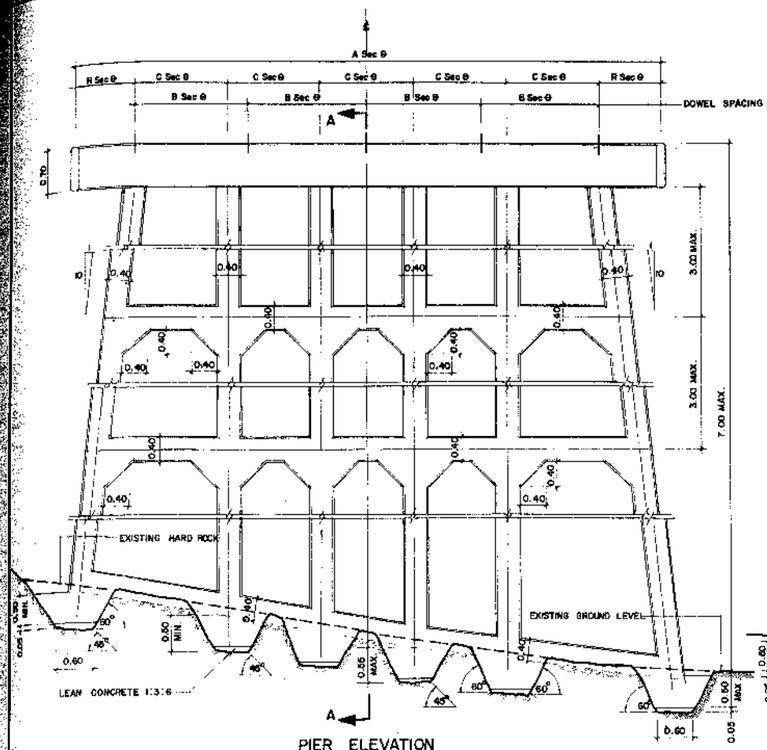
STANDARD DRAWING
0°-30° SKEW RC. SLAB BRIDGE
WALL BRACING PILE BENT DETAILS

DESIGNED : DOH & CONSULTANTS | CHECKED :

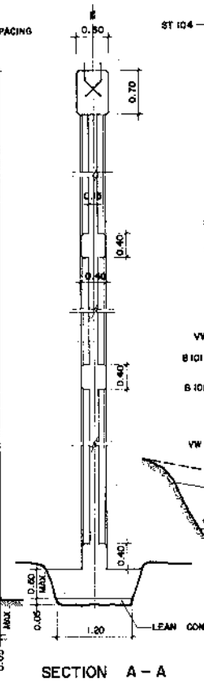
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)

APPROVED : FOR (DIRECTOR GENERAL)

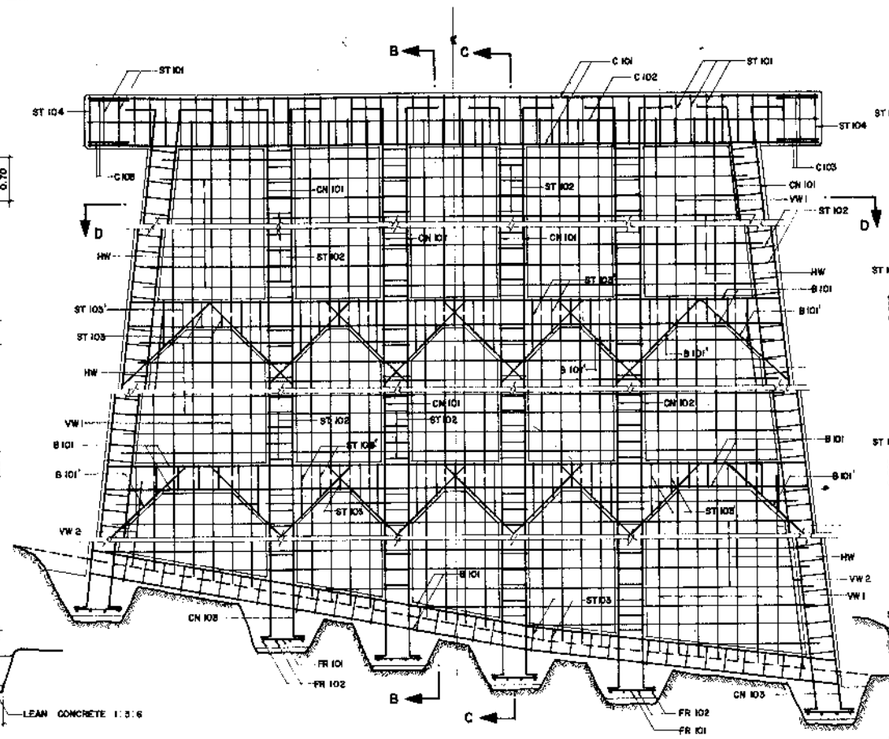
DATE JULY 1994
SCALE 1:25, 1:50, 1:75
DWG. NO. ST-31
SHEET NO. 144



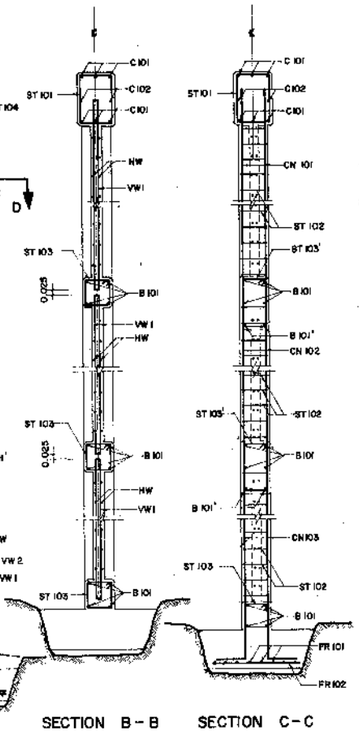
PIER ELEVATION
SCALE 1:50



SECTION A – A
SCALE 1:50

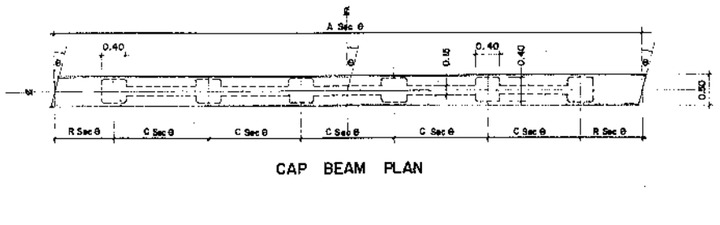


PIER REINFORCEMENT DETAILS
SCALE 1:40

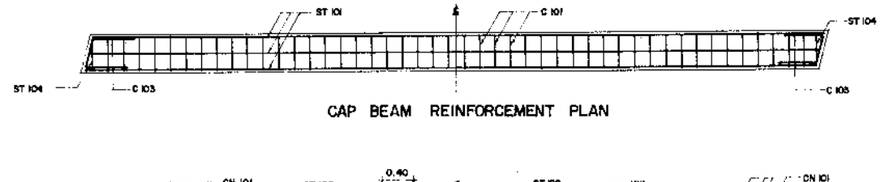


SECTION B – B
SCALE 1:40

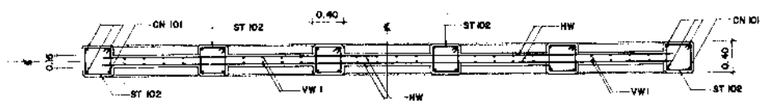
SECTION C – C
SCALE 1:40



CAP BEAM PLAN



CAP BEAM REINFORCEMENT PLAN



SECTION D – D
SCALE 1:40

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
	C101	8	–	6	–	8	–	6	–	8	–	6	–
	C102	4	–	2	–	4	–	2	–	4	–	2	–
	C103	4	–	4	–	4	–	4	–	4	–	4	–
	CN101	8	–	–	–	8	–	–	–	8	–	–	–
	CN102	8	–	–	–	8	–	–	–	8	–	–	–
	CN103	8	–	–	–	8	–	–	–	8	–	–	–
	ST101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
	ST102	3	0.20	–	1.35	3	0.20	–	1.35	3	0.20	–	1.35
	ST103	3	0.25	–	1.35	3	0.25	–	1.35	3	0.25	–	1.35
	ST103'	3	0.25	–	–	3	0.25	–	–	3	0.25	–	–
	ST104	3	–	2	–	3	–	2	–	3	–	2	–
	B101	8	–	–	–	8	–	–	–	8	–	–	–
	B101'	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55
	FR101	8	0.15	–	0.55	8	0.15	–	0.55	8	0.15	–	0.55
	FR102	8	0.15	–	1.15	8	0.15	–	1.15	8	0.15	–	1.15
	VW1	4	0.25	–	–	4	0.25	–	–	4	0.25	–	–
	VW2	4	–	–	–	4	–	–	–	4	–	–	–
	HW	4	0.25	–	–	4	0.25	–	–	4	0.25	–	–

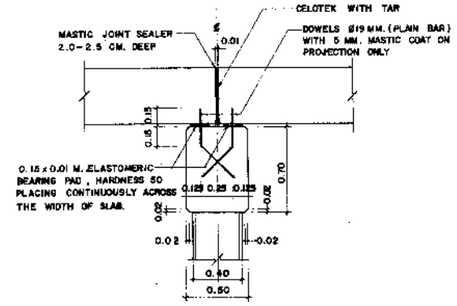
#3 = #3/8" OR 9 MM., #4 = #1/2" OR 12 MM., #6 = #3/4" OR 20 MM., #8 = #1" OR 25 MM.
NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

TABLE OF Sec θ

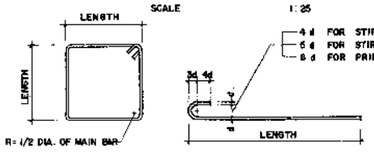
θ, DEGREE	0	5	10	15	20	25	30
Sec θ	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547

TABLE OF PIER DETAILS

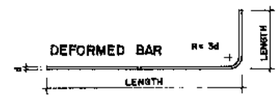
ROADWAY WIDTH, M.	LENGTH OF CAP BEAM A Sec θ, M.	DOWEL SPACING B Sec θ, M.	SPAN 8.00 M. COL. SPG. C Sec θ, M.	NO. OF COL.	SPAN 9.00 M. COL. SPG. C Sec θ, M.	NO. OF COL.	SPAN 10.00 M. COL. SPG. C Sec θ, M.	NO. OF COL.
6.00	(6.0 + 2R) Sec θ	2.00 Sec θ	1.50 Sec θ	5	1.20 Sec θ	5	1.20 Sec θ	6
7.00	(7.0 + 2R) Sec θ	1.75 Sec θ	1.75 Sec θ	5	1.40 Sec θ	6	1.40 Sec θ	6
8.00	(8.0 + 2R) Sec θ	2.00 Sec θ	2.00 Sec θ	6	1.60 Sec θ	6	1.60 Sec θ	6
9.00	(9.0+2R) Sec θ	1.80 Sec θ	2.25 Sec θ	5	1.80 Sec θ	7	1.80 Sec θ	7
10.00	(10.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	6	1.40 Sec θ	8	1.40 Sec θ	8
11.00	(11.0+2R) Sec θ	2.20 Sec θ	1.80 Sec θ & 1.85 Sec θ	7	1.50 Sec θ & 1.60 Sec θ	8	1.30 Sec θ & 1.40 Sec θ	9
12.00	(12.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	7	1.70 Sec θ & 1.80 Sec θ	8	1.50 Sec θ	9
13.00	(13.0+2R) Sec θ	1.85 Sec θ & 1.90 Sec θ	1.85 Sec θ & 1.90 Sec θ	8	1.85 Sec θ & 1.60 Sec θ	9	1.40 Sec θ & 1.45 Sec θ	10
14.00	(14.0+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	8	1.75 Sec θ	9	1.55 Sec θ & 1.60 Sec θ	10



CAP BEAM DETAILS
SCALE 1:25



PLAIN BAR



BAR BENDING DETAILS
NOT TO SCALE

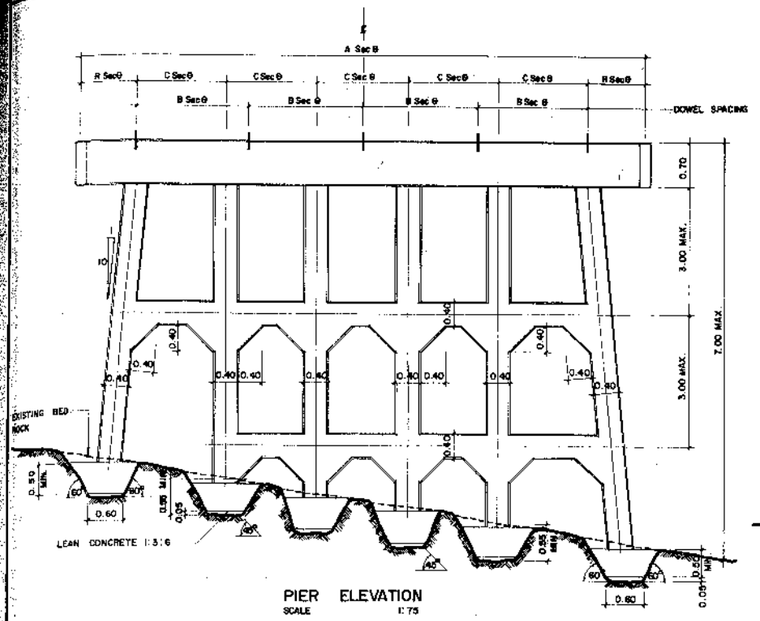
NOTES :

1. THIS STANDARD DRAWING IS APPLICABLE FOR FOUNDATIONS ON BED ROCK WHICH HAS A MINIMUM ALLOWABLE BEARING CAPACITY OF 80 TON/M^2.
2. THE BOTTOM OF THE LOWER FOOTING SHALL BE ABOVE 45° LINE FROM THE BOTTOM EDGES OF ADJACENT UPPER FOOTINGS.
3. THE EMBEDED DEPTH OF EACH FOOTING MEASURED AT THE CENTERLINE OF EACH COLUMN FROM EXISTING HARD BED ROCK TO THE BOTTOM OF EXCAVATION SHALL NOT BE LESS THAN 0.55 M. AND SHALL BE UNDER THE APPROVAL OF THE ENGINEER.
4. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES.
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.00 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.00 M.
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.00 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.00 M.
5. THE BOTTOM CROSS BRACING SHALL BE LAID ON BED ROCK UNDER THE APPROVAL OF THE ENGINEER.
6. CLEAR CONCRETE COVER SHALL BE 5 CM. EXCEPT THE CAP BEAM AND DIAPHAGMS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
7. LEAN CONCRETE OF APPROXIMATELY 5 CM. EXCEPT THE CAP BEAM AND DIAPHAGMS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
8. CONCRETE SHALL HAVE MINIMUM CEMENT CONTENT OF 350 KG/m.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE SYRENGTH OF 210 KG/cm^2 FOR A 0.15 x 0.15 x 0.15 m. CUBE AT 28 DAYS CEMENT SHALL BE TIS TYPE I PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX DESIGN PER CUBE METER IS AS FOLLOWING :
   PORTLAND CEMENT 350 KG., SAND 0.43 M.^{3}
   CRUSHED ROCK OR GRAVEL 0.86 M.^{3}
   CONCRETE SLUM MAX. 10 CM.
9. REBARS Ø 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
10. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
11. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
12. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 1 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM AND DIAPHRAGMS WITHOUT ALTERING THE LOCATIONS OF REBARS.
13. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.00 M. PIER HIGHER THAN 7.00 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
14. THE SKEW ANGLE (θ) IS THE ANGLE IN DEGREES BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY.
15. ALL DIMENSIONS SHOWN ARE IN METER UNLESS OTHERWISE INDICATED
16. THE DRAWING MAY BE USED IN COMBINATION WITH ONE OF THE FOLLOWING DRAWING BELOW WHICHEVER IS APPLICABLE :
17. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. SBD-106-14/6

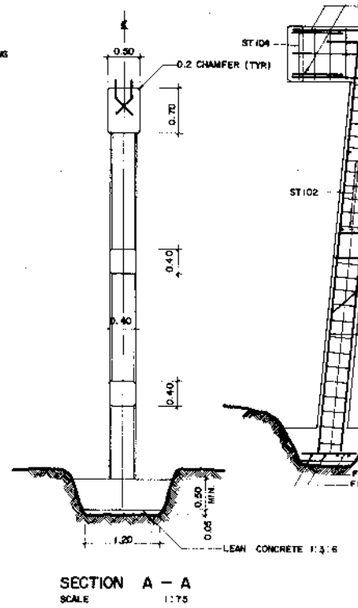
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
0°-30° SKEW RC. SLAB BRIDGE
WALL BRACING PIER ON BED ROCK DETAILS

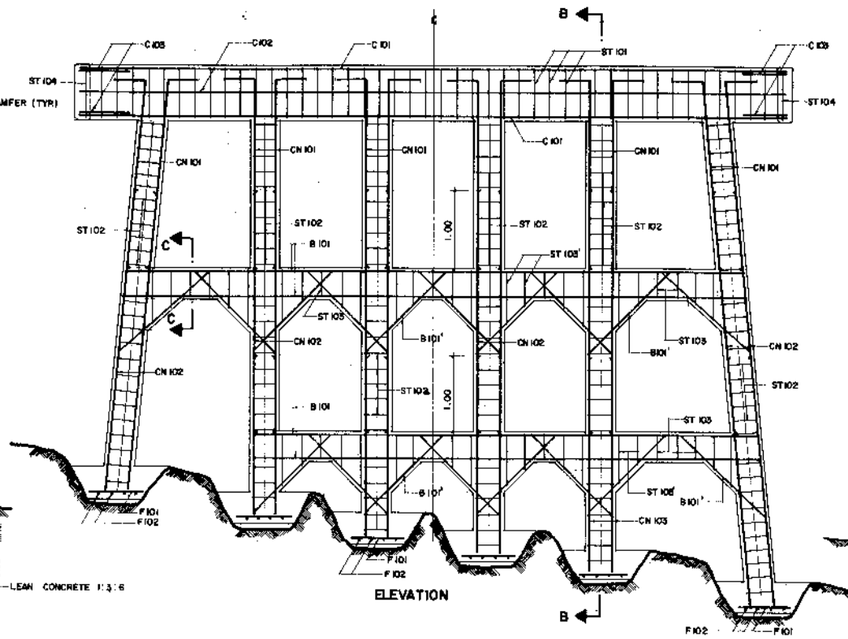
DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
		DWG. NO. ST-32
APPROVED: (DIRECTOR GENERAL)		SHEET NO. 145



PIER ELEVATION
SCALE 1:75

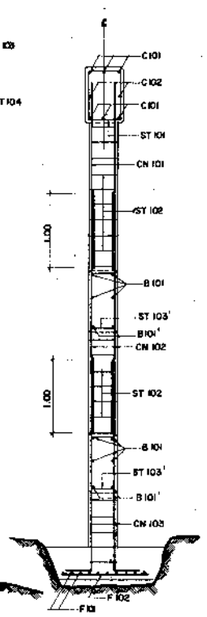


SECTION A – A
SCALE 1:75

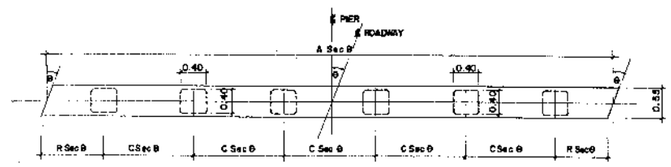


ELEVATION

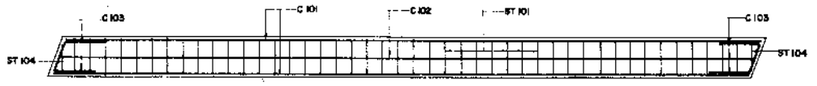
PIER REINFORCEMENT DETAILS
SCALE 1:50



SECTION B – B
SCALE 1:50



CAP BEAM PLAN
SCALE 1:50



CAP BEAM REINFORCEMENT PLAN
SCALE 1:50

SECTION C – C
SCALE 1:50

NOTES :

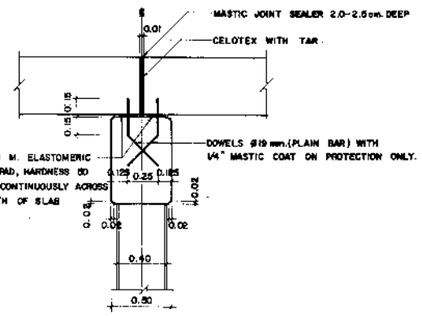
1. THIS STANDARD DRAWING IS APPLICABLE FOR FOUNDATIONS ON BED ROCK WHICH HAS A MINIMUM ALLOWABLE BEARING CAPACITY OF 80 TON/M^2.
2. THE BOTTOM OF THE LOWER FOOTINGS SHALL BE ABOVE 45° LINE FROM THE BOTTOM EDGES OF ADJACENT UPPER FOOTINGS.
3. THE EMBEDDED DEPTH OF EACH FOOTING MEASURED AT THE CENTERLINE OF EACH COLUMN FROM EXISTING HARD BED ROCK TO THE BOTTOM OF EXCAVATION SHALL NOT BE LESS THAN 0.55 M. AND SHALL BE UNDER THE APPROVAL OF THE ENGINEER.
4. HORIZONTAL CROSS BRACING BETWEEN COLUMN SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a. IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.00 M., A BRACING SHALL BE PLACED IN SUCH AS A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.00 M., AND
   b. IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEED 3.00 M. ADDITIONAL BRACING SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.00 M.
5. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM AT WHICH CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
6. LEAN CONCRETE OF APPROXIMATELY 5.0 CM. THICK SHALL BE PLACED UNDER THE BOTTOM OF ALL FOOTINGS. COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
7. CONCRETE SHALL HAVE MINIMUM CEMENT CONTENT OF 350 KG/m^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/cm^2 FOR A 0.15x 0.15x 0.15 m. CUBE AT 28 DAYS CEMENT SHALL BE TIS TYPE I PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX. DESING PER CUBE METER IS AS FOLLOWING :

PORTLAND CEMENT	350 KG.	CRUSHED ROCK OR GRAVEL	0.88 M^3
SAND	0.45 M^3	CONCRETE SLUM MAX.	10 CM.

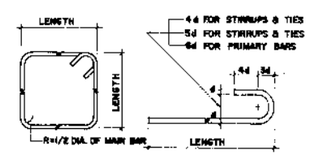
8. REBAR # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
9. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVAL BY THE ENGINEER.
10. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETER OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
11. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANCE PORTLAND CEMENT TYPE 5 CONFORMING TO TIS.15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITH OUT ALTERING THE LOCATION OF REBARS.
12. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.00 M. PIER HIGHER THAN 7.00 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
13. THE SKEW ANGLE (θ) IS THE ANGLE IN DEGREES BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY
14. ALL DIMENSIONS SHOWN ARE IN METER UNLESS OTHERWISE INDICATED.
15. THE DRAWING MAY BE USED IN COMBINATION WITH ONE OF THE FOLLOWING DRAWINGS BELOW WHICHEVER IS APPLICABLE : DWG. NOS. ST-02, ST-05, ST-06
16. THIS DRAWING IS ADAPTED FROM DOH. DWG. NO. 3 06-105-14/7

TABLE OF Sec θ

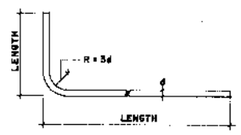
θ, DEGREE	0	5	10	15	20	25	30
Sec θ	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547



CAP BEAM DETAILS
SCALE 1:25



PLAIN BAR



DEFORMED BAR

BAR BENDING DETAILS
NOT TO SCALE

TABLE OF REINFORCEMT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	a	NO.	L	#	a	NO.	L	#	a	NO.	L	#	a	NO.	L	#	a	NO.	L	#	a	NO.	L
VARIES	C 101	5	–	6	–	5	–	6	–	5	–	6	–	5	–	6	–	5	–	6	–	5	–	6	–
VARIES	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
1.50	C 102	4	–	4	–	4	–	4	–	4	–	4	–	4	–	4	–	4	–	4	–	4	–	4	–
VARIES	CN 101	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–
VARIES	CN 102	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–
VARIES	CN 103	9	–	–	–	9	–	–	–	9	–	–	–	9	–	–	–	9	–	–	–	9	–	–	–
0.45	ST 101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
0.30	ST 102	3	0.20	–	1.35	3	0.20	–	1.35	3	0.20	–	1.35	3	0.20	–	1.35	3	0.20	–	1.35	3	0.20	–	1.35
0.30	ST 103	3	0.25	–	1.35	3	0.25	–	1.35	3	0.25	–	1.35	3	0.25	–	1.35	3	0.25	–	1.35	3	0.25	–	1.35
VARIES	ST 103'	3	0.25	–	–	3	0.25	–	–	3	0.25	–	–	3	0.25	–	–	3	0.25	–	–	3	0.25	–	–
0.30	ST 104	5	–	2	2.85	5	–	2	2.85	5	–	2	2.85	5	–	2	2.85	5	–	2	2.85	5	–	2	2.56
VARIES	B 101	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–	8	–	–	–
1.55	B 101'	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55	6	–	–	1.55
0.55	F 101	8	0.15	–	0.55	8	0.15	–	0.55	8	0.15	–	0.55	8	0.15	–	0.55	8	0.15	–	0.55	8	0.15	–	0.55
1.15	F 102	8	0.15		1.15	8	0.15		1.15	8	0.15		1.15	8	0.15		1.15	8	0.16		1.15	8	0.15		1.15

= Ø 3/8" OR 9 MM., #4 = Ø 1/2" OR 12 MM., #6 = Ø 3/4" OR 20 MM., #8 = Ø 1" OR 25 MM. NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR.

TABLE OF PIER DETAILS

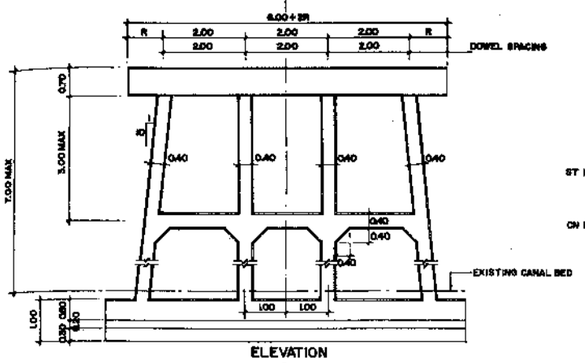
ROADWAY WIDTH M.	LENGTH OF CAP BEAM A Sec θ, M.	DOWEL SPACING B Sec θ, M.	SPAN 5.00 M.		SPAN 6.00 M.		SPAN 7.00 M.		SPAN 8.00 M.		SPAN 9.00 M.		SPAN 10.00 M.	
			COL. SPG C Sec θ, M.	NO. OF COLUMN	COL. SPG. C Sec θ, M.	NO. OF COLUMN	COL. SPG. C Sec θ, M.	NO. OF COLUMN	COL. SPG. C Sec θ, M.	NO. OF COLUMN	COL. SPG. C Sec θ, M.	NO. OF COLUMN	COL. SPG. C Sec θ, M.	NO. OF COLUMN
6.00	(6.00+2R) Sec θ	2.00 Sec θ	2.00 Sec θ	4	2.00 Sec θ	4	1.50 Sec θ	5	1.50 Sec θ	5	1.20 Sec θ	6	1.20 Sec θ	6
7.00	(7.00+2R) Sec θ	1.75 Sec θ	2.30 Sec θ & 2.40 Sec θ	4	2.30 Sec θ & 2.40 Sec θ	4	1.75 Sec θ	6	1.75 Sec θ	5	1.40 Sec θ	6	1.40 Sec θ	6
8.00	(8.00+2R) Sec θ	2.00 Sec θ	2.65 Sec θ & 2.70 Sec θ	4	2.65 Sec θ & 2.70 Sec θ	4	2.00 Sec θ	6	2.00 Sec θ	6	1.60 Sec θ	6	1.60 Sec θ	6
9.00	(9.00+2R) Sec θ	1.80 Sec θ	3.00 Sec θ	4	3.00 Sec θ	4	2.25 Sec θ	5	2.25 Sec θ	6	1.50 Sec θ	7	1.50 Sec θ	7
10.00	(10.00+2R) Sec θ	2.00 Sec θ	2.50 Sec θ	5	2.50 Sec θ	5	2.00 Sec θ	6	2.00 Sec θ	6	1.40 Sec θ & 1.45 Sec θ	8	1.40 Sec θ & 1.45 Sec θ	8
11.00	(11.00+2R) Sec θ	2.20 Sec θ	2.75 Sec θ	5	2.75 Sec θ	5	1.80 Sec θ & 1.85 Sec θ	7	1.80 Sec θ & 1.85 Sec θ	7	1.50 Sec θ & 1.60 Sec θ	8	1.30 Sec θ & 1.40 Sec θ	8
12.00	(12.00+2R) Sec θ	2.00 Sec θ	2.40 Sec θ	6	2.40 Sec θ	6	2.00 Sec θ	7	2.00 Sec θ	7	1.70 Sec θ & 1.80 Sec θ	8	1.50 Sec θ	8
13.00	(13.00+2R) Sec θ	1.86 Sec θ & 1.90 Sec θ	2.60 Sec θ	6	2.60 Sec θ	6	1.85 Sec θ & 1.90 Sec θ	8	1.85 Sec θ & 1.90 Sec θ	8	1.55 Sec θ & 1.65 Sec θ	9	1.40 Sec θ & 1.45 Sec θ	10
14.00	(14.00+2R) Sec θ	2.00 Sec θ	2.30 Sec θ & 2.40 Sec θ	7	2.30 Sec θ & 2.40 Sec θ	7	2.00 Sec θ	8	2.00 Sec θ	8	1.75 Sec θ	9	1.56 Sec θ & 1.60 Sec θ	10

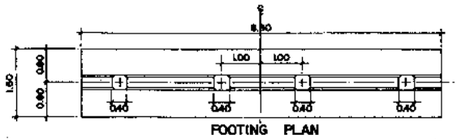
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

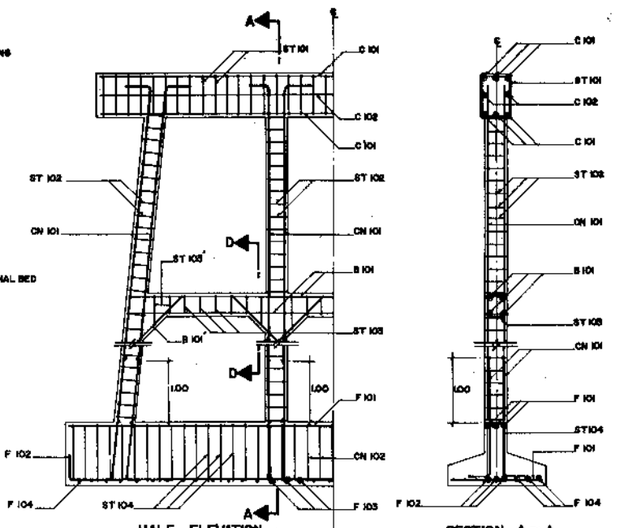
0°–30° SKEW RC. SLAB BRIDGE
SPREAD FOOTING PIER ON BED ROCK DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY. 1994
SUBMITTED : P. Bunyoi (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE 1:25, 1:50
APPROVED : For (DIRECTOR GENERAL)		DWG. NO. ST-33
		SHEET NO. 146

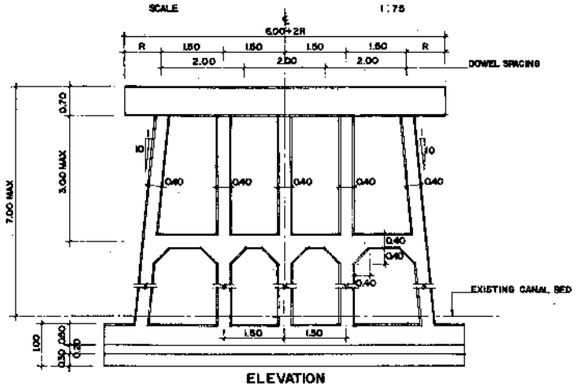


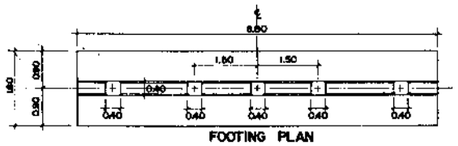


DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1:75

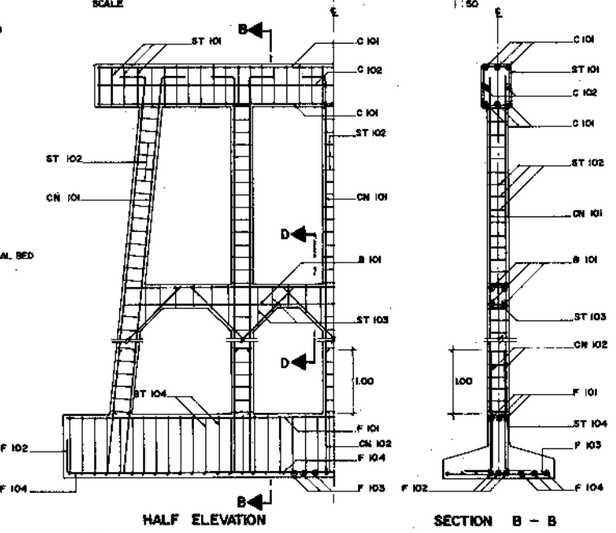


REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1:50

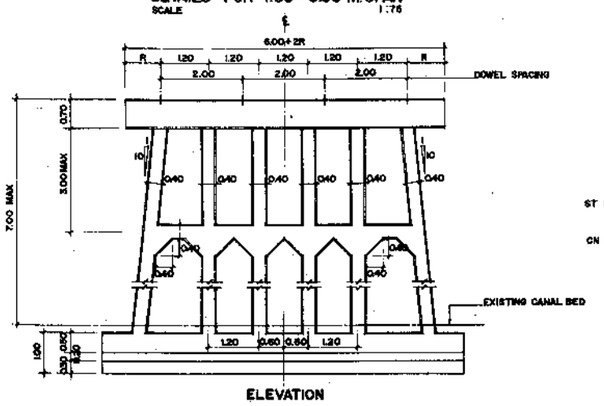


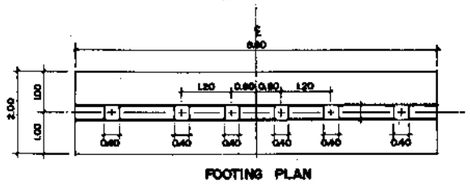


DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1:75

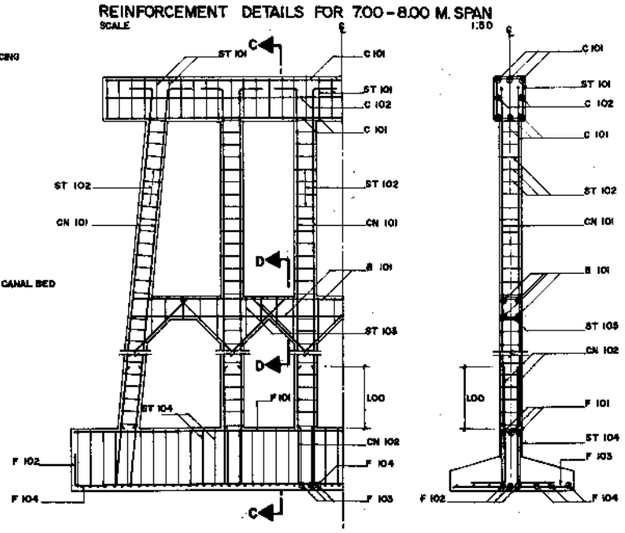


REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1:50





DETAILS FOR 9.00 - 10.00 M. SPAN
SCALE 1:75

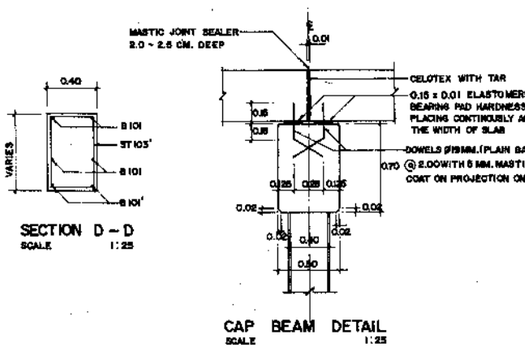


REINFORCEMENT DETAILS FOR 9.00 - 10.00 M. SPAN
SCALE 1:50

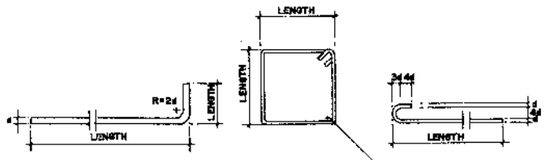
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L	#	@	NO.	L
	C 101	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	CN 101	5	–	16	11.25	6	–	16	11.25	6	–	20	11.25	6	–	20	11.25	6	–	24	11.25	6	–	24	11.25
	CN 102	8	–	16	2.31	6	–	16	2.31	6	–	20	2.31	6	–	20	2.31	6	–	24	2.31	6	–	24	2.31
	ST 101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
	ST 102	3	0.20	192	1.35	3	0.20	192	1.35	3	0.20	240	1.35	3	0.20	240	1.35	3	0.20	288	1.35	3	0.20	288	1.35
	ST 103	3	0.25	40	1.35	3	0.25	40	1.35	3	0.25	34	1.35	3	0.25	34	1.35	3	0.25	28	1.35	3	0.25	28	1.35
	ST 105	3	0.25	12		3	0.25	12		3	0.25	16		3	0.25	16		3	0.25	20		3	0.25	20	
	ST 104	3	0.20	44	2.55	3	0.20	44	2.55	3	0.20	44	2.55	3	0.20	44	2.55	3	0.20	44	2.55	3	0.20	44	2.55
	B 101	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	B 101'	6	–	12	1.55	6	–	12	1.55	6	–	12	1.55	6	–	12	1.55	6	–	12	1.55	6	–	12	1.55
	F 101	8	–	3	8.70	8	–	3	8.70	8	–	3	8.70	8	–	3	8.70	8	–	3	8.70	8	–	3	8.70
	F 102	8	–	3	9.90	8	–	3	9.90	8	–	3	9.90	8	–	3	9.90	8	–	3	9.90	8	–	3	9.90
	F 103	4	0.25	35	1.55	4	0.25	35	1.55	4	0.20	44	1.75	4	0.20	44	1.75	4	0.125	70	1.95	4	0.125	70	1.95
	F 104	4	–	6	8.70	4	–	6	8.70	4	–	6	8.70	4	–	6	8.70	4	–	6	8.70	4	–	6	8.70

3 = Ø 3/8" OR 9 MM. # 4 = Ø 1/2" OR 12 MM. # 6 = Ø 1" OR 25 MM. NO. = TOTAL AMOUNT OF BARS L = TOTAL LENGTH OF EACH BARS



CAP BEAM DETAIL
SCALE 1:25



BAR BENDING DETAILS
NOT TO SCALE

NOTES:

1. THE BOTTOM OF FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M^2.
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES:
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEED 5.0 M. A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEED 5.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 5.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 Kg/M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg/CM^2 FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE 1 PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS:

PORTLAND CEMENT	350	Kg.
SAND	0.48	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MIX.	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. SA05-106-14/23.

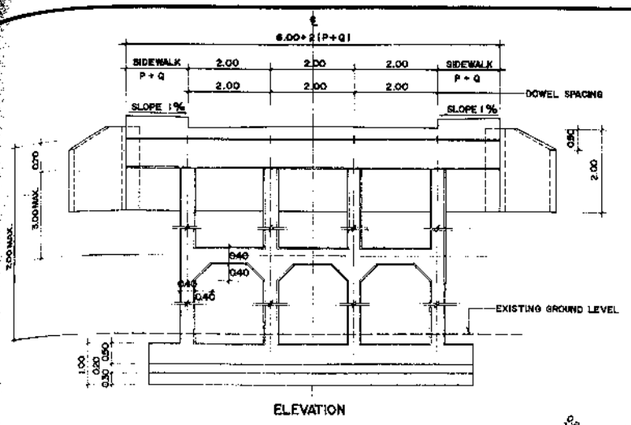
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

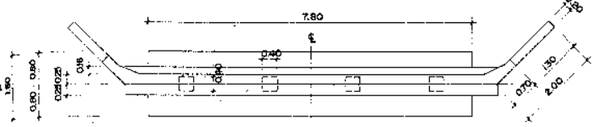
6.00 M. ROADWAY WIDTH SLAB BRIDGE.

SPREAD FOOTING PIER DETAILS

DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: 4/7/14 (DIRECTOR GENERAL)		DWG. NO. ST-34
		SHEET NO. 147

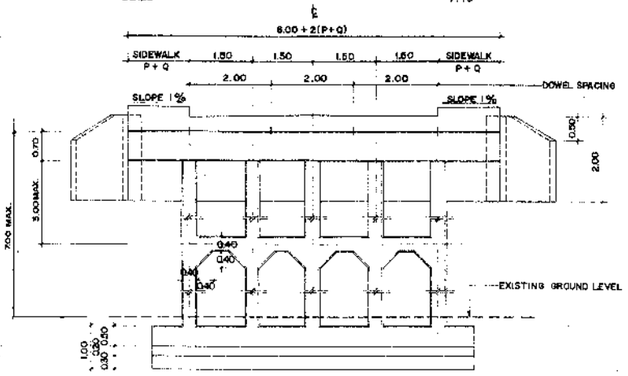


ELEVATION



PLAN

ABUTMENT DETAILS FOR 5.00-6.00 M. SPAN
SCALE 1:75



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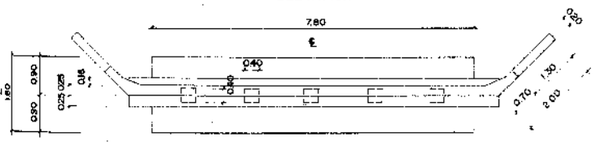
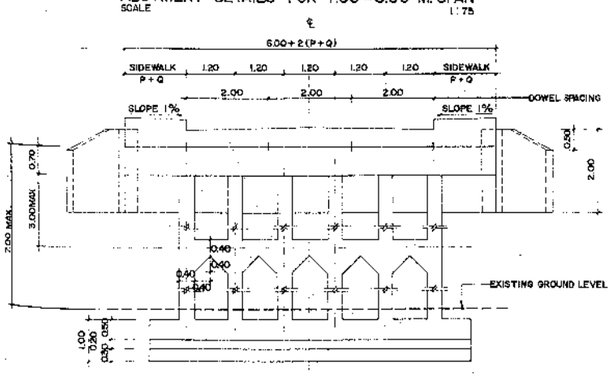
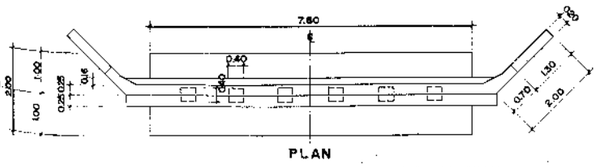


PLAN

ABUTMENT DETAILS FOR 7.00-8.00 M. SPAN
SCALE 1:75

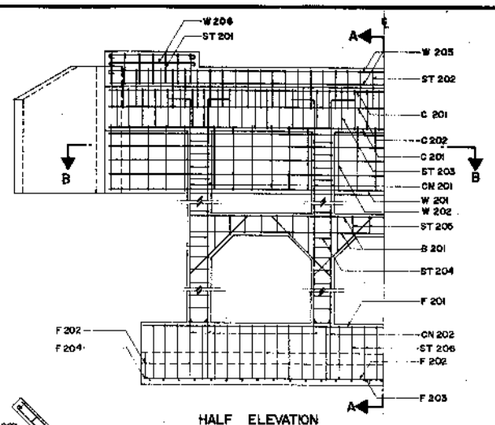


ELEVATION

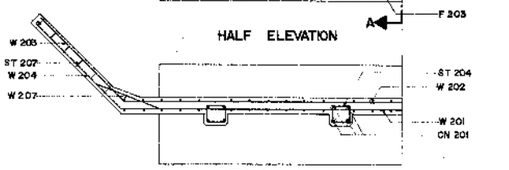


PLAN

ABUTMENT DETAILS FOR 9.00-10.00 M. SPAN
SCALE 1:75

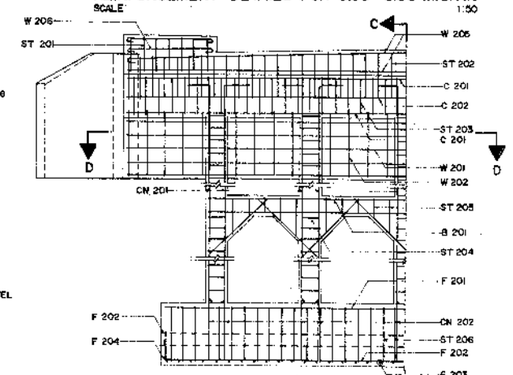


HALF ELEVATION

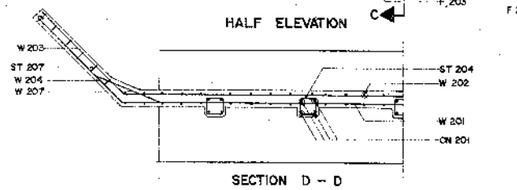


SECTION B - B

REINFORCEMENT DETAILS FOR 5.00-6.00 M.SPAN
SCALE 1:50

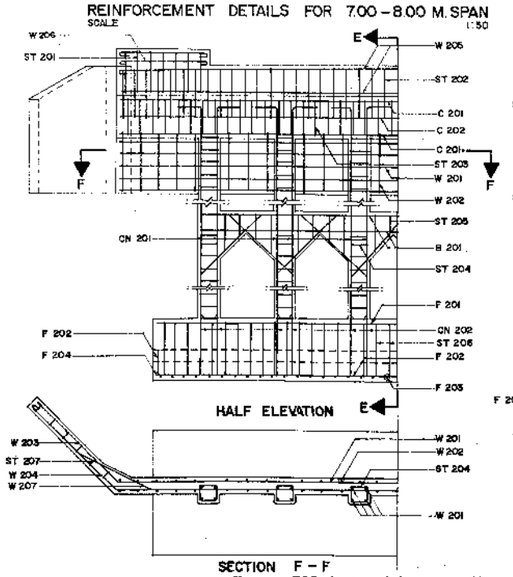


HALF ELEVATION



SECTION D - D

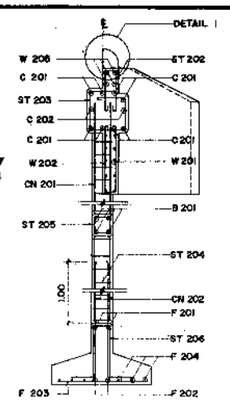
REINFORCEMENT DETAILS FOR 7.00-8.00 M.SPAN
SCALE 1:50



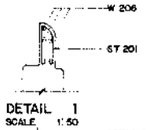
HALF ELEVATION

SECTION F - F

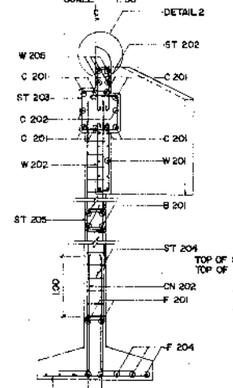
REINFORCEMENT DETAILS FOR 9.00-10.00 M.SPAN
SCALE 1:50



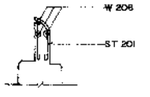
SECTION A - A



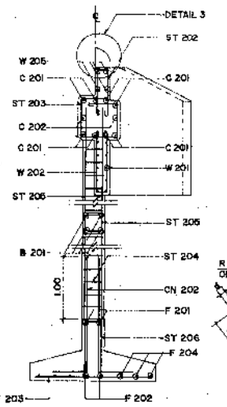
DETAIL 1
SCALE 1:50



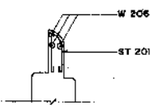
SECTION C - C



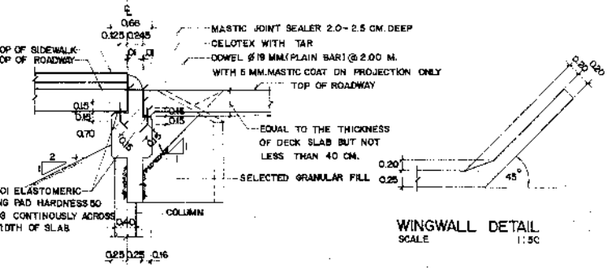
DETAIL 2
SCALE 1:50



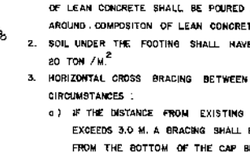
SECTION E - E



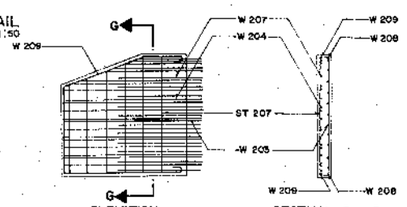
DETAIL 3
SCALE 1:50



ABUTMENT HEAD DETAIL
SCALE 1:50



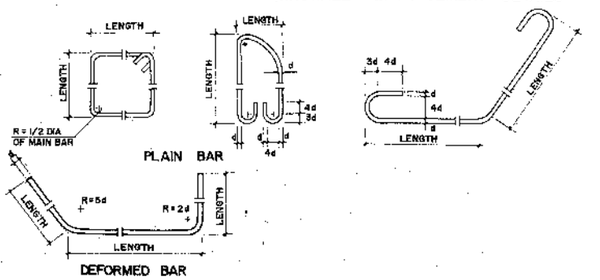
WINGWALL DETAIL
SCALE 1:50



ELEVATION

SECTION G - G

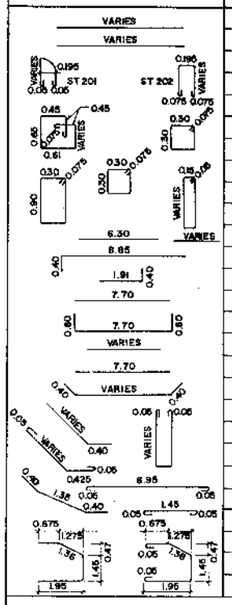
WINGWALL REINFORCEMENT DETAILS



BAR BENDINGS DETAILS
NOT TO SCALE

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS



BAR MARK	SPAN 5.00M.				SPAN 6.00M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00M.				SPAN 10.00 M.			
	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L
C 201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	6	–	8	–	8	–	8	–	8	–
C 202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
ST 201	2	0.20	–	1.215	2	0.20	–	1.295	2	0.20	–	1.355	2	0.20	–	1.435	2	0.20	–	1.515	2	0.20	–	1.595
ST 202	3	0.20	–	1.745	3	0.20	–	1.795	3	0.20	–	1.845	3	0.20	–	1.895	3	0.20	–	1.945	3	0.20	–	1.995
ST 203	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–
ST 204	3	0.20	156	1.35	3	0.20	156	1.35	3	0.20	196	1.35	3	0.20	195	1.35	3	0.20	234	1.35	3	0.20	234	1.35
ST 205	3	0.25	18	1.35	3	0.25	18	1.35	3	0.25	8	1.35	3	0.25	8	1.35	3	0.25	–	1.35	3	0.25	–	1.35
ST 206	3	0.25	24	–	3	0.25	24	–	3	0.25	32	–	3	0.25	32	–	3	0.25	40	–	3	0.25	40	–
ST 206	3	0.20	39	2.55	3	0.20	39	2.55	3	0.20	39	2.55	3	0.20	39	2.55	3	0.20	39	2.55	3	0.20	39	2.55
ST 207	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
B 201	8	–	8	6.30	8	–	8	6.30	8	–	8	6.30	8	–	8	6.30	8	–	8	6.30	8	–	8	6.30
B 201	6	–	24	1.55	6	–	24	1.55	6	–	32	1.55	6	–	32	1.55	6	–	40	1.55	6	–	40	1.55
CN 201	8	–	16	9.25	8	–	16	9.25	8	–	20	9.25	8	–	20	9.25	8	–	24	9.25	8	–	24	9.25
CN 202	8	–	16	2.31	8	–	16	2.31	8	–	20	2.31	8	–	20	2.31	8	–	24	2.31	8	–	24	2.31
F 201	8	–	2	7.70	8	–	2	7.70	8	–	2	7.70	8	–	2	7.70	8	–	2	7.70	8	–	2	7.70
F 202	8	–	2	8.90	8	–	2	8.90	8	–	2	8.90	8	–	2	8.90	8	–	2	8.90	8	–	2	8.90
F 203	4	0.25	31	1.55	4	0.25	31	1.55	4	0.20	39	1.75	8	0.20	39	1.75	4	0.125	62	1.95	4	0.125	62	1.95
F 204	4	–	6	7.70	4	–	6	7.70	4	–	6	7.70	4	–	6	7.70	4	–	6	7.70	4	–	6	7.70
W 201	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
W 202	2	0.30	–	2.70	2	0.30	–	2.60	2	0.30	–	2.60	2	0.30	–	2.50	2	0.30	–	2.40	2	0.30	–	2.30
W 203	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–
W 204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
W 205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
W 206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
W 208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
W 209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

= 2=Ø 1/4" OR 6 MM., #3 = Ø 3/8" OR 9 MM., #4 = Ø 1/2" OR 12 MM., #6 = Ø 3/4" OR 20 MM., #8 = Ø 1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L = LENGTH OF EACH BAR

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT, IT'S CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND. COMPOSITON OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON / M^2
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M. A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M. AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M. ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACKWALL AND WING WALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 300 Kg/M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 Kg/CM^2 FOR .15x.15x.15 M. CUBE AT 28 DAYS CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT, A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	Kg.
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MIX	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.

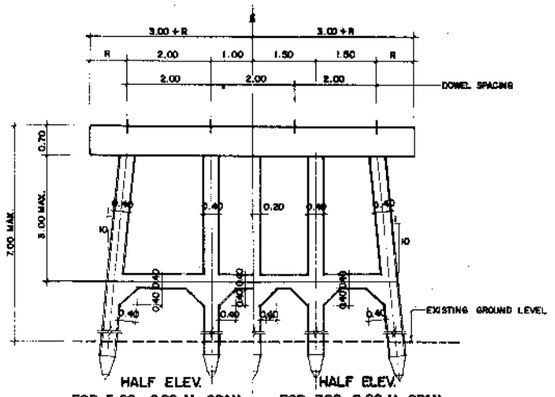
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

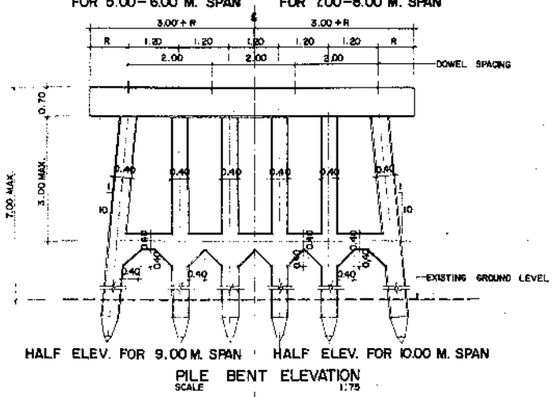
STANDARD DRAWING

6.00 M. ROADWAY WIDTH SLAB BRIDGE

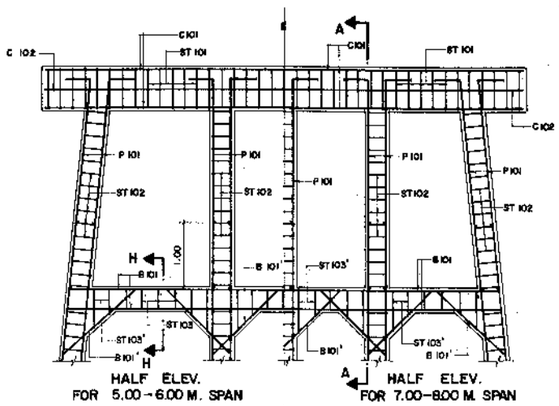
SPREAD FOOTING ABUTMENT DETAILS

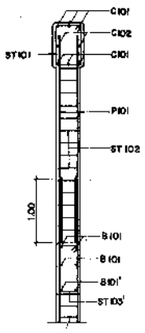
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ST-35
		SHEET NO. 148

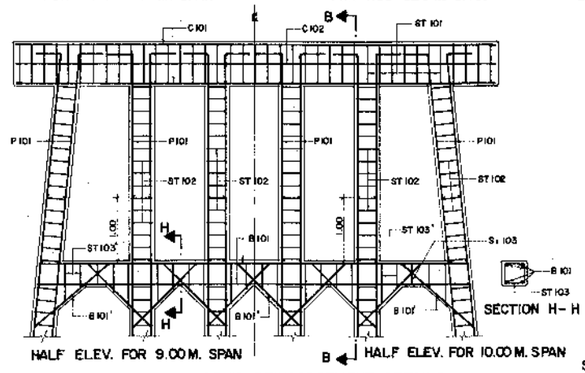


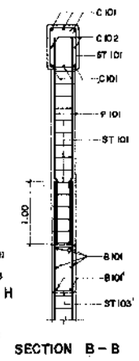


PILE BENT ELEVATION
SCALE 1:75

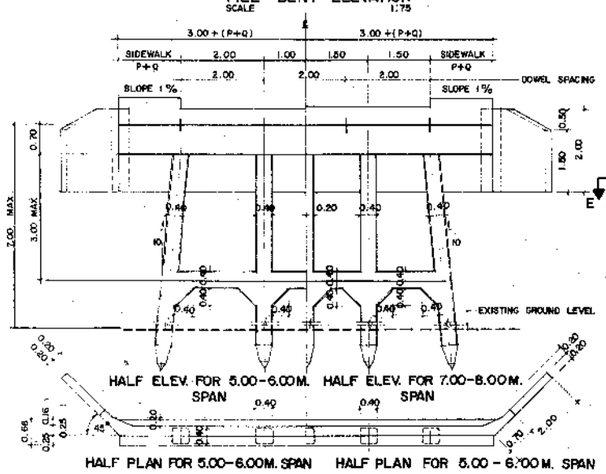


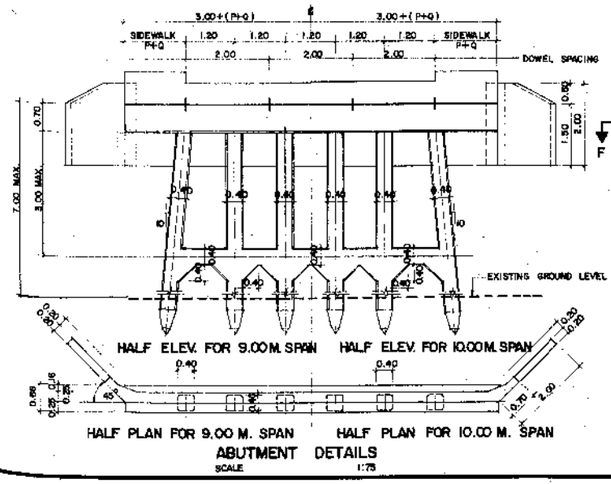




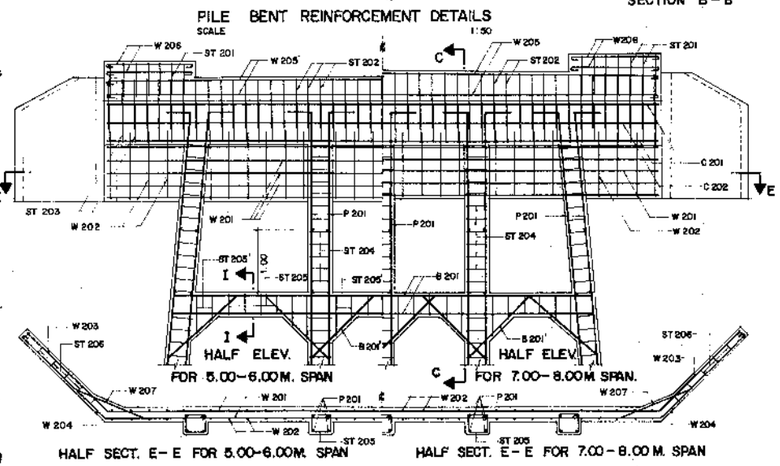


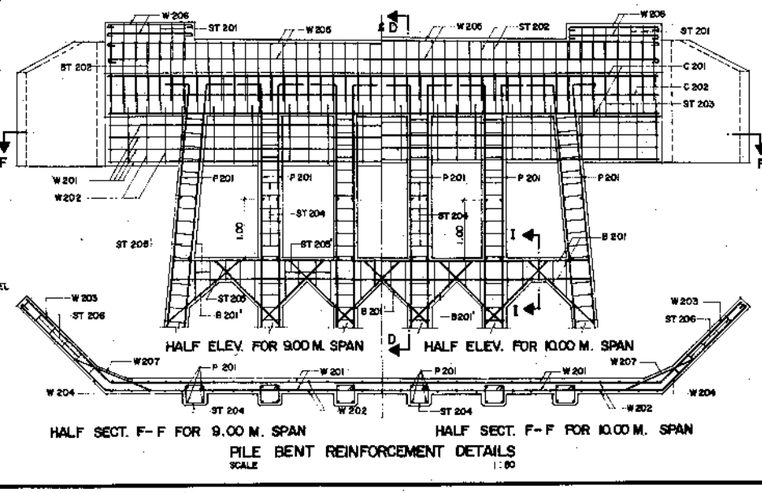
PILE BENT REINFORCEMENT DETAILS
SCALE 1:50



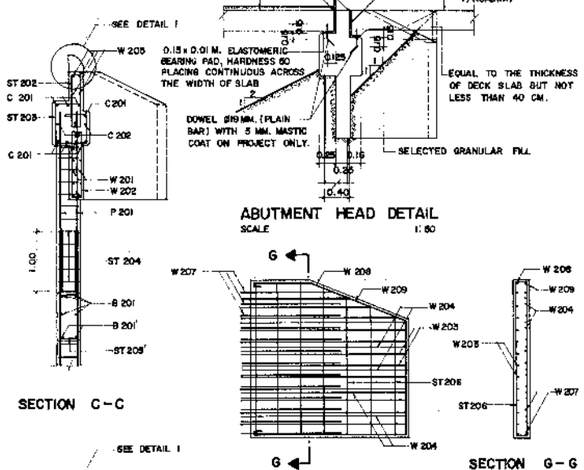


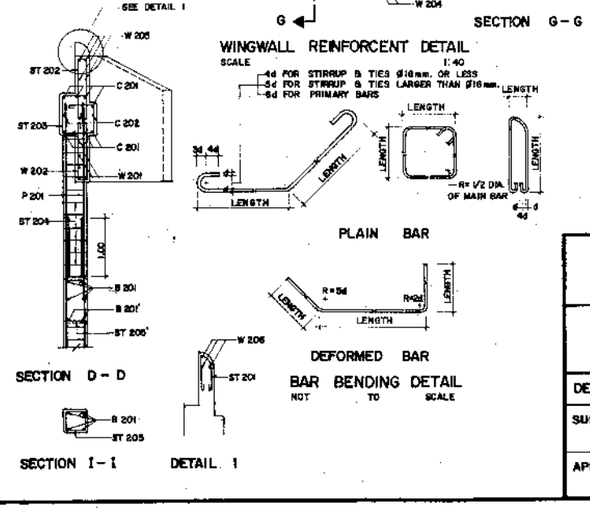
ABUTMENT DETAILS
SCALE 1:75

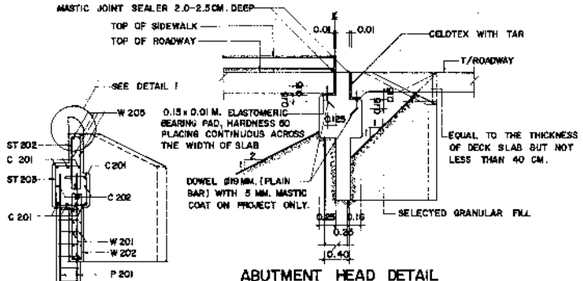




PILE BENT REINFORCEMENT DETAILS
SCALE 1:50







ABUTMENT HEAD DETAIL
SCALE 1:50

WINGWALL REINFORCENT DETAIL
SCALE 1:40

BAR BENDING DETAIL
NOT TO SCALE

TABLE OF REINFORCEMENT

	BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
PILE BENT		C 101	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–	6	–
		C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
		ST 101	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35	3	0.20	–	2.35
		ST 102	3	0.20	56	1.35	3	0.20	56	1.35	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	84	1.35	3	0.20	84	1.35
		ST 103	3	0.25	13	1.35	3	0.25	13	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	14	1.35
		ST 103'	3	0.25	12	–	3	0.25	12	–	3	0.25	16	–	3	0.25	16	–	3	0.25	20	–	3	0.25	20	–
		B 101	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
		B 101'	8	–	12	1.65	8	–	12	1.65	8	–	16	1.65	8	–	16	1.65	8	–	20	1.65	8	–	20	1.65
		P 101	8	–	16	3.75	8	–	16	3.75	8	–	20	3.75	8	–	20	3.75	8	–	24	3.75	8	–	24	3.75
ABUTMENT		C 201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
		C 202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
		ST 201	2	0.20	–	1.215	2	0.20	–	1.295	2	0.20	–	1.355	2	0.20	–	1.435	2	0.20	–	1.515	2	0.20	–	1.635
		ST 202	3	0.20	–	1.745	3	0.20	–	1.796	3	0.20	–	1.846	3	0.20	–	1.895	3	0.20	–	1.945	3	0.20	–	1.995
		ST 205	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–
		ST 204	3	0.20	56	1.35	3	0.20	56	1.35	3	0.20	70	1.35	3	0.20	70	1.35	3	0.20	84	1.35	3	0.20	84	1.35
		ST 205	3	0.25	13	1.35	3	0.25	12	1.35	3	0.25	14	1.35	3	0.25	14	1.35	3	0.25	16	1.35	3	0.25	16	1.35
		ST 206'	3	0.25	12	–	3	0.25	12	–	3	0.25	16	–	3	0.25	16	–	3	0.25	20	–	3	0.25	20	–
		ST 206	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
		B 201	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
		B 201'	8	–	12	1.65	8	–	12	1.65	8	–	16	1.65	8	–	16	1.65	8	–	20	1.65	8	–	20	1.65
		P 201	8	–	16	3.75	8	–	16	3.75	8	–	20	3.75	8	–	20	3.75	8	–	24	3.75	8	–	24	3.75
		W 201	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
		W 202	2	0.30	–	2.70	2	0.30	–	2.60	2	0.30	–	2.60	2	0.30	–	2.50	2	0.30	–	2.40	2	0.30	–	2.30
		W 203	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–
		W 204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
		W 205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
		W 206	2	–	6	–	2	–	6	–	2	–	5	–	2	–	5	–	2	–	6	–	2	–	6	–
		W 207	4	0.15	26	2.15	4	0.15	26	2.25	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
		W 208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
		W 209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

2 = Ø1/4" OR 6 MM., # 3 = Ø3/8" OR 9 MM., # 4 = Ø1/2" OR 12 MM. # 6 = Ø 3/4" OR 20 MM., # 8 = Ø1" OR 25 MM., NO. = TOTAL AMOUNT OF BARS, L= TOTAL LENGTH OF EACH BAR

NOTE :

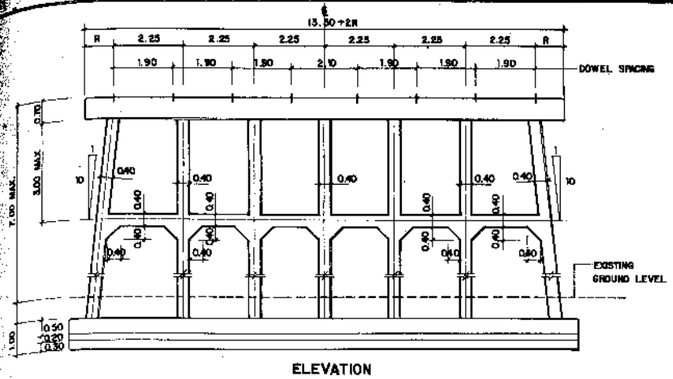
1. PILES SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT ITS CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE CAPACITY OF 90 TONS FOR PILE DETAILS, SEE DWG. NOS. MS-02, MS-03
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES :
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.00 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.00 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL 3.00 M. ADDITIONAL BRACING SHALL BE PROVIDED AT THE INTERVAL NOT MORE THAN 3.00 M.
3. CLEAR CONCRETE COVER SHALL BE 50 CM. EXCEPT THE CAP BEAM, BACK AND WING WALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG/M³ AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/cm² FOR A 0.15x0.15x0.15 m. CUBE AT 28 DAYS. CEMENT SHALL BE TIS TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWING :
   PORTLAND CEMENT 350 KG. CRUSHED ROCK OR GRAVEL 0.86 M³
   SAND 0.43 M³ CONCRETE SLUMP MAX. 10 CM.
5. REBAR #4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF THE BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITION CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.00 M. PIERS HIGHER THAN 7.00 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
10. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.00 M.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

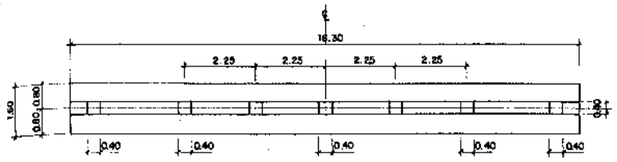
STANDARD DRAWING

6.00 M. ROADWAY WIDTH SLAB BRIDGE
PILE BENT AND ABUTMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE : JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE 1:50, 1:75
APPROVED : (DIRECTOR GENERAL)		DWG. NO. 3405-106-14/3
		SHEET NO. 149



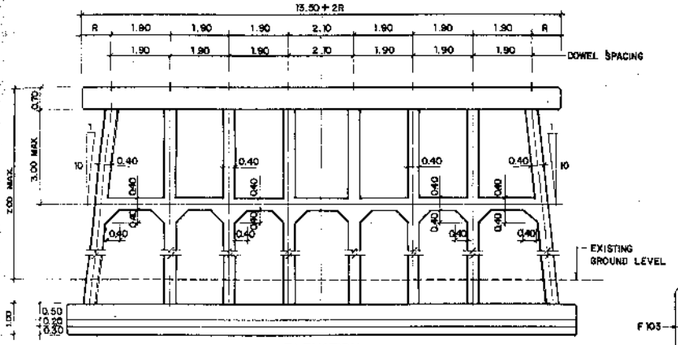
ELEVATION



FOOTING PLAN

PIER DETAILS FOR 5.00 - 6.00 M. SPAN

SCALE 1:100



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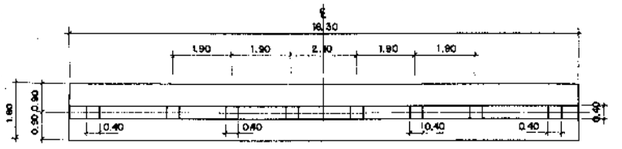
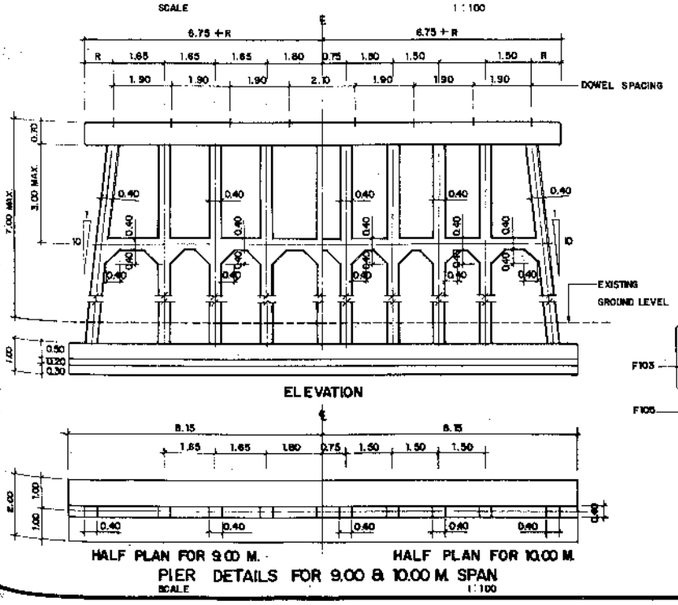


FOOTING PLAN

PIER DETAILS FOR 7.00 - 8.00 M SPAN

SCALE 1:100

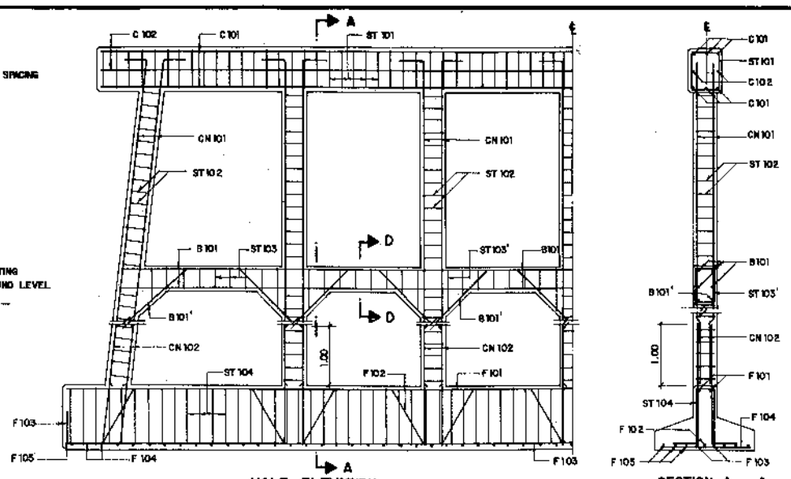


ELEVATION

HALF PLAN FOR 9.00 M. HALF PLAN FOR 10.00 M.

PIER DETAILS FOR 9.00 & 10.00 M. SPAN

SCALE 1:100

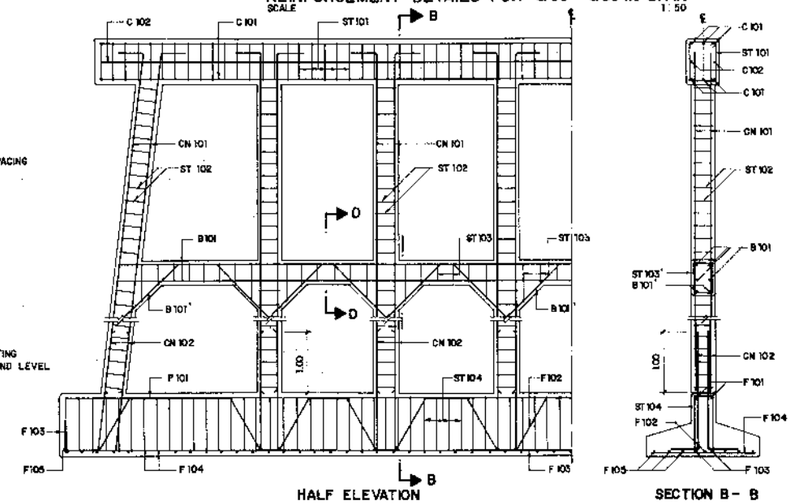


HALF ELEVATION

REINFORCEMENT DETAILS FOR 5.00 - 6.00 M SPAN

SCALE 1:50

SECTION A - A

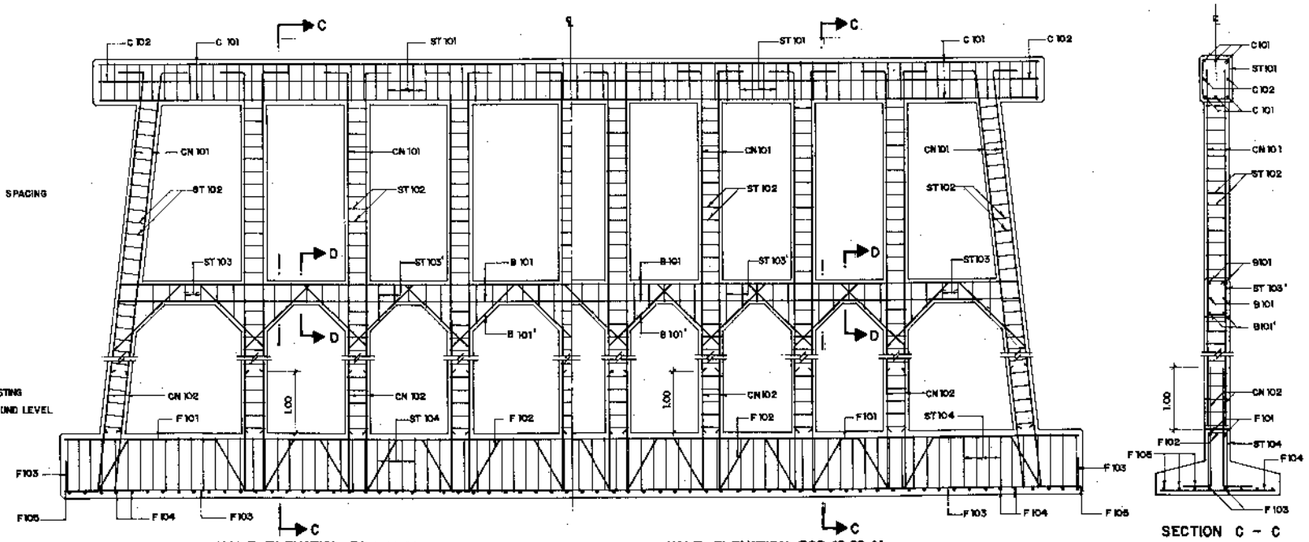


HALF ELEVATION

REINFORCEMENT DETAILS FOR 7.00 - 8.00 M SPAN

SCALE 1:50

SECTION B - B



HALF ELEVATION FOR 9.00 M. HALF ELEVATION FOR 10.00 M.

REINFORCEMENT DETAILS FOR 9.00 & 10.00 M. SPAN

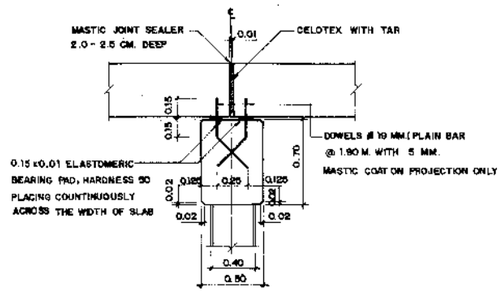
SCALE 1:50

SECTION C - C

TABLE OF REINFORCEMENT

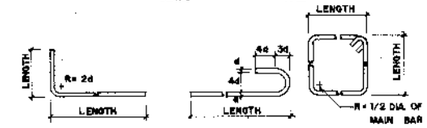
BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
VARIES	C 101	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-	8	-	6	-
VARIES	C 102	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-	4	-	2	-
10.85	CN 101	8	-	28	11.25	8	-	28	11.25	8	-	32	11.25	8	-	32	11.25	8	-	36	11.25	8	-	40	11.25
.40 1.91	CN 102	8	-	28	2.31	8	-	28	2.31	8	-	32	2.31	8	-	32	2.31	8	-	36	2.31	8	-	40	2.31
.45 .40 .65	ST 101	3	0.20	96	2.35	3	0.20	77	2.35	3	0.20	77	2.35	3	0.20	77	2.35	3	0.20	77	2.35	3	0.20	77	2.35
.30 .30 .30 .30	ST 102	3	0.20	96	1.35	3	0.20	432	1.35	3	0.20	480	1.35	3	0.20	480	1.35	3	0.20	528	1.35	3	0.20	528	1.35
.30 .30 .30 .90 VARIES	ST 103	3	0.25	84	1.35	3	0.25	84	1.35	3	0.25	74	1.35	3	0.25	74	1.55	3	0.25	60	1.35	3	0.25	52	1.35
	ST 103'	3	-	48		3	-	48	-	3	-	56	-	3	-	56	-	3	-	64	-	3	-	72	-
VARIES	ST 104	3	0.20	99	2.55	3	0.20	82	2.55	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55	3	0.20	79	2.55
1.55	B 101	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-	8	-
16.20	B 101'	6	-	48	1.55	6	-	48	1.55	6	-	56	1.55	6	-	56	1.55	6	-	64	1.55	6	-	72	1.55
.60 1.00 .60 .60 VARIES .60	F 101	8	-	2	16.20	8	-	2	16.20	8	-	2	16.20	8	-	2	16.20	8	-	2	16.20	8	-	2	16.20
	F 102	8	-	1	-	8	-	1	-	8	-	1	-	8	-	1	-	8	-	1	-	8	-	1	-
16.20 .60	F 103	8	-	2	17.40	8	-	2	17.40	8	-	2	17.40	8	-	2	17.40	8	-	2	17.40	8	-	2	17.40
VARIES	F 104	4	0.25	79	-	4	0.25	79	-	4	0.20	99	-	4	0.20	99	-	4	0.125	158	-	4	0.125	158	-
16.20	F 105	4	-	6	16.20	4	-	6	16.20	4	-	6	16.20	4	-	6	16.20	4	-	6	16.20	4	-	6	16.20

3 = Ø 3/8" OR 9 MM., # 4 = Ø 1/2" OR 12 MM., # 5 = Ø 5/8" OR 20 MM., # 8 = Ø 1" OR 25 MM., NO. = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR



CAP BEAM DETAIL

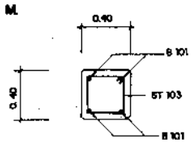
SCALE 1:25



DEFORMED BAR PLAIN BAR

BAR BENDING DETAILS

NOT TO SCALE



SECTION D - D

SCALE 1:25

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME.
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON / $M.^2$
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCE :
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEED 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND, LEVEL EXCEED 3.0 M. ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM., EXCEPT THE CAP BEAM AND WING WALLS WHERE A CLEAR COVER OF 5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG. / $M.^3$ AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./$CM.^2$ FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX. DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350 KG.	CRUSHED ROCK OR GRAVEL	0.86 $M.^3$
SAND	0.43 $M.^3$	CONCRETE SLUMP MAX.	10 CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS., OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
7. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANCE PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M., PIERS HIGHER THAN 7.0 M SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.

KINGDOM OF THAILAND

MINISTRY OF TRANSPORT AND COMMUNICATIONS

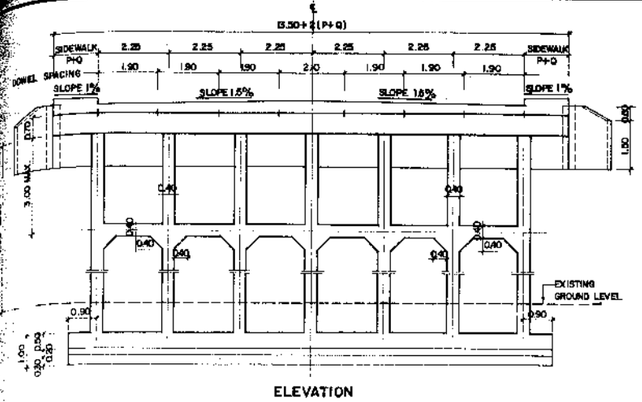
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

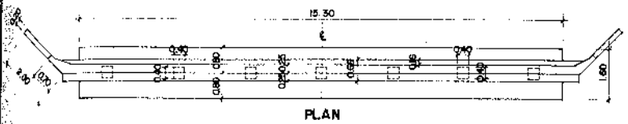
13.50 M. ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTING PIER DETAILS

DESIGNER : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. 3AD5-106-14/27
		SHEET NO. 150

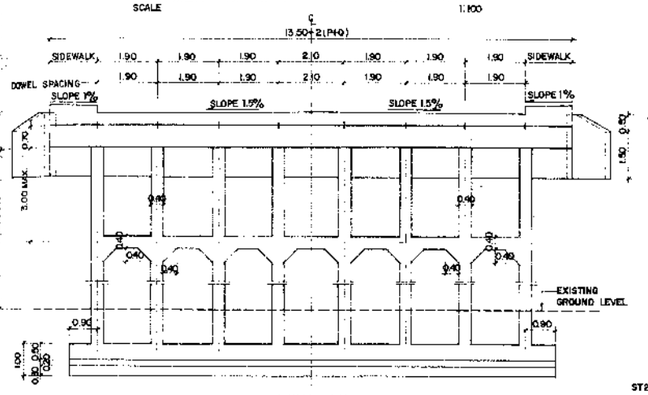


ELEVATION



PLAN

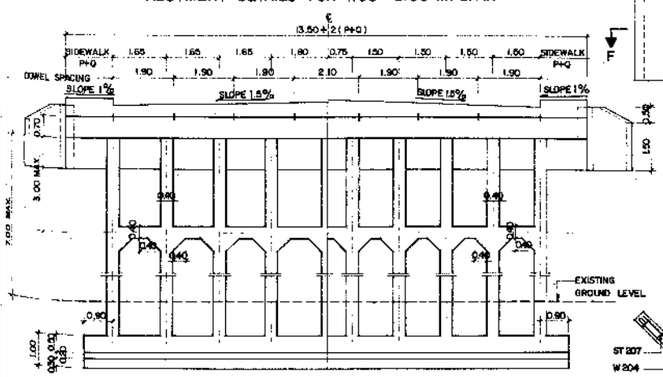
ABUTMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1:100



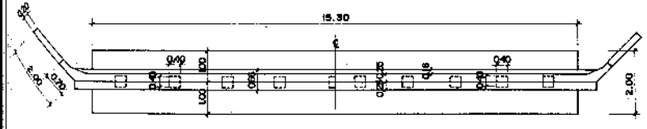
ELEVATION

PLAN

ABUTMENT DETAILS FOR 7.00 - 8.00 M. SPAN

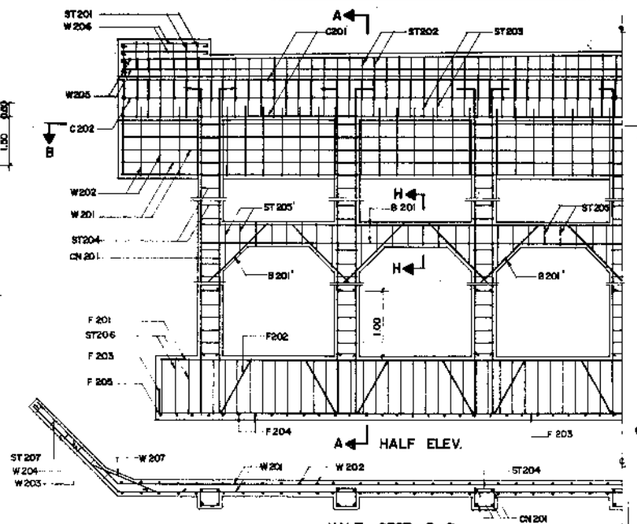


HALF ELEV. FOR 9.00 M. HALF ELEV. FOR 10.00 M.



HALF PLAN FOR 9.00 M. HALF PLAN FOR 10.00 M.

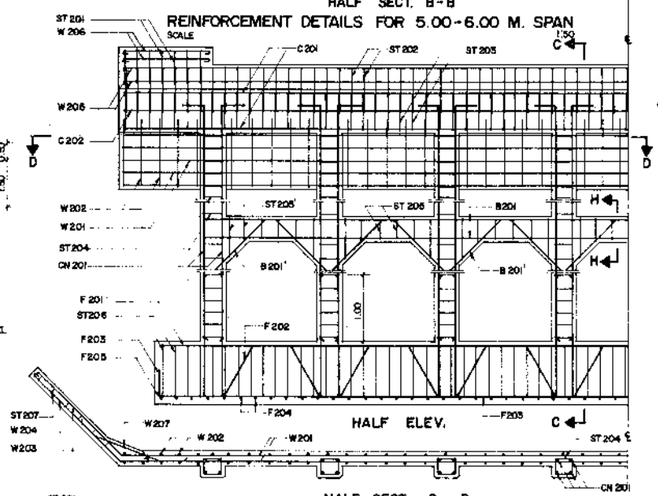
ABUTMENT DETAILS FOR 9.00 & 10.00 M. SPAN
SCALE 1:100



HALF ELEV.

HALF SECT. B - B

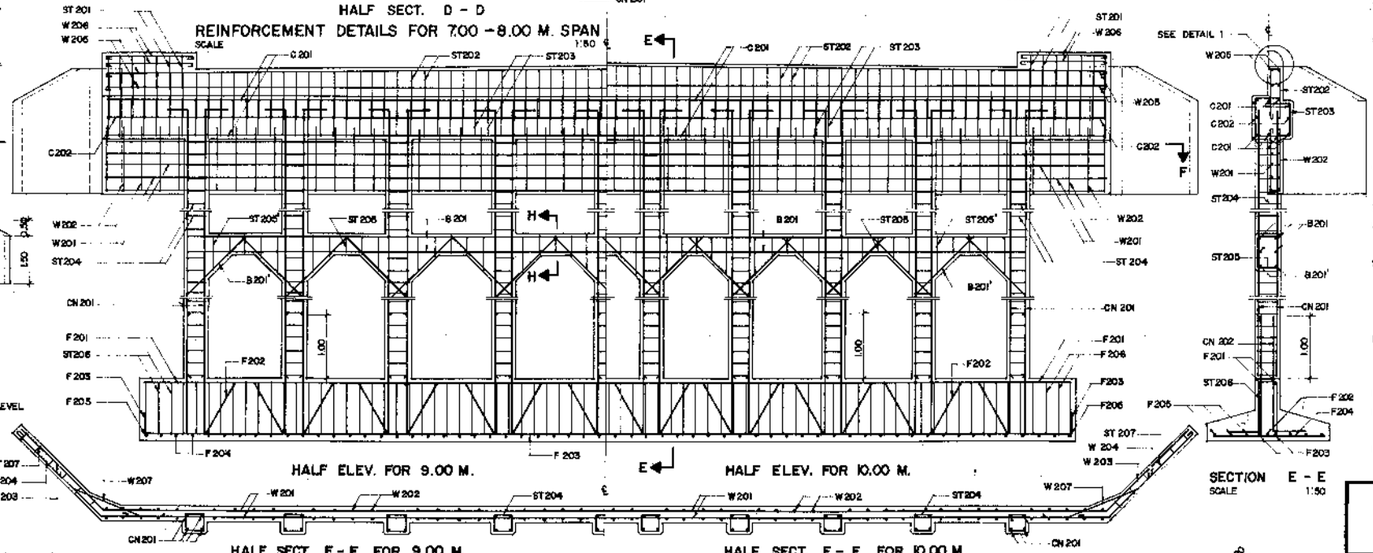
REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1:50



HALF ELEV.

HALF SECT. D - D

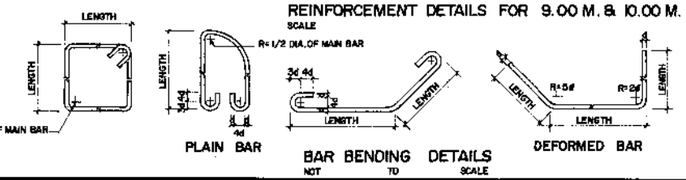
REINFORCEMENT DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1:50



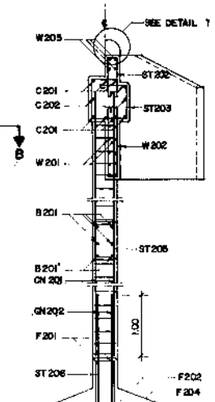
HALF ELEV. FOR 9.00 M. HALF ELEV. FOR 10.00 M.

HALF SECT. F - F FOR 9.00 M. HALF SECT. F - F FOR 10.00 M.

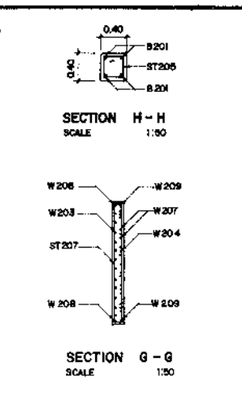
REINFORCEMENT DETAILS FOR 9.00 M. & 10.00 M. SPAN
SCALE 1:50



PLAIN BAR BAR BENDING DETAILS NOT TO SCALE DEFORMED BAR

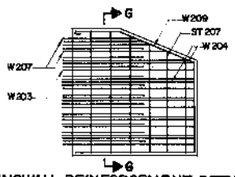


SECTION A - A
SCALE 1:50

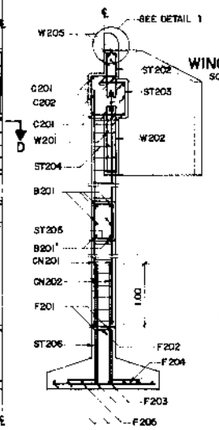


SECTION H - H
SCALE 1:50

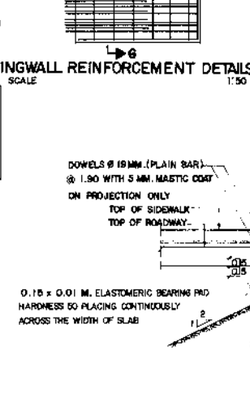
SECTION G - G
SCALE 1:50



WINGWALL REINFORCEMENT DETAILS
SCALE 1:50

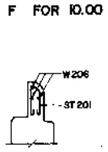


SECTION C - C
SCALE 1:50

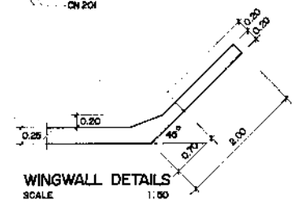


ABUTMENT HEAD DETAILS
SCALE 1:50

SECTION E - E
SCALE 1:50



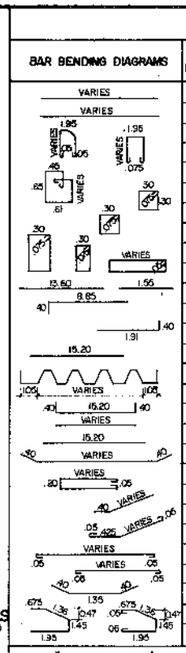
DETAIL 1
SCALE 1:50



WINGWALL DETAILS
SCALE 1:50

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS



BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
C201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
C202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
ST201	2	0.20	–	1.215	2	0.20	–	1.295	2	0.20	–	1.375	2	0.20	–	1.435	2	0.20	–	1.515	2	0.20	–	1.615
ST202	3	0.20	–	1.745	3	0.20	–	1.795	3	0.20	–	1.845	3	0.20	–	1.895	3	0.20	–	1.945	3	0.20	–	1.995
ST203	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–	3	0.20	–	–
ST204	3	0.20	254	1.35	3	0.20	254	1.35	3	0.20	312	1.36	3	0.20	312	1.36	3	0.20	351	1.35	3	0.20	390	1.35
ST205	3	0.25	46	1.35	3	0.25	46	1.35	3	0.25	56	1.35	3	0.25	56	1.35	3	0.25	26	1.35	3	0.25	26	1.35
ST206	3	–	46	–	3	–	48	–	3	–	56	–	3	–	56	–	3	–	64	–	3	–	72	–
ST205	3	0.20	77	2.55	3	0.20	77	2.55	3	0.20	77	2.55	3	0.20	77	2.55	3	0.20	77	2.55	3	0.20	77	2.55
ST207	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
B201	8	–	8	13.60	8	–	8	13.60	8	–	8	13.60	8	–	8	13.60	8	–	8	13.60	8	–	8	13.60
B201'	5	–	48	1.55	6	–	48	1.55	6	–	56	1.55	6	–	56	1.55	6	–	64	1.55	6	–	72	1.55
CN201	8	–	28	9.25	8	–	28	9.25	8	–	32	9.25	8	–	32	9.25	8	–	36	9.25	8	–	40	9.25
CN202	8	–	28	2.31	8	–	28	2.31	8	–	32	2.31	8	–	32	2.31	8	–	36	2.31	8	–	40	2.31
F201	8	–	2	15.20	8	–	2	15.20	8	–	2	15.20	8	–	2	15.20	8	–	2	15.20	8	–	2	15.20
F202	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–
F203	8		2	16.00	8		2	16.00	8		2	16.00	8		2	16.00	8		2	16.00	8		2	16.00
F204	4	0.25	61	–	4	0.25	61	–	4	0.20	76	–	4	0.20	76	–	4	0.125	122	–	4	0.125	122	–
F205	4	–	6	15.20	4	–	6	15.20	4	–	6	15.20	4	–	6	15.20	4	–	6	15.20	4	–	6	15.20
W201	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
W202	2	0.30	–	2.70	2	0.30	–	2.80	2	0.30	–	2.60	2	0.30	–	2.50	2	0.30	–	2.40	2	0.30	–	2.30
W203	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–
W204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
W205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
W206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
W207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
W208	4	–	2	5.435	4	–	2	5.485	4	–	2	5.485	4	–	2	5.485	4	–	2	5.435	4	–	2	5.435
W209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

#2=Ø 1/4" OR 6 MM., #3=Ø 3/8" OR 9 MM., #4=Ø 1/2" OR 12 MM., #5=Ø 5/4" OR 20 MM., #8=Ø 1" OR 25 MM., NO.=TOTAL AMOUNT OF BARS, L=TOTAL LENGTH OF EACH BAR

NOTES :

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED, 10 CM. THICKNESS OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON / M^2
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK WALL AND WINGWALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
5. CONCRETE SHALL HAVE ALUMINIUM CEMENT CONTENT OF 350 KG./M. AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM. FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.43	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MAX	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS. 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS. 20, GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED
7. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETER OF BIGGER BAR FOR DEFORMED BARS
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFROMING TO TIS. 15, SHALL BE USED AND ADDITION CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM, BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HEIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
11. ALL DIAMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED
12. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 10.00 M.
13. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3A05-106-14/9

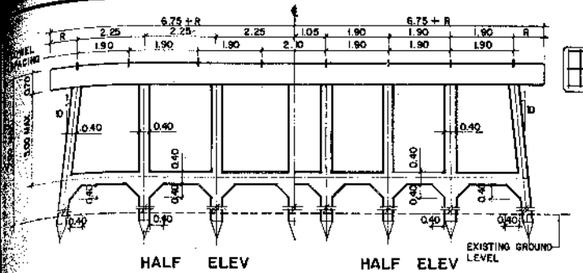
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

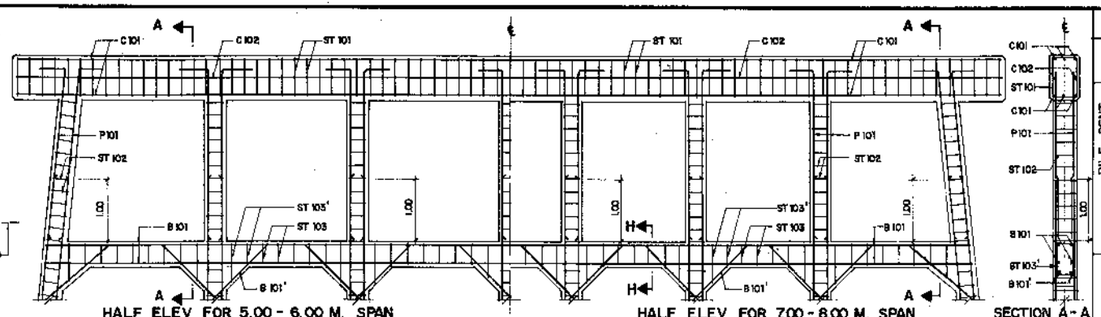
STANDARD DRAWING

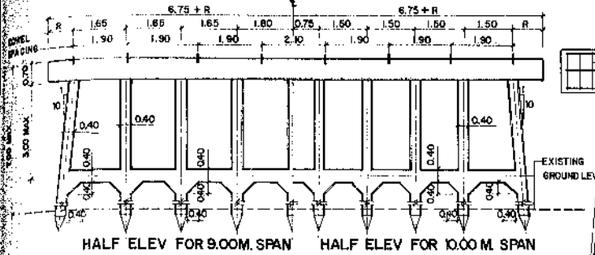
13.50 M. ROADWAY WIDTH SLAB BRIDGE

SPREAD FOOTING ABUTMENT DETAILS

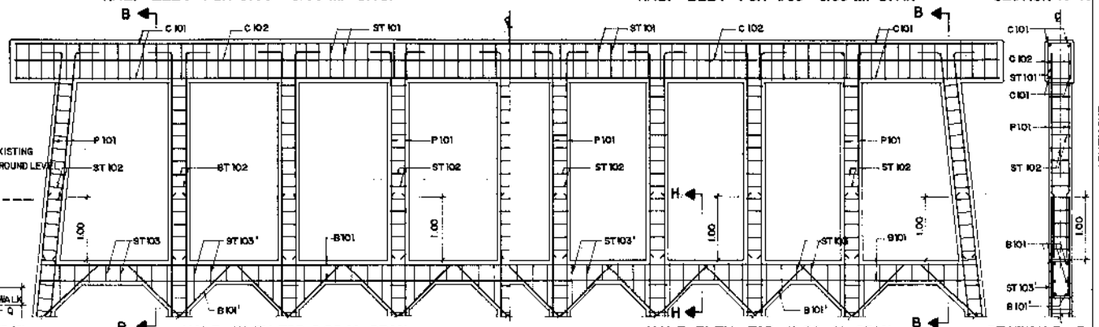
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG.NO. 3A05-106-14/27[a]
		SHEET NO. 151

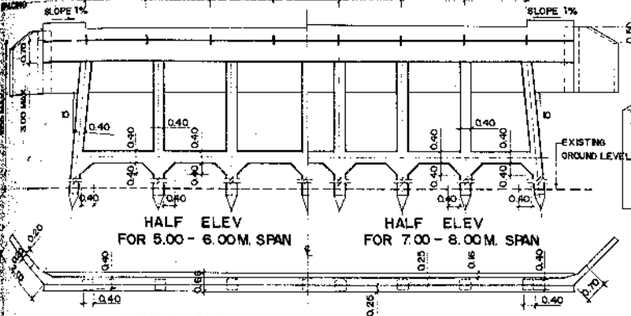


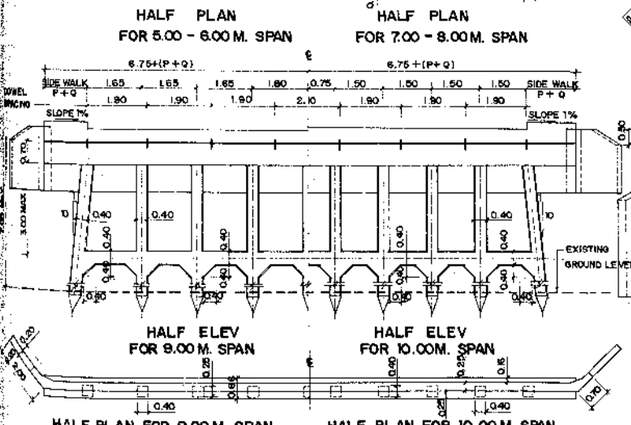




PILE BENT ELEVATION
SCALE 1:100

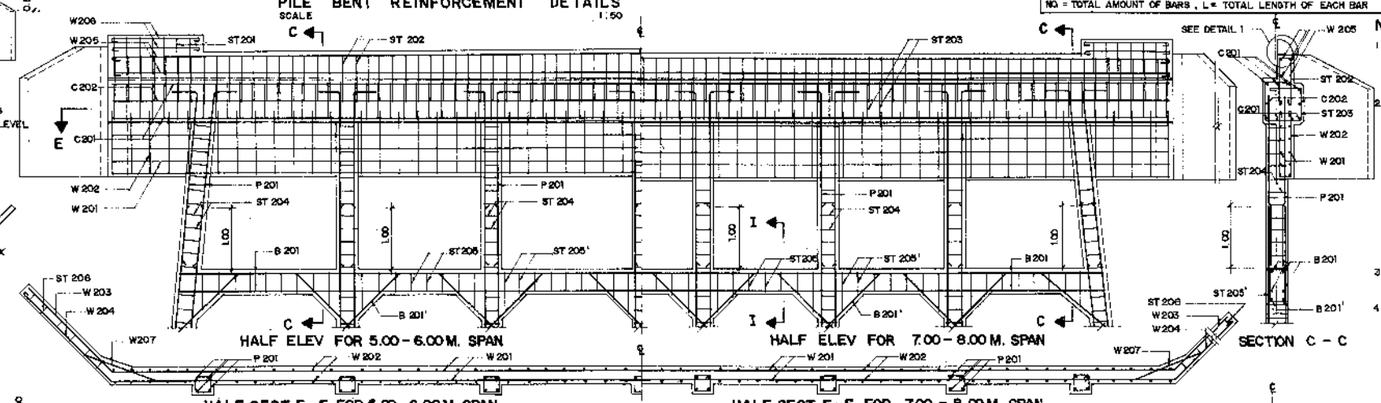


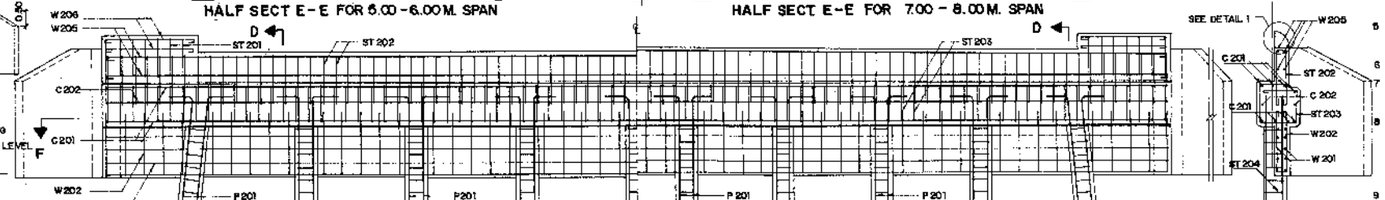


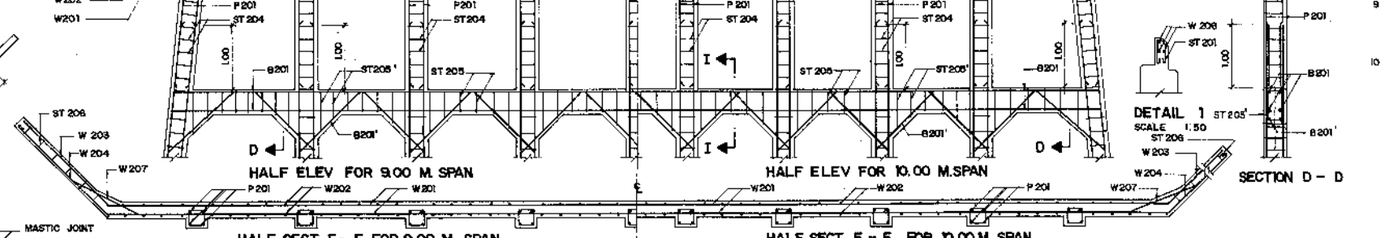


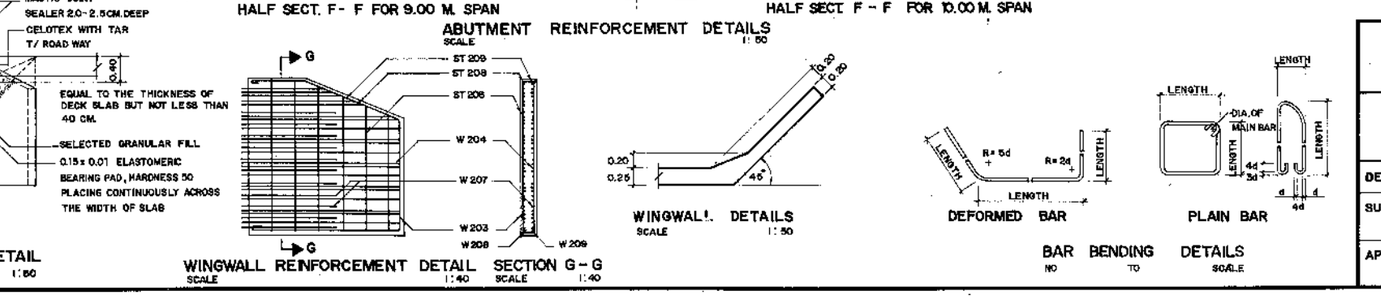
ABUTMENT DETAILS
SCALE 1:100

PILE BENT REINFORCEMENT DETAILS
SCALE 1:50

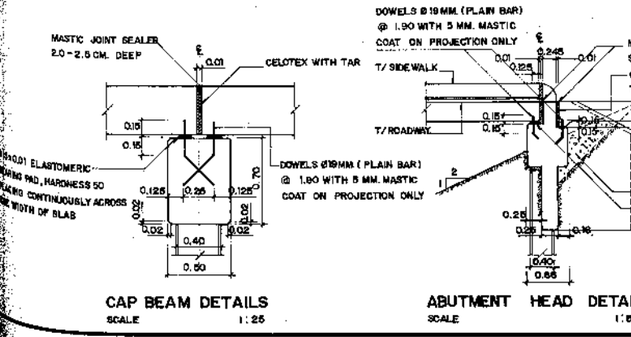








ABUTMENT REINFORCEMENT DETAILS
SCALE 1:50



CAP BEAM DETAILS
SCALE 1:25

ABUTMENT HEAD DETAIL
SCALE 1:50

SCALE 1:40 SCALE 1:40

SCALE 1:50

BAR BENDING DETAILS
NO SCALE TO

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M. #	@	NO.	L	SPAN 6.00 M. #	@	NO.	L	SPAN 7.00 M. #	@	NO.	L	SPAN 8.00 M. #	@	NO.	L	SPAN 9.00 M. #	@	NO.	L	SPAN 10.00 M. #	@	NO.	L
PILE BENT	C 101	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST 101	3	0.20	94	2.35	3	0.20	94	2.35	3	0.20	94	2.35	3	0.20	94	2.35	3	0.20	94	2.35	3	0.20	94	2.35
	ST 102	3	0.20	126	1.35	3	0.20	126	1.35	3	0.20	140	1.35	3	0.20	140	1.35	3	0.20	154	1.35	3	0.20	166	1.35
	ST 103	3	0.25	40	1.35	3	0.25	40	1.35	3	0.25	35	1.35	3	0.25	35	1.35	3	0.25	30	1.35	3	0.25	23	1.35
	ST 103'	3	0.25	24	–	3	0.25	24	–	3	0.25	28	–	3	0.25	28	–	3	0.25	32	–	3	0.25	36	–
	B 101	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
	B 101'	6	–	24	1.55	6	–	24	1.55	6	–	28	1.55	6	–	–	1.55	6	–	32	1.55	6	–	36	1.55
	P 101	8	–	36	3.75	6	–	36	3.75	6	–	40	3.75	8	–	40	3.75	8	–	44	3.75	8	–	48	3.75
ABUTMENT	C 201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	C 202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST 201	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–
	ST 202	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–
	ST 203	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–
	ST 204	3	0.20	126	1.35	3	0.20	126	1.35	3	0.20	140	1.35	3	0.20	140	1.35	3	0.20	154	1.35	3	0.20	154	1.35
	ST 205	3	0.25	40	1.35	3	0.25	40	1.35	3	0.25	35	1.35	3	0.25	35	1.35	3	0.25	30	1.35	3	0.25	23	1.35
	ST 205'	3	0.25	24	–	3	0.25	24	–	3	0.25	28	–	3	0.25	28	–	3	0.25	32	–	3	0.25	36	–
	ST 206	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
	B 201	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
	B 201'	6	–	24	1.55	6	–	24	1.55	6	–	28	1.55	6	–	28	1.55	6	–	32	1.55	6	–	36	1.55
	P 201	8	–	36	3.75	8	–	36	3.75	8	–	40	3.75	8	–	40	3.75	8	–	44	3.75	8	–	42	3.75
	W 201	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
	W 202	2	0.30	55	–	2	0.30	55	–	2	0.30	55	–	2	0.30	55	–	2	0.30	55	–	2	0.30	55	–
	W 203	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–
	W 204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
	W 205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
	W 206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
	W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
	W 208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
	W 209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

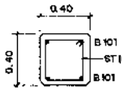
# 2 = Ø 1/4" OR 6MM., # 3 = Ø 3/8" OR 9MM., # 4 = Ø 1/2" OR 12 MM., # 6 = Ø 3/4" OR 20 MM., # 8 = Ø 1" OR 25 MM.
NO = TOTAL AMOUNT OF BARS , L = TOTAL LENGTH OF EACH BAR

NOTES.

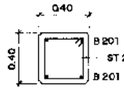
1. PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT ITS CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE CAPACITY OF 90 TONS OR PILE DETAILS SEE DWG NO. MS - 02 , MS - 03
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES .
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE GROUND LEVEL EXCEEDS 3.0M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM , BACK AND WING WALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT 350 KG./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/CM^2 FOR A 0.15x0.15x0.15 M CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS :

PORTLAND CEMENT	350 KG.	CRUSHED ROCK OR GRAVEL	0.86 M^3
SAND	0.43 M.^{3}	CONCRETE SLUMP MAX.	10 CM.

5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BAR, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS ORTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER - BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION , HIGH SULPHATE CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM , BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS.
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HEIGHER THAN 7.0 M. SHALL BE SUMITTED TO THE ENGINEER FOR APPROVAL.
10. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.



SECTION H - H
SCALE 1:25



SECTION I - I
SCALE 1:25

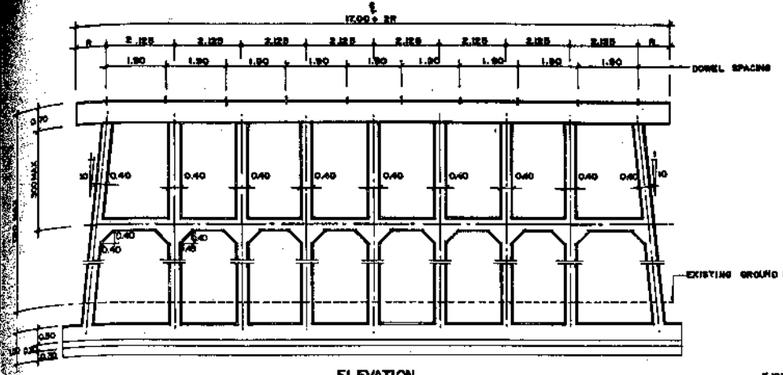
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

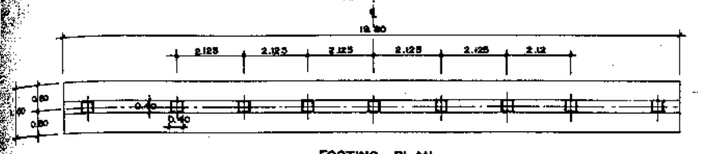
13.50 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

DESIGNER : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. 3AD5 - 106 - 14 / 28
		SHEET NO. 152

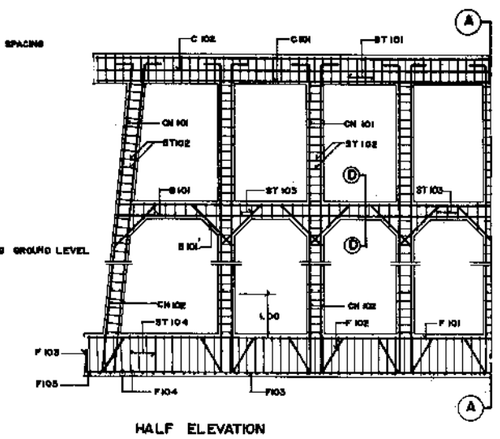


ELEVATION

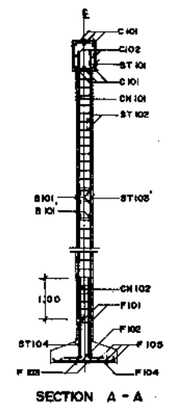


FOOTING PLAN

PIER DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1 : 1 0 0



HALF ELEVATION



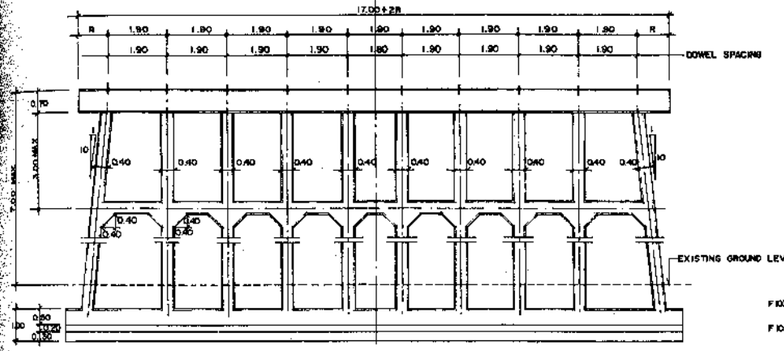
SECTION A - A

REINFORCEMENT DETAILS FOR 5.00 - 6.00 M. SPAN
SCALE 1 : 7 5

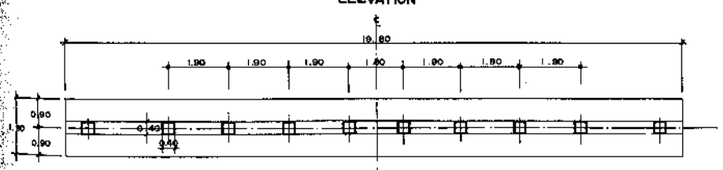
TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L
	C101	8	—	6	—	8	—	6	—	8	—	6	—	8	—	6	—	8	—	6	—	8	—	6	—
	C102	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—	4	—	2	—
	CN101	8	—	28	11.25	8	—	2	11.25	8	—	32	11.25	8	—	32	11.25	6	—	36	11.25	8	—	40	11.25
	CN102	8	—	28	2.31	6	—	28	2.31	8	—	32	2.31	8	—	32	2.31	8	—	36	2.31	8	—	40	2.31
	ST101	3	.20	85	2.35	3	.20	85	2.35	3	.20	85	2.35	3	.20	85	2.35	3	.20	95	2.35	3	.20	95	2.35
	ST102	3	.20	432	1.35	3	.20	432	1.35	3	.20	480	1.35	3	.20	480	1.35	3	.20	528	1.35	3	.20	528	1.35
	ST103	3	.25	66	1.35	3	.25	66	1.35	3	.25	66	1.35	3	.25	66	1.35	3	.25	46	1.35	3	.25	46	1.35
	ST103'	3	—	64	—	3	—	64	—	3	—	72	—	3	—	72	—	3	—	80	—	3	—	88	—
	ST104	3	.20	99	2.55	3	.20	99	2.55	3	.20	99	2.55	3	.20	99	2.55	3	.20	99	2.55	3	.20	99	2.55
	B101	6	—	4	—	6	—	4	—	6	—	4	—	6	—	4	—	6	—	4	—	6	—	4	—
	B101'	8	—	64	1.55	8	—	64	1.55	8	—	72	1.55	8	—	72	1.55	6	—	80	1.55	8	—	88	1.55
	F101	8	—	2	19.70	8	—	2	19.70	8	—	2	19.70	8	—	2	1970	8	—	2	19.70	8	—	2	1970
	F102	8	—	1	—	8	—	1	—	8	—	1	—	6	—	1	—	8	—	1	—	8	—	1	—
	F103	8	—	2	20.90	8	—	2	20.90	8	—	2	20.90	6	—	2	20.90	8	—	2	20.90	8	—	2	20.90
	F104	4	—	28	79	4	—	28	79	4	.20	99	—	4	.20	99	—	4	.125	186	—	4	.125	156	—
	F105	4	—	6	19.70	4	—	6	19.70	4	—	6	19.70	4	—	6	19.70	4	—	6	19.70	4	—	6	19.70

3 = Ø 3/8 OR 9 MM., # 4 = Ø 1/2 OR 12 MM., # 6 = Ø 3/4 OR 20 MM., # 8 = Ø 1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

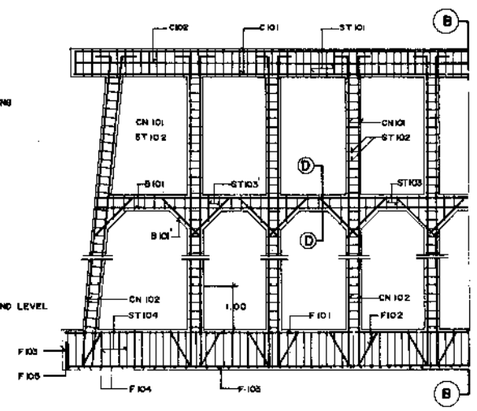


ELEVATION

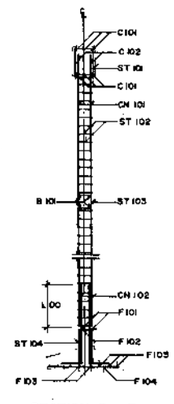


FOOTING PLAN

PIER DETAILS FOR 7.00 - 8.00 M. SPAN
SCALE 1 : 1 0 0

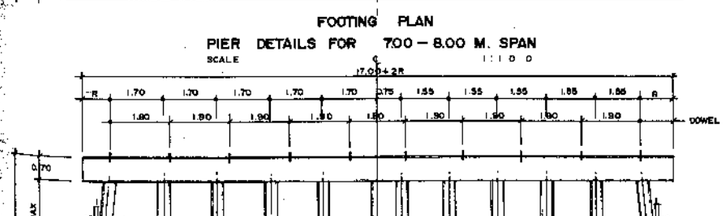


HALF ELEVATION



SECTION B - B

REINFORCEMENT DETAILS FOR 7.00 - 8.00 M SPAN
SCALE 1 : 7 5



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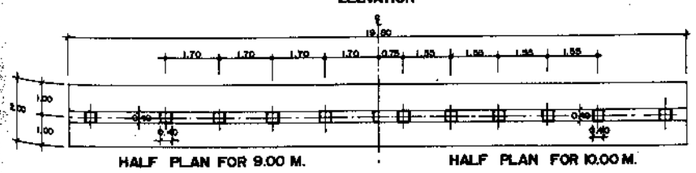
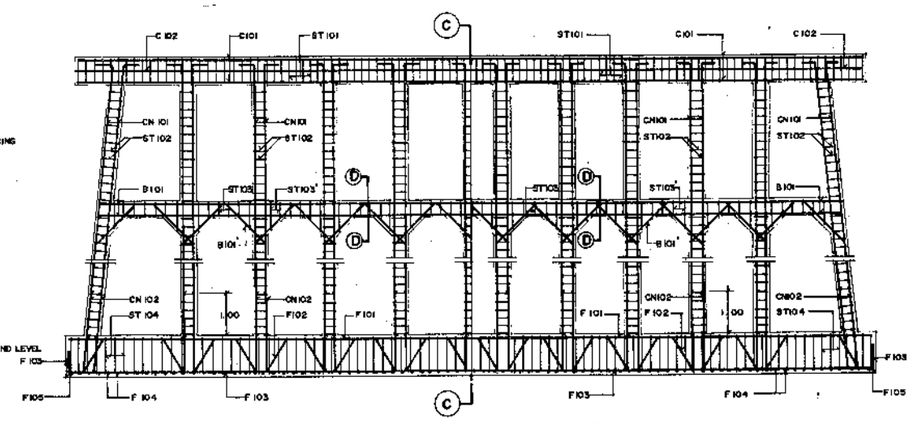


FOOTING PLAN

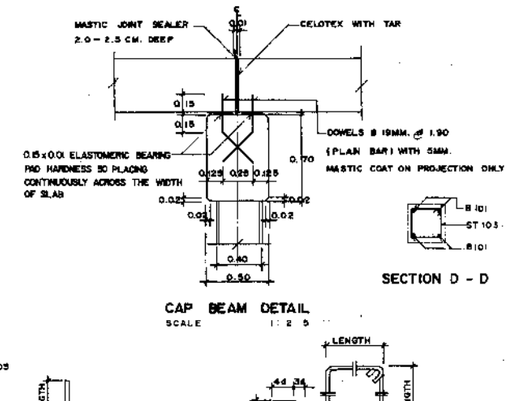
PIER DETAILS FOR 9.00 & 10.00 M SPAN
SCALE 1 : 1 0 0



HALF ELEVATION FOR 9.00M. HALF ELEVATION FOR 10.00 M.

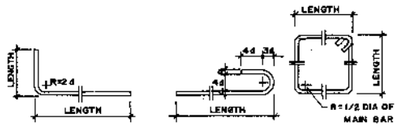
REINFORCEMENT DETAILS FOR 9.00 & 10.00M. SPAN
SCALE 1 : 7 5

SECTION C-C



CAP BEAM DETAIL
SCALE 1 : 2 5

SECTION D - D



DEFORMED BAR PLAIN BAR

BAR BENDING DETAILS
NOT TO SCALE

NOTES.

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M. AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:5 BY VOLUME
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON / M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCE:
   a.) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b.) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0M. ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM, BACK AND WING WALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG/M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/CM^2 FOR A .15 x .15 x .15 M CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS:

PORTLAND CEMENT	350	KG
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.86	M^3
CONCRETE SLUMP MAX.	10	CM.

6. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BAR, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED
7. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
9. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANCE PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 5 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M., PIER HIGHER THAN 7.0 M SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12 M.
12. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.

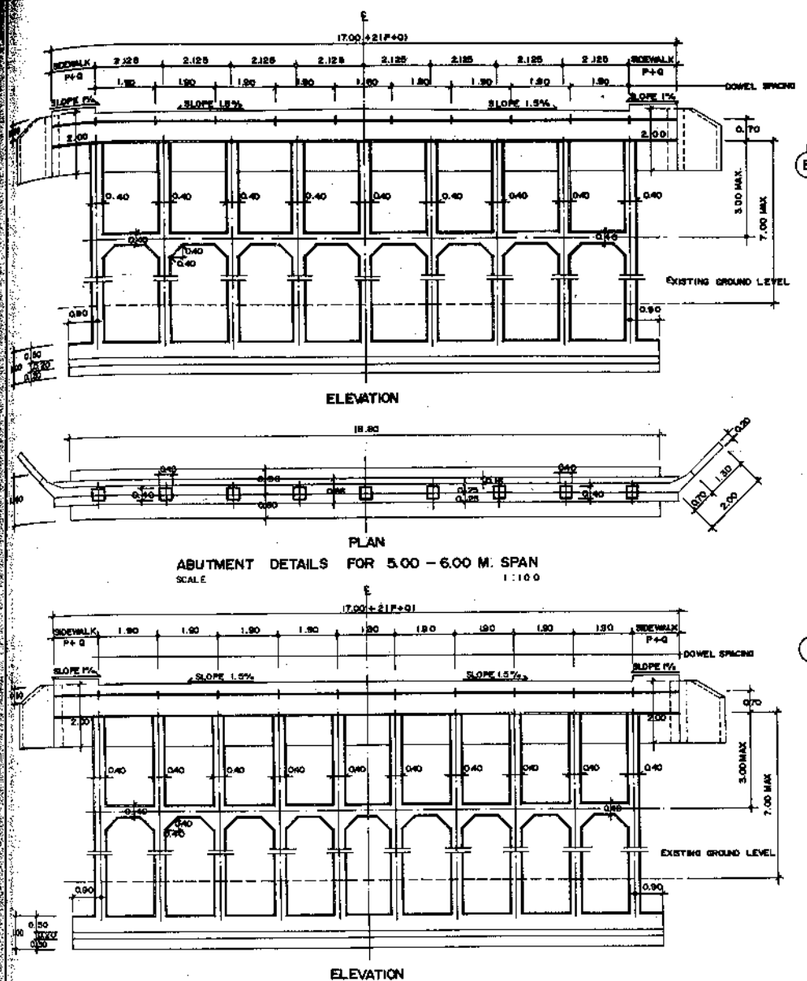
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

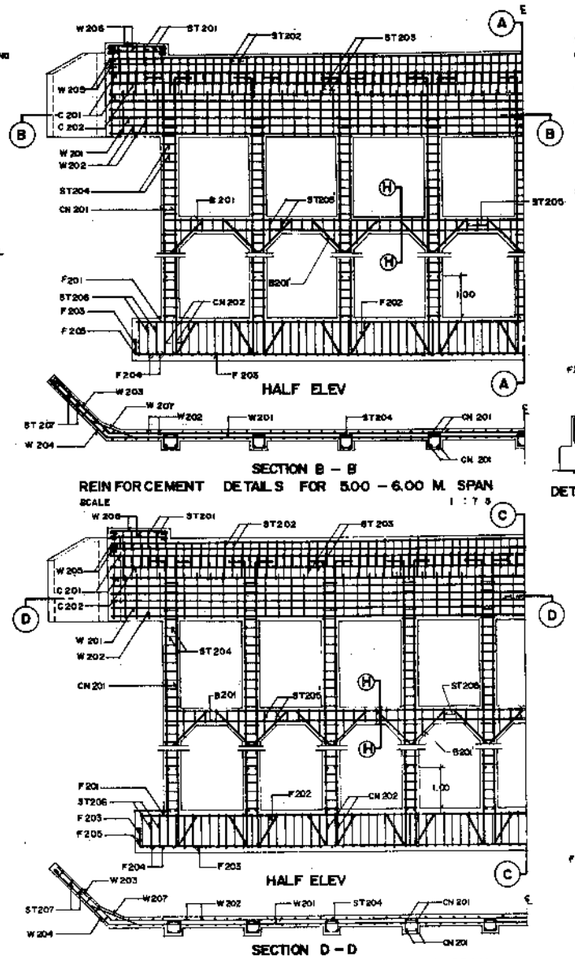
STANDARD DRAWING

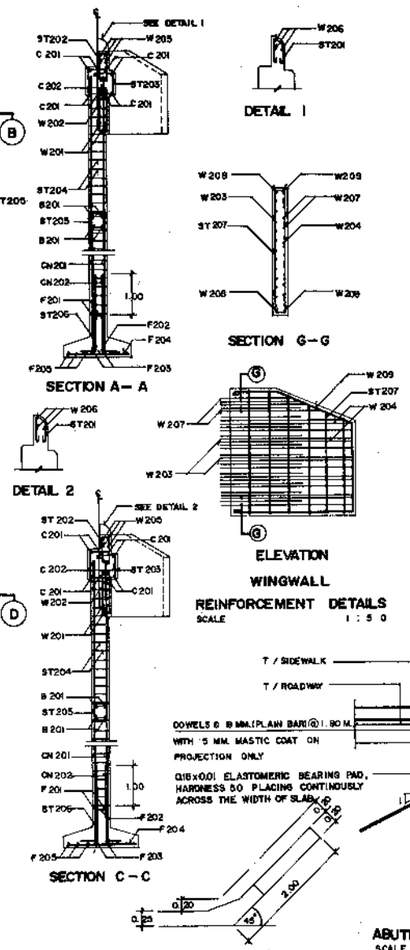
17.00 M. ROADWAY WIDTH SLAB BRIDGE

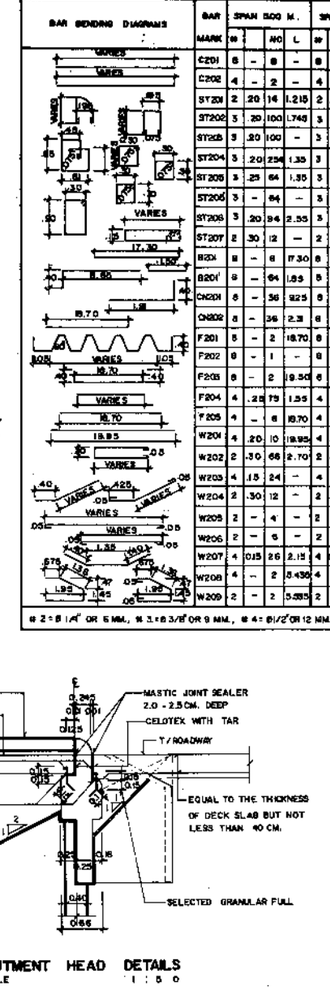
SPREAD FOOTING PIER DETAILS

DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS-SHOWN
APPROVED: (DIRECTOR GENERAL)		DWG. NO. 3.405-106-14/29
		SHEET NO. 153









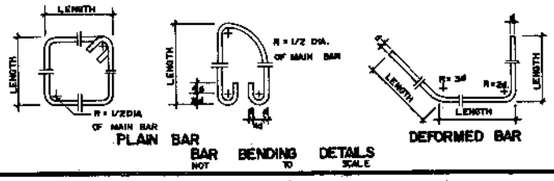


TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS

BAR MARK	SPAN 5.00 M.			SPAN 6.00 M.			SPAN 7.00 M.			SPAN 8.00 M.			SPAN 9.00 M.			SPAN 10.00 M.		
	#	NO	L	#	NO	L	#	NO	L	#	NO	L	W	NO	L	W	NO	L
C201	6	–	8	6	–	8	6	–	8	6	–	8	6	–	8	6	–	8
C202	4	–	2	4	–	2	4	–	2	4	–	2	4	–	2	4	–	2
ST201	2	20	14	1.215	2	20	14	1.286	2	20	14	1.358	2	20	14	1.435	2	20	14	1.515	2	20	14	1.633
ST202	3	20	100	1.748	3	20	100	1.785	3	20	100	1.845	3	20	100	1.895	3	20	100	1.945	3	20	100	1.995
ST203	3	20	100	–	3	20	100	–	3	20	100	–	3	20	100	–	3	20	100	–	3	20	100	–
ST204	3	20	256	1.35	3	20	204	1.35	3	20	312	1.35	3	20	312	1.35	3	20	312	1.35	3	20	390	1.35
ST205	3	25	64	1.35	3	25	64	1.35	3	25	64	1.35	3	25	54	1.35	3	25	40	1.35	3	25	44	1.89
ST206	3	–	64	–	3	–	64	–	3	–	72	–	3	–	72	–	3	–	80	–	3	–	88	–
ST208	3	20	84	2.35	3	20	94	2.35	3	20	94	2.35	3	20	94	2.35	3	20	94	2.35	3	20	94	2.56
ST207	2	30	12	–	2	30	12	–	2	30	12	–	2	30	12	–	2	30	12	–	2	30	12	–
B201	8	–	8	17.30	8	–	8	17.30	8	–	8	17.30	8	–	8	17.30	8	–	8	17.30	8	–	8	17.30
B201'	8	–	64	1.85	8	–	64	1.95	8	–	72	1.85	8	–	72	1.85	8	–	80	1.85	8	–	88	1.05
CN201	8	–	36	9.25	8	–	36	9.25	8	–	40	9.25	8	–	40	9.25	8	–	44	9.25	8	–	48	9.25
CN202	8	–	36	2.31	8	–	36	2.31	8	–	40	2.31	8	–	40	2.31	8	–	44	2.31	8	–	48	2.31
F201	8	–	2	18.70	8	–	2	18.70	8	–	2	18.70	8	–	2	18.70	8	–	2	18.70	8	–	2	18.70
F202	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–	8	–	1	–
F203	8	–	2	19.50	8	–	2	19.50	8	–	2	19.50	8	–	2	19.50	8	–	2	19.50	8	–	2	19.50
F204	4	.25	79	1.35	4	.25	75	1.35	4	.20	94	1.76	4	.20	94	1.75	4	.125	150	1.95	4	.125	150	1.95
F205	4	–	6	18.70	4	–	6	18.70	4	–	6	18.70	4	–	6	18.70	4	–	6	18.70	4	–	6	18.70
W201	4	.20	10	19.95	4	.20	10	19.95	4	.20	10	19.95	4	.20	10	19.95	4	.20	10	19.95	4	.20	10	19.95
W202	2	.30	66	2.70	2	.30	66	2.60	2	.30	66	2.60	2	.30	66	2.50	2	.30	66	2.40	2	.30	66	2.30
W203	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–	4	.15	24	–
W204	2	.30	12	–	2	30	12	–	2	.30	12	–	2	30	12	–	2	.30	12	–	2	.30	12	–
W205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
W206	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–	2	–	6	–
W207	4	015	26	2.15	4	015	26	2.15	4	015	26	2.15	4	015	26	2.15	4	0.15	26	2.15	4	0.15	85	2.15
W208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
W209	2	–	2	5.335	2	–	2	5.335	2	–	2	5.335	2	–	2	5.335	2	–	2	5.335	2	–	2	5.335

= 8 I.M. OR 6 MM., # 3 = 8 3/8" OR 9 MM., # 4 = 81/2" OR 12 MM., # 8 = 1" OR 25 MM., NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR

NOTES

1. THE BOTTOM OF A FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY BUT NOT LESS THAN 2.5 M AFTER THE GROUND UNDER THE BOTTOM OF FOOTING HAS BEEN PREPARED . 10 CM. THICK OF LEAN CONCRETE SHALL BE POURED AT LEAST 10 CM. WIDER THAN THE FOOTING ALL AROUND COMPOSITION OF LEAN CONCRETE SHALL BE 1:3:6 BY VOLUME .
2. SOIL UNDER THE FOOTING SHALL HAVE A MINIMUM ALLOWABLE BEARING CAPACITY OF 20 TON/M.^{2}
3. HORIZONTAL CROSS BRACING BETWEEN COLUMN SHALL BE PROVIDED IN FOLLOWING CIRCUMSTANCES
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0M., A SPACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM BOTTOM OF THE CAP BEAM TO THE CENTERLINE THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEEDS 3.0 M., ADDITIONAL BRACINGS SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
4. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM , BACK AND WING WALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED.
5. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG/M^3 AND A MINIMUM ULTIMATE COMPRESSIVE MGTH OF 210 KG/CM^2 FOR A 15x15x15 CM CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS

PORTLAND CEMENT	350	KG.
SAND	0.45	M^3
CRUSHED ROCK OR GRAVEL	0.85	M^3
CONCRETE SLUMP MAX	10	CM.

6. REBARS IN # 4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED .
7. LOCATION OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER .
8. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS .
9. IN CASE OF SALINE PROTECTION , HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED WITHOUT ALTERING THE LOCATIONS OF REBARS.
10. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING CANAL BED TO THE TOP OF CAP BEAM SHALL BE 7.0 M PIERS HIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL .
11. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT 10.00 M.
12. ALL DIMENTIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED.

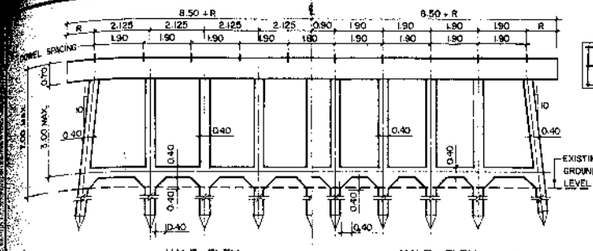
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

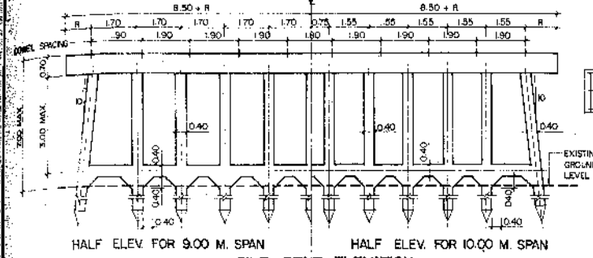
STANDARD DRAWING

17.00 M. ROADWAY WIDTH SLAB BRIDGE

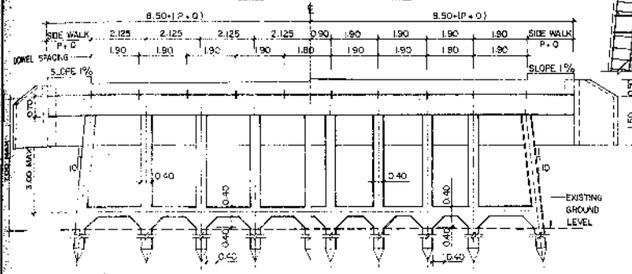
SPREAD FOOTING ABUTMENT DETAILS

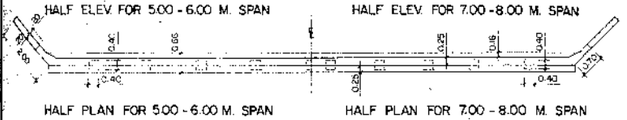
DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: (DIRECTOR GENERAL)		DWG. NO. SAD5-106-14/29d
		SHEET NO. 154

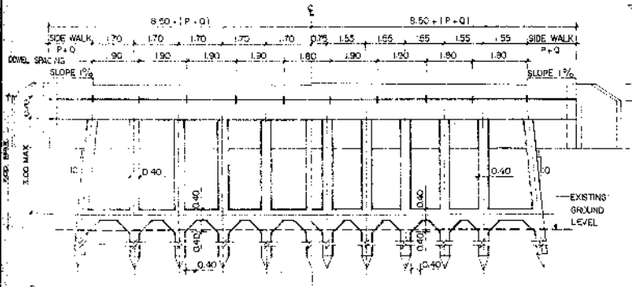




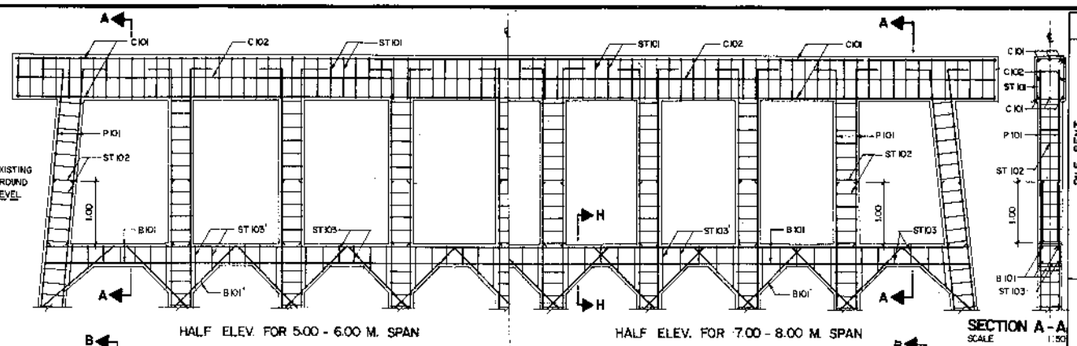
PILE BENT ELEVATION
SCALE 1:25

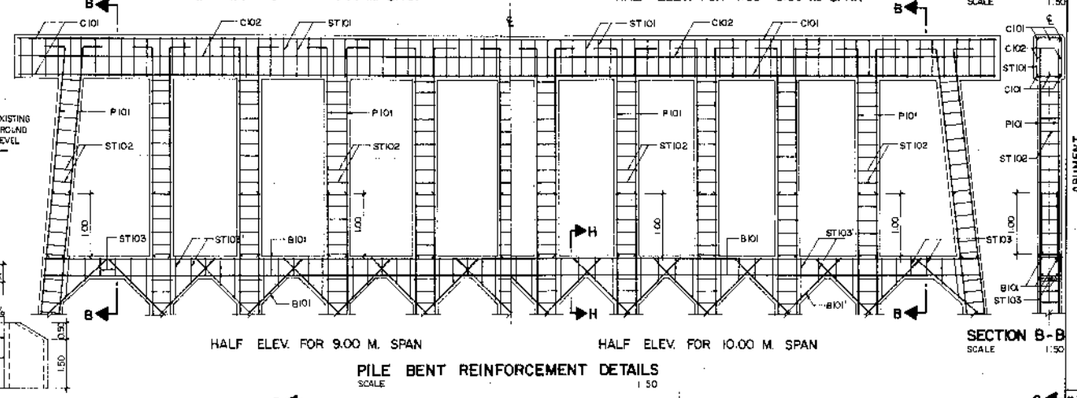




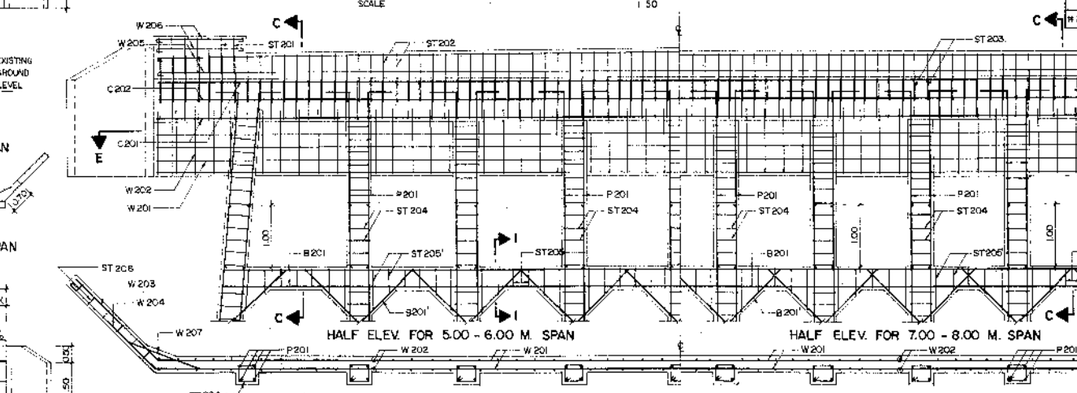


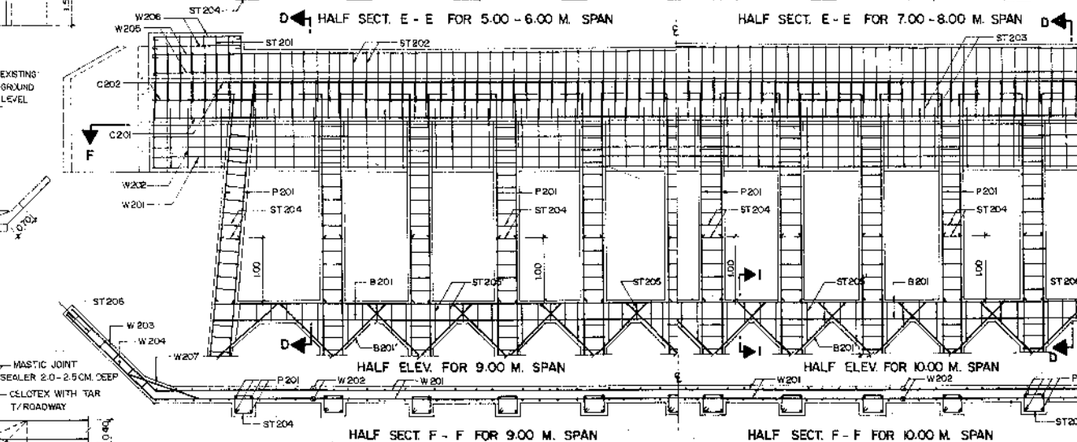
ABUTMENT DETAILS
SCALE 1:25



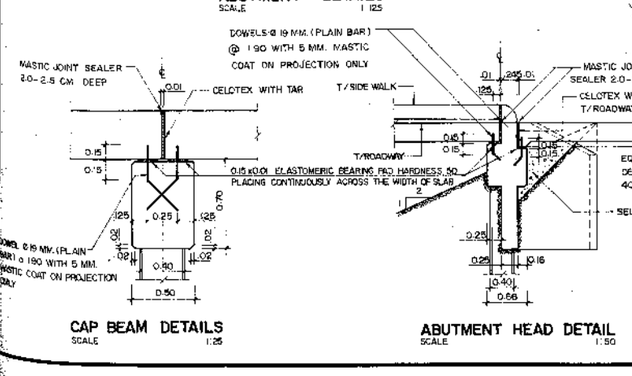


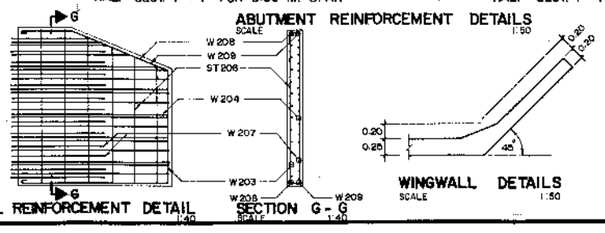
PILE BENT REINFORCEMENT DETAILS
SCALE 1:50





ABUTMENT REINFORCEMENT DETAILS
SCALE 1:50





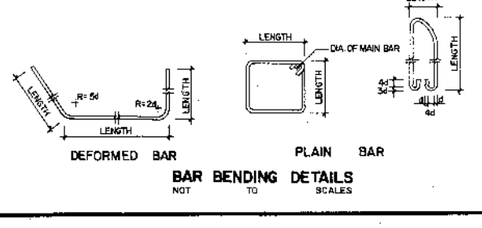


TABLE OF REFORCEMENT

BAR BENDING DIAGRAMS	BAR MARK	SPAN 5.00 M.				SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
		#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L	#	@	NO	L
PILE BENT	C 101	8	–	8	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–	8	–	6	–
	C 102	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST 101	3	0.20	94	2.35	3	0.20	94	2.35	3	0.20	94	2.35	3	0.20	94	2.35	3	0.20	94	2.35	3	0.20	94	2.35
	ST 102	3	0.20	126	1.35	3	0.20	126	1.35	3	0.20	140	1.35	3	0.20	140	1.35	3	0.20	154	1.35	3	0.20	168	1.35
	ST 103	3	0.25	32	1.35	3	0.25	32	1.35	3	0.25	27	1.35	3	0.25	27	1.35	3	0.25	22	1.35	3	0.25	25	1.35
	ST 103'	3	0.25	32	–	3	0.25	32	–	3	0.25	36	–	3	0.25	36	–	3	0.25	40	–	3	0.25	44	–
	B 101	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
	B 101'	6	–	32	1.05	6	–	32	1.05	6	–	36	1.05	6	–	36	1.05	6	–	40	1.05	6	–	44	1.05
	P 101	8	–	36	3.75	8	–	36	3.75	8	–	40	3.75	8	–	40	3.75	8	–	44	3.75	8	–	48	3.75
ABUTMENT	C 201	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–	8	–
	C 202	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–
	ST 201	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–	2	0.20	14	–
	ST 202	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–
	ST 203	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–	3	0.20	100	–
	ST 204	3	0.20	126	1.35	3	0.20	126	1.35	3	0.20	140	1.35	3	0.20	140	1.35	3	0.20	154	1.35	3	0.20	154	1.35
	ST 205	3	0.25	32	1.35	3	0.25	32	1.35	3	0.25	27	1.35	3	0.25	27	1.35	3	0.25	27	1.35	3	0.25	25	1.35
	ST 205'	3	0.25	32	–	3	0.25	32	–	3	0.25	36	–	3	0.25	36	–	3	0.25	40	–	3	0.25	44	–
	ST 206	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
	B 201	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–	8	–	4	–
	B 201'	6	–	32	1.05	6	–	32	1.05	6	–	36	1.05	6	–	36	1.05	6	–	40	1.05	6	–	44	1.05
	P 201	8	–	36	3.75	8	–	36	3.75	8	–	40	3.75	8	–	40	3.75	8	–	44	3.75	8	–	48	3.75
	W 201	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–	4	0.20	10	–
	W 202	2	0.30	55	–	2	0.30	55	–	2	0.30	55	–	2	0.30	55	–	2	0.30	55	–	2	0.30	55	–
	W 203	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–	4	0.15	24	–
	W 204	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–	2	0.30	12	–
	W 205	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–	2	–	4	–
	W 206	2	–	6	–	2	–	6	–	2	–	4	–	2	–	6	–	2	–	6	–	2	–	6	–
	W 207	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15	4	0.15	26	2.15
	W 208	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435	4	–	2	5.435
	W 209	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535	2	–	2	5.535

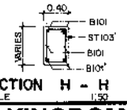
= Ø 1/4" OR 6 MM. , # 3 = Ø 3/8" OR 9 MM. , # 4 = Ø 1/2" OR 12 MM. , # 6 = Ø 3/4" OR 20 MM. , # 8 = Ø 1" OR 25 MM , NO = TOTAL AMOUNT OF BARS , L = TOTAL LENGTH OF EACH BAR.

NOTES :

1. PILE SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT ITS CAPACITY AND SHALL HAVE A MINIMUM ULTIMATE CAPACITY OF 90 TONS FOR PILE DETAILS SEE DWG.NO.SIB , S.9
2. HORIZONTAL CROSS BRACING BETWEEN COLUMNS SHALL BE PROVIDED IN THE FOLLOWING CIRCUMSTANCES .
   a) IF THE DISTANCE FROM EXISTING GROUND LEVEL TO THE BOTTOM OF THE CAP BEAM EXCEEDS 3.0 M., A BRACING SHALL BE PLACED IN SUCH A WAY THAT THE DISTANCE FROM THE BOTTOM OF THE CAP BEAM TO THE CENTERLINE OF THE BRACING IS NOT MORE THAN 3.0 M., AND
   b) IF THE DISTANCE BETWEEN THE CENTERLINE OF THE BRACING TO THE EXISTING GROUND LEVEL EXCEED 3.0 M., ADDITIONAL BRACING SHALL BE PROVIDED AT AN INTERVAL NOT MORE THAN 3.0 M.
3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE CAP BEAM , BACK AND WING WALLS WHERE A CLEAR COVER OF 2.5 CM. SHALL BE PROVIDED
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M.^{3} AND A MINIMUM ULTIVATE COMPRESSIVE STRENGTH OF 210 KG./CM.^{2} FOR A 0.15x0.15x0.15 M. CUBE AT 28 DAYS CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS .

PORTLAND CEMENT	350	KG.
SAND	0.43	M.^{3}
CRUSHED ROCK OR GRAVEL	0.83	M.^{3}
CONCRETE SLUMP MAX	10	CM.

5. REBARS # 4 OR LARGER SHALL BE TIS 15 GRADE SD30 DEFORMED BAR OTHERS SHALL BE TIS 20 GRADE SR24 PLAIN BARS UNLESS OTHERWISE INDICATED
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS
8. IN CASE OF SALINE PROTECTION , HIGH SULPHATE RESISTANT CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM , BACK WALL AND WINGWALLS WITHOUT ALTERING THE LOCATIONS OF REBARS
9. THE MAXIMUM FREE HEIGHT OF PIER FROM EXISTING GROUND LEVEL TO THE TOP OF CAP BEAM SHALL BE 7.0 M. PIERS HEIGHER THAN 7.0 M. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL
10. ALL DIMENSIONS SHOWN ARE IN METERS UNLESS OTHERWISE INDICATED



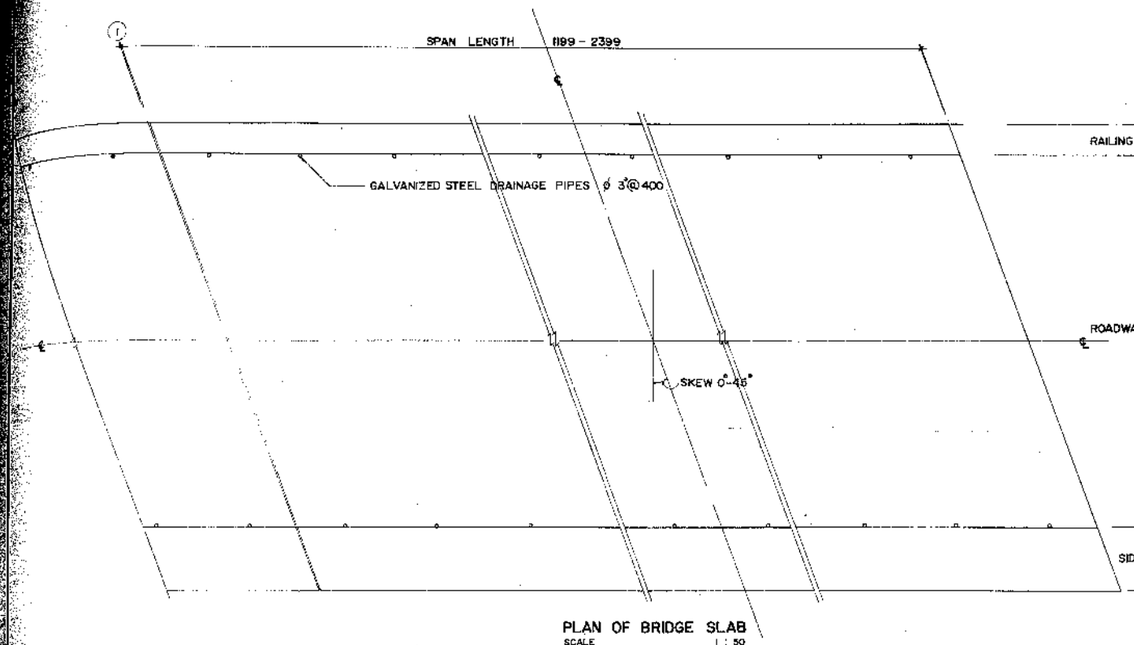
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

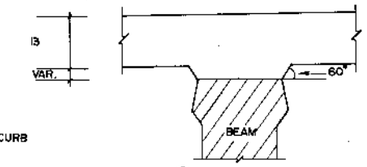
17.00 M. ROADWAY WIDTH SLAB BRIDGE

PILE BENT AND ABUTMENT DETAILS

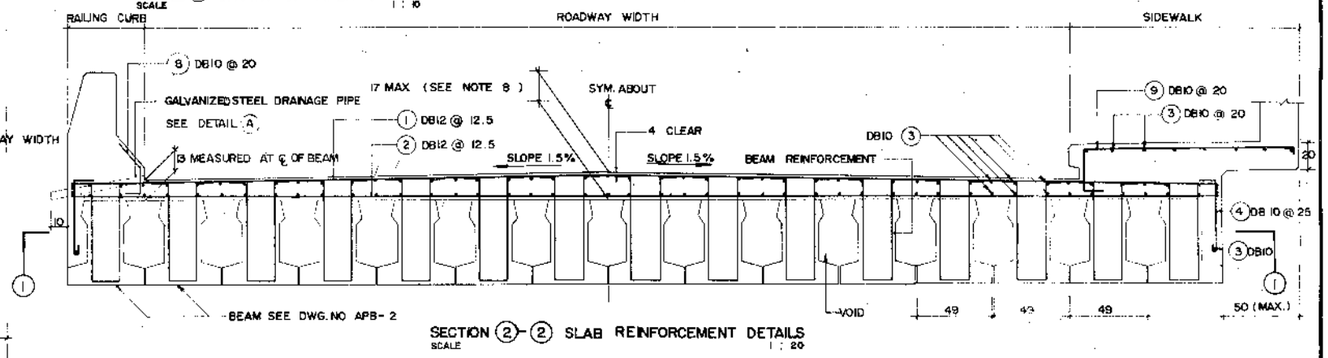
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. 3AD5-106-14/30
		SHEET NO. 155



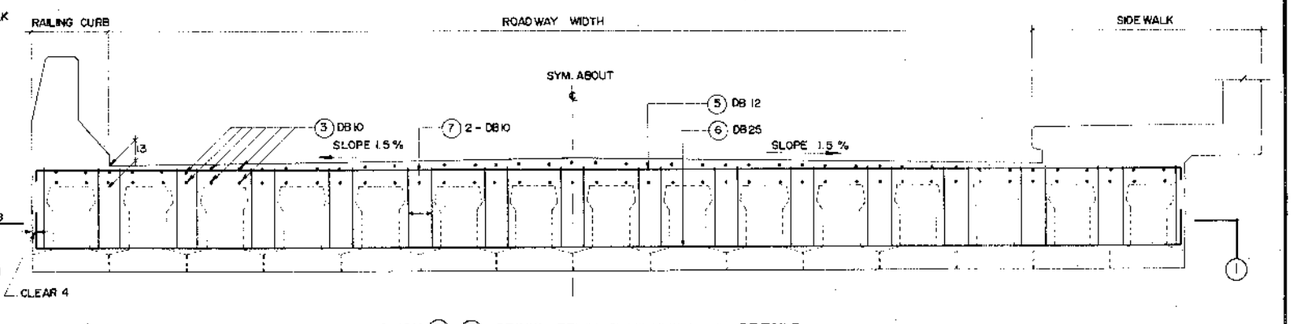
PLAN OF BRIDGE SLAB
SCALE 1 : 50



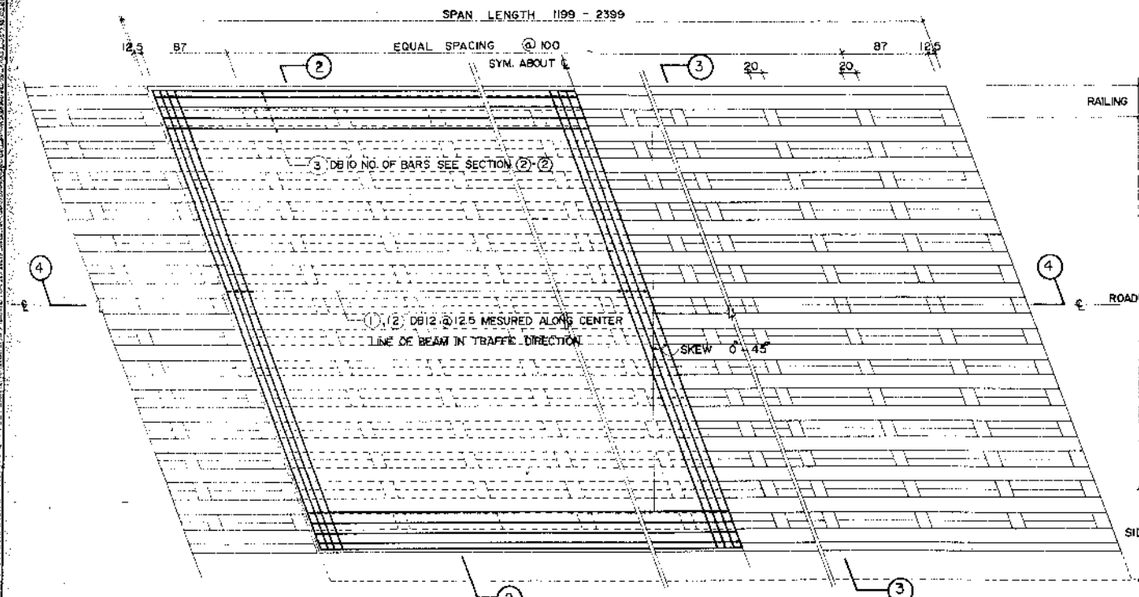
DETAIL (B) SHOWN CHAMFER DETAIL
SCALE 1 : 10



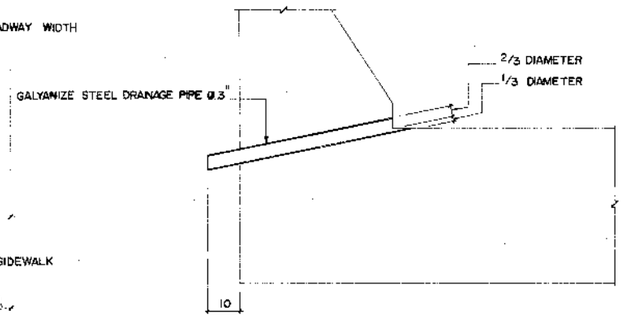
SECTION (2)-(2) SLAB REINFORCEMENT DETAILS
SCALE 1 : 20



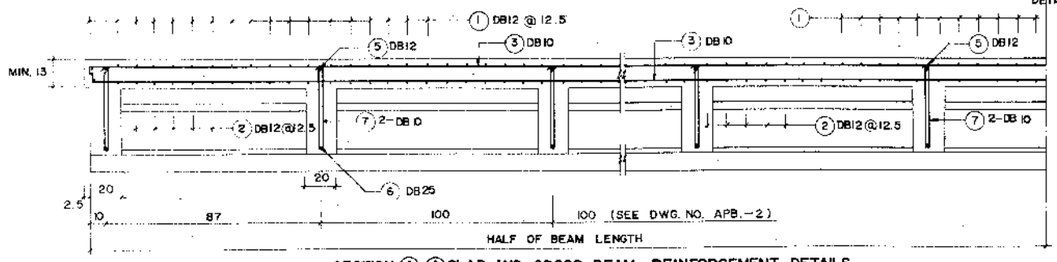
SECTION (3)-(3) CROSS BEAM REINFORCEMENT DETAILS
SCALE 1 : 20



SECTION (1)-(1) PLAN OF CROSS BEAM AND REINFORCEMENT DETAILS
SCALE 1 : 50



DETAIL (A) DRAINAGE PIPE DETAILS
SCALE 1 : 10



SECTION (4)-(4) SLAB AND CROSS BEAM REINFORCEMENT DETAILS
SCALE 1 : 20

TABLE OF REINFORCEMENT

BAR MARK	NUMBER	BARS BENDING	BAR MARK	NUMBER	BARS BENDING
(1)	DB 12		(8)	DB10	
(2)	DB 12		(9)	DB10	
(3)	DB 10				
(4)	DB 10				
(5)	DB 12				
(6)	DB 25				
(7)	DB 10				

NOTES :

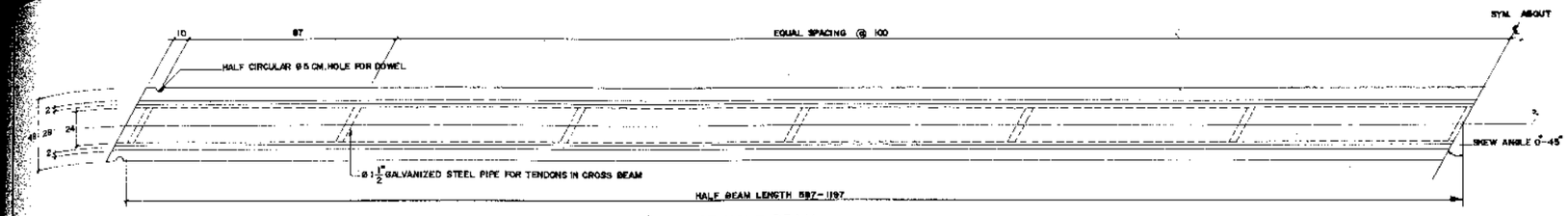
1. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHEWISE INDICATED.
2. ALL CONCRETE EXPOSED CORNERS SHALL HAVE 1 CM. CHAMFER UNLESS OTHERWISE INDICATED.
3. REBARS ϕ 12 MM. OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED
4. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
5. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
6. CONCRETE IN SLAB AND CROSS BEAM SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 20 N/MM.^{2} FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS WITH MAXIMUM CONCRETE SLUMP 8 CM.
7. CLEAR CONCRETE COVER SHALL BE 3.0 CM. UNLESS OTHEDWISE INDICATED
8. THE THICKNESS OF SLAB SHALL NOT BE GREATER THAN 17 CM. IN CASE OF HIGHER ELEVATION OF SLAB IS REGUIRED. THE SLAB SHALL BE RAISED UP AS SHOWN IN DETAILS B.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

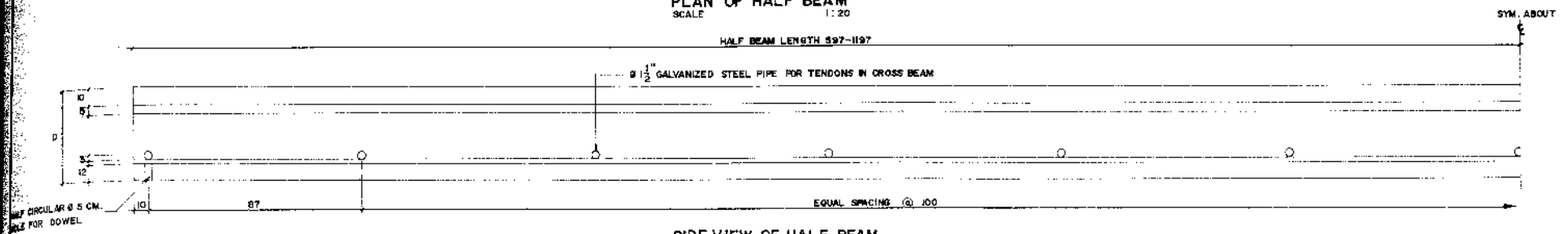
STANDARD DRAWING

12.00-24.00M. SPAN MULTI-BEAM BRIDGE PLAN, SECTIONS AND REINFORCEMENT DETAILS.

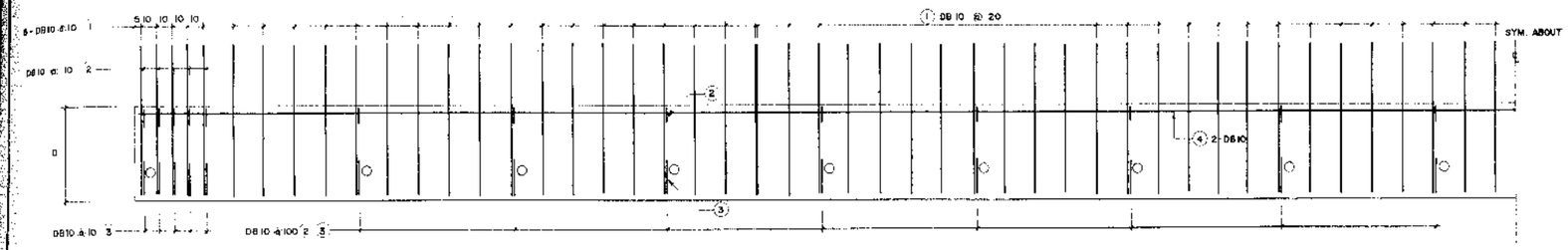
DESIGNED : DOH. & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. APB - 1
		SHEET NO. 156



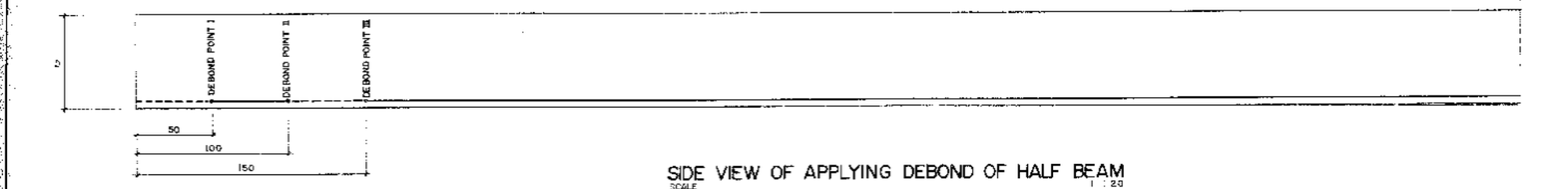
PLAN OF HALF BEAM
SCALE 1:20



SIDE VIEW OF HALF BEAM
SCALE 1:20



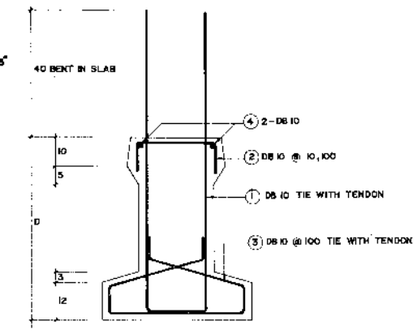
SIDE VIEW OF HALF BEAM REINFORCEMENT
SCALE 1:20



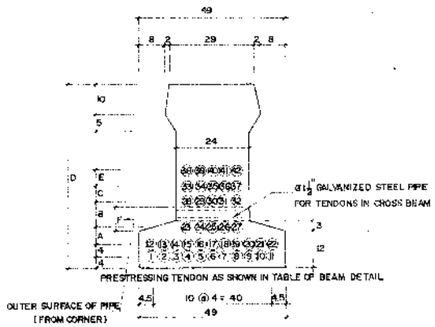
SIDE VIEW OF APPLYING DEBOND OF HALF BEAM
SCALE 1:20

TABLE OF BEAM DETAIL

SPAN M.	BEAM LENGTH cm.	D cm.	PRESTRESSING TENDON 7 mm. WIRES NO.	A	B	C	E	F	TENSION FORCE AT TRANSFER KN./ TENDON	DEBONDING NO.– FIRST POINT	PRESTRESSING TENDON 3/8" STRANDS NO.	A	B	C	E	F	TENSION FORCE AT TRANSFER KN./ TENDON	DEBONDING NO.– FIRST POINT	BEARING THICKNESS cm.
12	1194	44	(22 TENDONS)	19.25	–	–	–	7	47.1	(2)(3)(9)(10) POINT I (4)(5) POINT II (6)(7) POINT III (8 TENDONS)	(13 TENDONS)	9.9	–	–	–	6	77.5	(1)(6)(11) POINT I (4)(8) POINT II (5 TENDONS)	2.0
14	1394	49	(27 TENDONS)	4	29	–	–	7	47.2	(6)(7)(8) POINT I (1)(5)(11) POINT II – POINT III (7 TENDONS)	(15 TENDONS)	22	–	–	–	7	77.5	(3)(9) POINT I – POINT II – POINT III (2 TENDONS)	2.0
16	1594	54	(30 TENDONS)	4	24	–	–	7	47.5	(4)(5)(7)(8) POINT I (3)(9) POINT II (2)(10) POINT III (8 TENDONS)	(18 TENDONS)	26	–	–	–	7	77.1	(4)(8) POINT I (3)(5) POINT II – POINT III (4 TENDONS)	2.5
18	1794	59	–	–	–	–	–	–	–	–	(22 TENDONS)	43	–	–	–	7	77.5	(4)(6) POINT I (2)(6) POINT II (3)(9) POINT III (6 TENDONS)	2.5
20	1994	68	–	–	–	–	–	–	–	–	(26 TENDONS)	50	–	–	–	7	77.5	(6)(6)(7) POINT I (2)(3)(8) POINT II (5)(6)(7) POINT III (10 TENDONS)	3.0
22	2194	73	–	–	–	–	–	–	–	–	(30 TENDONS)	20	16	–	–	7	77.5	(3)(17)(2) POINT I (4)(6)(19)(2) POINT II (2)(3)(4)(8)(8)(9)(10) POINT III (14 TENDONS)	3.0
24	2394	80	–	–	–	–	–	–	–	–	(34 TENDONS)	12	12	10.5	–	7	77.5	(8)(12)(2) POINT I (4)(8)(9)(2) POINT II (2)(3)(4)(6)(8)(8)(9)(10) POINT III (14 TENDONS)	3.0



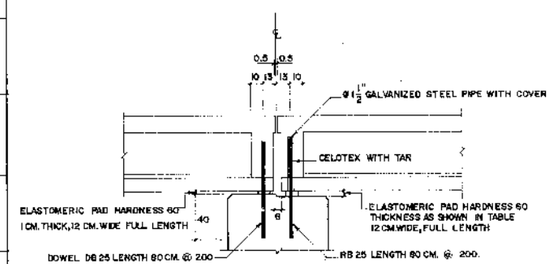
SECTION OF PRESTRESSING TENDON
SCALE 1:10



SECTION OF BEAM AND PRESTRESSING TENDONS
SCALE 1:10

TABLE OF REINFORCEMENT

BAR MARK	BAR SIZE	BAR BENDING DIAGRAMS
①	DB 10	① 15 ② 15
②	DB 10	15 15 ③
③	DB 10	
④	DB 10	10 ④ 10



FIXED BEARING FREE BEARING

CAP BEAM DETAIL
SCALE 1:25

NOTES:

1. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
2. ALL EXPOSED CORNERS SHALL HAVE 1 CM. CHAMFERS UNLESS OTHERWISE INDICATED.
3. REBAR ≥ 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS; OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
4. CONCRETE SHALL HAVE THE 28-DAYS MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASED ON 15x15x15 CM. CUBE SAMPLES, OF 40 N./mm.^{2} AND MAXIMUM SLUMP OF 8 CM.
5. PRESTRESSING OF STRAIGHT TENDON SHALL BE AS FOLLOWS.
   A) Ø 7 mm. STRESS-RELIEVED WIRE SHALL HAVE AN MAXIMUM TENSION (BREAKING STRENGTH) OF 64 KN./TENDON
   B) Ø 3/8" SEVEN-WIRE STRAND SHALL HAVE AN MAXIMUM TENSION OF 106 KN./TENDON.
6. APPLY FORCE TO A TENDON AT TRANSFER UNTIL THE MAXIMUM TENSION IS EQUAL TO THE CORRESPONDING FORCE SPECIFIED IN THE TABLE OF DETAIL OF BEAM.
7. DEBONDING MEANS THAT APPLY THE PLASTIC TUBE TO THE PRESTRESSING TENDON FOR PROTECT THE THEDONS FORM CONCRETE THE POINT OF APPLYING PLASTIC TUBE UP TO THE POINT AS SHOWN IN TABLE THROUGH THE END BEAM.
8. CLEAR CONCRETE COVER SHALL BE 2.5 CM OR AS SHOWN IN THE FIGURES.
9. IN CASE OF SKEW CASTING FOR SKEWED BRIDGE, THE TENDONS SHALL ALSO BE SKEWED.
10. IN DETERMINING THE LEVEL OF THE ABUTMENT HEAD, IT MUST SUBTRACT BY THE BEAM CHAMFERS.
11. ELASTOMERIC PAD SHALL BE FOLLOWED BY THE LASTEST STANDARD OF AASHTO.

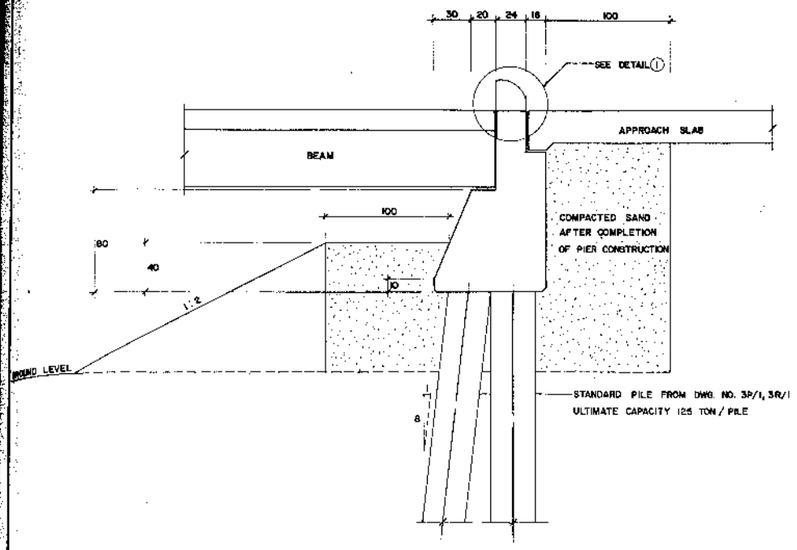
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

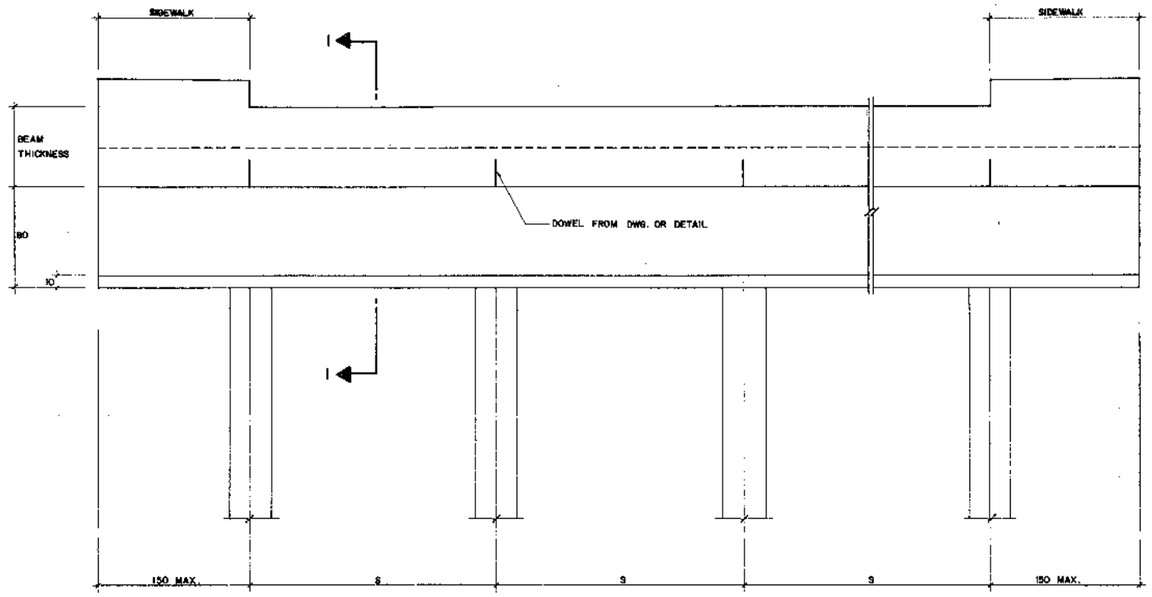
12.00-24.00 M. SPAN MULTI-BEAM TYPE

PRESTRESSED CONCRETE GIRDER

DESIGNED : DOH. & CONSULTANTS	CHECKED : Kongsak	DATE JULY 1994
SUBMITTED : P. Bunnag. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. APB.-2
		SHEET NO. 157

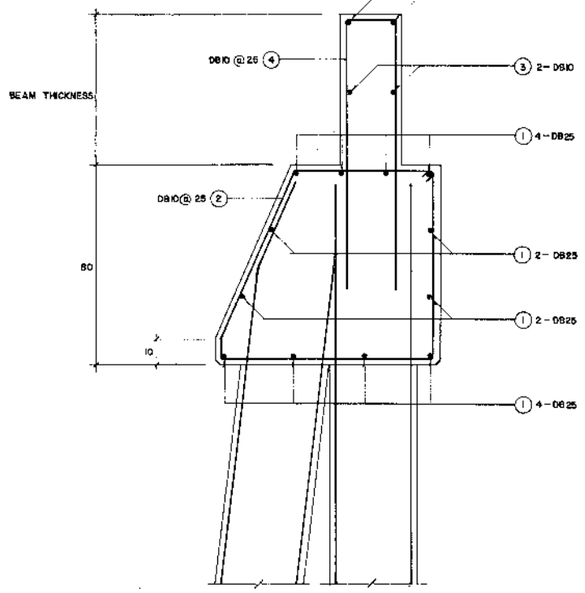


SECTION I — I ABUTMENT DETAIL
SCALE 1 : 25

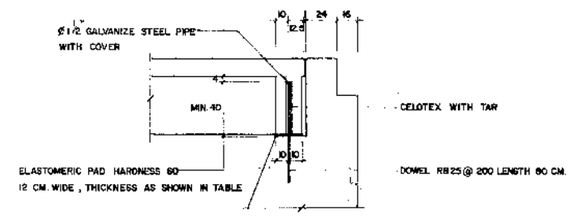


NOTES :

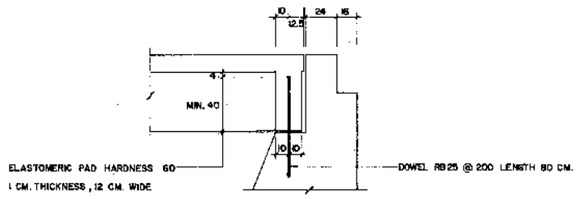
1. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
2. ALL EXPOSED CORNERS SHALL HAVE 1 CM. CHAMFERS UNLESS OTHERWISE INDICATED.
3. REBAR # 4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR24 PLAINS BARS UNLESS OTHERWISE INDICATED.
4. CONCRETE SHALL HAVE THE 28-DAY MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASED ON 15 x 15 x 15 CM. CUBE SAMPLES, OF 20 N./mm.^{2} AND MAXIMUM SLUMP OF 8 CM.
5. CLEAR CONCRETE COVER SHALL BE 3 CM. AND 5 CM. FOR HIGH SULPHATE RESISTANT.



SECTION I — I REINFORCEMENT DETAIL
SCALE 1 : 12.5

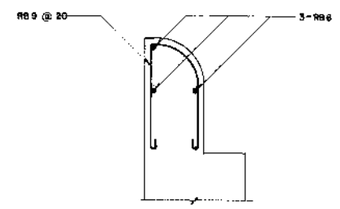


FREE BEARING



FIXED BEARING

ABUTMENT HEAD DETAIL
SCALE 1 : 50



DETAIL (1)
SCALE 1 : 12.5

SPACING OF PILE DETAIL

1. FOR PRESTRESS CONCRETE BRIDGE OF MULTI — BEAM 12.00 - 24.00 M. SPAN LENGTH.

TABLE OF PIER LOCATION AND BEARING PAD THICKNESS

SPAN LENGTH (M.)	S (CM.) MAX.	BEARING THICKNESS (CM.)
12.00	240	2
14.00	220	2
16.00	200	2.5
18.00	180	2.5
20.00	160	3
22.00	140	3
24.00	120	3

2. FOR GENERAL BRIDGE

S = AS SHOWN IN PLAN AND PROFILE OR NOTES OF BRIDGE.

TABLE OF REINFORCEMENT

BAR MARK	BAR SIZE	BAR BENDING DIAGRAMS
①	DB 25	10 … 10 ①
②	DB 10	②
③	DB 10	5 … 5 ③
④	DB 10	④

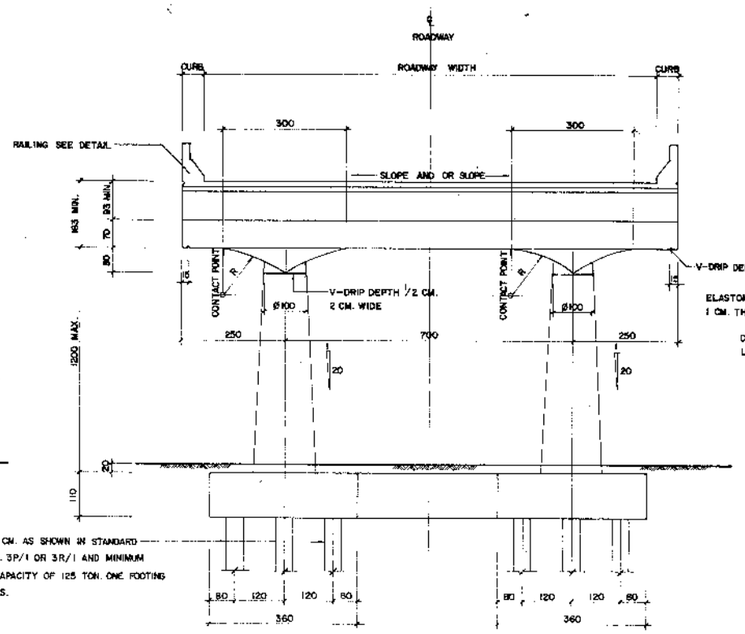
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
12.00 - 24.00 M. SPAN MULTI - BEAM TYPE
PILE BENT AND ABUTMENT DETAILS FOR ANY ROADWAY WIDTH

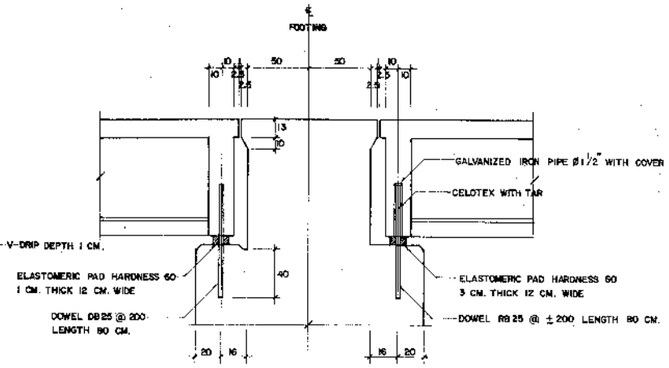
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Buraspa (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : FOR (DIRECTOR GENERAL)		DWG. NO. AP8 - 4
		SHEET NO. 158

PLAN
SCALE 1 : 75

SECTION A — A
SCALE 1 : 75



SECTION B — B
SCALE 1 : 75

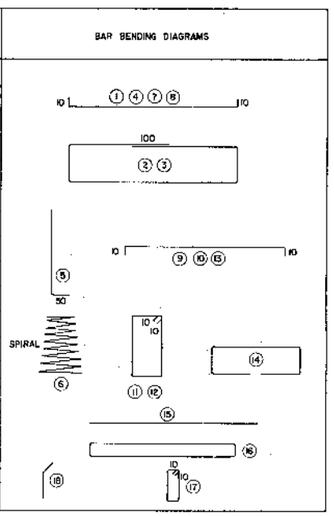


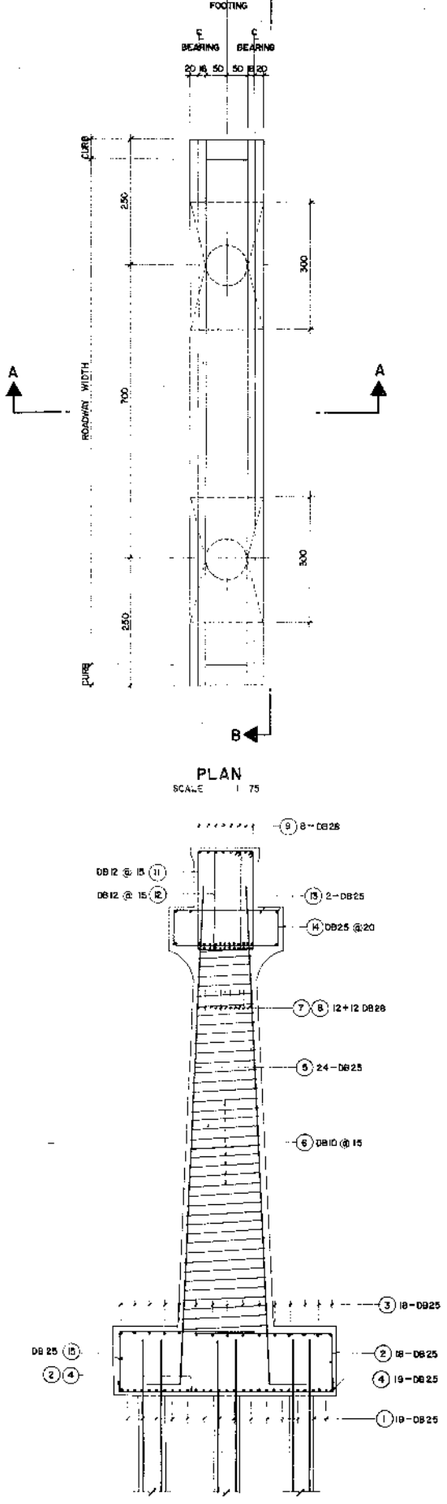
FIXED BEARING FREE BEARING

CONSTRUCTION JOINT
SCALE 1 : 25

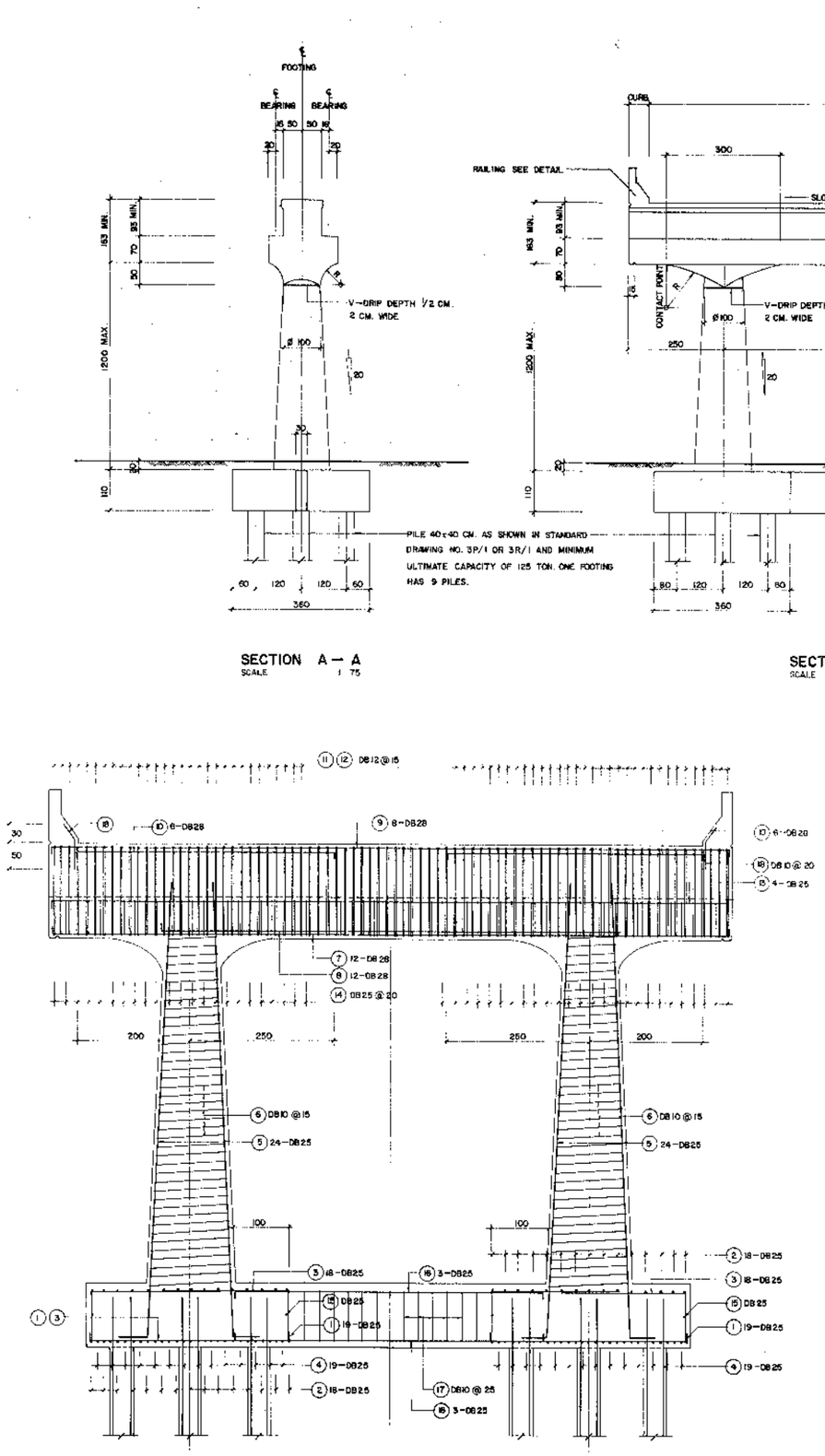
TABLE OF REINFORCEMENT

BAR MARK	BAR SIZE.	BAR BENDING DIAGRAMS
①	DB25	
②	DB25	
③	DB25	
④	DB25	
⑤	DB25	
⑥	DB10	
⑦	DB28	
⑧	DB28	
⑨	DB28	
⑩	DB28	
⑪	DB12	
⑫	DB12	
⑬	DB25	
⑭	DB25	
⑮	DB25	
⑯	DB25	
⑰	DB10	
⑱	DB10	





SECTION A — A FOOTING REINFORCEMENT
SCALE 1 : 50



SECTION B — B FOOTING REINFORCEMENT
SCALE 1 : 50

NOTES :

1. ALL DIMENSIONS GIVEN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
2. ALL EXPOSED CORNER SHALL HAVE 1 CM. CHAMFERS UNLESS OTHERWISE INDICATED.
3. REBARS SHALL CONFORM TO THE STANDARD TIS. 24 CLASS SD30 FOR THE DEFORMED BARS.
4. CONCRETE SHALL HAVE PROPERTIES AS FOLLOW.
   4.1 THE MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 20 N./mm.^{2} FOR .15x.15x.15 M. CUBE AT 28 DAYS.
   4.2 SLUMP LESS THAN 8 CM.
5. CLEAR CONCRETE COVER SHOULD BE 3 CM. UNLESS OTHERWISE INDICATED.
6. BEFORE CASTING SLAB ON ANY FOOTING, IT SHOULD BE LAID DOWN THE NEXT BEAM OF OTHERS SPAN.
7. ELASTOMERIC PAD SHALL CONFORM TO THE LATEST STANDARD OF AASHTO.

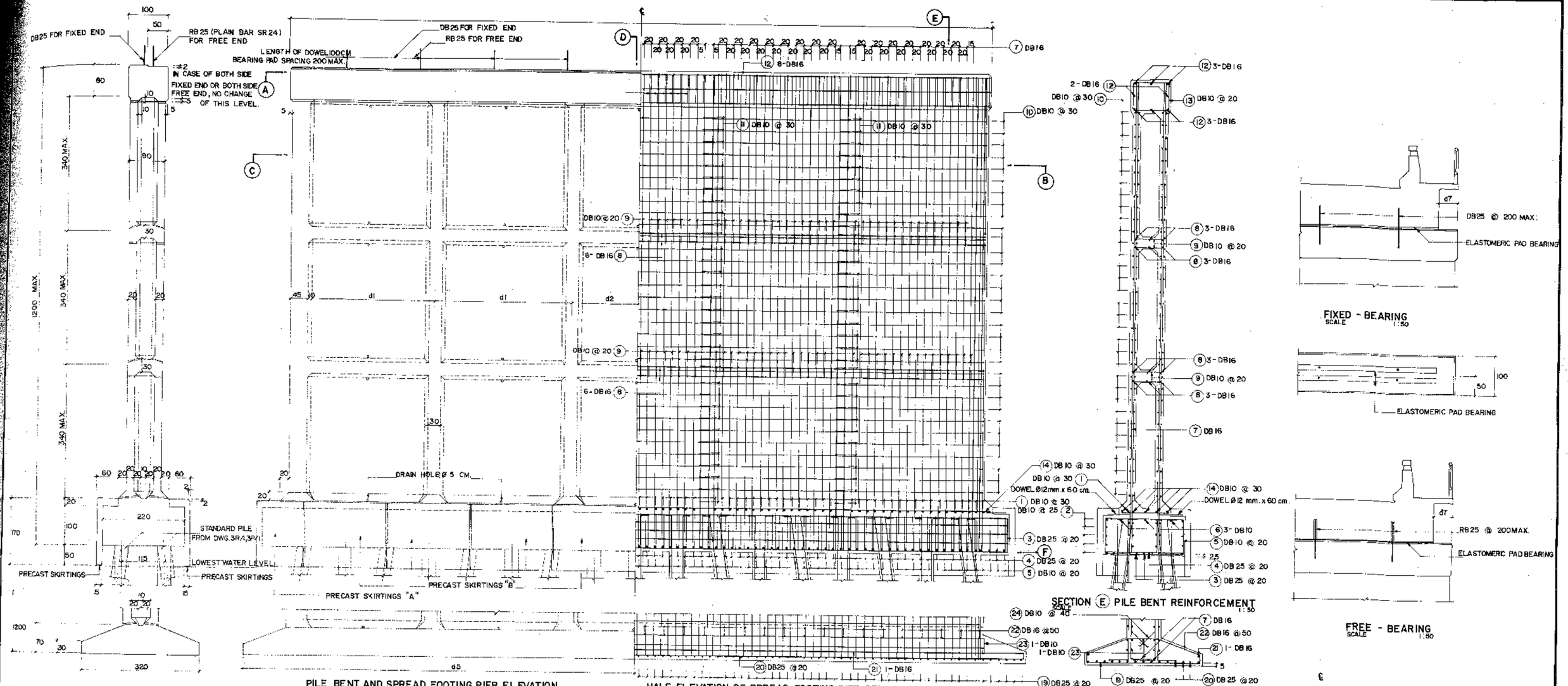
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

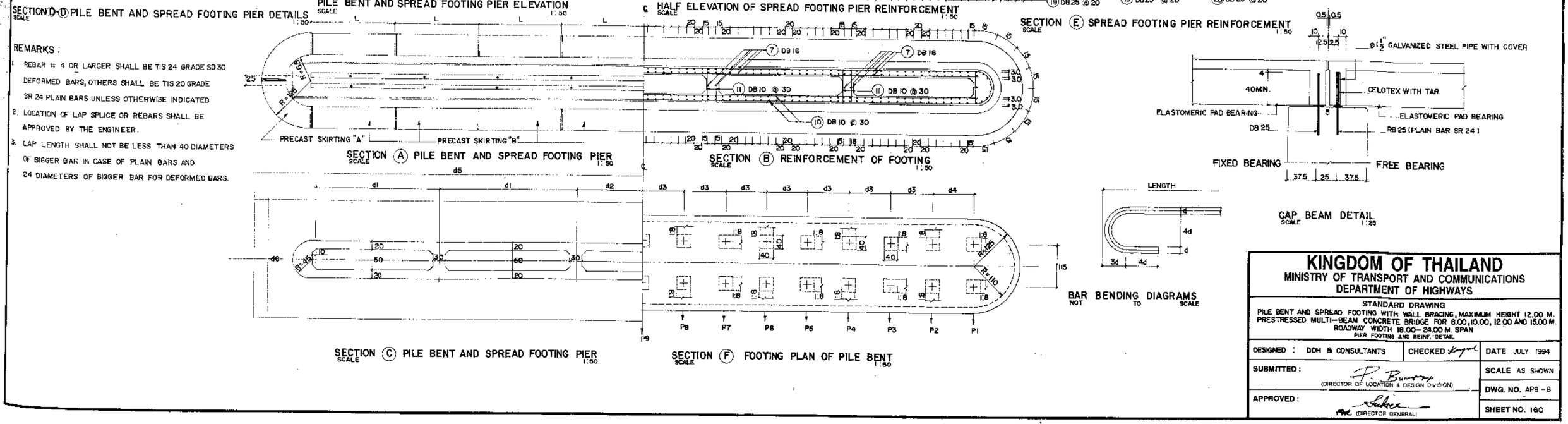
STANDARD DRAWING

14.00 — 24.00 M. SPAN MULTI-BEAM TYPE

12.00 M. ROADWAY & CURB

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
		DWG. NO. APB-7
APPROVED : (DIRECTOR GENERAL)		SHEET NO. 159





REMARKS :

1. REBAR # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED
2. LOCATION OF LAP SPLICE OR REBARS SHALL BE APPROVED BY THE ENGINEER.
3. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR IN CASE OF PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

PILE BENT AND SPREAD FOOTING WITH WALL BRACING, MAXIMUM HEIGHT 12.00 M. PRESTRESSED MULTI-BEAM CONCRETE BRIDGE FOR 8.00, 10.00, 12.00 AND 15.00 M. ROADWAY WIDTH 18.00 - 24.00 M. SPAN

PIER FOOTING AND REINF. DETAIL

DESIGNED : DOH & CONSULTANTS	CHECKED	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. APB - 8
		SHEET NO. 160

BAR MARK	NO.	BAR BENDING DIAGRAMS (CM.)
①	DB10	
②	DB10	
③	DB25	
④	DB25	
⑤	DB10	
⑥	DB10	
⑦	DB16	
⑧	DB16	
⑨	DB10	
⑩	DB10	
⑪	DB10	
⑫	DB16	
⑬	DB10	
⑭	DB10	
⑮	DB10	
⑯	DB10	
⑰	DB10	
⑱	DB10	
⑲	DB25	
⑳	DB25	
㉑	DB16	
㉒	DB16	
㉓	DB10	
㉔	DB10	

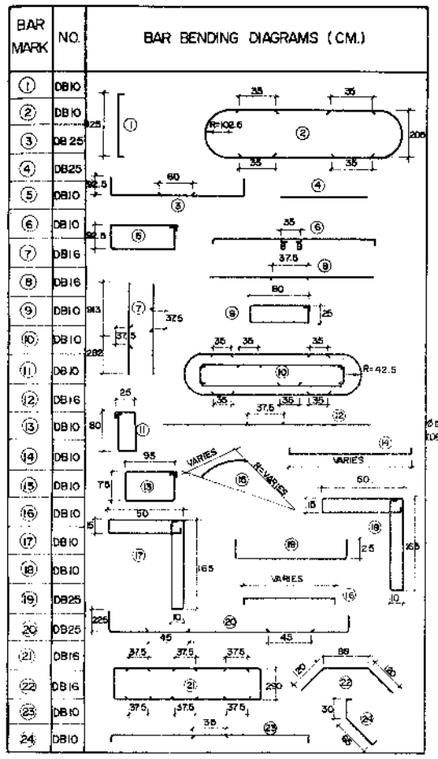
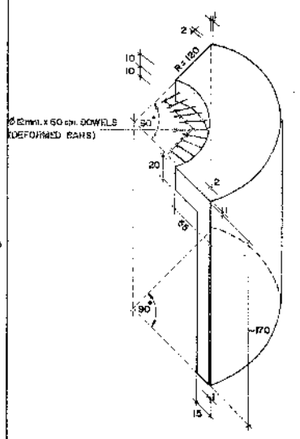
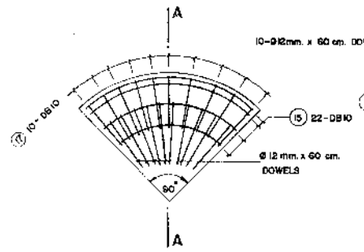


TABLE OF SIZE, LOCATION, NUMBER OF PILES OF FOOTING

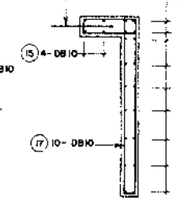
ROADWAY WIDTH	d CM.	d_1 CM.	d_7 CM.	d_2 CM.	PILE FOOTING												SPREAD FOOTING	
					NUMBER OF PILES										PILE HEAD SPACING C-C		HALF LENGTH OF FOOTING D_5 CM.	WIDTH OF FOOTING D_6 CM.
					P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9		d_3	d_4		
8.00	1,040	306	20	154	4	4	4	4	4	-	-	-	2	22	110	85	470 + 175	320
10.00	1,260	285	30	-	4	4	4	4	4	4	-	-	2	26	110	85	580 + 175	320
12.00	1,480	272	40	-	4	4	4	4	4	4	4	-	2	30	110	85	690 + 175	320
14.00	1,700	264	50	150	4	4	4	4	4	4	4	4	2	34	110	85	800 + 175	320
15.00	1,800	260	50	140	4	4	4	4	4	4	4	4	2	34	117	90	850 + 175	320



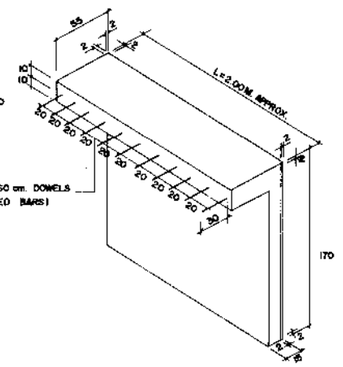
PRECAST SKIRTING 'A' DETAILS
SCALE 1:30



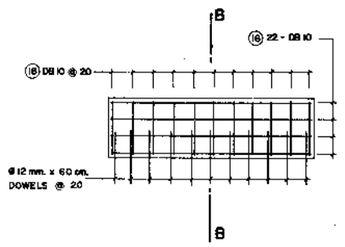
PRECAST SKIRTING 'A' REINFORCEMENT
SCALE 1:30



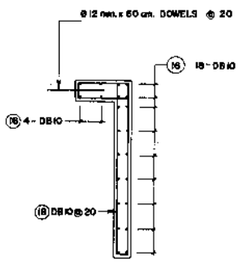
SECTION A—A
SCALE 1:30



PRECAST SKIRTING 'B' DETAILS (SKEWED BRIDGE)
SCALE 1:30



PRECAST SKIRTING 'B' REINFORCEMENT
SCALE 1:30



SECTION B—B
SCALE 1:30

NOTES :

1. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM.^{2} FOR A 0.15x0.15x0.15 CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBE METER IS AS FOLLOWS :

PORTLAND CEMENT	350	KG.
SAND	0.43	M.^{3}
CRUSH ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP, MAX.	10	CM.

2. REBAR # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BAR UNLESS OTHERWISE INDICATED.
3. CLEAR CONCRETE COVER SHALL BE 3 CM. FOR PORTLAND CEMENT TYPE I AND 5 CM. FOR HIGH SULPHATE RESISTANT FOR PORTLAND CEMENT TYPE 5 WITHOUT ALTERING THE SIZE OF REBARS.
4. ALL EXPOSED CORNERS SHALL HAVE 2 CM. CHAMFERS UNLESS OTHERWISE INDICATED.
5. COLUMN JOINT SPACING 340 M. MAXIMUM.
6. ALL MATERIALS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER.
7. MINIMUM SAFE BEARING CAPACITY OF SOIL UNDER SPREAD FOOTING PIERS SHALL BE 20 TON/M.^{2} THE BOTTOM OF FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY.
8. FOR PILE FOOTING PIERS, EACH PILE SHALL HAVE A MINIMUM ULTIMATE CAPACITY OF 110TONS AND SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT ITS CAPACITY.
9. REBARS FOR PILE FOOTING PIERS ARE BAR MARK NOS 1-18, REBARS FOR SPREAD FOOTING PIERS ARE BAR MARK NOS 7-13 AND BAR MARK NOS 19-24.
10. FOR ELASTOMERIC PAD, CONTRACTOR SHALL SUBMIT A CERTIFICATE FROM THE MANUFACTURER SHOWING THAT THEY WILL PERFORM IN ACCORDANCE WITH THE SPECIFICATION.

REMARKS :

1. PILES SHALL BE LOCATED BY STARTING FROM PILE NO P9 AT THE CENTERLINE OF THE PIER AND THE PILE SPACINGS D3 AND D4 SHALL BE MEASURED FROM THIS PILE IN ORDER TO LOCATE PILE NOS P8-P1 RESPECTIVELY. IF THERE IS NO PILE NO P9 AT THE CENTERLINE OF THE PIER, THE FIRST PILE SPACING D_3 ADJACENT TO THE CENTERLINE OF THE PIER SHALL BE SUBSTITUTED BY $D_{3/2}$.
2. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
3. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.00 M. FOR PILE FOOTING PIERS THESE QUANTITIES DO NOT INCLUDE REBARS IN THE PILES.
4. FOR SPREAD FOOTING PIERS, THE MAXIMUM HEIGHT FROM THE BOTTOM OF FOOTING TO THE TOP OF CAP BEAM SHALL BE 15.00 M.
5. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
6. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR IN CASE OF PLAIN BAR AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
7. LENGTH AND AMOUNT OF REINFORCEMENT SHOWN IN THE TABLE MAY VARY ACCORDING TO PIER SHAPE BUT SPACING SHALL BE AS SHOWN ON THE DWGS.
8. THE PRECAST SKIRTING "A" SHALL BE OBTAINED BY DIVIDING THE SEMICIRCULAR END OF A PIER INTO TWO EQUAL SECTORS OF 90°. THE PRECAST SKIRTING "B" SHALL BE OBTAINED BY DIVIDING THE STRAIGHT PORTION INTO EQUAL LENGTHS. THESE LENGTH SHALL BE AS LONG AS POSSIBLE BUT NOT MORE THAN 2.00 M.

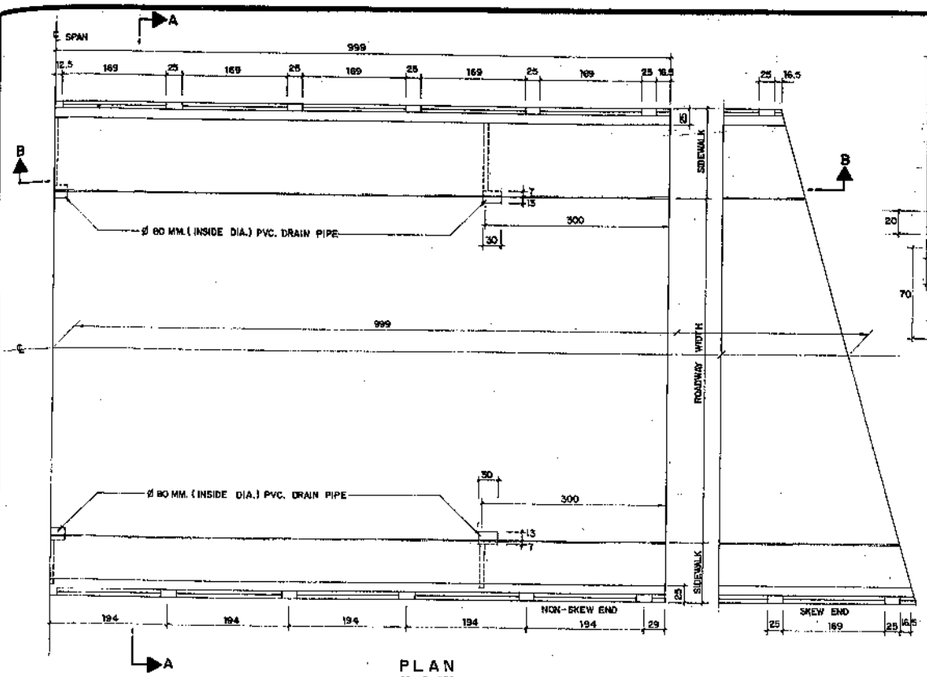
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

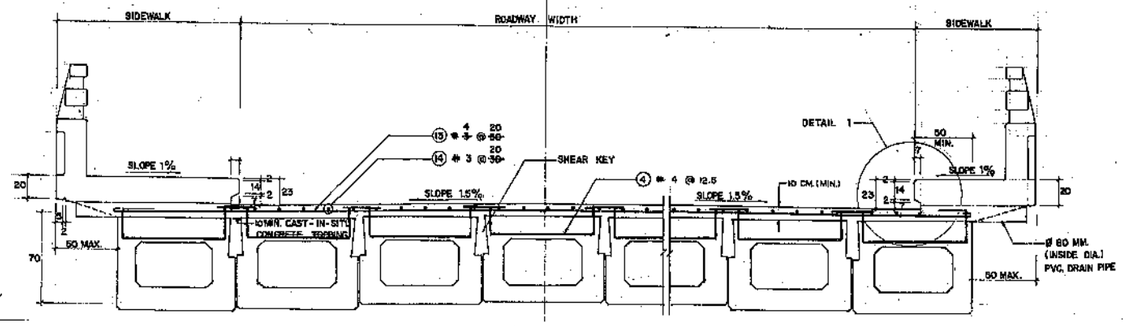
PILE BENT AND SPREAD FOOTING WITH WALL BRACING, MAXIMUM HEIGHT 12.00 M. PRESTRESSED MULTI-BEAM CONCRETE BRIDGE FOR 8.00, 10.00, 12.00 AND 15.00 M. ROADWAY WIDTH 18.00-24.00 M. SPAN

TABLE OF REINFORCEMENT AND CONSTRUCTION DETAILS

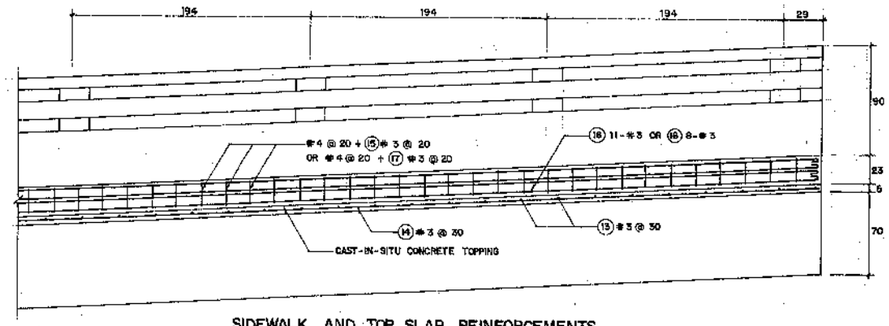
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Bunyay. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
		DWG. NO. APB-9
APPROVED : For (DIRECTOR GENERAL)		SHEET NO. 161



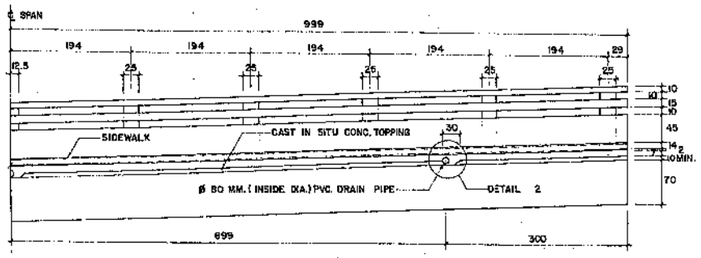
PLAN
SCALE 1:50



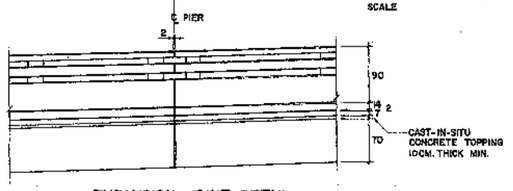
SECTION A – A



SIDEWALK AND TOP SLAB REINFORCEMENTS
SCALE 1:25



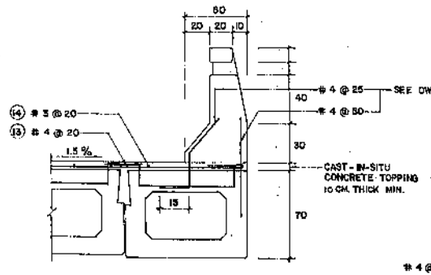
SECTION B – B
SCALE 1:50



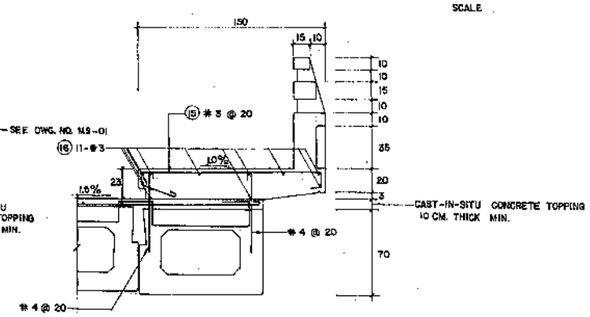
EXPANSION JOIT DETAIL
SCALE 1:50

NOTES :

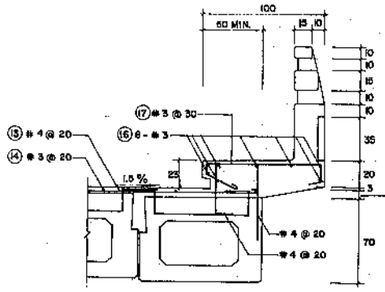
1. REBARS # 4 OR LARGER SHALL BE TIS. 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS.20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
2. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
3. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
4. SURFACE OF PRECAST GIRDERS IN CONTACT WITH CAST-IN-SITU CONCRETE SHALL BE ROUGHENED AND CLEANED BEFORE CONCRETING. THE SURFACES SHALL BE SOAKED FOR AT LEAST 2 HOURS. THEN CEMENT SLURRY OR MORTAR WITH CEMENT TO SAND RATIO OF 1:1 BY WEIGHT SHALL BE APPLIED BEFORE CONCRETING.
5. CAST-IN-SITU CONCRETE FOR BRIDGE TOPPING AND SHEAR KEY BETWEEN BOX GIRDERS SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 360 KG/CM^2 FOR 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS.
6. CAST-IN-SITU CONCRETE FOR SIDEWALK, CURB AND RAILING SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/CM^2 FOR 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS.
7. NUMBER OF BOX GIRDERS FOR EACH SPAN DEPENDS ON THE WIDTH OF ROADWAY, SIDEWALK AND GIRDER ARRANGEMENT. THE BOX GIRDERS SHALL BE ARRANGED IN SUCH A WAY THAT ,
   a) IF SIDEWALK WIDTH IS NOT MORE THAN 50 CM., THE OUTSIDE EDGE OF THE EXTERIOR GIRDER SHALL BE LINED UP WITH THE OUTSIDE EDGE OF THE SIDEWALK.
   b) IF SIDEWALK WIDTH IS MORE THAN 50 CM. THE OVERHANGING PART OF SIDEWALK FROM OUTSIDE EDGE OF THE EXTERIOR GIRDER SHALL NOT EXCEED 50 CM. AND A MINIMUM OF 30 CM. OF THE SIDEWALK SHALL BE ON TOP OF THIS BOX GIRDER.
   c) THE OUTSIDE EDGES OF THE EXTERIOR GIRDERS SHALL BE IN LINE THROUGHOUT THE BRIDGE LENGTH REGARDLESS THE TYPES AND THE SPAN LENGTH OF THE GIRDERS.
8. SELECTION OF PRETENSION BOX GIRDERS AS SHOWN ON DWG. NO. 5BD20 S/1 OR POST-TENSION BOX GIRDERS AS SHOWN ON DWG. NO. 5 BD 20 S/2 AND DWG. NO. 5 BD 20 S/3 SHALL BE UNDER THE APPROVAL OF THE ENGINEER.
9. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.



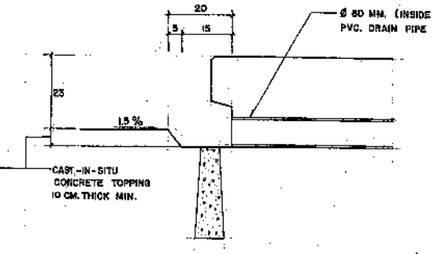
CONCRETE BARRIER DETAIL
SCALE 1:25



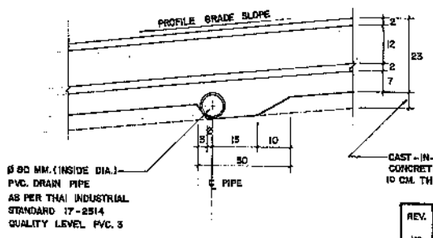
150 CM. SIDEWALK DETAIL
SCALE 1:25



100 CM. SIDEWALK DETAIL
SCALE 1:50



DETAIL (1)
SCALE 1:10

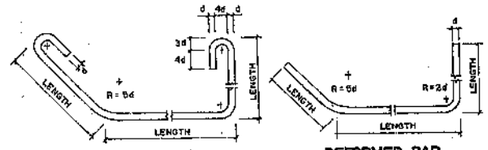


DETAIL (2)
SCALE 1:10

TABLE OF REINFORCEMENT

	BAR BENDING DIAGRAMS	BAR MARK	#	NO	L
TOP SLAB	VARIES 7.5 7.5 / VARIES 7.5 7.5 7.5 56 7.5	13	4	100 / 87	-
	985 7.5 7.5 985 7.5 7.5 36 / 99 7.5 7.5 7.5 36 7.5	14	3	-	-
150 CM. SIDEWALK	145 9 7.5 12.5 7.5 15 / 985 7.5 7.5 36 7.5 36 / 99 7.5 7.5 36 7.5	15	3	101	247
	QUANTITIES SHOWN FOR 1 SIDE ONLY	16	3	11	-
100 CM. SIDEWALK	95 9 7.5 12.5 7.5 15 / 985 7.5 7.5 36 7.5 36 / 99 7.5 7.5 36 7.5	17	3	67	-
	QUANTITIES SHOWN FOR 1 SIDE ONLY	18	3	8	-

NOTES
1. REINFORCEMENTS SHOWN ARE FOR ONE SPAN ONLY
2. # 3 = ø 3/8" OR 9 MM. # 4 = ø 1/2" OR 12 MM.
NO = TOTAL AMOUNT OF BARS
L = TOTAL LENGTH OF EACH BAR



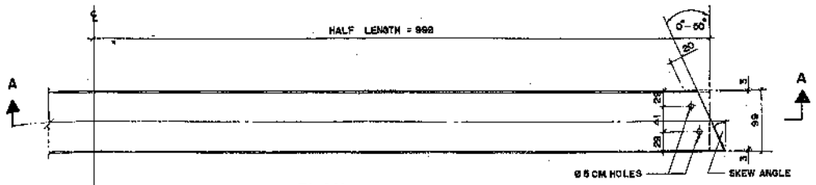
BAR BENDING DETAILS
NOT TO SCALE

REV. NO.	DESCRIPTION	CHECKED SIGN	CHECKED DATE	SUBMITTED SIGN	SUBMITTED DATE	APPROVED SIGN	APPROVED DATE
1	1.1 CONCRETE TOPPING THK. TO BE REVISED TO 10 CM. MIN.						
	1.2 BAR MARK NO. 13, 14 TO BE REVISED TO # 4 @ 20 AND # 3 @ 20 RESPECTIVELY						
	1.3 SHAPE OF BAR MARK NO. 4 ON DWG. NO. SBD 20S/2 TO BE REVISED						

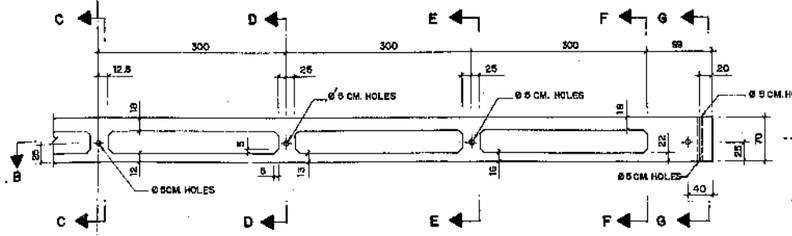
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
0°–50° SKEW PC. BOX GIRDER BRIDGE
20.00 M. SPAN
BRIDGE DECK PLAN, SECTION AND DETAILS

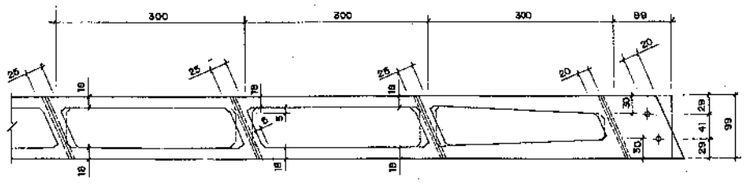
DESIGNED : DOH & CONSULTANTS | CHECKED : | DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION) | SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL) | DWG. NO. 5 BD 20 S-0°-50°/A
SHEET NO. 162



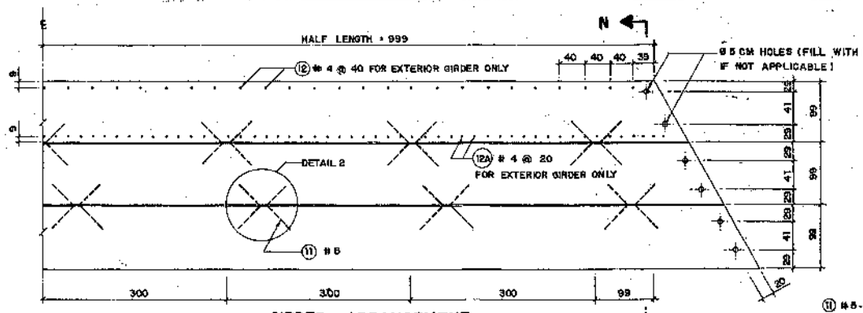
PLAN
SCALE 1:50



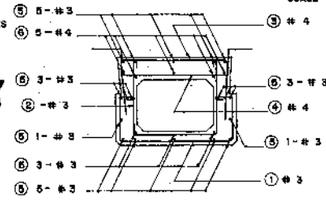
SECTION A - A
SCALE 1:50



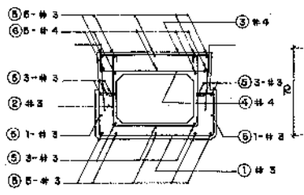
SECTION B - B
SCALE 1:50



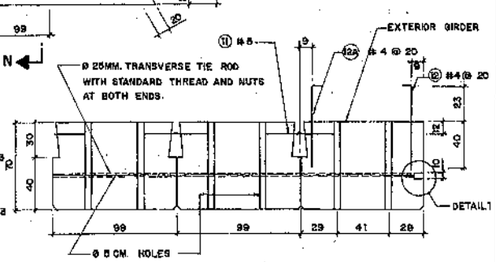
GIRDER ARRANGEMENT
SCALE 1:50



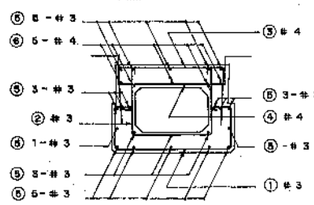
SECTION J - J
SCALE 1:25



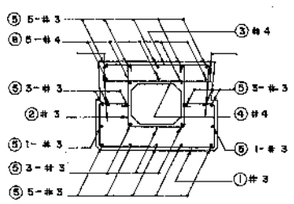
SECTION K - K
SCALE 1:25



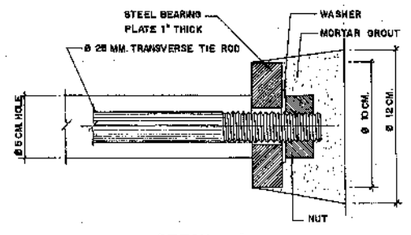
SECTION N - N
SCALE 1:25



SECTION L - L
SCALE 1:25



SECTION M - M
SCALE 1:25



DETAIL 1
SCALE 1:2.5

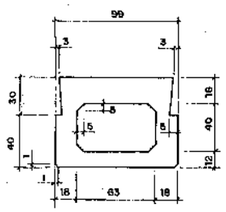
TABLE OF REINFORCEMENT

BAR MARK	#	NO.	LENGTH CM.	TOTAL LENGTH CM.
①	3	116±	210 ±	22,020 ±
②	3	86±	175 ±	15,155 ±
③	4	187 ±	189	35,343 ±
④	4	159 ±	196 166	13,992 ±
⑤	3	21	2,114	44,400
⑥	4	5	2,093	10,465
⑦	3	80	80	4,000
⑧	3	30	110	3,300
⑨	4	50 ±	95 ±	4,750 ±
⑩	4	70 ±	65 ±	4,550 ±
⑪	5	14	135	1,890 ±
⑫	4	49 ±	76	3,676 ±
12A	4	99 ±	76	7,425 ±

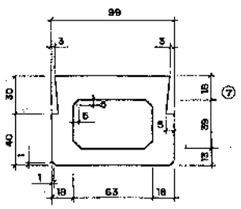
#	3	4	5
TOTAL LENGTH M.	900.00	753.37	18.90

3 = Ø 3/8" OR 9 MM.
4 = Ø 1/2" OR 12 MM.
5 = Ø 5/8" OR 16 MM.

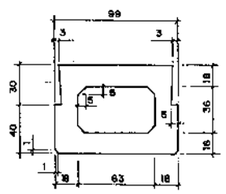
NO = TOTAL AMOUNT OF BARS
L = TOTAL LENGTH OF EACH BAR



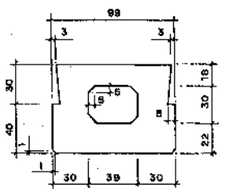
SECTION C - C
SCALE 1:25



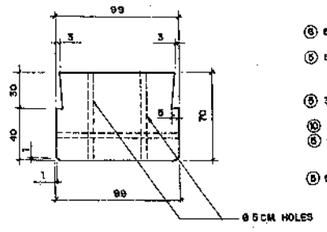
SECTION D - D
SCALE 1:25



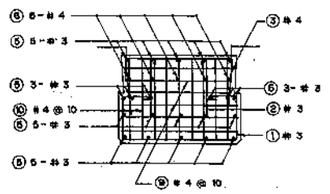
SECTION E - E
SCALE 1:25



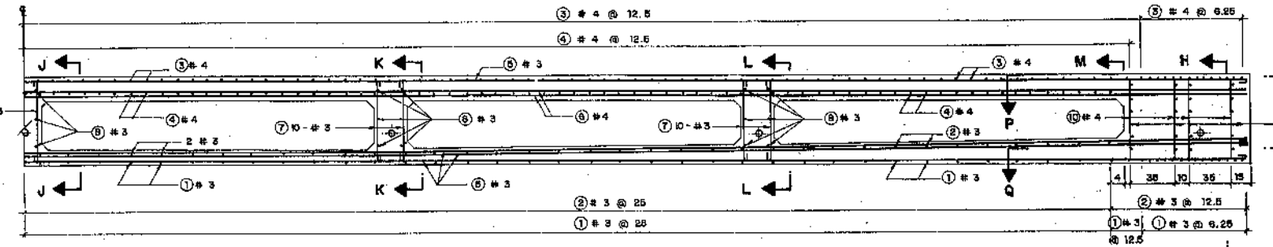
SECTION F - F
SCALE 1:25



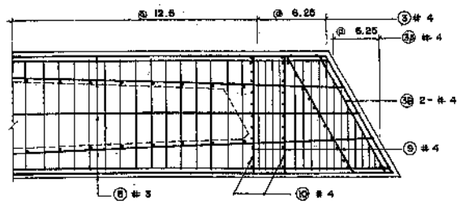
SECTION G - G
SCALE 1:25



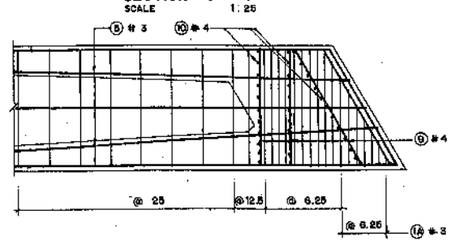
SECTION H - H
SCALE 1:25



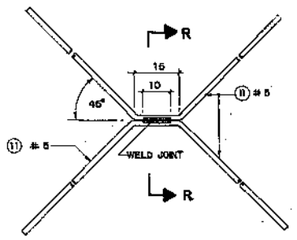
LONGITUDINAL REINFORCEMENT
SCALE 1:25



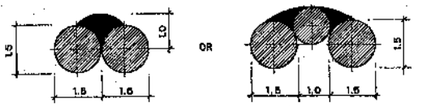
SECTION P - P
SCALE 1:25



SECTION Q - Q
SCALE 1:25

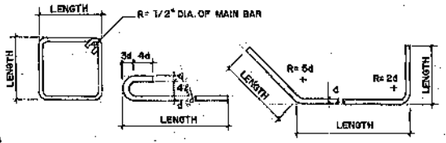


DETAIL 2
SCALE 1:25



FOR BARS IN CONTACT OR FOR BARS WITH SOME SPACE APART

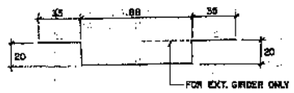
SECTION R - R
SCALE 1:1



BAR BENDING DETAILS
NOT TO SCALE

NOTES :

1. REBARS #4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR24 PLAIN BARS UNLESS OTHER WISE INDICATED
2. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
3. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
4. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.



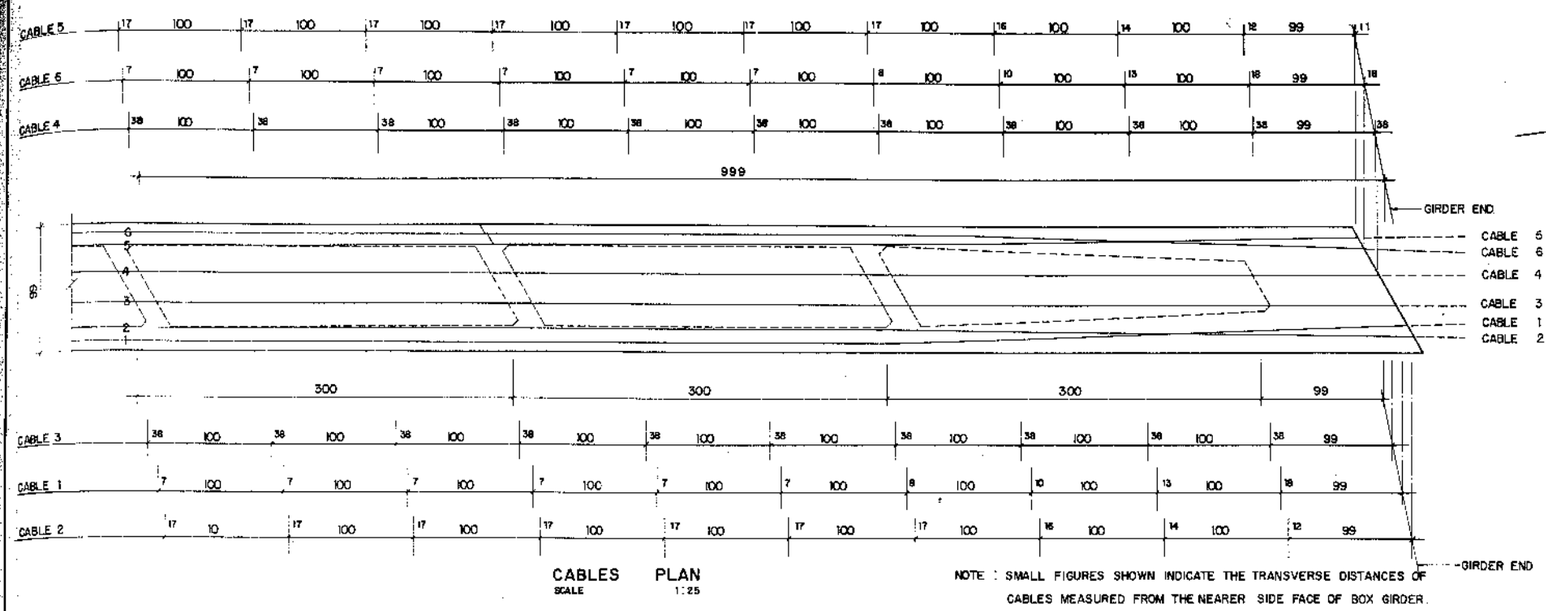
REBAR NO. ④ DETAIL
NOT TO SCALE

REV. NO.	DESCRIPTION	CHECKED SIGN	CHECKED DATE	SUBMITTED SIGN	SUBMITTED DATE	APPROVED SIGN	APPROVED DATE
1	SHAPE OF BAR MARK NO.4 TO BE REVISED AS SHOWN ON THIS DRAWING		15/10/41		16/10/41		

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

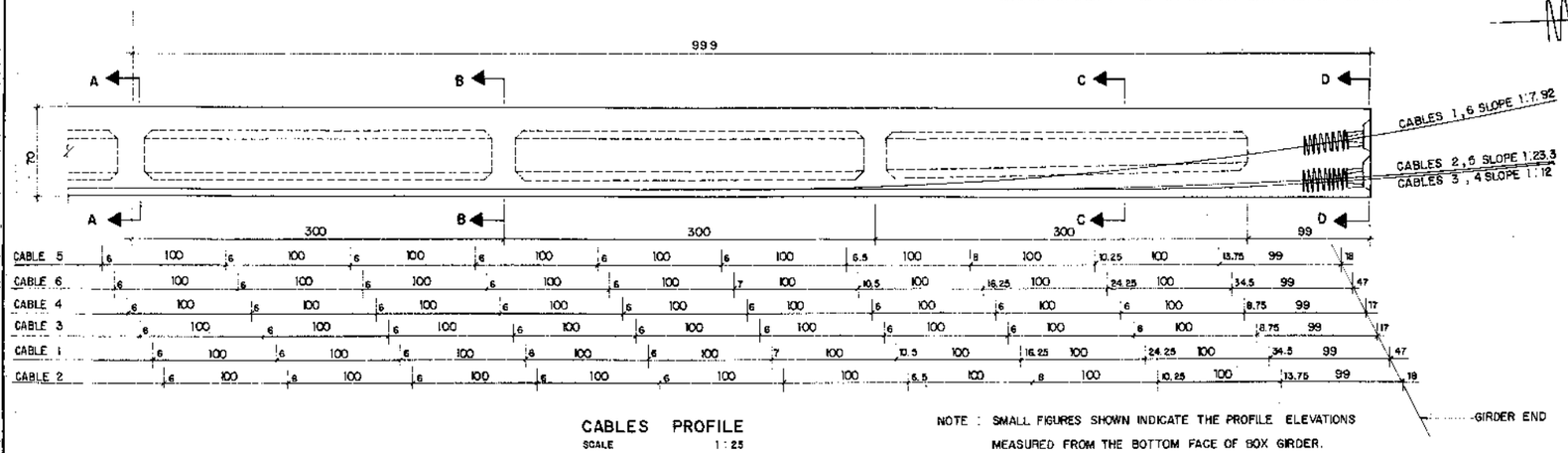
STANDARD DRAWING
POST - TENSIONED BOX GIRDER
20.00M. SPAN
PLAN, SECTION AND REINFORCEMENT DETAILS

DESIGNED: DOH & CONSULTANTS | CHECKED: | DATE JULY 1994
SUBMITTED: P. Boonyaprapa (DIRECTOR OF LOCATION & DESIGN DIVISION) | SCALE AS SHOWN
APPROVED: (DIRECTOR GENERAL) | DWG. NO. 5 BD 20 S/2 | SHEET NO. 183



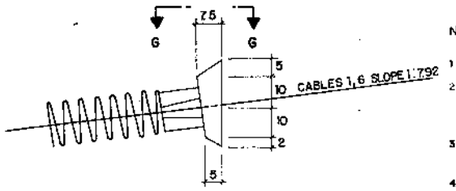
CABLES PLAN
SCALE 1:25

NOTE : SMALL FIGURES SHOWN INDICATE THE TRANSVERSE DISTANCES OF CABLES MEASURED FROM THE NEARER SIDE FACE OF BOX GIRDER.

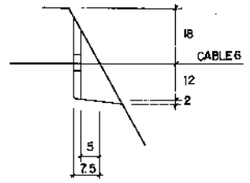


CABLES PROFILE
SCALE 1:25

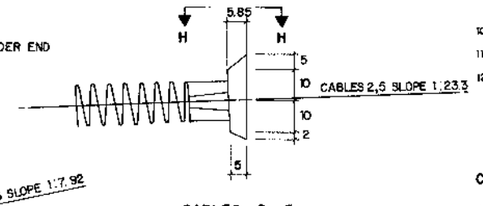
NOTE : SMALL FIGURES SHOWN INDICATE THE PROFILE ELEVATIONS MEASURED FROM THE BOTTOM FACE OF BOX GIRDER.



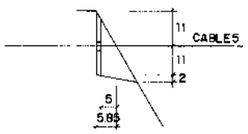
CABLES 1, 6



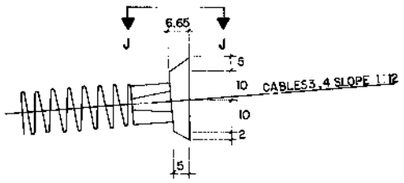
SECTION G - G



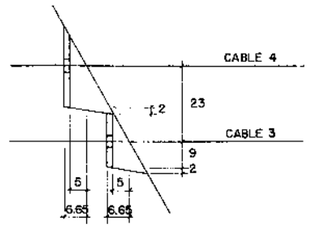
CABLES 2 , 5



SECTION H - H



CABLE 3, 4



SECTION J - J

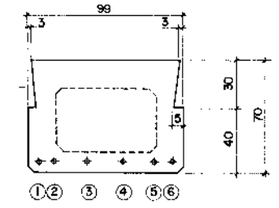
ANCHORAGE DETAILS
SCALE 1:10

NOTES :

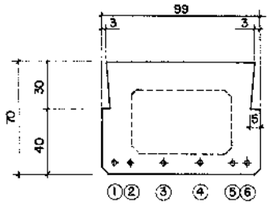
1. WORK THIS DRAWING WITH DWG. NO. 5BD20 S/2.
2. TOTAL NUMBERS OF PRESTRESSING CABLES SHALL BE 6. EACH CABLE CONSISTS OF TWELVE OF ø 7 mm. PRESTRESSING WIRES HAVING A MINIMUM ULTIMATE TENSILE STRENGTH OF 16,000 KG./CM^2
3. ALL CABLES SHALL BE STRESSED BY JACKING AT BOTH ENDS SIMULTANEOUSLY THE JACKING FORCES SHALL BE APPLIED TO CABLE NOS 3,4,2,5,1 AND 6 RESPECTIVELY
4. EACH CABLE SHALL HAVE AN INITAL PRESTRESSING FORCE OF 51,000 Kg. OR STRESSIES OF 11,050 KG./CM^2
5. IF THE MEASUREMENT OF FORCES AS SPECIFIED IN ITEM 3 CAN NOT BE ACHIEVED, THE PRESTRESSING FORCES IN CABLES MAY BE ATTAINED BY CONTROLLING OF THE EXACT ELONGATION AT EACH END OF THE CABLES TO BE AS FOLLOWS :—
   6.4 Cm. FOR CABLE 1 AND 6
   5.95 Cm. FOR CABLE 2 AND 5
   5.85 Cm. FOR CABLE 3 AND 4
   THESE ELONGATIONS ARE BASED ON MODULUS OF ELASTICITY OF THE PRESTRESSING WIRES OF 2,000,000 KG./CM^2 AN ADDITIONAL ELONGATION OF 1 CM. MAY BE PROVIDED FOR SLIPPAGE THIS SHALL BE DONE UNDER THE CLOSED INSPECTION AND APPROVAL OF THE ENGINEER.
6. OTHER REBARS SHALL BE THE SAME AS THOSE SPECIFIED FOR SIDEWALKS AND RAILINGS.
7. REBAR ø 3 SPACED AT 1M. IN VERTICAL AND HORIZONTAL DIRECTIONS SHALL BE USED TO HOLD THE CABLES IN POSITIONS.
8. MIX DESIGN OF CONCRETE FOR PRESTRESSED BOX GIRDERS SHALL BE SUBMITTED FOR THE APPROVAL OF THE ENGINEER. CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 360 KG/CM^2 FOR .15 x .15 x .15 M. CUBE AT 28 DAYS.
9. TRANSVERSE TIE BARS SHALL BE T.I.S. 20 GRADE SR 24 PLAIN BARS WITH 2 LAYERS OF RUST PROOF PAINT SUCH AS RUST-O-LIUM OR EQUIVALENT QUALITY PAINT. THREADED ENDS SHALL BE STANDARD THREAD WITH NUTS AND BEARING WASHERS.
10. ALL MATERIALS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER.
11. CABLE PROFILES SHOWN ARE AT THE CENTER OF THE CABLES.
12. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.

CONSTRUCTION SEQUENCES

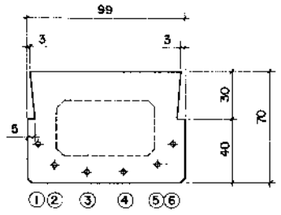
1. CAST THE GIRDER WITH THE SPECIFIED CAMBER.
2. JACKING OF PRESTRESSING TENDONS IN ACCORDANCE WITH THE SEQUENCES AS MENTIONED IN ITEM 2 OF NOTES MAY BE STARTED IF CONCRETE ATTAINED A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 290 KG./CM^2 FOR .15 M. STANDARD CUBE.
3. GROUT ALL CABLE DUCTS WITH CEMENT SLURRY. APPLY EPOXY RASIN TO THE RECESSES AT BOTH ENDS OF THE GIRDER JUST BEFORE FILLING THEM WITH MORTAR.
4. GIRDER SHALL BE LIFT AT BOTH ENDS. MIDSPAN LIFTING IS PROHIBITTED.
5. THE NEXT ADJACENT GIRDER SHALL BE PRESSED AGAINST THE FIRST ONE BY TIGHTENING THE TEMPORARY TIE RODS WITH A TORQUE OF 2,000 KG./CM. THEN WELD THE SHEAR CONNECTORS TOGETHER.
6. CONCRETE BRIDGE ALL SHEAR KEYS WITH CONCRETE OF THE SAME CLASS AS FOR SIDE WALK.
7. CONCRETE BRIDGE TOPPING, SIDEWALKS AND RAILINGS THEN COAT THE BRIDGE TOPPING WITH THE SPECIFIED WEARING SURFACE.
8. IF GIRDERS CAN NOT BE PLACED ACROSS THE FULL WIDTH OF THE BRIDGE DUE TO THE NEED OF PARTIAL OPENING OF TRAFFIC LANES. THE FIRST GROUP OF GIRDERS MAY BE JOINED TOGETHER AS MENTIONED IN STEP 5. THE METHOD OF PRESSING THE LATTER GROUP OF GIRDERS TO THE FIRST GROUP SHALL BE DONE UNDER THE APPROVAL OF THE ENGINEER.



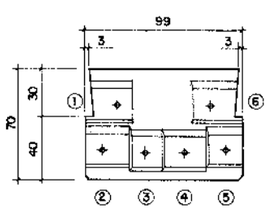
SECTION A - A
SCALE 1:20



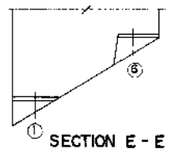
SECTION B - B
SCALE 1:20



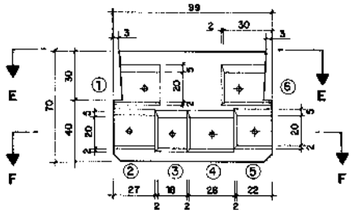
SECTION C - C
SCALE 1:20



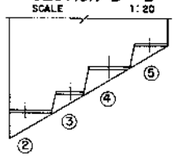
SECTION D - D
SCALE 1:20



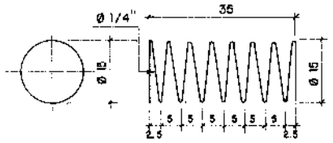
SECTION E - E
SCALE 1:20



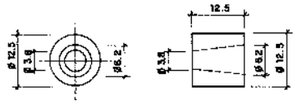
SECTION D - D
SCALE 1:20



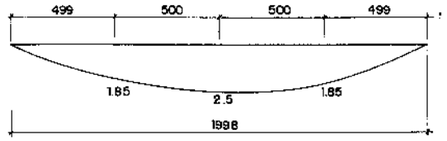
SECTION F - F
SCALE 1:20



SPIRAL DETAIL
SCALE 1:7.5

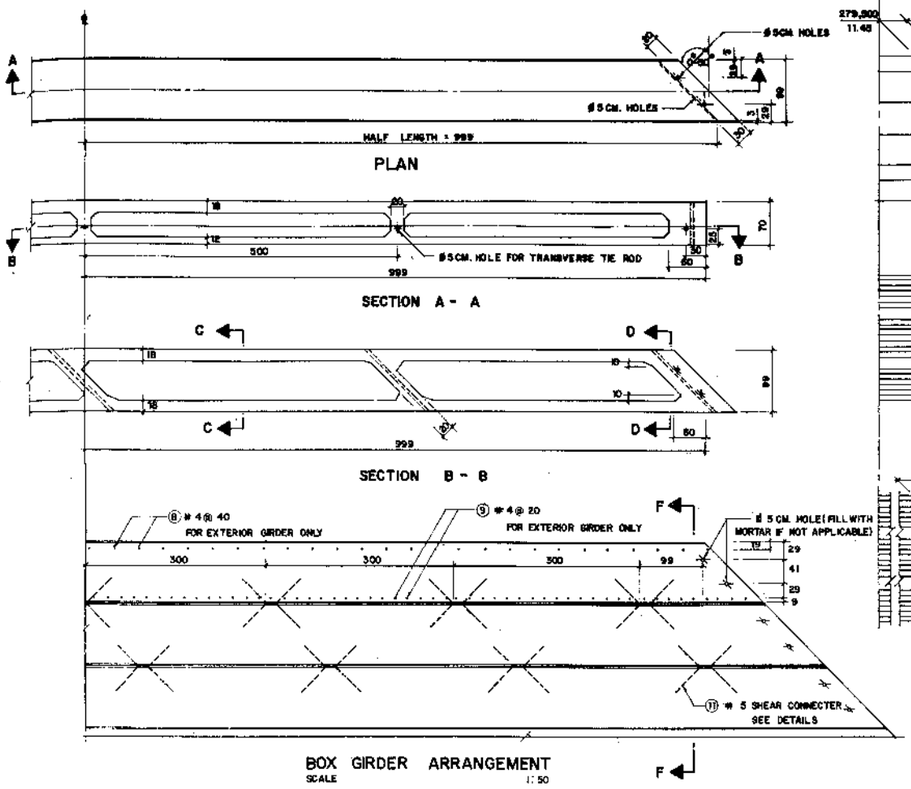


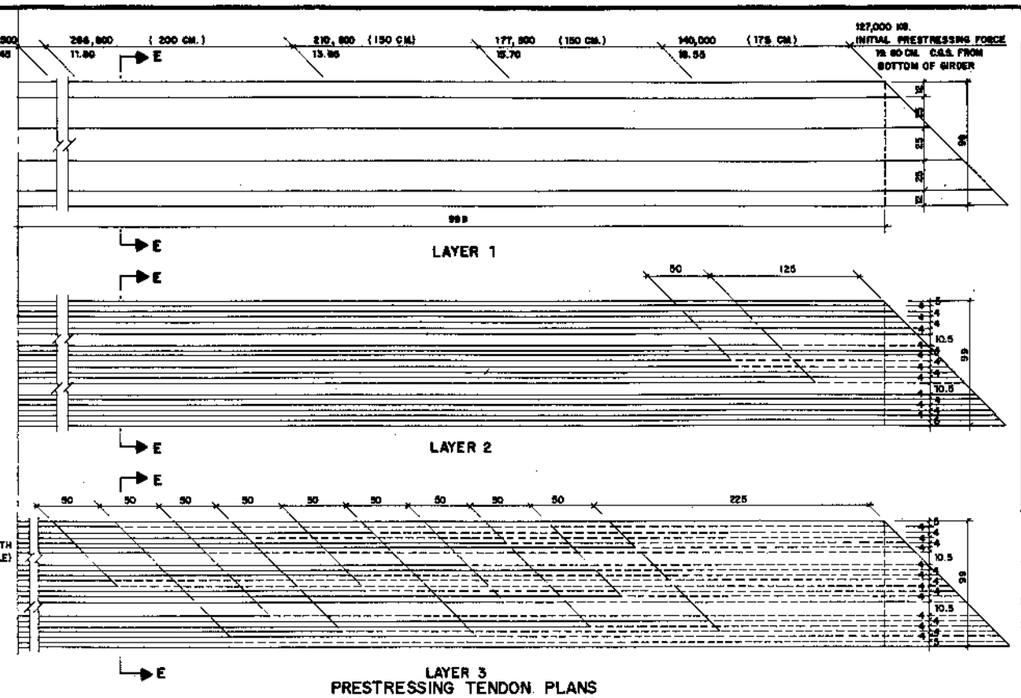
GRIP DETAILS
SCALE 1:7.5

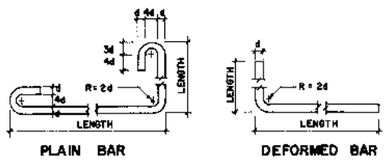


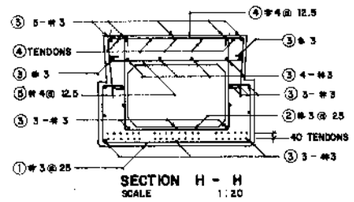
CAMBER
SCALE 1:15

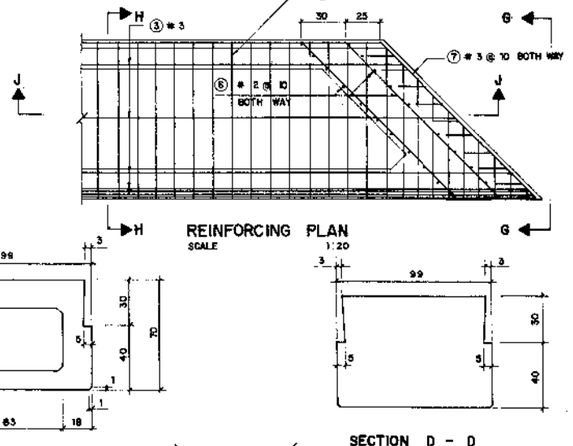
KINGDOM OF THAILAND MINISTRY OF TRANSPORT AND COMMUNICATIONS DEPARTMENT OF HIGHWAYS		
STANDARD DRAWING POST - TENSIONED BOX GIRDER 20.00M. SPAN PRESTRESSING CABLE ARRANGEMENT		
DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: (DIRECTOR GENERAL)		DWG. NO. 5 BD 20 S/3
		SHEET NO. 164

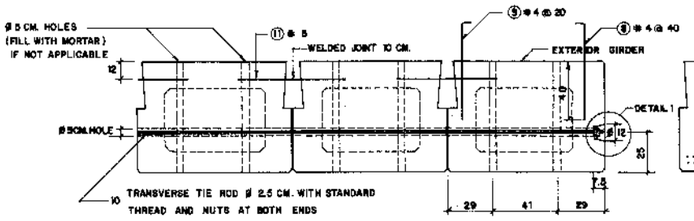


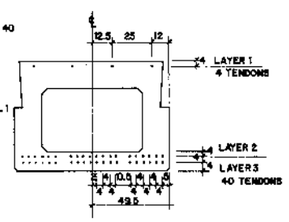


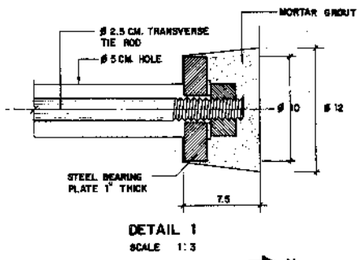


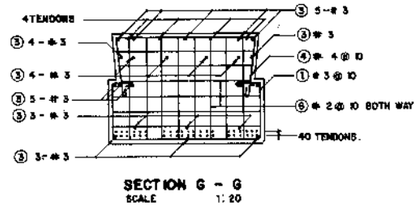












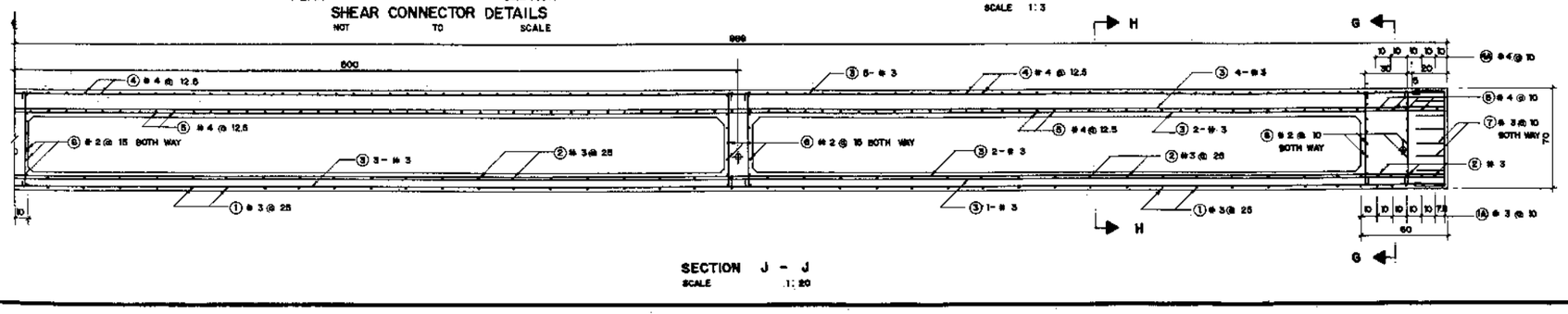


TABLE OF REINFORCEMENT FOR ONE GIRDER

BAR BENDING DIAGRAMS (DIMENSION IN CM.)	BAR MARK	#	NO.	L	TOTAL LENGTH M.	TOTAL REINFORCEMENT. #	TOTAL LENGTH M.
(1A) SEE SECTION J - J	(1)	3	67	210	183.00	–	–
(1)	(2)	3	77	200	154.00	–	–
(2)	(3)	3	23	2063	475.00	–	–
(3)	(4)	4	160	189	302.40	–	–
(4)	(5)	4	152	87	132.24	–	–
(5)	(6)	2	150	98±	142.50	2	142.50
(6)	(7)	3	30	145±	43.50±	3	855.5
(7)	(8)	4	51	75	38.25	–	–
(8)	(9)	4	101	75	75.75	4	546.64
(9)	(10)	8	5	VARIES	VARIES	5	VARIES
(10)	(11)	3	VARIES	135	VARIES	8	VARIES
(11)							

2 = Ø 1/4" OR 6 MM. # 5 = Ø 5/8" OR 15 MM.
3 = Ø 3/8" OR 9 MM. # 8 = Ø 1" OR 25 MM.
4 = Ø 1/2" OR 12 MM.

NO = TOTAL AMOUNT OF BARS
L = TOTAL LENGTH OF EACH BAR.

NOTES :

1. TOTAL PRESTRESSING TENDONS SHALL BE 44 TENDONS OF Ø 3/8" - OF 7 WIRE STRANDS WITH A MINIMUM ULTIMATE STRENGTH OF 17,600 KG./CM^2
2. OTHER TYPES OF PRESTRESSING TENDONS MAY BE USED UNDER THE APPROVAL OF THE ENGINEER.
3. LOCATIONS OF BOND AND DEBOND OF TENDONS SHALL BE AS SHOWN ON THE DRAWING DEBONDING SHALL BE DONE BY USING SUITABLE PLASTIC TUBES WRAPPED AROUND THE TENDONS.
4. EACH PRESTRESSING TENDON SHALL HAVE AN INITIAL STRESS OF 12,300 KG / CM^2 OR IT SHALL BE STRETCHED UNTIL AN ELONGATION OF 12.7 CM. HAS REACHED.
5. TRANSVERSE TIE RODS SHALL BE STRUCTURAL GRADE WITH 2 LAYERS OF RUST PROOF PAINT SUCH AS RUST-O-LIUM OR EQUIVALENT QUALITY PAINT THREADED ENDS SHALL BE STANDARD THREAD WITH NUTS AND BEARING WASHERS
6. MIX. DESIGN OF CONCRETE FOR PRESTRESSED BOX GIRDERS SHALL BE SUBMITTED FOR APPROVAL OF THE ENGINEER. CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 360 KG/CM^2 FOR 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS.
7. REBARS # 4 OR LARGER SHALL BE TIS.24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS EXCEPT OTHERWISE INDICATED.
8. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
9. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
10. ALL MATERIALS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER.
11. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.

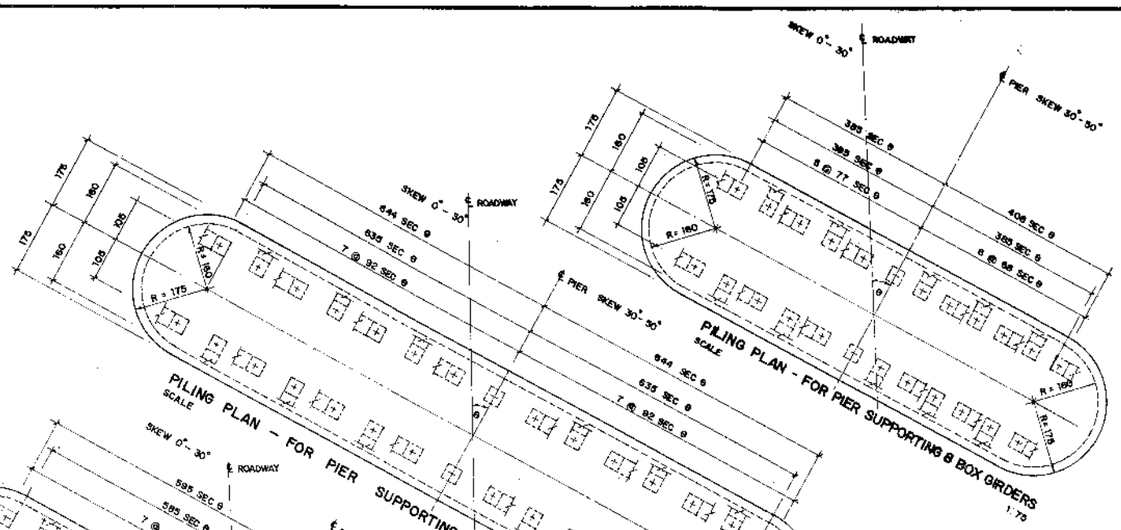
CONSTRUCTION SEQUENCES

1. CONCRETE THE BOX GIRDER AFTER A MINIMUM ULTIMATE STRENGTH OF 290 KG. / CM^2 FOR 0.15 x 0.15 x 0.15 M. CUBE HAS REACHED. THE PRE-TENSIONING TENDONS MAY BE RELEASED.
2. PLACE THE GIRDERS IN POSITIONS THEY SHALL BE LIFTED AT BOTH ENDS. MIDSPAN LIFTING IS PROHIBITTED.
3. THE NEXT ADJACENT GIRDER SHALL BE PRESSED AGAINST THE FIRST ONE BY TIGHTENING THE NUTS AT THE ENDS OF THE TRANSVERSE TIE BARS WITH A TORQUE OF 2,000 KG./CM. THEN SHEAR CONNECTORS TOGETHER.
4. CONCRETE ALL SHEAR KEYS WITH CONCRETE HAVING THE SAME PROPERTIES AS FOR THE SIDEWALK.
5. CONCRETE BRIDGE TOPPING, SIDEWALKS AND RAILINGS THEN COAT THE BRIDGE TOPPING WITH THE SPECIFIED WEARING SURFACE
6. DUE TO THE PRESENT OF THE 1.5 CM. UPWARD CAMBER OF GIRDER AT TRANSFER, THEREFORE IN CALCULATION OF THE ELEVATION OF THE TOP OF PIERS THIS QUANTITY SHALL BE TAKEN INTO ACCOUNT SO THAT THE FINAL FINISHED ELEVATION OF THE BRIDGE WILL BE IN ACCORDANCE WITH THE DESIGN DRAWINGS.
7. IF GIRDERS CAN NOT BE PLACED ACROSS THE FULL WIDTH OF THE BRIDGE DUE TO THE NEED OF PARTIAL OPENING OF TRAFFIC LANES. THE FIRST GROUP OF GIRDERS MAY BE JOINED TOGETHER AS MENTIONED IN STEPS 3 AND 4. THE METHOD OF PRESSING THE LATTER GROUP OF GIRDERS TO THE FIRST GROUP SHALL BE DONE UNDER THE APPROVAL OF THE ENGINEER.

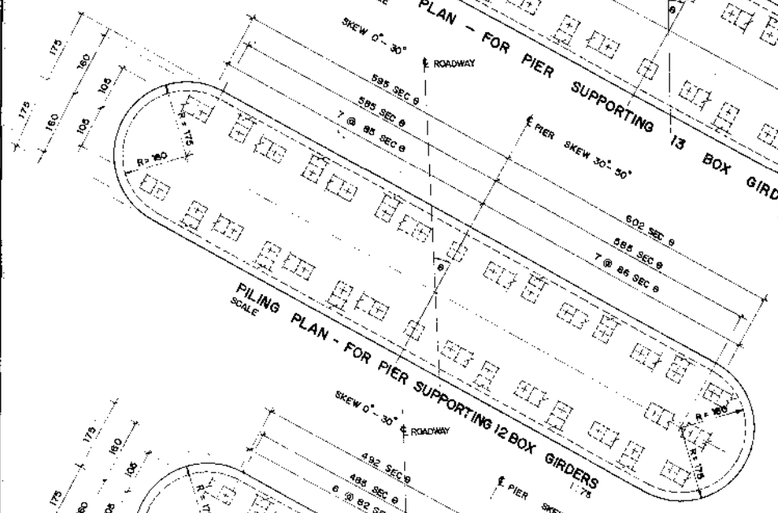
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
PRE-TENSIONED BOX GIRDER
20.00 M. SPAN
PLAN, SECTIONS AND DETAILS

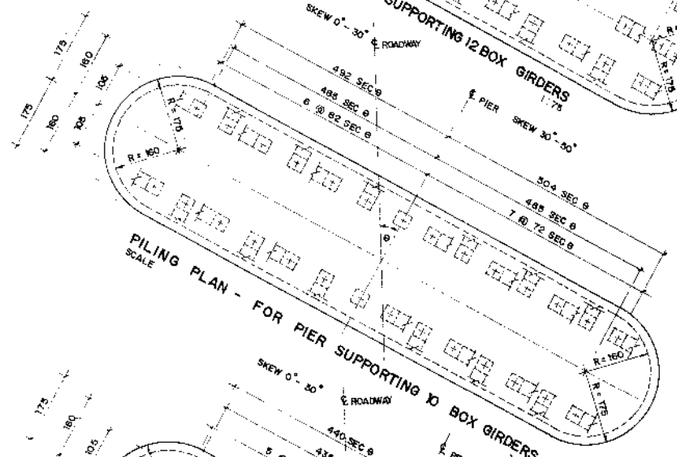
DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: (DIRECTOR GENERAL)		DWG. NO. SB020 9/4
		SHEET NO. 165



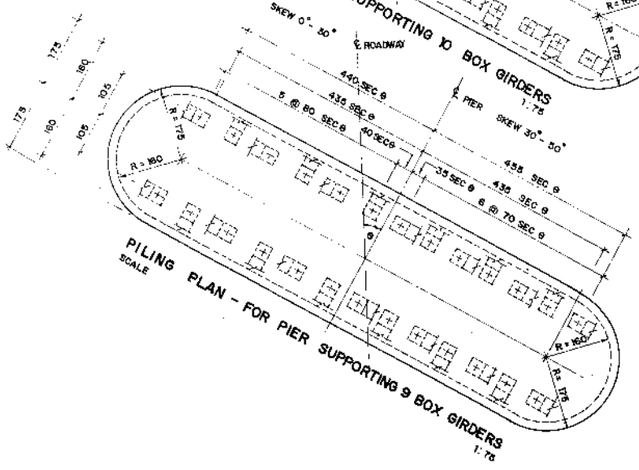
PILING PLAN - FOR PIER SUPPORTING 8 BOX GIRDERS
SCALE 1:75



PILING PLAN - FOR PIER SUPPORTING 13 BOX GIRDERS
SCALE 1:75

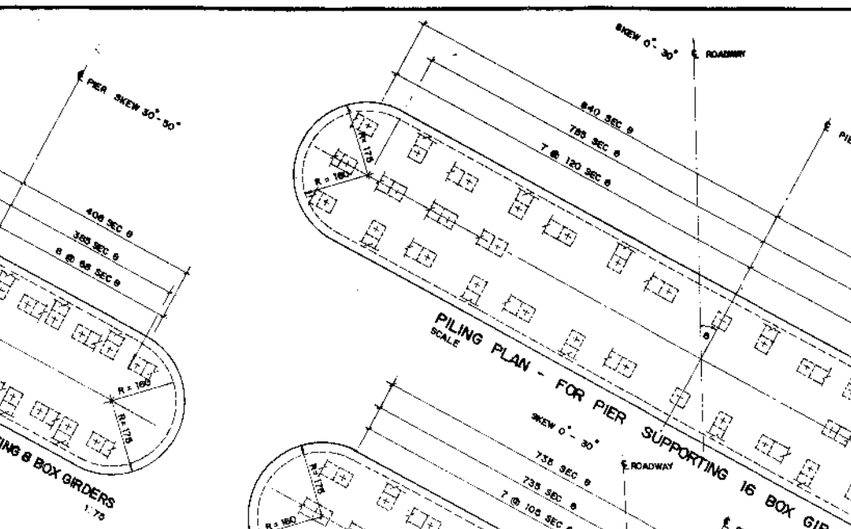


PILING PLAN - FOR PIER SUPPORTING 12 BOX GIRDERS
SCALE 1:75

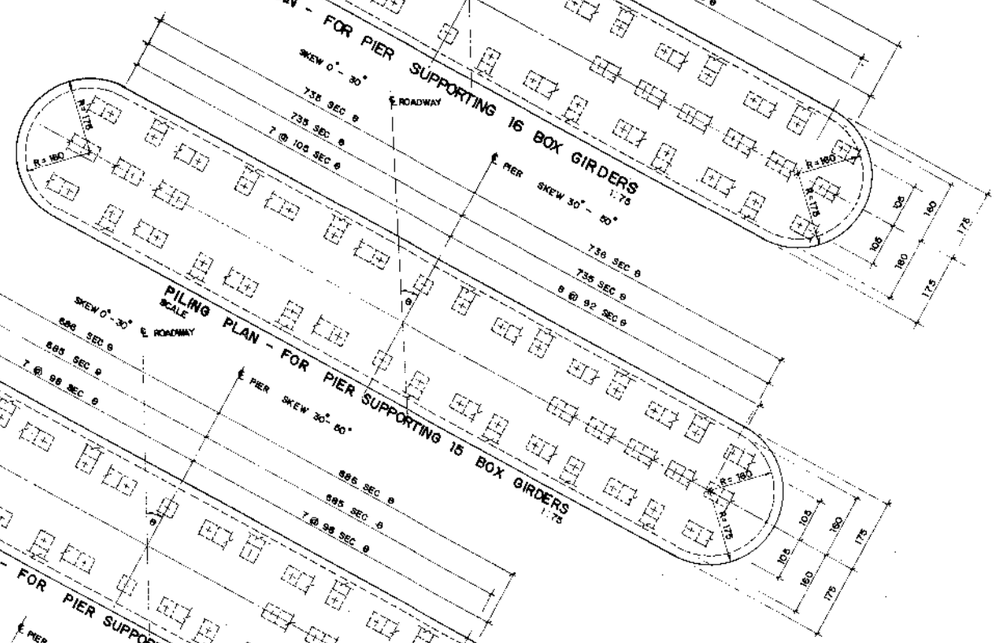


PILING PLAN - FOR PIER SUPPORTING 10 BOX GIRDERS
SCALE 1:75

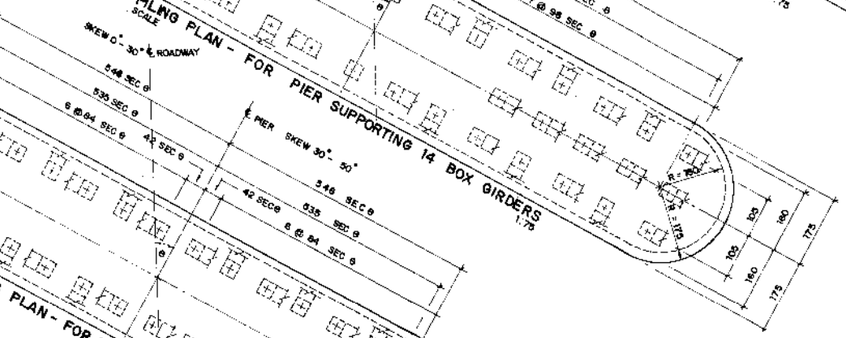
PILING PLAN - FOR PIER SUPPORTING 9 BOX GIRDERS
SCALE 1:75



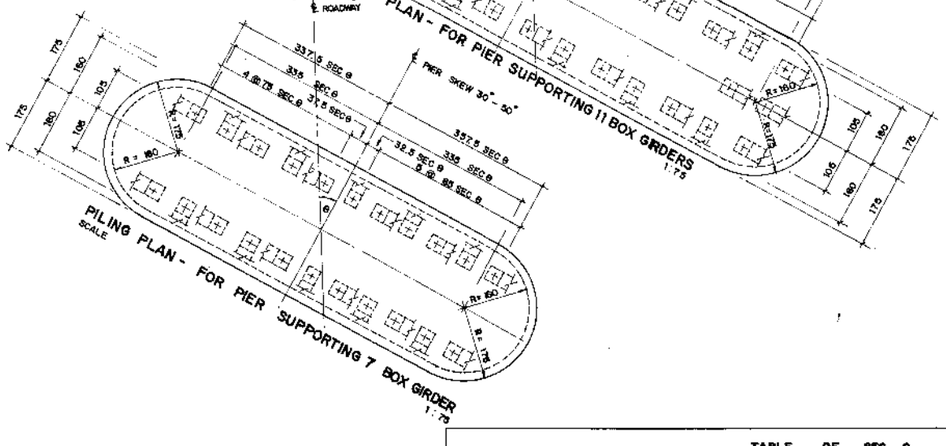
PILING PLAN - FOR PIER SUPPORTING 16 BOX GIRDERS
SCALE 1:75



PILING PLAN - FOR PIER SUPPORTING 15 BOX GIRDERS
SCALE 1:75



PILING PLAN - FOR PIER SUPPORTING 14 BOX GIRDERS
SCALE 1:75



PILING PLAN - FOR PIER SUPPORTING 11 BOX GIRDERS
SCALE 1:75

PILING PLAN - FOR PIER SUPPORTING 7 BOX GIRDER
SCALE 1:75

NOTES

1. WORK THIS DRAWING WITH DWG NO. 58020-10-614/2 AND 58020-10-614/3
2. SLOPES OF ALL BATTERED PILES SHALL BE 1:8
3. EACH PILE SHALL HAVE A MINIMUM ULTIMATE CAPACITY OF 80 TONS AND SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT TIS CAPACITY.
4. THE SKEW ANGLE (θ) IS THE ANGLE IN DEGREE BETWEEN THE DIRECTION OF THE CANAL AND A LINE PERPENDICULAR TO THE ROADWAY
5. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED

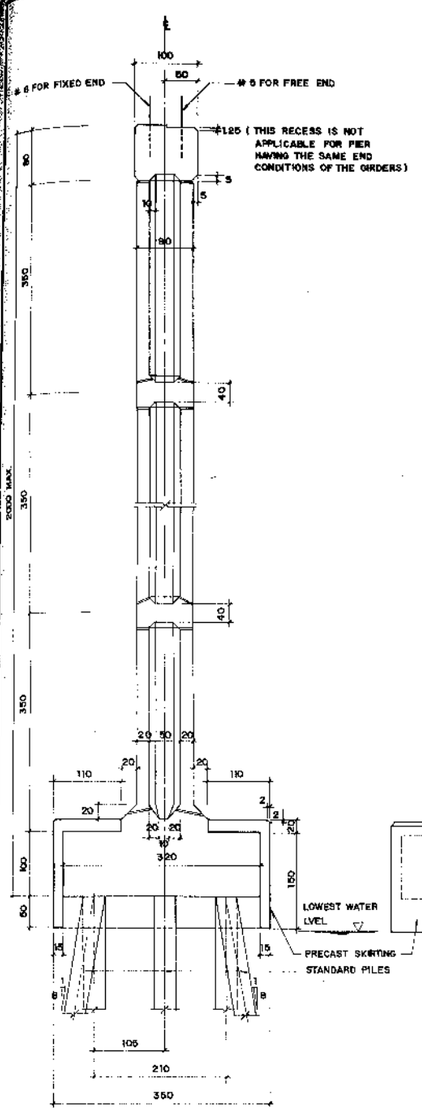
TABLE OF SEC θ

	SKEW ANGLE (θ)										
	0	5	10	15	20	25	30	35	40	45	50
SEC	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547	1.2208	1.3054	1.4142	1.5557

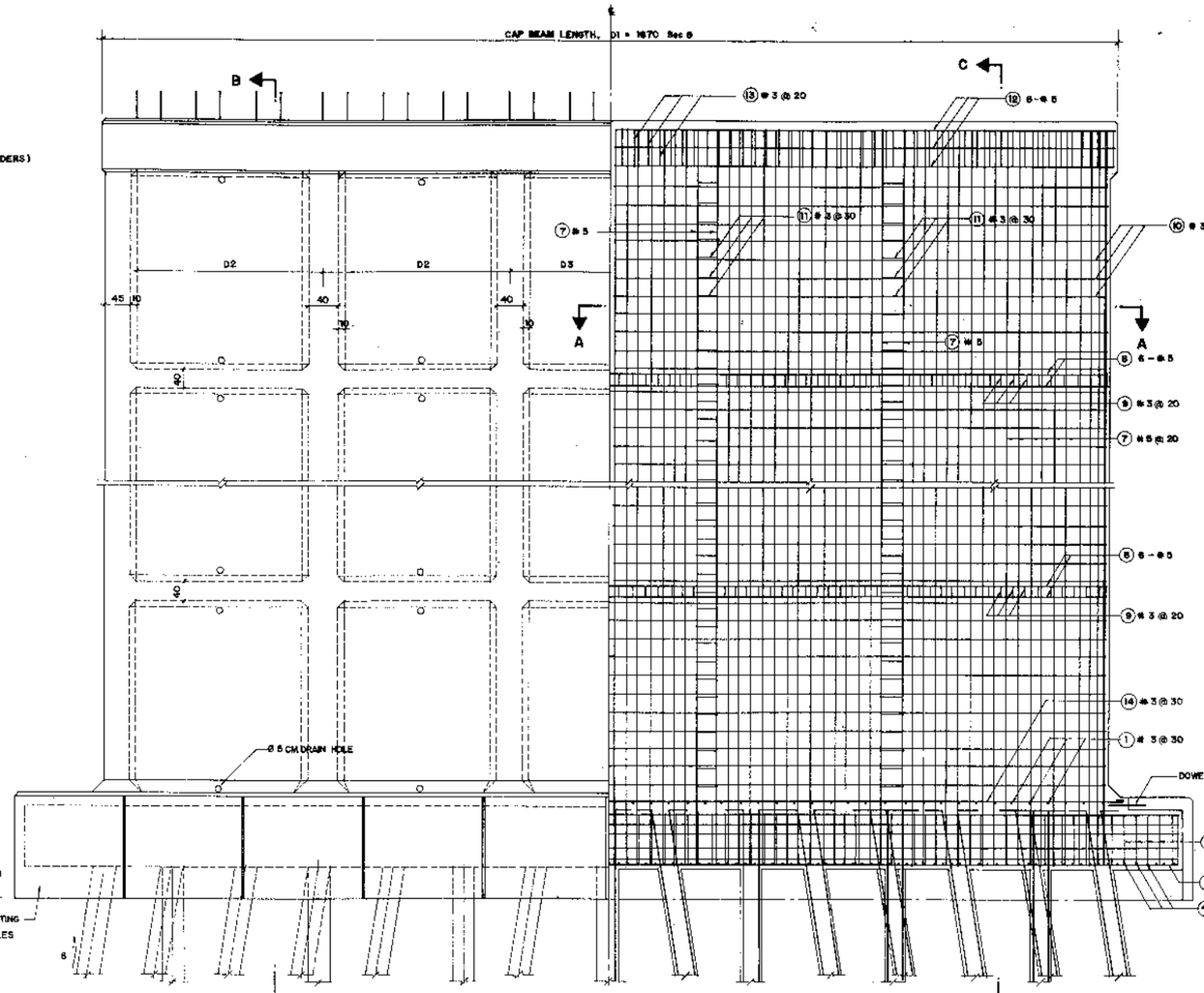
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
0°- 50° SKEW PC BOX GIRDER BRIDGE
20.00M. SPAN
PILE FOOTING PIER, PILING PLANS.

DESIGNED : DOH & CONSULTANTS	CHECKED :
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)	DATE JULY 1994
APPROVED : (DIRECTOR GENERAL)	SCALE AS SHOWN
	DWG. NO. 58020-10-614/1
	SHEET NO. 166



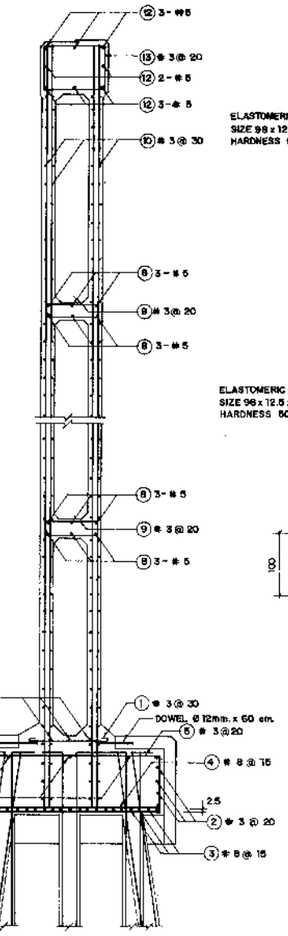
SECTION B - B
SCALE 1:50



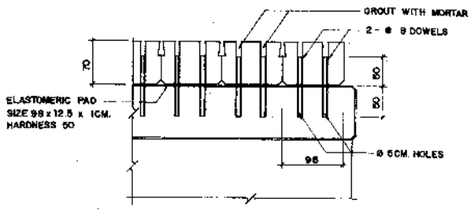
HALF PILE FOOTING ELEVATION

HALF PILE FOOTING REINFORCEMENT

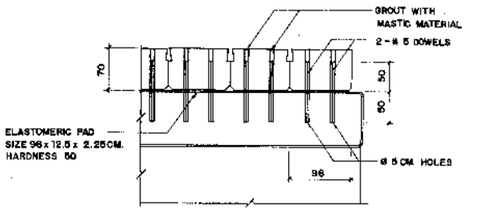
ELEVATION AND REINFORCEMENT DETAIL
SCALE 1:50



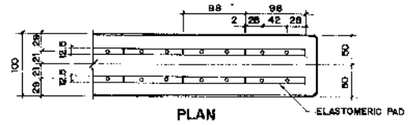
SECTION C - C
SCALE 1:50



FIXED BEARING ELEVATION

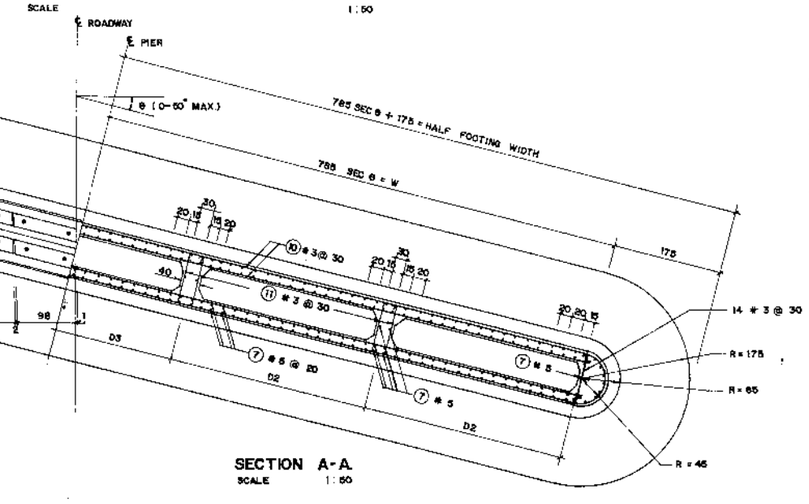


FREE BEARING ELEVATION



PLAN

BEARING DETAILS
SCALE 1:50



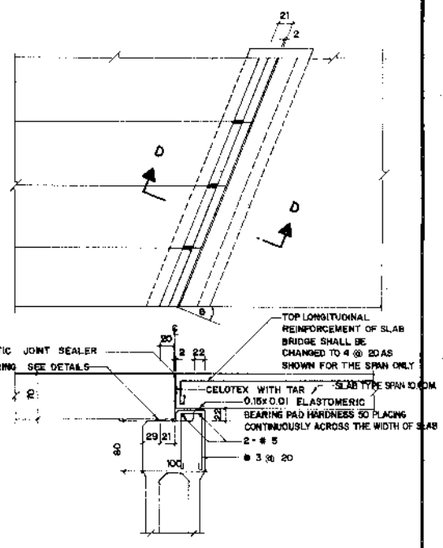
HALF BEARING PLAN
SCALE 1:50

SECTION A-A
SCALE 1:50

NOTE: BEARING AND REINFORCING PLAN SHOWN HERE ARE FOR PIER SUPPORTING 16 BOX GIRDERS.

NOTES:

1. WORK THIS DRAWING WITH DWG NO. SBD20-10-614/1 AND SBD20-10-614/3
2. FOR SKIRT DETAILS SEE DWG NO. SBD20-10-614/3.
3. ALL EXPOSED CONCRETE CORNERS SHALL HAVE 2 CM. CHAMFERS UNLESS OTHERWISE INDICATED
4. HORIZONTAL STIFFENERS BETWEEN WALLS OF A PIER SHALL BE PROVIDED AT EQUAL SPACING OF NOT MORE THAN 3.50 M.
5. DIAPHRAGM COLUMNS SHALL BE ARRANGED IN SUCH A WAY THAT BOTH D_2 AND $2D_3$ SHALL NOT BE GREATER THAN 3.20 M.
6. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.



SECTION D - D

PILE HEAD DETAILS
SCALE 1:50

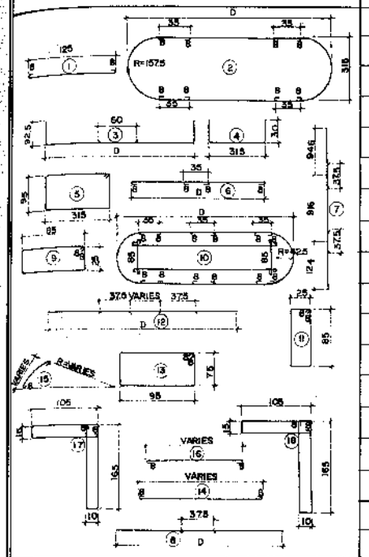
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
0°~50° SKEW PC BOX GIRDER BRIDGE
20.00M. SPAN
PILE FOOTING PIER DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Buraphasy (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. SBD20-10-614/2
		SHEET NO. 157

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS CM.



BAR MARK	#	7 - BOX GIRDER				8 - BOX GIRDER				9 - BOX GIRDER				10 - BOX GIRDER				11 - BOX GIRDER				12 - BOX GIRDER				13 - BOX GIRDER				14 - BOX GIRDER				15 - BOX GIRDER				16 - BOX GIRDER			
		NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH
1	3	@30	-	141	3,807	@30	-	141	4,230	@30	-	141	4,794	@30	-	141	5,217	@30	-	141	5,640	@30	-	141	6,063	@30	-	141	6,627	@30	-	141	7,050	@30	-	141	7,473	@30	-	141	8,047
2	3	@20	985	2,535	12,555	@20	1,085	2,733	13,665	@20	1,185	2,933	14,665	@20	1,285	3,133	15,665	@20	1,385	3,333	16,665	@20	1,485	3,533	17,665	@20	1,585	3,733	18,665	@20	1,685	3,933	19,665	@20	1,785	4,133	20,665	@20	1,885	4,333	21,665
3	8	23	1,015	1,260	28,980	23	1,115	1,360	31,280	23	1,215	1,460	33,580	23	1,315	1,560	35,880	23	1,415	1,660	38,180	23	1,515	1,760	40,480	23	1,615	1,860	42,780	23	1,715	1,860	45,080	23	1,815	2,060	47,380	23	1,915	2,160	49,680
4	8	68	-	375	25,500	75	-	375	28,125	82	-	375	30,750	88	-	375	33,000	95	-	375	35,625	101	-	375	37,875	108	-	375	40,500	115	-	375	43,125	122	-	375	45,750	128	-	375	48,000
5	3	51	-	636	19,386	56	-	636	46,616	61	-	636	50,996	66	-	636	55,176	71	-	636	59,356	76	-	636	63,536	81	-	636	67,716	88	-	636	71,896	91	-	636	76,076	96	-	636	80,256
6	3	3	1,015	-	3,045	3	1,115	-	3,345	3	1,215	-	3,645	3	1,315	-	3,945	3	1,415	-	4,245	3	1,515	-	4,545	3	1,615	-	4,845	3	1,715	-	5,145	3	1,815	-	5,445	3	1,915	-	5,745
7	5	190	-	2,061	391,590	200	-	2,061	412,200	210	-	2,061	432,810	220	-	2,061	453,420	230	-	2,061	474,030	240	-	2,061	494,640	260	-	2,061	535,860	270	-	2,061	556,470	280	-	2,061	577,080				
8	5	24	750	-	18,912	24	850	-	21,312	24	950	-	23,712	24	1,050	-	26,112	24	1,150	-	28,512	24	1,250	-	30,912	24	1,350	-	33,312	24	1,450	-	35,712	24	1,550	-	38,112	24	1,650	-	40,512
9	3	120	-	236	28,320	140	-	236	33,040	160	-	236	37,760	180	-	236	42,480	200	-	236	47,200	220	-	236	51,920	240	-	236	56,640	260	-	236	61,360	280	-	236	66,080	300	-	236	70,800
10	3	58	755	3,442	199,636	58	855	3,842	222,836	58	955	4,242	246,036	58	1,055	4,642	269,236	58	1,155	5,042	292,436	58	1,255	5,442	315,636	58	1,355	5,842	338,836	58	1,455	6,242	362,036	58	1,555	6,642	385,236	58	1,655	7,042	408,436
11	3	116	-	236	27,376	116	-	236	27,376	116	-	236	27,376	116	-	236	27,376	174	-	236	41,064	174	-	236	41,064	174	-	236	41,064	232	-	236	54,752	232	-	236	54,752	232	-	236	54,752
12	5	8	765	840	6,720	8	865	940	7,520	8	965	1,040	8,320	8	1,065	1,140	9,120	8	1,165	1,240	9,920	8	1,265	1,340	10,720	8	1,365	1,440	11,520	8	1,465	1,540	12,320	8	1,565	1,640	13,120	8	1,665	1,740	13,920
13	3	38	-	356	13,528	43	-	356	15,308	48	-	356	17,088	53	-	356	18,868	58	-	356	20,648	63	-	356	22,428	68	-	356	24,208	73	-	356	25,988	78	-	356	27,768	83	-	356	29,548
14	5	@20	-	804	4,020	@20	-	904	4,520	@20	-	1,004	5,020	@20	-	1,104	5,520	@20	-	1,204	6,020	@20	-	1,304	6,520	@20	-	1,404	7,020	@20	-	1,504	7,520	@20	-	1,604	8,020	@20	-	1,704	8,520
15	3	104	-	-	26,348	104	-	-	26,348	104	-	-	26,348	104	-	-	26,348	104	-	-	26,348	104	-	-	26,348	104	-	-	26,348	104	-	-	26,348	104	-	-	26,348	104	-	-	26,348
16	3	208	-	185	38,480	208	-	204	42,432	260	-	185	48,100	260	-	208	53,300	312	-	191	59,592	312	-	208	64,272	364	-	193	70,252	364	-	207	75,348	416	-	195	81,120	416	-	208	86,528
17	3	44	-	581	25,564	44	-	581	25,564	44	-	581	25,564	44	-	581	25,564	44	-	581	25,564	44	-	581	25,564	44	-	581	25,564	44	-	581	25,564	44	-	581	25,564	44	-	581	25,564
18	3	@20	-	581	41,832	@20	-	581	51,128	@20	-	581	58,100	@20	-	581	63,980	@20	-	581	69,720	@20	-	581	75,692	@20	-	581	81,540	@20	-	581	87,474	@20	-	581	92,960	@20	-	581	102,256

#3 = Ø 3/8" OR 9MM. #4 = Ø 1/2" OR 12 MM #5 = Ø 5/8" OR 16 MM. #6 = Ø 1" OR 25 MM. NO= TOTAL AMOUNT OF BARS L= TOTAL LENGTH OF EACH BAR

NOTES :

1 WORK THIS DRAWING WITH DWG NO. 5BD20-10-614/1 AND 5BD20-10-614/2.

2 CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG/CM^2 FOR .15 x .15 x .15 CUBE AT 28 DAYS AN APPROXIMATE MIX DESIGN PER CUBIC METER IS SUGGESTED AS FOLLOWS :

PORTLAND CEMENT, MIN	350	KG.
SAND	0.43	M^3
CRUSHED ROCK OR GRAWEL	0.86	M^3
CONCRETE SLUMP, MAX	10	CM

3 CLEAR CONCRETE COVER SHALL BE 2.5 CM.

4 IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATIONS OF REBARS.

5 REBARS #4 OR LARGER SHALL BE TIS.24 GRADE SD.30 DEFORMMED BARS, OTHERS SHALL BE TIS20 GRADE SR.24 PLAIN BARS, UNLESS OTHERWISE INDICATED.

6 LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.

7 LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.

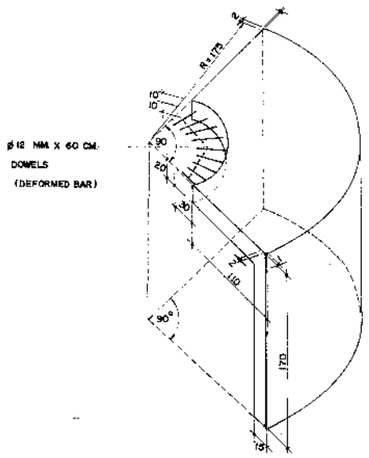
8 IN CASE OF NON-SKEW BRIDGE, BEARINGS UNDER 10.0 M. SPAN SLAB BRIDGE SHALL BE CONSTANTLY 22 CM. WIDE

9 ALL MATERIALS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER FOR ELASTOMERIC PADS, CONTRACTOR SHALL SUBMIT A CERTIFICATE FROM THE MANUFACTURER SHOWING THAT THEY WILL PERFORM IN ACCORDANCE WITH THE SPECIFICATIONS.

10 QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 20.0 M.

11 LENGTH AND AMOUNT OF REBARS SHOWN IN THE TABLE MAY VARY ACCORDING TO PIER SHAPE BUT SPACING SHALL BE AS SHOWN ON THE DRAWINGS.

12 ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.

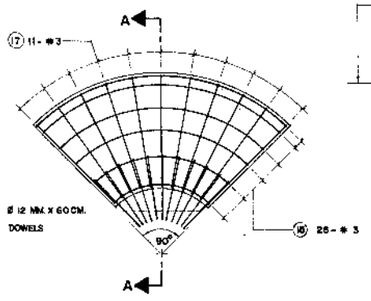


PILE FOOTING

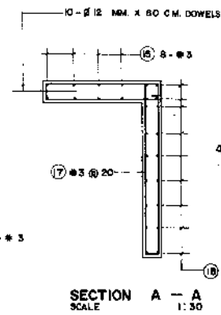
NUMBER OF BOX GIRDER	D1 CM	D2 CM	D3 CM	HALF LENGTH OF FOOTING CM	WIDTH OF FOOTING CM	NUMBER OF PILES 0°-30° SKEW	NUMBER OF PILES 30°-50° SKEW	PILE HEAD SPACING C-C 0°-30° SKEW	PILE HEAD SPACING C-C 50°-60° SKEW	W (CM)
7	770 SEC θ	215 SEC θ	109 SEC θ	535 SEC θ + 175	350	20	24	75 SEC θ	65 SEC θ	335 SEC θ
8	870 SEC θ	250 SEC θ	-	585 SEC θ + 175	350	22	26	77 SEC θ	68 SEC θ	385 SEC θ
9	970 SEC θ	283 SEC θ	142 SEC θ	635 SEC θ + 175	350	24	28	80 SEC θ	70 SEC θ	435 SEC θ
10	1,070 SEC θ	316 SEC θ	159 SEC θ	685 SEC θ + 175	350	26	30	82 SEC θ	72 SEC θ	485 SEC θ
11	1,170 SEC θ	2625 SEC θ	-	535 SEC θ + 175	350	28	32	84 SEC θ	84 SEC θ	535 SEC θ
12	1,270 SEC θ	2875 SEC θ	-	685 SEC θ + 175	350	30	34	85 SEC θ	85 SEC θ	585 SEC θ
13	1370 SEC θ	312.5 SEC θ	-	636 SEC θ + 175	350	32	36	92 SEC θ	92 SEC θ	636 SEC θ
14	1,470 SEC θ	270 SEC θ	-	685 SEC θ + 175	350	34	40	98 SEC θ	98 SEC θ	685 SEC θ
15	1,570 SEC θ	290 SEC θ	-	735 SEC θ + 175	350	38	44	105 SEC θ	92 SEC θ	735 SEC θ
16	1,670 SEC θ	310 SEC θ	-	785 SEC θ + 175	350	38	46	120 SEC θ	105 SEC θ	785 SEC θ

TABLE OF SEC θ

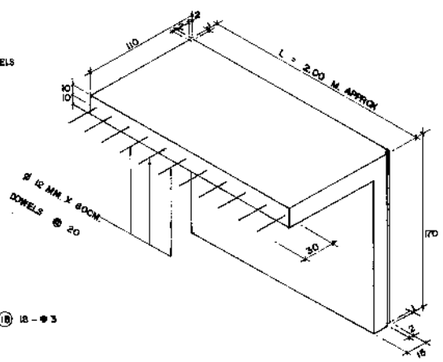
	SKEW ANGLE (θ)										
	0	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°
SEC θ	1.0000	1.0058	1.0154	1.0353	1.0642	1.1034	1.1547	1.2208	1.3054	1.4142	1.5557

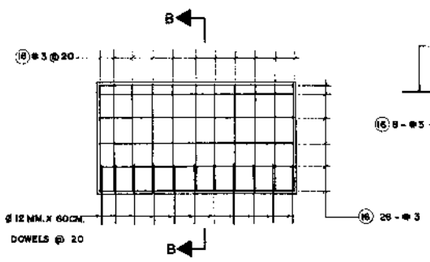


PRECAST SKIRTING "A" DETAILS
SCALE 1:30

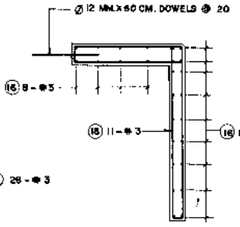


SECTION A - A
SCALE 1:30

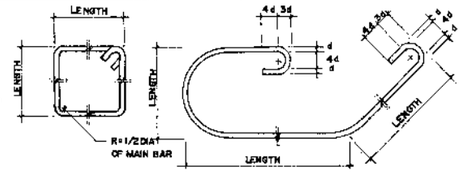




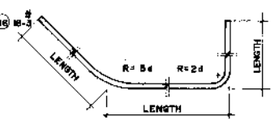
PRECAST SKIRTING "B" DETAILS
SCALE 1:30



SECTION B - B
SCALE 1:30



PLAIN BAR



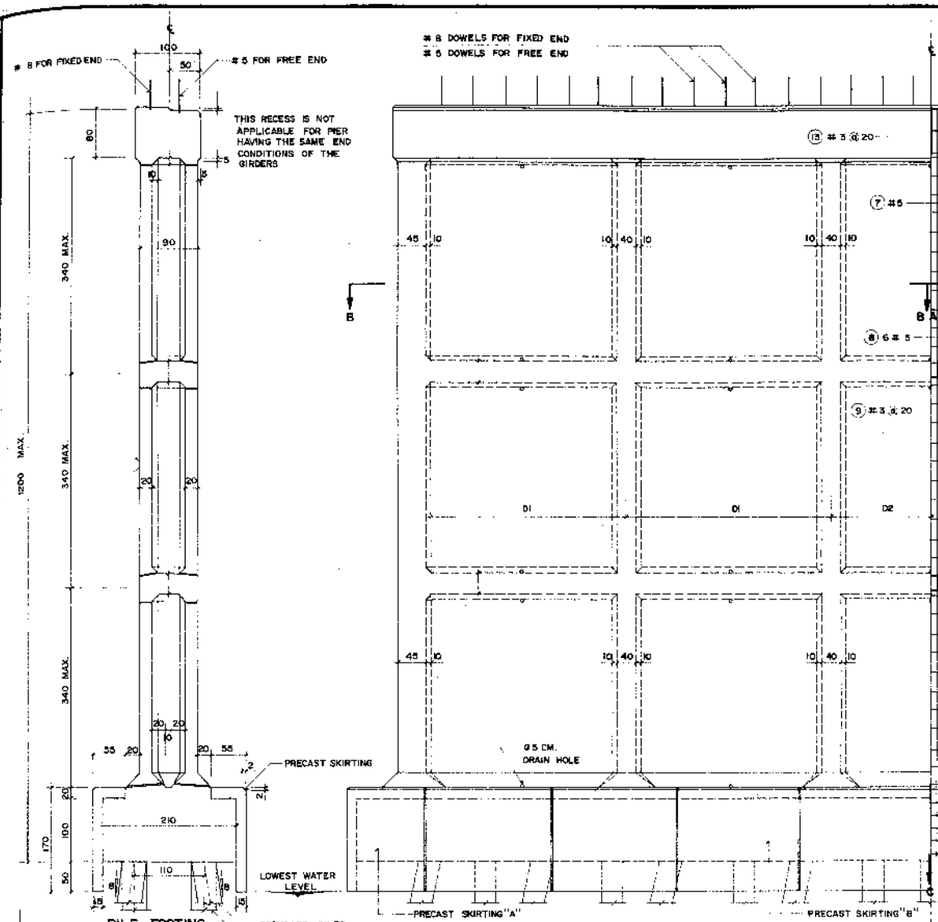
DEFORMED BAR

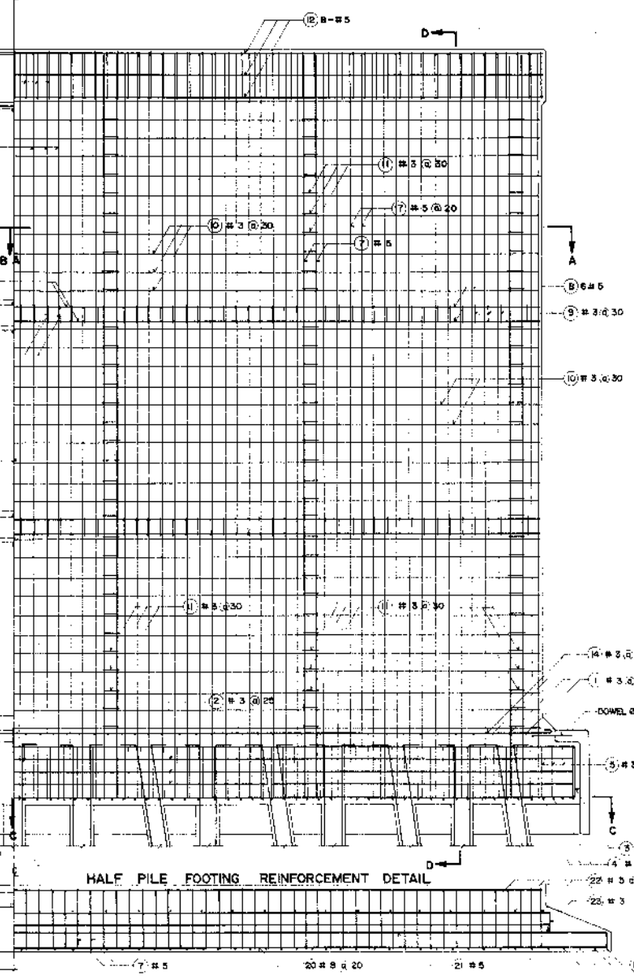
BAR BENDING DETAILS NOT TO SCALE

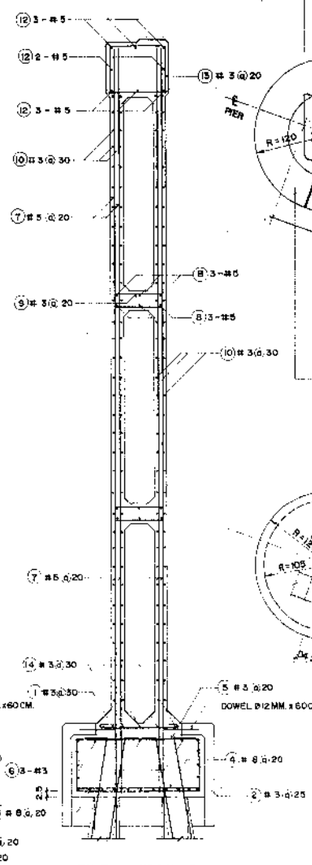
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

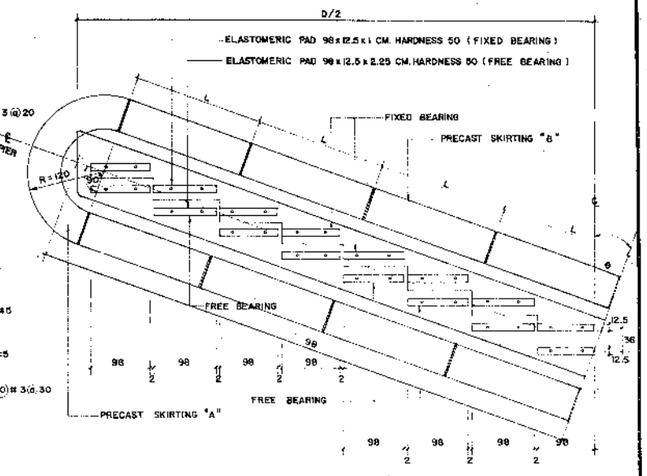
STANDARD DRAWING
0°-50° SKEW PC. BOX GIRDER BRIDGE
20.00 M. SPAN
PIER REINFORCING AND SKIRTING DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : 1994 (DIRECTOR GENERAL)		DWG. NO. 5 BD 20-10-614/3
		SHEET NO. 168

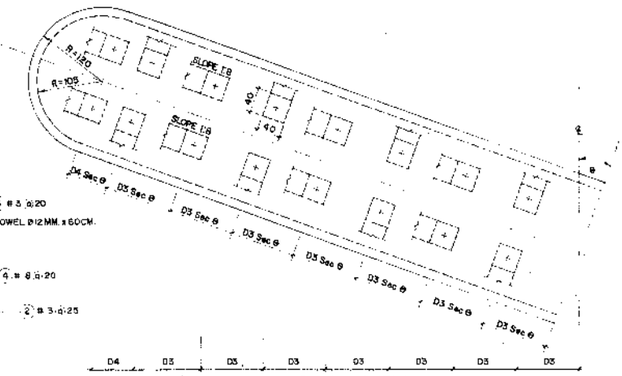




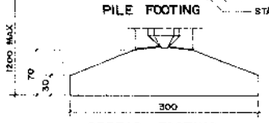




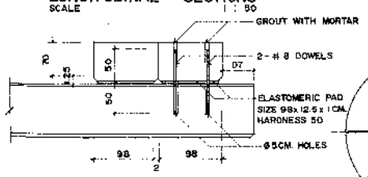
HALF BEARING PLAN (SKEW)
SCALE 1 : 50



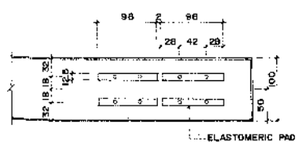
HALF PILING PLAN (SKEW)
SCALE 1 : 50



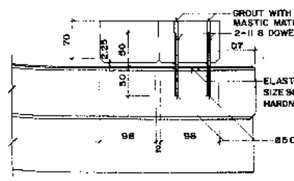
SPREAD FOOTING
LONGITUDINAL SECTIONS
SCALE 1 : 50



FIXED BEARING ELEVATION

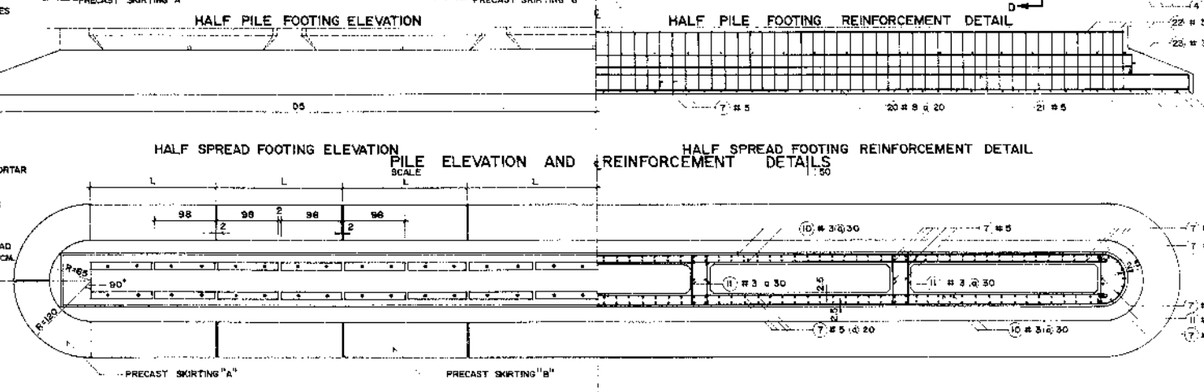


PLAN

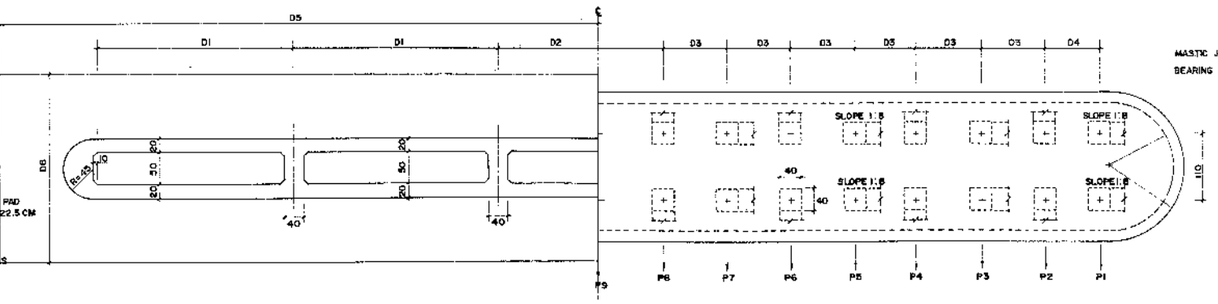


FREE BEARING ELEVATION

BEARING DETAILS
SCALE 1 : 50



HALF PLAN
SCALE 1 : 50

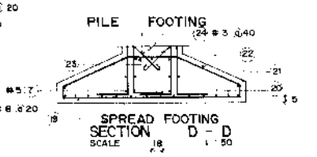


SECTION B - B
SCALE 1 : 50

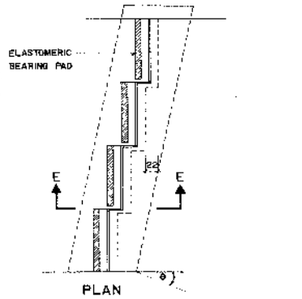
SECTION A - A
SCALE 1 : 50

SECTION C - C
SCALE 1 : 50

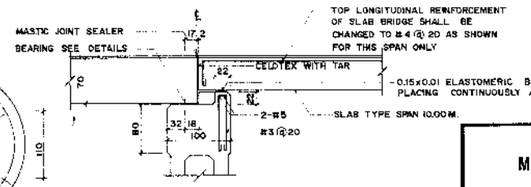
PILE ELEVATION AND REINFORCEMENT DETAILS
SCALE 1 : 50



SECTION D - D
SCALE 1 : 50



PLAN



TOP LONGITUDINAL REINFORCEMENT OF SLAB BRIDGE SHALL BE CHANGED TO #4 @ 20 AS SHOWN FOR THIS SPAN ONLY

0.15 x 0.01 ELASTOMERIC BEARING PAD HARDNESS 50 PLACING CONTINUOUSLY ACROSS THE WIDTH OF SLAB

SECTION E - E
PIER HEAD DETAILS
SCALE 1 : 50

NOTES :

1. WORK THIS DRAWING WITH DWG NO SBD 20-10-614/5.
2. ALL EXPOSED CONCRETE CORNERS SHALL HAVE 2 CM. CHAMFERS UNLESS OTHERWISE INDICATED.
3. HORIZONTAL STIFFENERS BETWEEN WALLS OF A PIER SHALL BE PROVIDED AT EQUAL SPACING OF NOT MORE THAN 3.4 M.
4. DIAPHRAGM COLUMNS SHALL BE ARRANGED IN SUCH A WAY THAT BOTH D1 AND D2 SHALL NOT BE GREATER THAN 3.2 M.
5. MINIMUM ALLOWABLE BEARING CAPACITY OF SOIL UNDER SPREAD FOOTING PIERS SHALL BE 20 TON/M THE BOTTOM OF FOOTING SHALL BE EMBEDDED IN THE EXISTING GROUND NOT LESS THAN 2.5 M. OR AT THE LEVEL WHERE SCOUR WILL NOT AFFECT ITS CAPACITY
6. FOR PILE FOOTING PIERS, EACH PILE SHALL HAVE A MINIMUM ULTIMATE CAPACITY OF 90 TONS AND SHALL BE DRIVEN TO A DEPTH WHERE SCOUR WILL NOT AFFECT ITS CAPACITY.
7. FOR SPREAD FOOTING PIERS, THE MAXIMUM HEIGHT FROM THE BOTTOM OF FOOTING TO THE TOP OF CAP BEAM SHALL BE 12.0 M.
8. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

0°-50° SKEW PC. BOX GIRDER BRIDGE

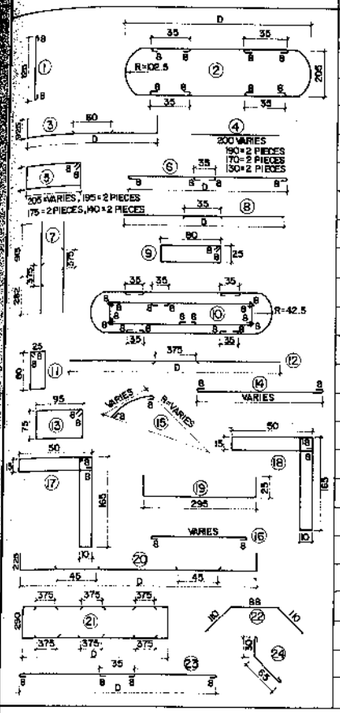
SPREAD AND PILE FOOTING PIER DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. S BD 20-10-614/4
		SHEET NO. 169

TABLE OF REINFORCEMENT

BAR BENDING DIAGRAMS

CM.



BAR MARK	⌀	7 – BOX GIRDER				8 – BOX GIRDE				9 – BOX GIRDER				10 – BOX GIRDER				11 – BOX GIRDER				12 – BOX GIRDER				13 – BOX GIRDER				14 – BOX GIRDER				15 – BOX GIRDER				16 – BOX GIRDER			
		NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH	NO	D	L	TOTAL LENGTH
1	3	@ 30	–	141	3,807	@30	–	141	4,230	@ 30	–	141	4,794	@ 30	–	141	5,217	@ 30	–	141	5,640	@ 30	–	141	6,063	@ 30	–	141	6,627	@ 30	–	141	7,050	@ 30	–	141	7,483	@ 30	–	141	8,047
2	3	@ 20	845	2,188	10,940	@20	945	2,388	11,940	@ 20	1,045	2,588	12,940	@ 20	1,145	2,788	13,940	@ 20	1,255	2,998	14,990	@ 20	1,365	3,218	16,090	@ 20	1,475	3,438	17,190	@ 20	1,585	3,658	18,290	@ 20	1,695	3,878	19,390	@ 20	1,805	4,098	20,490
3	8	11	845	1,090	11,990	11	945	1,190	13,080	11	1,045	1,290	14,190	11	1,145	1,390	15,290	11	1,255	1,500	16,500	11	1,365	1,610	17,710	11	1,475	1,720	18,920	11	1,585	1,830	20,130	11	1,695	1,940	21,340	11	1,805	2,050	22,550
4	8	44	–	200	8,800	49	–	200	9,800	54	–	200	10,800	59	–	200	11,800	64	–	200	12,800	69	–	200	13,800	74	–	200	14,800	79	–	200	15,800	84	–	200	16,800	89	–	200	17,800
5	3	44	–	611	26,884	49	–	611	29,939	54	–	611	32,994	59	–	611	36,094	64	–	611	39,104	69	–	611	42,159	74	–	611	45,214	79	–	611	48,269	84	–	611	55,324	89	–	611	58,379
6	3	3	845	904	2,712	3	945	1,004	3,012	3	1,045	1,104	3,135	3	1,145	1,204	3,612	3	1,255	1,314	3,942	3	1,365	1,424	4,272	3	1,475	1,534	4,602	3	1,585	1,644	4,932	3	1,695	1,754	5,262	3	1,805	1,864	5,592
7	5	148	–	1,232.5	182,410	172	–	1,232.5	211,990	196	–	1,232.5	241,570	220	–	1,232.5	271,150	244	–	1,232.5	300,730	268	–	1,232.5	330,310	292	–	1,232.5	359,890	316	–	1,232.5	389,470	340	–	1,232.5	419,050	364	–	1,232.5	448,630
8	5	12	845	882.5	10,590	12	945	982.5	11,790	12	1,054	1,082.5	12,990	12	1,145	1,182.5	14,190	12	1,255	1,292.5	15,510	12	1,365	1,402.5	16,830	12	1,475	1,512.5	18,150	12	1,585	1,622.5	19,470	12	1,696	1,732.5	20,790	12	1,805	1,842.5	22,110
9	3	58	–	226	13,108	58	–	226	15,368	78	–	226	17,268	86	–	226	19,386	98	–	226	22,148	108	–	226	24,408	118	–	226	26,668	128	–	226	28,928	138	–	226	31,188	148	–	226	33,448
10	3	37	825	3,394	125,578	37	925	3,794	141,000	37	1,025	4,194	154,900	37	1,125	4,594	170,000	37	1,235	4,994	184,998	37	1,345	5,394	199,800	37	1,455	5,794	214,000	37	1,565	6,194	239,000	37	1,675	6,594	244,800	37	1,785	6,994	258,988
11	3	96	–	226	21,696	96	–	226	21,696	96	–	226	21,696	96	–	226	21,696	128	–	226	28,478	128	–	226	28,478	128	–	226	28,476	160	–	226	36,160	160	–	226	36,160	160	–	226	36,160
12	5	6	735	772.5	8,180	8	835	872.5	8,980	8	935	972.5	7,780	8	1,035	1,072.5	8,580	8	1,145	1,182.5	9,460	8	1,255	1,292.5	10,340	8	1,365	1,402.5	11,220	8	1,475	1,512.5	12,100	8	1,585	1,822.5	12,980	8	1,695	1,732.5	13,860
13	3	40	–	356	14,240	45	–	356	16,020	50	–	356	17,800	55	–	356	19,580	60	–	356	21,360	65	–	356	23,140	70	–	356	24,920	75	–	356	26,700	80	–	356	28,480	85	–	356	30,260
14	3	@ 30	–	776	4,656	@30	–	876	5,256	@30	–	976	5,856	@30	–	1,076	6,456	@ 30	–	1,186	7,116	@ 30	–	1,296	7,776	@ 30	–	1,406	8,436	@ 30	–	1,516	9,096	@ 30	–	1,626	9,756	@ 30	–	1,736	10,416
15	3	88	–	–	16,072	88	–	–	16,072	88	–	–	16,072	88	–	–	16,072	88	–	–	16,072	88	–	–	16,072	88	–	–	16,072	88	–	–	16,072	88	–	–	16,072	88	–	–	16,072
16	3	176	–	171	30,096	176	–	196	34,496	220	–	179	39,380	220	–	199	43,780	264	–	196	49,104	264	–	204	53,856	308	–	192	59,136	308	–	208	64,064	352	–	197	69,344	352	–	211	74,272
17	3	40	–	471	18,840	40	–	471	18,840	40	–	471	18,840	40	–	471	18,840	40	–	471	18,840	40	–	471	18,840	40	–	471	18,840	40	–	471	18,840	40	–	471	18,840	40	–	471	18,840
18	3	@ 20	–	471	33,912	@20	–	471	38,622	@ 20	–	471	43,332	@ 20	–	471	48,984	@ 20	–	471	54,636	@ 20	–	471	60,288	@ 20	–	471	64,998	@ 20	–	471	71,592	@ 20	–	471	78,196	@ 20	–	471	82,896
19	8	40	–	345	13,900	46	–	345	15,180	48	–	345	16,860	52	–	345	17,940	56	–	345	19,320	60	–	345	20,700	64	–	345	22,080	68	–	345	23,460	72	–	345	24,840	76	–	345	26,220
20	5	16	930	1,065	17,040	16	1,030	1,165	18,640	16	1,130	1,285	20,240	18	1,230	1,365	21,840	18	1,340	1,475	23,600	16	1,450	1,585	25,360	16	1,560	1,695	27,120	16	1,670	1,805	28,880	16	1,780	1,915	30,640	16	1,890	2,025	32,400
21	5	1	930	2,680	2,680	1	1,030	2,880	2,880	1	1,130	3,080	3,080	1	1,230	3,280	3,280	1	1,340	3,500	3,500	1	1,450	3,840	3,840	1	1,560	4,214	4,214	1	1,670	4,434	4,434	1	1,780	4,664	4,664	1	1,890	4,894	4,894
22	5	17	–	293	4,981	19	–	293	5,567	21	–	293	6,153	23	–	293	6,739	25	–	293	7,325	27	–	293	7,911	29	–	293	8,497	31	–	293	9,083	33	–	293	9,669	35	–	293	10,255
23	3	1	930	985	985	1	1,030	1,085	1,085	1	1,130	1,195	1,195	1	1,230	1,305	1,305	1	1,340	1,415	1,415	1	1,450	1,525	1,525	1	1,560	1,635	1,635	1	1,670	1,745	1,745	1	1,780	1,855	1,855	1	1,890	1,965	1,965
24	3	28	–	111	3,108	34	–	111	3,774	40	–	111	4,440	46	–	111	5,106	52	–	111	5,772	58	–	111	6,438	64	–	111	7,104	70	–	111	7,770	76	–	111	8,436	82	–	111	9,102

⌀ 3 = ⌀ 3/8" OR 9 MM., ⌀ 5 = ⌀ 5/8" OR 16 MM., ⌀ 6 = ⌀ 3/4" OR 20 MM., ⌀ 8 = ⌀ 1" OR 25 MM. NO = TOTAL AMOUNT OF BARS, L = TOTAL LENGTH OF EACH BAR.

NUMBER OF BOX GIRDER	D CM.	D1 CM.	D7 CM.	D2 CM.	PILE FOOTING													SPREAD FOOTING	
					NUMBER OF PILES									PILE HEAD SPACING C – C 0° – 30° SKEW		PILE HEAD SPACING C – C 30° – 50° SKEW		HALF LENGTH OF FOOTING D5 CM.	WIDTH OF FOOTING D6 CM.
					P1	P2	P3	P4	P5	P6	P7	P8	P9	SKEW 0°–50°	SKEW 30°–50°	D3	D4	D5	D4		
7	740 Sec θ	205 Sec θ	20 Sec θ	104 Sec θ	4	4	4	4	–	–	–	–	2	16	18	94 Sec θ	86 Sec θ	80 Sec θ	80 Sec θ	320 Sec θ + 150	300
8	840 Sec θ	240 Sec θ	20 Sec θ	–	4	4	4	4	–	–	–	–	2	16	18	110 Sec θ	95 Sec θ	98 Sec θ	76 Sec θ	370 Sec θ + 150	300
9	940 Sec θ	273 Sec θ	20 Sec θ	137 Sec θ	4	4	4	4	4	–	–	–	2	18	20	110 Sec θ	90 Sec θ	98 Sec θ	77 Sec θ	420 Sec θ + 150	300
10	1,040 Sec θ	308 Sec θ	20 Sec θ	154 Sec θ	4	4	4	4	4	–	–	–	2	20	22	110 Sec θ	85 Sec θ	96 Sec θ	78 Sec θ	470 Sec θ + 150	300
11	1,150 Sec θ	257.5 Sec θ	25 Sec θ	–	4	4	4	4	4	4	–	–	2	22	24	110 Sec θ	85 Sec θ	100 Sec θ	75 Sec θ	525 Sec θ + 150	300
12	1,260 Sec θ	285 Sec θ	30 Sec θ	–	4	4	4	4	4	4	–	–	2	24	26	110 Sec θ	85 Sec θ	100 Sec θ	60 Sec θ	580 Sec θ + 150	300
13	1,370 Sec θ	312.5 Sec θ	35 Sec θ	–	4	4	4	4	4	4	4	–	2	26	28	110 Sec θ	85 Sec θ	101 Sec θ	80 Sec θ	635 Sec θ + 150	300
14	1,480 Sec θ	272 Sec θ	40 Sec θ	–	4	4	4	4	4	4	4	4	–	28	30	110 Sec θ	85 Sec θ	102 Sec θ	78 Sec θ	690 Sec θ + 150	300
15	1,590 Sec θ	294 Sec θ	45 Sec θ	–	4	4	4	4	4	4	4	4	2	30	32	110 Sec θ	86 Sec θ	103 Sec θ	75 Sec θ	745 Sec θ + 150	300
16	1,700 Sec θ	316 Sec θ	50 Sec θ	–	4	4	4	4	4	4	4	4	2	32	34	110 Sec θ	85 Sec θ	103 Sec θ	79 Sec θ	800 Sec θ + 150	300

TABLE OF Sec θ

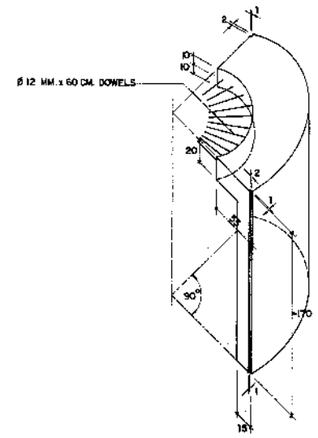
	SKEW ANGLE(θ)										
	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°
Sec θ	1.0000	1.0038	1.0154	1.0353	1.0642	1.1034	1.1547	1.2208	1.3054	1.4142	1.5557

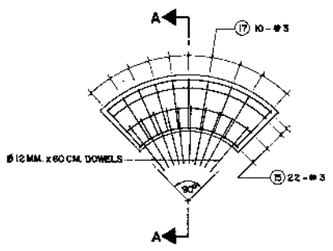
NOTES :

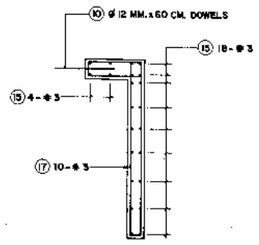
1. CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KM./CM.^{2} FOR 15 x 15 x 15 CUBE AT 28 DAYS. AN APPROXIMATE DESIGN PER CUBIC METER IS SUGGESTED AS FOLLOWS :

PORTLAND CEMENT, MIN.	350	KG.
SAND	0.45	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP, MAX.	10	CM.

2. CLEAR CONCRETE COVER SHALL BE 2.5 CM.
3. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED AND ADDITIONAL CONCRETE COVER OF 2.5 CM. FROM NORMAL CASE ALL AROUND SHALL BE PROVIDED FOR THE CAP BEAM WITHOUT ALTERING THE LOCATION OF REBARS.
4. REBARS ⌀ 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
5. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
6. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
7. ALL MATERIALS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER FOR ELASTOMERIC PADS, CONTRACTOR SHALL SUBMIT A CERTIFICATE FROM THE MANUFACTURER SHOWING THAT TYEY WILL PERFORM IN ACCORDANCE WITH SPECIFICATIONS.
8. PILES SHALL BE LOCATED BY STARTING FROM PILE NO. P9 AT THE CENTERLINE OF THE PIER AND THE PILE SPACINGS D3 AND D4 SHALL BE MEASURED FROM THIS PILE ORDER TO LOCATE PILE NOS P8 – P1 RESPECTIVELY. IF THERE IS NO PILE NO P9 AT THE CENTERLINE OF THE PIER, THE FIRST PILE SPACING D3 ADJACENT TO THE CENTERLINE OF THE PIER SHALL BE SUBSTITUTED BY D3/2.
9. FOR PIERS WITH SKEW ANGLES OF 0°–30°, ALL PILES UNDER MARK [ ] SHALL BE OMITTED AND PILES UNDER MARK (⌀) SHALL BE ADDED ON WHEREVER THOSE MARKS APPEAR.
10. FOR PIERS WITH SKEW ANGLES OF 30–50, ALL PILES UNDER MARK (⌀⌀) SHALL BE OMITTED.
11. FOR PILE DETAILS SEE DWG. NO. 3R/1 OR 3P/1
12. IN CASE OF NON – SKEW BRIDGE, BEARING UNDER 10.0 M. SPAN SLAB BRIDGE SHALL BE CONSTANTLY 22 CM. WIDE.
13. LENGTH AND AMOUNT OF REINF. SHOWN IN THE TABLE MAY VARY ACCORDING TO PIER SHAPE BUT SPACING SHALL BE AS SHOWN ON THE DWGS.
14. REBARS FOR PILE FOOTING PIER ARE BAR MARK NO. 1 – 18.
15. REBARS FOR SPREAD FOOTING PIER ARE BAR MARK NO. S7 – 13 AND BAR MARK NO. S19 – 24.
16. QUANTITIES OF REBARS SHOWN IN THE TABLE ARE BASED ON THE TOTAL PIER HEIGHT OF 12.0 M. AS SHOWN ON DWG. NO. SBD 20 – 10 – 614/4 FOR PILE FOOTING PIERS. THESE QUANTITIES DO NOT INCLUDE REBARS IN THE PILES.
17. WORK THIS DRAWING WITH DWG. NO. SBD 20 – 10 – 614/4.
18. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.



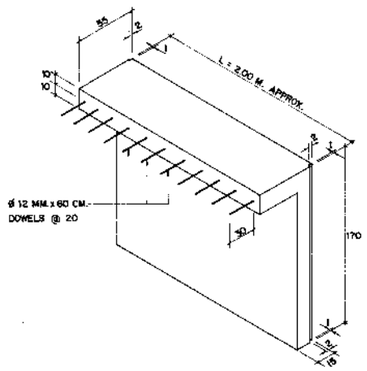




SECTION A – A

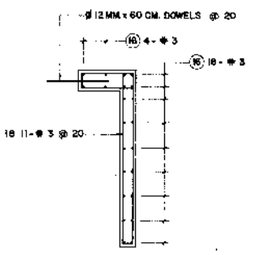
PRECAST SKIRTING "A" DETAILS

SCALE 1 : 30

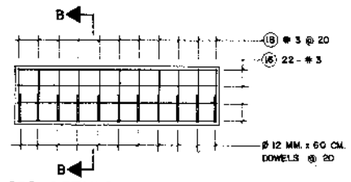


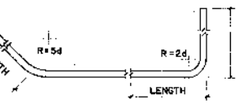
PRECAST SKIRTING "B" DETAILS

SCALE 1 : 30

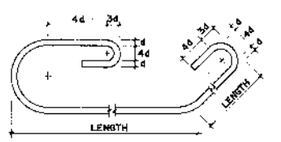


SECTION B – B

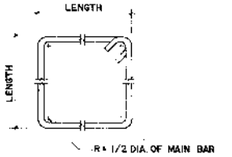




DEFORMED BAR



PLAIN BAR



BAR BENDING DETAILS

NOT TO SCALE

KINGDOM OF THAILAND

MINISTRY OF TRANSPORT AND COMMUNICATIONS

DEPARTMENT OF HIGHWAYS

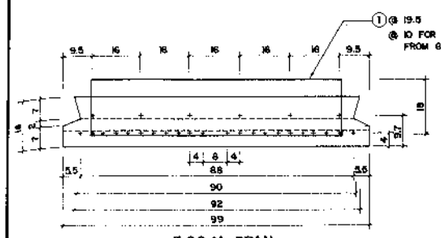
STANDARD DRAWING

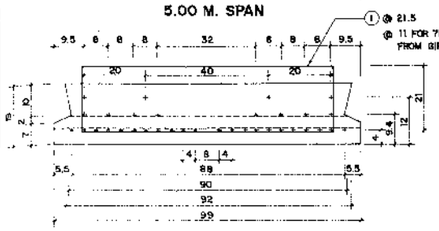
0°–50° SKEW PC. BOX GIRDER BRIDGE

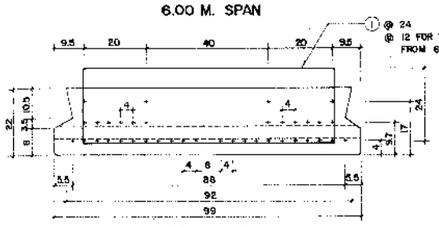
20.00 M. SPAN

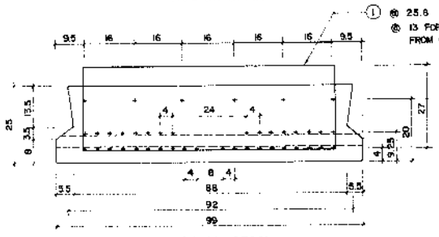
PIER REINFORCING AND SKIRTING DETAILS

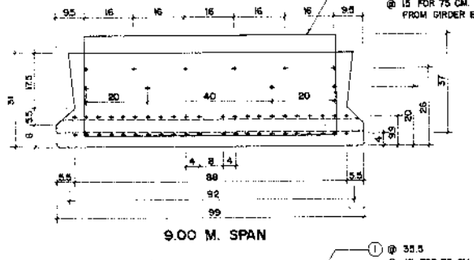
DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: (DIRECTOR GENERAL)		DWG. NO. SBD 20-10-614/5
		SHEET NO. 170

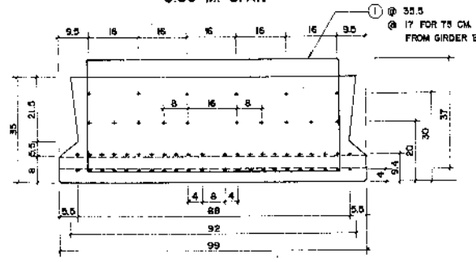




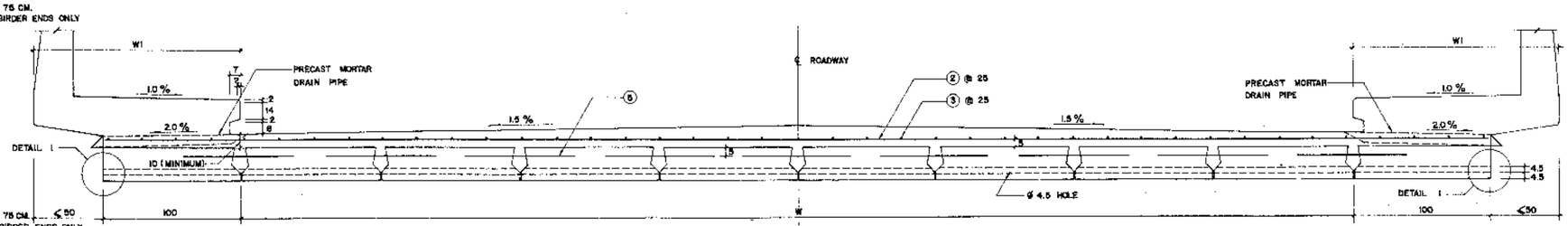




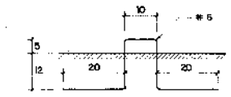




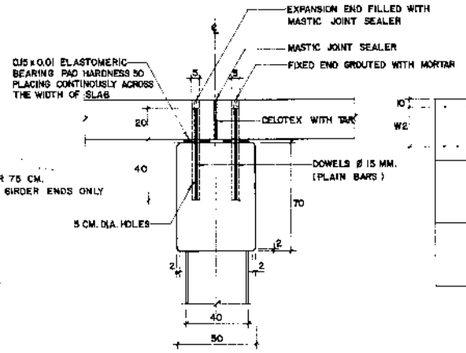
GIRDER CROSS SECTIONS
SCALE 1:10



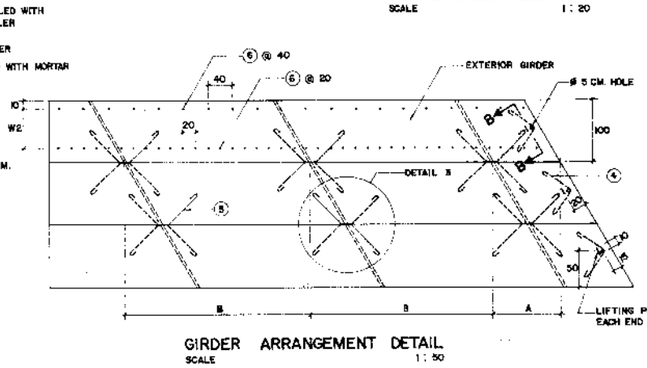
TRANSVERSE SECTION
SCALE 1:20



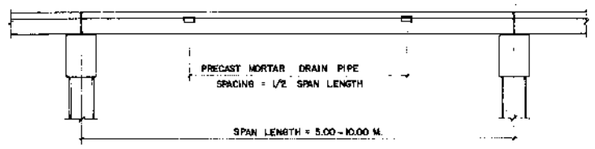
SECTION B – B
SCALE 1:10
(SHOWN DETAIL OF LIFTING HOOK)



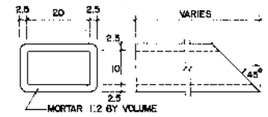
CAP BEAM DETAIL
SCALE 1:20



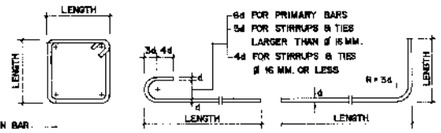
GIRDER ARRANGEMENT DETAIL
SCALE 1:50



DRAIN PIPE LOCATIONS
SCALE 1:50

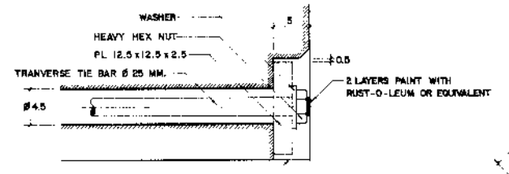


PRECAST MORTAR DRAIN PIPE
SCALE 1:10

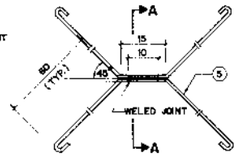


PLAIN BAR DEFORMED BAR

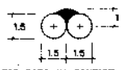
BAR BENDING DETAILS
NOT TO SCALE



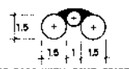
DETAIL 1
SCALE 1:4



DETAIL 3
SCALE 1:10

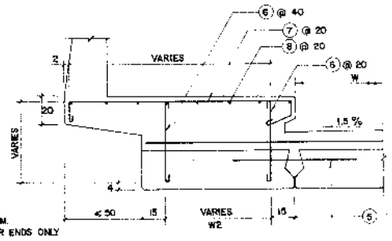


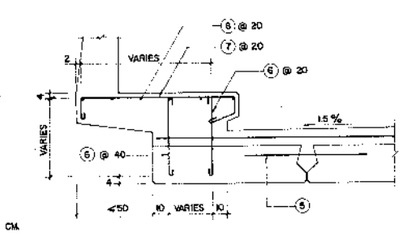
FOR BARS IN CONTACT



FOR BARS WITH SOME SPACE APART

SECTION A – A
SCALE 1:2





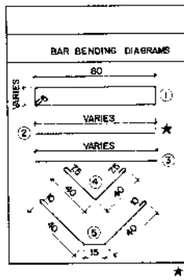
SIDEWALK DETAILS
SCALE 1:20

NOTES:

1. ALL PRESTRESSING TENDONS ARE Ø 7 MM. STRESS-RELIEVED WIRES HAVING A MINIMUM ULTIMATE STRENGTH OF 16,000 KG/CM^2 AND CONFORM TO TIS 95.
2. INITIAL STRESSES IN PRESTRESSING TENDONS SHALL BE 11,200 KG/CM.^{2}
3. OTHER TYPES OF PRESTRESSING TENDONS MAY BE USED UNDER THE APPROVAL OF THE ENGINEER.
4. TRANSVERSE TIE BARS SHALL BE MADE FROM TIS 24 GRADE SD 30 DEFORMED BARS WITH 2 LAYERS OF RUST PROOF PAINT SUCH AS RUST-O-LEUM OR EQUIVALENT QUALITY PAINT. THREADED ENDS SHALL BE STANDARD THREAD WITH NUTS AND BEARING WASHERS. NUTS SHALL BE TURNED WITH A TORQUE OF 2,000 Kg.-CM.
5. MIX DESIGN OF CONCRETE WITH A MINIMUM CEMENT CONTENT OF 350 KG/M^3 FOR PRESTRESSED GIRDERS SHALL BE SUBMITTED FOR THE APPROVAL OF THE ENGINEER. CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 420 KG/CM^2 FOR A 0.15 x 0.15 x 0.15 M. CUBE AT 28 DAYS. PRESTRESSING TENDONS MAY BE RELEASED WHEN CONCRETE STRENGTH REACHES 80 % OF THE SPECIFIED STRENGTH.
6. REBARS SMALLER THAN # 3 SHALL BE TIS 20 GRADE SR 24 PLAIN BARS OTHERS SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS UNLESS OTHERWISE INDICATED.
7. ALL MATERIALS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER.
8. GIRDER SHALL BE LIFTED AT BOTH ENDS ONLY; MIDSPAN LIFTING IS PROHIBITTED.
9. THIS TYPE OF GIRDERS MAY BE USED WITH PIERS FOR SLAB BRIDGE HAVING THE SAME SPAN LENGTH.
10. DOWELS FOR HOLDING GIRDERS TO PIERS SHALL BE PROVIDED AT EVERY ALTERNATE GIRDER.
11. CASTING LENGTH OF A GIRDER SHALL BE 1 CM. SHORTER THAN THE SPECIFIED SPAN LENGTH
12. FOR SIDEWALK AND RAILING DETAILS SEE DWG.NO. MS – 01.
13. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED
14. IF PIER FALL WITHIN THE TRANSITION OF HORIZONTAL CURVE, THE TOP OF CAP BEAM SHALL BE SUPERELEVATED IN ACCORDANCE WITH THE ROADWAY SUPERELEVATION, SO THAT THE GIRDERS SHALL BE ON A SMOOTHED PLANE. ELEVATION OF FINISHED SURFACE SHALL BE ATTAINED BY ADJUSTING THE CONCRETE TOPPING. THIS SHALL BE DONE WITH THE APPROVAL OF THE ENGINEER.
15. THIS DRAWING IS ADAPTED FROM DOH DWG.NO. 3APD5-106-14/1d.

TABLE OF BRIDGE REINFORCEMENT (PER 1.0 M. WIDTH, 0° SKEW)

BAR BENDING DIAGRAMS



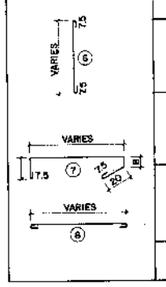
SPAN 5.00 M.					SPAN 6.00 M.				SPAN 7.00 M.				SPAN 8.00 M.				SPAN 9.00 M.				SPAN 10.00 M.			
BAR MARK	#	NO.	LENGTH CM.	TOTAL LENGTH CM.	#	NO.	LENGTH CM.	TOTAL LENGTH CM.	#	NO.	LENGTH CM.	TOTAL LENGTH CM.	#	NO.	LENGTH CM.	TOTAL LENGTH CM.	#	NO.	LENGTH CM.	TOTAL LENGTH CM.	#	NO.	LENGTH CM.	TOTAL LENGTH CM.
①	RB 2	34	211	7174	RB 2	36	217	7812	RB 2	36	223	7908	RB 2	37	229	8473	RB 2	36	241	8676	RB 2	34	249	8466
②	RB 3	20	100	2000	RB 3	24	100	2400	RB 3	26	100	2600	RB 3	32	100	3200	RB 3	36	100	3600	RB 3	40	100	4000
③	RB 3	4	500	2000	RB 3	4	600	2400	RB 3	4	700	2800	RB 3	4	800	3200	RB 3	4	900	3600	RB 3	4	1000	4000
④	DB 4	4	100	400	DB 4	4	100	400	DB 4	4	100	400	DB 4	4	100	400	DB 4	4	100	400	DB 4	4	100	400
⑤	DB 5	4	172.5	690	DB 5	6	172.5	1035	DB 5	6	172.5	1035	DB 5	6	172.5	1035	DB 5	6	172.5	1035	DB 5	8	172.5	1058

RB = ROUND BARS
DB = DEFORMED BARS
# 2 = Ø 1/4" OR 6 MM.
# 4 = Ø 1/2" OR 12 MM.
# 3 = Ø 3/8" OR 9 MM.
# 5 = Ø 5/8" OR 16 MM.
NO. = TOTAL AMOUNT OF BARS
L = TOTAL LENGTH OF EACH BAR

★ LENGTH OF BAR MARK ② FOLLOWS THE WIDTH OF BRIDGE DECK.

TABLE OF SIDEWALK REINFORCEMENT (0° SKEW)

BAR BENDING DIAGRAMS



SIDEWALK WIDTH CM.	SPAN	5.00 M.				6.00 M.			7.00 M.			8.00 M.			9.00 M.			10.00 M.		
	BAR MARK	#	NO.	LENGTH CM.	TOTAL LENGTH	NO.	LENGTH CM.	TOTAL LENGTH CM.	NO.	LENGTH CM.	TOTAL LENGTH CM.	NO.	LENGTH CM.	TOTAL LENGTH CM.	NO.	LENGTH CM.	TOTAL LENGTH CM.	NO.	LENGTH CM.	TOTAL LENGTH CM.
40	⑥	DB 4	37	62.5	2312.5	45	65.5	2947.5	53	68.5	3630.5	60	71.5	4290	68	77.5	5270	75	81.5	6112.5
	⑦	RB 3	25	90.6	2265	30	90.6	2718	35	90.6	3171	40	90.6	3264	45	90.6	4077	50	90.6	4530
	⑧	RB 3	3	500	1500	3	600	1800	3	700	2100	3	800	2400	3	900	2700	3	1000	3000
100	⑥	DB 4	37	82.5	2312.5	45	65.5	2947.5	53	68.5	3630.5	60	71.5	4290	68	77.5	5270	75	81.5	6112.5
	⑦	RB 3	25	150.6	3760	30	150.6	4518	35	150.6	5271	40	150.6	6024	45	150.6	6777	50	150.6	7530
	⑧	RB 3	5	500	2500	5	600	3000	5	700	3500	5	800	4000	5	900	4500	5	1000	5000
150	⑥	DB 4	37	62.5	2312.5	45	65.5	2947.5	53	68.5	3630.5	60	71.5	4290	68	77.5	5270	75	81.5	6112.5
	⑦	RB 3	25	200.6	5015	30	200.6	6018	35	200.6	7021	40	200.6	8024	45	200.6	9027	50	200.6	10030
	⑧	RB 3	8	500	4000	8	600	4800	8	700	5600	8	800	6400	8	900	7200	8	1000	8000

RB = ROUND BARS
DB = DEFORMED BAR
# 3 = Ø 3/8" OR 9 MM.
# 4 = Ø 1/2" OR 12 MM.
NO. = TOTAL AMOUNT OF BARS
L = TOTAL LENGTH OF EACH BAR

TABLE OF SHEAR CONNECTOR

SPAN M.	A M.	B M.	TOTAL AMOUNT FOR ONE GIRDER
5	1	3	4
6	1	2	5
7	1	2.5	6
8	1	3	6
9	1.5	3	6
10	0.5	3	8

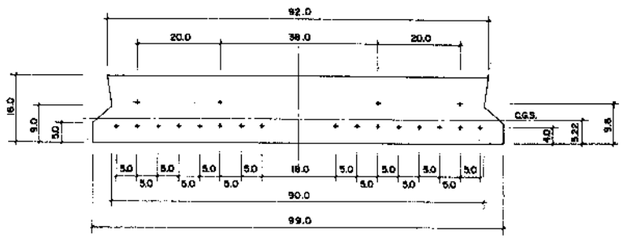
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

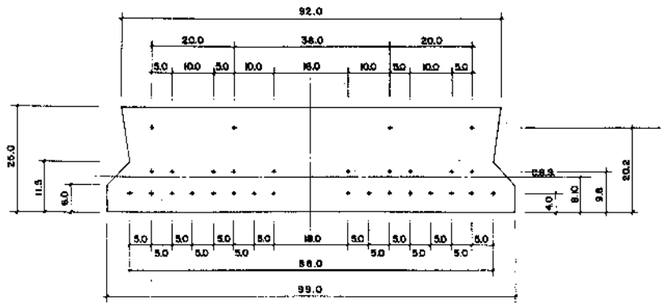
0° – 30° SKEW PC. PLANK GIRDER BRIDGE

GIRDER ARRANGEMENT AND DETAILS

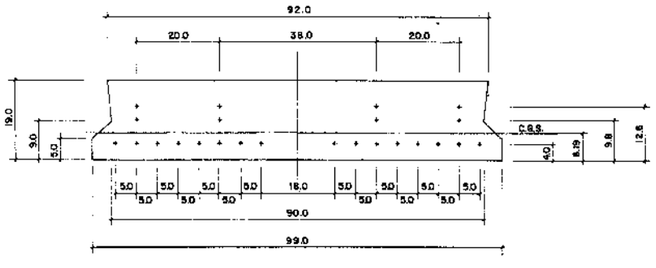
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE	JULY 1994
SUBMITTED : P. Buranang. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE	AS SHOWN
		DWG. NO.	PT-01
APPROVED : (DIRECTOR GENERAL)		SHEET NO.	171



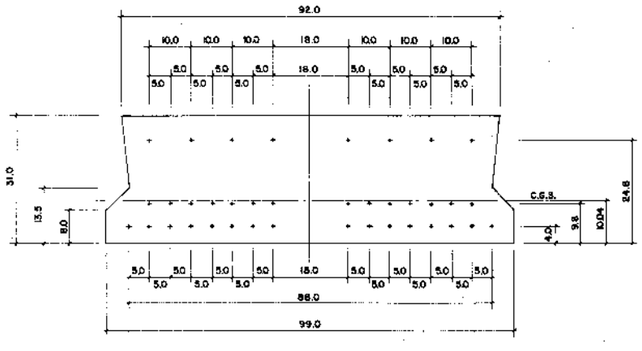
5.00 M. SPAN



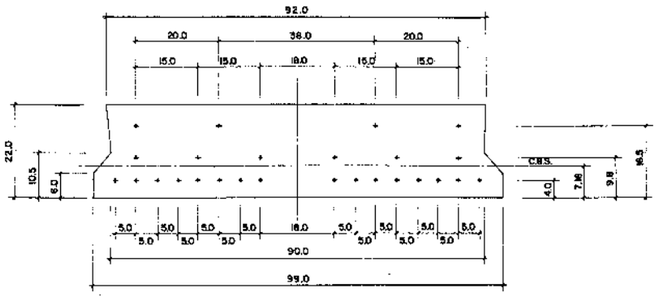
8.00 M. SPAN



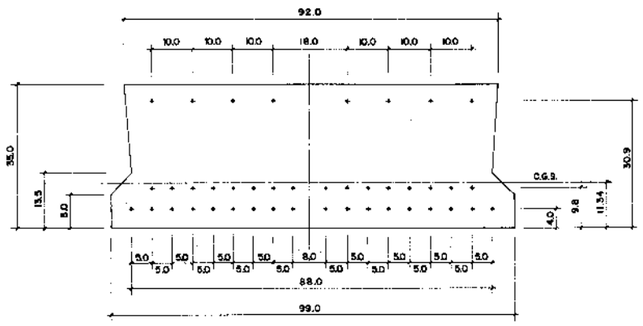
6.00 M. SPAN



9.00 M. SPAN



7.00 M. SPAN



10.00 M. SPAN

TENDON ARRANGEMENTS
SCALE 1 : 7.5

NOTES :

1. THIS DRAWING SHALL BE USED IN CONJUNCTION WITH DWG. NO. PT-01 . IT SHOWS ALTERNATIVE ARRANGEMENTS OF THE PRESTRESSING TENDONS WHEN THE ø 3/8" STRANDS ARE USED INSTEAD OF THE ø 7 MM. WIRES AS SHOWN ON DWG.NO. PT-01 .
2. ALL PRESTRESSING TENDONS SHALL BE ø 3/8" (9.53 MM.) STRESS-RELIEVED 7-WIRE STRANDS CONFORMING TO TIS.420 GRADE 1,725 OR APPROVED EQUAL WITH THE MINIMUM ULTIMATE TENSILE LOAD OF 9,078 KG.
3. THE INITIAL PRESTRESSING FORCE PER TENDON AFTER ANCHORING SHALL BE 6,330 KG. WITH THE CORRESPONDING ELONGATION OF 0.615 CM. PER 1 METER OF TENDON LENGTH. AN ADDITIONAL ELONGATION OF 1.0 CM. SHALL BE PROVIDED TO ALLOW FOR TENDON SLIPPAGE AT ANCHORING .
4. ALL DIMENSIONS ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
5. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3APD5-106-14/15 .

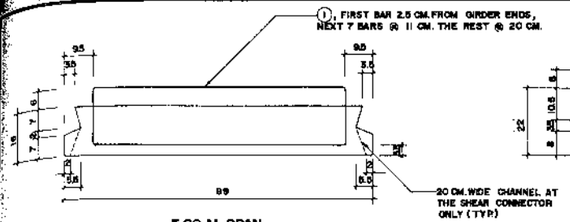
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

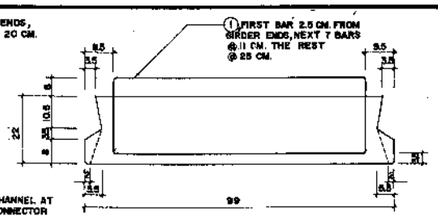
PRESTRESSED CONCRETE PLANK GIRDER

ø 3/8" WIRE STRAND ARRANGEMENTS

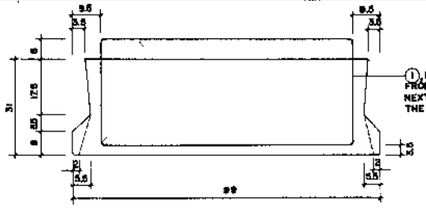
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
		DWG. NO. PT-02
APPROVED : (DIRECTOR GENERAL)		SHEET NO. 172



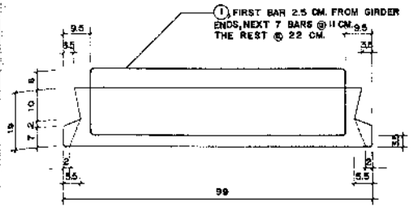
5.00 M. SPAN



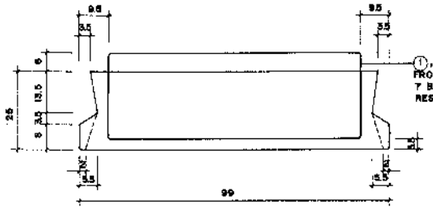
7.00 M. SPAN



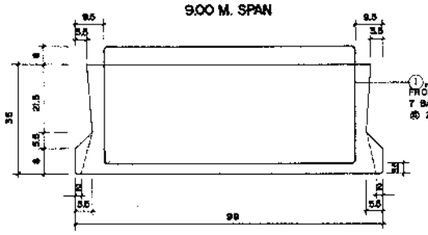
9.00 M. SPAN



6.00 M. SPAN

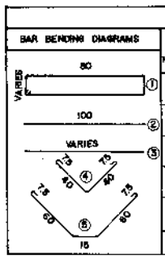


8.00 M. SPAN

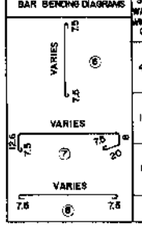


10.00 M. SPAN

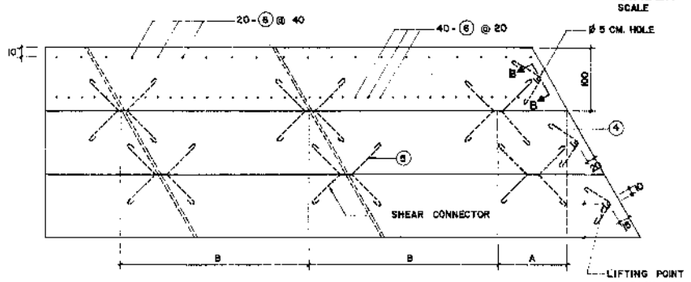
GIRDER CROSS SECTIONS
SCALE 1:10

BAR BENDING DIAGRAMS	BAR MARK	#	SPAN 5.00 M. NO	LENGTH CM.	TOTAL LENGTH CM.	SPAN 6.00 M. NO	LENGTH CM.	TOTAL LENGTH CM.	SPAN 7.00 M. NO	LENGTH CM.	TOTAL LENGTH CM.	SPAN 8.00 M. NO	LENGTH CM.	TOTAL LENGTH CM.	SPAN 9.00 M. NO	LENGTH CM.	TOTAL LENGTH CM.	SPAN 10.00 M. NO	LENGTH CM.	TOTAL LENGTH CM.
	①	RB2	32	211	6752	36	217	7812	38	223	8474	40	229	9160	40	241	9640	40	249	9960
	②	RB3	20	100	2000	24	100	2400	28	100	2800	32	100	3200	36	100	3600	40	100	4000
	③	RB3	4	500	2000	4	600	2400	4	700	2800	4	800	3200	4	900	3600	4	1000	4000
	④	DB4	4	100	400	4	100	400	4	100	400	4	100	400	4	100	400	4	100	400
	⑤	DB5	12	172.5	2070	16	172.5	2760	16	172.5	2760	20	172.5	3450	24	172.5	4130	24	172.5	4130

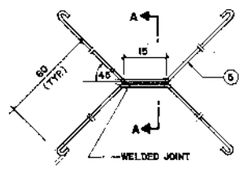
RB = ROUND BARS DB = DEFORMED BARS # 2= Ø 1/4" OR Ø 6 MM., # 4= Ø 1/2" OR Ø 12 MM., # 5= Ø 5/8" OR Ø 16 MM. NO= TOTAL AMOUNT OF BARS L= TOTAL LENGTH OF EACH BAR

BAR BENDING DIAGRAMS	SIDE WALK WIDTH CM.	BAR MARK	#	SPAN 5.00 M. NO	L CM.	TOTAL LENGTH CM.	SPAN 6.00 M. NO	L CM.	TOTAL LENGTH CM.	SPAN 7.00 M. NO	L CM.	TOTAL LENGTH CM.	SPAN 8.00 M. NO	L CM.	TOTAL LENGTH CM.	SPAN 9.00 M. NO	L CM.	TOTAL LENGTH CM.	SPAN 10.00 M. NO	L CM.	TOTAL LENGTH CM.
	40	⑥	DB4	37	62.5	2312.5	45	65.5	2947.5	53	68.5	3630.5	60	71.5	4290.0	68	77.5	5270.0	75	81.5	6112.5
		⑦	RB3	25	90.6	2265.0	30	90.6	2718.0	38	90.6	3471.0	40	90.6	3624.0	45	90.6	4077.0	50	90.6	4530.0
		⑧	RB3	3	500	1500	3	600	1800	3	700	2100	3	800	2400	3	900	2700	3	1000	3000
	100	⑥	DB4	37	62.5	2312.5	45	65.5	2947.5	53	68.5	3630.5	60	71.5	4290	68	77.5	5270	75	81.5	6112.5
		⑦	RB3	25	150.6	3765	30	150.6	4518	35	150.6	5271	40	150.6	6024	45	150.6	6777	50	150.6	7530
		⑧	RB3	5	500	2500	5	600	3000	5	700	3500	5	800	4000	5	900	4500	5	1000	5000
	150	⑥	DB4	37	62.5	2312.5	45	65.5	2947.5	53	68.5	3630.5	60	71.5	4280	68	77.5	5270	75	81.5	6112.5
		⑦	RB3	25	200.6	5015	30	200.6	6018	35	200.6	7021	40	200.6	8024	45	200.6	9027	50	200.6	10030
		⑧	RB3	8	500	4000	8	600	4800	8	700	5600	8	800	6400	8	900	7200	8	1000	8000

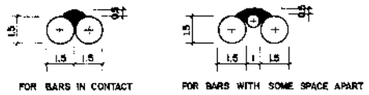
RB = ROUND BARS # 3= Ø 3/8" OR Ø 9 MM. # 4= Ø 1/2" OR Ø 12 MM. NO = TOTAL AMOUNT OF BARS L = TOTAL LENGTH OF EACH BARS



GIRDER ARRANGEMENT DETAIL
SCALE 1:50



SHEAR CONNECTOR DETAIL
SCALE 1:50

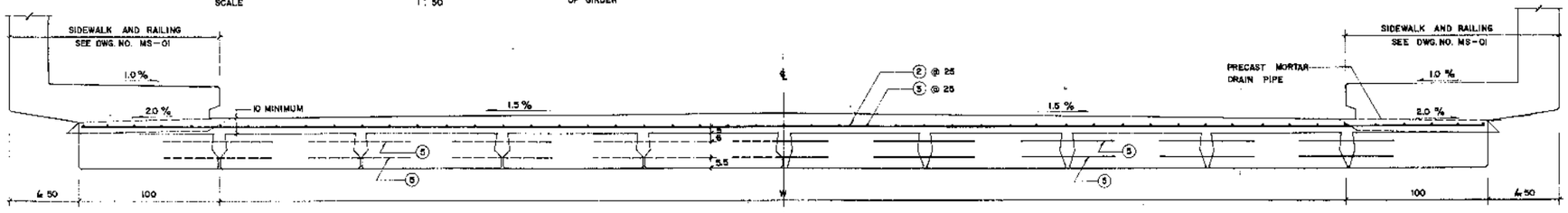


SECTION A – A
SCALE 1:2

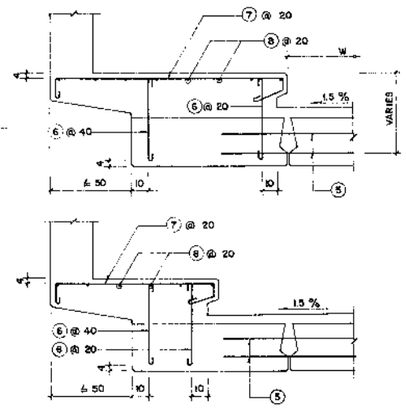
TABLE OF SHEAR CONNECTOR			
SPAN (M.)	TOTAL AMOUNT FOR ONE GIRDER	A (CM.)	B (CM.)
5	12	70	179.50
6	18	70	153.00
7	16	70	186.36
8	20	70	164.75
9	24	50	159.80
10	24	50	178.00

NOTES :

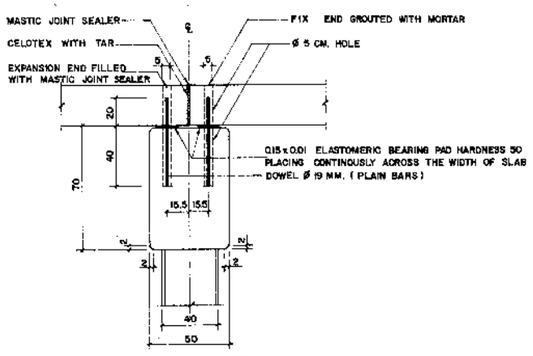
1. WORK THIS DRAWING WITH DWG. NO. PT-04
2. CASTING LENGTH OF A GIRDER SHALL BE 1 CM. SHORTER THAN THE SPAN LENGTH.
3. UNLESS OTHERWISE APPROVED, CEMENT USED IN THE CONCRETE MIX SHALL BE PORTLAND CEMENT TYPE I CONFORMING TO TIS 15.
4. MIX DESIGN OF CONCRETE FOR PRESTRESSED GIRDERS, BRIDGE TOPPING, SIDEWALK AND RAILING SHALL BE SUBMITTED FOR THE APPROVAL OF THE ENGINEER. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG/M. AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH FOR A .15 x .15 x .15 M. CUBE AT 28 DAYS AS FOLLOWS :–
   A) FOR PRESTRESSED GIRDER 420 KG/CM^2
   B) FOR BRIDGE TOPPING 300 KG/CM^2
   C) FOR SIDEWALK AND RAILING 210 KG/CM^2
5. PRESTRESSING TENDONS MAY BE RELEASED AFTER CONCRETE HAS ATTAINED A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 340 KG/CM^2 FOR THE STANDARD CUBE.
6. REBARS SMALLER THAN # 3 SHALL BE TIS 20 GRADE SR 24 PLAIN ROUND BARS, OTHERS SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS UNLESS OTHERWISE INDICATED.
7. ALL MATERIALS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER.
8. GIRDER SHALL BE LIFTED AT BOTH ENDS, MIDSPAN LIFTING IS PROHIBITED.
9. THIS TYPE OF GIRDERS MAY BE USES WITH PIERS FOR SLAB BRIDGE HAVING THE SAME SPAN LENGTH.
10. DOWELS FOR HOLDING GIRDERS TO PIERS SHALL BE PROVIDED AT EVERY ALTERNATE GIRDER.
11. TOP AND BOTTOM SHEAR CONNECTORS SHALL BE WELDED SIMULTANEOUSLY.
12. TIGHTENING OF THE NEXT ADJACENT GIRDER TO THE PREVIOUS ONE SHALL BE DONE IN SUCCESSION.
13. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
14. IF PIERS FALL WITHIN THE TRANSITION OF HORIZONTAL CURVE, THE TOP OF CAP BEAM SHALL BE SUPERELEVATED IN ACCORDANCE WITH THE ROADWAY SUPERELEVATION SO THAT THE GIRDERS SHALL BE ON A SMOOTH PLANE. ELEVATION OF FINISHED SURFACE SHALL BE ATTAINED BY ADJUSTING THE CONCRETE TOPPING. THIS SHALL BE DONE WITH THE APPROVAL OF THE ENGINEER.
15. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3 APD 6-106-14/10.



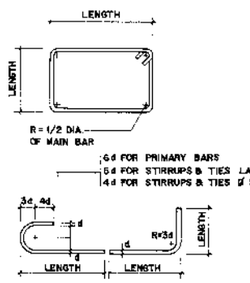
TRANSVERSE SECTION
SCALE 1:20



SIDEWALK DETAILS
SCALE 1:20

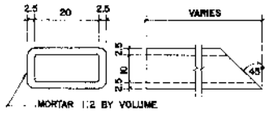


CAP BEAM DETAIL
SCALE 1:20

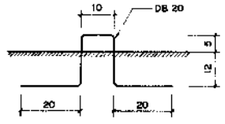


PLAIN BAR DEFORMED BAR

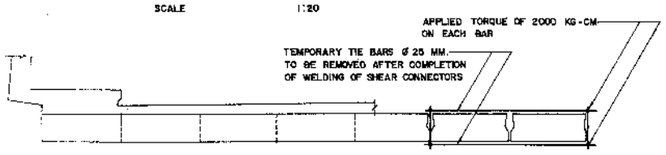
BAR BENDING DETAILS
NOT TO SCALE



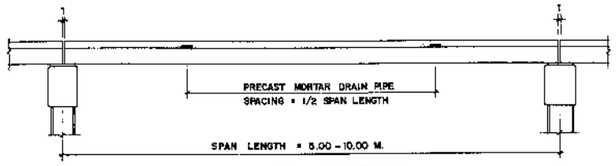
PRECAST MORTAR DRAIN PIPE
SCALE 1:10



SECTION B – B
SCALE 1:10
(SHOWN DETAIL OF LIFTING HOOK)



GIRDER ERECTION DIAGRAM
SCALE 1:40



DRAIN PIPE LOCATIONS
SCALE 1:50

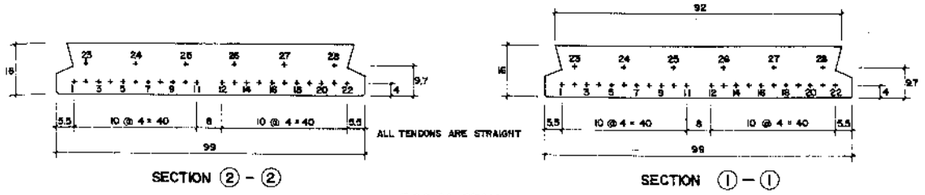
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

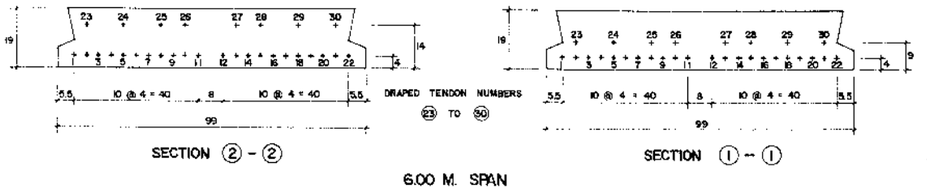
0° – 30° SKEW PC. GIRDER BRIDGE

GIRDER ARRANGEMENT AND DETAILS

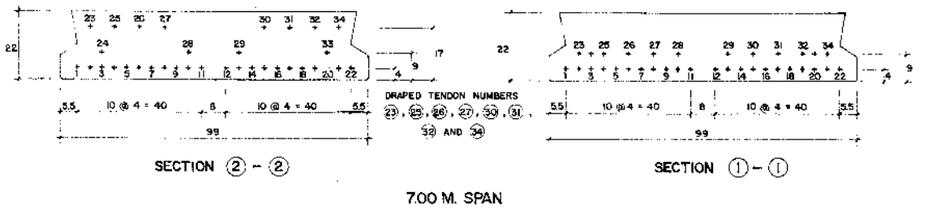
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Boonyaa. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PT-03
		SHEET NO. 173



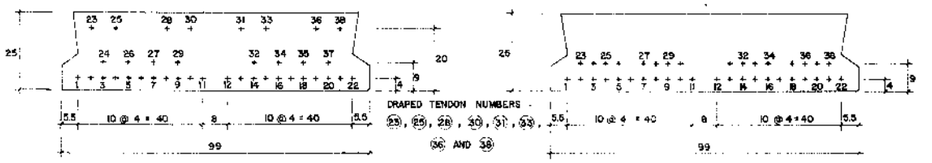
5.00 M. SPAN



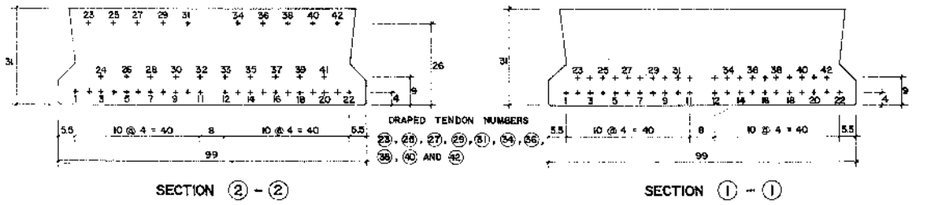
6.00 M. SPAN



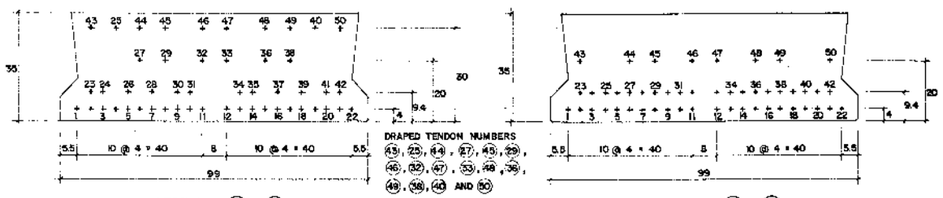
7.00 M. SPAN



8.00 M. SPAN

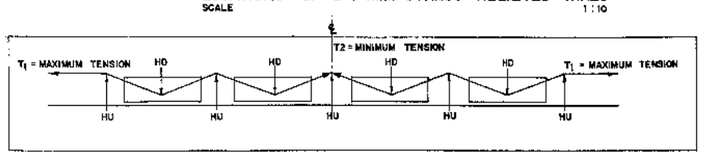


9.00 M. SPAN

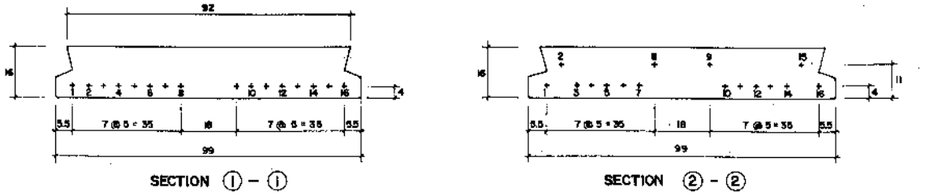


10.00 M. SPAN

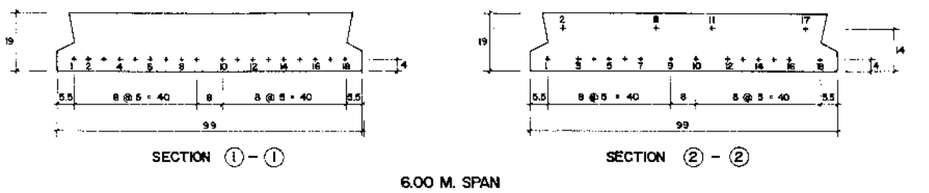
LOCATIONS OF Ø 7 MM. STRESS-RELIEVED WIRES
SCALE 1:10



PRESTRESSING DIAGRAM



5.00 M. SPAN



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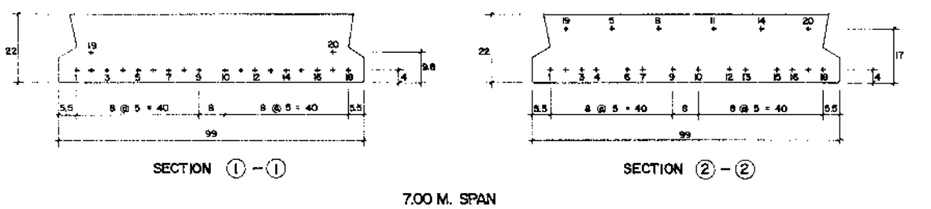

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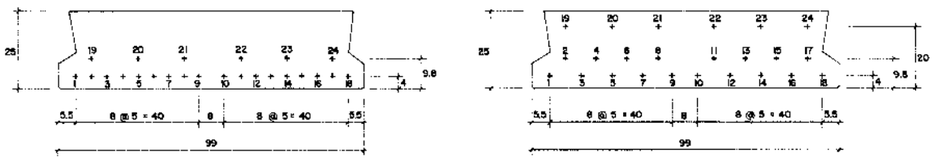

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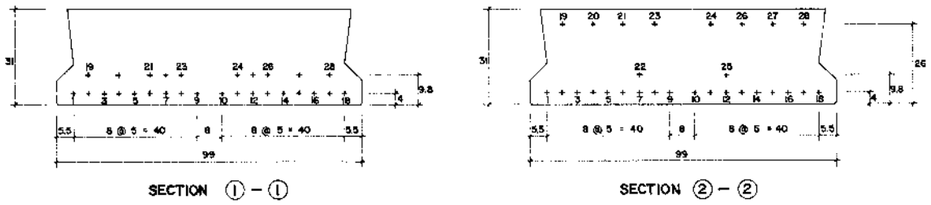
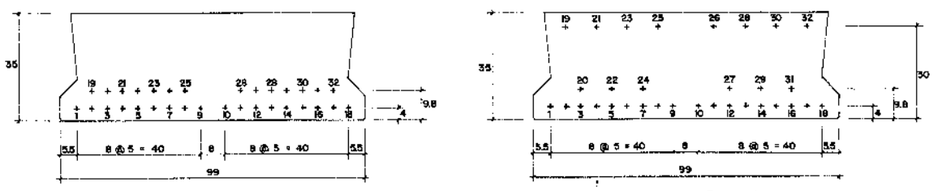
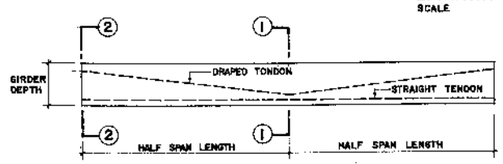


9.00 M. SPAN



10.00 M. SPAN

LOCATIONS OF Ø 3/8" SEVEN-WIRE STRANDS
SCALE 1:10



PROFILE OF TENDONS

NOTES:

1. WORK THIS DRAWING WITH DWG.NO. PT-03.
2. PRESTRESSING TENDONS SHALL BE AS FOLLOWS :-
   - A) Ø 7 MM. STRESS-RELIEVED WIRE SHALL HAVE A MINIMUM ULTIMATE STRENGTH OF 18,500 KG/CM.^{2} AND CONFORM TO TIS 95 OR APPROVED EQUAL.
   - B) Ø 3/8" SEVEN-WIRE STRAND SHALL HAVE A MINIMUM ULTIMATE LOAD OF 9,075 KG. AND CONFORM TO TIS 420 OR APPROVED EQUAL.
3. PRESTRESSING OF STRAIGHT TENDON SHALL BE AS FOLLOWS :-
   - A) Ø 7 MM. STRESS-RELIEVED WIRE SHALL HAVE AN INITIAL PRESTRESSING FORCE OF 4,320 KG/TENDON AFTER ANCHORING.
   - B) Ø 3/8" SEVEN-WIRE STRAND SHALL HAVE AN INITIAL PRESTRESSING FORCE OF 6,330 KG/TENDON AFTER ANCHORING.
4. PRESTRESSING OF DRAPED TENDON SHALL BE AS FOLLOWS :-
   - A) TWO METHODS OF PRESTRESSING MAY BE USED :
     FIRST METHOD : APPLY FORCE TO A HORIZONTAL TENDON AT LEVEL HD OR HU IN SUCH A WAY THAT WHEN HOLD-DOWN DEVICE (HD) AND HOLD-UP DEVICE (HU) ARE APPLIED TO HOLD THE TENDON IN POSITION THE PRESTRESSING FORCE IN THE TENDON AT MIDSPAN OF EACH GIRDER IS EQUAL TO THE CORRESPONDING FORCE SPECIFIED IN NOTE 3.
     SECOND METHOD : FIX THE HD AND HU DEVICE IN SUCH A WAY THAT WHEN APPLYING A FORCE TO THE DRAPED PRESTRESSING TENDON IT WILL BE IN THE DESIRED POSITION, JACK THE TENDON UNTIL THE MAXIMUM TENSION IS EQUAL TO THE CORRESPONDING FORCE SPECIFIED IN NOTE 3.
     THE MINIMUM TENSION IN THE TENDON SHALL BE AS FOLLOWS :-
     FOR Ø 7 MM. STRESS-RELIEVED WIRE = 10,500 KG/CM.^{2}
     OR = 4,050 KG/TENDON
     FOR Ø 3/8" SEVEN-WIRE STRAND = 11,500 KG/CM.^{2}
     = 6,000 KG/TENDON
   - B) THE SURFACES OF HD AND HU DEVICES WHICH CONTACT THE TENDONS SHALL HAVE A SMOOTH CIRCULAR SHAPE HAVING A RADIUS NOT LESS THAN 5 CM.
     THE NUMBERS OF HD AND HU DEVICE SHALL BE ARRANGED IN SUCH A WAY THAT THE LIMITS OF FORCES AS SPECIFIED IN THE ABOVE PARAGRAPH A CAN BE ACHIEVED.
5. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
6. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3APD 5-106-14/14.

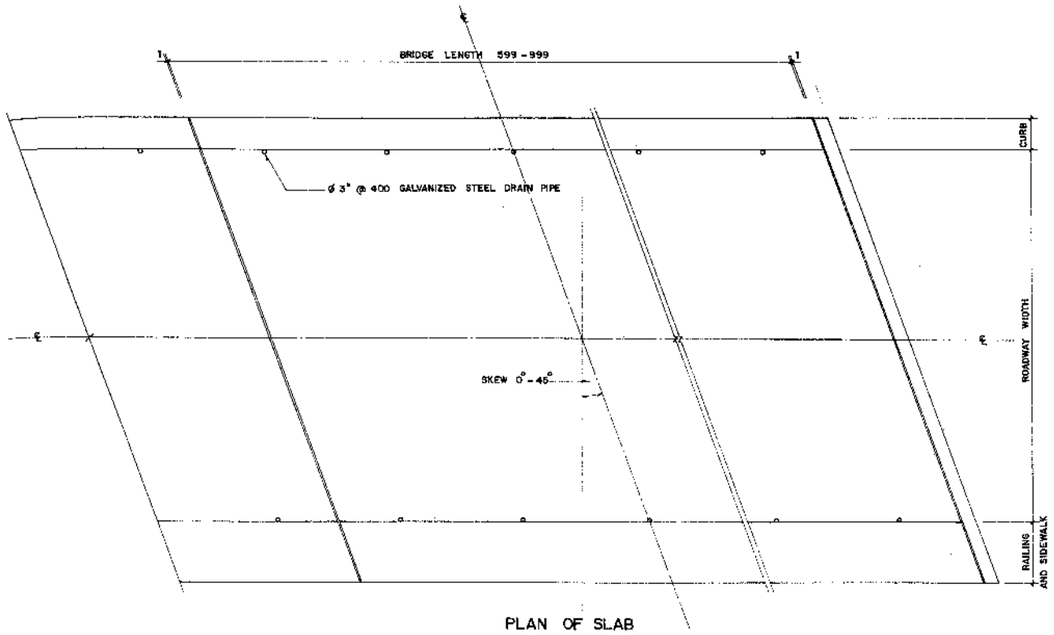
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

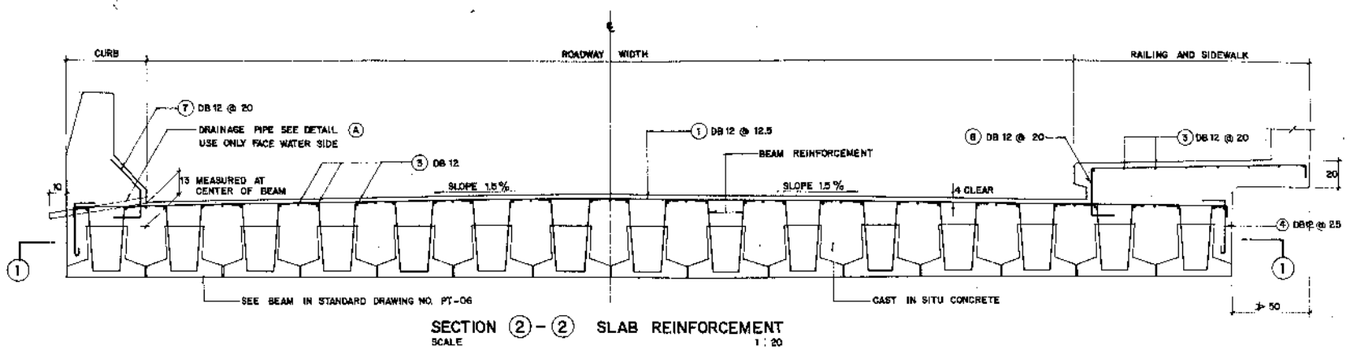
PRESTRESSED CONCRETE GIRDER

DRAPED TENDON ARRANGEMENT

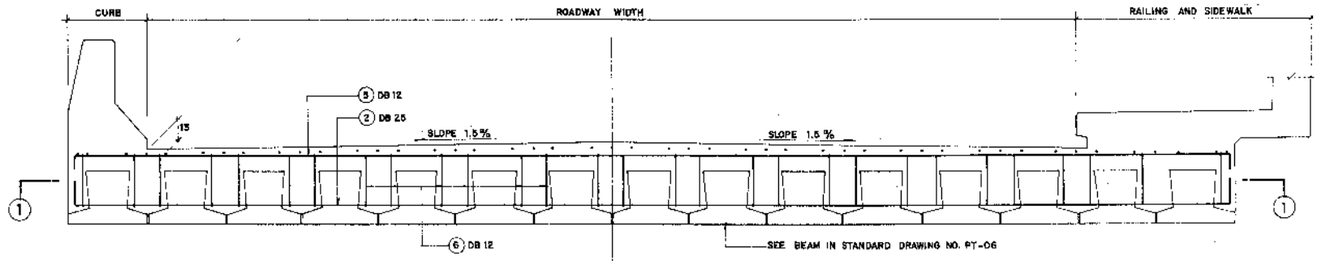
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE : JULY 1994
SUBMITTED : P. Buranapong (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE : AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PT-04
		SHEET NO. 174



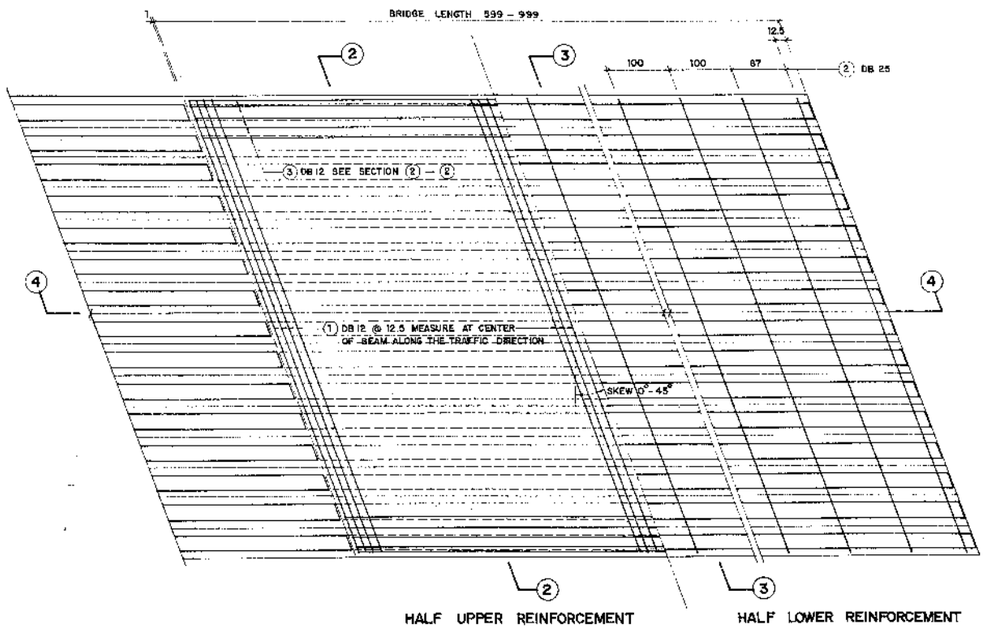
PLAN OF SLAB
SCALE 1 : 50



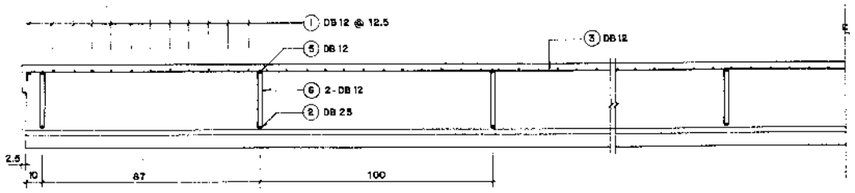
SECTION (2) – (2) SLAB REINFORCEMENT
SCALE 1 : 20



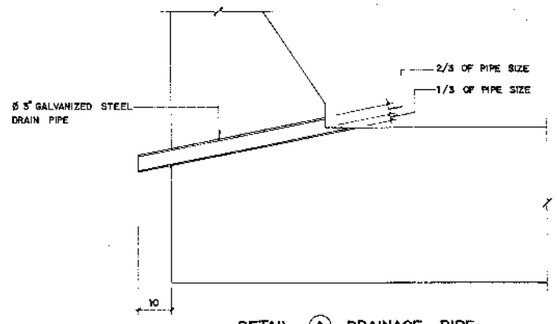
SECTION (3) – (3) CROSS BEAM REINFORCEMENT
SCALE 1 : 20



SECTION (1) – (1) PLAN OF BEAM
SCALE 1 : 50



SECTION (4) – (4) SLAB REINFORCEMENT
SCALE 1 : 20



DETAIL (A) DRAINAGE PIPE
SCALE 1 : 10

TABLE OF REINFORCEMENT

BAR MARK	BAR SIZE	BAR BENDING DIAGRAM
①	DB 12	
②	DB 25	
③	DB 12	
④	DB 12	
⑤	DB 12	
⑥	DB 12	
⑦	DB 12	
⑧	DB 12	

NOTES :

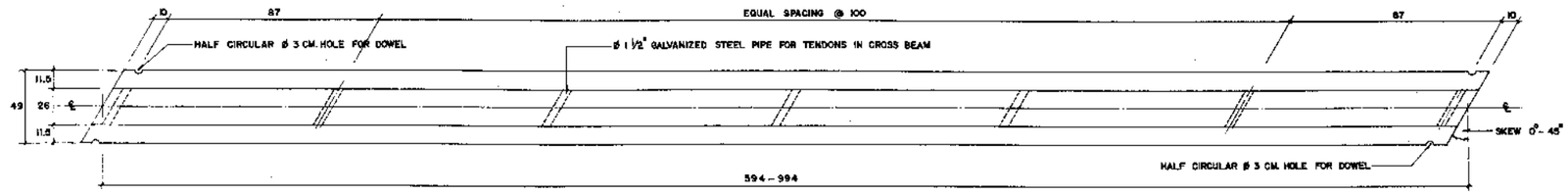
1. ALL DIMENSIONS SHOWN ARE IN CETIMETERS UNLESS OTHERWISE INDICATED.
2. ALL EXPOSED CORNERS SHALL HAVE A 1 CM. CHAMFER UNLESS OTHERWISE INDICATED.
3. REBAR Ø 12 MM. OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M^3 AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 N/MM^2 FOR A 15 x 15 x 15 CM. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT AND MAXIMUM SLUMP OF 5 CM.
5. CLEAR CONCRETE COVER SHALL BE 3 CM. UNLESS OTHERWISE INDICATED.
6. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. APC-1.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

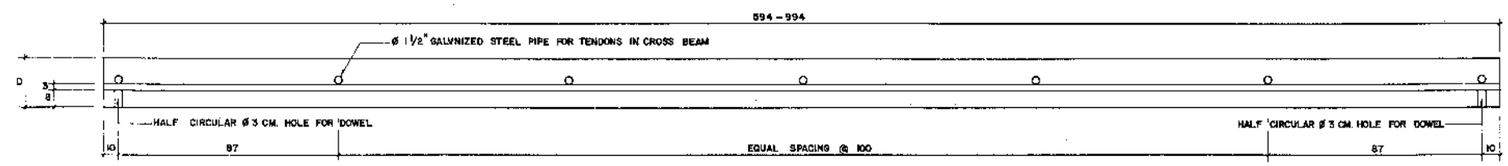
STANDARD DRAWING

6.00 – 10.00 M. SPAN MULTI – BEAM TYPE

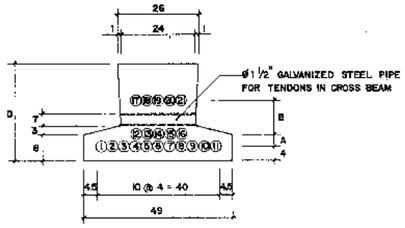
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PT-05
		SHEET NO. 175



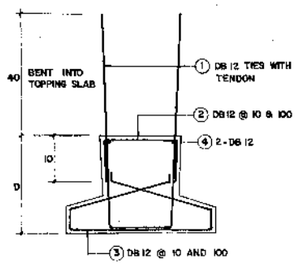
PLAN
SCALE 1:20



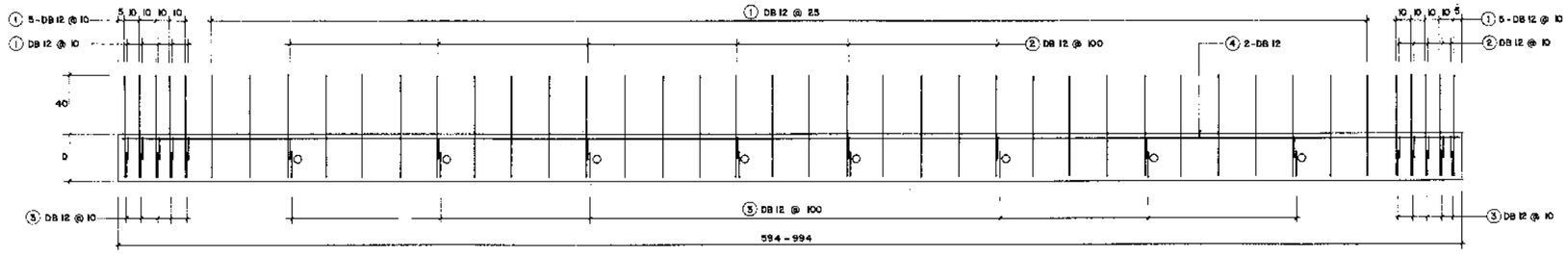
SIDE VIEW OF BEAM
SCALE 1:20



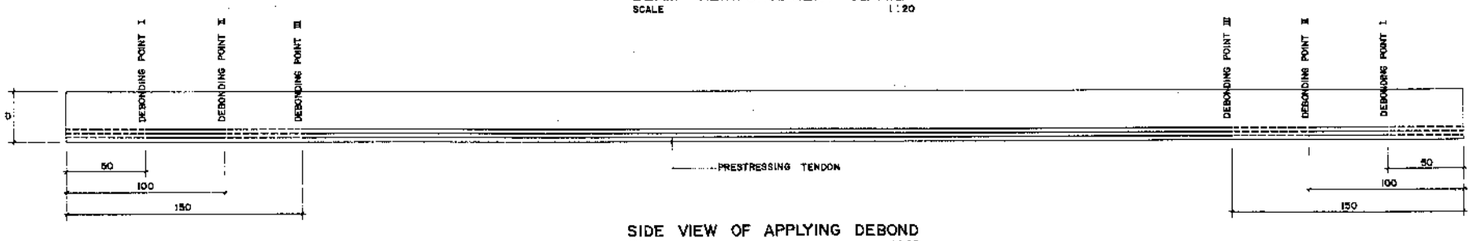
SECTION OF BEAM AND PRESTRESSING TENDONS
SCALE 1:10



SECTION OF REINFORCEMENT
SCALE 1:10



BEAM REINFORCEMENT DETAILS
SCALE 1:20



SIDE VIEW OF APPLYING DEBOND
SCALE 1:20

TABLE OF DETAILS OF BEAMS

SPAN M.	BEAM LENGTH cm.	D cm.	PRESTRESSING TENDON 7 mm. WIRES					PRESTRESSING TENDON 3/8" STRANDS				
			NO.	TENSION FORCE AT TRANSFER KN/TENDON	A	B	DEBONDING NO. - AT POINT	NO.	TENSION FORCE AT TRANSFER KN/TENDON	A	B	DEBONDING NO. - AT POINT
6.0	594	19	(12) (14) (16) (1)(2)(3)(4)(5)(6)(7)(8)(9)(10)(11) (14 TENDONS)	45.9	47	–	(2)(10) POINT I (6) POINT II POINT III (3 TENDONS)	(14) (1)(2)(3)(6)(9)(10)(11) (8 TENDONS)	77.5	8	–	(3)(9) POINT I (6) POINT II (3 TENDONS)
8.0	794	25	(18) (20) (12)(13) (15)(16) (1)(2)(3)(4)(5)(6)(7)(8)(9)(10)(11) (17 TENDONS)	47.0	4	9.25	(2)(6)(10) POINT I (3)(9) POINT II POINT III (5 TENDONS)	(12)(13)(15)(16) (1)(3)(6)(7)(9)(11) (10 TENDONS)	77.5	6.25	–	(3)(9) POINT I (2 TENDONS)
10.0	994	35	(17)(18) (20)(21) (12)(13)(14)(15)(16) (1)(2)(3)(4)(5)(6)(7)(8)(9)(10)(11) (20 TENDONS)	47.7	4	16	(2)(6)(10) POINT I POINT II (3 TENDONS)	(12)(13) (15)(16) (1)(3)(4)(6) (7)(8)(9)(11) (12 TENDONS)	77.5	16	–	(3)(9) POINT I (2 TENDONS)

TABLE OF REINFORCEMENT

NO.	BAR SIZE	BAR BENDING DIAGRAM
①	DB 12	①
②	DB 12	②
③	DB 12	③
④	DB 12	10 ④ 10

NOTES :

1. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
2. ALL EXPOSED CORNERS SHALL HAVE A 1 CM. CHAMFER UNLESS OTHERWISE INDICATED.
3. REBAR Ø 12 MM. OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHER SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
4. CONCRETE SHALL HAVE THE 28-DAYS MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASED ON 0.15x0.15x0.15 CM. CUBE SAMPLES, OF 40 N/MM^2 AND MAXIMUM SLUMP OF 8 CM.
5. PRESTRESSING OF STRAIGHT TENDON SHALL BE AS FOLLOWS :
   A) Ø 7 MM. STRESS-RELIEVED WIRE SHALL HAVE A MAXIMUM TENSION (BREAKING STRENGTH) OF 64 KN/TENDON.
   B) Ø 3/8" SEVEN-WIRE STRAND SHALL HAVE A MAXIMUM TENSION (BREAKING STRENGTH) OF 106 KN/TENDON.
6. APPLY FORCE TO A TENDON AT TRANSFER UNTIL THE MAXIMUM TENSION AT TRANSFER IS EQUAL TO THE CORRESPONDING FORCE SPECIFIED IN THE TABLE OF DETAILS OF BEAMS.
7. DEBONDING OF A PRESTRESSING TENDON IS ACHIEVED BY ENVELOPING THE TENDON WITH A PLASTIC TUBE FROM THE DEBONDING POINTS AS SHOWN IN THE TABLE THROUGH THE END OF BEAM.
8. UNLESS OTHERWISE SHOWN, CLEAR CONCRETE COVER SHALL BE 2.5 CM.
9. IN CASE OF SKEW CASTING FOR SKEW BRIDGE, THE TENDON SHALL ALSO BE SKEW.
10. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. APC-2.

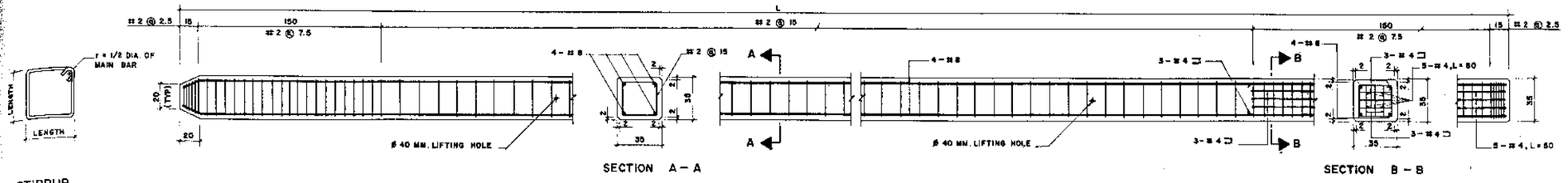
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

6.00 - 10.00 M. SPAN MULTI-BEAM TYPE

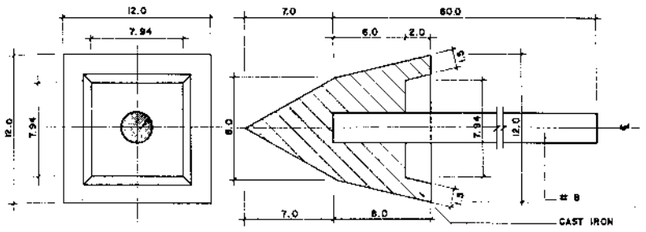
PRESTRESSED CONCRETE GIRDER

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PT-06
		SHEET NO. 176

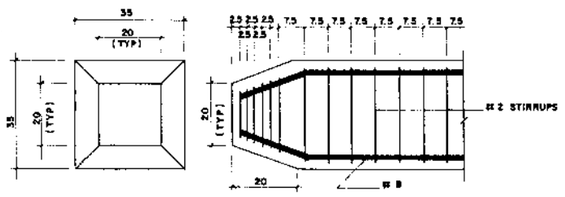


STIRRUP
NOT TO SCALE

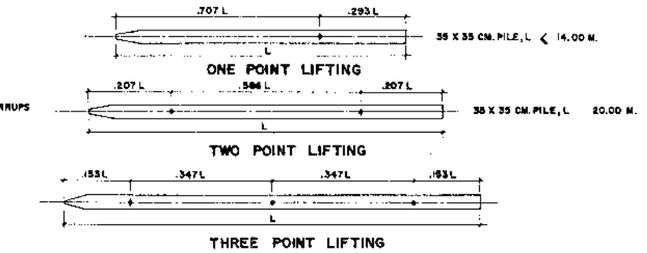
REINFORCEMENT DETAILS
SCALE 1 : 20



PILE TIP TYPE B
SCALE 1 : 2.5



PILE TIP TYPE A
SCALE 1 : 10

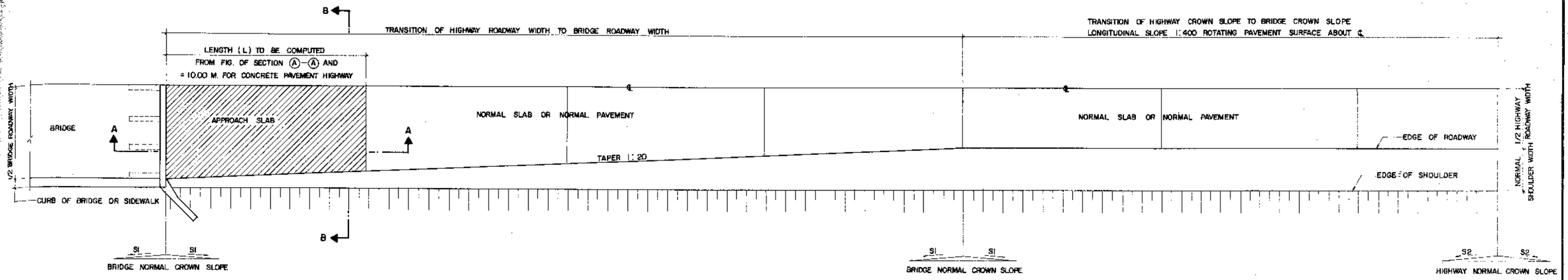


PILE LIFTING LOCATIONS
NOT TO SCALE

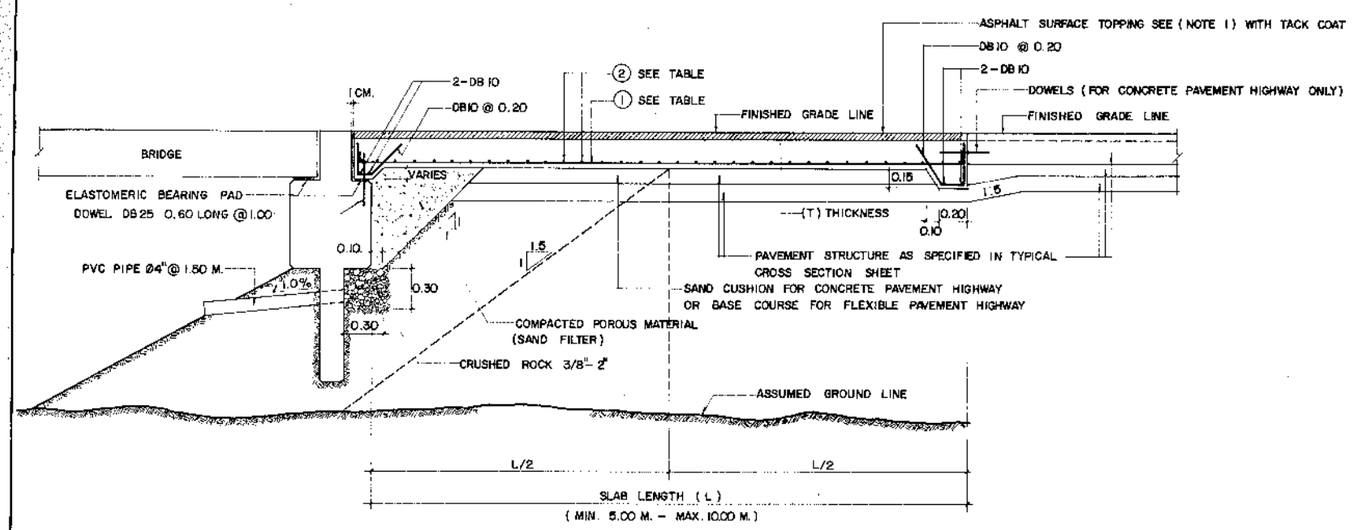
#2 = Ø 1/4" OR 6 MM. #3 = Ø 3/8" OR 9 MM.
#4 = Ø 1/2" OR 12 MM. #8 = Ø 1" OR 25 MM.

TABLE OF APPROXIMATE ULTIMATE CAPACITY (R) OF 35 x 35 CM. PILE IN TONS DRIVEN BY DROP HAMMER WITH FRICTION WINCH, HAMMER WEIGHT (W) OF 3.0, 3.5 AND 4.0 TONS, DROP HEIGHT (h) OF 100, 120 AND 150 CM. WITH APPROPRIATE CUSHION OF 5 CM. THICK ON THE TOP OF PILE HEAD, IN ACCORDANCE WITH AVERAGE PILE PENETRATION (S) FOR THE LAST TEN BLOWS.

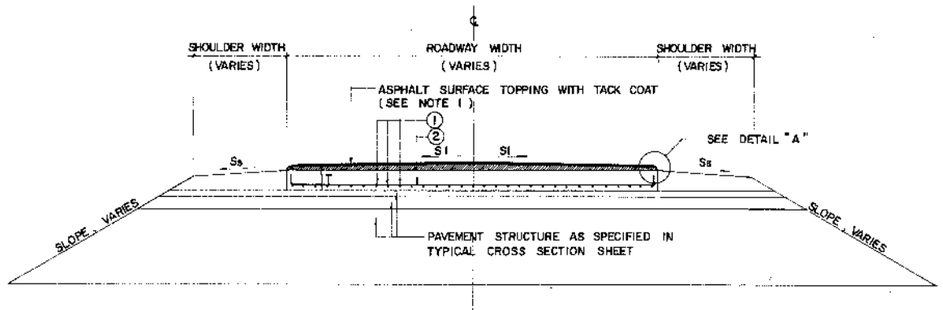
| LENGTH OF PILE (L) M. | APPROX WEIGHT OF PILE (P) TONS | 3.0 TON DROP HAMMER (W) WITH FRICTION WINCH — PENETRATION (S) — CM. — HAMMER DROP HEIGHT (h) — CM. | | |



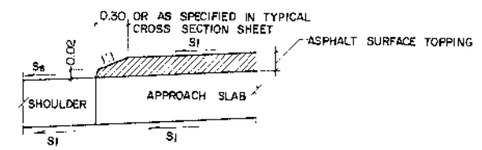
PLAN
NOT TO SCALE



SECTION A – A
SCALE 1:25



SECTION B – B
SCALE 1:50



DETAIL "A"
NOT TO SCALE

NOTES

1. THE ASPHALT SURFACE FOR THE TOPPING ON THE APPROACH SLAB SHALL BE AS FOLLOW
   - 1.1 FOR CONCRETE PAVEMENT HIGHWAY ON SOFT FOUNDATION WITH ASPHALTIC CONCRETE TREATED SHOULDER THE 5 cm. HOT MIXED ASPHALTIC CONCRETE SHALL BE USED AS THE TOPPING .
   - 1.2 FOR CONCRETE PAVEMENT HIGHWAY ON SOFT FOUNDATION WITH BITUMINOUS SURFACE TREATMENT TREATED SHOULDER OR NONTREATED SHOULDER EITHER 5 cm. COLD MIX. ASPHALTIC CONCRETE OR 5 cm. HOT MIXED ASPHALTIC CONCRETE SHALL BE USED.
   - 1.3 FOR CONCRETE PAVEMENT HIGHWAY ON NORMAL SOIL FOUNDATION NO ASPHALT SURFACE TOPPING REQUIRED AND THE APPROACH SLAB SHALL BE RAISED TO THE FINISHED GRADE LINE.
   - 1.4 FOR FLEXIBLE PAVEMENT HIGHWAY WITH ASPHALTIC CONCRETE SURFACE THE TOPPING SHALL BE THE SAME AS THE HIGHWAY ASPHALTIC CONCRETE SURFACE COURSE BUT SHOULD BE 5 cm. THICK (MINIMUM.)
   - 1.5 FOR FLEXIBLE PAVEMENT HIGHWAY WITH BITUMINOUS SURFACE TREATMENT SURFACE EITHER 5 mm. COLD MIXED ASPHALTIC CONCRETE OR 5 cm. HOT MIXED ASPHALTIC CONCRETE SHALL BE USED.
2. THE COLD MIXED AND THE HOT MIXED ASPHALTIC CONCRETE FOR THE TOPPING AS STATED IN NOTE 1 WILL BE CONFORMED TO THE SPECIAL PROVISIONS FOR ASPHALT TOPPING ON THE APPROACH SLAB STATED BY THE MATERIAL & RESEARCH DIVISION DEPARTMENT OF HIGHWAY.
3. THE TACK COAT SHALL BE REFERRED TO STANDARD DH-S 403/2531
4. THE CONSTITUENTS OF THE CONCRETE MIX. PER. CUBIC METER MUST BE AS FOLLOWS – PORTLAND CEMENT 350 kgs. SAND 430 LITRES CRUSHED ROCK OR GRAVEL 860 LITRES, SLUMP OF THE CONCRETE MIX NOT BE HIGHER THAN 8 cm. WITH AN ULTIMATE COMPRESSIVE STRENGTH OF STANDARD CUBE 15x15x15 cm. NOT LOWER THAN 20 N/mm^2 AT THE AGE OF 28 DAYS.
5. REINFORCING STEEL MUST CONFORM TO THE STANDARD TIS. 20-2527 FOR THE ROUND BAR AND TIS. 24-2527 CLASS SD 30 FOR THE DEFORMED BAR .
6. THE NORMAL CONCRETE CLEAR COVERING SHALL BE 3 cm. AND 5 cm. FOR SULPHATE RESISTANT
7. THE COST OF THE APPROACH SLAB SHALL INCLUDE THE COST FOR THE ASPHALT TOPPING AND THE TACK COAT AS STATED IN THIS DRAWING (IF ANY)
8. DIMENSIONS ARE IN METER UNLESS OTHERWISE INDICATED.

TABLE SHOW THE DETAILS OF THE APPROACH SLAB

SLAB LENGTH (L) M.	THICKNESS (T) CM.	REINFORCEMENT ①	REINFORCEMENT ②
5.00	20	DB20 @ 0.20	DB10 @ 0.20
6.00	22	DB20 @ 0.15	DB10 @ 0.15
7.00	24	DB20 @ 0.20	DB12 @ 0.20
8.00	26	DB20 @ 0.15	DB12 @ 0.15
9.00	28	DB25 @ 0.20	DB16 @ 0.20
10.00	30	DB25 @ 0.15	DB25 @ 0.15

REMARK

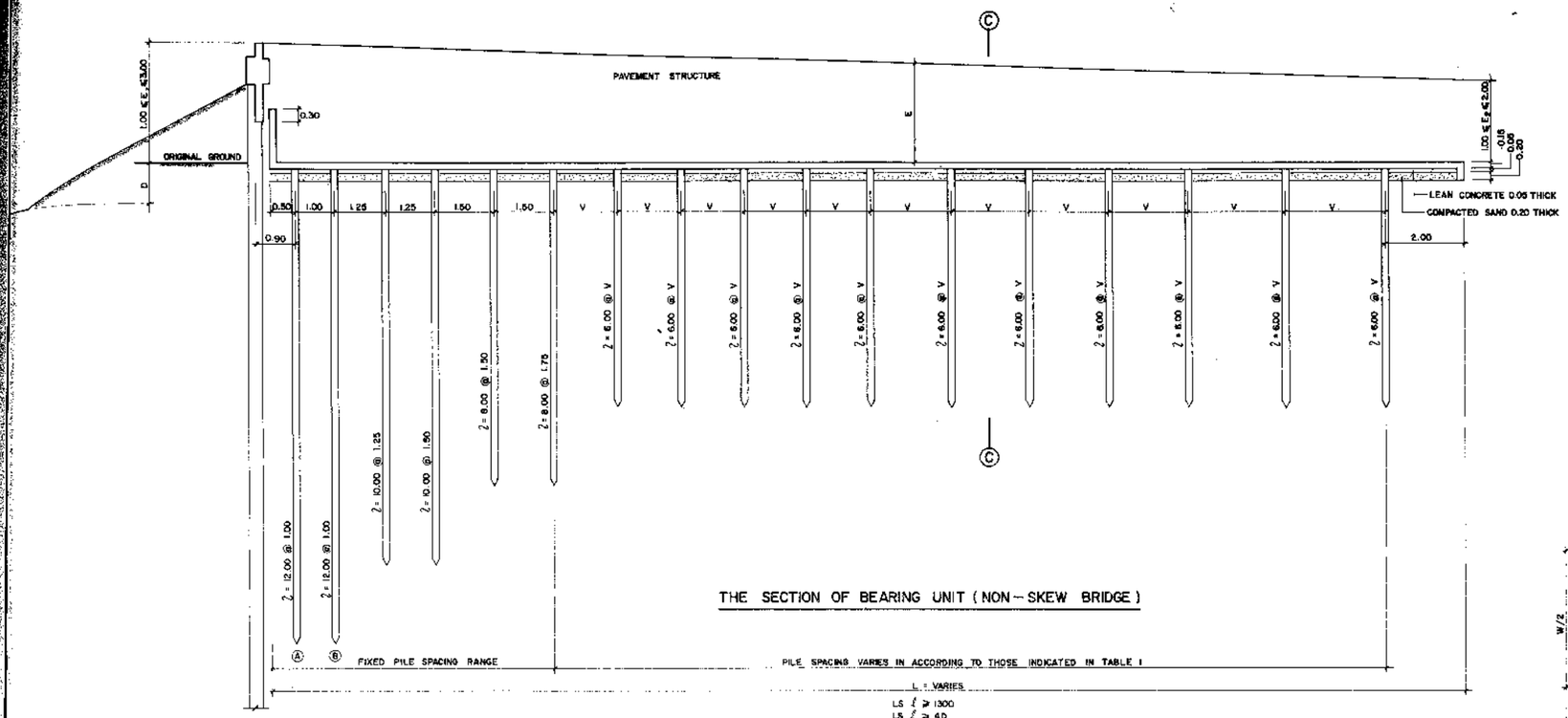
FOR SKEW BRIDGE THE SLAB LENGTH (L) WILL BE THE SHORT SIDE OF THE APPROACH SLAB BUT THE THICKNESS AND THE REINFORCEMENT SHALL BE EQUIVALENT TO THOSE OF THE SLAB WITH THE SLAB LENGTH (L) EQUAL TO THE LONG SIDE OF THE APPROACH SLAB.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

BRIDGE APPROACH SLAB AND POROUS BACKFILL MATERIALS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : for (DIRECTOR GENERAL)		DWG. NO. AP-3
		SHEET NO. 178

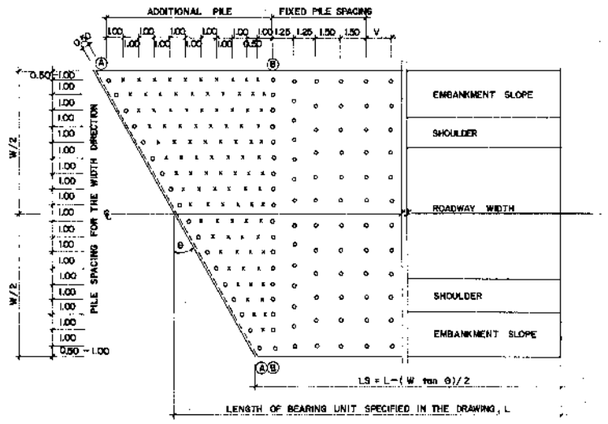


THE SECTION OF BEARING UNIT (NON – SKEW BRIDGE)

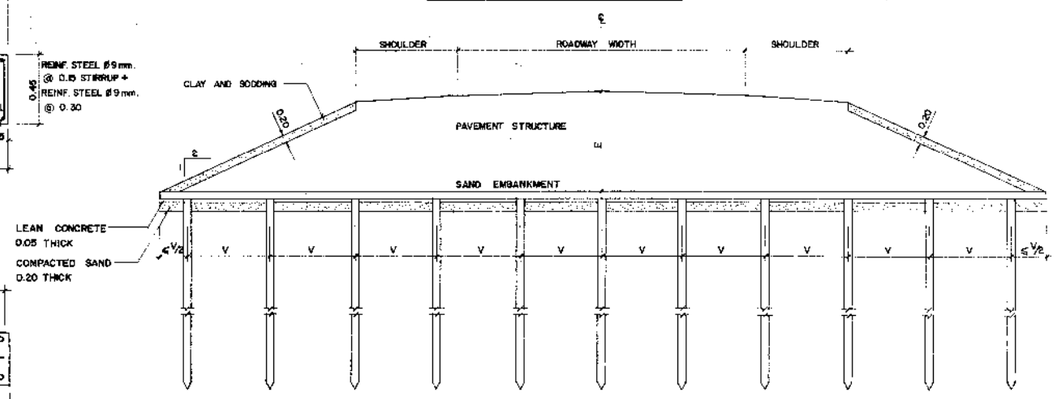
L = VARIES
LS ≥ 1300
LS ≥ 4 D
LS ≥ 2.5 (E + D)
OR LS = THE LENGTH TO BE SPECIFIED BY THE LOCATION AND DESIGN DIVISION
BEARING SLAB SHALL HAVE 2.00 M. EXTENTION AT THE SLAB FREE END.

NOTES :

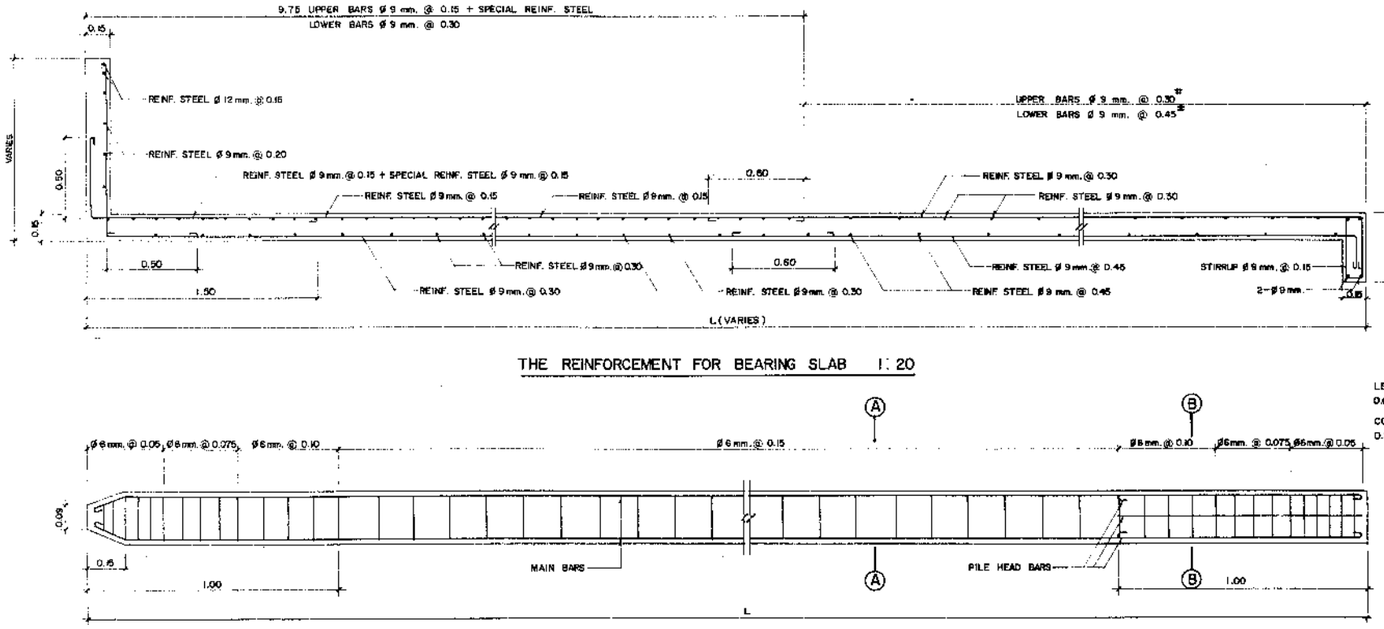
1. CONCRETE MIX PER 1 CU.M. SHALL APPROXIMATELY HAVE
   PORTLAND CEMENT IN ACCORDANCE WITH ASTM STANDARD C 150–63 TYPE I OR EQUIVALENT QUALITY, NOT LESS THAN 350 KG.
   COARSE SAND 430 LITRE
   CRUSHED ROCK OR GRAVEL 860 LITRE
   WATER 195 LITRE
   CONCRETE SLUMP NOT EXCEED 10 CM.
   ULTIMATE COMPRESSIVE STRENGTH OF THE STANDARD CUBE, 15x15x15 CM. SHALL NOT BE LESS THAN 210 KG./CM.^{2}
2. REINFORCEMENT STEEL, Ø 6 MM. AND Ø 9 MM. SHALL BE STRUCTURAL GRADE WHILE Ø 12 MM. AND ABOVE SHALL BE INTERMEDIATE GRADE DEFORMED BAR.
3. ANY DETAILS NOT SPECIFIED IN THE DRAWING OR UNCLEARED OR NON-CONFORMED WHICH WOULD CRETE THE PROBLEM IN CONSTRUCTION, THE DECISION OF THE DOH'S LOCATION AND DESIGN DIVISION SHALL GOVERN.
4. ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE INDICATED.
5. DESIGN ASSUMPTION : SOIL CONDITION FOLLOWS THE GENERAL CHARACTERISTIC OF BANGKOK CLAY.
6. PRESTRESSED CONCRETE PILE SHALL BE ALLOWED ONLY THOSE HAVING THE EFFECTIVE PERIMETER NOT LESS THAN THE VALUE STATED IN THE DRAWING WITH THE PRIOR APPROVAL OF THE DOH'S LOCATION AND DESIGN ON CASE BY CASE BASIS.
7. IN CASE OF SKEW BRIDGE, THE LENGTH OF BEARING UNIT (L) SHALL BE MEASURED ALONG THE LINE AT THE MIDDLE OF THE WIDTH OF BEARING UNIT. THE LENGTH OF BEARING UNIT ON THE SHORT SIDE SHALL NOT BE LESS THAN (LS) AS SPECIFIED IN THE DRAWING.
8. THIS DRAWING IS ADOPTED FROM THE DOH'S STANDARD DRAWING NO. S2/22.



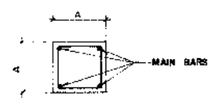
PLAN INDICATING THE LOCATION OF ADDITIONAL PILE FOR THE CASE OF SKEW BRIDGE



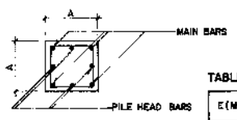
SECTION Ⓒ – Ⓒ 1 : 75



THE REINFORCEMENT FOR BEARING SLAB 1 : 20



SECTION Ⓐ – Ⓐ 1 : 12.5



SECTION Ⓑ – Ⓑ 1 : 12.5

THE RC. PILE 1 : 12.5

TABLE 1 INDICATING THE DEPTH OF FILL AND PILE SPACING

E (METER)	2.75 – 3.00	2.50 – 2.75	2.25 – 2.50	< 2.25
V (METER)	1.50	1.75	2.00	2.50

TABLE 2 INDICATING SIZE AND REINFORCEMENT FOR THE PILE

L	A	MAIN BARS	PILE HEAD BARS	LIFING POINTS (MEASURED FROM BOTH ENDS)
12.00	0.20	4 – Ø 16 mm.	4 – Ø 12 mm.	2.40
10.00	0.18	4 – Ø 12 mm.	4 – Ø 12 mm.	2.00
8.00	0.18	4 – Ø 9 mm.	4 – Ø 9 mm.	1.60
6.00	0.18	4 – Ø 9 mm.	4 – Ø 9 mm.	1.20

IN CASE OF NON – SKEW BRIDGE

1. ROW Ⓐ AND Ⓑ SHALL BE 1.00 METER APART

IN CASE OF SKEW BRIDGE

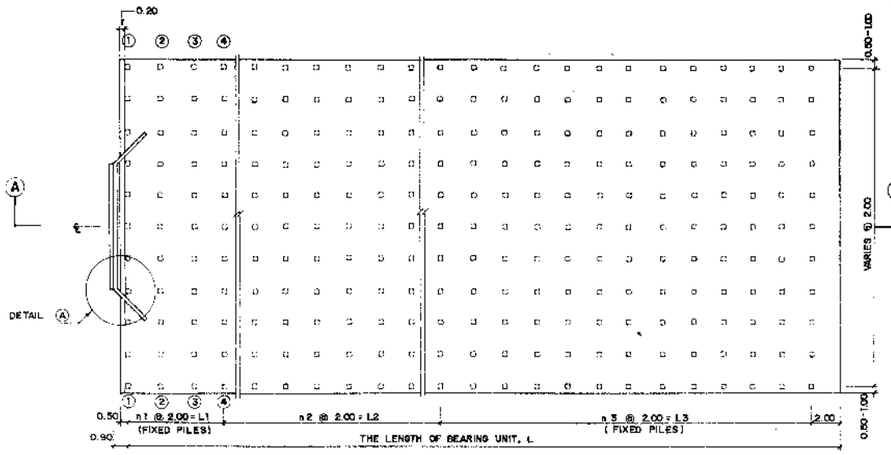
1. PILE SPACING (ADDITIONAL PART) ALONG THE LENGTH OF BEARING UNIT SHALL BE 1.00 METER BY MEASURING FROM ROW (A) TOWARD (B) FOR THE LAST PILE NEAR ROW (B), IF THE SPACING FROM ROW (B) IS LESS THAN 1.00 METER, THE SPACING OF THE LAST TWO PILES SHALL BE ADJUSTED TO HAVE THE SPACING NOT LESS THAN 0.50 METER BUT NOT EXCEED 1.00 METER.
   X ADDITIONAL PILE, 12.00 M. LONG.
   O PILES AS INDICATED IN THE DRAWING FOR NON – SKEW BRIDGE
2. FOR DEFORMED BAR, NOT NECESSARY TO HOOK.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

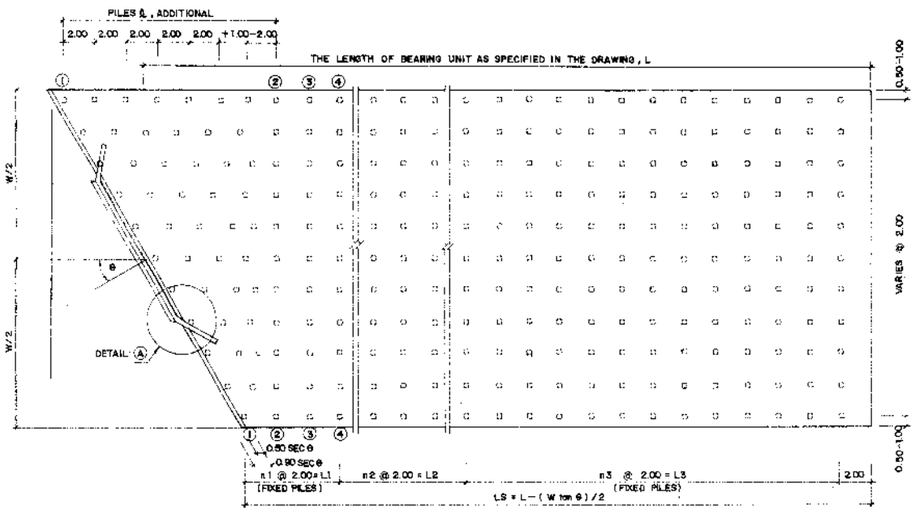
STANDARD DRAWING

BEARING UNIT AT BRIDGE END ON SOFT CLAY

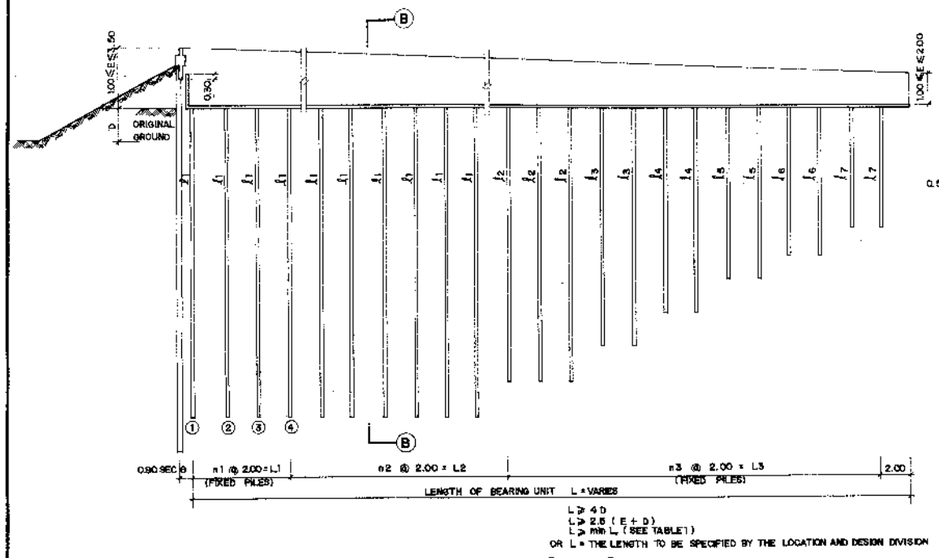
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Bunyy. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
		DWG. NO. S2/22
APPROVED : (DIRECTOR GENERAL)		SHEET NO. 179



PLAN INDICATING THE LOCATION OF PILE (FOR NON-SKEW BRIDGE) 1:200

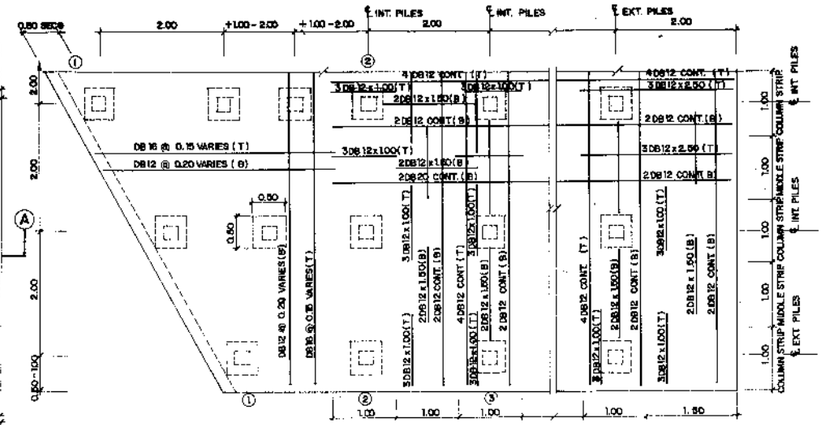


PLAN INDICATING THE LOCATION OF PILE (FOR SKEW BRIDGE) 1:200

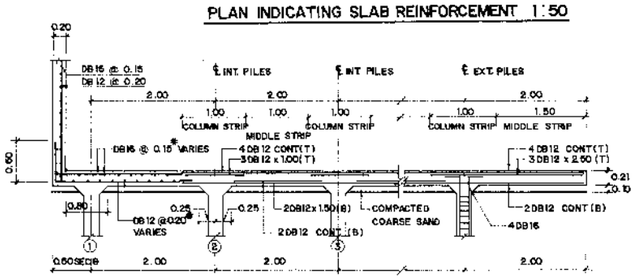


SECTION (A) - (A)

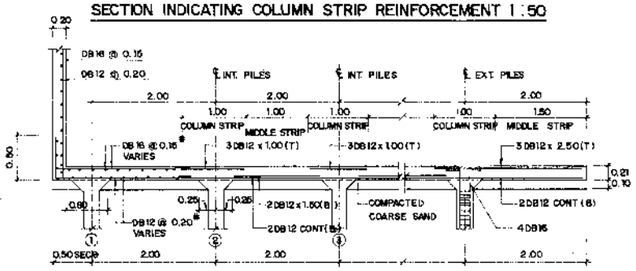
THE SECTION INDICATING THE LOCATION OF PILE 1:200



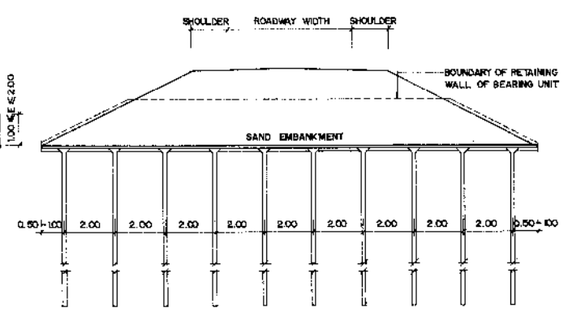
PLAN INDICATING SLAB REINFORCEMENT 1:50



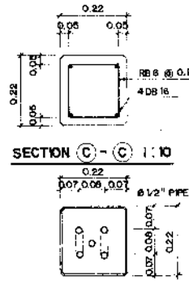
SECTION INDICATING COLUMN STRIP REINFORCEMENT 1:50

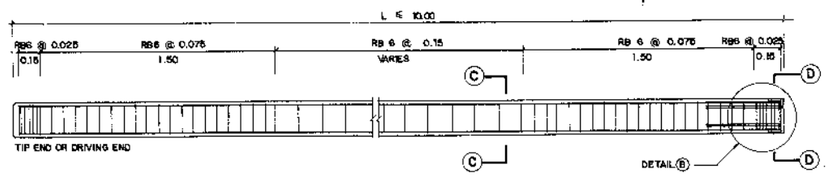


SECTION INDICATING MIDDLE STRIP REINFORCEMENT 1:50

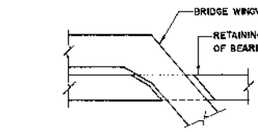


SECTION (B) - (B) 1:25

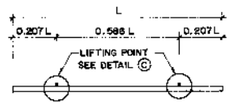




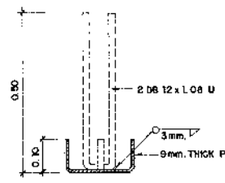
THE SECTION OF RC. PILE 1:20



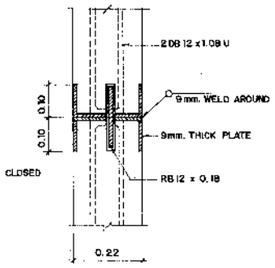
DETAIL (A) INDICATING THE SECTION OF BRIDGE WING WALL AND RETAINING WALL



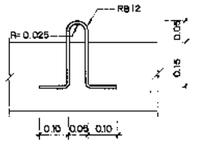
PLAN INDICATING PILE LIFTING POINTS



DETAIL (B) 1:10



SECTION INDICATING THE EXTENTION OF PILE 1:10



DETAIL (C) 1:10

TABLE I

EMBANKMENT/E METER	l_1 METER	l_2 METER	l_3 METER	l_4 METER	l_5 METER	l_6 METER	l_7 METER	n_1	L_1 METER	n_2	L_2 METER	n_3	L_3 METER	min. LS
3.25 - 3.50	19.00	17.00	15.00	13.00	11.00	9.00	7.00	3.00	6.00	≥ 1	≥ 2	12.00	24.00	34.00
<3.25 - 2.75	18.00	16.00	14.00	12.00	10.00	8.00	6.00	3.00	6.00	≥ 1	≥ 2	12.00	24.00	34.00
<2.75 - 2.25	17.00	15.00	13.00	11.00	9.00	7.00	--	3.00	6.00	≥ 1	≥ 2	10.00	20.00	30.00
<2.25	16.00	14.00	12.00	10.00	8.00	6.00	--	3.00	6.00	≥ 1	≥ 2	10.00	20.00	30.00

GENERAL NOTES

1. CONCRETE SHALL HAVE THE ULTIMATE COMPRESSIVE STRENGTH OF STANDARD CUBE, 15 x 15 x 15 CM. AT 28 DAYS, NOT LESS THAN 350 KG / CM^2
2. CONCRETE COVERING SHALL BE 4.5 CM. (TO THE OUTER SURFACE OF REINFORCEMENT)
3. THE REINFORCEMENT AT THE MIDDLE STRIP AND COLUMN STRIP SHALL BE PLACED SIMILARLY IN BOTH DIRECTIONS (LONGITUDINAL AND TRANSVERSE).
4. THE REINFORCEMENT STEEL, RB SHALL CONFORM TO THE TIS STANDARD 20 - 2515, SR 24 GRADE WHILE THE DEFORMED BAR (DB) SHALL CONFORM TO THE TIS STANDARD 24 - 2516, SD 30 GRADE.
5. ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE STATED.
6. ANY ITEMS WHICH ARE NOT INDICATED HEREIN OR WOULD CREATE PROBLEM IN CONSTRUCTION, SHALL BE UNDER THE JURISDICTION OF THE DOH'S LOCATION AND DESIGN DIVISION.
7. IN CASE OF SKEW BRIDGE, THE LENGTH OF BEARING UNIT (L) SHALL BE MEASURED ALONG THE LINE AT THE MIDDLE OF THE WIDTH OF BEARING UNIT. THE LENGTH OF BEARING UNIT ON THE SHORT SIDE SHALL NOT BE LESS THAN (LS) AS SPECIFIED IN THE DRAWING.
8. THIS DRAWING IS ADOPTED FROM THE DOH'S STANDARD DRAWING NO. S2 / 23

NOTES FOR BEARING UNIT PILES

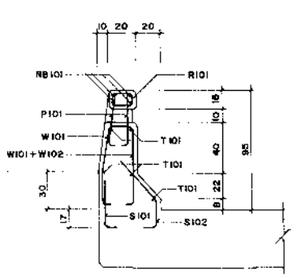
1. CONCRETE SHALL HAVE ULTIMATE COMPRESSIVE STRENGTH OF STANDARD CUBE, 15 x 15 x 15 CM. AT 28 DAYS, NOT LESS THAN 200 KG/CM^2
2. THE REINFORCEMENT STEEL, RB SHALL CONFORM TO THE TIS STANDARD 20 - 2515, SR 24 GRADE WHILE THE DEFORME BAR, DB SHALL CONFORM TO TIS 24 - 2516, SD 30 GRADE
3. IF THE PILE LENGTH IS MORE THAN 10.00 M., PILE EXTENTION METHOD IS RECOMMENDED BY USING THE TWO PILES, EACH HAVING THE LENGTH OF HALF OF THE REQUIRED PILE LENGTH.
4. IN CASE OF SKEW BRIDGE, PILE SPACING FOR THE ADDITIONAL PART SHALL BE 2.00 M. IN LONGITUDINAL DIRECTION BY MEASURING FROM ROW 1 TOWARD 2 FOR THE LAST PILE NEAR ROW 2. IF THE SPACING FROM ROW 2 IS MORE THAN 2.00 M. BUT NOT OVER 4.00 M., ONE PILE SHOULD BE DRIVEN AT THE MID OF AVAILABLE SPACING.
5. PRESTRESSED CONCRETE PILE SHALL BE ALLOWED ONLY THOSE HAVING THE EFFECTIVE PERIMETER NOT LESS THAN THE VALUE INDICATED IN THE DRAWING WITH THE PRIOR APPROVAL OF THE DOH'S LOCATION AND DESIGN DIVISION ON CASE BY CASE BASIS.
6. CALCULATION OF THE PILE LENGTH (AS INDICATED IN THE DRAWING) IS BASED UPON THE GENERAL CHARACTERISTIC OF BANGKOK CLAY.
7. IF THE CONDITION OF SUBGRADE SOIL AT THE CONSTRUCTION SITE IS KNOW OR INVESTIGATED, THE PILE LENGTH AS SPECIFIED IN THE DRAWING MAY BE CHANGED AND ADJUSTED TO SUIT THE LOCAL SOIL CONDITION, HOWEVER, IT IS SUBJECT TO THE WRITTEN APPROVAL OF THE DOH'S LOCATION AND DESIGN DIVISION ON CASE BY CASE BASIS.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

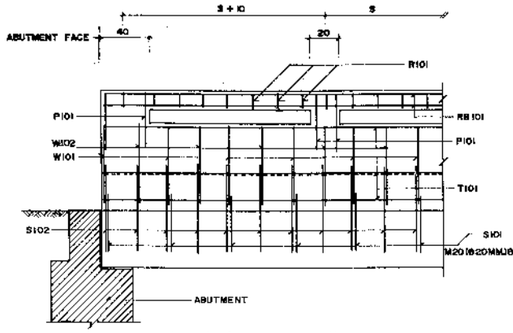
STANDARD DRAWING

BEARING UNIT AT BRIDGE END ON SOFT CLAY ; RIGID PAVEMENT

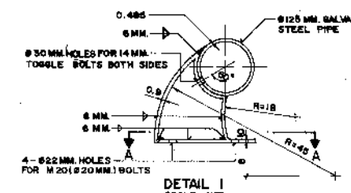
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Bumpenpong. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. S2/23
		SHEET NO. 180

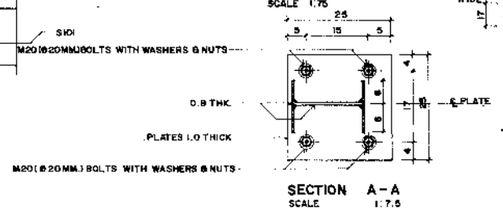


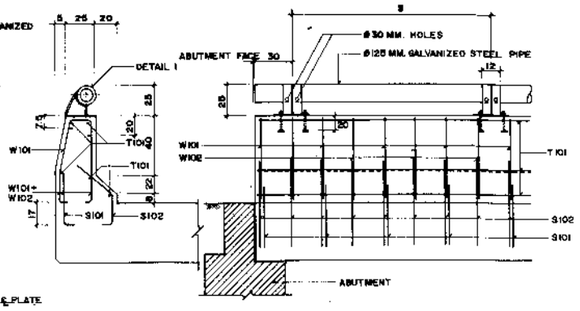
TRANSVERSE SECTION



LONGITUDINAL SECTION



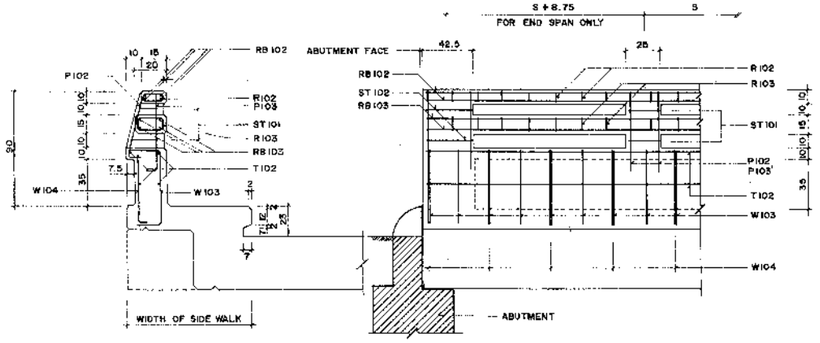




TRANSVERSE SECTION LONGITUDINAL SECTION

TYPE 1 TRAFFIC RAILING
SCALE 1:25

TYPE 2 TRAFFIC RAILING
SCALE 1:25

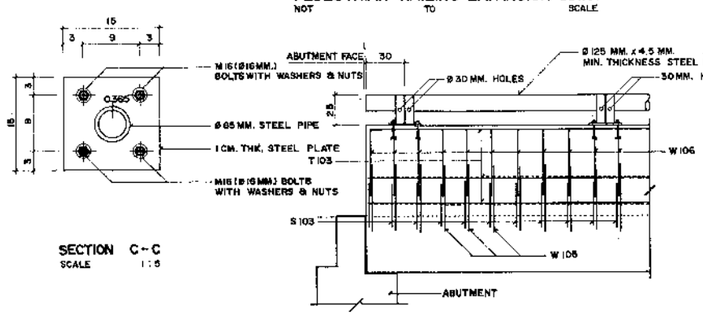


TRANSVERSE SECTION LONGITUDINAL SECTION

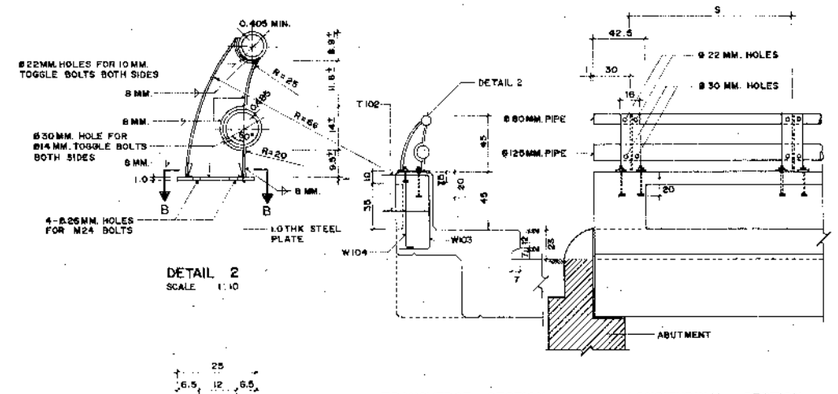
TYPE 3 COMBINATION RAILING
SCALE 1:25

TRANSVERSE SECTION

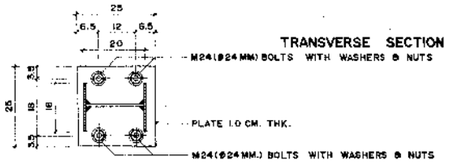
PEDESTRIAN RAILING EXPANSION JOINT
NOT TO SCALE



TYPE 5 TRAFFIC CURB AND PEDESTRIAN RAILING
SCALE 1:25

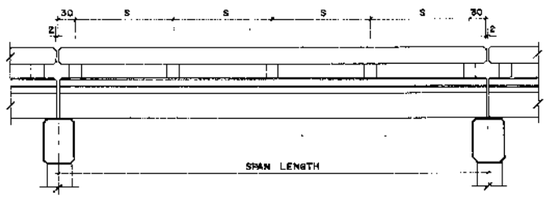


TRANSVERSE SECTION LONGITUDINAL SECTION

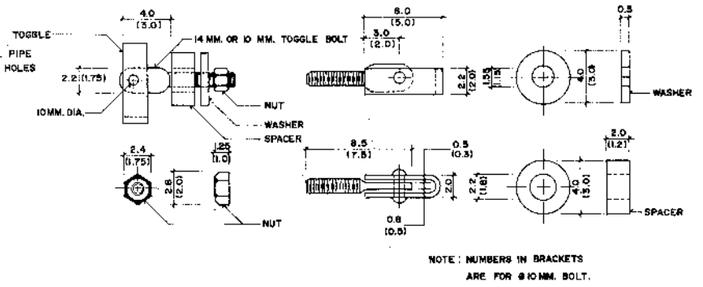


SECTION B-B
SCALE 1:10

TYPE 4 COMBINATION RAILING
SCALE 1:25



TYPICAL RAILING POST SPACING
SCALE 1:50



Ø14 MM.,Ø10 MM. TOGGLE BOLT AND TOGGLE
NOT TO SCALE

TABLE OF RAILING REINFORCEMENT

TYPE	TYPE OF RAILING	BAR BENDING DIAGRAMS	BAR MARK	ll	ø	NO	L
1	TRAFFIC	44 / 15 / 6 10 / VARIES	P101	4	-	4 #	84
			R101	2	20	-	60
			RB101	4	-	4	-
1 AND 2	TRAFFIC	7.5 VARIES 7.5 / 80 / 30 65 10 / 40 10 / 30 10 / 40 10 / 25 10	T101	3	-	5	-
			W101	4	50	-	171
			W102	4	50	-	85
			S101	4	50	-	50
			S102	4	25	-	75
3	COMBINATION	45.5 / 80 / 10 / VARIES / 15 / 5 20 / VARIES / 15 / 5 37.5 / 7.5 VARIES 7.5 / 10 / 5 15 / VARIES / 15 / 5 10	P102	4	-	2 #	61
			P103	4	-	2 #	70
			ST101	2	-	2 #	-
			ST102	2	-	2 #	-
			RB102	3	-	4	-
			R102	2	20	-	140
			RB103	4	-	4	-
			R103	2	20	-	60

TYPE	TYPE OF RAILING	BAR BENDING DIAGRAMS	BAR MARK	ll	ø	NO	L
1 AND 2	COMBINATION	7.5 VARIES 7.5 / 22.5 60 22.5 / 55 10	T102	3	-	4	-
			W103	5	20	-	105
			W104	4	40	-	65
	TRAFFIC AND PEDESTRIAN	7.5 VARIES 7.5 / 20 30 25 10 / 20 49 10 / 5 37 57 40 10	T103	3	-	5	-
			W105	5	25	-	100
			W106	4	25	-	162
			S103	4	25	-	55

L = TOTAL LENGTH OF EACH BAR
NO = TOTAL AMOUNT OF BARS
# = AMOUNT OF REINFORCEMENT IN ONE POST
#2 = Ø1/4" OR 6 MM.
#3 = Ø3/8" OR 9 MM.
#4 = Ø1/2" OR 12 MM.
#5 = Ø5/8" OR 16 MM.

TABLE OF RAILING POST SPACING

SPAN (M)	5.00	6.00	7.00	8.00	9.00	10.00	15.00	20.00	29.97
SPACING, S (M)	1.45	1.80	1.60	1.85	1.69	1.88	1.82	1.96	1.85
SPACING, SI (M.)	0.1460	0.1500	0.1451	0.1540	0.1529	0.1569	0.1517	0.1509	0.1541

NOTES :

1. SCOPES OF APPLICATION OF RAILING ARE AS FOLLOWS :-
   - TYPE 1, FOR SHORT BRIDGES OR BRIDGES WITHOUT SIDE WALK IN GENERAL.
   - TYPE 2, FOR BRIDGES WITHOUT SIDEWALK WHICH HAVE A TOTAL LENGTH OF MORE THAN 80.0 M. OR FOR BRIDGES IN URBAN AREA OR WHEN STEEL RAILINGS ARE REQUIRED FOR AESTHETIC PURPOSES. IT SHALL BE SHOWN ON THE DRAWINGS BY THE ENGINEER.
   - TYPE 3, FOR BRIDGES WITH .50 M. SIDEWALKS OR WIDER IN GENERAL.
   - TYPE 4, FOR BRIDGES WITH .50 M. SIDEWALKS OR WIDER AND HAVING A TOTAL LENGTH OF MORE THAN 80.0 M. OR WHEN STEEL RAILINGS ARE REQUIRED FOR AESTHETIC PURPOSES. IT SHALL BE SHOWN ON THE DRAWING BY THE ENGINEER.
   - TYPE 5, FOR BRIDGES WITH HEAVY TRAFFIC AND DENSE PEDESTRIAN IN ORDER TO SEPARATE THE VEHICLES FROM PEDESTRIAN FOR THE SAKE OF SAFETY. IT SHALL BE SHOWN ON THE DRAWINGS BY THE ENGINEER.
2. ANY SPECIAL RAILINGS, IF DIFFERENT FROM THE ABOVE-MENTIONED MAY BE USED UNDED THE APPROVAL OF THE ENGINEER.
3. DESIGN STRESSES :
   - CONCRETE fc = 70 KG/CM^2
   - REBAR fs = 1200 KG/CM^2 FOR PLAIN BARS.
   - fs = 1400 KG/CM^2 FOR DEFORMED BARS.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG/M^3 AND A MINIMUM 28-DAYS 0.15x0.15x0.15M.CUBE STRENGTH OF 210 KG/CM^2. CEMENT SHALL BE TIS. 15 TYPE 1 PORTLAND CEMENT UNLESS SALINE PROTECTION IS SPECIFIED WHEN TYPE 5 PORTLAND CEMENT SHALL BE USED INSTEAD.
5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. CLEAR CONCRETE COVER SHALL BE 2.5 CM.
7. ALL EXPOSED CORNERS SHALL HAVE 2 CM. CHAMFERS UNLESS OTHER WISE INDICATED.
8. RAILING POST SPACINGS FOR ALL TYPES OF RAILING ARE AS SHOWN IN THE TABLE ABOVE.
9. IN SOME CASE, TRAFFIC RAILING TYPE 1 MAY BE SUBSTITUTED BY GUARD RAILS FASTENED ON CONCRETE RAILING POSTS IF APPROVED BY THE ENGINEER.
10. DIAMETERS OF GALVANIZED STEEL PIPES SHOWN ARE NOMINAL DIAMETERS.
11. ALL STRUCTURAL STEEL FOR RAILING POSTS, RAILINGS AND ALL ACCESSORIES SHALL BE GALVANIZED WITH MINIMUM OF 376 G/M^2 (1.25 OUNCE/FT^2). THE FABRICATOR SHALL SUBMIT THE SAMPLES FOR TESTING AS FOLLOWS,

QUANTITY OF PRODUCT			NUMBER OF SAMPLES
LESS THAN		500	2
500	-	820	3
820	-	1,200	4
1,200	-	1,600	5
1,600	-	2,000	6

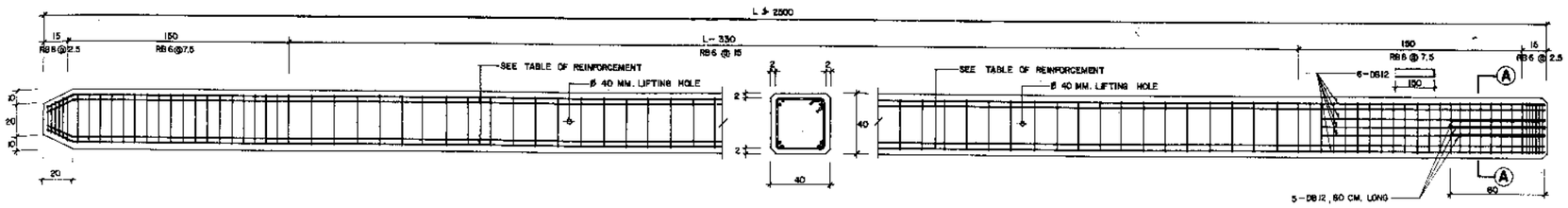
12. AT RAILING JOINT, A PIECE OF PIPE OF 60CM. LONG HAVING AN OUTER DIAMETER SLIGHTLY SMALLER THAN THE INNER DIAMETER OF THE RAILING PIPES SHALL BE INSERTED AND FASTENED TO BOTH RAILING PIPES BY 2 - Ø10MM SET SCREWS AT 0.5 M. FROM EACH SIDE OF THE JOINT.
13. EXPANSION JOINTS SHALL BE PROVIDED FOR STEEL PIPE RAILING AT THE INTERVAL NOT MORE THAN 15.0 M. BOTH ENDS OF THE RAILING PIPES SHALL BE CLOSED BY WELDING TO THE PIPES A CIRCULAR PLATE HAVING THE SAME SIZE AND THICKNESS OF THE PIPE.
14. QUANTITIES OF REBARS SHOWN ARE FOR RAILING AND POSTS ONLY. QUANTITIES OF REBARS IN SIDEWALKS AND CURBS ARE SHOWN ON SLAB BRIDGE DRAWINGS IN CONSTRUCTION OF BRIDGE DECK AND SIDEWALKS. DOWELS FOR RAILING POST SHALL BE PROVIDED IN ACCORDANCE WITH THIS DRAWING.
15. WELDED JOINTS OF PEDESTRIAN RAILING POSTS SHALL BE PAINTED BY 2 LAYERS OF ALUMINUM PAINT
16. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
17. PAINTING AT THE END FACES OF RAILING POSTS AND SIDEWALKS WHICH EXPOSED TO TRAFFIC (IF ANY) SHALL BE PROVIDED BY APPLYING ALTERNATE STRIPES OF BLACK AND WHITE COLOUR OF .10 M. WIDE EACH AND 45 TO THE HORIZONTAL PLANE. WHITE PAINT SHALL BE LIGHT REFLECTED ONE DETAILS OF THE PAINTING ARE SHOWN ON DWG NO. ST.-01 OR ST-26.
18. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3AD5-106-14/26.

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

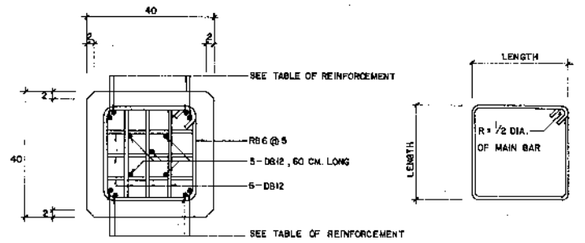
STANDARD DRAWING

RAILING POST AND RAILING DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. MS-01
		SHEET NO. 181

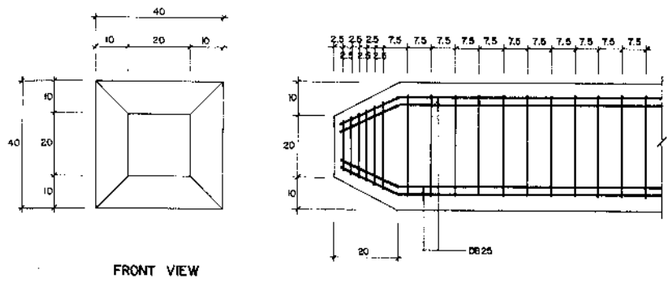


REINFORCEMENT DETAILS
SCALE 1 : 20



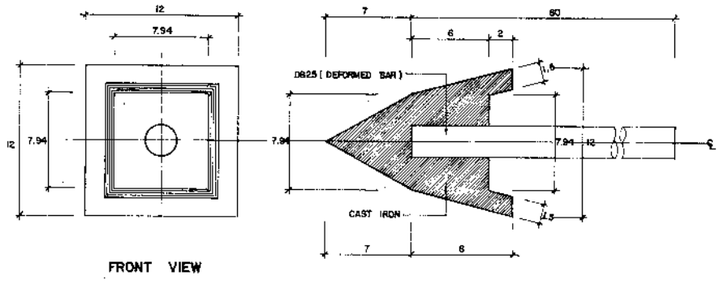
SECTION A – A
SCALE 1 : 10

STIRRUP DETAIL
NOT TO SCALE



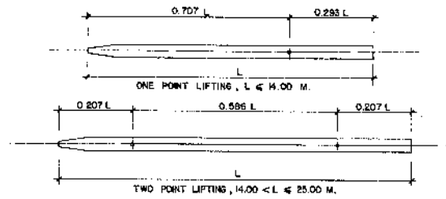
FRONT VIEW

PILE TIP TYPE A
SCALE 1 : 10



FRONT VIEW

PILE TIP TYPE B
SCALE 1 : 2.5



PILE LIFTING LOCATIONS
NOT TO SCALE

TABLE OF REINFORCEMENT

LENGTH OF PILE (L)	REINFORCEMENT
NOT MORE THAN 19 M.	4–ø 28 MM. OR 8–ø 20 MM.
MORE THAN 19.00 M. BUT NOT MORE THAN 25.00 M.	8–ø 25 MM.

TABLE OF APPROXIMATE ULTIMATE CAPACITY (R) 40 x 40 CM. PILE IN TONS DRIVEN BY DROP HAMMER WITH FRICTION WINCH , HAMMER WEIGHT (W) OF 3.5 , 4.0 AND 4.5 TONS , DROP HEIGHT (h) OF 100, 120 AND 150 CM. WITH APPROPRIATE CUSHION OF 5 CM. THICK ON THE TOP OF PILE HEAD , IN ACCORDANCE WITH AVERAGE PILE PENETRATION (S) FOR THE LAST FIVE BLOWS .

LENGTH OF PILE (L) M.	APPROX. WEIGHT OF PILE (P) TONS	3.5 – TON DROP HAMMER (W) WITH FRICTION WINCH																											
		PENETRATION (S) – CM.																											
		1.5			1.0			0.7			0.5			0.4			0.3			0.2			0.1			0.05		
		HAMMER DROP HEIGHT (H) – CM.																											
		100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150
6	2.304	85	99	120	108	125	148	127	146	171	143	162	188	152	172	198	162	182	209	173	193	220	184	204	232	190	210	238
7	2.688	80	94	115	102	118	141	121	138	162	136	154	179	145	163	189	154	173	199	164	183	209	175	195	221	181	200	227
8	3.072	76	89	108	97	113	134	115	132	154	130	147	171	138	156	180	147	165	190	157	175	200	168	186	211	173	192	217
9	3.456	73	85	103	93	107	128	110	126	148	124	141	163	132	149	172	141	158	181	150	168	191	160	178	202	166	184	208
10	3.840	69	81	98	89	103	122	105	120	141	119	135	157	127	143	165	135	151	174	144	161	184	154	171	194	159	176	198
11	4.224	66	78	94	85	99	117	101	116	136	114	129	150	122	137	159	130	146	167	138	155	177	148	164	186	153	169	192
12	4.608	64	75	90	82	95	113	97	111	131	110	124	145	117	132	153	125	140	161	133	149	170	143	158	180	147	163	185
13	4.992	61	72	87	79	91	109	94	107	126	106	120	140	113	127	147	120	135	155	129	144	164	138	153	173	142	158	178
14	5.376	59	69	84	75	88	105	90	103	121	102	116	135	109	123	142	116	131	150	124	139	159	133	148	168	138	152	172
15	5.760	57	67	81	73	85	101	87	100	117	99	112	130	105	119	137	112	126	145	120	134	153	129	143	162	133	147	167
16	6.144	55	65	78	71	82	98	84	97	114	96	108	126	102	115	133	109	122	141	116	130	149	125	138	157	129	143	162
17	6.528	53	63	76	69	80	95	82	94	110	93	105	122	99	112	129	106	119	135	113	126	144	121	134	152	125	139	157
18	6.912	52	61	73	67	77	92	79	91	107	90	102	119	96	108	125	102	115	132	110	123	140	117	130	148	122	135	152
19	7.296	50	58	71	65	75	89	77	88	104	87	99	115	93	105	122	100	112	129	107	119	136	114	127	144	118	131	148
20	7.680	49	57	69	63	73	87	75	86	101	85	96	112	91	102	118	97	109	125	104	116	132	111	123	140	115	127	144
21	8.064	47	56	67	61	71	85	73	84	98	83	94	109	88	100	115	94	106	122	101	113	129	108	120	137	112	124	140
22	8.448	46	54	66	60	69	82	71	81	95	81	91	106	86	97	112	92	103	119	98	110	126	105	117	133	109	121	137

LENGTH OF PILE (L) M.	APPROX. WEIGHT OF PILE (P) TONS	4.0 – TON DROP HAMMER (W) WITH FRICTION WINCH																											
		PENETRATION (S) – CM.																											
		1.5			1.0			0.7			0.5			0.4			0.3			0.2			0.1			0.05		
		HAMMER DROP HEIGHT (H) – CM.																											
		100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150
6	2.304	99	115	139	125	143	170	145	166	193	162	183	212	171	193	222	182	203	233	192	214	244	204	226	256	210	232	262
7	2.688	94	110	132	118	136	161	138	158	184	154	175	202	163	184	212	173	194	222	184	205	233	195	216	245	201	222	251
8	3.072	90	104	125	113	130	154	132	151	176	148	167	193	156	176	203	166	185	212	176	196	223	186	207	234	192	212	240
9	3.456	86	100	120	108	125	147	127	144	169	141	160	185	150	169	194	159	176	204	168	188	214	179	198	225	184	204	230
10	3.840	82	96	115	104	119	141	121	138	162	136	153	178	144	162	187	153	171	196	162	180	206	172	191	216	177	196	221
11	4.224	79	92	111	100	115	136	117	133	156	131	148	171	138	156	179	147	164	188	156	174	198	166	184	208	171	189	213
12	4.608	76	88	106	96	111	131	112	128	150	126	142	165	133	150	173	141	159	182	150	168	191	160	177	201	165	182	206
13	4.992	73	85	103	92	107	126	108	124	145	121	137	159	129	146	167	137	153	175	145	162	184	154	171	194	159	176	199
14	5.376	70	82	99	89	103	122	105	120	140	117	133	154	124	140	162	132	148	170	140	156	178	149	166	188	154	170	192
15	5.760	68	79	96	86	100	118	101	116	135	114	128	149	120	135	156	128	143	164	136	152	173	145	160	182	149	165	186
16	6.144	66	77	93	84	96	114	96	112	131	110	125	144	117	131	152	124	139	159	132	147	168	140	155	176	145	160	181
17	6.528	64	75	90	81	94	111	93	109	127	107	121	140	113	128	147	120	135	155	128	143	163	136	151	171	140	155	176
18	6.912	62	72	87	79	91	108	92	106	124	104	117	136	110	124	143	117	131	150	124	139	158	132	147	166	136	151	171
19	7.296	60	70	85	76	88	105	90	103	120	101	114	132	107	121	139	114	127	146	121	135	154	129	143	162	133	147	166
20	7.680	59	68	82	74	86	102	87	100	117	98	111	129	104	117	135	111	124	142	118	131	150	125	139	158	129	143	162
21	8.064	57	67	80	72	84	99	85	97	114	95	108	126	101	114	132	108	121	139	115	128	146	122	135	154	126	139	158
22	8.448	56	65	78	71	82	97	83	95	111	93	106	122	99	111	129	105	118	135	112	125	142	119	132	150	123	136	154

LENGTH OF PILE (L) M.	APPROX. WEIGHT OF PILE (P) TONS	4.5 – TON DROP HAMMER (W) WITH FRICTION WINCH																											
		PENETRATION (S) – CM.																											
		1.5			1.0			0.7			0.5			0.4			0.3			0.2			0.1			0.05		
		HAMMER DROP HEIGHT (H) – CM.																											
		100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150	100	120	150
6	2.304	113	131	157	140	161	190	152	184	215	180	203	234	190	213	244	200	223	255	211	235	267	223	247	279	229	253	285
7	2.688	107	125	150	134	154	181	155	176	205	172	194	224	181	203	234	191	214	244	202	224	255	213	236	267	219	242	273
8	3.072	103	120	143	128	147	174	148	169	197	165	186	214	174	195	224	183	205	234	193	215	245	204	226	256	210	232	262
9	3.456	98	115	137	123	141	167	142	162	189	158	178	208	167	187	215	176	197	225	186	207	235	196	218	246	202	223	252
10	3.840	94	110	132	118	136	160	137	158	182	152	171	198	160	180	207	169	189	216	179	199	227	189	208	237	194	215	243
11	4.224	91	106	127	114	131	154	132	150	175	146	165	191	154	174	200	163	182	209	172	192	216	182	202	229	187	207	234
12	4.608	88	102	122	110	126	149	127	145	169	141	158	184	149	167	193	157	176	201	168	185	211	176	195	221	181	200	226
13	4.992	85	98	118	106	122	144	123	140	163	137	154	178	144	162	186	152	170	195	161	179	204	170	189	214	175	194	218
14	5.376	82	95	114	102	118	139	119	135	158	132	149	172	139	157	180	147	165	189	156	173	197	165	183	207	170	187	212
15	5.760	79	92	111	99	114	135	115	131	153	128	144	167	135	152	175	145	160	183	151	168	191	160	177	200	164	182	205
16	6.144	77	89	107	96	110	130	112	127	148	124	140	162	131	147	169	139	155	177	147	163	186	155	172	195	160	176	199
17	6.528	74	87	104	93	107	127	108	123	144	121	136	157	127	143	165	135	151	172	142	158	180	151	167	189	155	171	193
18	6.912	72	84	101	91	104	123	105	120	140	117	132	153	124	139	160	131	146	168	138	154	175	146	162	184	151	167	188
19	7.296	70	82	98	88	101	120	103	117	136	114	129	149	120	135	156	127	142	163	135	150	171	143	158	179	147	162	183
20	7.680	68	80	96	86	98	117	100	114	133	111	125	145	117	132	152	124	139	159	131	146	166	139	154	174	143	158	178
21	8.064	67	78	93	84	96	114	97	111	129	108	122	141	114	129	148	121	135	155	128	142	162	135	150	170	139	154	174
22	8.448	65	76	91	82	94	111	95	109	126	106	119	138	112	125	144	118	132	151	125	139	158	132	146	166	136	150	170

NOTES :

1. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG./M.^{3} AND A MINIMUM 28–DAY 0.15 M.– CUBE STRENGTH OF 300 KG./CM.^{2} CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT. A SUGGESTED APPROXIMATE MIX DESIGN PER CUBIC METER IS AS FOLLOWS.

PORTLAND CEMENT	350	KG.
SAND	0.43	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
CONCRETE SLUMP , MAX.	10	CM.

2. REBAR ø 12 MM. OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BAR , OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
3. IN CASE OF SALINE PROTECTION , HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SPECIFICATIONS SHALL BE USED INSTEAD OF PORTLAND CEMENT TYPE I .
4. CLEAR CONCRETE COVER SHALL BE 5 CM.
5. WEIGHT OF DROP HAMMER SHALL NOT BE LESS THAN HALF THE WEIGHT OF THE PILE , NOT BE LESS THAN 3.5 TONS.
6. FOLLOWER SHALL NOT BE USED UNLESS IT IS NECESSARY AND AN APPROVAL OF THE ENGINEER IS GIVEN. IN SUCH CASES, ITEM 7 BELOW SHALL BE FOLLOWED.
7. PILE LOAD TESTS MAY BE NEEDED UNDER THE JUDGMENT OF THE ENGINEER . TESTING PROCEDURE AND CRITERIA SHALL BE ACCORDANCE WITH THE DOH SPECIFICATIONS..
8. SHOP DRAWING SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL FOR PILES LONGER THAN OR DIFFER FROM THOSE SHOWN ON THIS DRAWING .
9. TYPE A OR TYPE B PILE TIPS SHALL BE USED UNDER THE APPROVAL OF THE ENGINEER.
10. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
11. ALL PILE ULTIMATE CAPACITIES SHOWN IN THIS DRAWING ARE DERIVED FROM HILEY'S FORMULA.

$$R = \frac{nWhE}{S + \frac{C}{2}}$$

WHERE R,W,h AND S ARE AS STATED IN THE TABLES .

- n = EFFICIENCY FACTOR = $\frac{W + e^2 P}{W + P}$
- P = WEIGHT OF THE PILE IN TONS .
- e = COEFFICIENT OF PILE HEAD AND CUSHION.
  - = 0.25 FOR CONCRETE PILE WITH JUTE MAT HEAD CUSHION.
- E = EQUIPMENT LOSS FACTOR = 0.75
- C = TEMPORARY COMPRESSION = $C_1 + C_2 + C_3$
- C_1 = PILE SHORTENING FOR PILE LENGTH OF L(M.) = $\frac{10^5 RL}{AEc}$ CM.
- C_2 = COMPRESSION IN PILE HEAD CUSHION = $9.018 \frac{R}{A}$ CM.
- C_3 = COMPRESSION IN THE SOIL UNDERNEATH AND SURROUNDING THE PILE = 0.25 CM.
- A = CROSS SECTIONAL AREA OF PILE IN CM.^{2}
- Ec = MODULAS OF ELASTICITY OF CONCRETE 230,500 KG./CM.^{2}

12. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 3R/1

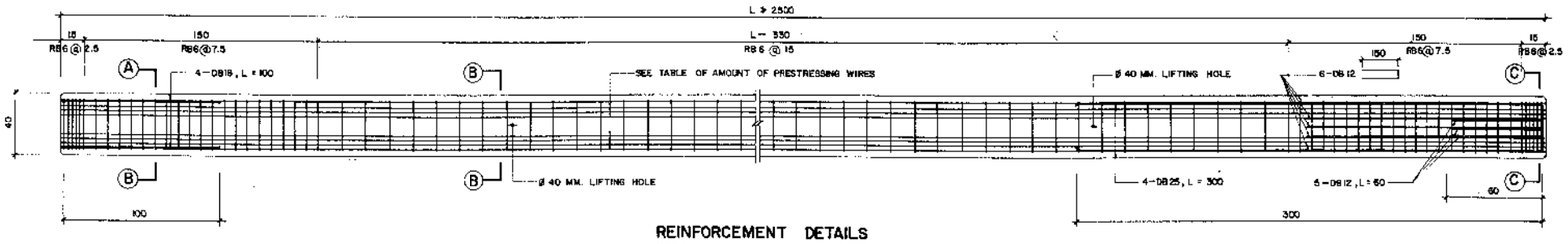
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

0.40 x 0.40 M. RC. PILE

PILE CAPACITY AND REINFORCEMENT DETAILS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. MS–02
		SHEET NO. 182

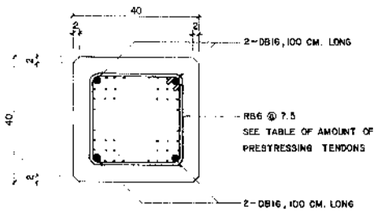


REINFORCEMENT DETAILS

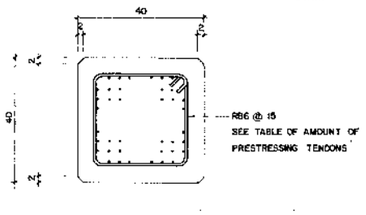
SCALE 1 : 20

TABLE OF AMOUNT PRESTRESSING TENDONS

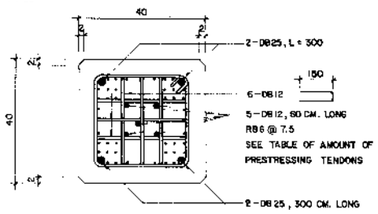
PRESTRESSING WIRES Ø 5 MM.	PRESTRESSING WIRES Ø 7 MM.	PRESTRESSING WIRES Ø 9.53 MM. (3/8")
40	24	16



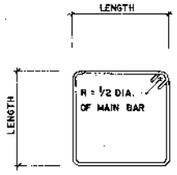
SECTION A – A
SCALE 1 : 10



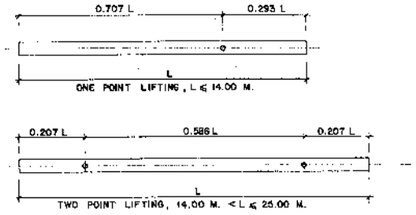
SECTION B – B
SCALE 1 : 10



SECTION C – C
SCALE 1 : 10



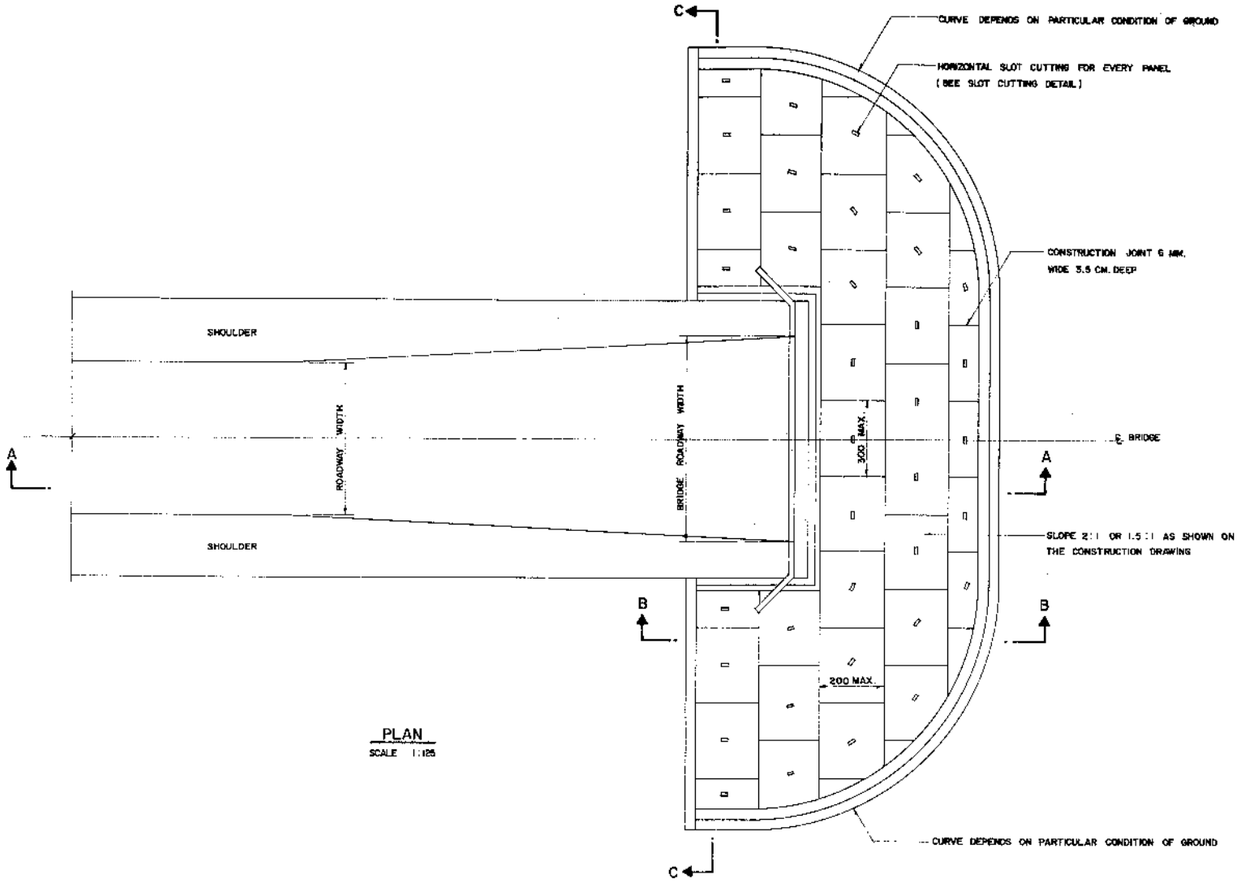
STIRRUP DETAIL
NOT TO SCALE



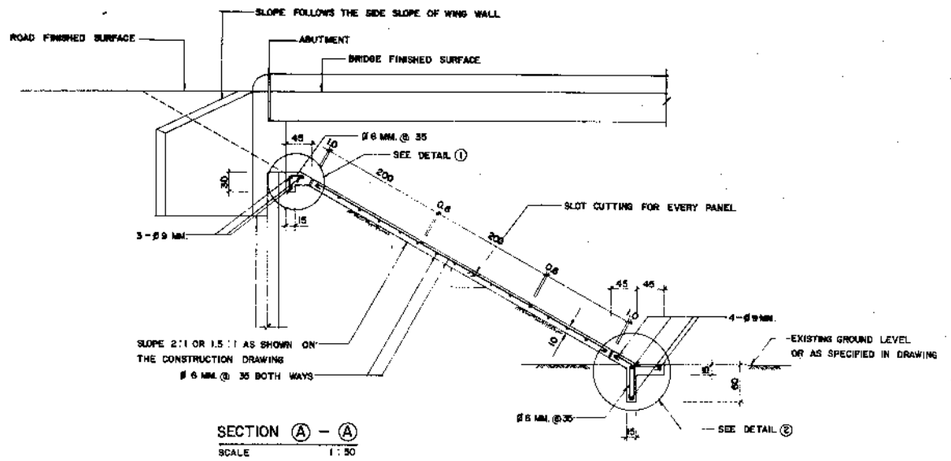
PILE LIFTING LOCATIONS
NOT TO SCALE

TABLE OF APPROXIMATE ULTIMATE CAPACITY (R) 40 x 40 CM. PILE IN TONS DRIVEN BY DROP HAMMER WITH FRICTION WINCH, HAMMER WEIGHT (W) OF 3.5, 4.0 AND 4.5 TONS, DROP HEIGHT (h) OF 100, 120 AND 150 CM. WITH APPROPRIATE CUSHION OF 5 CM. THICK ON THE TOP OF PILE HEAD, IN ACCORDANCE WITH AVERAGE PILE PENETRATION (S) FOR THE LAST FIVE BLOWS.

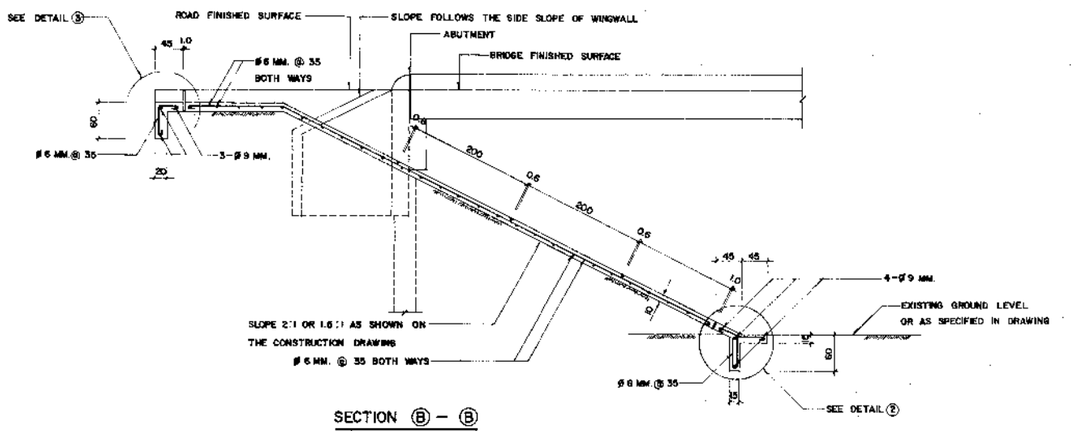
| LENGTH OF PILE (L) M. | APPROX. WEIGHT OF PILE (P) TONS | 3.5 – TON DROP HAMMER (W) WITH FRICTION WINCH | | |



PLAN
SCALE 1:125



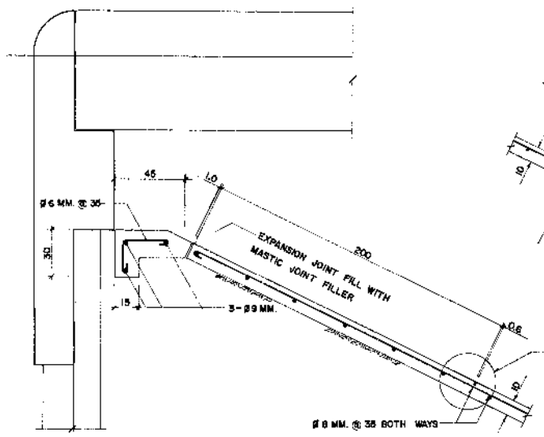
SECTION Ⓐ – Ⓐ
SCALE 1:50



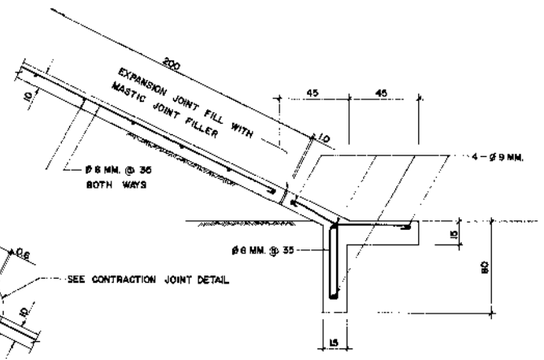
SECTION Ⓑ – Ⓑ
SCALE 1:50

NOTES :

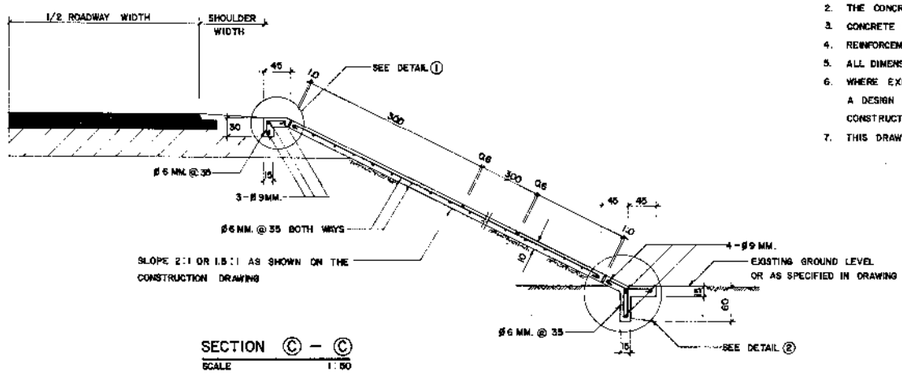
1. BEFORE POURING THE CONCRETE SLAB, THE EXISTING SLOPE SHALL BE WELL PREPARED AND COMPACTED TO MEET THE SIDE SLOPES OF THE ROADBED.
2. THE CONCRETE SLAB SHALL BE 10 CM. THICK.
3. CONCRETE SHALL BE CLASS "C"
4. REINFORCEMENT SHALL CONFORM TO THE TIS 20 GRADE SR 24.
5. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
6. WHERE EXISTING SOIL CONDITIONS ARE POOR OR WHERE ROADBED IS VERY HIGH, A DESIGN MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.
7. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. S2/10-19.



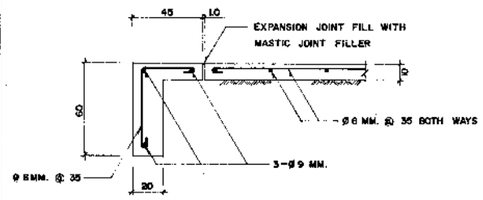
DETAIL ①
SCALE 1:20



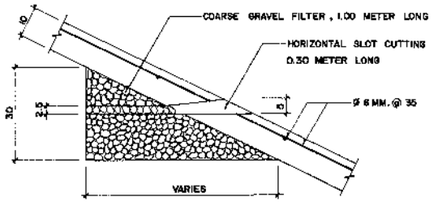
DETAIL ②
SCALE 1:20



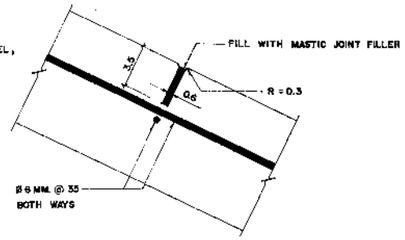
SECTION Ⓒ – Ⓒ
SCALE 1:50



DETAIL ③
SCALE 1:20



SLOT CUTTING DETAIL
SCALE 1:10



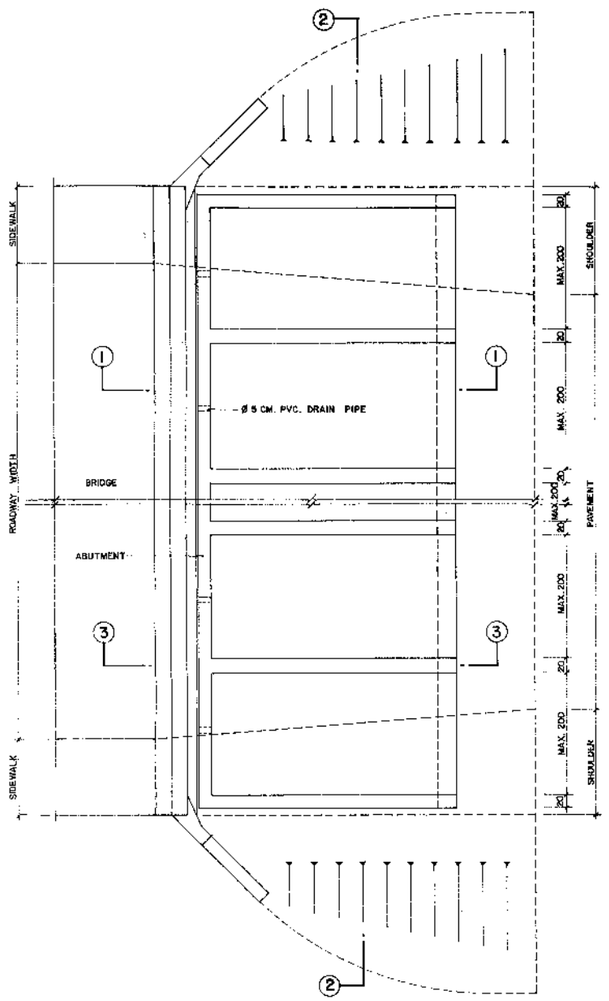
CONTRACTION JOINT DETAIL
SCALE 1:2.5

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

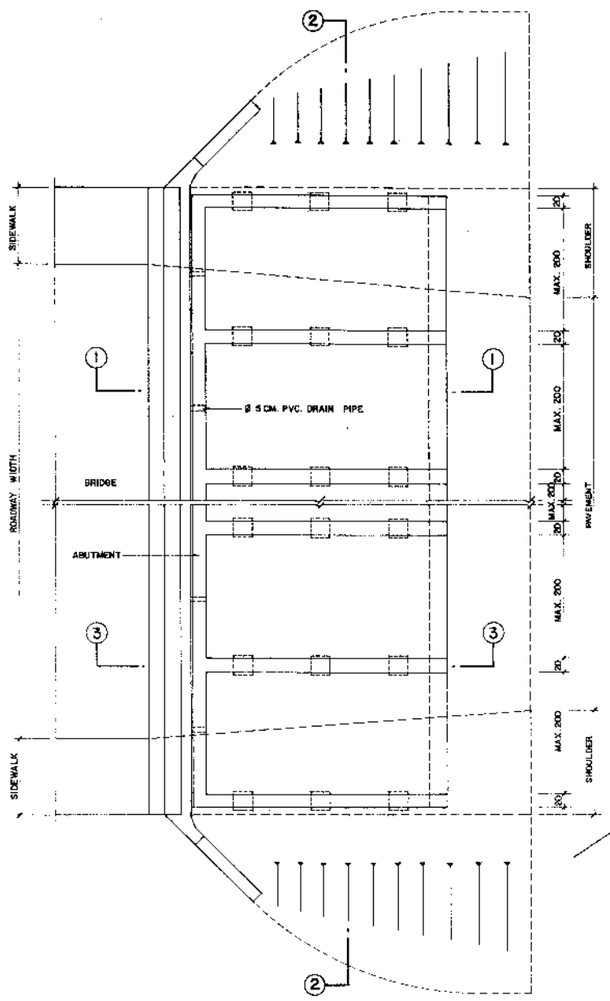
STANDARD DRAWING

CONCRETE SLOPE PROTECTION

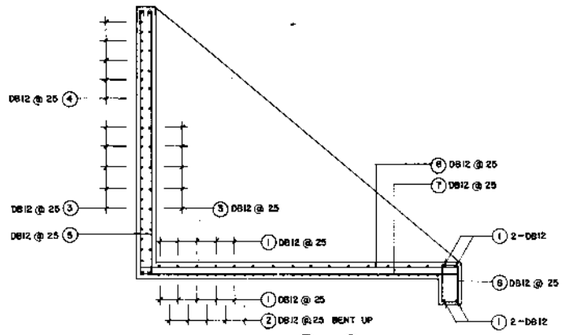
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Bumpap. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
		DWG. NO. MS-04
APPROVED : (DIRECTOR GENERAL)		SHEET NO. -184



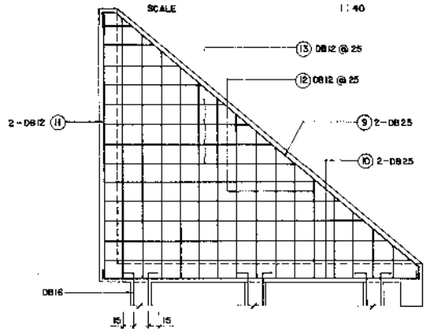
PLAN , ABUTMENT PROTECTOR TYPE (A)
SCALE 1 : 50



PLAN , ABUTMENT PROTECTOR TYPE (B)
SCALE 1 : 50



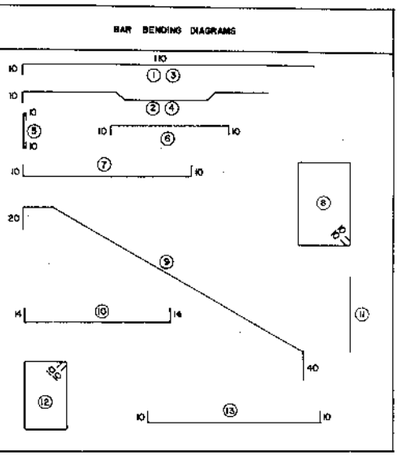
SECTION (1) – (1)
REINFORCEMENT DETAILS
SCALE 1 : 40

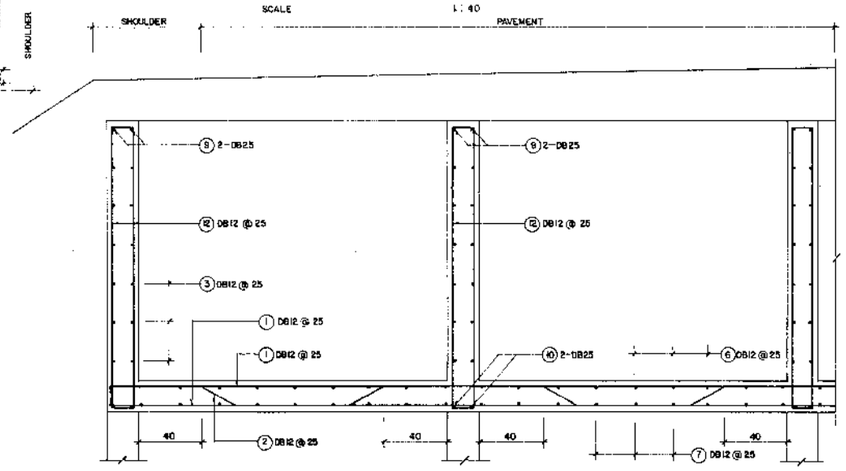


SECTION (1) – (1)
REINFORCEMENT DETAILS
SCALE 1 : 40

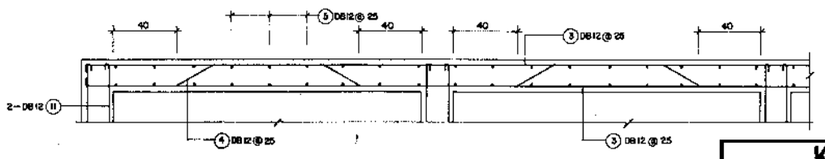
TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (MIN.)	BAR BENDING DIAGRAMS
(1)	DB 12	
(2)	DB 12	
(3)	DB 12	
(4)	DB 12	
(5)	DB 12	
(6)	DB 12	
(7)	DB 12	
(8)	DB 12	
(9)	DB 25	
(10)	DB 25	
(11)	DB 12	
(12)	DB 12	
(13)	DB 12	





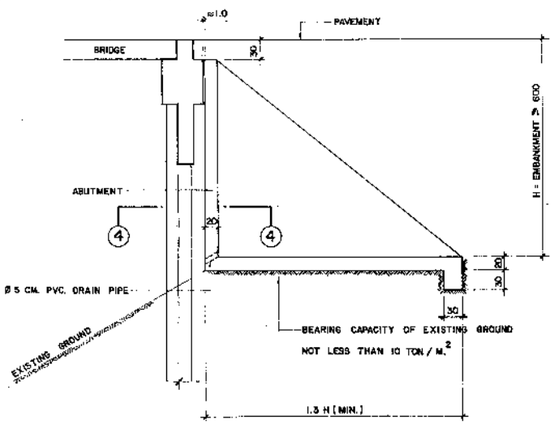
SECTION (2) – (2)
REINFORCEMENT DETAILS
SCALE 1 : 20



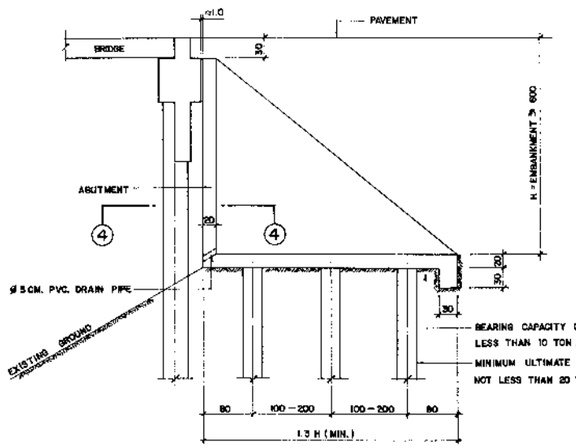
SECTION (4) – (4)
REINFORCEMENT DETAILS
SCALE 1 : 20

NOTES :

1. DEPTH OF FILL SHALL NOT EXCEED 0.60 M.
2. ALL EXPOSED CORNERS SHALL HAVE 1 CM. CHAMFER UNLESS OTHERWISE INDICATED.
3. REBARS Ø 12 MM. OR LARGER SHALL BE TIS 24 GRADE SD30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR24 PLAIN BARS UNLESS OTHERWISE INDICATED.
4. CONCRETE SHALL HAVE A MINIMUM CEMENT CONTENT OF 350 KG/M.^{3} AND A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KG./CM.^{2} FOR .15 x .15 x .15 M. CUBE AT 28 DAYS. CEMENT SHALL BE TIS 15 TYPE I PORTLAND CEMENT AND MAXIMUM SLUMP OF 10 CM
5. CLEAR CONCRETE COVER SHALL BE 5 CM.
6. IF THE DISTANCE BETWEEN PILES IS LESS THAN 100 CM., ONE ROW OF PILES SHALL BE REDUCED. SIMILARLY, IF THE DISTANCE BETWEEN PILES IS MORE THAN 200 CM., ONE ADDITIONAL ROW OF PILES SHALL BE INTRODUCED
7. ALL DIAMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
8. DB IS THE DIAMETER OF BARS IN MILLIMETERS.
9. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. AP – 2.



SECTION (1) – (1)
SCALE 1 : 50



SECTION (1) – (1)
SCALE 1 : 50

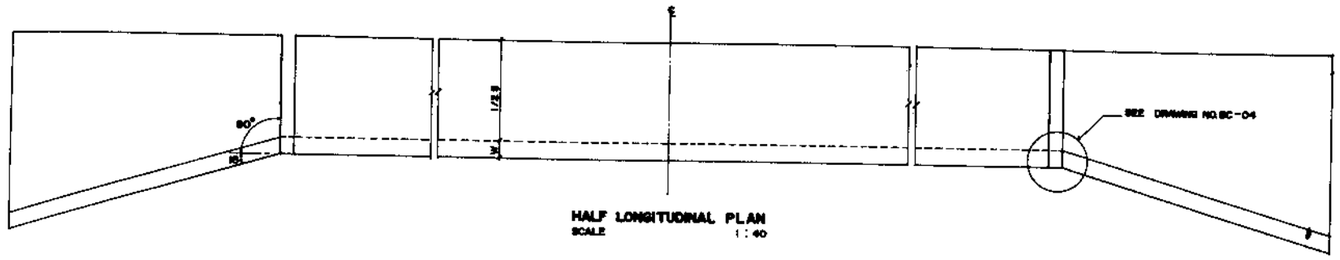
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

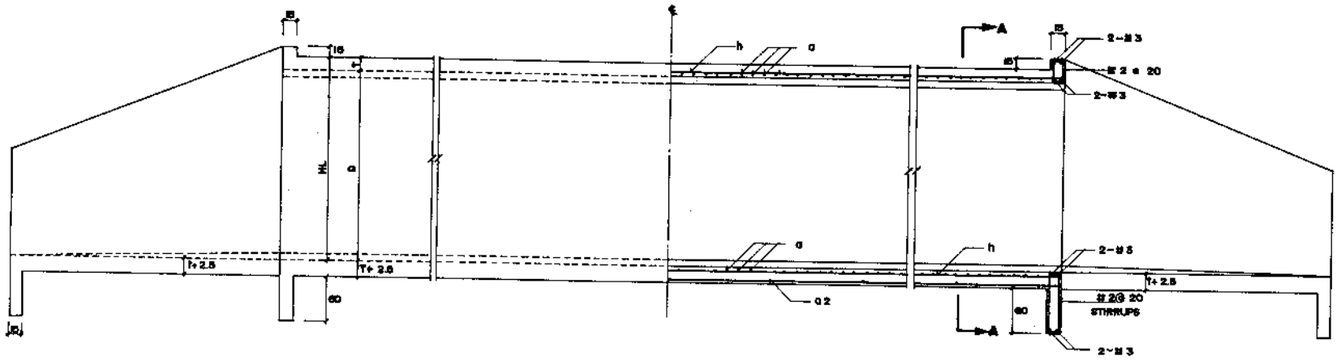
ABUTMENT PROTECTOR FOR EMBANKMENT ≥ 6.00 M.

PLAN, ELEVATION AND SECTIONS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : FOR (DIRECTOR GENERAL)		DWG. NO. MS - 11
		SHEET NO. 185

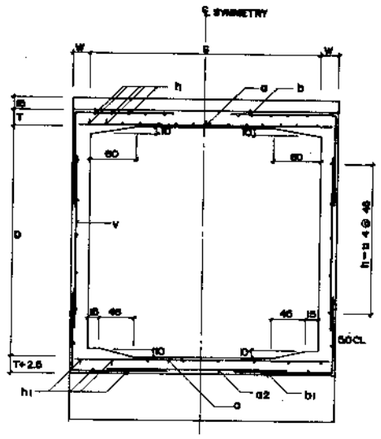


HALF LONGITUDINAL PLAN
SCALE 1 : 40

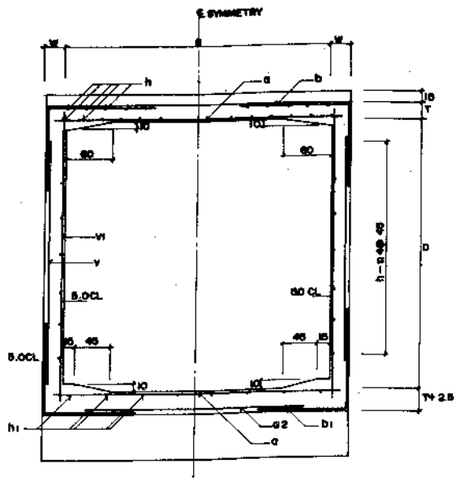


HALF LONGITUDINAL ELEVATION
SCALE 1 : 40

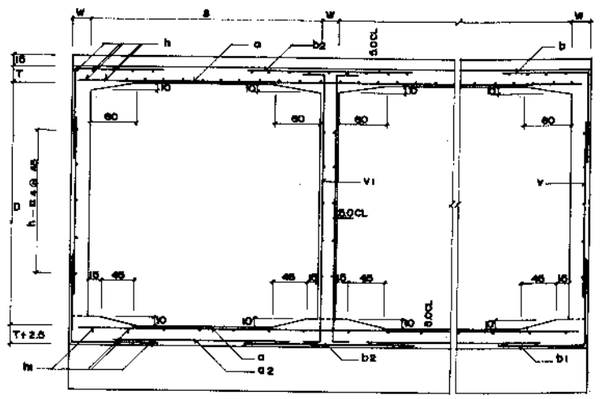
HALF LONGITUDINAL SECTION
SCALE 1 : 40



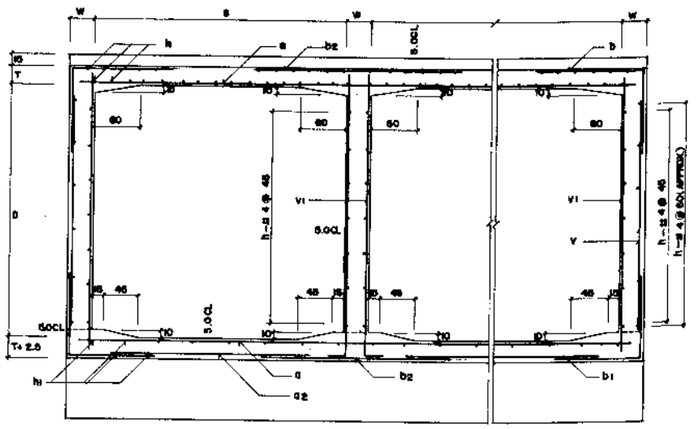
SINGLE BOX TYPE B
(FOR D > 245 CM. AND W < 30 CM.)



SINGLE BOX TYPE C
(FOR D > 245 CM. AND W ≥ 30 CM.)



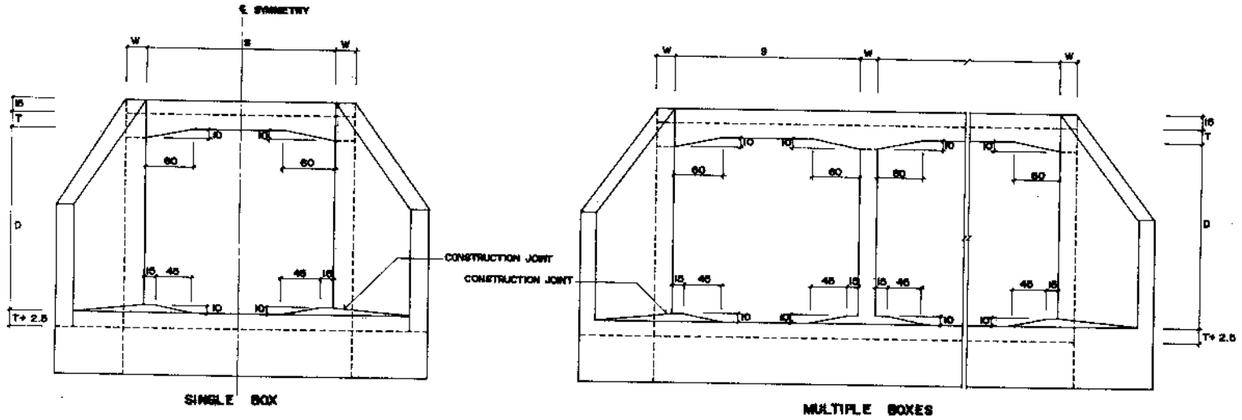
MULTIPLE BOXES TYPE B
(FOR D > 245 CM. AND W < 30 CM.)



MULTIPLE BOXES TYPE C
(FOR D > 245 CM. AND W ≥ 30 CM.)

NOTES :

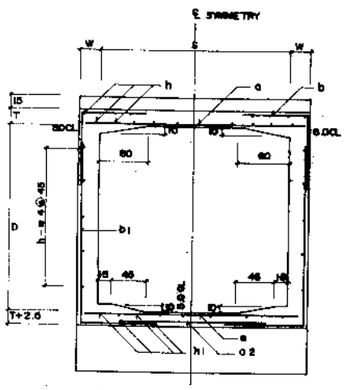
1. FOR GENERAL NOTES NOT MENTIONED IN THIS DRAWING SEE DWG. NO. BC-02
2. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE BOTTOM OF BOTTOM SLABS OR WALL WHERE CLEAR COVER OF 7.5 CM. SHALL BE PROVIDED
3. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
4. WORK THIS DRAWING WITH DWG. NOS. BC-02, BC-04
5. THIS DRAWING IS ADAPTED FROM DOH DRAWING NO. 78/7
6. THIS DRAWING SHALL BE USED FOR NEW CONSTRUCTION OF R.C. BOX CULVERT.



SINGLE BOX

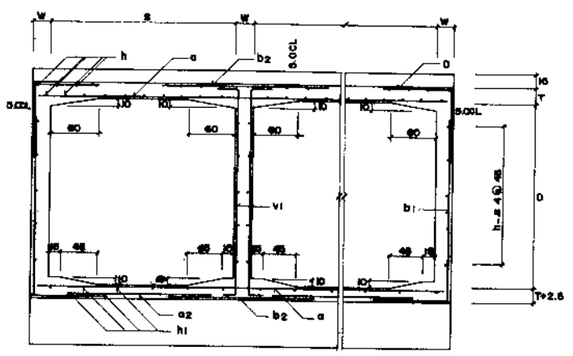
MULTIPLE BOXES

TRANSVERSE ELEVATION
SCALE 1 : 40



SINGLE BOX TYPE A
(FOR D ≤ 245 CM. AND W < 30 CM.)

SECTION A – A
SCALE 1:40



MULTIPLE BOXES TYPE A
(FOR D ≤ 245 CM. AND W < 30 CM.)

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

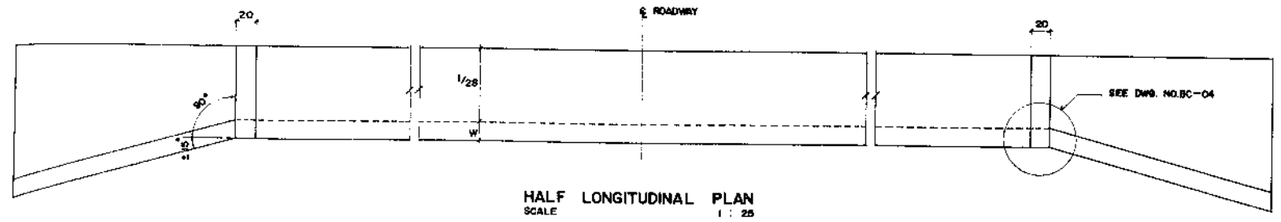
RIGID FRAME R.C BOX CULVERT

PLAN ELEVATIONS AND SECTIONS

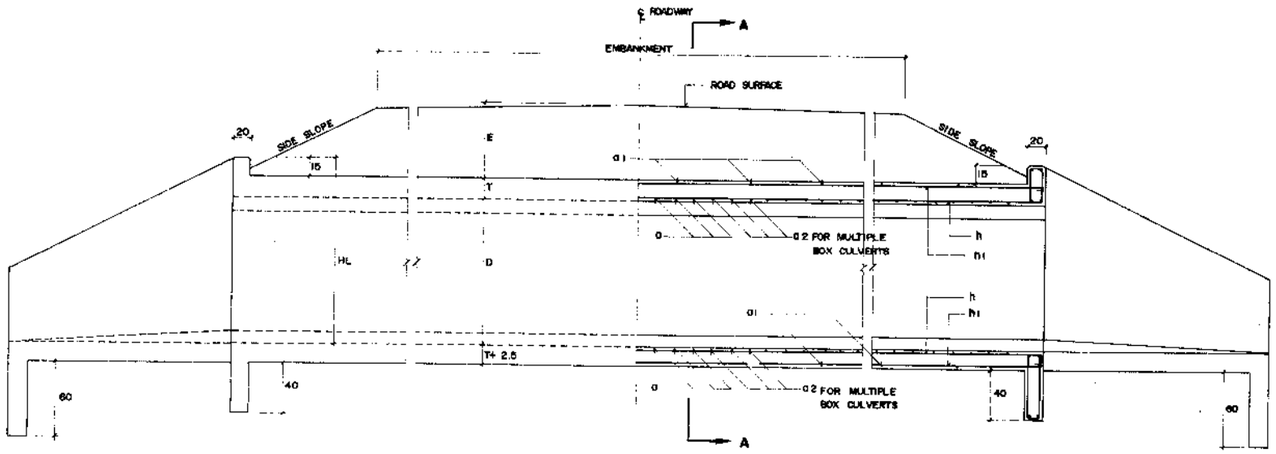
DESIGNED : DOH & CONSULTANT	CHECKED :	DATE JULY 1994
SUBMITTED : P. Buranagy. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : M.M. (DIRECTOR GENERAL)		DWG. NO. BC-01
		SHEET NO. 186

S	D	FILL HEIGHT CM.	T CM.	W CM.	BAR MARK a			BAR MARK a2			BAR MARK b&b1			BAR MARK b			BAR MARK b1			BAR MARK h			BAR MARK h1			BAR MARK v			BAR MARK v1			BAR MARK b2		
					#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	F CM.	G CM.	L CM.	G1 CM.	L CM.	#	@ CM.	NO	#	@ CM.	NO	#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	L CM.
CLEAR SPAN 180 CM.	210 CM.	0 - 30	24	25	5	14	270	4	±120	195	4	16.5	100	100	220	180	300	4	25	20	4	45	11	–	–	–	4	30	235	4	16.5	200
		31 - 60	21.5	25	5	16.5	270	4	±120	195	4	16.5	100	100	220	180	300	4	30	19	4	45	11	–	–	–	4	30	235	4	16.5	200
		61 - 150	20	25	5	20	270	4	±120	195	4	15	100	100	220	180	300	4	38	18	4	45	11	–	–	–	4	30	235	4	15	200
		151 - 225	20	25	5	17.5	270	4	±120	195	4	12.5	100	100	220	180	300	4	45	17	4	45	11	–	–	–	4	30	235	4	12.5	200
		226 - 300	21.5	25	5	16.5	270	4	±120	195	4	12.5	100	100	220	180	300	4	45	17	4	38	13	–	–	–	4	30	235	4	12.5	200
		301 - 375	22.5	25	5	14	270	4	±120	195	4	11.5	100	100	220	180	300	4	45	17	4	30	15	–	–	–	4	30	235	4	11.5	200
		376 - 450	24	25	6	17.5	275	4	±120	195	4	11	100	100	220	180	300	4	45	17	5	30	15	–	–	–	4	30	235	4	11	200
		451 - 600	27.5	25	6	15	275	4	±120	195	5	12.5	102.5	102.5	225	182.5	305	4	45	17	5	30	15	–	–	–	4	30	235	5	12.5	200
		601 - 750	31	25	6	13	275	4	±120	195	5	12.5	102.5	102.5	225	182.5	305	4	45	17	6	30	15	–	–	–	4	30	235	5	12.5	200
		751 - 900	36	25	6	13	275	4	±120	195	5	12.5	102.5	102.5	225	182.5	305	4	45	17	6	30	15	–	–	–	4	30	235	5	12.5	200
		901 - 1050	39	25	6	12	275	4	±120	195	5	12.5	102.5	102.5	225	182.5	305	4	45	17	6	30	15	–	–	–	4	30	235	5	12	200
		1051 - 1200	42	25	6	10	275	4	±120	195	5	12.5	102.5	102.5	225	182.5	305	4	45	17	6	30	15	–	–	–	4	30	235	5	12	200
		1201 - 1500	46	25	8	16.5	275	4	±120	195	5	12.5	102.5	102.5	225	182.5	305	4	45	17	8	30	15	–	–	–	4	30	235	5	12	200
		0 - 30	24	25	5	14	270	4	±120	195	4	16.5	100	100	220	210	330	4	25	22	4	45	11	–	–	–	4	30	265	4	16.5	200
		31 - 60	21.5	25	5	16.5	270	4	±120	195	4	16.5	100	100	220	210	330	4	30	21	4	45	11	–	–	–	4	30	265	4	16.5	200
		61 - 150	20	25	5	20	270	4	±120	195	4	15	100	100	220	210	330	4	38	20	4	45	11	–	–	–	4	30	265	4	15	200
		151 - 225	20	25	5	17.5	270	4	±120	195	4	12.5	100	100	220	210	330	4	45	19	4	45	11	–	–	–	4	30	265	4	12.5	200
		226 - 300	21.5	25	5	16.5	270	4	±120	195	4	12.5	100	100	220	210	330	4	45	19	4	38	13	–	–	–	4	30	265	4	12.5	200
		301 - 375	22.5	25	5	14	270	4	±120	195	4	11.5	100	100	220	210	330	4	45	19	4	30	15	–	–	–	4	30	265	4	11.5	200
		376 - 450	24	25	6	17.5	275	4	±120	195	4	11.5	100	100	220	210	330	4	45	19	5	30	15	–	–	–	4	30	265	4	11.5	200
		451 - 600	27.5	25	6	15	275	4	±120	195	5	12.5	102.5	102.5	225	212.5	335	4	45	19	5	30	15	–	–	–	4	30	265	5	12.5	200
		601 - 750	31	25	6	14	275	4	±120	195	5	12.5	102.5	102.5	225	212.5	335	4	45	19	6	30	15	–	–	–	4	30	265	5	12.5	200
		751 - 900	36	25	6	13	275	4	±120	195	5	12.5	102.5	102.5	225	212.5	335	4	45	19	6	30	15	–	–	–	4	30	265	5	12.5	200
		901 - 1050	39	25	6	12	275	4	±120	195	5	12.5	102.5	102.5	225	212.5	335	4	45	19	6	30	15	–	–	–	4	30	265	5	12	200
		1051 - 1200	42	25	6	10	275	4	±120	195	5	12.5	102.5	102.5	225	212.5	335	4	45	19	6	30	15	–	–	–	4	30	265	5	12	200
		1201 - 1500	46	25	8	16.5	275	4	±120	195	5	12.5	102.5	102.5	225	212.5	335	4	45	19	8	30	15	–	–	–	4	30	265	5	12	200
		0 - 30	24	25	5	12.5	300	4	±120	225	4	17.5	110	110	240	210	340	4	23	25	4	45	13	–	–	–	4	30	285	4	17.5	220
		31 - 60	22.5	25	5	15	300	4	±120	225	4	17.5	110	110	240	210	340	4	25	24	4	45	13	–	–	–	4	30	285	4	17.5	220
		61 - 150	22.5	25	5	17.5	300	4	±120	225	4	16.5	110	110	240	210	340	4	38	21	4	45	13	–	–	–	4	30	285	4	16.5	220
		151 - 225	22.5	25	5	15	300	4	±120	225	4	14	110	110	240	210	340	4	45	20	4	45	13	–	–	–	4	30	285	4	14	220
		226 - 300	22.5	25	6	19	305	4	±120	225	4	12.5	110	110	240	210	340	4	45	20	4	38	15	–	–	–	4	30	285	4	12.5	220
		301 - 375	25	25	6	16.5	305	4	±120	225	4	12.5	110	110	240	210	340	4	45	20	4	30	17	–	–	–	4	30	285	4	12.5	220
		376 - 450	26	25	6	15	305	4	±120	225	4	11	110	110	240	210	340	4	45	20	5	30	17	–	–	–	4	30	285	4	11	220
		451 - 600	30	25	6	12.5	305	4	±120	225	5	12.5	112.5	112.5	245	212.5	345	4	45	20	5	30	17	–	–	–	4	30	285	5	12.5	220
		601 - 750	34	25	6	11	305	4	±120	225	5	12.5	112.5	112.5	245	212.5	345	4	45	20	6	30	17	–	–	–	4	30	285	5	12.5	220
		751 - 900	38	25	6	10	305	4	±120	225	5	12.5	112.5	112.5	245	212.5	345	4	45	20	6	30	17	–	–	–	4	30	285	5	12	220
		901 - 1050	43	25	8	17	305	4	±120	225	5	12.5	112.5	112.5	245	212.5	345	4	45	20	6	30	17	–	–	–	4	30	285	5	12	220
		1051 - 1200	46	25	8	15	305	4	±120	225	5	12.5	112.5	112.5	245	212.5	345	4	45	20	8	30	17	–	–	–	4	30	285	5	12	220
		1201 - 1500	52	25	8	13	305	4	±120	225	5	12.5	112.5	112.5	245	212.5	345	4	45	20	8	30	17	–	–	–	4	30	285	5	12	220
		0 - 30	24	25	5	12.5	300	4	±120	225	4	16.5	110	110	240	240	370	4	23	25	4	45	13	–	–	–	4	30	295	4	16.5	220
		31 - 60	22.5	25	5	15	300	4	±120	225	4	16.5	110	110	240	240	370	4	25	24	4	45	13	–	–	–	4	30	295	4	16.5	220
		61 - 150	22.5	25	5	17.5	300	4	±120	225	4	15	110	110	240	240	370	4	38	21	4	45	13	–	–	–	4	30	295	4	15	220
		151 - 225	22.5	25	5	15	300	4	±120	225	4	12.5	110	110	240	240	370	4	45	20	4	45	13	–	–	–	4	30	295	4	12.5	220
		226 - 300	22.5	25	6	20	305	4	±120	225	4	12.5	110	110	240	240	370	4	45	20	4	38	15	–	–	–	4	30	295	4	12.5	220
		301 - 375	25	25	6	17.5	305	4	±120	225	4	12.5	110	110	240	240	370	4	45	20	4	30	17	–	–	–	4	30	295	4	12.5	220
		376 - 450	26	25	6	15	305	4	±120	225	4	11	110	110	240	240	370	4	45	20	5	30	17	–	–	–	4	30	295	4	11	220
		451 - 600	30	25	6	12.5	305	4	±120	225	5	12.5	112.5	112.5	245	242.5	375	4	45	20	5	30	17	–	–	–	4	30	295	5	12.5	220
		601 - 750	34	25	6	11	305	4	±120	225	5	12.5	112.5	112.5	245	242.5	375	4	45	20	6	30	17	–	–	–	4	30	295	5	12.5	220
		751 - 900	38	25	6	10	305	4	±120	225	5	12.5	112.5	112.5	245	242.5	375	4	45	20	6	30	17	–	–	–	4	30	295	5	12.5	220
		901 - 1050	43	25	8	17	305	4	±120	225	5	12.5	112.5	112.5	245	242.5	375	4	45	20	8	30	17	–	–	–	4	30	295	5	12	220
		1051 - 1200	46	25	8	15	305	4	±120	225	5	12.5	112.5	112.5	245	242.5	375	4	45	20	8	30	17	–	–	–	4	30	295	5	12	220
		1201 - 1500	52	25	8	13	305	4	±120	225	5	12.5	112.5	112.5	245	242.5	375	4	45	20	8	30	17	–	–	–	4	30	295	5	12	220
		0 - 30	24	25	6	19	335	4	±120	245	4	15	120	120	260	240	380	4	26	26	4	45	13	–	–	–	4	30	295	4	15	240
		31 - 60	24	25	6	20	335	4	±120	245	4	15	120	120	260	240	380	4	25	25	4	45	13	–	–	–	4	30	295	4	15	240
		61 - 150	24	25	6	17.5	335	4	±120	245	4	12.5	120	120	260	240	380	4	38	22	4	45	13	–	–	–	4	30	295	4	14	240
		151 - 225	24	25	6	16.5	335	4	±120	245	4	12.5	120	120	260	240	380	4	45	20	4	45	13	–	–	–	4	30	295	4	12.5	240
		226 - 300	25	25	6	16.5	335	4	±120	245	4	12.5	120	120	260	240	380	4	45	20	4	38	17	–	–	–	4	30	295	4	12.5	240
		301 - 375	27.5	25	6	15	335	4	±120	245	4	12.5	120	120	260	240	380	4	45	20	4	30	19	–	–	–	4	30	295	4	12.5	240
		376 - 450	30	25	6	12.5	335	4	±120	245	4	11	120	120	260	240	380	4	45	20	5	30	19	–	–	–	4	30	295	4	11	240
		451 - 600	32.5	25	6	10	335	4	±120	245	5	12.5	122.5	122.5	265	242.5	385	4	45	20	5	30	19	–	–	–	4	30	295	5	12.5	240
		601 - 750	37.5	25	8	17.5	340	4	±120	245	5	12.5	122.5	122.5	265	242.5	385	4	45	20	6	30	19	–	–	–	4	30	295	5	12.5	240
		751 - 900	43	27.5	8	16.5	340	4	±120	245	5	12.5	122.5	122.5	265	242.5	385	4	45	20	6	30	19	–	–	–	4	30	295	5	12.5	240
		901 - 1050	49	27.5	8	15.5	340	4	±120	245	5	12.5	122.5	122.5	265	242.5	385	4	45	20	8	30	19	–	–	–	4	30	295	5	12	240
		1051 - 1200	51	27.5	8	14	340	4	±120	245	5	12.5	122.5	122.5	265	242.5	385	4	45	20	8	30	19	–	–	–	4	30	295	5	12	240
		1201 - 1500	57	27.5	8	12	340	4	±120	245	5	12.5	122.5	122.5	265	242.5	385	4	45	20	8	30	19	–	–	–	4	30	295	5	12	240
		0 - 30	24	27.5	6	19	335	4	±120	245	4	15	120	120	260	120	260	4	23	28	4	45	13	4	30	260	4	30	325	4	15	240
		31 - 60	24	27.5	6	20	335	4	±120	245	4	15	120	120	260	120	260	4	25	27	4	45	13	4	30	260	4	30	325	4	15	240
		61 - 150	24	27.5	6	22.5	335	4	±120	245	4	15	120	120	260	120	260	4	38	24	4	45	13	4	30	260	4	30	325	4	15	240
		151 - 225	24	27.5	6	19	335	4	±120	245	4	15	122.5	122.5	265	122.5	265	4	45	22	4	45	13	4	30	260	4	30	325	4	15	240
		226 - 300	24	27.5	6	17.5	335	4	±120	245	4	15	122.5	122.5	265	122.5	265	4	45	22	4	38	17	4	30	260	4	30	325	4	15	240
		301 - 375	26.5	27.5	6	15	335	4	±120	245	4	15	122.5	122.5	265	122.5	265	4	45	22	4	30	19	4	30	260	4	30	325	4	15	240
		376 - 450	28	27.5	6	14	335	4	±120	245	5	14	122.5	122.5	265	122.5	265	4	45	22	5	30	19	4	28	260	4	30	325	5	14	240
		451 - 600	32.5	27.5	6	11	335	4	±120	245	5	12.5	122.5	122.5	265	122.5	265	4	45	22	5	30	19	4	25	260	4	30	325	5	12.5	240
		601 - 750	37.5	27.5	8	18	340	4	±120	245	5	12.5	122.5	122.5	265	122.5	265	4	45	22	6	30	19	4	25	260	4	30	325	5	12.5	240
		751 - 900	43	27.5	8	17.5	340	4	±120	245	5	12.5	122.5	122.5	265	122.5	265	4	45	22	6	30	19	4	25	260	4	30	325	5	12.5	240
		901 - 1050	49	27.5	8	15.5	340	4	±120	245	5	12.5	122.5	122.5	265	122.5	265	4	45	22	8	30	19	4	25	260	4	30	325	5	12	240
		1051 - 1200	51	27.5	8	14	340	4	±120	245	5	12.5	122.5	122.5	265	122.5	265	4	45	22	8	30	19	4	25	260	4	30	325	5	12	240
		1201 - 1500	57	27.5	8	12	340	4	±120	245	5	12.5	122.5	122.5	265	122.5	265	4	45	22	8	30	19	4	25	260	4	30	325	5	12	240

S	D	FILL HEIGHT CM.	T CM.	W CM.	BAR MARK a			BAR MARK a2			BAR MARK b&b1			BAR MARK b			BAR MARK b1			BAR MARK h			BAR MARK h1			BAR MARK v			BAR MARK v1			BAR MARK b2		
					#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	F CM.	G CM.	L CM.	G1 CM.	L CM.	#	@ CM.	NO	#	@ CM.	NO	#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	L CM.
CLEAR SPAN 270 CM.	300 CM.	0 - 30	25	30	6	17.5	365	4	±120	265	4	15	130	130	280	130	280	4	21.5	38	4	45	15	4	30	280	4	30	355	4	15	265
		31 - 60	25	30	6	20	365	4	±120	265	4	15	130	130	280	130	280	4	22.5	37	4	45	15	4	30	280	4	30	355	4	15	265
		61 - 150	25	30	6	21.5	365	4	±120	265	5	15	132.5	132.5	285	132.5	285	4	30	34	4	45	15	4	30	280	4	30	355	5	15	265
		151 - 225	25	30	6	17.5	365	4	±120	265	5	14	132.5	132.5	285	132.5	285	4	45	31	4	45	15	4	28	280	4	30	355	5	14	265
		226 - 300	26.5	30	6	16.5	365	4	±120	265	5	12.5	132.5	132.5	285	132.5	285	4	45	31	4	45	15	4	25	280	4	30	355	5	12.5	265
		301 - 375	27.5	30	6	13	370	4	±120	265	5	12.5	132.5	132.5	285	132.5	285	4	45	31	4	30	21	4	25	290	4	30	355	5	12.5	265
		376 - 450	30	30	6	12	370	4	±120	265	5	12.5	132.5	132.5	285	132.5	285	4	45	31	5	30	21	4	25	290	4	30	355	5	12.5	265
		451 - 600	35	30	6	16.5	375	4	±120	265	5	12.5	132.5	132.5	285	132.5	285	4	45	31	5	30	21	4	25	290	4	30	355	5	12.5	265
		601 - 750	41	30	6	16.5	375	4	±120	265	5	12.5	132.5	132.5	285	132.5	285	4	45	31	6	30	21	4	25	290	4	30	355	5	12.5	265
		751 - 900	47.5	30	6	15.5	375	4	±120	265	5	12.5	132.5	132.5	285	132.5	285	4	45	31	6	30	21	4	25	290	4	30	355	5	12.5	265
		901 - 1050	53	30	6	14	375	4	±120	265	5	12.5	132.5	132.5	285	132.5	285	4	45	31	6	30	21	4	25	290	4	30	355	5	12.5	265
		1051 - 1200	56	30	6	13	375	4	±120	265	5	12.5	132.5	132.5	285	132.5	285	4	45	31	8	30	21	4	25	290	4	30	355	5	12.5	265
		1201 - 1500	60	30	8	11	375	4	±120	265	5	11	132.5	132.5	285	132.5	285	4	45	31	8	30	21	4	25	290	4	30	355	5	12	265
		0 - 30	26.5	30	6	17.5	405	4	±120	295	4	12.5	140	140	300	140	300	4	22.5	38	4	45	17	4	25	295	4	30	355	4	12.5	285
		31 - 60	26.5	30	6	19	405	4	±120	295	4	12.5	140	140	300	140	300	4	25	37	4	45	17	4	25	295	4	30	355	4	12.5	285
		61 - 150	26.5	30	6	17.5	405	4	±120	295	5	16.5	142.5	142.5	305	142.5	305	4	38	33	4	45	17	4	33	295	4	30	355	5	16.5	285
		151 - 225	26.5	30	6	14.5	410	4	±120	295	5	12.5	142.5	142.5	305	142.5	305	4	45	32	4	45	17	4	25	295	4	30	355	5	12.5	285
		226 - 300	27.5	30	6	14	410	4	±120	295	5	12.5	142.5	142.5	305	142.5	305	4	45	32	4	38	18	4	25	295	4	30	355	5	12.5	285
		301 - 375	30	30	6	12	410	4	±120	295	5	12.5	142.5	142.5	305	142.5	305	4	45	32	4	30	23	4	25	295	4	30	355	5	12.5	285
		376 - 450	34	30	6	11	410	4	±120	295	5	12.5	142.5	142.5	305	142.5	305	4	45	32	5	30	23	4	25	295	4	30	355	5	12.5	285
		451 - 600	37.5	30	6	16	415	4	±120	295	5	12.5	142.5	142.5	305	142.5	305	4	45	32	5	30	23	4	25	295	4	30	355	5	12.5	285
		601 - 750	44	30	6	14.5	415	4	±120	295	5	12.5	142.5	142.5	305	142.5	305	4	45	32	6	30	23	4	25	295	4	30	355	5	12.5	285
		751 - 900	51	30	8	13.5	415	4	±120	295	5	12.5	142.5	142.5	305	142.5	305	4	45	32	6	30	23	4	25	295	4	30	355	5	12.5	285
		901 - 1050	55	30	8	13	415	4	±120	295	5	11	142.5	142.5	305	142.5	305	4	45	32	6	30	23	4	25	295	4	30	355	5	12	285
		1051 - 1200	58	30	8	12	415	4	±120	295	5	11	142.5	142.5	305	142.5	305	4	45	32	8	30	23	4	25	295	4	30	355	5	12	285
		1201 - 1500	63	30	8	10	415	4	±120	295	5	11	142.5	142.5	305	142.5	305	4	45	32	8	30	23	4	25	295	4	30	355	5	12	285
		0 - 30	26.5	32.5	6	17.5	405	4	±120	295	4	12.5	140	140	300	140	300	4	22.5	41	4	45	17	4	25	325	4	30	385	4	12.5	285
		31 - 60	26.5	32.5	6	19	405	4	±120	295	4	12.5	140	140	300	140	300	4	25	39	4	45	17	4	25	325	4	30	386	4	12.5	285
		61 - 150	26.5	32.5	6	19	405	4	±120	295	5	15	142.5	142.5	305	142.5	305	4	38	35	4	45	17	4	30	325	4	30	386	5	15	285
		151 - 225	26.5	32.5	6	16	410	4	±120	295	5	11	142.5	142.5	305	142.5	305	4	45	34	4	45	17	4	22	325	4	30	385	5	11	285
		226 - 300	27.5	32.5	6	14.5	410	4	±120	295	5	11	142.5	142.5	305	142.5	305	4	45	34	4	38	19	4	22	325	4	30	385	5	11	285
		301 - 375	30	32.5	6	13	410	4	±120	295	5	11	142.5	142.5	305	142.5	305	4	45	34	4	30	23	4	22	325	4	30	385	5	11	285
		376 - 450	32.5	32.5	6	11	410	4	±120	295	5	11	142.5	142.5	305	142.5

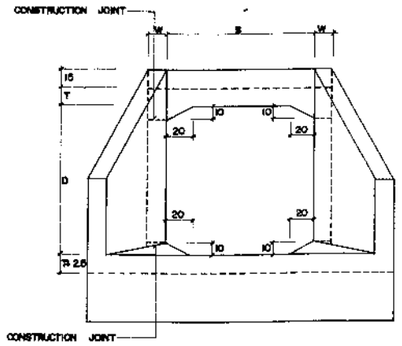


HALF LONGITUDINAL PLAN
SCALE 1 : 25



HALF LONGITUDINAL ELEVATION
SCALE 1 : 25

HALF LONGITUDINAL SECTION
SCALE 1 : 25



ELEVATION
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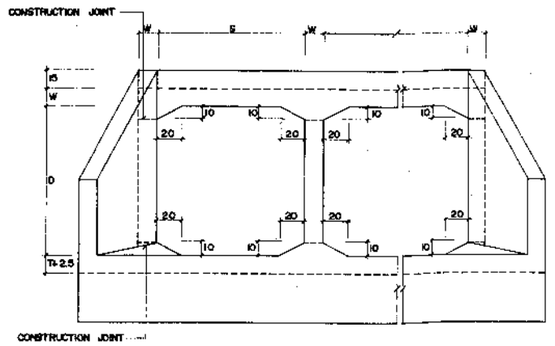
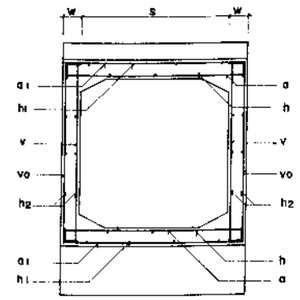
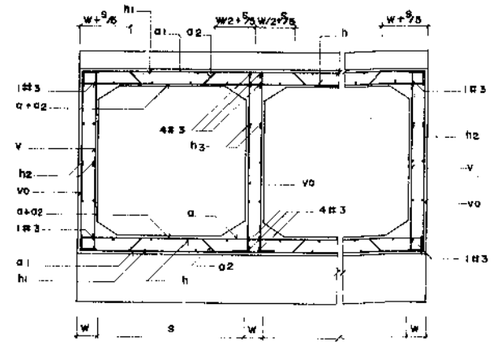


ELEVATION
SCALE 1 : 25



SECTION A-A
SCALE 1 : 25

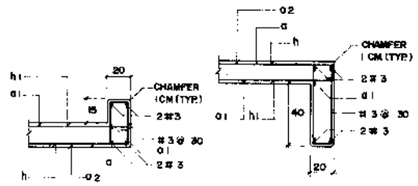


SECTION A A
SCALE 1 : 25

TABLE OF TOP AND BOTTOM SLAB REINFORCEMENTS

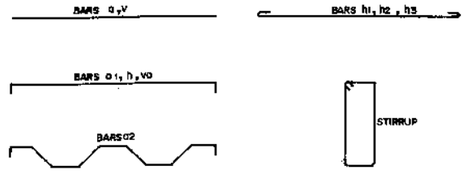
CLEAR SPAN	DEPTH OF FILL, E CM.	T CM.	SINGLE BOX CULVERT a			a1			h			h1			MULTIPLE BOX CULVERT a		a1		a2		h		h1	
			#	@	L	#	@	L	#	@	NO.	#	@	NO.	#	@	#	@	#	@	#	@	#	@
60 CM.	0 – 30	20	5	16	113	3	45	113	4	30	8	3	45	6	5	32	3	45	5	32	4	30	3	45
	31 – 60	20	4	22	113	3	60	113	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45
	61 – 150	20	4	22	113	3	60	113	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45
	151 – 225	20	4	22	113	3	60	113	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45
90 CM.	0 – 30	22.5	5	16	143	3	45	143	4	25	12	3	40	8	5	30	3	45	5	30	4	25	3	40
	31 – 60	20	4	16	143	3	60	143	4	40	8	3	40	8	4	30	3	60	4	30	4	40	3	40
	61 – 150	20	4	22	143	3	60	143	4	40	8	3	40	8	4	44	3	60	4	44	4	40	3	40
	151 – 225	20	4	22	143	3	60	143	4	40	8	3	40	8	4	44	3	60	4	44	4	40	3	40
120 CM.	0 – 30	22.5	5	18	173	3	45	173	4	25	14	3	36	10	5	26	3	45	5	26	4	25	3	40
	31 – 60	20	5	16	173	3	60	173	4	30	12	3	36	10	5	32	3	60	5	32	4	30	3	40
	61 – 150	20	4	15	173	3	60	173	4	36	10	3	36	10	4	30	3	60	4	30	4	40	3	40
	151 – 226	20	4	15	173	3	60	173	4	36	10	3	36	10	4	30	3	60	4	30	4	40	3	40
150 CM.	0 – 30	24	6	18	210	3	45	210	4	25	16	3	45	10	6	36	3	45	6	30	4	25	3	45
	31 – 60	22.5	6	22	210	3	60	210	4	30	14	3	45	10	6	44	3	60	6	44	4	30	3	45
	61 – 150	20	5	16	203	3	60	203	4	45	10	3	45	10	5	32	3	60	5	32	4	45	3	45
	151 – 226	22.5	5	16	203	3	60	203	4	45	10	3	46	10	5	32	3	60	5	32	4	45	3	46
180 CM.	0 – 30	25	5	12	233	3	45	233	4	21	22	3	45	12	5	24	3	45	5	24	4	21	3	45
	31 – 60	24	5	14	233	3	60	233	4	30	16	3	45	12	5	28	3	60	5	28	4	30	3	45
	61 – 150	22.5	5	15	233	3	60	233	4	45	12	3	45	12	5	30	3	60	5	30	4	45	3	46
	151 – 226	22.5	5	14	233	3	60	233	4	45	12	3	45	12	5	28	3	60	5	28	4	45	3	46

3 = ⌀ 3/8" OR 9 MM. # 4 = ⌀ 1/2" OR 12 MM. NO. = TOTAL AMOUNT OF BARS
5 = ⌀ 5/8" OR 16 MM. # 6 = ⌀ 3/4" OR 20 MM. L. = TOTAL LENGTH OF EACH BAR



TOP BEAM BOTTOM BEAM

END BEAM DETAILS
NOT TO SCALE



BAR BENDING DIAGRAMS
NOT TO SCALE

TABLE OF VERTICAL WALL REINFORCEMENT

DEPTH D CM.	SINGLE BOX CULVERT DEPTH OF FILL (E) 0-225 CM. WIDTH W CM.	REINFORCING BAR V #	@	REINFORCING BAR Vo #	@	REINFORCING BAR h #	@	MULTIPLE BOX CULVERTS DEPTH OF FILL (E) 0-225 CM. EXTERIOR WALL REINFORCING BAR V #	@	TOTAL AMOUNT OF h2 (# 3) EACH WALL	INTERIOR WALL REINFORCING BAR Vo #	@	TOTAL AMOUNT OF h3 (# 3) EACH WALL
60	20	4	30	3	30	3	30	4	30	8	3	40	4
90	20	4	30	3	30	3	30	4	30	12	3	40	6
120	20	4	30	3	30	3	30	4	30	12	3	40	6
150	22.5	4	30	3	30	3	30	4	30	16	3	40	8
180	25	4	30	3	30	3	30	4	30	20	3	40	10

NOTES :

1. DESIGN PARAMETERS ARE
   1.1 LIVE LOADING : HS 20-44
   1.2 WORKING STEEL STRESSES :
   - PLAIN BARS, f_s = 1200 KG/CM^2
   - DEFORMED BARS, f_s = 1400 KG/CM^2
   1.3 WORKING CONCRETE STRESS, f_c = 80 KG/CM^2
2. CONCRETE SHALL HAVE THE 28 DAYS MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASED ON 15x15x15 CM. CUBE SAMPLES, OF 180 KG/CM. AND SHALL HAVE A MINIMUM CEMENT CONTENT OF 320 KG. PER CUBIC METER OF CONCRETE. THE FOLLOWING IS THE SUGGESTED CONCRETEMIX PROPORTIONS PER CUBIC METER :
   TYPE I PORTLAND CEMENT 350 KG.
   SAND 0.45 M^3
   CRUSHED ROCK OR GRAVEL 0.86 M^3
   WITH THE MAXIMUM SLUMP OF 10 CM.
3. REBARS II 4 OR LARGER SHALL BE TIS 24 GRADE 80 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR24 PLAIN BARS UNLESS OTHERWISE INDICATED.
4. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
5. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
6. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SPECIFICATIONS SHALL BE USED INSTEAD OF TYPE I PORTLAND CEMENT.
7. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE BOTTOM OF BOTTOM SLABS AND OUTSIDE FACES OF THE EXTERIOR WALLS WHERE A CLEAR COVER OF 7.5 CM. SHALL BE PROVIDED.
8. WORK THIS DRAWING WITH DWG. NO. SC-04.
9. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED
10. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 78/8.
11. THIS DRAWING SHALL BE USED FOR NEW CONSTRUCTION OF R.C. BOX CULVERT

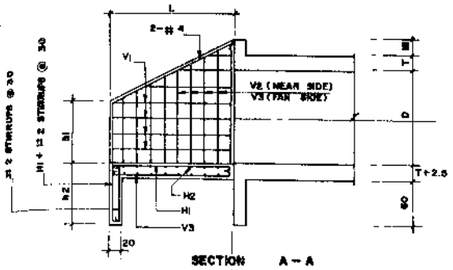
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

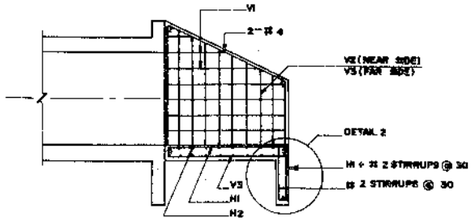
SIMPLE SPAN BOX CULVERT

PLAN , ELEVATIONS, SECTIONS AND DETAILS

DESIGNED : DOH & CONSULTANT	CHECKED :
SUBMITTED : P. Buranay. (DIRECTOR OF LOCATION & DESIGN DIVISION)	DATE JULY 1994
APPROVED : (DIRECTOR GENERAL)	SCALE AS SHOWN
	DWG. NO. BC-03
	SHEET NO. 185



SECTION A – A
NOT TO SCALE



SECTION B – B
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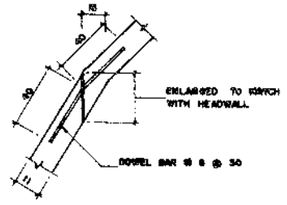
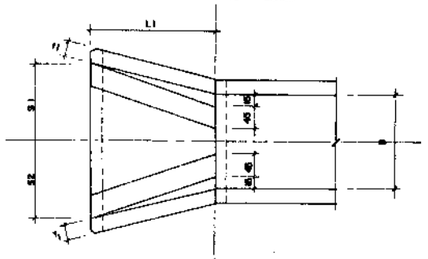
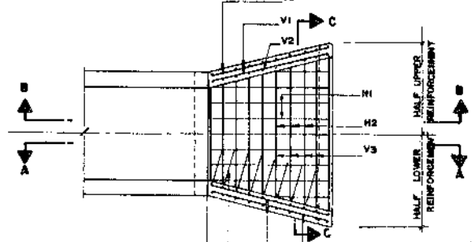
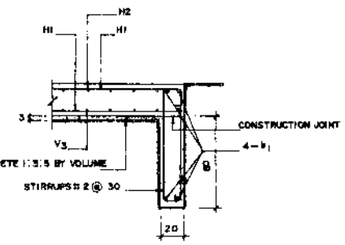


DETAIL 1
SCALE 1:20

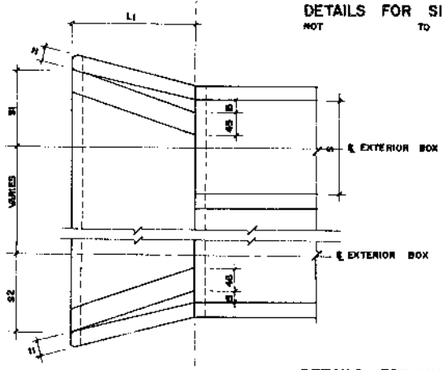


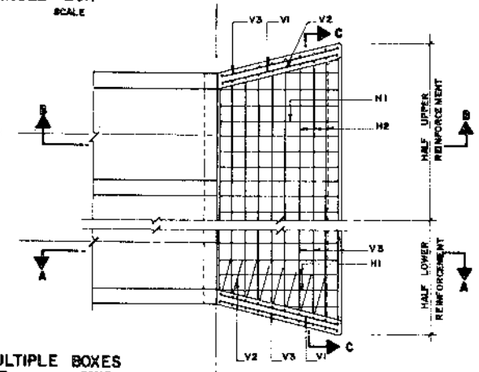


DETAILS FOR SINGLE BOX
NOT TO SCALE

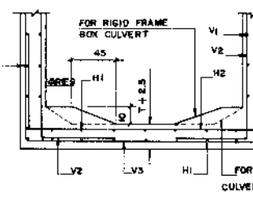


DETAIL 2
SCALE 1:20

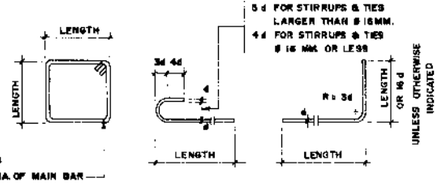




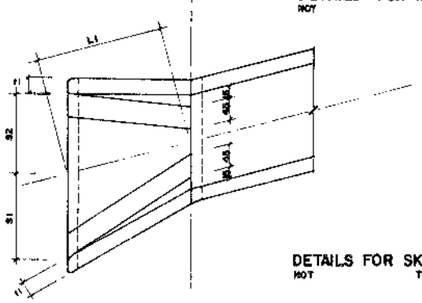
DETAILS FOR MULTIPLE BOXES
NOT TO SCALE

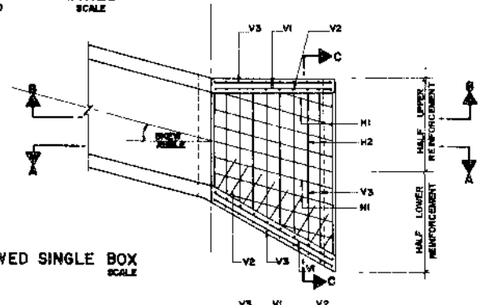


R = 1/2 DIA. OF MAIN BAR



PLAIN BAR DEFORMED BAR





DETAILS FOR SKEWED SINGLE BOX
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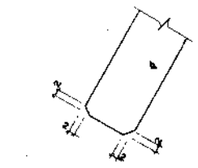
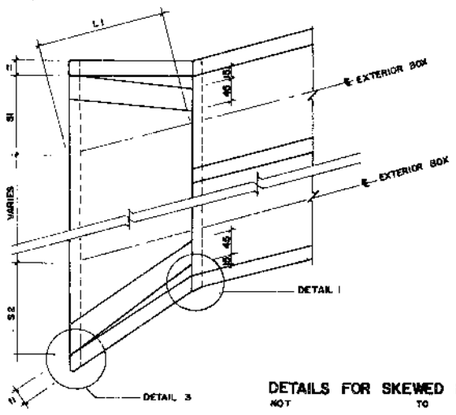
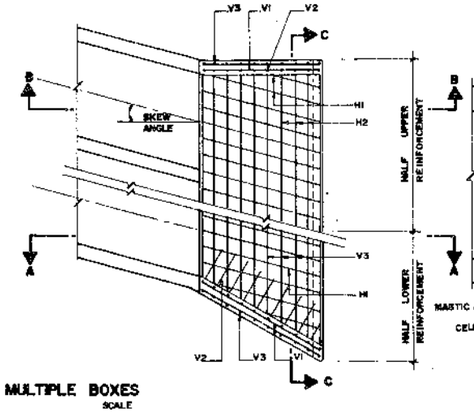
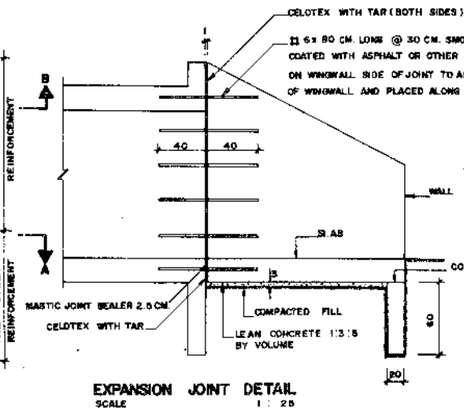


DETAIL 3
NOT TO SCALE

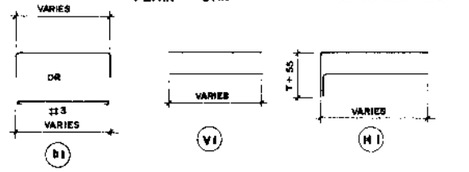


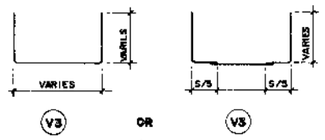


DETAILS FOR SKEWED MULTIPLE BOXES
NOT TO SCALE



EXPANSION JOINT DETAIL
SCALE 1:25





BAR BENDING DIAGRAMS
NOT TO SCALE

TABLE OF REINFORCEMENT FOR HEADWALL OF SINGLE BOX CULVERT

SIZE OF CULVERT		L	b1	t1	CULVERTS												V1		V2		V3		H1		H2		b1	
					SKEW 0°			SKEW 15°			SKEW 30°			SKEW 45°													
S	B				L1	S1	S2	L1	S1	S2	L1	S1	S2	L1	S1	S2	#	@	#	@	#	@	#	@	#	@	#	NO.
60	60	95	50	20	90	54	54	93	54	57	104	57	66	127	66	95	3	30	3	20	3	20	3	30	3	20	3	4
80	60	95	50	20	100	69	69	93	69	73	104	73	83	127	83	111	3	30	3	20	3	20	3	30	3	20	3	4
80	80	145	55	20	140	82	82	145	82	92	161	82	104	198	104	147	3	30	3	20	3	20	3	30	3	20	3	4
120	80	145	55	20	140	90	98	145	98	103	161	103	119	198	119	132	3	30	3	20	3	20	3	30	3	20	3	4
120	120	185	65	20	180	108	108	185	106	113	207	115	135	254	135	192	3	30	3	20	3	20	3	30	3	20	3	4
150	80	145	55	20	140	112	112	145	112	118	161	118	134	198	134	177	3	30	3	20	3	20	3	30	3	20	3	4
150	120	185	65	20	180	123	123	185	123	131	207	131	151	254	151	207	3	30	3	20	3	20	3	30	3	20	3	4
150	150	235	70	22.5	230	138	138	235	138	146	265	146	172	325	172	245	3	30	3	15	3	15	3	30	3	15	3	4
180	120	185	65	20	180	138	138	185	138	149	207	148	166	254	166	222	3	30	3	15	3	15	3	30	3	15	3	4
180	150	235	70	22.5	230	152	152	235	152	161	265	161	187	325	187	258	3	30	3	15	3	15	3	30	3	15	3	4
180	180	275	80	25	270	162	162	275	162	173	311	173	204	382	204	287	3	30	3	10	3	10	3	30	3	10	3	4
210	180	275	80	25	270	177	177	275	177	188	311	188	218	382	218	302	3	30	4	20	4	20	4	30	4	20	4	4
210	210	320	85	25	315	188	188	320	189	202	363	202	236	445	236	355	3	30	4	16	4	16	4	30	4	16	4	4
240	210	320	85	25	315	204	204	320	204	217	363	217	253	445	253	350	3	30	4	16	4	16	4	30	4	16	4	4
240	240	365	95	25	360	216	216	372	218	231	415	231	272	508	272	383	3	30	4	12	4	12	4	30	4	12	4	4
270	240	365	95	25	360	231	231	372	231	246	415	246	287	508	287	398	3	30	4	12	4	12	4	30	4	12	4	4
270	270	405	100	27.5	400	242	242	414	242	259	461	259	303	565	303	428	3	30	4	10	4	10	4	30	4	10	4	4
300	270	405	100	27.5	400	257	257	414	257	274	461	274	318	565	318	443	3	30	4	10	4	10	4	30	4	10	4	4
300	300	455	115	30	450	270	270	466	270	289	518	289	340	636	340	478	4	30	5	12	5	12	4	30	5	12	5	4
330	300	455	115	30	450	285	285	466	285	304	518	304	356	636	355	494	4	30	5	12	5	12	4	30	5	12	5	4
330	330	505	120	32.5	500	299	299	517	299	320	576	320	378	707	378	531	4	30	5	10	5	10	4	30	5	10	5	4
360	330	505	120	32.5	500	314	314	517	314	335	576	335	391	707	391	548	4	30	5	10	5	10	4	30	5	10	5	4
360	360	545	130	35	540	324	324	556	324	347	632	347	408	763	408	575	4	30	6	12	6	12	4	30	6	12	6	4

3 = Ø 3/8" OR 9 MM., # 4 = Ø 1/2" OR 12 MM., # 5 = Ø 5/8" OR 16 MM., # 6 = Ø 3/4" OR 20 MM.

NO. = TOTAL AMOUNT OF BARS

NOTES :

1. DESIGN PARAMETERS ARE
   - 1.1 LIVE LOADING : HS 20-44
   - 1.2 WORKING STEEL STRESSES :
     - PLAIN BARS, f_s = 1,200 KG./CM.^{2}
     - DEFORMED BARS, f_s = 1,400 KG./CM.^{2}
   - 1.3 WORKING CONCRETE STRESS, f_c = 60 KG./CM.^{2}
2. CONCRETE SHALL HAVE THE 28-DAY MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASED ON 15x15 x 15 CM. CUBE SAMPLES, OF 180 KG./CM.^{2} AND SHALL HAVE A MINIMUM CEMENT CONTENT OF 320 KG. PER CUBIC METER OF CONCRETE. THE FOLLOWING IS THE SUGGESTED CONCRETE MIX PROPORTIONS PER CUBIC METER :

TYPE I PORTLAND CEMENT	320	KG.
SAND	0.43	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
WITH THE MAXIMUM SLUMP OF	10	CM.

3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE BOTTOM OF BOTTOM SLABS OR WALLS AT WHICH CLEAR COVER OF 7.5 CM. SHALL BE PROVIDED.
4. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SPECIFICATIONS SHALL BE USED INSTEAD OF TYPE I PORTLAND CEMENT.
9. WORK THIS DRAWING WITH DWG. NOS. BC-01, BC-02, BC-03 AS REQUIRED.
10. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 78/9.
11. THIS DRAWING SHALL BE USED FOR NEW CONSTRUCTION OF R.C. BOX CULVERT

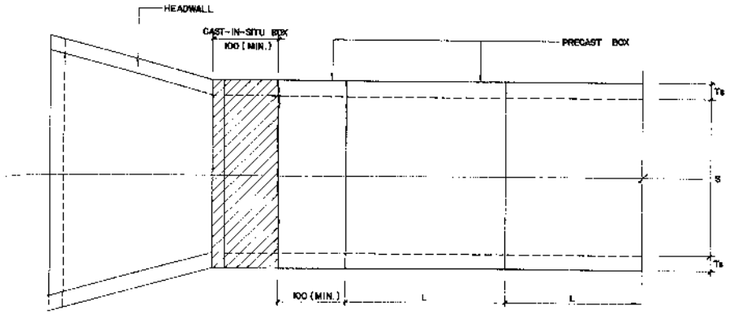
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

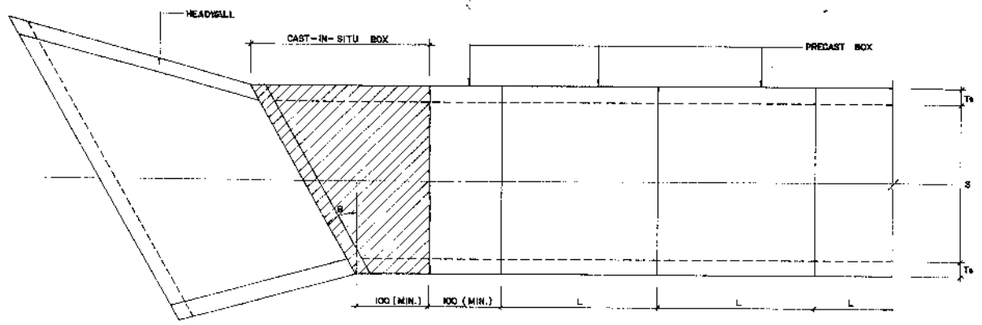
R.C. HEADWALL FOR BOX CULVERT

DIMENSIONS, REINFORCEMENT AND DETAILS

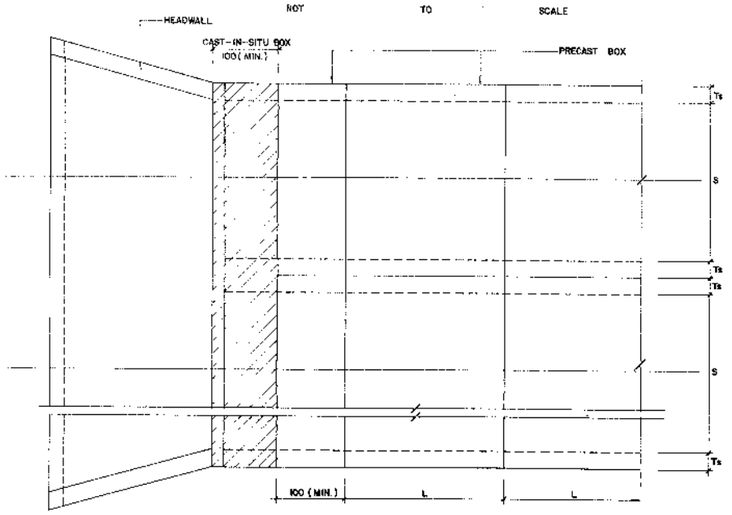
DESIGNED : DOH. & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN.
APPROVED : (DIRECTOR GENERAL)		DWG. NO. BC-04
		SHEET NO. 189



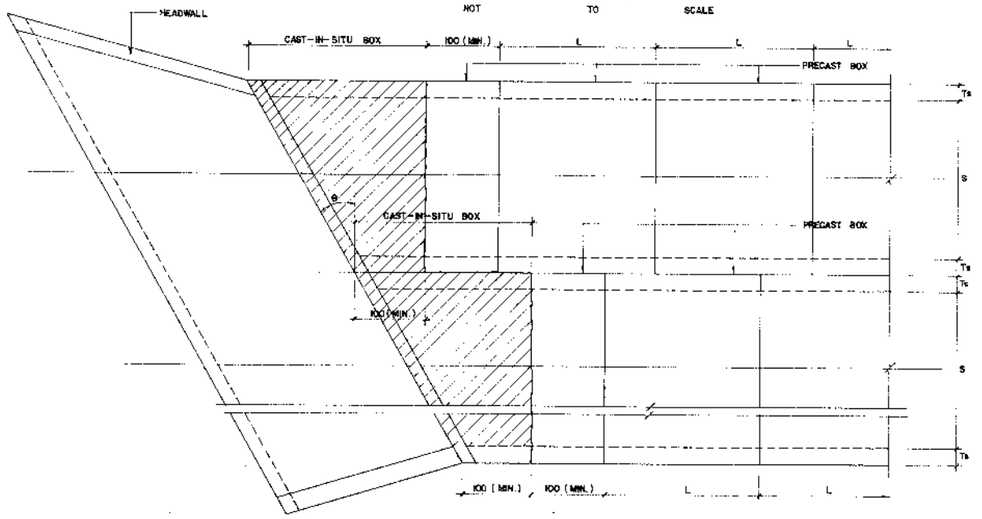
PLAN (SINGLE BOX , NON – SKEW)
NOT TO SCALE



PLAN (SINGLE BOX , SKEW θ)
NOT TO SCALE



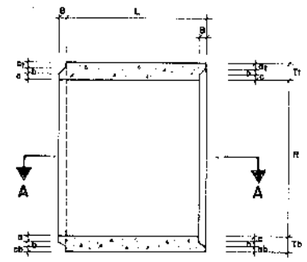
PLAN (MULTIPLE BOXES , NON – SKEW)
NOT TO SCALE



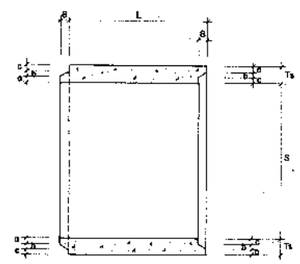
PLAN (MULTIPLE BOXES , SKEW θ)
NOT TO SCALE

NOTES :

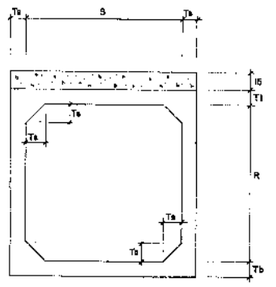
1. DESIGN LOAD IS HS20 – 44.
2. DEPTH OF FILL SHALL NOT EXCEED 0.80 M.
3. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
4. WORK THIS DRAWING WITH DWG. NO. BC–05.
5. THE SKEW ANGLE (θ) SHALL NOT BE MORE THAN 45 DEGREE.
6. W IS 15 CM. FOR NON – SKEW BOX AND IS 25 CM. FOR SKEW BOX.
7. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 7 PB/1.



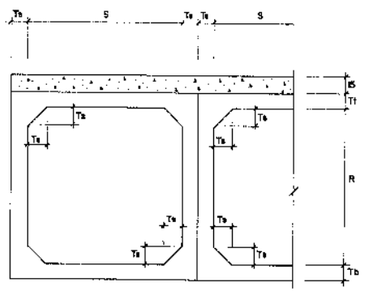
LONGITUDINAL SECTION OF PRECAST BOX
NOT TO SCALE



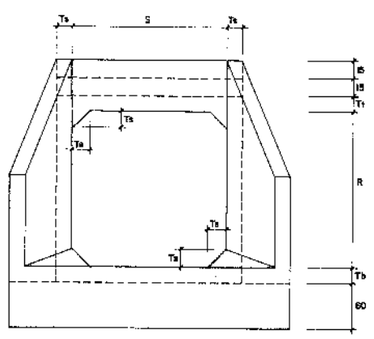
SECTION A– A
NOT TO SCALE



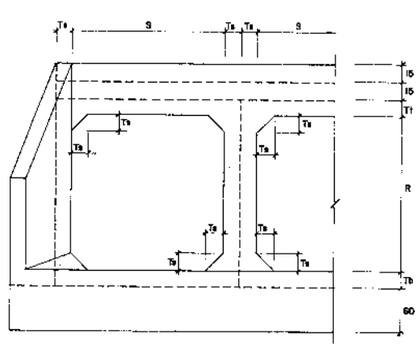
ELEVATION (SINGLE BOX, NON – SKEW)
NOT TO SCALE



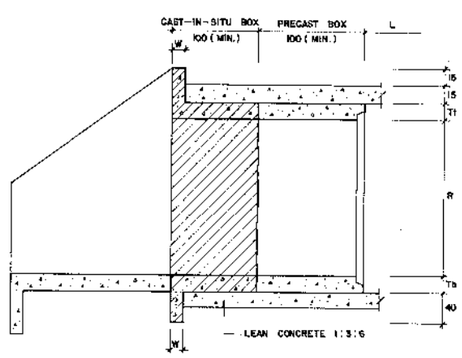
ELEVATION (MULTIPLE BOXES, NON – SKEW)
NOT TO SCALE



HEADWALL ELEVATION (SINGLE BOX)
NOT TO SCALE



HEADWALL ELEVATION (MULTIPLE BOXES)
NOT TO SCALE



LONGITUDINAL SECTION OF HEADWALL
NOT TO SCALE

TABLE OF DIMENSIONS

SIZE OF CULVERT	DIMENSIONS												
S x R	R	S	Ts	Tf	Tb	a	b	c	a1	a2	a3	a4	L (MIN.)
120 x 120	120	120	12.5	15	15	4	4.5	4	10.5	8.5	10.5	6.5	250
150 x 120	120	150	15	20	17.5	5	4.5	5.5	10	7.5	10.5	8	250
150 x 150	150	150	15	20	17.5	5	4.5	5.5	10	7.5	10.5	8	250
180 x 150	150	180	17.5	20	17.5	6	4.5	7	8.5	6	9.5	7	250
180 x 180	180	180	17.5	20	17.5	6	4.5	7	8.5	6	9.5	7	250
210 x 180	180	210	20	20	20	7.5	4.5	8	7.5	7.5	8	8	200
210 x 210	210	210	20	20	20	7.5	4.5	8	7.5	7.5	8	8	200
240 x 210	210	240	20	20	20	7.5	4.5	8	7.5	7.5	8	8	200
240 x 240	240	240	20	20	20	7.5	4.5	8	7.5	7.5	8	8	200

TABLE OF REINFORCEMENT (SQ.CM. PER 1.0 M. LENGTH OF BOX)

SIZE OF CULVERT	REINFORCEMENT BARS								END BEAM	
S x R	As1	As2	As3	As4	As7	As8	As5 *	As6 *	As9	As10
120 x 120	3.4	9.1	5.1	2.8	3.8	3.0	4.4	3.8	2–DB12	2–DB12
150 x 120	4.0	9.3	5.1	3.0	4.0	3.6	4.4	4.0	2–DB16	2–DB12
150 x 150	3.4	9.7	5.5	3.0	4.0	3.6	4.7	4.0	2–DB16	2–DB12
180 x 150	4.9	10.2	5.5	3.5	4.0	3.8	4.4	4.0	2–DB20	2–DB16
180 x 180	4.2	10.8	6.1	3.5	4.0	3.6	4.7	4.0	2–DB20	2–DB16
210 x 180	5.7	10.8	6.1	4.0	4.2	4.0	4.2	4.0	2–DB25	2–DB20
210 x 210	5.3	11.2	6.8	4.0	4.9	4.0	4.4	4.0	2–DB25	2–DB20
240 x 210	6.4	12.3	7.4	4.0	5.7	4.7	4.7	4.0	2–DB25	2–DB25
240 x 240	5.9	12.7	8.0	4.9	6.1	5.5	4.7	4.0	2–DB25	2–DB25

* STEEL AREA PER 1.0 M. WIDTH OF BOX

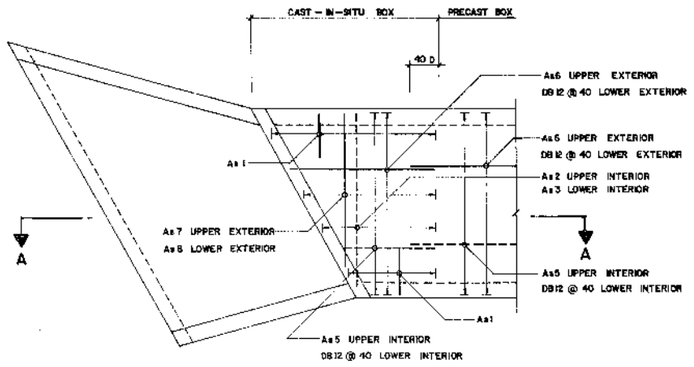
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

PRECAST BOX CULVERT DEPTH OF FILL ≯ 0.60 M.

PLAN, ELEVATION AND SECTIONS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. BC–05
		SHEET NO. 190

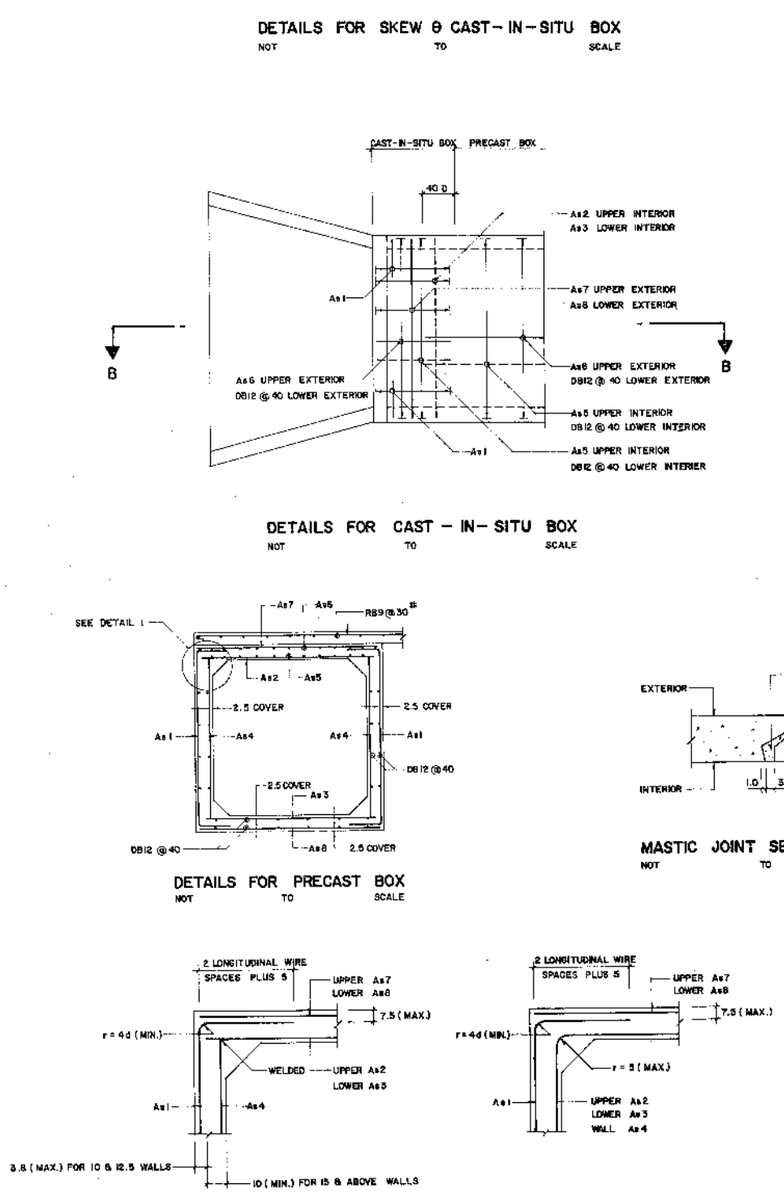


DETAILS FOR SKEW θ CAST – IN – SITU BOX
NOT TO SCALE

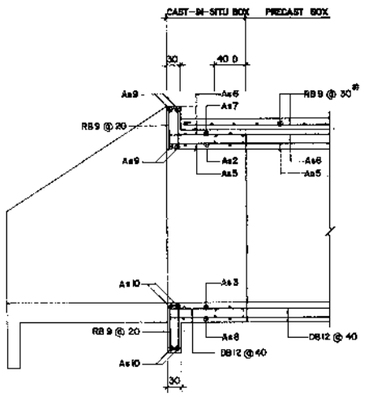
DETAILS FOR CAST – IN – SITU BOX
NOT TO SCALE

DETAILS FOR PRECAST BOX
NOT TO SCALE

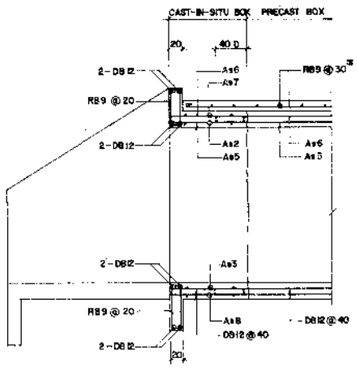
MASTIC JOINT SEALER DETAIL
NOT TO SCALE



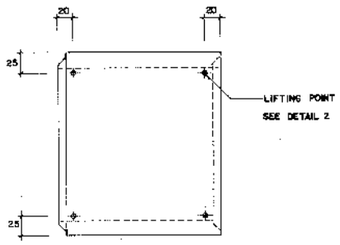
DETAIL 1
NOT TO SCALE



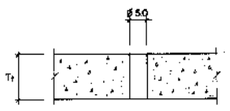
SECTION A – A
NOT TO SCALE



SECTION B – B
NOT TO SCALE



BOX LIFTING LOCATIONS
NOT TO SCALE



DETAIL 2
NOT TO SCALE

NOTES :

1. CONCRETE :
   a.) FOR PRECAST BOX CULVERT SHALL HAVE MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 44 MPa FOR .15 x .15 x .15 M. CUBE AT 28 DAYS.
   b.) FOR CAST – IN – SITU BOX CULVERT SHALL HAVE MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 35 MPa FOR .15 x .15 x .15 M. CUBE AT 28 DAYS.
2. WELDED WIRE FABRIC FOR STEEL REINFORCEMENT SHALL HAVE A MINIMUM YIELD STRENGTH (Fsy) OF 440 MPa.
3. CLEAR CONCRETE COVER SHALL BE 2.5 CM. EXCEPT THE BOTTOM SLABS OR WALLS AT WHICH CLEAR COVER OF 5 CM. SHALL BE PROVIDED.
4. DEPTH OF FILL SHALL NOT EXCEED 0.60 M.
5. PREPARATION FOR INSTALLATION OF PRECAST BOX CULVERT.
   a.) POURING LEAN CONCRETE OF MIXING RATIO 1 : 3 : 6 BY WEIGTH AND THICKNESS NOT LESS THAN 12 CM.
   b.) THE LEVEL OF LEAN CONCRETE MUST BE APPROXIMATLY 3 CM. LOWER THAN THE EXACT LEVEL.
   c.) INSTALL PRECAST BOX CULVERT AFTER LEAN CONCRETE WAS HARDEN. BEFORE INSTALLING PRECAST BOX CULVERT, THERE MUST BE CEMENT MORTAR WITH MIXING RATIO 1 : 2 BY VOLUME ON THE SURFACE OF LEAN CONCRETE AND THE THICKNESS OF THESE MORTAR SHOULD BE THICK ENOUGH TO FILL THE VOID BETWEEN THE BOTTOM OF PRECAST BOX CULVERT AND TOP SURFACE OF LEAN CONCRETE.
6. REINFORCING STEEL WHICH HAS A DIFFERENT STRENGTH FROM THE ABOVE SPECIFICATIONS COULD BE USED UPON APPROVAL OF THE LOCATION AND DESIGN DIVISION.
7. FOR DETAILS OF HEADWALL SEE DRAWING NO. BC – 04.
8. THE DIMENSIONS AS SHOWN IN TABLE OF DIMENSIONS ARE ONLY RECOMMENDED DIMENSIONS.
9. THE REINFORCEMENT FOR CAST – IN – SITU CONCRETE SECTION MUST BE THE SAME AS THE REINFORCEMENT IN PRECAST BOX CULVERT. FOR SKEW BOX THE REINFORCEMENT SHALL FOLLOW THIS DRAWING.
10. PROVIDE DB12 BARS AS LONGITUDINAL STEEL BARS AT THE INNER AND OUTER SIDE OF PRECAST BOX CULVERT WALL. (SPACING NOT MORE THAN 40 CM.)
11. IN CASE OF SALINE PROTECTION , HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED INSTEAD OF TYPE 1 CEMENT.
12. WORK THIS DRAWING WITH DWG. NO. BC – 05.
13. DB /3 THE DIAMETER OF REINFORCING BAR IN MILLIMETERS.
14. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
15. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 7 P9/2.

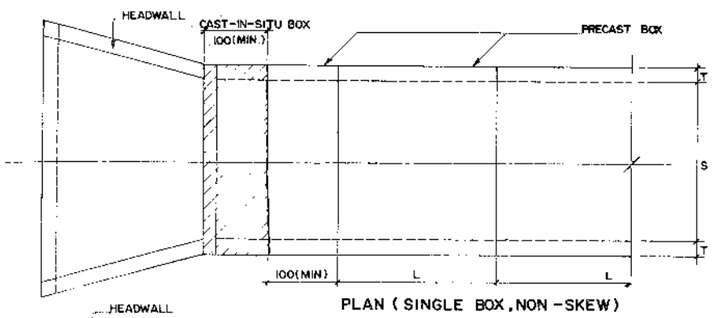
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

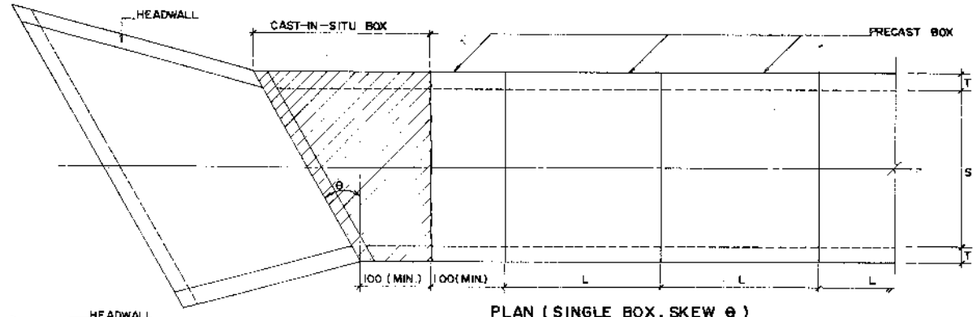
PRECAST BOX CULVERT DEPTH OF FILL ≯ 0.60 M.

REINFORCEMENT AND DETAILS

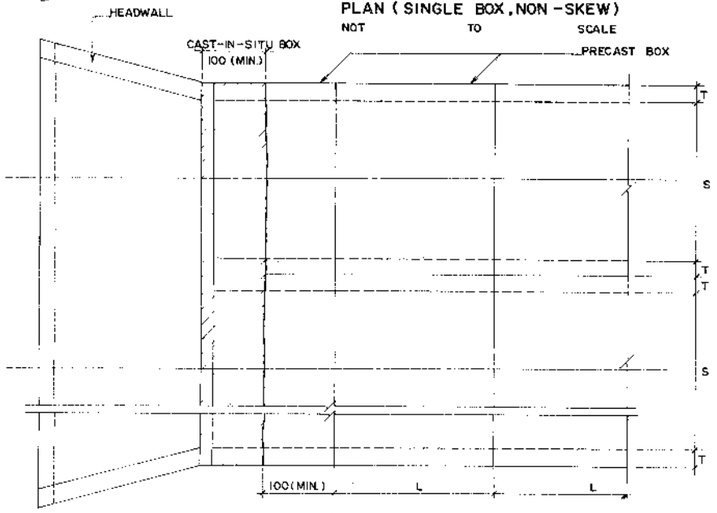
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE	JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE	AS SHOWN
		DWG. NO.	BC – 06
APPROVED : (DIRECTOR GENERAL)		SHEET NO.	19



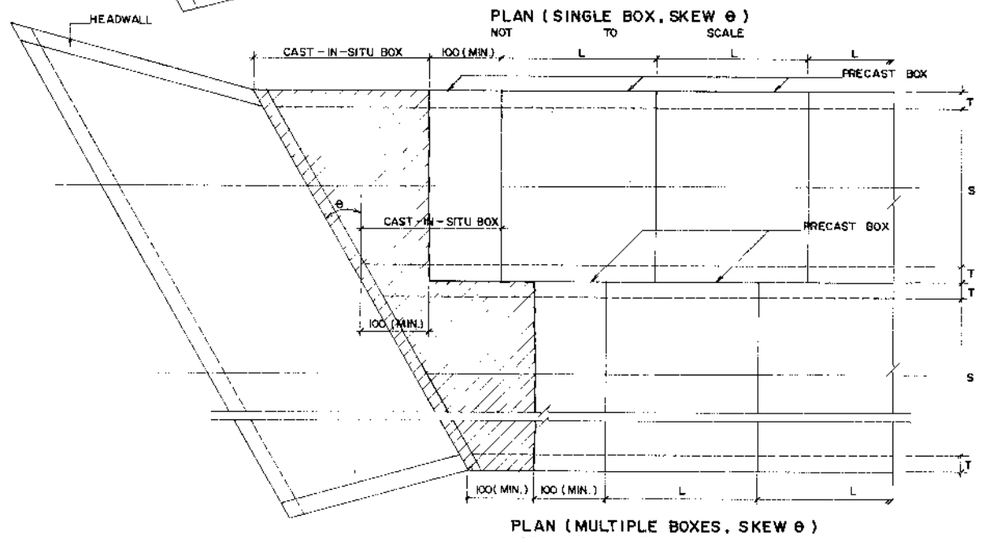
PLAN (SINGLE BOX, NON-SKEW)
NOT TO SCALE



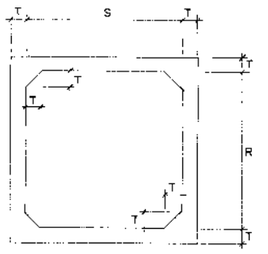
PLAN (SINGLE BOX, SKEW θ)
NOT TO SCALE



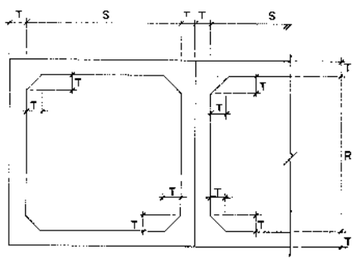
PLAN (MULTIPLE BOXES, NON-SKEW)
NOT TO SCALE



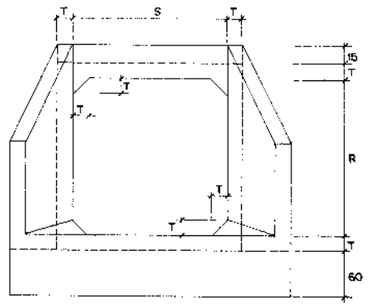
PLAN (MULTIPLE BOXES, SKEW θ)
NOT TO SCALE



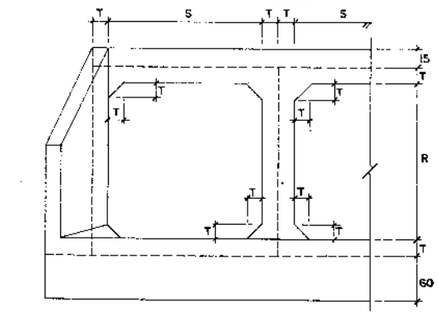
ELEVATION (SINGLE BOX, NON-SKEW)
NOT TO SCALE



ELEVATION (MULTIPLE BOX, NON-SKEW)
NOT TO SCALE



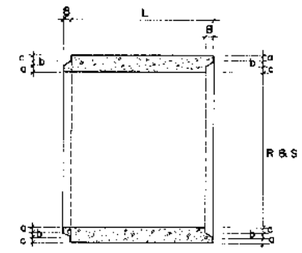
HEADWALL ELEVATION (SINGLE BOX)
NOT TO SCALE



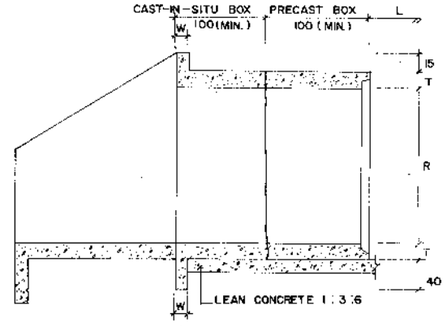
HEADWALL ELEVATION (MULTIPLE BOXES)
NOT TO SCALE

NOTES :

1. DESIGN LOAD IS HS 20-44.
2. DEPTH OF FILL EXCEEDS 0.60 M.
3. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
4. WORK THIS DRAWING WITH DOH DWG. NO BC-08.
5. THE SKEW ANGLE (θ) SHALL NOT BE MORE THAN 45 DEGREES.
6. W IS 20 CM. FOR NON-SKEW BOX AND IS 30 CM. FOR SKEW BOX.
7. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 7 PB/3.



LONGITUDINAL SECTION OF PRECAST BOX
NOT TO SCALE



LONGITUDINAL SECTION OF HEADWALL
NOT TO SCALE

TABLE OF DIMENSIONS

SIZE OF CULVERT	DIMENSIONS						
S x R	R	S	T	a	b	c	L
120 x 120	120	120	12.5	4	4.5	4	250
150 x 120	120	150	15	5	4.5	5.5	250
150 x 150	150	150	15	5	4.5	5.5	250
180 x 150	150	180	17.5	6	4.5	7	250
180 x 180	180	180	17.5	6	4.5	7	250
210 x 180	180	210	20	7.5	4.5	8	200
210 x 210	210	210	20	7.5	4.5	8	200
240 x 210	210	240	20	7.5	4.5	8	200
240 x 240	240	240	20	7.5	4.5	8	200

TABLE OF REINFORCEMENT (SQ.CM. PER 1.0 M. LENGTH OF BOX)

DEPTH OF FILL (M.)	CULVERT 120 x 120					CULVERT 150 x 120					CULVERT 150 x 150					CULVERT 180 x 150					CULVERT 180 x 180					CULVERT 210 x 180					CULVERT 210 x 210					CULVERT 240 x 210					CULVERT 240 x 240				
	M	As1	As2	As3	As4	M	As1	As2	As3	As4	M	As1	As2	As3	As4	M	As1	As2	As3	As4	M	As1	As2	As3	As4	M	As1	As2	As3	As4	M	As1	As2	As3	As4	M	As1	As2	As3	As4	M	As1	As2	As3	As4
0.6	86	3.8	6.4	5.9	2.5	71	4.9	6.8	5.7	3.0	104	4.2	7.4	6.1	3.0	84	5.1	7.6	6.1	3.6	120	4.7	8.3	6.6	3.6	97	5.1	8.3	6.6	4.0	140	4.7	8.9	7.0	4.0	104	5.9	10.4	8.0	4.0	155	5.5	10.8	8.5	4.0
0.9	61	2.5	3.8	3.8	2.5	58	3.2	4.2	4.4	3.0	74	3.0	4.7	4.9	3.0	69	3.6	5.1	4.9	3.6	84	3.6	5.5	5.3	3.6	79	4.0	5.7	5.5	4.0	97	4.0	6.1	5.7	4.0	89	4.7	7.4	6.8	4.0	104	4.2	7.8	7.2	4.0
1.2	53	2.5	3.0	3.2	2.5	56	3.0	3.4	3.6	3.0	64	3.0	3.8	4.0	3.0	64	3.6	4.2	4.4	3.6	74	3.6	4.7	4.9	3.6	74	4.0	5.1	5.3	4.0	84	4.0	5.3	5.7	4.0	81	4.2	6.6	6.6	4.0	91	4.0	6.8	7.0	4.0
1.5	51	2.5	2.8	3.0	2.5	56	3.0	3.4	3.6	3.0	61	3.0	3.6	3.8	3.0	64	3.6	4.2	4.4	3.6	69	3.6	4.4	4.7	3.6	71	4.0	4.9	5.3	4.0	84	4.0	5.3	5.7	4.0	79	4.4	6.6	7.0	4.0	86	4.2	7.0	7.6	4.0
1.8	48	2.5	3.0	3.0	2.5	56	3.0	3.4	3.6	3.0	56	3.0	3.6	3.8	3.0	64	3.6	4.2	4.4	3.6	66	3.6	4.4	4.7	3.6	69	4.0	5.1	5.3	4.0	84	4.0	5.3	5.7	4.0	76	4.4	6.6	7.2	4.0	81	4.2	7.0	7.6	4.0
2.4	46	2.5	3.2	3.2	2.5	51	3.0	3.6	3.8	3.0	56	3.0	3.8	4.0	3.0	58	3.6	4.4	4.7	3.6	64	3.6	4.7	5.1	3.6	66	4.0	5.5	5.7	4.0	71	4.0	5.7	6.1	4.0	74	4.7	7.2	7.6	4.0	79	4.4	7.4	8.0	4.0
3.0	46	2.5	3.4	3.6	2.5	51	3.0	4.2	4.4	3.0	53	3.0	4.4	4.7	3.0	58	3.6	5.1	5.3	3.6	61	3.6	5.3	5.7	3.6	66	4.0	6.1	6.4	4.0	69	4.0	6.4	6.8	4.0	71	5.3	8.0	8.9	4.0	76	4.9	0.5	9.1	4.0
3.7	46	2.5	4.0	4.0	2.5	51	3.0	4.7	4.9	3.0	53	3.0	4.9	5.1	3.0	58	3.6	5.7	6.1	3.6	61	3.6	5.9	6.4	3.6	66	4.2	7.0	7.2	4.0	69	4.0	7.2	7.6	4.0	74	5.9	9.1	9.7	4.0	74	5.5	9.3	10.2	4.0
4.3	46	2.5	4.4	4.4	2.5	51	3.4	5.3	5.5	3.0	53	3.0	5.5	5.7	3.0	58	4.0	6.6	6.8	3.6	61	3.6	6.8	7.0	3.6	64	4.7	7.6	8.0	4.0	69	4.4	7.8	8.3	4.0										
4.9	46	2.5	4.9	5.1	2.5	48	3.8	5.9	6.1	3.0	53	3.4	6.1	6.4	3.0	56	4.4	7.2	7.4	3.6	61	4.0	7.4	7.8	3.6	64	5.3	8.5	8.9	4.0	69	4.9	8.7	9.1	4.0										
5.5	43	3.0	5.3	5.5	2.5	48	4.2	6.6	6.6	3.0	51	3.6	6.8	7.0	3.0	56	4.9	7.8	8.3	3.6	58	4.4	8.0	8.5	3.6	64	5.7	9.3	9.7	4.0															

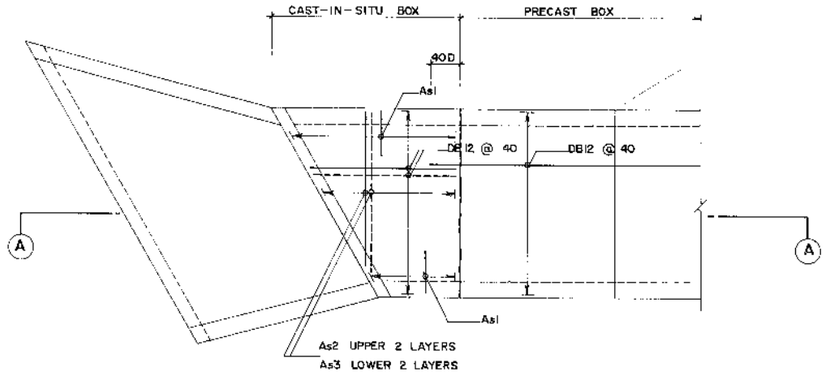
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

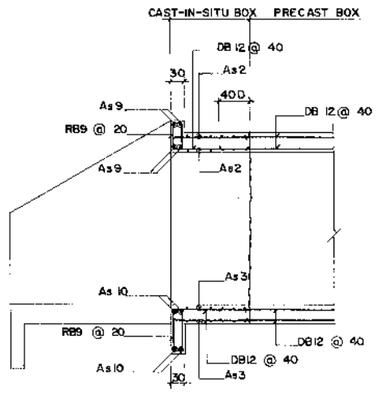
PRECAST BOX CULVERT DEPTH OF FILL > 0.60 M.

PLAN, ELEVATION AND SECTIONS

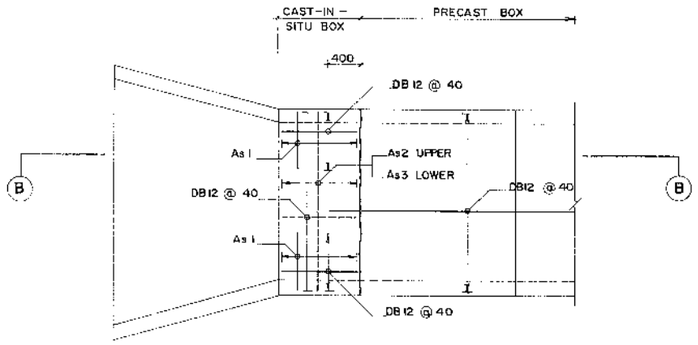
DESIGNED : DOH. & CONSULTANTS.	CHECKED	DATE JULY 1994
SUBMITTED : P. Bunyasi (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : for (DIRECTOR GENERAL)		DWG. NO. BC.-07
		SHEET NO. 192



DETAILS FOR SKEW θ CAST-IN-SITU BOX
NOT TO SCALE



SECTION A-A
NOT TO SCALE



DETAILS FOR CAST-IN-SITU BOX
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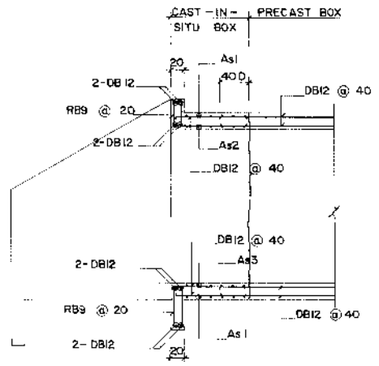

SECTION B-B
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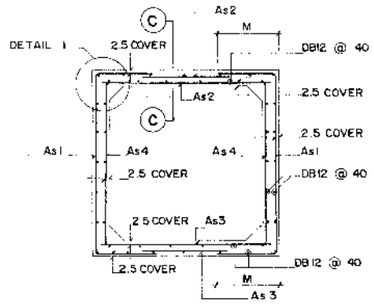
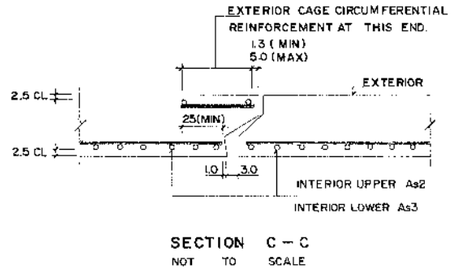
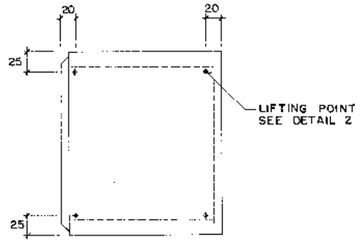


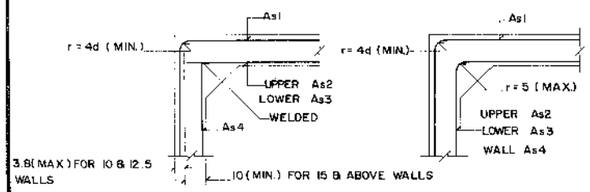
DETAILS FOR PRECAST BOX
NOT TO SCALE



SECTION C-C
NOT TO SCALE



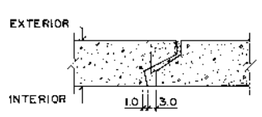
BOX LIFTING LOCATIONS
NOT TO SCALE



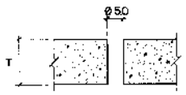
TYPE A TYPE B

DETAIL 1
NOT TO SCALE

MORTAR CEMENT RATIO 1:2 BY VOLUME



MASTIC JOINT SEALER DETAIL
NOT TO SCALE



DETAIL 2
NOT TO SCALE

TABLE OF REINFORCEMENT
END BEAM FOR SKEW BOX

SIZE OF CULVERT S x R	END BEAM As 9	As 10
120 x 120	2-DB 12	2-DB12
150 x 120	2-DB 16	2-DB12
150 x 150	2-DB16	2-DB12
180 x 150	2-DB20	2-DB16
180 x 180	2-DB20	2-DB16
210 x 180	2-DB25	2-DB20
210 x 210	2-DB25	2-DB20
240 x 210	2-DB25	2-DB25
240 x 240	2-DB25	2-DB25

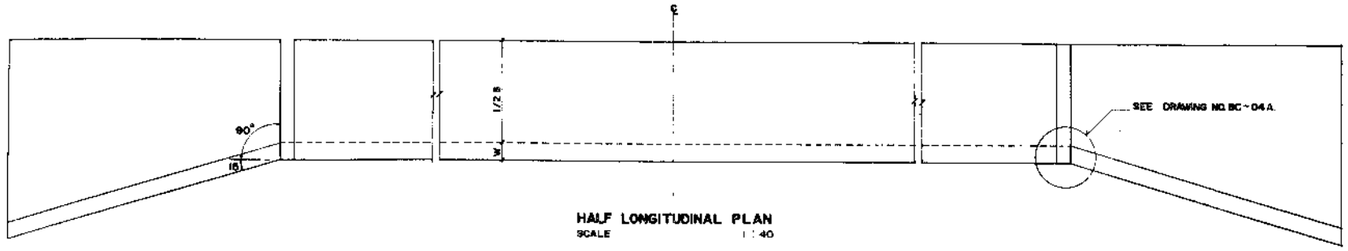
NOTES :

1. CONCRETE :
   a) FOR PRECAST BOX CULVERT SHALL HAVE MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 44 MPa FOR .15 X .15 X .15 M. CUBE AT 28 DAYS.
   b) FOR CAST-IN-SITU BOX CULVERT SHALL HAVE MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 35 MPa FOR .15 X .15 X .15 M. CUBE AT 28 DAYS.
2. WELDED WIRE FABRIC FOR STEEL REINFORCEMENT SHALL HAVE MINIMUM YIELD STRENGTH (Fsy) OF 440 MPa.
3. CLEAR CONCRETE COVER SHALL BE 2.5 CM. EXCEPT THE BOTTOM SLABS OR WALLS AT WHICH CLEAR COVER OF 5 CM. SHALL BE PROVIDED.
4. DEPTH OF FILL EXCEEDS 0.60 M.
5. PREPARATION FOR INSTALLATION OF PRECAST BOX CULVERT.
   a) POURING LEAN CONCRETE OF MIXING RATIO 1 : 3 : 6 BY WEIGTH AND THICKNESS NOT LESS THAN 12 CM.
   b) THE LEVEL OF LEAN CONCRETE MUST BE APPROXIMATLY 3 CM , OWER THAN THE EXACT LEVEL
   c) INSTALL PRECAST BOX CULVERT AFTER LEAN CONCRETE WAS HARDEN. BEFORE INSTALLING PRECAST BOX CULVERT, THERE MUST BE CEMENT MORTAR WITH MIXING RATIO 1:2 BY VOLUME ON THE SURFACE OF LEAN CONCRETE AND THE THICKNESS OF THESE MORTAR SHOULD BE THICK ENOUGH TO FILL THE VOID BETWEEN THE BOTTOM OF PRECAST BOX CULVERT AND TOP SURFACE OF LEAN CONCRETE.
6. REINFORCING STEEL WHICH HAS A DIFFERENT STRENGTH FROM THE ABOVE SPECIFICATIONS COULD BE USED UPON APPROVAL OF THE LOCATION AND DESIGN DIVISION.
7. FOR DETAILS OF HEADWALL SEE DRAWING NO. BC - 04.
8. THE DIMENSIONS AS SHOWN IN TABLE OF DIMENSIONS ARE ONLY RECOMMENDED DIMENSION.
9. THE REINFORCEMENT FOR CAST-IN-SITU CONCRETE SECTION MUST BE SAME AS THE REINFORCEMENT IN PRECAST BOX CULVERT. FOR SKEW BOX THE REINFORCEMENT SHALL FOLLOW THIS DRAWING.
10. PROVIDE DB12 BARS AS LONGITUDINAL STEEL BARS AT THE INNER AND OTHER SIDE OF PRECAST BOX CULVERT WALL (SPACING NOT MORE THAN 40 CM.).
11. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SHALL BE USED INSTEAD OF TYPE 1 CEMENT.
12. WORK THIS DRAWING WITH DWG. NO. BC-07.
13. DB IS THE DIAMETER OF REINFORCEMENT STEEL IN MILLIMETERS.
14. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
15. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 7 PB /4.

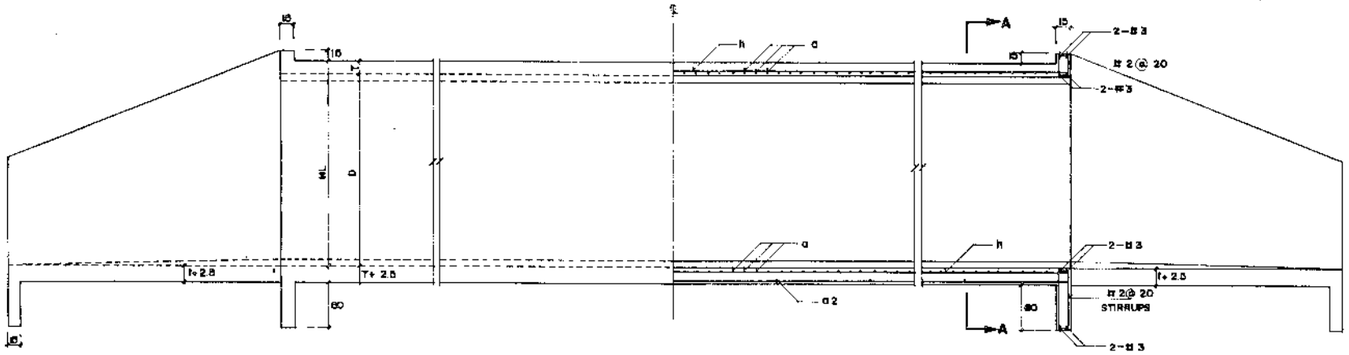
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
PRECAST BOX CULVERT DEPTH OF FILL > 0.60 M.
REINFORCEMENT AND DETAILS

DESIGNED : DOH. & CONSULTANTS.	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : For (DIRECTOR GENERAL)		DWG. NO. BC-08
		SHEET NO. 193

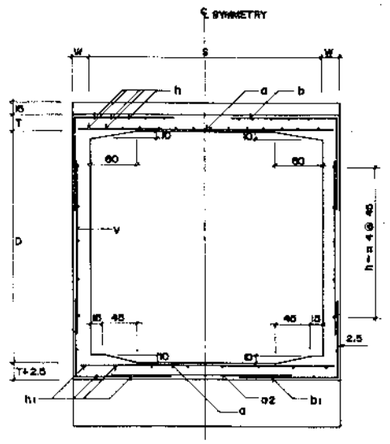


HALF LONGITUDINAL PLAN
SCALE 1 : 40

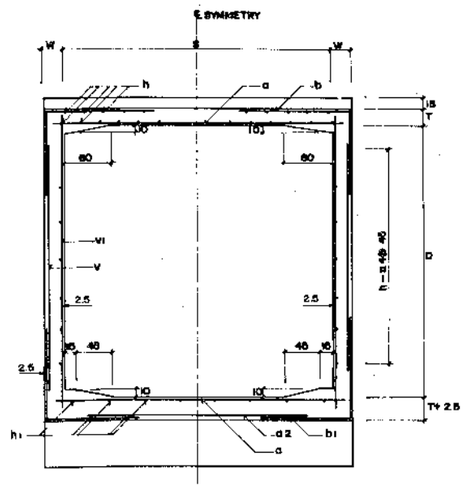


HALF LONGITUDINAL ELEVATION
SCALE 1 : 40

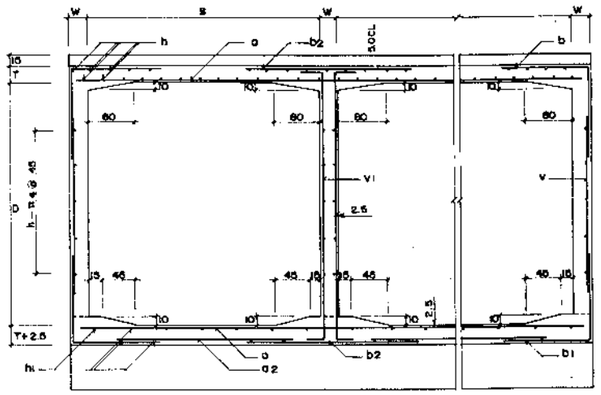
HALF LONGITUDINAL SECTION
SCALE 1 : 40



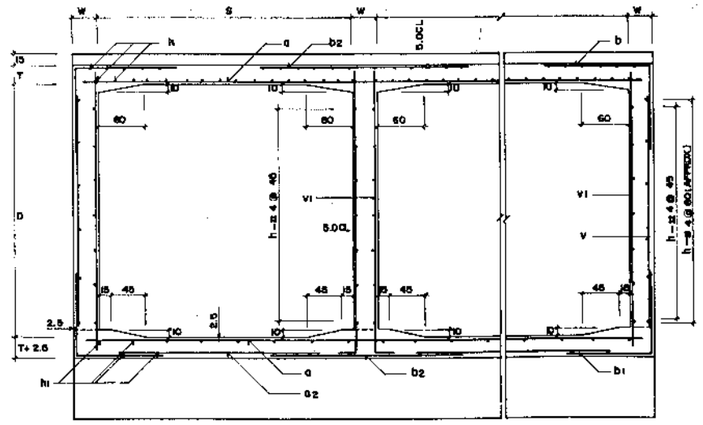
SINGLE BOX TYPE B
(FOR D > 240 CM. AND W < 25 CM.)



SINGLE BOX TYPE C
(FOR D > 240 CM. AND W ≥ 25 CM.)



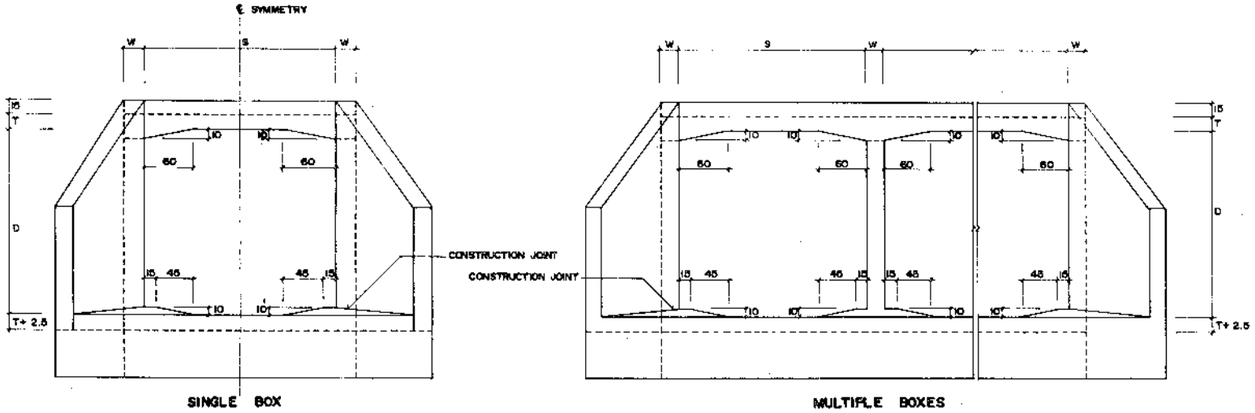
MULTIPLE BOXES TYPE B
(FOR D > 240 CM. AND W < 25 CM.)



MULTIPLE BOXES TYPE C
(FOR D > 240 CM. AND W ≥ 25 CM.)

NOTES :

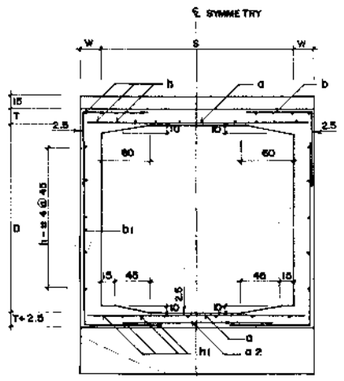
1. FOR GENERAL NOTES NOT MENTIONED IN THIS DRAWING SEE DWG. NO. BC-02
2. CLEAR CONCRETE COVER SHALL BE 2.5 CM. EXCEPT THE BOTTOM OF BOTTOM SLABS OR WALL WHERE CLEAR COVER OF 5 CM. SHALL BE PROVIDED
3. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
4. WORK THIS DRAWING WITH DWG. NO. BC-02A, BC-02A
5. THIS DRAWING IS ADAPTED FROM DOH DRAWING NO. 78/7
6. THIS DRAWING SHALL BE USED FOR EXTENSION OF EXISTING R.C. BOX CULVERTS WHICH HAVE CONCRETE COVERING 2.5 CM. ONLY



SINGLE BOX

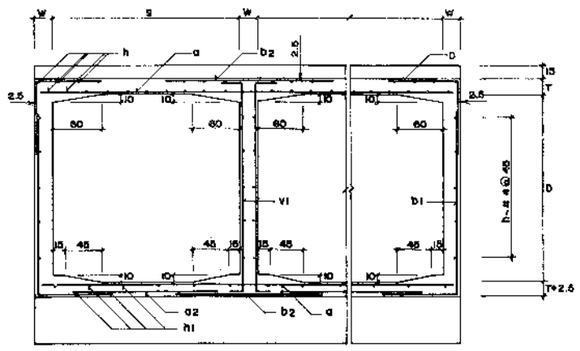
MULTIPLE BOXES

TRANSVERSE ELEVATION
SCALE 1 : 40



SINGLE BOX TYPE A
(FOR D ≤ 240 CM. AND W < 25 CM.)

SECTION A – A
SCALE 1:40



MULTIPLE BOXES TYPE A
(FOR D ≤ 240 CM. AND W < 25 CM.)

KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

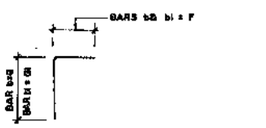
STANDARD DRAWING

RIGID FRAME R.C. BOX CULVERT

PLAN ELEVATIONS AND SECTIONS

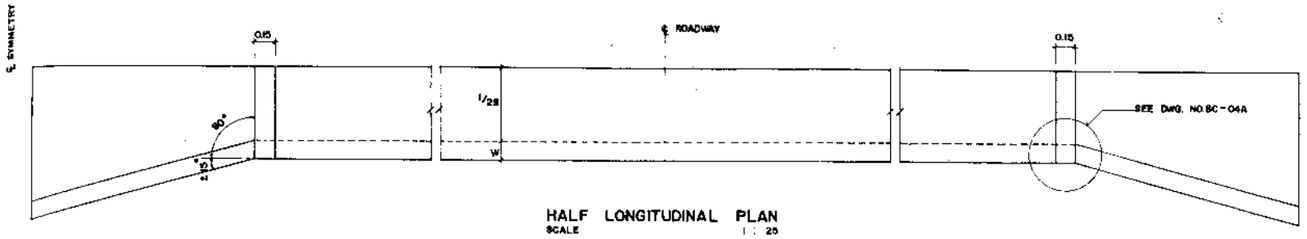
DESIGNED : DOH & CONSULTANT	CHECKED :	DATE JULY 1994
SUBMITTED : P. Buranpong. (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. BC-01A
		SHEET NO. 194

S	D	FILL HEIGHT CM.	T CM.	W CM.	BAR MARK a			BAR MARK a2			BAR MARK b&b1			BAR MARK b			BAR MARK b1			BAR MARK h			BAR MARK hv			BAR MARK v			BAR MARK v1			BAR MARK b2		
					#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	F CM.	G CM.	L CM.	G1 CM.	L CM.	#	@ CM.	NO	#	@ CM.	NO	#	@ CM.	NO	#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	L CM.
CLEAR SPAN 210 CM.	180 CM.	0 - 30	19	20	5	16	265	4	± 120	190	4	16.5	100	100	215	180	295	4	35	20	4	45	11	-	-	-	4	30	230	4	16.5	195
		31 - 60	16.5	20	5	16.5	265	4	± 120	190	4	16.5	100	100	215	180	295	4	30	19	4	45	11	-	-	-	4	30	230	4	16.5	195
		61 - 150	15	20	5	20	285	4	± 120	190	4	15	100	100	215	180	295	4	38	18	4	45	11	-	-	-	4	30	230	4	15	195
		151 - 225	15	20	5	17.5	265	4	± 120	190	4	12.5	100	100	215	180	295	4	45	17	4	45	11	-	-	-	4	30	230	4	12.5	195
		226 - 300	16.5	20	5	18.5	265	4	± 120	190	4	12.5	100	100	215	180	295	4	45	17	4	38	13	-	-	-	4	30	230	4	12.5	195
		301 - 375	17.5	20	5	14	265	4	± 120	190	4	11.5	100	100	215	180	295	4	45	17	4	30	15	-	-	-	4	30	230	4	11.5	195
		376 - 450	19	20	5	17.5	270	4	± 120	190	4	11	100	100	215	180	295	4	45	17	5	30	15	-	-	-	4	30	230	4	11	195
		451 - 600	22.5	20	6	15	270	4	± 120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12.5	195
		601 - 750	26	20	6	13	270	4	± 120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12.5	195
		751 - 900	31	20	6	15	270	4	± 120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12	195
		901 - 1050	34	20	6	16	270	4	± 120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12	195
		1051 - 1200	37	20	6	16	270	4	± 120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12	195
		1201 - 1500	41	20	6	16.5	270	4	± 120	190	5	12.5	102.5	102.5	220	182.5	300	4	45	17	6	30	15	-	-	-	4	30	230	5	12	195
						*																*											
	210 CM.	0 - 30	19	20	5	14	265	4	± 120	190	4	16.5	100	100	215	210	325	4	28	22	4	45	11	-	-	-	4	30	260	4	16.5	195
		31 - 60	16.5	20	5	16.5	265	4	± 120	190	4	16.5	100	100	215	210	325	4	30	21	4	45	11	-	-	-	4	30	260	4	16.5	195
		61 - 150	15	20	5	20	265	4	± 120	190	4	15	100	100	215	210	325	4	38	20	4	45	11	-	-	-	4	30	260	4	15	195
		151 - 225	15	20	5	17.5	265	4	± 120	190	4	12.5	100	100	215	210	325	4	45	19	4	45	11	-	-	-	4	30	260	4	12.5	195
		226 - 300	16.5	20	5	18.5	265	4	± 120	190	4	12.5	100	100	215	210	325	4	45	19	4	38	13	-	-	-	4	30	260	4	12.5	195
		301 - 375	17.5	20	5	14	265	4	± 120	190	4	11.5	100	100	215	210	325	4	45	19	4	30	15	-	-	-	4	30	260	4	11.5	195
		376 - 450	19	20	5	17.5	270	4	± 120	190	4	11.5	100	100	215	210	325	4	45	19	5	30	15	-	-	-	4	30	260	4	11.5	195
		451 - 600	22.5	20	6	15	270	4	± 120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12.5	195
		601 - 750	28	20	6	14	270	4	± 120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12.5	195
		751 - 900	31	20	6	13	270	4	± 120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12.5	195
		901 - 1050	34	20	6	12	270	4	± 120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12	195
		1051 - 1200	37	20	6	10	270	4	± 120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12	195
		1201 - 1500	41	20	6	16.5	270	4	± 120	190	5	12.5	102.5	102.5	220	212.5	330	4	45	19	6	30	15	-	-	-	4	30	260	5	12	195
						*																*											
	240 CM.	0 - 30	19	20	5	12.5	295	4	± 120	220	4	17.5	110	110	235	210	355	4	23	23	4	45	13	-	-	-	4	30	260	4	17.5	215
		31 - 60	17.5	20	5	15	295	4	± 120	220	4	17.5	110	110	235	210	335	4	25	24	4	45	13	-	-	-	4	30	260	4	17.5	215
		61 - 150	17.5	20	5	17.5	295	4	± 120	220	4	16.5	110	110	235	210	335	4	38	21	4	45	13	-	-	-	4	30	260	4	16.5	215
		151 - 225	17.5	20	5	15	295	4	± 120	220	4	14	110	110	235	210	335	4	45	20	4	45	13	-	-	-	4	30	260	4	14	215
		226 - 300	17.5	20	5	18	300	4	± 120	220	4	12.5	110	110	235	210	335	4	45	20	4	36	13	-	-	-	4	30	260	4	12.5	215
		301 - 375	20	20	5	16.5	300	4	± 120	220	4	12.5	110	110	235	210	335	4	45	20	4	30	17	-	-	-	4	30	260	4	12.5	215
		376 - 450	21	20	6	15	300	4	± 120	220	4	11	110	110	235	210	335	4	45	20	5	30	17	-	-	-	4	30	260	4	11	215
		451 - 600	25	20	6	12.5	300	4	± 120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	5	30	17	-	-	-	4	30	260	5	12.5	215
		601 - 750	29	20	6	11	300	4	± 120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	6	30	17	-	-	-	4	30	260	5	12.5	215
		751 - 900	33	20	6	10	300	4	± 120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	6	30	17	-	-	-	4	30	260	5	12.5	215
		901 - 1050	38	20	6	17	300	4	± 120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	6	30	17	-	-	-	4	30	260	5	12	215
		1051 - 1200	41	20	6	15	300	4	± 120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	6	30	17	-	-	-	4	30	260	5	12	215
		1201 - 1500	47	20	6	15	300	4	± 120	220	5	12.5	112.5	112.5	240	212.5	340	4	45	20	6	30	17	-	-	-	4	30	260	5	12	215
						*																*											
	240 CM.	0 - 30	19	20	5	12.5	295	4	± 120	220	4	16.5	110	110	235	240	365	4	23	25	4	45	13	-	-	-	4	30	290	4	16.5	215
		31 - 60	17.5	20	5	15	295	4	± 120	220	4	16.5	110	110	235	240	365	4	25	24	4	45	13	-	-	-	4	30	290	4	16.5	215
		61 - 150	17.5	20	5	17.5	295	4	± 120	220	4	15	110	110	235	240	365	4	38	21	4	45	13	-	-	-	4	30	290	4	15	215
		151 - 225	17.5	20	5	15	295	4	± 120	220	4	12.5	110	110	235	240	365	4	45	20	4	45	13	-	-	-	4	30	290	4	12.5	215
		226 - 300	17.5	20	5	20	300	4	± 120	220	4	12.5	110	110	235	240	365	4	45	20	4	38	13	-	-	-	4	30	290	4	12.5	215
		301 - 375	20	20	5	17.5	300	4	± 120	220	4	12.5	110	110	235	240	365	4	45	20	4	30	17	-	-	-	4	30	290	4	12.5	215
		376 - 450	21	20	6	15	300	4	± 120	220	4	11	110	110	235	240	365	4	45	20	5	30	17	-	-	-	4	30	290	4	11	215
		451 - 600	25	20	6	12.5	300	4	± 120	220	5	12.5	112.5	112.5	240	242.5	370	4	45	20	5	30	17	-	-	-	4	30	290	5	12.5	215
		601 - 750	29	20	6	11	300	4	± 120	220	5	12.5	112.5	112.5	240	242.5	370	4	45	20	6	30	17	-	-	-	4	30	290	5	12.5	215
		751 - 900	33	20	6	10	300	4	± 120	220	5	12.5	112.5	112.5	240	242.5	370	4	45	20	6	30	17	-	-	-	4	30	290	5	12.5	215
		901 - 1050	38	20	6	17	300	4	± 120	220	5	12.5	112.5	112.5	240	242.5	370	4	45	20	6	30	17	-	-	-	4	30	290	5	12	215
		1051 - 1200	41	20	6	15	300	4	± 120	220	5	12.5	112.5	112.5	240	242.5	370	4	45	20	6	30	17	-	-	-	4	30	290	5	12	215
		1201 - 1500	47	20	6	15	300	4	± 120	220	5	12.5	112.5	112.5	240	242.5	370	4	45	20	6	30	17	-	-	-	4	30	290	5	12	215
						*																*											
	270 CM.	0 - 30	19	20	6	18	330	4	± 120	240	4	15	120	120	255	240	375	4	23	26	4	45	13	-	-	-	4	30	290	4	15	235
		31 - 60	19	20	6	20	330	4	± 120	240	4	15	120	120	255	240	375	4	25	25	4	45	13	-	-	-	4	30	290	4	15	235
		61 - 150	19	20	6	22.5	330	4	± 120	240	4	14	120	120	255	240	375	4	38	22	4	45	13	-	-	-	4	30	290	4	14	235
		151 - 225	19	20	6	17.5	330	4	± 120	240	4	12.5	120	120	255	240	375	4	45	20	4	45	13	-	-	-	4	30	290	4	12.5	235
		226 - 300	20	20	6	16.5	330	4	± 120	240	4	12.5	120	120	255	240	375	4	45	20	4	38	17	-	-	-	4	30	290	4	12.5	235
		301 - 375	22.5	20	6	15	330	4	± 120	240	4	12.5	120	120	255	240	375	4	45	20	4	30	19	-	-	-	4	30	290	4	12.5	235
		376 - 450	25	20	6	12.5	330	4	± 120	240	4	11	120	120	255	240	375	4	45	20	5	30	19	-	-	-	4	30	290	4	11	235
		451 - 600	27.5	20	6	10	330	4	± 120	240	5	12.5	122.5	122.5	260	242.5	390	4	45	20	6	30	19	-	-	-	4	30	290	5	12.5	235
		601 - 750	32.5	20	6	17.5	330	4	± 120	240	5	12.5	122.5	122.5	260	242.5	390	4	45	20	6	30	19	-	-	-	4	30	290	5	12.5	235
		751 - 900	38	22.5	8	16.5	335	4	± 120	240	5	12.5	122.5	122.5	260	242.5	390	4	45	20	6	30	19	-	-	-	4	30	290	5	12.5	235
		901 - 1050	44	22.5	8	15.5	335	4	± 120	240	5	12.5	122.5	122.5	260	242.5	390	4	45	20	6	30	19	-	-	-	4	30	290	5	12	235
		1051 - 1200	48	22.5	8	14	335	4	± 120	240	5	12.5	122.5	122.5	260	242.5	390	4	45	20	6	30	19	-	-	-	4	30	290	5	12	235
		1201 - 1500	52	22.5	8	12	335	4	± 120	240	5	12.5	122.5	122.5	260	242.5	390	4	45	20	6	30	19	-	-	-	4	30	290	5	12	235
						*																*											
	270 CM.	0 - 30	19	22.5	6	19	330	4	± 120	240	4	15	120	120	255	120	255	4	23	28	4	45	13	4	30	255	4	30	320	4	15	235
		31 - 60	19	22.5	6	20	330	4	± 120	240	4	15	120	120	255	120	255	4	25	27	4	45	13	4	30	255	4	30	320	4	15	235
		61 - 150	19	22.5	6	22.5	330	4	± 120	240	4	15	120	120	255	120	255	4	38	24	4	45	13	4	30	255	4	30	320	4	15	235
		151 - 225	19	22.5	6	19	330	4	± 120	240	4	15	122.5	122.5	260	122.5	260	4	45	22	4	45	13	4	30	255	4	30	320	4	15	235
		226 - 300	19	22.5	6	17.5	330	4	± 120	240	4	15	122.5	122.5	260	122.5	260	4	45	22	4	38	17	4	30	255	4	30	320	4	15	235
		301 - 375	21.5	22.5	6	15	330	4	± 120	240	4	15	122.5	122.5	260	122.5	260	4	45	22	4	30	19	4	30	255	4	30	320	4	15	235
		376 - 450	24	22.5	6	14	330	4	± 120	240	5	14	122.5	122.5	260	122.5	260	4	45	22	5	30	19	4	25	255	4	30	320	5	12.5	235
		451 - 600	27.5	22.5	6	11	330	4	± 120	240	5	12.5	122.5	122.5	260	122.5	260	4	45	22	6	30	19	4	25	255	4	30	320	5	12.5	235
		601 - 750	32.5	22.5	6	18	335	4	± 120	240	5	12.5	122.5	122.5	260	122.5	260	4	45	22	6	30	19	4	25	255	4	30	320	5	12.5	235
		751 - 900	38	22.5	8	17.5	335	4	± 120	240	5	12.5	122.5	122.5	260	122.5	260	4	45	22	6	30	19	4	25	255	4	30	320	5	12	235
		901 - 1050	44	22.5	8	15.5	335	4	± 120	240	5	12.5	122.5	122.5	260	122.5	260	4	45	22	6	30	19	4	25	255	4	30	320	5	12	235
		1051 - 1200	48	22.5	8	14	335	4	± 120	240	5	12.5	122.5	122.5	260	122.5	260	4	45	22	6	30	19	4	25	255	4	30	320	5	12	235
		1201 - 1500	52	22.5	8	12	335	4	± 120	240	5	12.5	122.5	122.5	260	122.5	260	4	45	22	6	30	19	4	25	255	4	30	320	5	12	235
						*																*											

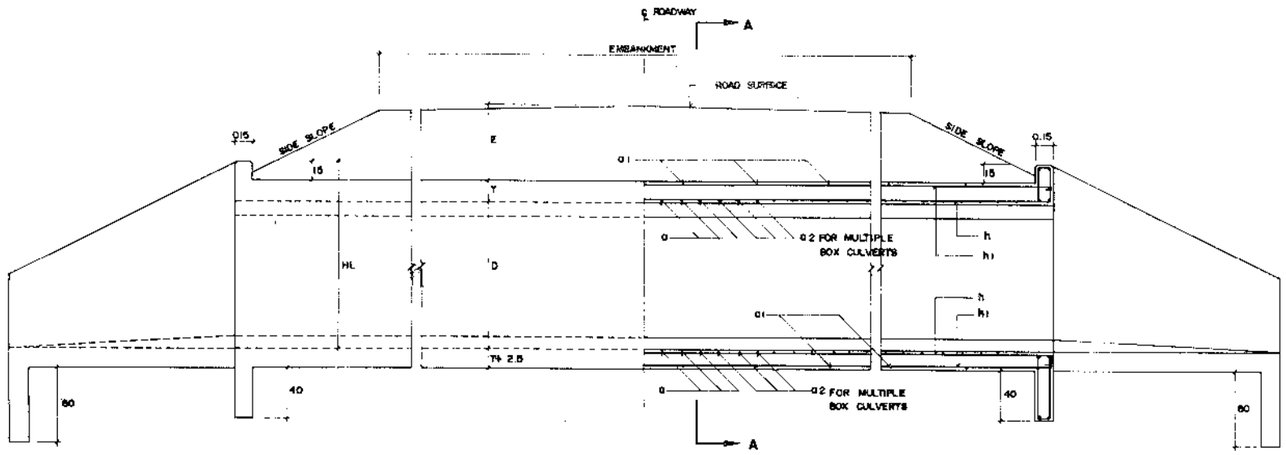


BENDING DETAILS FOR BARS b & b1
NOT TO SCALE

S	D	FILL HEIGHT CM.	T CM.	W CM.	BAR MARK a			BAR MARK a2			BAR MARK b&b1			BAR MARK b			BAR MARK b1			BAR MARK h			BAR MARK hv			BAR MARK v			BAR MARK v1			BAR MARK b2		
					#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	F CM.	G CM.	L CM.	G1 CM.	L CM.	#	@ CM.	NO	#	@ CM.	NO	#	@ CM.	NO	#	@ CM.	L CM.	#	@ CM.	L CM.	#	@ CM.	L CM.
CLEAR SPAN 270 CM.	270 CM.	0 - 30	20	22.5	6	17.5	360	4	± 120	260	4	15	130	130	275	130	275	4	21.5	30	4	45	12	4	30	255	4	30	320	4	19	260
		31 - 60	20	22.5	6	18	360	4	± 120	260	4	15	130	130	275	130	275	4	23.5	28	4	45	15	4	30	255	4	30	320	4	18	260
		61 - 150	20	22.5	6	19	360	4	± 120	260	5	19	132.5	132.5	280	132.5	280	4	30	28	4	45	15	4	30	255	4	30	320	5	19	260
		151 - 225	20	22.5	6	19.5	360	4	± 120	260	5	19	132.5	132.5	280	132.5	280	4	45	25	4	45	15	4	30	255	4	30	320	5	19	260
		226 - 300	21.5	22.5	6	15	360	4	± 120	260	5	15	132.5	132.5	280	132.5	280	4	45	25	4	38	17	4	30	255	4	30	320	5	15	260
		301 - 375	24	22.5	6	13	365	4	± 120	260	5	15	132.5	132.5	280	132.5	280	4	45	25	4	30	21	4	30	255	4	30	320	5	15	260
		376 - 450	26	22.5	6	11	365	4	± 120	260	5	14	132.5	132.5	280	132.5	280	4	45	25	5	30	21	4	30	255	4	30	320	5	14	260
		451 - 600	30	22.5	6	17.5	370	4	± 120	260	5	12.5	132.5	132.5	280	132.5	280	4	45	25	6	30	22	4	28	255	4	30	320	5	13.5	260
		601 - 750	36	22.5	6	14	370	4	± 120	260	5	12.5	132.5	132.5	280	132.5	280	4	45	25	6	30	21	4	28	255	4	30	320	5	12.5	260
		751 - 900	42.5	22.5	8	15.5	370	4	± 120	260	5	12.5	132.5	132.5	280	132.5	280	4	45	25	6	30	21	4	28	255	4	30	320	5	12.5	260
		901 - 1050	48	22.5	6	14	370	4	± 120	260	5	11	132.5	132.5	280	132.5	280	4	45	25	6	30	21	4	28	256	4	30	320	5	12	260
		1051 - 1200	51	22.5	6	13	370	4	± 120	260	5	11	132.5	132.5	280	132.5	280	4	45	25	6	30	21	4	28	255	4	30	320	5	12	260
		1201 - 1500	55	22.5	6	11	370	4	± 120	260	5	11	132.5	132.5	280	132.5	280	4	45	25	8	30	21	4	25	255	4	30	320	5	12	260
						*																*											
	300 CM.	0 - 30	20	25	6	17.5	360	4	± 120	260	4	15	130	130	275	130	275	4	21.5	30	4	45	15	4	30	265	4	30	350	4	15	260
		31 - 60	20	25	6	20	360	4	± 120	260	4	15	130	130	275	130	275	4	22.5	37	4	45	15	4	30	265	4	30	350	4	15	260
		61 - 150	20	25	6	21.5	360	4	± 120	260	5	15	132.5	132.5	280	132.5	280	4	30	34	4	45	15	4	30	265	4	30	350	5	15	260
		151 - 225	20	25	6	17.5	360	4	± 120	260	5	14	132.5	132.5	280	132.5	280	4	45	34	4	45	15	4	28	265	4	30	350	5	14	260
		226 - 300	21.5	25	6	16.5	360	4	± 120	260	5	12.5	132.5	132.5	280	132.5	280	4	45	31	4	45	17	4	28	265	4	30	350	5	12.5	260
		301 - 375	22.5	25	6	13	365	4	± 120	260	5	12.5	132.5	132.5	280	132.5	280	4	45	31	4	30	21	4	25	265	4	30	350	5	12.5	260
		376 - 450	25	25	6	12	365	4	± 120	260	6	12.5	132.5	132.5	280	132.5	280	4	45	31	5	30	21	4	25	265	4	30	350	5	12.5	260
		451 - 600	30	25	8	15	370	4	± 120	260	5	12.5	132.5	132.5	280	132.5	280	4	45	31	5	30	21	4	25	265	4	30	350	5	12.5	260
		601 - 750	36	25	8	16.5	370	4	± 120	260	5	12.5	132.5	132.5	280	132.5	280	4	45	31	6	30	21	4	25	265	4	30	350	5	12.5	260
		751 - 900	42.5	25	8	15.5	370	4	± 120	260	5	12.5	132.5	132.5	280	132.5	280	4	45	31	6	30	21	4	25	265	4	30	350	5	12.5	260
		901 - 1050	48	25	8	14	370	4	± 120	260	5	11	132.5	132.5	280	132.5	280	4	45	31	6	30	21	4	25	265	4	30	350	5	12.5	260
		1051 - 1200	51	25	8	13	370	4	± 120	260	5	11	132.5	132.5	280	132.5	280	4	45	31	6	30	21	4	25	265	4	30	350	5	12	260
		1201 - 1500	55	25	8	11	370	4	± 120	260	5	11	132.5	132.5	280	132.5	280	4	45	31	8	30	21	4	25	265	4	30	350	5	12	260
						*																*											
	300 CM.	0 - 30	21.5	25	6	17.5	400	4	± 120	290	4	12.5	140	140	295	140	295	4	22.5	36	4	45	17	4	28	290	4	30	350	4	12.5	260
		31 - 80	21.5	25	6	19	400	4	± 120	290	4	12.5	140	140	295	140	295	4	28	37	4	45	17	4	28	290	4	30	350	4	12.5	260
		81 - 150	21.5	25	6	17.5	400	4	± 120	290	5	14.5	142.5	142.5	300	142.5	300	4	38	33	4	45	17	4

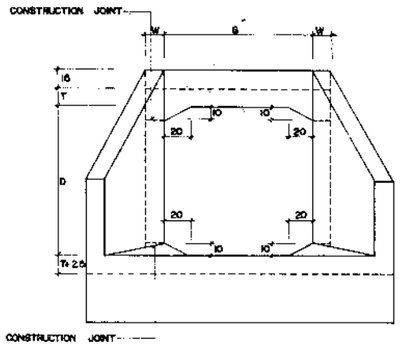


HALF LONGITUDINAL PLAN
SCALE 1 : 25

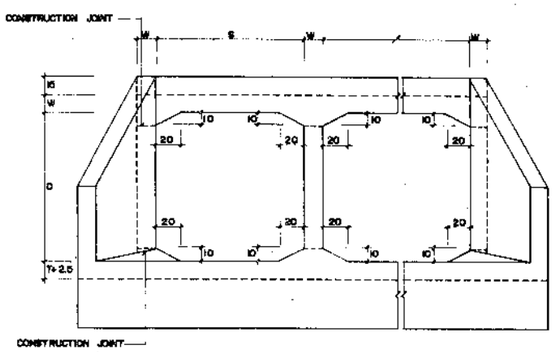


HALF LONGITUDINAL ELEVATION
SCALE 1 : 25

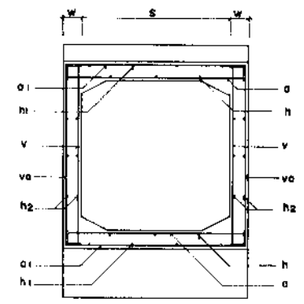
HALF LONGITUDINAL SECTION
SCALE 1 : 25



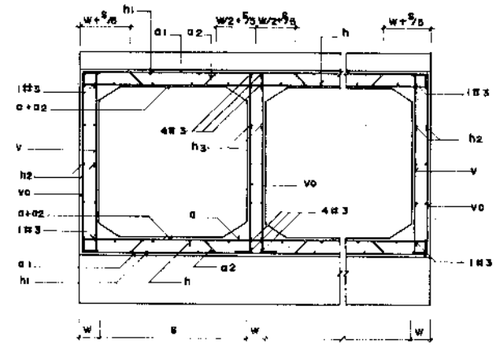
ELEVATION
SCALE 1 : 25



ELEVATION
SCALE 1 : 25



SECTION A-A
SCALE 1 : 25



SECTION A A
SCALE 1 : 25

NOTES :

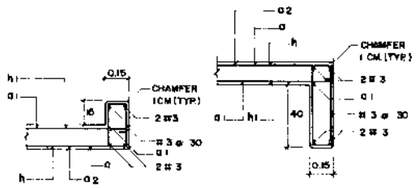
1. DESIGN PARAMETERS ARE
   - 1.1 LIVE LOADING : HS 20-44
   - 1.2 WORKING STEEL STRESSES :
     - PLAIN BARS, f_s = 1200 KG/CM^2
     - DEFORMED BARS, f_s = 1400 KG/CM^2
   - 1.3 WORKING CONCRETE STRESS, f_c = 80 KG/CM^2
2. CONCRETE SHALL HAVE THE 28 DAYS MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASED ON 15x15x15 CM. CUBE SAMPLES, OF 180 KG/CM^2 AND SHALL HAVE A MINIMUM CEMENT CONTENT OF 320 KG. PER CUBIC METER OF CONCRETE. THE FOLLOWING IS THE SUGGESTED CONCRETE MIX PROPORTIONS PER CUBIC METER :
   - TYPE I PORTLAND CEMENT 350 KG.
   - SAND 0.45 M^3
   - CRUSHED ROCK OR GRAVEL 0.85 M^3

   WITH THE MAXIMUM SLUMP OF 10 CM.
3. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
4. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER
5. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
6. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SPECIFICATIONS SHALL BE USED INSTEAD OF TYPE I PORTLAND CEMENT.
7. CLEAR CONCRETE COVER SHALL BE 2.5 CM. EXCEPT THE BOTTOM OF BOTTOM SLABS AND OUTSIDE FACES OF THE EXTERIOR WALLS WHERE A CLEAR COVER OF 5.0 CM. SHALL BE PROVIDED.
8. WORK THIS DRAWING WITH DWG. NO. BC-04 A.
9. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
10. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 75/6.
11. THIS DRAWING SHALL BE USED FOR EXTENSION OF EXISTING R.C. BOX CULVERTS WHICH HAVE CONCRETE COVERING 2.5 CM ONLY

TABLE OF TOP AND BOTTOM SLAB REINFORCEMENTS

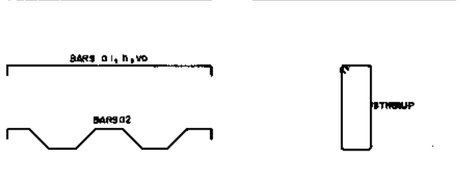
CLEAR SPAN	DEPTH OF FILL, E CM.	T CM.	SINGLE BOX CULVERT												MULTIPLE BOX CULVERT											
			a			a1			h			h1			a		a1			a2		h			h1		
			#	@	L	#	@	L	#	@	NO.	#	@	NO.	#	@	#	@	#	@	#	@	#	@	#	@
60 CM.	0 – 30	15	5	15	108	3	40	108	4	30	8	3	45	6	5	32	3	45	5	32	4	30	3	45		
	31 –	15	4	22	108	3	60	108	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45		
	61 – 150	15	4	22	108	3	60	108	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45		
	151 – 225	15	4	22	108	3	60	108	4	30	8	3	45	6	4	44	3	60	4	44	4	30	3	45		
90 CM.	0 – 30	17.5	5	15	138	3	45	138	4	25	12	3	40	8	5	30	3	45	5	30	4	25	3	40		
	31 – 60	15	4	15	138	3	60	138	4	40	8	3	40	8	4	30	3	60	4	30	4	40	3	40		
	61 – 150	15	4	22	138	3	60	138	4	40	8	3	40	8	4	44	3	60	4	44	4	40	3	40		
	151 – 225	15	4	22	138	3	60	138	4	40	8	3	40	8	4	44	3	60	4	44	4	40	3	40		
120 CM.	0 – 30	17.5	5	13	168	3	45	168	4	25	14	3	36	10	5	28	3	45	5	28	4	25	3	40		
	31 – 60	15	5	15	168	3	60	168	4	30	12	3	36	10	5	32	3	60	5	32	4	30	3	40		
	61 – 150	15	4	15	168	3	60	168	4	36	10	3	36	10	4	30	3	60	4	30	4	40	3	40		
	151 – 225	15	4	15	168	3	60	168	4	36	10	3	36	10	4	30	3	60	4	30	4	40	3	40		
150 CM.	0 – 30	19	5	18	205	3	45	205	4	25	16	3	45	10	5	36	3	45	5	30	4	25	3	45		
	31 – 60	17.5	5	22	205	3	60	205	4	30	14	3	45	10	6	44	3	60	6	44	4	30	3	45		
	61 – 150	15	5	18	198	3	60	198	4	45	10	3	45	10	5	32	3	60	5	32	4	45	3	45		
	151 – 225	17.5	5	15	198	3	60	198	4	45	10	3	45	10	5	32	3	60	5	32	4	45	3	45		
180 CM.	0 – 30	20	5	12	228	3	45	228	4	21	22	3	45	12	6	24	3	45	6	24	4	21	3	45		
	31 – 60	19	5	14	228	3	60	228	4	30	16	3	45	12	6	28	3	60	6	28	4	30	3	45		
	61 – 150	17.5	5	15	228	3	60	228	4	45	12	3	45	12	6	30	3	60	6	30	4	45	3	45		
	151 – 225	17.5	5	14	228	3	60	228	4	45	12	3	45	12	6	28	3	60	5	28	4	45	3	45		

3 = ø 3/8" OR 9 MM. # 4 = ø 1/2" OR 12 MM. NO. = TOTAL AMOUNT OF BARS
5 = ø 5/8 OR 16 MM. # 6 = ø 3/4" OR 20 MM. L = TOTAL LENGTH OF EACH BAR



TOP BEAM BOTTOM BEAM

END BEAM DETAILS
NOT TO SCALE



BAR BENDING DIAGRAMS
NOT TO SCALE

TABLE OF VERTICAL WALL REINFORCEMENT

DEPTH D CM.	WIDTH W CM.	SINGLE BOX CULVERT						MULTIPLE BOX CULVERTS					
		DEPTH OF FILL (E) 0 – 225 CM.						DEPTH OF FILL (E) 0 – 225 CM.					
		REINFORCING BAR V		REINFORCING BAR Vo		REINFORCING BAR h		EXTERIOR WALL			INTERIOR WALL		
								REINFORCING BAR V		TOTAL AMOUNT OF h2 (# 3) EACH WALL	REINFORCING BAR Vo		TOTAL AMOUNT OF a3 (# 3) EACH WALL
		#	@	#	@	#	@	#	@		#	@	
60	20	4	30	3	30	3	30	4	30	8	3	40	4
90	20	4	30	3	30	3	30	4	30	12	3	40	6
120	20	4	30	3	30	3	30	4	30	12	3	40	8
150	22.5	4	30	3	30	3	30	4	30	16	3	40	8
180	25	4	30	3	30	3	30	4	30	20	3	40	10

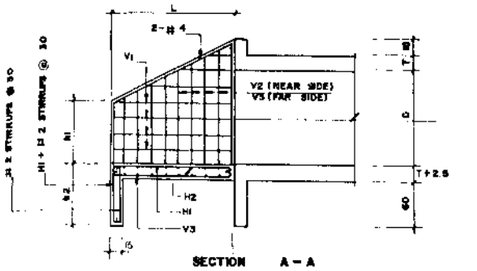
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

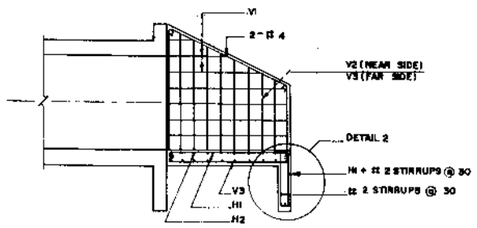
SIMPLE SPAN BOX CULVERT

PLAN, ELEVATIONS, SECTIONS AND DETAILS

DESIGNED: DOH & CONSULTANT CHECKED:	DATE JULY 1994
SUBMITTED: P. Buraparp. (DIRECTOR OF LOCATION & DESIGN DIVISION)	SCALE AS SHOWN
APPROVED: (DIRECTOR GENERAL)	DWG. NO. BC-03A
	SHEET NO. 186



SECTION A – A
NOT TO SCALE



SECTION B – B
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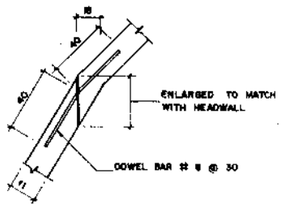
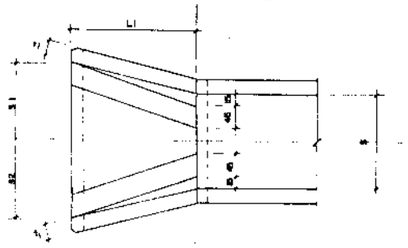
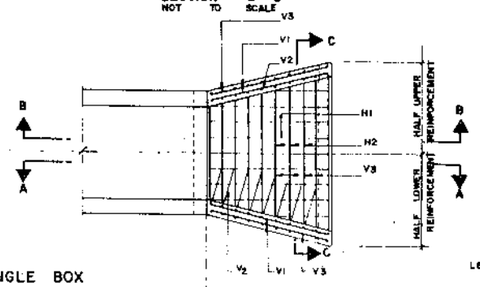
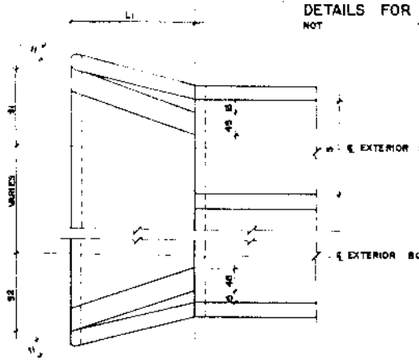


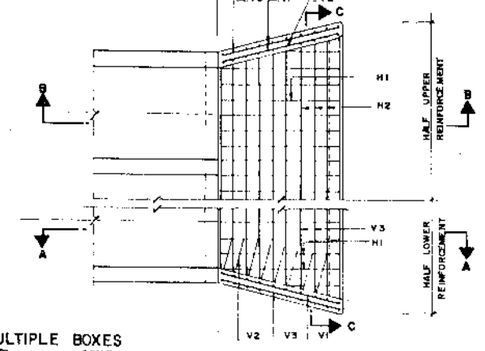
DETAIL 1
SCALE 1:20



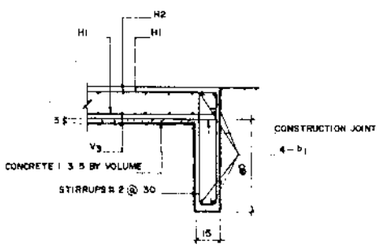


DETAILS FOR SINGLE BOX
NOT TO SCALE

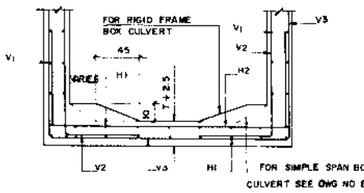


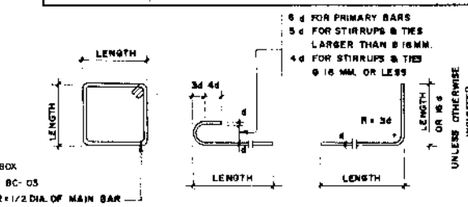


DETAILS FOR MULTIPLE BOXES
NOT TO SCALE



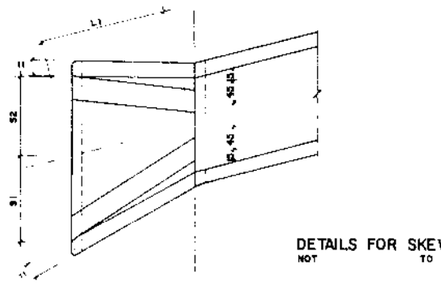
DETAIL 2
SCALE 1:20

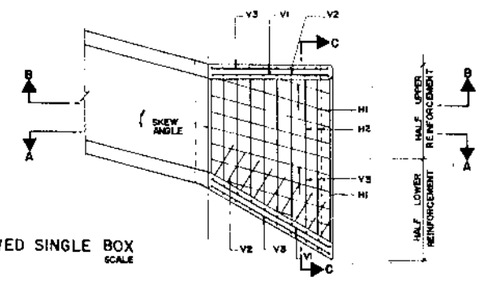




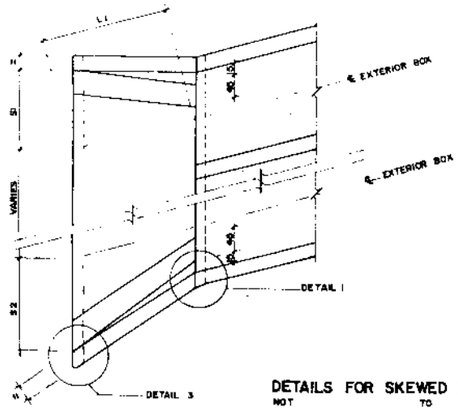
PLAIN BAR DEFORMED BAR

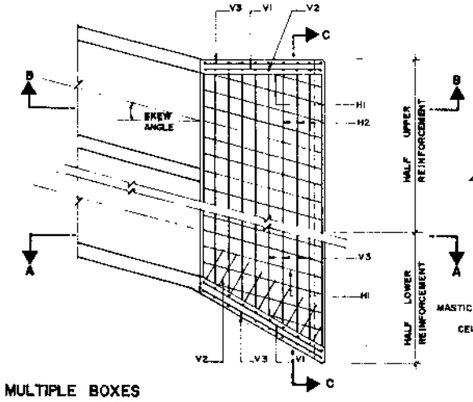
6 d FOR PRIMARY BARS
5 d FOR STIRRUPS & TIES LARGER THAN 8 16MM.
4 d FOR STIRRUPS & TIES @ 16 MM. OR LESS





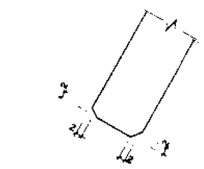
DETAILS FOR SKEWED SINGLE BOX
NOT TO SCALE



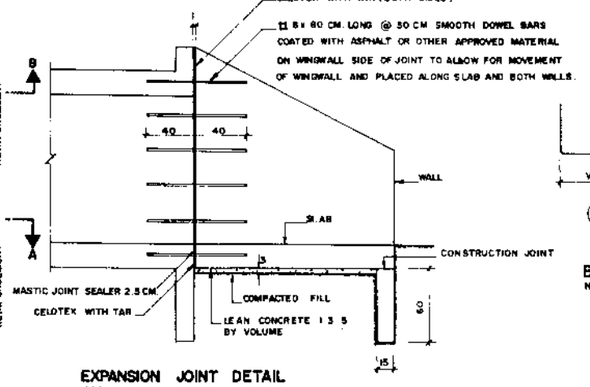


DETAILS FOR SKEWED MULTIPLE BOXES
NOT TO SCALE

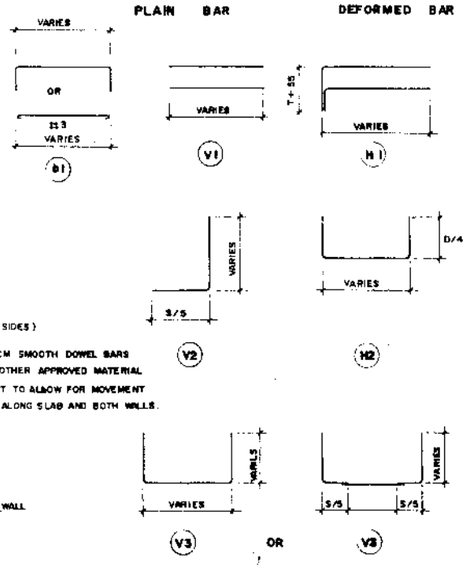
SECTION C – C
NOT TO SCALE



DETAIL 3
NOT TO SCALE



EXPANSION JOINT DETAIL
SCALE 1:25



BAR BENDING DIAGRAMS
NOT TO SCALE

TABLE OF REINFORCEMENT FOR HEADWALL OF SINGLE BOX CULVERT

SIZE OF CULVERT S	SIZE OF CULVERT D	L	h1	t1	CULVERTS SKEW 0° L1	SKEW 0° B1	SKEW 0° B2	SKEW 15° L1	SKEW 15° B1	SKEW 15° B2	SKEW 30° L1	SKEW 30° B1	SKEW 30° B2	SKEW 45° L1	SKEW 45° B1	SKEW 45° B2	V1 #	V1 @	V2 #	V2 @	V3 #	V3 @	H1 #	H1 @	H2e #	H2e @	b1 #	b1 NO.
60	60	95	50	15	90	54	54	93	54	57	104	57	66	127	66	96	3	30	3	20	3	20	3	30	3	20	3	4
90	60	95	50	15	90	69	69	93	69	73	104	75	83	127	83	111	3	30	3	20	3	20	3	30	3	20	3	4
90	90	145	55	15	140	82	82	145	82	98	161	88	104	196	104	147	3	30	3	20	3	20	3	30	3	20	3	4
120	90	145	55	15	140	98	98	145	98	103	161	103	119	196	119	152	3	30	3	20	3	20	3	30	3	20	3	4
120	120	185	65	15	180	108	108	186	108	115	207	115	133	254	135	192	3	30	3	20	3	20	3	30	3	20	3	4
150	90	145	55	15	140	112	112	145	112	118	161	118	134	196	134	177	3	30	3	20	3	20	3	30	3	20	3	4
150	120	185	65	15	180	123	123	186	123	131	207	131	151	254	151	207	3	30	3	20	3	20	3	30	3	20	3	4
150	150	235	70	17.5	230	136	136	238	138	146	265	146	172	325	172	243	3	30	3	15	3	15	3	30	3	15	3	4
180	120	185	65	15	180	138	138	186	138	146	207	146	166	254	166	222	3	30	3	15	3	15	3	30	3	15	3	4
180	150	235	70	17.5	230	152	152	238	152	161	265	161	187	325	187	259	3	30	3	15	3	15	3	30	3	15	3	4
180	180	275	80	20	270	162	162	278	162	173	311	173	204	382	204	287	3	30	3	10	3	10	3	30	3	10	3	4
210	180	275	80	20	270	177	177	279	177	188	311	188	219	382	219	302	3	30	4	20	4	20	4	30	4	20	4	4
210	210	320	85	20	315	189	189	326	189	202	363	202	238	445	238	335	3	30	4	16	4	16	4	30	4	16	4	4
240	210	320	85	20	315	204	204	326	204	217	363	217	253	445	253	350	3	30	4	16	4	16	4	30	4	16	4	4
240	240	365	95	20	360	216	216	372	216	231	415	231	272	508	272	385	3	30	4	12	4	12	4	30	4	12	4	4
270	240	365	95	20	360	231	231	372	231	248	415	246	287	508	287	388	3	30	4	12	4	12	4	30	4	12	4	4
270	270	405	100	22.5	400	242	242	414	242	259	461	259	303	565	303	425	3	30	4	10	4	10	4	30	4	10	4	4
300	270	405	100	22.5	400	257	257	414	257	274	461	274	318	565	318	443	3	30	4	10	4	10	4	30	4	10	4	4
300	300	455	115	25	450	270	270	466	270	289	518	289	340	636	340	478	4	30	5	12	5	12	4	30	5	12	5	4
330	300	455	115	25	450	285	285	466	285	304	518	304	388	636	385	484	4	30	5	12	5	12	4	30	5	12	5	4
330	330	505	120	27.5	500	298	298	517	298	320	576	320	376	707	378	531	4	30	5	10	5	10	4	30	5	10	5	4
360	330	505	120	27.5	500	314	314	517	314	335	576	335	381	707	391	546	4	30	5	10	5	10	4	30	5	10	5	4
360	360	545	130	30	540	324	324	558	324	347	632	347	408	763	408	575	4	30	6	12	6	12	4	30	6	12	6	4

3 = Ø 3/8" OR 9 MM., # 4 = Ø 1/2" OR 12 MM., # 5 = Ø 5/8" OR 16 MM., # 6 = Ø 3/4" OR 20 MM. NO. = TOTAL AMOUNT OF BARS

NOTES :

1. DESIGN PARAMETERS ARE
   - 1.1 LIVE LOADING : HS 20-44
   - 1.2 WORKING STEEL STRESSES :
     - PLAIN BARS, f_s = 1,200 KG./CM.^{2}
     - DEFORMED BARS, f_s = 1,400 KG./CM.^{2}
   - 1.3 WORKING CONCRETE STRESS, f_c = 60 KG./CM.^{2}
2. CONCRETE SHALL HAVE THE 28-DAY MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASED ON 15x15 x 15 CM. CUBE SAMPLES, OF 180 KG./CM.^{2} AND SHALL HAVE A MINIMUM CEMENT CONTENT OF 320 KG. PER CUBIC METER OF CONCRETE. THE FOLLOWING IS THE SUGGESTED CONCRETE MIX PROPORTIONS PER CUBIC METER :

TYPE I PORTLAND CEMENT	320	KG.
SAND	0.43	M.^{3}
CRUSHED ROCK OR GRAVEL	0.86	M.^{3}
WITH THE MAXIMUM SLUMP OF	10	CM.

3. CLEAR CONCRETE COVER SHALL BE 5.0 CM. EXCEPT THE BOTTOM OF BOTTOM SLABS OR WALLS AT WHICH CLEAR COVER OF 7.5 CM. SHALL BE PROVIDED.
4. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
5. REBARS # 4 OR LARGER SHALL BE TIS 24 GRADE SD 30 DEFORMED BARS, OTHERS SHALL BE TIS 20 GRADE SR 24 PLAIN BARS UNLESS OTHERWISE INDICATED.
6. LOCATIONS OF LAP SPLICE OF REBARS SHALL BE APPROVED BY THE ENGINEER.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BARS AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BARS.
8. IN CASE OF SALINE PROTECTION, HIGH SULPHATE RESISTANT PORTLAND CEMENT TYPE 5 CONFORMING TO TIS 15 SPECIFICATIONS SHALL BE USED INSTEAD OF TYPE I PORTLAND CEMENT.
9. WORK THIS DRAWING WITH DWG. NOS. BC-01, BC-02, BC-03 AS REQUIRED.
10. THIS DRAWING IS ADAPTED FROM DOH DWG. NO. 78/9.
11. THIS DRAWING SHALL BE USED FOR NEW CONSTRUCTION OF R.C. BOX CULVERT

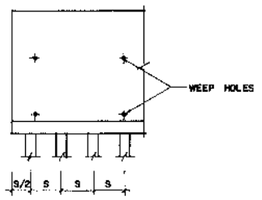
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

R.C. HEADWALL FOR BOX CULVERT

DIMENSIONS, REINFORCEMENT AND DETAILS

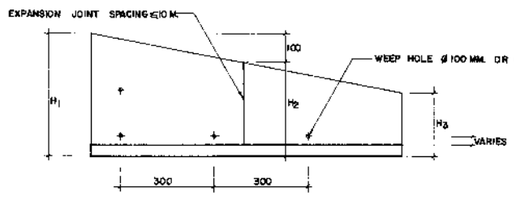
DESIGNED : DOH. & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : P. Banyong (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. BC-04A
		SHEET NO. 19



SIDE VIEW OF WALL SHOWING THE POSITION OF PILE ALONG THE LENGTH OF WALL

SCALE 1:100

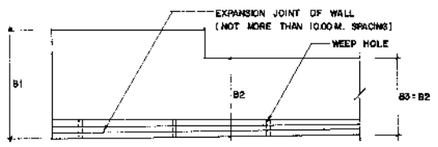
NOTE : S = 2.50 M. FOR HEIGHT (H) ≤ 11.10 M.
OTHERWISE S = 1.00 M.



SIDE VIEW OF WALL IN CASE OF HEIGHT OF WALL VARIES ALONG THE LENGTH OF WALL

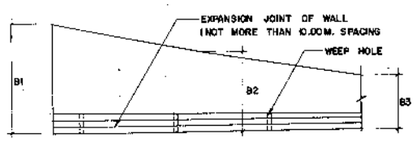
SCALE 1:100

NOTE : THE WIDTH OF BASE B1,B2 & B3 VARIES ALONG THE HEIGHT H1, H2 & H3 OF WALL



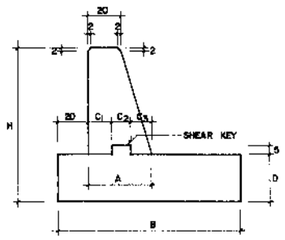
PLAN OF BASE OF PILE FOOTING IN CASE OF HEIGHT OF WALL VARIES ALONG THE LENGTH OF WALL

SCALE 1:100



PLAN OF BASE OF SPREAD FOOTING IN CASE OF HEIGHT OF WALL VARIES ALONG THE LENGTH OF WALL

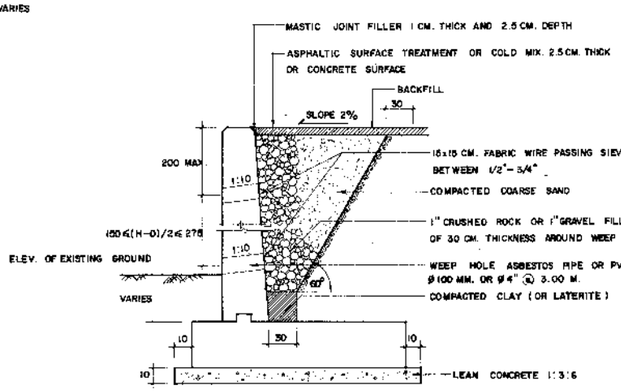
SCALE 1:100



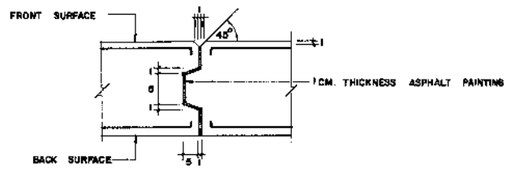
SECTION OF RETAINING WALL SHOWING DIMENSIONS AND THE POSITION OF SHEAR KEY

SCALE 1:100

NOTES : IN CASE OF HEIGHT, H, FALLS WITHIN THE RANGE OF THE HEIGHT GIVEN IN THE ABOVE TABLE, THE VALUES (D, A, C1, C2 AND C3) FOR THE HEIGHT H CAN BE CALCULATED BY VARYING THESE VALUES LINEARLY IN THE RANGE OF HEIGHT GIVEN. THE VALUE B SHALL BE CALCULATED IN THE SAME MANNER AS THE RETAINING WALL WITH MAT FOOTING. THE VALUE B IN THE ABOVE TABLE CAN BY APPLICIABLE FOR THE RETAINING WALL WITH PILE FOOTING. FOR ANY OF H WHICH IS HIGHER THAN REQUIRED HEIGHT, e.g., FOR H = 5.50 M. USE B = 6.00 M.



DETAIL OF BASE OF RETAINING WALL, WEEP HOLE AND EARTH BACKFILL



EXPANSION JOINT OF RETAINING WALL DETAIL

CONSTRUCTION SPECIFICATION

1. GENERAL NOTE FOR RETAINING WALL

1.1 CONCRETE SHALL HAVE MINIMUM UTIMATE STRENGTH OF 210 KG./CM.^{2} FOR 15x15x15 CUBE AT 28 DAYS AND CONCRETE SLUMP TEST SHALL NOT EXCEED 10 CM.

AN APPROXIMATE MIX. DESIGN OF CONCRETE PER CUBIC METER IS RECOMMENDED AS FOLLOW :-

PORTLAND CEMENT TYPE I (CONFORM TO TIS. 15 PART I)	325 KGS.
SAND	430 LITRES
CRUSHED ROCK OR GRAVEL	860 LITRES
W/C RATIO	0.45-0.60 BY WEIGHT

1.2 AFTER THE FOUNDATION UNDERNEATH IS COMPACTED, THE LEAN CONCRETE SHALL BE PLACED FOR 10 CM. THICK AS THE BASE WITH 10 CM. AROUND WIDER THAN THE FOUNDATION. THE MIX. DESIGN OF THE LEAN CONCRETE IS 1:3:6 BY VOLUME.

1.3 CONCRETE COVER SHALL BE 2.5 CM. EXCEPT FOR THE FOUNDATION STRUCTURE THE CONCRETE COVER SHALL BE 5 CM. IN CASE OF MARINE CLAY, CONCRETE COVER FOR THE OTHER PART OF THE WALL AND THE FOUNDATION FACING THE MARINE SOIL SHALL BE ADDED 2.5 CM. FROM THE DIMENSIONS SHOWN IN THIS DRAWING.

1.4 EARTH BACKFILL SHALL BE SANDY SOIL OR GRAVEL SOIL OR ROCK OR OTHE SOIL IN THE CONSTRUCTION AREA HAVING THE SAME QUALITIES BY THE APPROVAL OF THE OWNER DMSION.

2. SPECIAL NOTES OF RETAINING WALL USING SPREAD FOOTING.

2.1 THE ELEVATION OF THE FOUNDATION SHALL BE NOT LESS THAN 50 CM. FROM THE EXISTING GROUND LINE MEASURED FROM THE SURFACE OF THE LEAN CONCRETE IN NO. 1.2

2.2 EARTH BACKFILL SHALL BE SUPPORT THE ALLOWABLE LOAD NOT LESS THAN P Tons/m.^{2} AS TABLE FOLLOWS :-

HEIGHT OF WALL (m.)	5.0<H≤6.0	4.0<H≤6.0	3.0<H≤4.0	2.0<H≤3.0	H≤2.0
P, Tons/m.^{2}	22.0	17.0	14.0	12.0	6.5

ALL THOSE CONSIDER WITH IN NOTES NO. 3

3. SPECIAL NOTE FOR RETAINING WALL WITH PILE FOUNDATION

3.1 THE ELEVATION OF THE FOUNDATION SHALL BE AT LEAST THE SAME LEVEL AS THE EXISTING GROUND MEASURED FROM THE SURFACE OF THE LEAN CONCRETE

3.2 VARIOUS SIZES OF RC. PILE GIVEN IN THIS DRAWING HAVE THE DETAIL AS FOLLOWS :-

3.2.1 RC. PILE SIZE 35x35 CM.^{2} SHALL BE DRIVEN UNTIL IT REACHES ALLOWABLE LOAD WHICH MUST NOT BE LESS THAN 35 TONS IF THE DEPTH OF THE DRIVEN PILE IS LESS THAN 10.00 M., PILE LOAD TEST MUST BE PERFORMED TO ENSURE THAT ALLOWABLE TENSILE STRENGTH IS NOT LESS THAN 15 TONS.

3.2.2 RC. PILE SIZE 20x20 CM.^{2} SHALL BE DRIVEN UNTIL IT REACHES ALLOWABLE LOAD WHICH MUST NOT BE THAN 12 TONS IF THE DEPTH OF THE DRIVEN PILE IS LESS THAN 10.00 M., PILE LOAD TEST MUST BE PERFORMED TO ENSURE THAT ALLOWABLE TENSILE STRENGTH IS NOT LESS THAN 4 TONS

3.2.3 RC. PILE SIZE 18x18 CM.^{2} SHALL BE DRIVE UNTIL IT REACHES ALLOWABLE LOAD WHICH MUST NOT BE LESS THAN 2 TONS

3.2.4 TO TEST THE ALLOWABLE LOAD OF PILE, THE METHOD OF "STATIC PILE LOAD TEST" SHALL BE CONDUCTED AND THE CALCULATION OF ALLOWABLE LOAD CAN BE OBTAINED AS FOLLOW :-

A. IN CASE OF THE TESTED PILE CAN RESIST MORE THAN GIVEN ALLOWABLE LOAD FOR PILE SIZE IN 3.2.1, 3.2.2 AND 3.2.3, THE AVERAGE SETTLEMENT RATIO OF PILE (TOTAL SETTLEMENT OF PILE HEAD AT THAT TIME / LOADING SUBJECTED TO PILE HEAD AT THE SAME TIME.) SHALL NOT EXCEED 0.025 CM./PILE IN 24 HOURS THEN ALLOWABLE LOAD CAN BE OBTAINED AS A HALF OF SUBJECTED LOAD (FACTOR OF SAFETY = 2.0)

B. IN CASE OF SETTLEMENT RATIO EXCEEDING THE VALUE INDICATED IN A. OR INCREASING LOAD ON PILE HEAD UNTIL ITS FAILURE, ALLOWABLE LOAD IS OBTAINED BY DEVIDING THAT LOAD BY 2.5 (FACTER OF SAFTY = 2.5)

IN CASE OF STATIC PILE LOAD TEST CAN NOT BE PERFORMED, ALLOWABLE LOAD MIGTH BE COMPUTED BY PILE DRIVING FORMULAS SUCH AS HILEY FORMULA, JUNBO FORMULA OR DANISH FORMULA USING FACTOR OF SAFETY AT LEAST 3.0

3.2.5 CONCRETE FOR PILE SHALL HAVE ULTIMATE COMPRESSIVE STRENGTH AT LEAST 300 KG/CM.^{2} FOR 15x15x15 CUBE AT 28 DAYS AND CONCRETE SLUMP TEST CAN NOT EXCEED 8 CM.

AN APPROXIMATE MIX DESIGN OF CONCRETE PER CUBIC METER IS RECOMMENED AS FOLLOW :-

PORTLAND CEMENT TYPE 1 (CONFORM TO TIS. 15 PART I) MIN.	350 KGS.
SAND	430 LITRES
CRUSH ROCK OR GRAVEL	860 LITRES
W/C RATIO	0.40-0.45 BY WEIGHT

3.2.6 BEFORE CONSTRUCTION OF BASE OF RETAINING WALL., THE TOP OF PILE SHALL BE CHISELED AND BEND THE MAIN REINFORCING STEEL AS SHOWN IN THE DRAWING OR USE THE METHOD OF WELDING THE REINFORCING STEEL WITH THE SAME SIZE OF STEEL AS SHOWN IN THE DRAWING.

3.2.7 FOR PILE SIZE 35x35 CM., USING PILE TIP EITHER TYPE A OR B DEPENDS ON OWNER DIVISION.

4. REINFORCING STEEL NOTES :

4.1 ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE DEFORMED BAR (CONFORM TO TIS 24, SD 30) EXCEPT FOR BAR DIAMETER IS LESS THAN Ø12 mm. WHICH MAY BE STRUCTURE GRADE. (CONFORM TO TIS 20, SR 24)

4.2 IN CASE OF SPLICING OF REINFORCEMENT SPLICING SHALL BE BY AROUND BUTT-WELDING WHICH THE STRENGTH OF WELDED JOINT IS NOT LESS THAN THE ULTIMATE TENSILE STRENGTH OR BY LAPPING BARS WHICH THE LAP LENGTH SHALL NOT BE LESS THAN 20 TIMES THE BAR DIAMETER FOR THE INTERMEDIATE GRADE REINFORCING STEEL (40 TIMES THE BAR DIAMETERS FOR STRUCTURAL GRADE REINFORCING STEEL) LOCATION OF THE LAPPED BARS BE SPACED APART UNDER CONSIDERATION OF THE INSPECTOR.

NOTES

1. ALL DIMENSIONS ARE IN CENTIMETER UNLESS OTHERWISE INDICATED.
2. ANY PROBLEMS DUE THE DESIGNATIONS SHALL BE CONSIDERED AND DECIDED BY THE LOCATION AND DESIGN DIVISION.
3. RETAINING WALLS SHOWN IN THIS DRAWING SHALL BE USED FOR THE ROADWAY EMBANKMENT THAT IS PROPERTY DESIGNED.

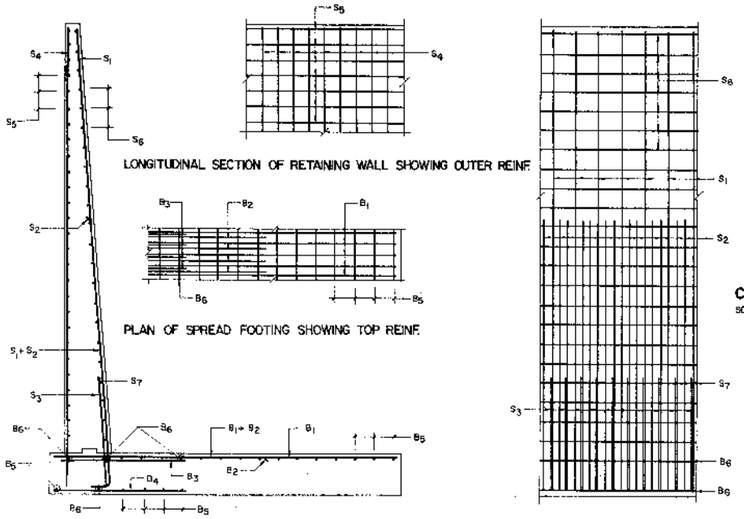
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

CANTELEVER RETAINING WALL 6.00 M. MAX. HIGH

DETAILS AND SPECIFICATIONS

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE	JULY 1994
SUBMITTED : P. Bangyai, (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE	AS SHOWN
		DWG. NO.	ABT 267-17/8
APPROVED : For (DIRECTOR GENERAL)		SHEET NO.	198



REINFORCING DETAIL OF RETAINING WALL AND SPREAD FOOTING FOR HEIGHT 4.01 - 6.00 M.
SCALE 1:40

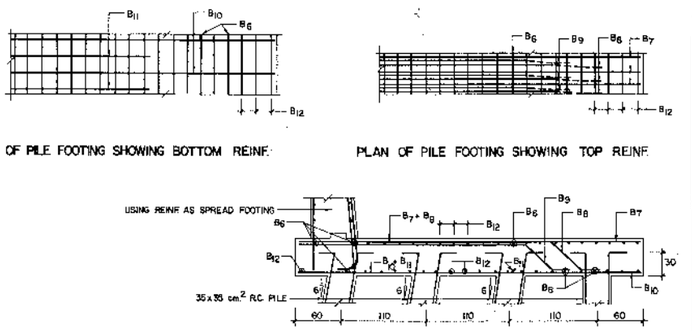
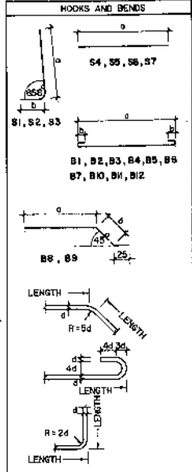


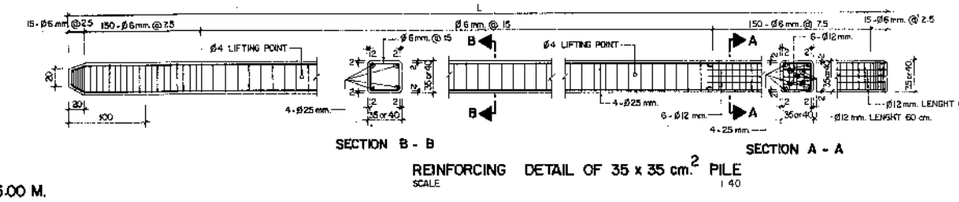
TABLE OF REINFORCEMENT FOR RETAINING WALL PER 1.00 M. LENGTH

HOOKS AND BENDS

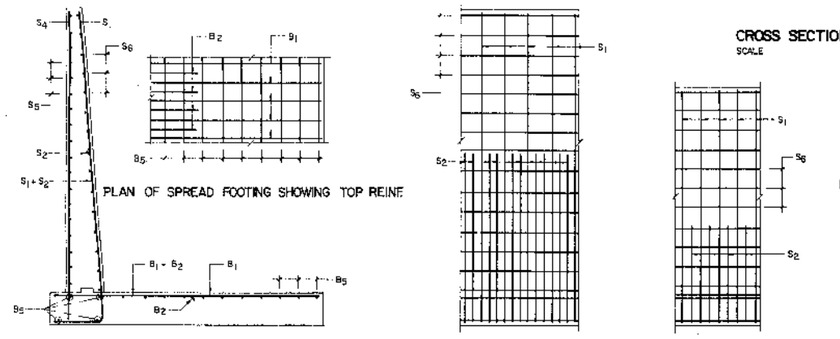


NO. OF BARS	HEIGHT 6.00 M.					HEIGHT 5.00 M.					HEIGHT 4.00 M.					HEIGHT 3.00 M.					HEIGHT 2.00 M.					HEIGHT 1.00 M.				
	ø	@	a	b	L	ø	@	a	b	L	ø	@	a	b	L	ø	@	a	b	L	ø	@	a	b	L	ø	@	a	b	L
S1	19	30	389.5	25	614.5	16	30	489.5	25	514.5	16	30	393.5	64	457.5	12	22	293.5	56.5	349.5	9	12	193	47	240*	9	12	93	42	135
S2	19	10	341.5	25	366.5	16	10	315	25	340	16	10	215.5	64	279.5	12	22	115.5	56.5	172	–	–	–	–	–	–	–	–	–	–
S3	19	20	141	25	166	16	20	139.5	25	164.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S4	9	20	589.5	0	589.5	9	20	489.5	0	489.5	9	20	393.5	0	393.5	9	20	293	0	293	9	20	193	0	193	9	20	93	0	93
S5	9	20	100	0	100	9	20	100	0	100	9	20	100	0	100	9	20	100	0	100	9	20	100	0	100	9	20	100	0	100
S6	9	25	100	0	100	9	25	100	0	100	9	25	100	0	100	9	25	100	0	100	9	25	100	0	100	9	25	100	0	100
S7	25	–	100	0	100	25	–	100	0	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B1	19	14	445*	0	445*	19	24	395*	0	395*	19	24	345*	0	345*	16	32	245*	0	245*	9	20	170*	7.5	185*	9	20	95*	7.5	110*
B2	19	14	277.5	0	277.5	19	24	270.5	0	270.5	19	24	182.5	0	182.5	16	32	132.5	0	132.5	–	–	–	–	–	–	–	–	–	–
B3	16	12	177.5	0	177.5	16	14	170.5	0	170.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B4	19	25	177.5	0	177.5	19	45	177.5	0	177.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B5	9	25*	100	0	100	9	25*	100	0	100	9	25*	100	0	100	9	25*	100	0	100	9	25*	100	0	100	9	25*	100	0	100
B6	25	–	100	0	100	25	–	100	0	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B6	25	–	100	0	100	25	–	100	0	100	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B7	25	16	445	0	445	25	20	395	0	395	19	30	345	0	345	16	12	245	0	245	9	20	170	7.5	185	9	20	95	7.5	110
B8	25	16	327.5	56.5	408	25	20	267.5	50.5	343	19	10	172.5	0	172.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B9	16	18	295	49.5	369.5	16	30	217.5	43	288.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B10	25	40	445	0	445	19	40	395	0	395	9	20	345	0	345	9	20	245	0	245	9	20	170	0	170	9	20	95	0	95
B11	25	40	277	0	277	19	40	215	0	215	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B12	12	18*	100	0	100	12	20*	100	0	100	9	20*	100	0	100	9	12*	100	0	100	9	20*	100	0	100	9	20*	100	0	100

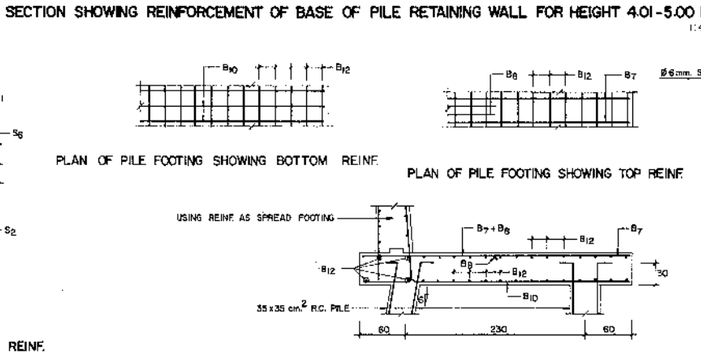
REMARK
ø = DIAMETER OF REINFORCEMENT IN MILLIMETERS
* REDUCING THE LENGTH OF REINFORCEMENT IN CASE OF HEIGHT LESS THAN THE GIVEN
# # OR AS SHOWN IN CROSS SECTION

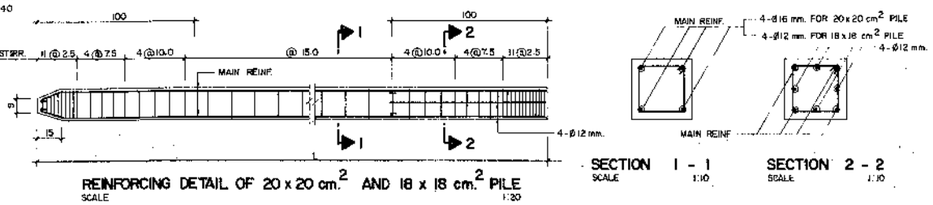


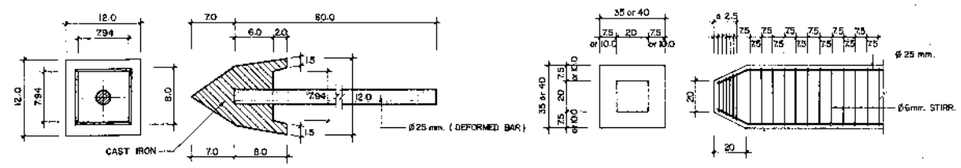
REINFORCING DETAIL OF 35 x 35 cm.² PILE
SCALE 1:40

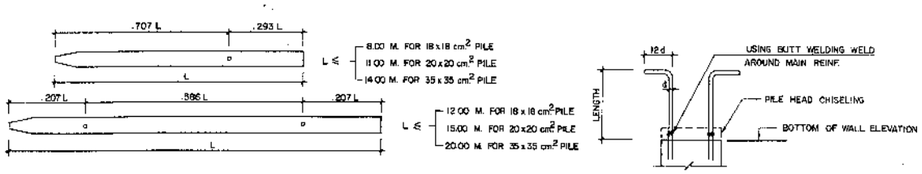


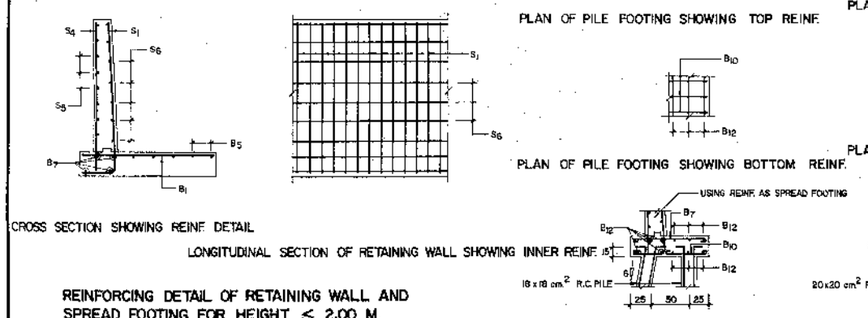
REINFORCING DETAIL OF RETAINING WALL AND SPREAD FOOTING FOR HEIGHT 2.01 - 4.00 M.
SCALE 1:40



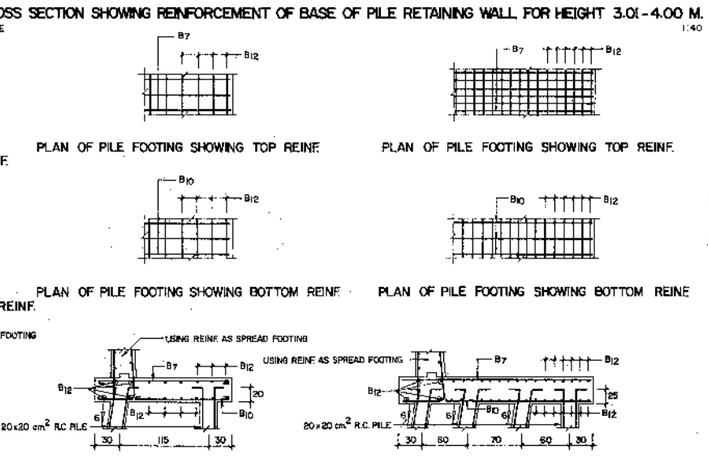








REINFORCING DETAIL OF RETAINING WALL AND SPREAD FOOTING FOR HEIGHT ≤ 2.00 M.
SCALE 1:40



CROSS SECTION SHOWING REINFORCEMENT OF BASE OF PILE RETAINING WALL FOR HEIGHT ≤ 1.00 M.
SCALE 1:40

CROSS SECTION SHOWING REINFORCEMENT OF BASE OF PILE RETAINING WALL FOR HEIGHT 2.01 - 3.00 M.
SCALE 1:40

CROSS SECTION SHOWING REINFORCEMENT OF BASE OF PILE RETAINING WALL FOR HEIGHT 1.01 - 2.00 M.
SCALE 1:40

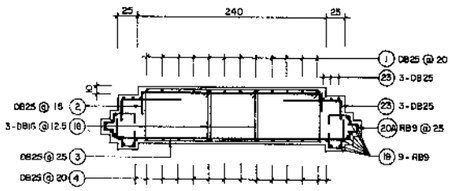
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

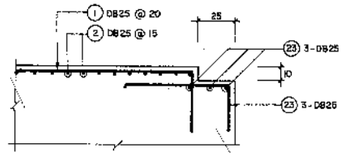
CANTILEVER RETAINING WALL 6.00 M.MAX.

REINFORCEMENT DETAILS

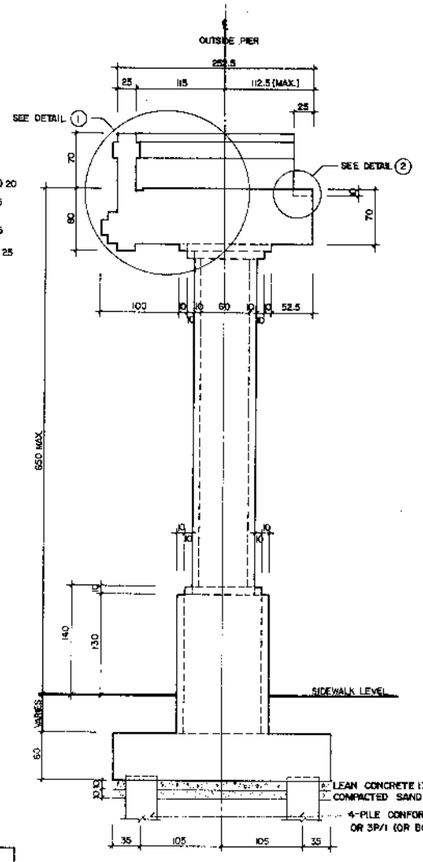
DESIGNED : DOH CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. ABT 267-17/9
		SHEET NO. 199



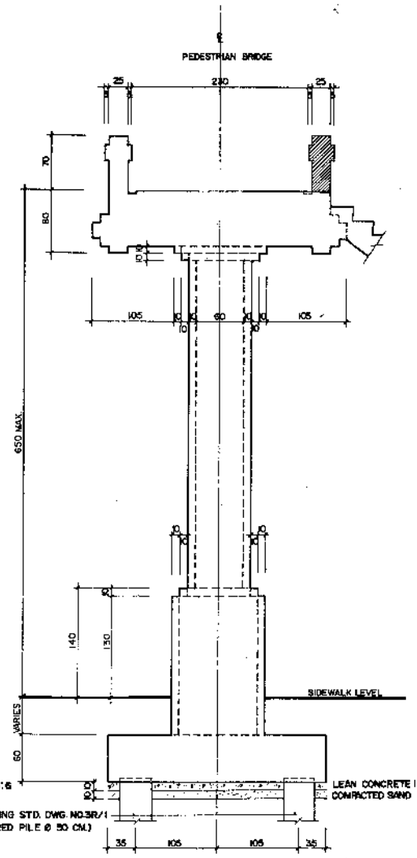
SECTION C - C
SCALE 1:40



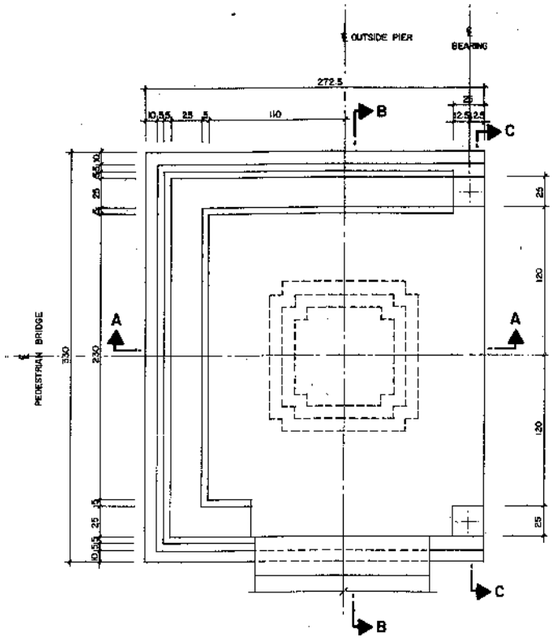
DETAIL (2)
SCALE 1:25



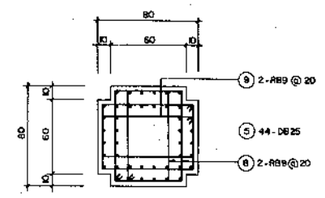
SECTION A - A
SCALE 1:40



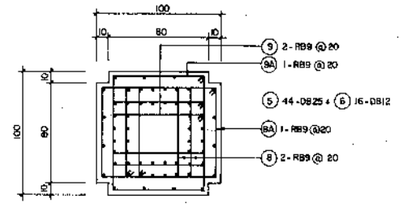
SECTION B - B
SCALE 1:40



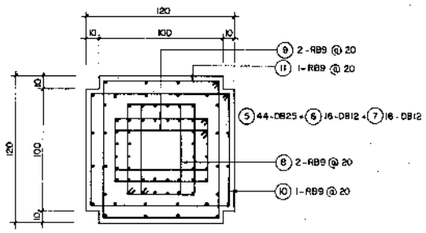
PLAN
SCALE 1:25



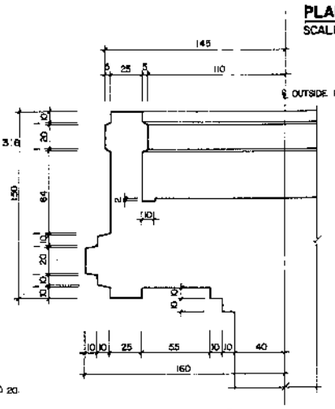
SECTION 1 - 1 (FOR SPAN ≤ 16.00 M.)
SCALE 1:25



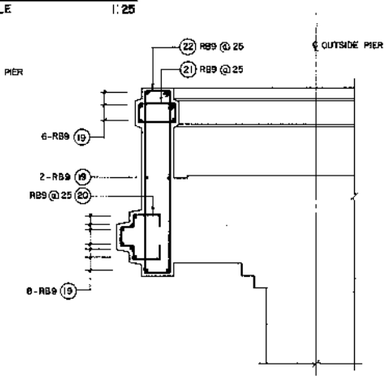
SECTION 2 - 2 (FOR SPAN ≤ 16.00 M.)
SCALE 1:25



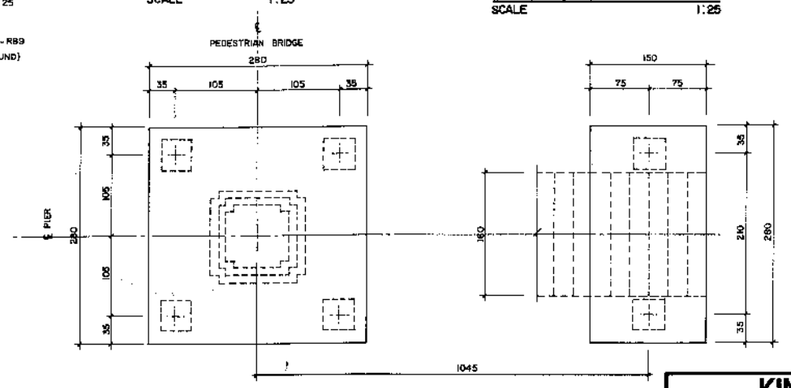
SECTION 3 - 3 (FOR SPAN ≤ 16.00 M.)
SCALE 1:25



DETAIL (1)
SCALE 1:25



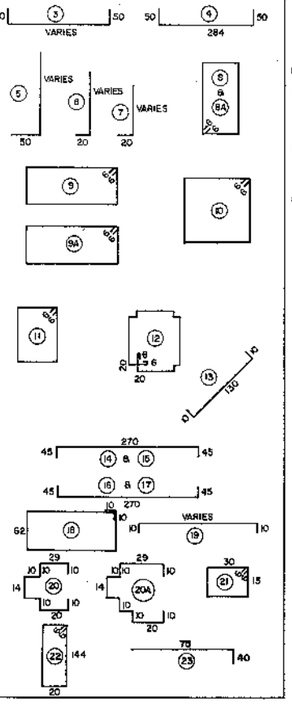
DETAIL (1) REINFORCEMENT
SCALE 1:25

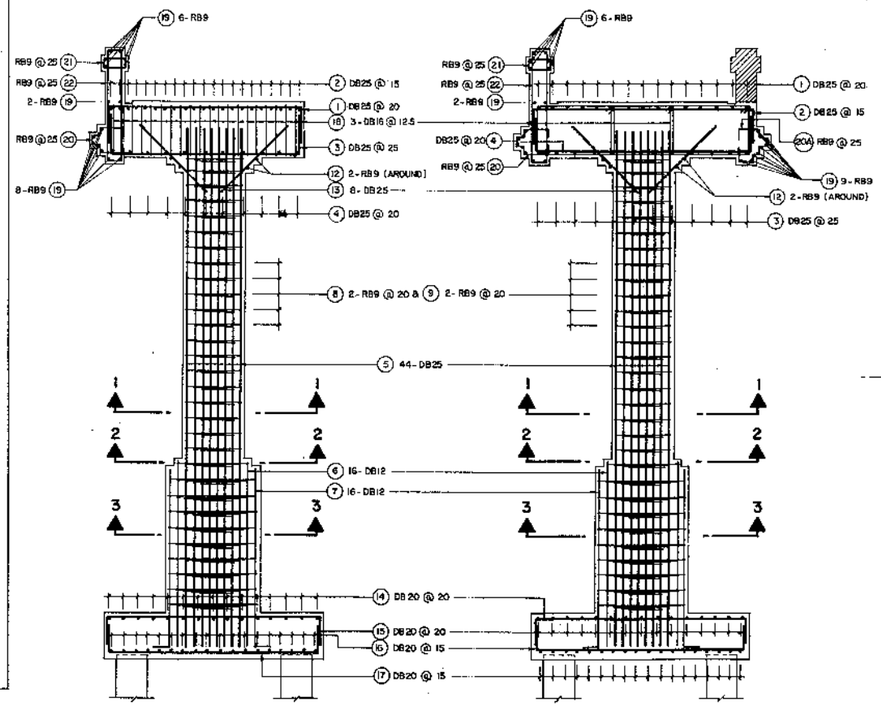


PILING PLAN
SCALE 1:40

TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
①	DB25	
②	DB 25	
③	DB 25	
④	DB 25	
⑤	DB 25	
⑥	DB 12	
⑦	DB 12	
⑧ & ⑧A	RB 9	
⑨ & ⑨A	RB 9	
⑩	RB 9	
⑪	RB 9	
⑫	RB 9	
⑬	DB 25	
⑭	DB 20	
⑮	DB 20	
⑯	DB 20	
⑰	DB 20	
⑱	DB 16	
⑲	RB 9	
⑳	RB 9	
⑳A	RB 9	
㉑	RB 9	
㉒	RB 9	
㉓	DB 25	





SECTION A - A REINFORCEMENT
SCALE 1:40

SECTION B - B REINFORCEMENT
SCALE 1:40

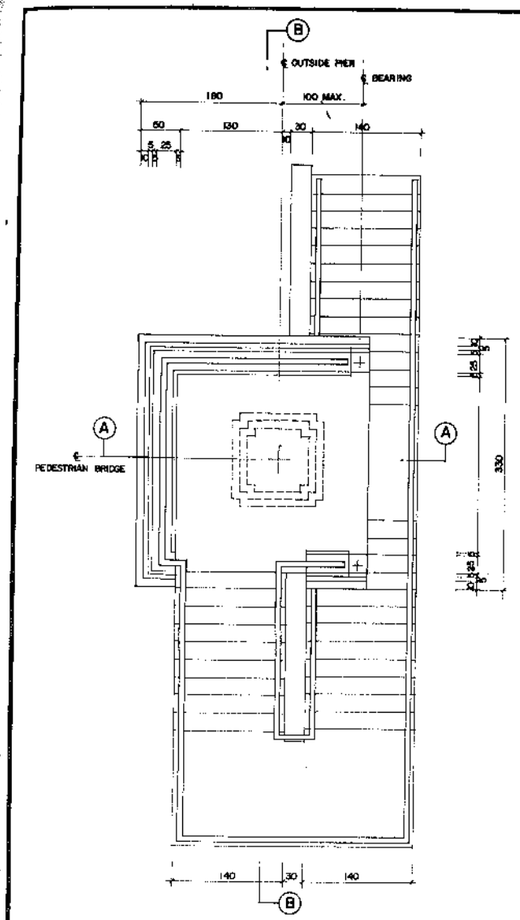
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

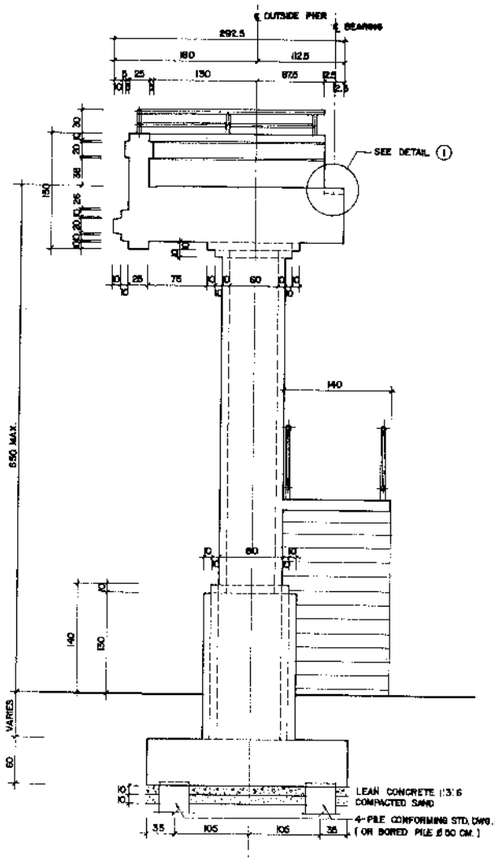
PEDESTRIAN BRIDGE

OUTSIDE PIER DETAILS FOR SPAN ≤ 16.00 M. (TYPE I)

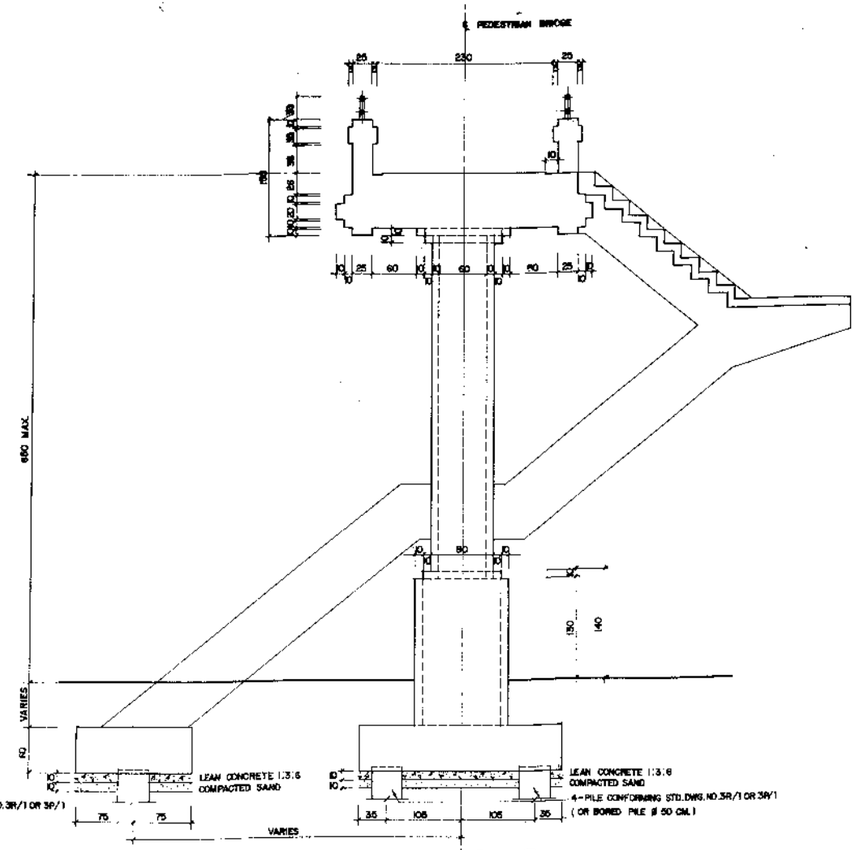
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PS-01
		SHEET NO. 200



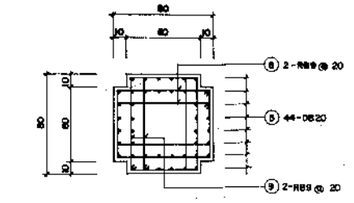
PLAN
SCALE 1:40



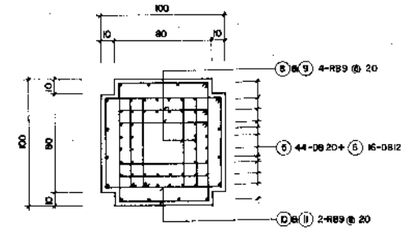
SECTION (A) - (A)
SCALE 1:40



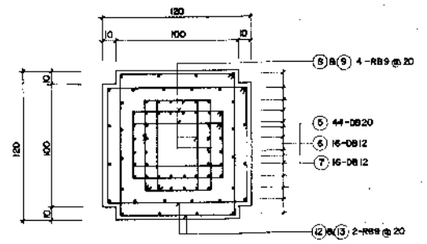
SECTION (B) - (B)
SCALE 1:40



SECTION (1) - (1) (FOR SPAN ≤ 16.00 M.)
SCALE 1:25

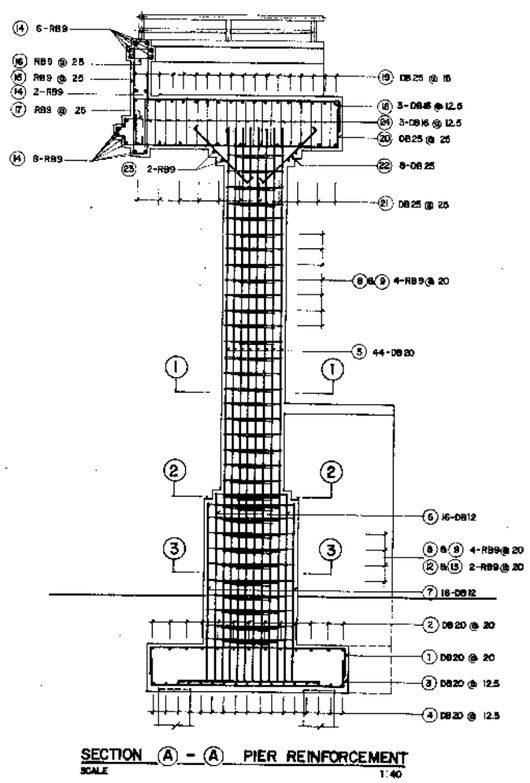


SECTION (2) - (2) (FOR SPAN ≤ 16.00 M.)
SCALE 1:25

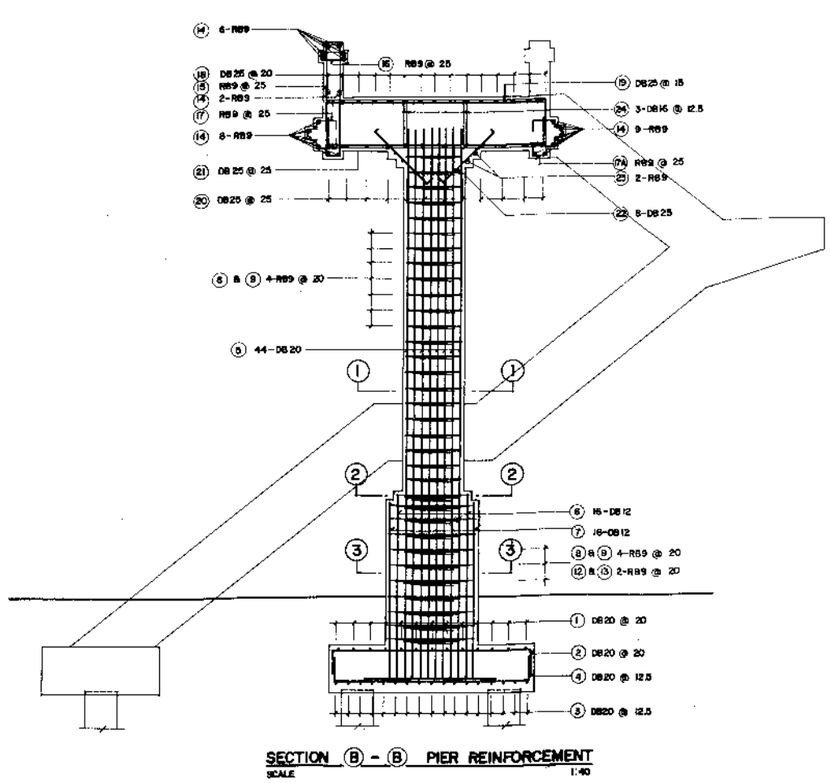


SECTION (3) - (3) (FOR SPAN ≤ 16.00 M.)
SCALE 1:25

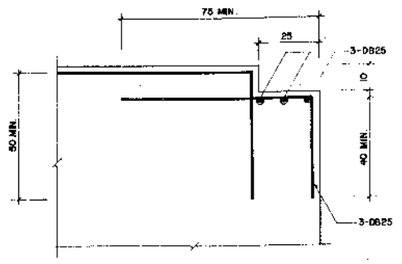
TABLE OF REINFORCEMENT		
BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
(1) & (2)	DB 20	
(3) & (4)	DB20	
(5)	DB20	
(6)	DB12	
(7)	DB12	
(8)	RB9	
(9)	RB9	
(10)	RB9	
(11)	RB9	
(12)	RB9	
(13)	RB9	
(14)	RB9	
(15)	RB9	
(16)	RB9	
(17) & (17A)	RB9	
(18) & (19)	DB25	
(20) & (21)	DB25	
(22)	DB25	
(23)	RB9	
(24)	DB16	



SECTION (A) - (A) PIER REINFORCEMENT
SCALE 1:40



SECTION (B) - (B) PIER REINFORCEMENT
SCALE 1:40



DETAIL (1)
SCALE 1:12.5

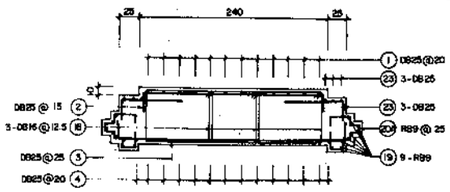
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

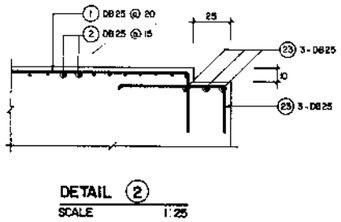
PEDESTRIAN BRIDGE

OUTSIDE PIER DETAILS FOR SPAN ≤ 16.00 M. (TYPE II)

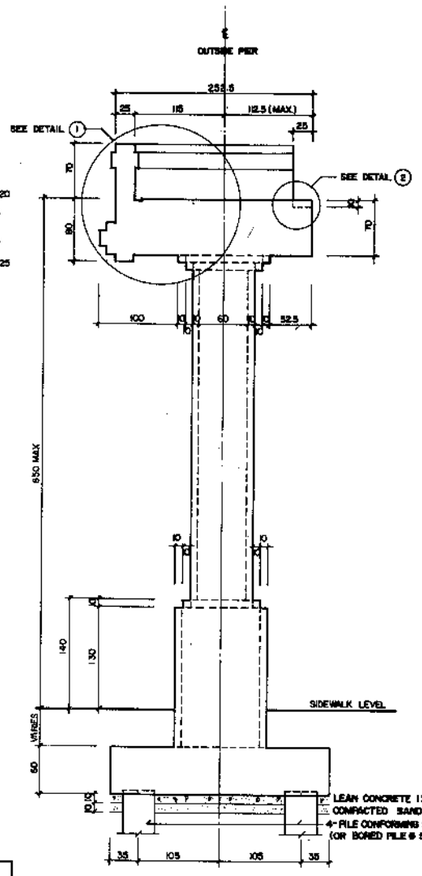
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PS-02
		SHEET NO. 201



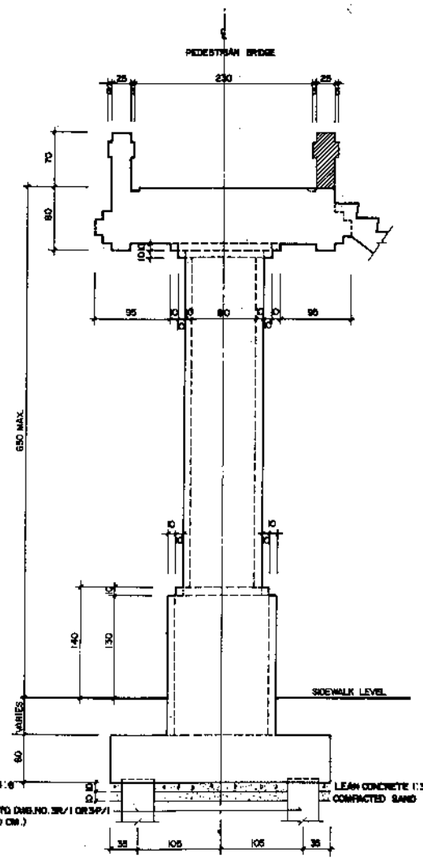
SECTION C - C
SCALE 1:40



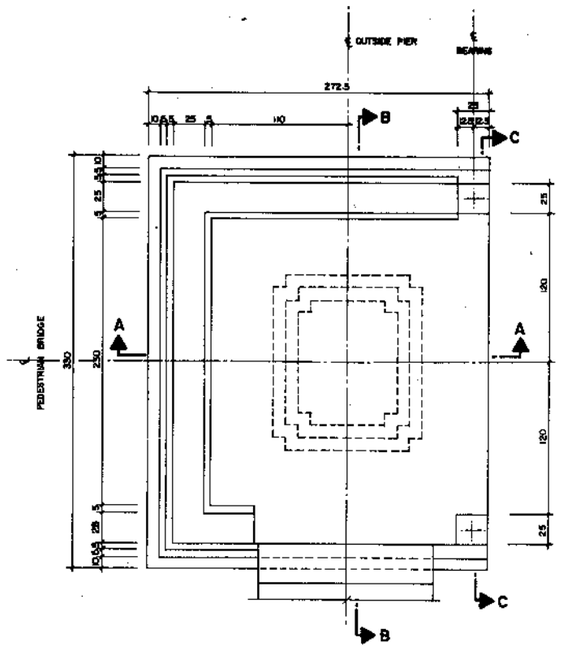
DETAIL (2)
SCALE 1:25



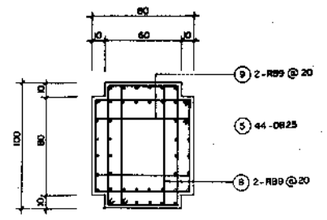
SECTION A - A
SCALE 1:40



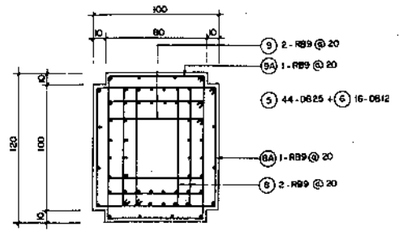
SECTION B - B
SCALE 1:40



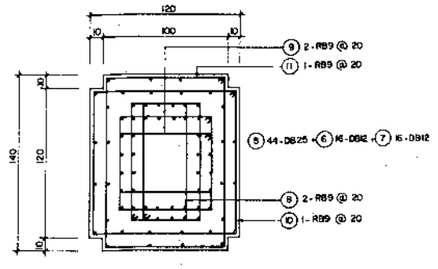
PLAN
SCALE 1:25



SECTION 1 - 1 (FOR SPAN 16.01 - 21.00 M)
SCALE 1:25



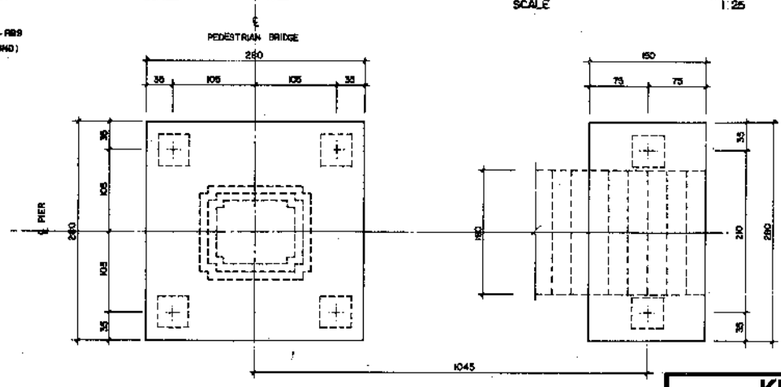
SECTION 2 - 2 (FOR SPAN 16.01 - 21.00 M.)
SCALE 1:25



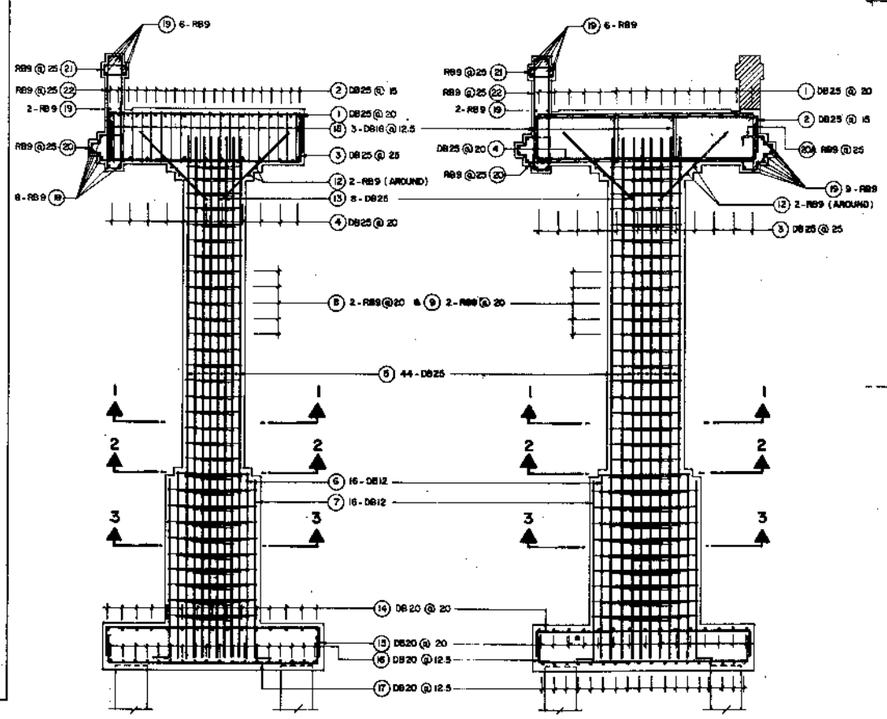
SECTION 3 - 3 (FOR SPAN 16.01 - 21.00 M.)
SCALE 1:25

DETAIL (1)
SCALE 1:25

DETAIL (1) REINFORCEMENT
SCALE 1:25



PILING PLAN
SCALE 1:40



SECTION A - A REINFORCEMENT
SCALE 1:40

SECTION B - B REINFORCEMENT
SCALE 1:40

TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
(1)	DB 25	VARIES (1) 50 … 50
(2)	DB 25	284 (2) 50 … 50
(3)	DB 25	(3) VARIES 50 … 50
(4)	DB 25	(4) 284 50 … 50
(5)	DB 25	(5) 50
(6)	DB 12	(6) VARIES 20
(7)	DB 12	(7) VARIES 20
(8) & (8A)	RB 9	(8) & (8A)
(9) & (9A)	RB 9	(9) & (9A)
(10)	RB 9	(10)
(11)	RB 9	(11)
(12)	RB 9	(12) 20 6 6 20
(13)	DB 25	(13) 10
(14)	DB 20	(14) 45 270 (15) 45
(15)	DB 20	
(16)	DB 20	(16) 45 (17) 45, 10 270 10
(17)	DB 20	
(18)	DB 16	(18) 62 10 VARIES (19) 10
(19)	RB 9	
(20)	RB 9	(20) 14 10 10 29 10 10
(20A)	RB 9	(20A) 14 10 10 29 10 10
(21)	RB 9	(21) 30 15
(22)	RB 9	(22) 20 144
(23)	DB 25	(23) 75 40

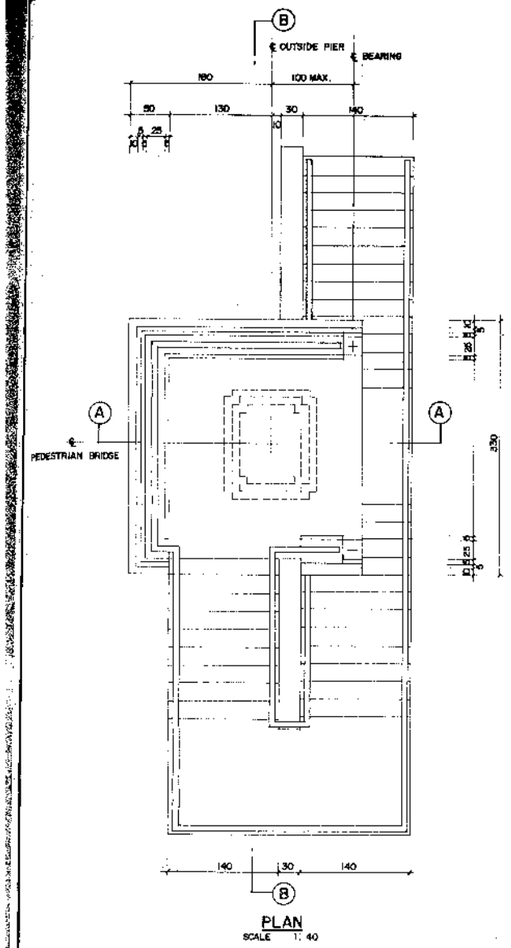
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

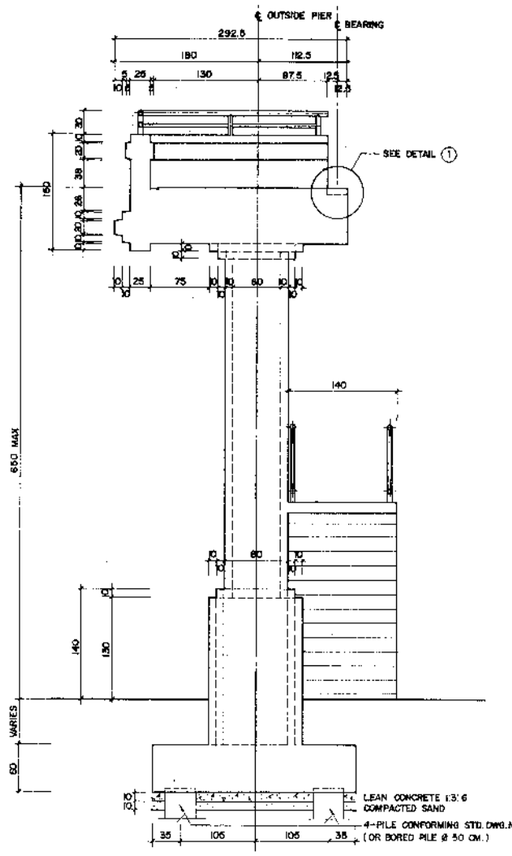
PEDESTRIAN BRIDGE

OUTSIDE PIER DETAILS FOR SPAN 16.01 – 21.00 M. (TYPE I)

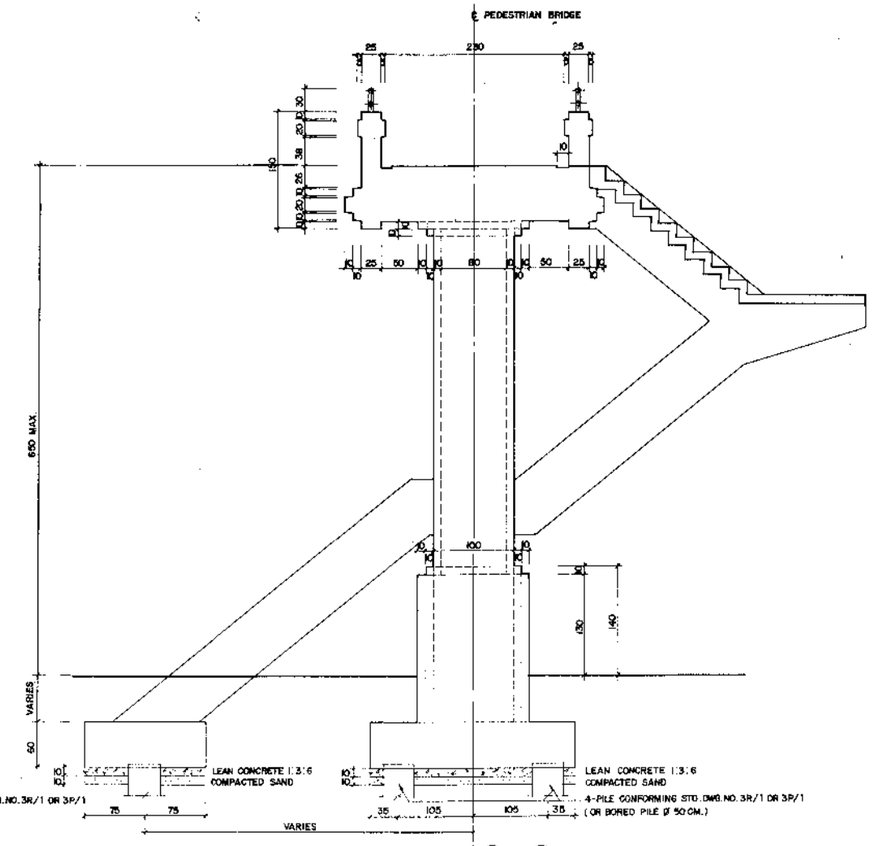
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PS-03
		SHEET NO. 202



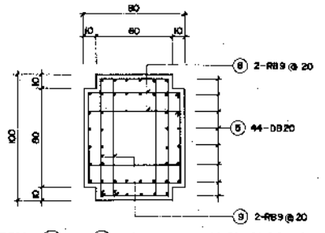
PLAN
SCALE 1:40



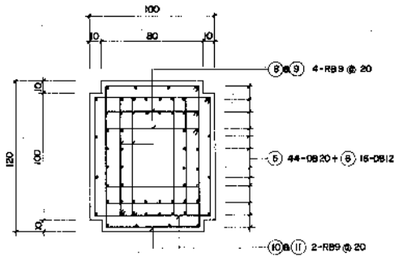
SECTION (A) - (A)
SCALE 1:40



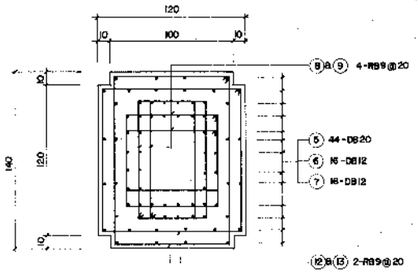
SECTION (B) - (B)
SCALE 1:40



SECTION (1) - (1) (FOR SPAN 16.01-21.00 M.)
SCALE 1:25

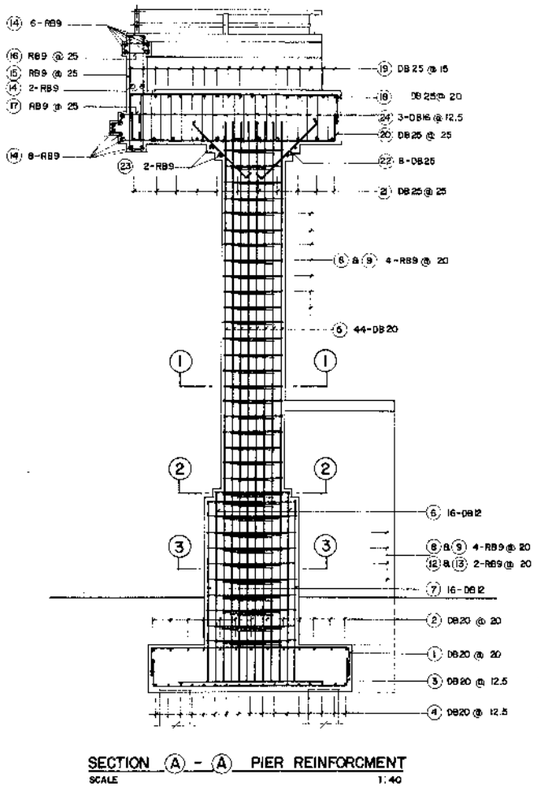


SECTION (2) - (2) (FOR SPAN 16.01-21.00 M.)
SCALE 1:25

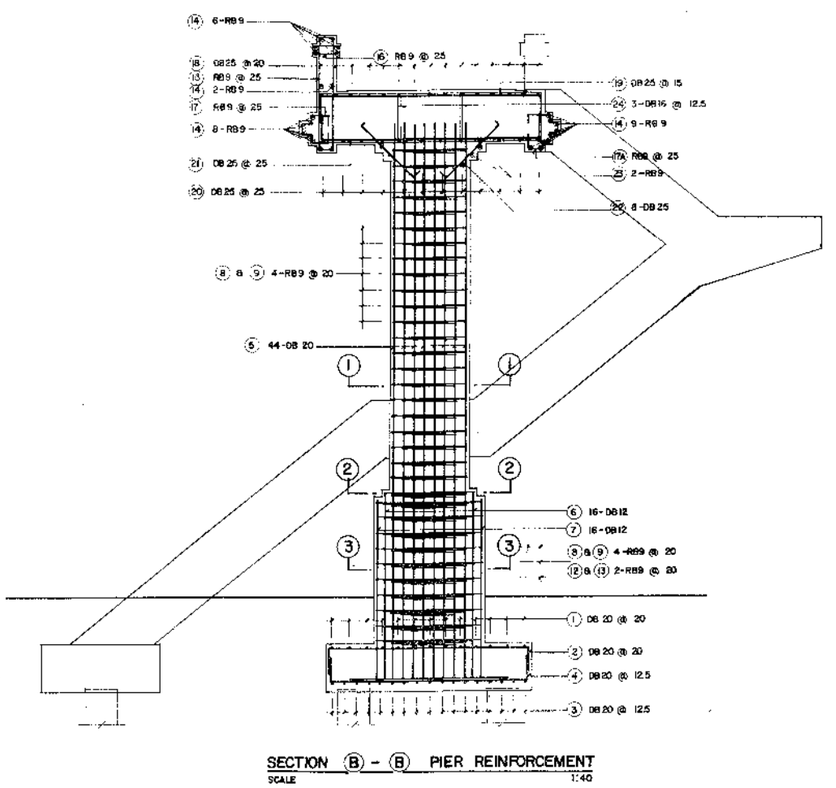


SECTION (3) - (3) (FOR SPAN 16.01-21.00 M.)
SCALE 1:25

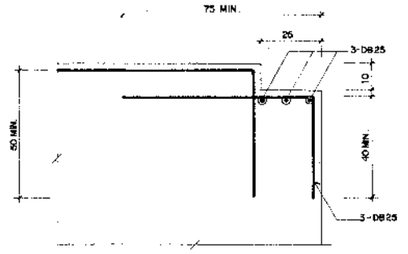
TABLE OF REINFORCEMENT		
BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
① & ②	DB 20	
③ & ④	DB 20	
⑤	DB 20	
⑥	DB 12	
⑦	DB 12	
⑧	RB 9	
⑨	RB 9	
⑩	RB 9	
⑪	RB 9	
⑫	RB 9	
⑬	RB 9	
⑭	RB 9	
⑮	RB 9	
⑯	RB 9	
⑰ & ⑰A	RB 9	
⑱ & ⑲	DB 25	
⑳ & ㉑	DB 25	
㉒	DB 25	
㉓	RB 9	
㉔	DB 16	



SECTION (A) - (A) PIER REINFORCMENT
SCALE 1:40



SECTION (B) - (B) PIER REINFORCMENT
SCALE 1:40



DETAIL (1)
SCALE 1:12.5

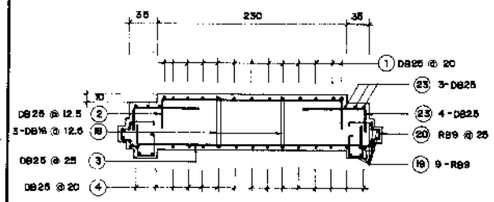
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

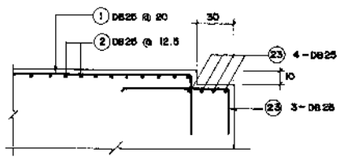
PEDESTRIAN BRIDGE

OUTSIDE PIER DETAILS FOR SPAN 16.01 - 21.00 M. (TYPE II)

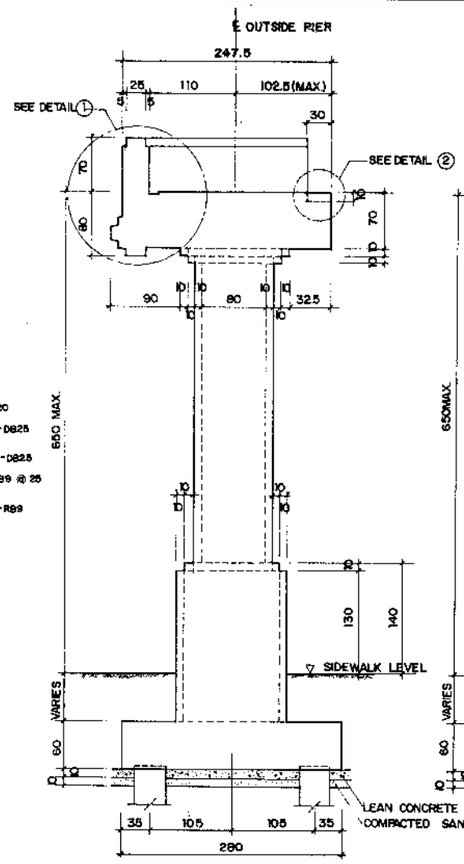
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PS-04
		SHEET NO. 203



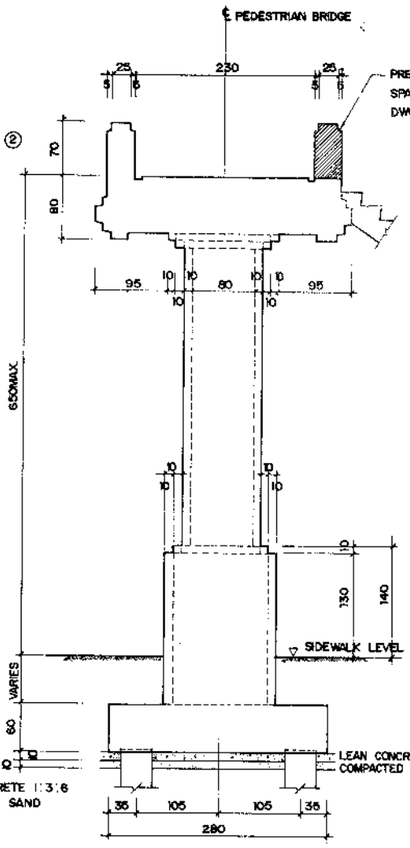
SECTION (C) - (C) 1 : 40



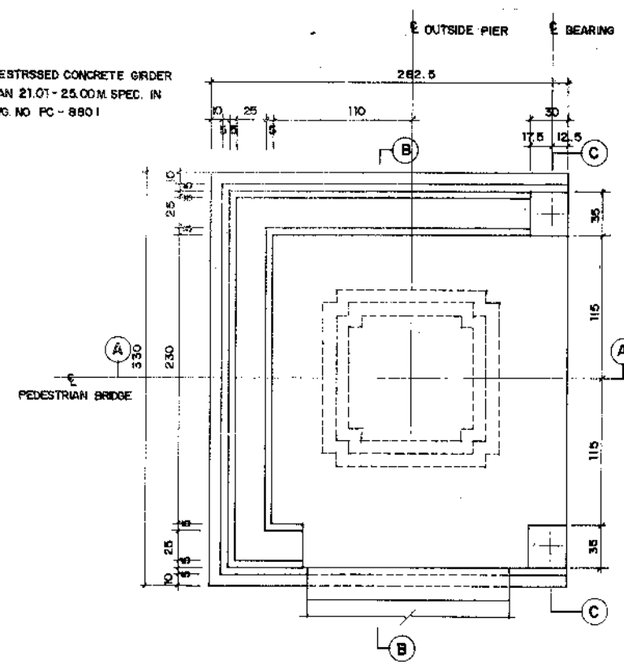
DETAIL (2) 1 : 25



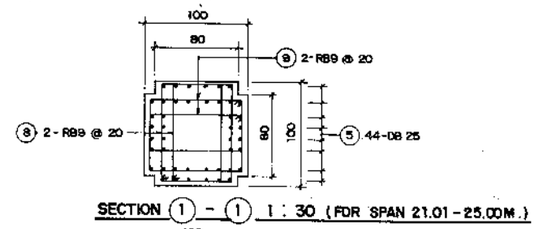
SECTION (A) - (A) 1 : 40



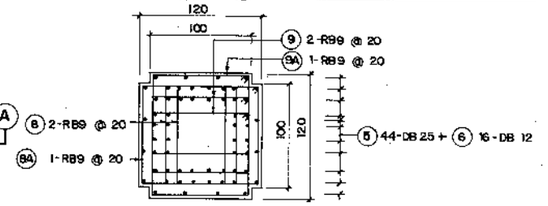
SECTION (B) - (B) 1 : 40



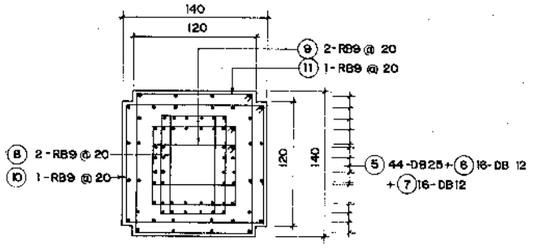
PLAN OF OUTSIDE PIER 1:25



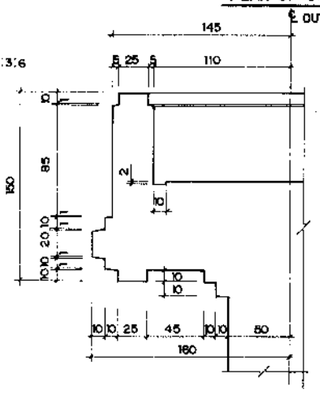
SECTION (1) - (1) 1 : 30 (FOR SPAN 21.01 - 25.00M.)



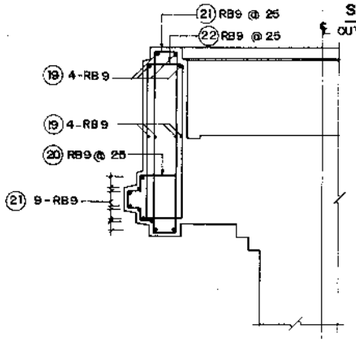
SECTION (2) - (2) 1 : 30 (FOR SPAN 21.01 - 25.00 M.)



SECTION (3) - (3) 1 : 30 (FOR SPAN 21.01-25.00 M.)



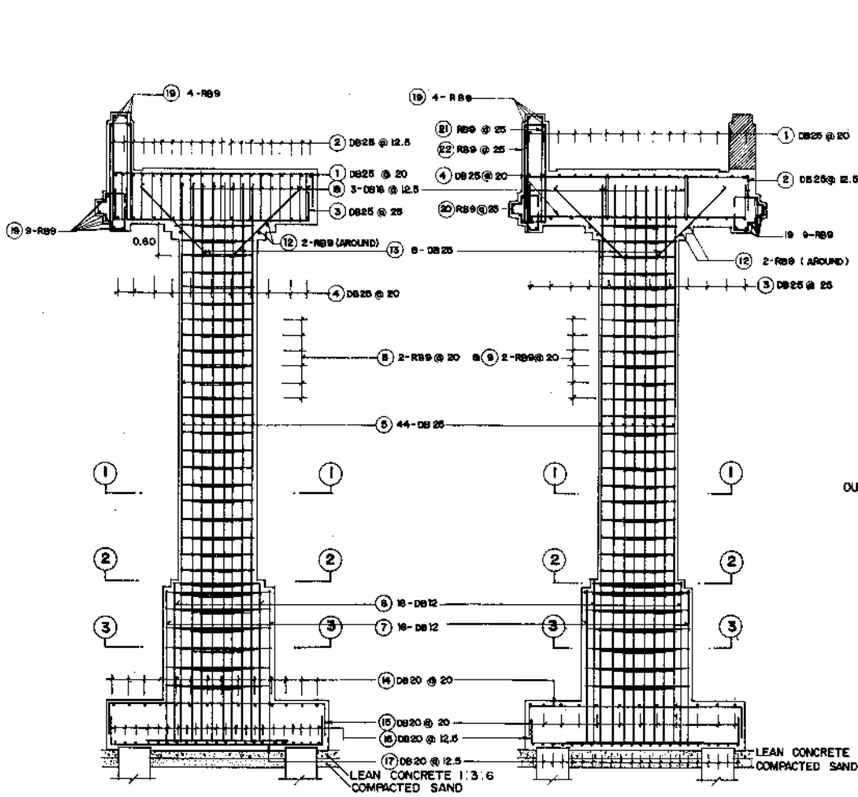
DETAIL (1)



DETAIL (1) REINFORCEMENT

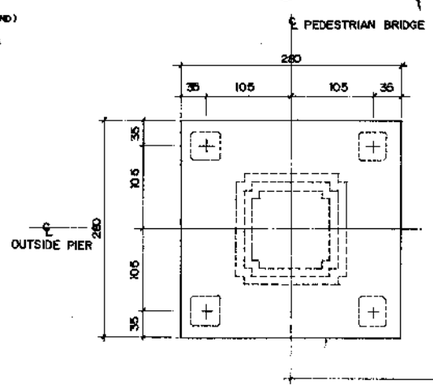
TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
①	DB 25	
②	DB 25	
③	DB 25	
④	DB 25	
⑤	DB 25	
⑥	DB 12	
⑦	DB 12	
⑧ & 9A	RB 9	
⑨ & 9A	RB 9	
⑩	RB 9	
⑪	RB 9	
⑫	RB 9	
⑬	DB 25	
⑭	DB 20	
⑮	DB 20	
⑯	DB 20	
⑰	DB 20	
⑱	DB 16	
⑲	RB 9	
⑳	RB 9	
㉑	RB 9	
㉒	RB 9	
㉓	DB 25	

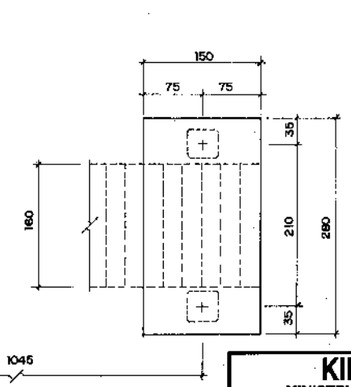


SECTION (A) - (A) 1:40
PIER REINFORCEMENT

SECTION (B) - (B) 1:40
PIER REINFORCEMENT



PILING PLAN - BRIDGE PIER FOOTING



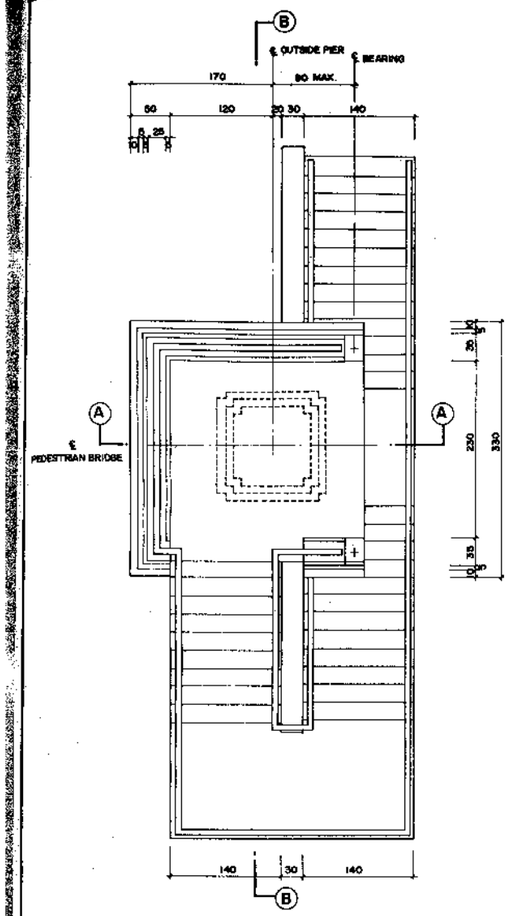
PILING PLAN - STAIR FOOTING

PILING PLAN 1:40

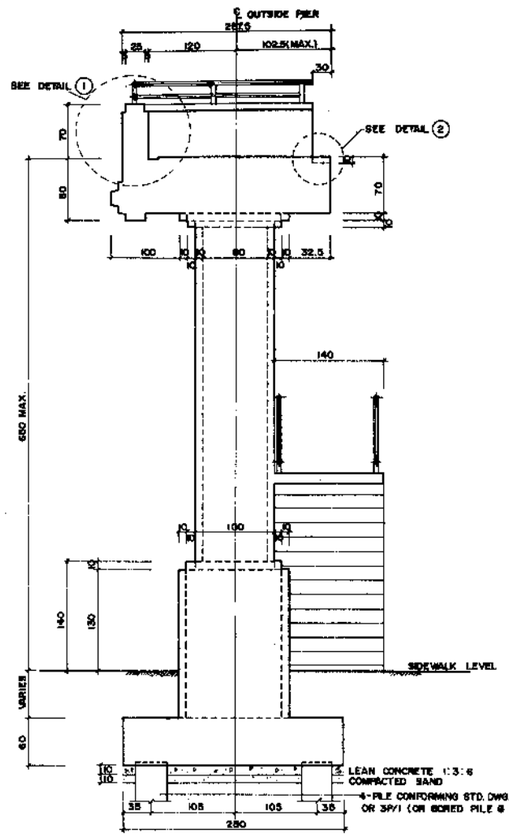
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
PEDESTRIAN BRIDGE
OUTSIDE PIER DETAILS FOR SPAN 21.01 - 25.00 M. (TYPE I)

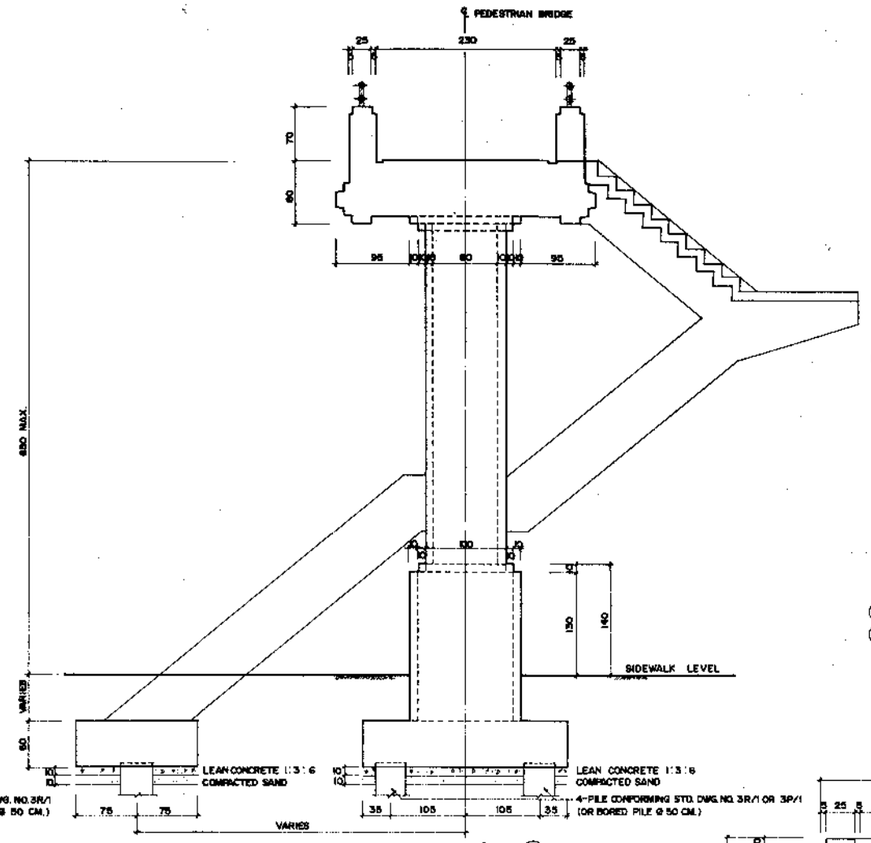
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO.- PS-05
		SHEET NO. 204



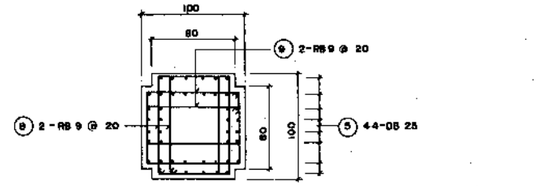
PLAN
SCALE 1:40



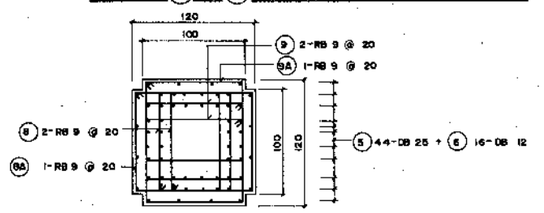
SECTION (A) - (A)
SCALE 1:40



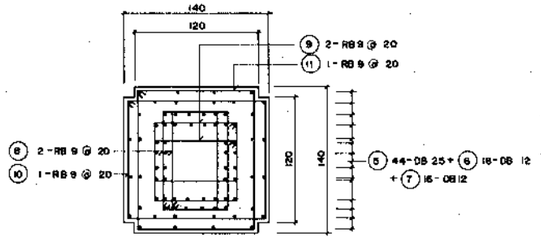
SECTION (B) - (B)
SCALE 1:40



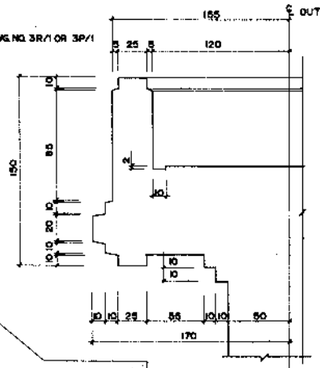
SECTION (1) - (1) 1:30 (FOR SPAN 21.01 - 25.00M.)



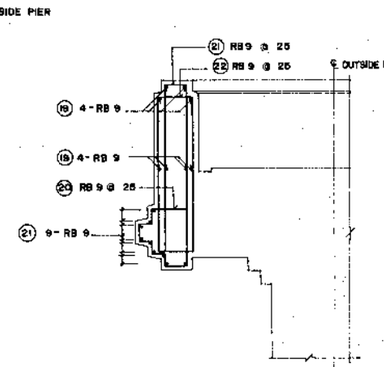
SECTION (2) - (2) 1:30 (FOR SPAN 21.01 - 25.00M.)



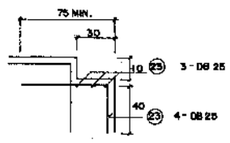
SECTION (3) - (3) 1:30 (FOR SPAN 21.01 - 25.00M.)



DETAIL (1)



DETAIL (1) REINFORCEMENT

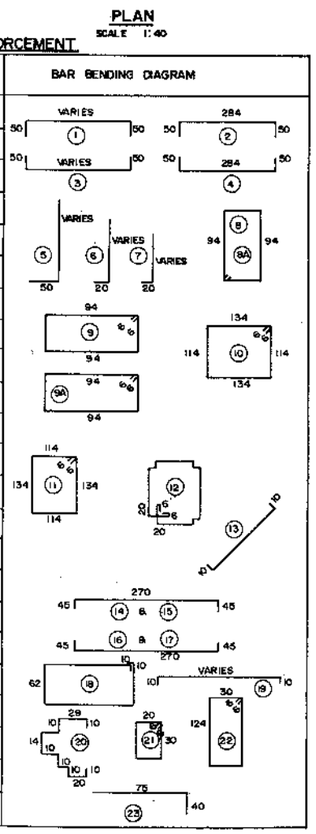


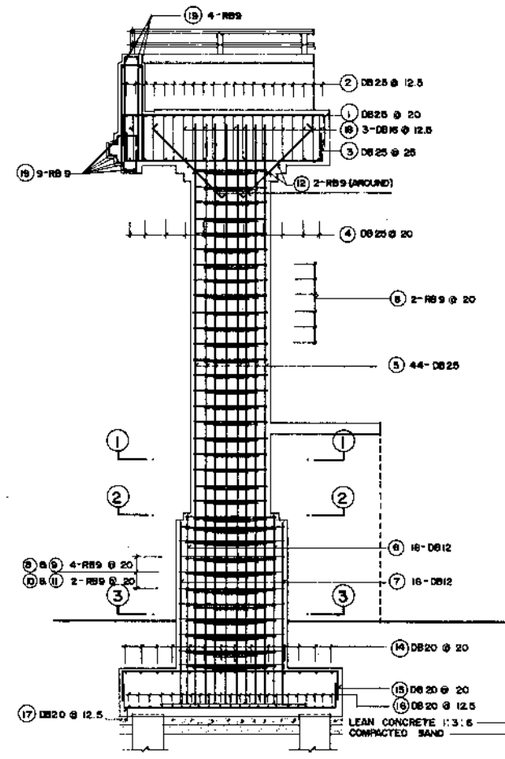
DETAIL (2)

TABLE OF REINFORCEMENT

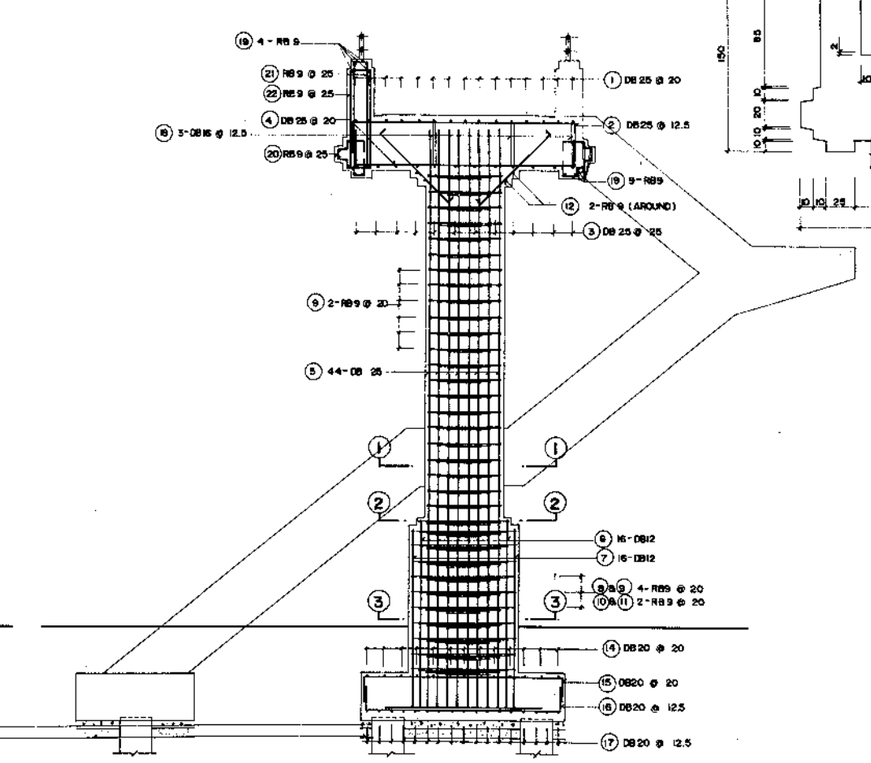
BAR MARK	BAR DIA. (MM.)
(1)	DB 25
(2)	DB 25
(3)	DB 25
(4)	DB 25
(5)	DB 25
(6)	DB 12
(7)	DB 12
(8) & (8A)	RB 9
(9) & (9A)	RB 9
(10)	RB 9
(11)	RB 9
(12)	RB 9
(13)	DB 25
(14)	DB 20
(15)	DB 20
(16)	DB 20
(17)	DB 20
(18)	DB 16
(19)	RB 9
(20)	RB 9
(21)	RB 9
(22)	RB 9
(23)	DB 25

BAR BENDING DIAGRAM





SECTION (A) - (A) 1:40
PIER REINFORCEMENT

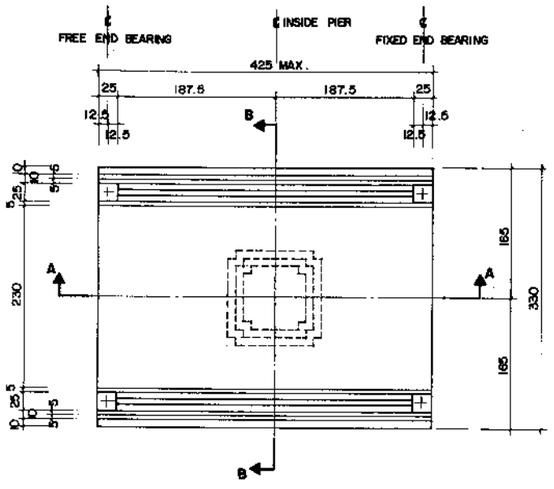


SECTION (B) - (B) 1:40
PIER REINFORCEMENT

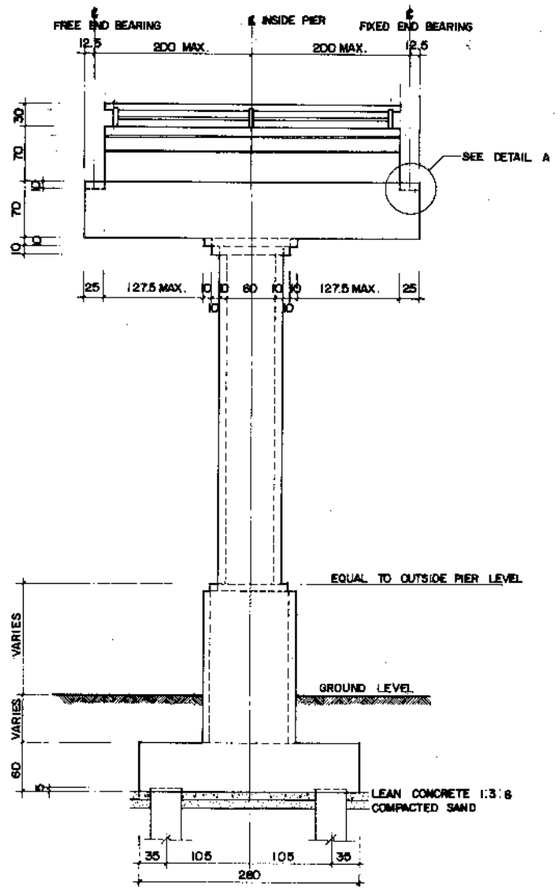
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
PEDESTRIAN BRIDGE
OUTSIDE PIER DETAILS FOR SPAN 21.01 - 25.00 M. (TYPE II)

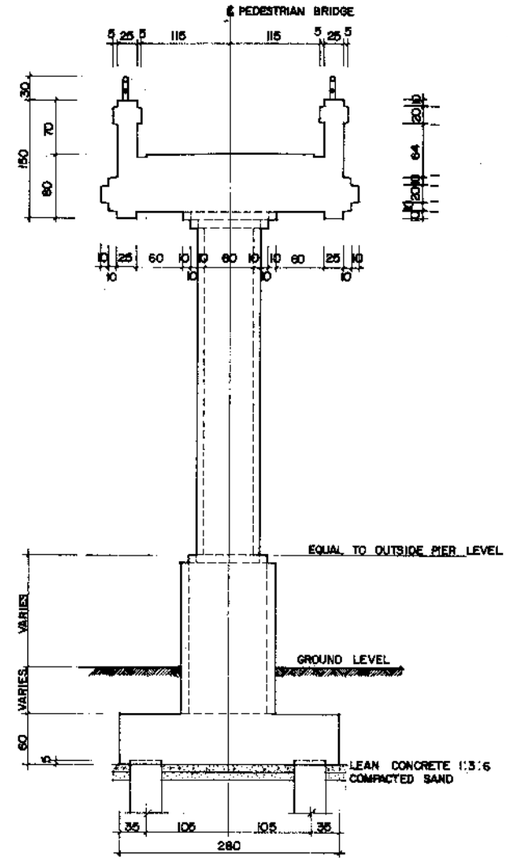
DESIGNED: DOH & CONSULTANTS	CHECKED	DATE JULY 1994	
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN	
APPROVED: (DIRECTOR GENERAL)		DWG. NO. PS-06	
		SHEET NO. 205	



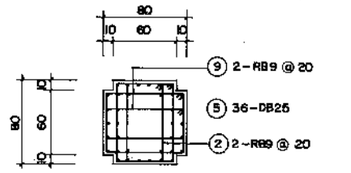
PLAN
SCALE 1:40



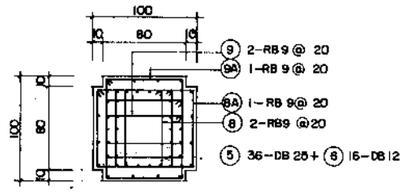
SECTION A – A
SCALE 1:40



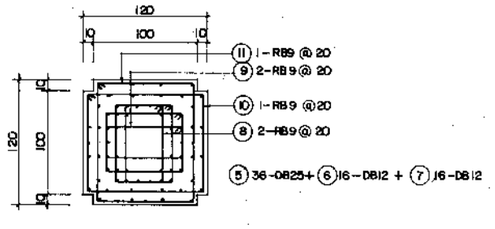
SECTION B – B
SCALE 1:40



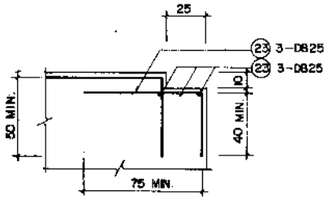
SECTION 1 – 1
SCALE 1:30



SECTION 2 – 2
SCALE 1:30



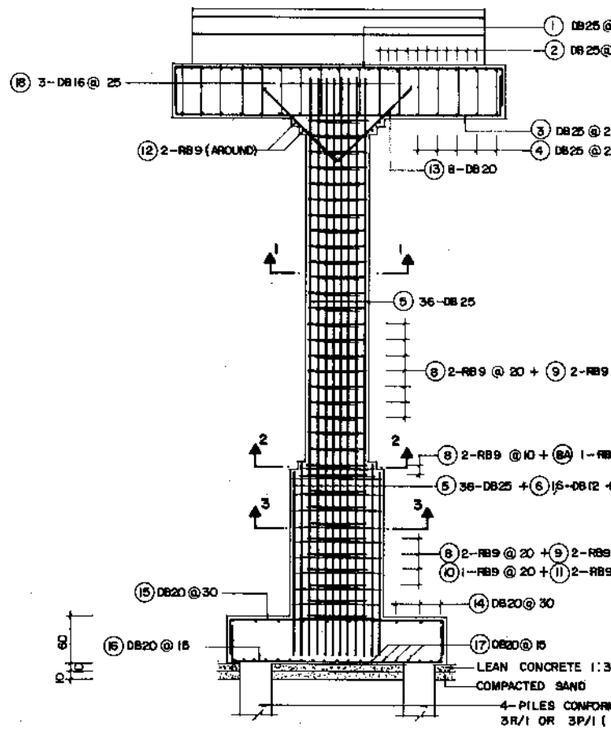
SECTION 3 – 3
SCALE 1:30



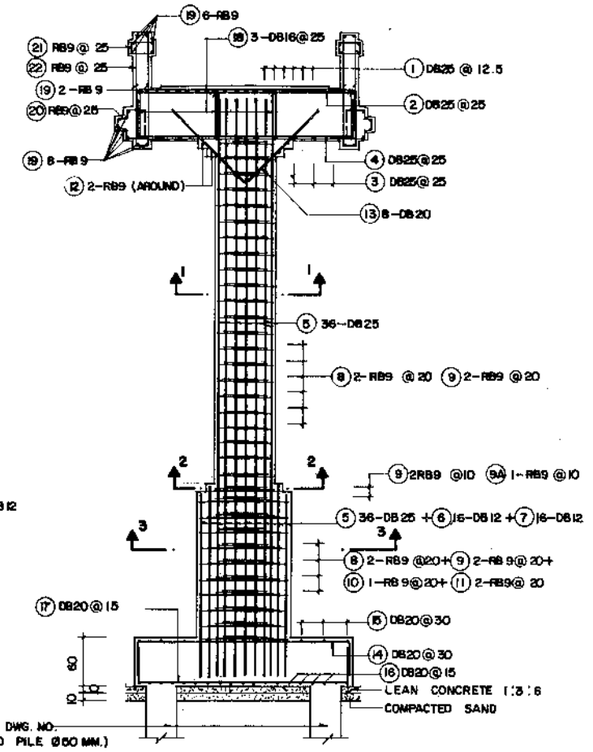
DETAIL A
SCALE 1:20

TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
①	DB 25	
②	DB 25	
③	DB 25	
④	DB 25	
⑤	DB 25	
⑥	DB 12	
⑦	DB 12	
⑧ & ⑧A	RB 9	
⑨ & ⑨A	RB 9	
⑩	RB 9	
⑪	RB 9	
⑫	RB9	
⑬	DB 20	
⑭	DB 20	
⑮	DB 20	
⑯	DB 20	
⑰	DB20	
⑱	DB 16	
⑲	RB 9	
⑳	RB 9	
㉑	RB 9	
㉒	RB 9	
㉓	DB 25	



SECTION A – A REINFORCEMENT
SCALE 1:40



SECTION B – B REINFORCEMENT
SCALE 1:40

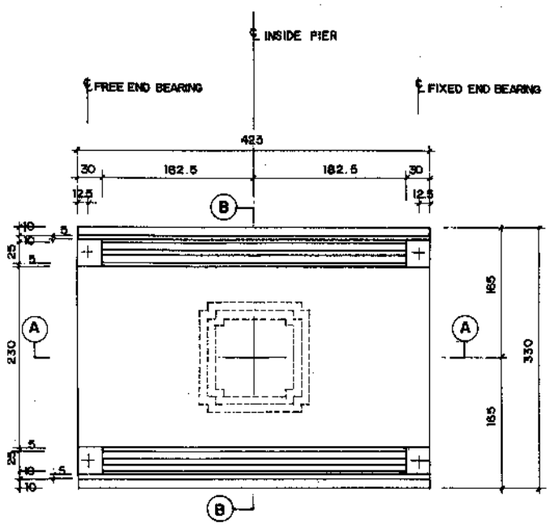
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

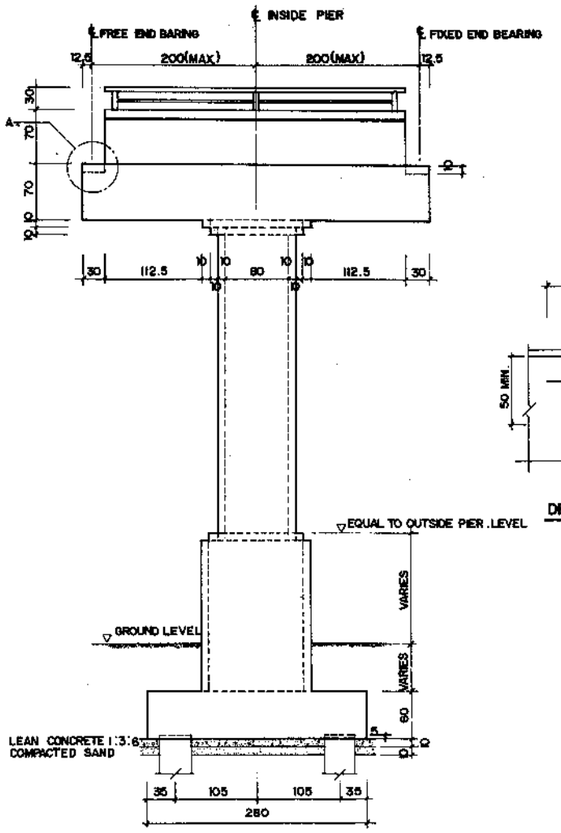
PEDESTRIAL BRIDGE

INSIDE PIER DETAILS FOR SPAN ≤ 16.00 M.

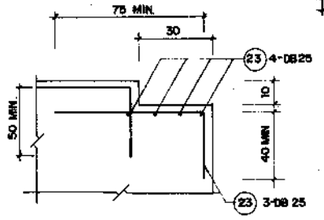
DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: (DIRECTOR GENERAL)		DWG. NO. PS-07
		SHEET NO. 206



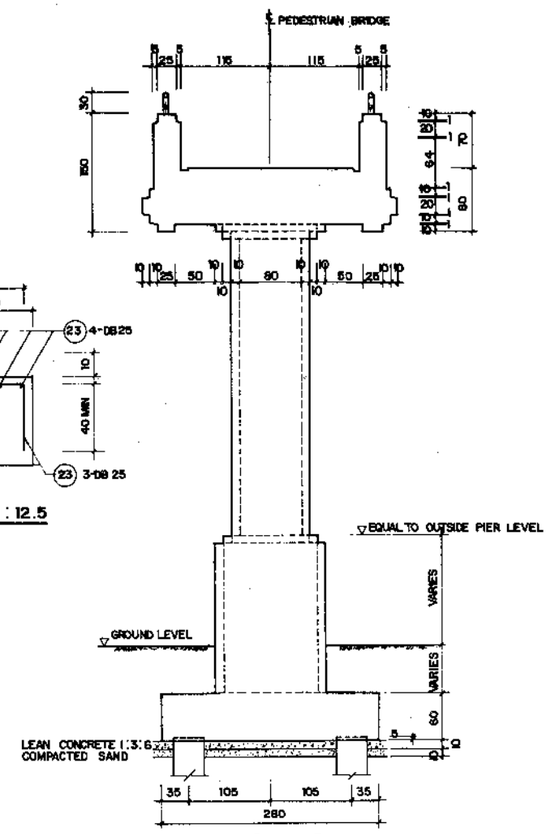
PLAN 1:40



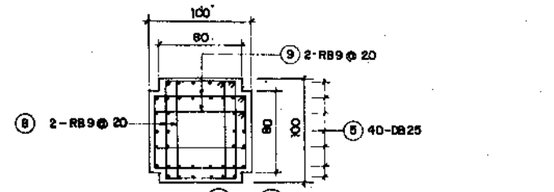
SECTION (A) - (A) 1:40



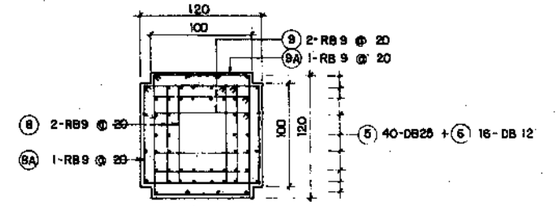
DETAIL (A) 1:12.5



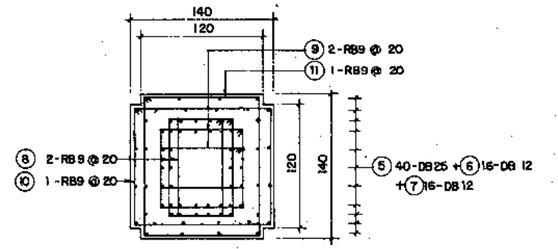
SECTION (B) - (B) 1:40



SECTION (1) - (1) 1:30 (FOR SPAN 21.01 - 25.00 M.)



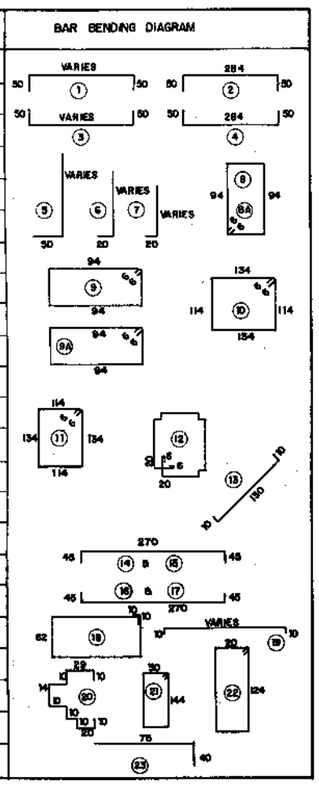
SECTION (2) - (2) 1:30 (FOR SPAN 21.01 - 25.00 M.)

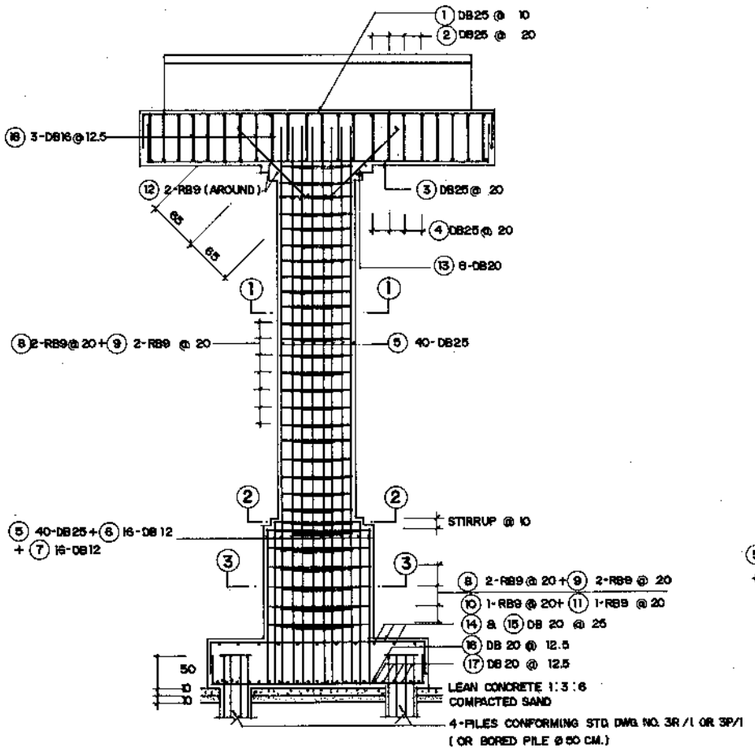


SECTION (3) - (3) 1:30 (FOR SPAN 21.01 - 25.00 M.)

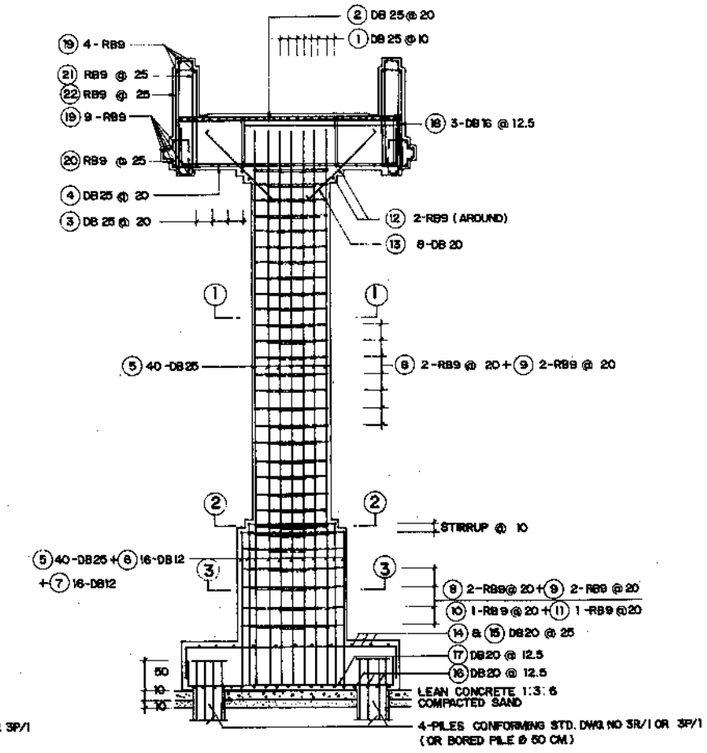
TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
(1)	DB 25	
(2)	DB 25	
(3)	DB 25	
(4)	DB 25	
(5)	DB 25	
(6)	DB 12	
(7)	DB 12	
(8) & (8A)	RB 9	
(9) & (9A)	RB 9	
(10)	RB 9	
(11)	RB 9	
(12)	RB 9	
(13)	DB 20	
(14)	DB 20	
(15)	DB 20	
(16)	DB 20	
(17)	DB 20	
(18)	DB 16	
(19)	RB 9	
(20)	RB 9	
(21)	RB 9	
(22)	RB 9	
(23)	DB 25	





SECTION (A) - (A) PIER REINFORCEMENT 1:40

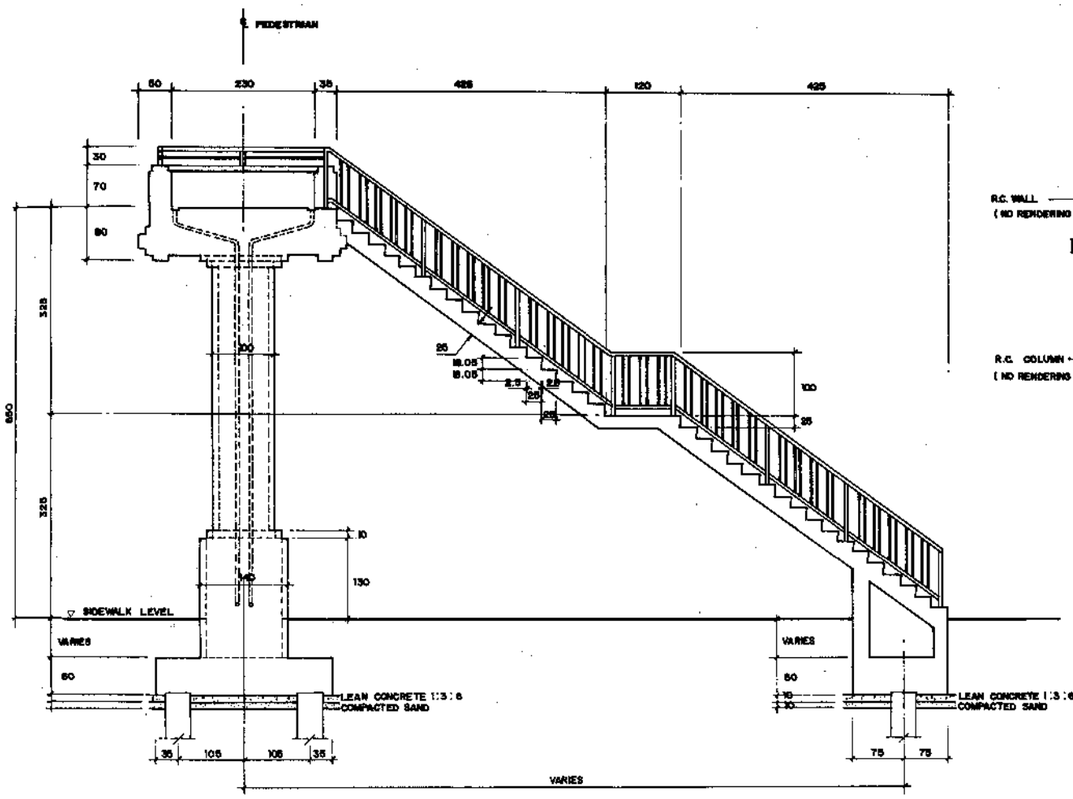


SECTION (B) - (B) PIER REINFORCEMENT 1:40

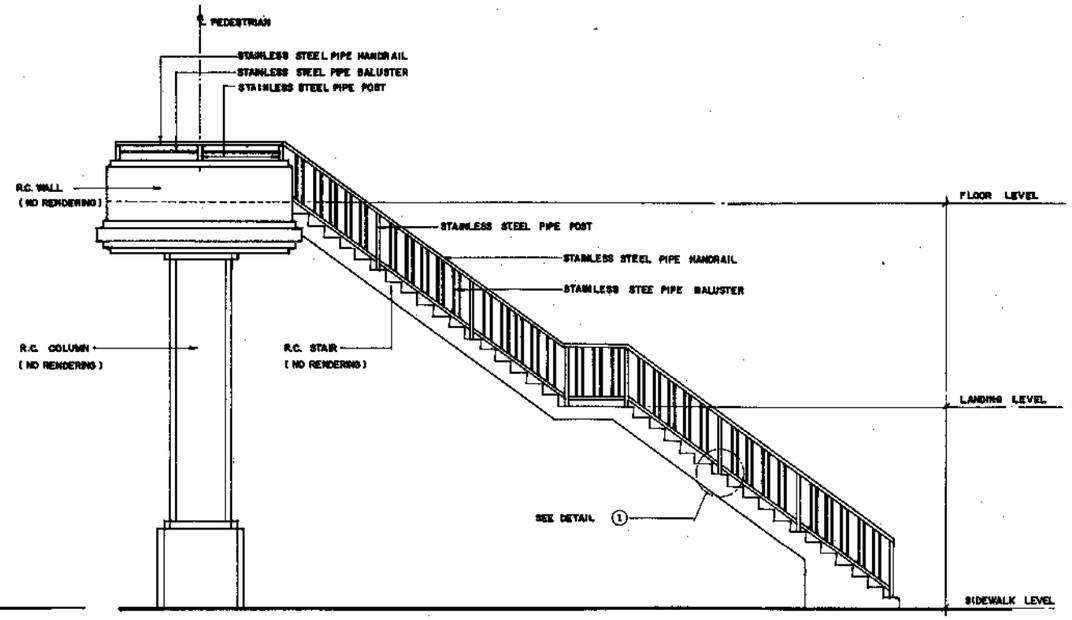
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
PEDESTRIAN BRIDGE
INSIDE PIER DETAILS FOR SPAN 21.01 - 25.00M.

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PS-09
		SHEET NO. 208



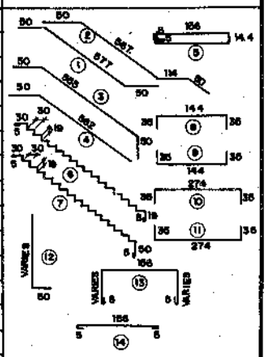
SECTION (B) - (B) 1:50

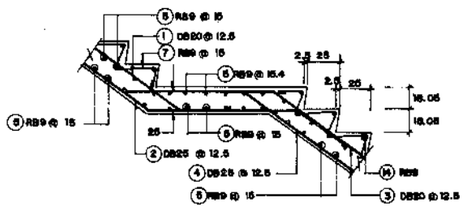


SIDE ELEVATION 1:50

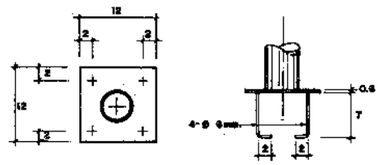
TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
(1)	DB 20	
(2)	DB 25	
(3)	DB 20	
(4)	DB 25	
(5)	RB 9	
(6)	RB 9	
(7)	RB 9	
(8)	DB 16	
(9)	DB 16	
(10)	DB 16	
(11)	DB 16	
(12)	DB 16	
(13)	RB 9	
(14)	RB 9	

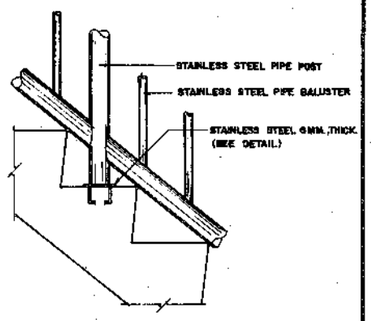




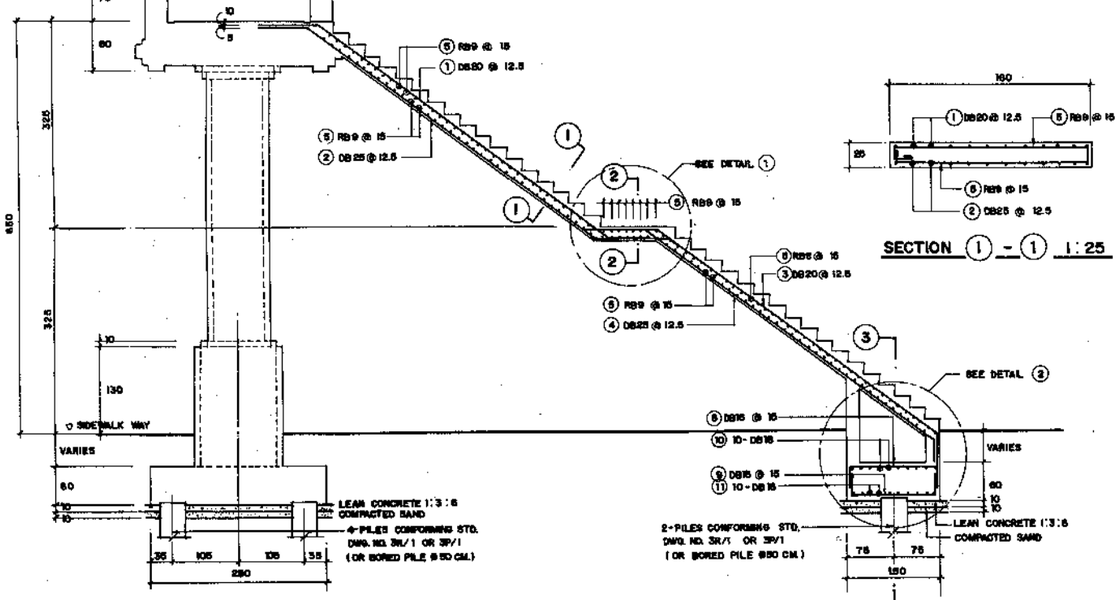
DETAIL (1) 1:25



DETAIL OF STAINLESS STEEL PLATE 1:5

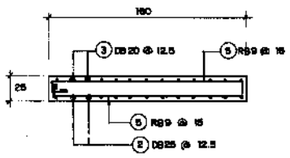


DETAIL (1) 1:10

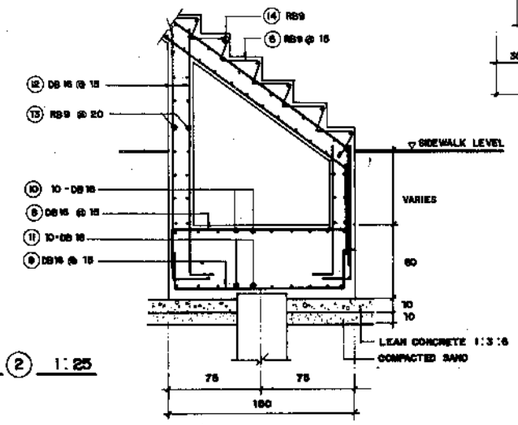


DETAIL OF STAIR REINFORCEMENT 1:50

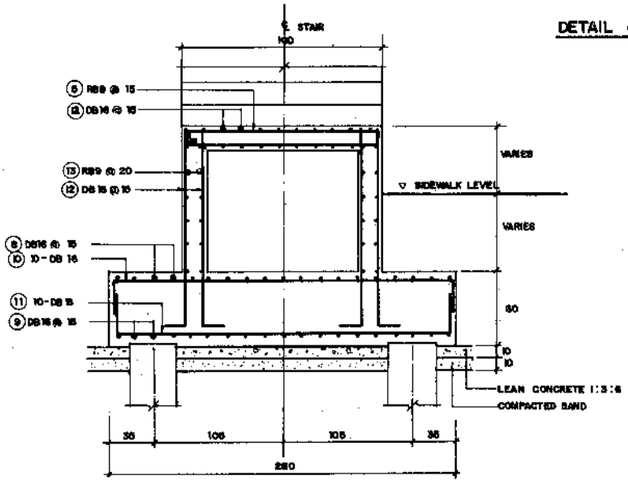
SECTION (1) - (1) 1:25



SECTION (2) - (2) 1:25



DETAIL (2) 1:25



SECTION (3) - (3) 1:25

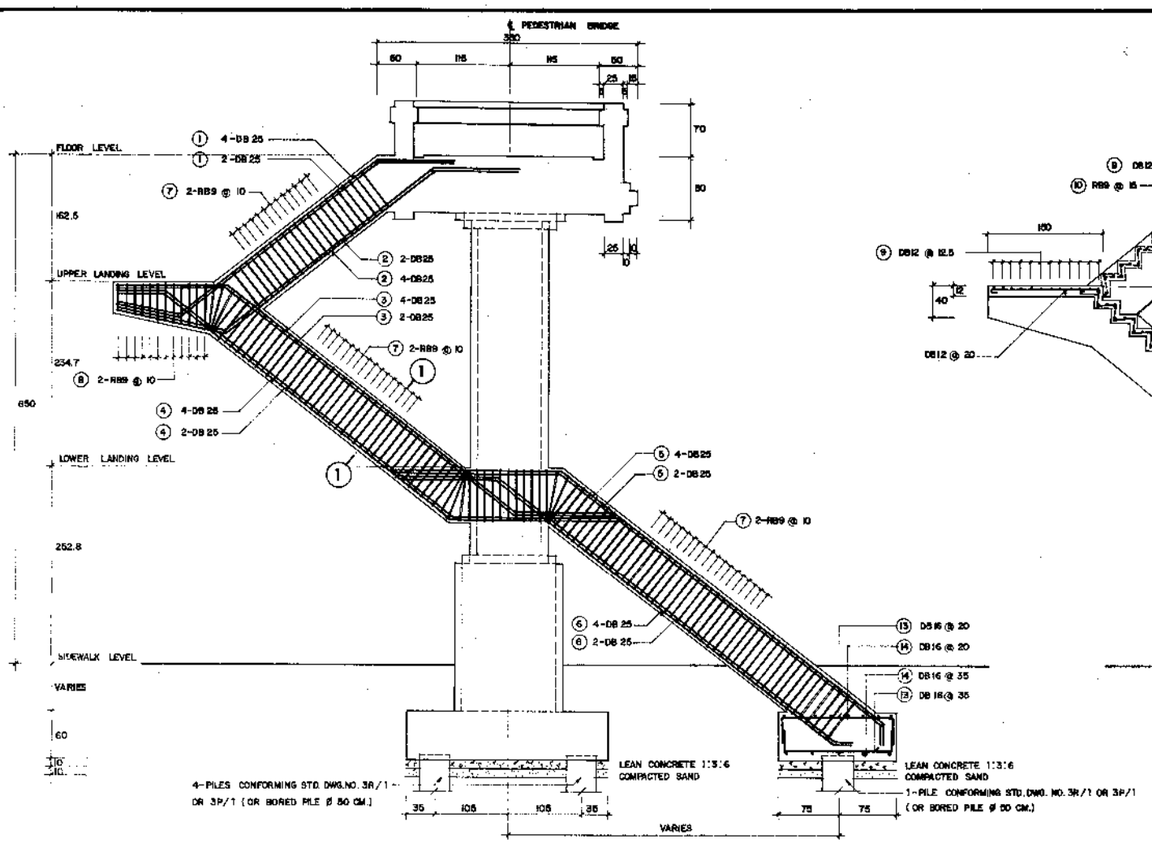
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

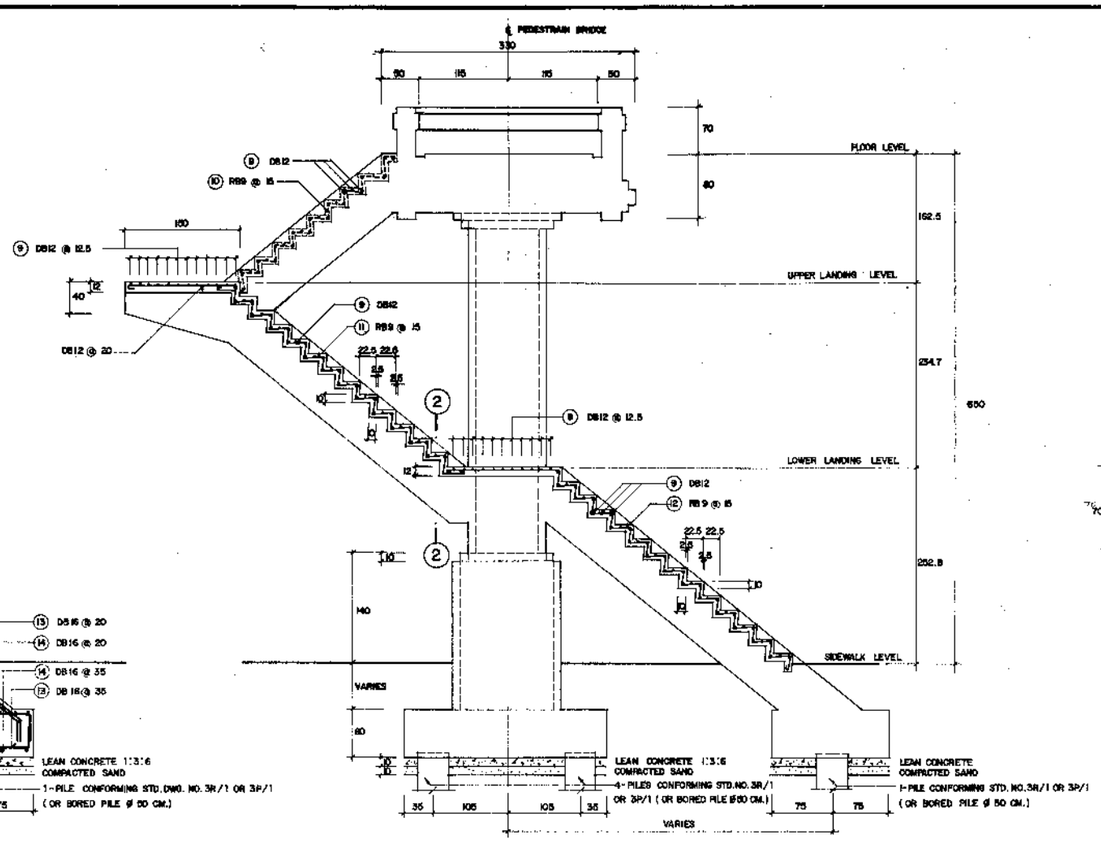
PEDESTRIAN BRIDGE

STAIRS DETAILS (TYPE I)

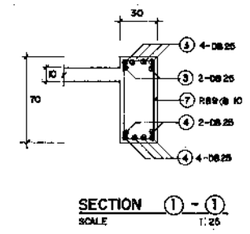
DESIGNED: DOH & CONSULTANTS	CHECKED:	DATE JULY 1994
SUBMITTED: (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED: Pgc. (DIRECTOR GENERAL)		DWG. NO. PS-10
		SHEET NO. 209



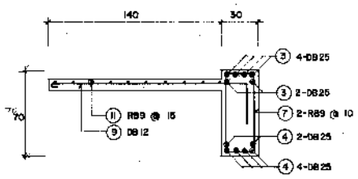
STAIR BEAM REINFORCEMENT
SCALE 1:40



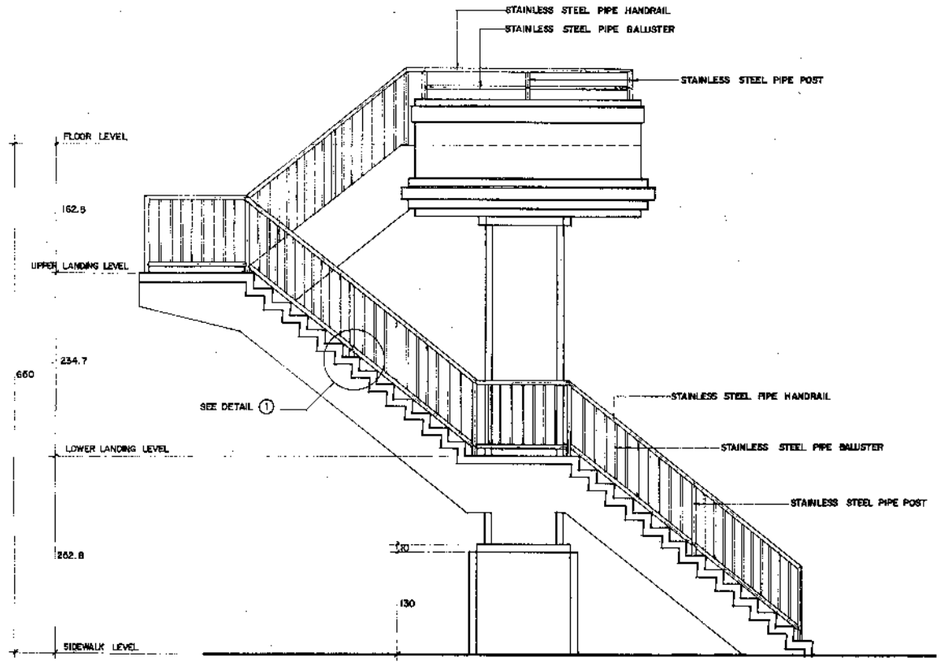
STAIR SLAB REINFORCEMENT
SCALE 1:40



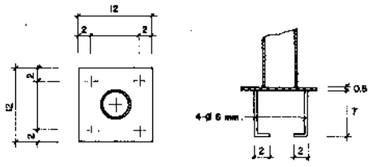
SECTION ① - ①
SCALE 1:25



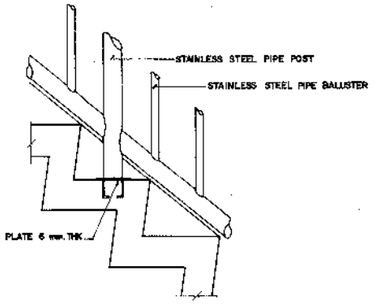
SECTION ② - ②
SCALE 1:25

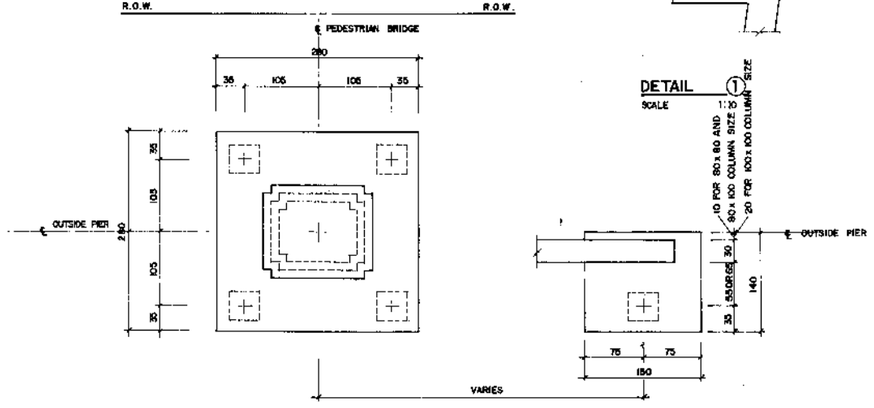


SIDE ELEVATION
SCALE 1:40



DETAIL OF STAINLESS STEEL PLATE
SCALE 1:5





PILING PLAN
SCALE 1:40

TABLE OF REINFORCEMENT

BAR MARK	BAR DIA.(MM)	BAR BENDING DIAGRAM
①	DB 25	
②	DB 25	
③	DB 25	
④	DB 25	
⑤	DB 25	
⑥	DB 25	
⑦	RB 9	
⑧	RB 9	
⑨	DB 12	
⑩	RB 9	
⑪	RB 9	
⑫	RB9	
⑬	DB16	
⑭	DB16	

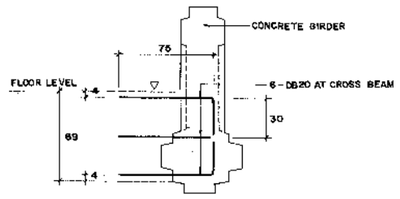
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

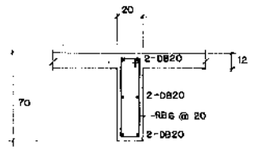
PEDESTRIAN BRIDGE

STAIRS DETAILS (TYPE II)

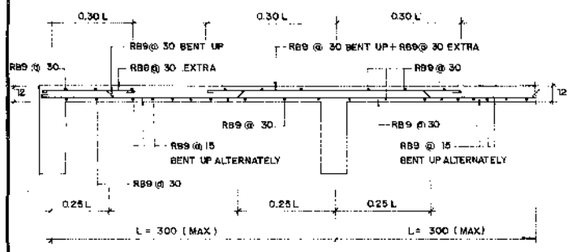
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : PDR (DIRECTOR GENERAL)		DWG. NO. PS-11
		SHEET NO. 210



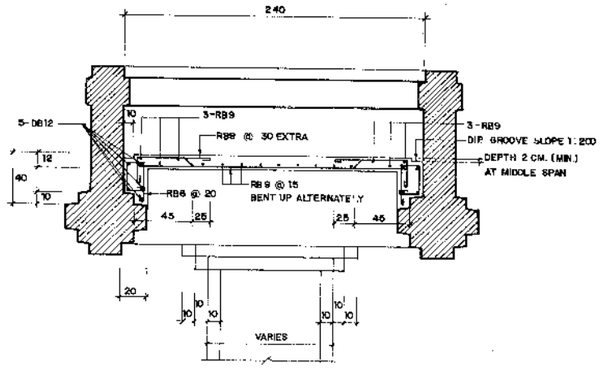
DETAIL OF PRESTRESSED CONCRETE GIRDER EXTRA REINFORCEMENT



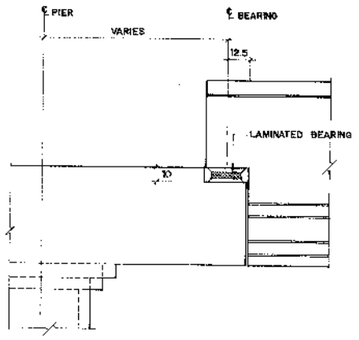
DETAIL OF CROSS BEAM REINFORCEMENT 1:25



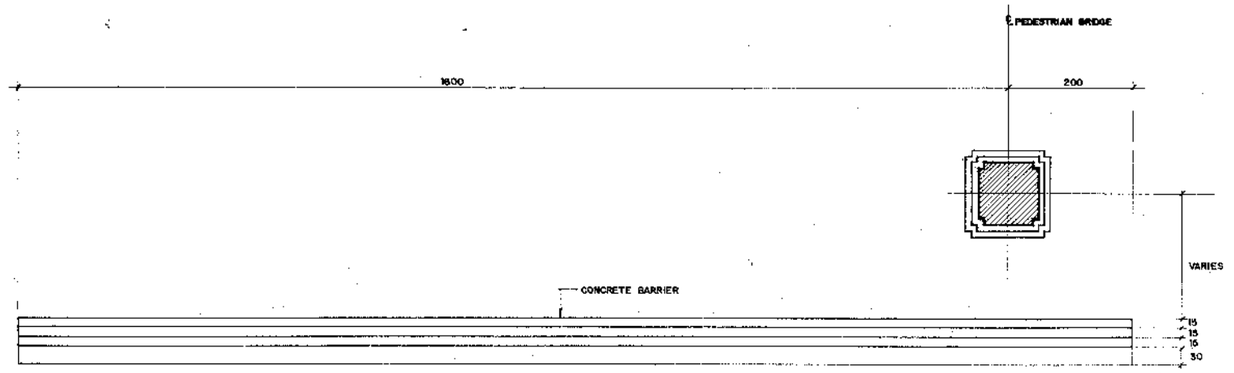
DETAIL OF SLAB REINFORCEMENT 1:25



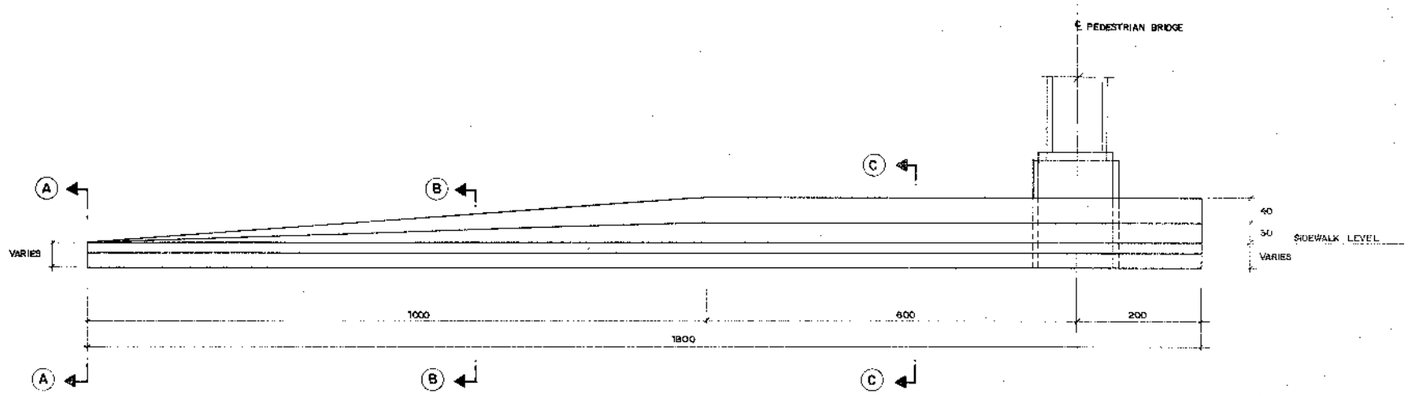
CROSS SECTION OF SLAB REINFORCEMENT 1:25



DETAIL OF BEARING



PLAN

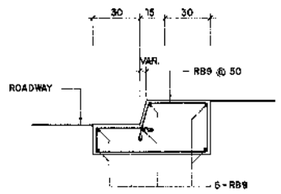


PROFILE

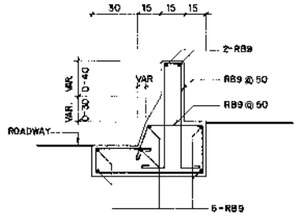
CONSTRUCTION SPECIFICATION

1. REINFORCING STEEL
   - 1.1 ROUND BAR (RB) SHALL CONFORM TIS 20 CLASS SR 24
   - 1.2 DEFORMED BAR (DB) SHALL CONFORM TIS 24 CLASS SD 30
2. CONCRETE
   - 2.1 A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 210 KSC. FOR A 15x15x15 CM. CUBE AT 28 DAYS.
   - 2.2 CONCRETE SLUMP, MAX. 8.0 CM.
3. CLEAR CONCRETE COVER SHALL BE 3.0 CM. UNLESS OTHERWISE INDICATED
4. PILES (SELECTED FROM 4.1 OR 4.2)
   - 4.1 R.C. PILE OR PRESTRESSED CONCRETE PILE 40 x 40 CM. SHALL CONFORM STD. DWG. NO. 3R/1 OR 3P/1 RESPECTIVELY HAVING ULTIMATE CAPACITY NOT LESS THAN 110 TONS FROM HILEY'S FORMULA OR 90 TONS FROM LOAD TEST.
   - 4.2 BORED PILE Ø 50 CM. HAVING ULTIMATE CAPACITY NOT LESS THAN 90 TONS FROM LOAD TEST.
5. BORED PILE
   - 5.1 BORED PILE Ø 50 CM. DEPTH NOT LESS THAN 21.00 M. OR TO SAND LAYER USING 10-DB16, LENGTH 20.00 M. (INCLUDED LAPPING) FOR MAIN REINFORCING STEEL, RB6 @ 15 MM. FOR STIRRUPS AND PILE HEAD MUST BE EXTRA REINFORCED 10-DB20, LENGTH 5.00 M. CONTRACTOR MUST TEST BORED PILE BY LOAD TEST AT 90 TONS. CONFORMING ASTM D1143 AND MUST HAVE TOTAL SETTLEMENT AND PERMANENT SETTLEMENT NOT OVER THAN 25 MM. AND 6.5 MM. RESPECTIVELY. ITEM OF COMPUTATION OR DETAILS SHALL BE UNDER LOCATION AND DESIGN DIVISION APPROVAL.
   - 5.2 CONCRETE SPECIFICATION FOR BORED PILE IS THE SAME AS ITEM 2.
   - 5.3 OPERATING METHOD OF BORED PILE
     - 5.3.1 CASING MUST IN VERTICAL LINE
     - 5.3.2 MUST POUR CONCRETE TO FINISHED BORE HOLE IMMEDIATELY BY CONE AND REMOVED CASING BY PRESSURED
     - 5.3.3 MUST BE NOT BORING SOIL LESS THAN 3.0 M. FROM THE PILE WHICH AGE NOT OVER 24 HRS.
     - 5.3.4 MUST HAVE 10-DB 20, 80 CM. LENGTH FOR EXTRA REINFORCING STEEL IN FOUNDATION.
     - 5.3.5 TOP OF BORED PILE LEVEL MUST HIGER THAN REQUIRED LEVEL NOT LESS THAN 500 MM.
6. FOUNDATION LEVEL OF PEDESTRIAN BRIDGE MUST BE THE SAME LEVEL.
7. STAINLESS STEEL PIPE OF PEDESTRIAN BRIDGE SHALL BE APPROVED BY ENGINEER.
   - 7.1 STAIRS
     - HAND RAIL (TOP - BOTTOM) Ø 2 1/2" THICKNESS 1.5 MM. (MIN.) IS WELDED WITH BALUSTER (TOP - BOTTOM) AND POST.
     - POST Ø 2 1/2" THICKNESS 1.5 MM. (MIN.) THE TOP AND BOTTOM IS WELDED WITH HAND RAIL AND STAINLESS STEEL PLATE 10 x 10 CM. THICKNESS 6 MM. FIXED IN STAIRS SLAB RESPECTIVELY.
     - BALUSTER Ø 1 1/2" THICKNESS 1.2 MM. (MIN.) IS WELDED WITH HAND RAIL (TOP - BOTTOM)
   - 7.2 PEDESTRIAN BRIDGE HAND RAIL.
     - HAND RAIL Ø 2 1/2" THICKNESS 1.5 MM. (MIN.) IS WELDED WITH BALUSTER.
     - POST Ø 2 1/2" THICKNESS 1.5 MM. THE TOP AND BOTTOM IS WELDED WITH HAND RAIL AND STAINLESS STEEL PLATE 10 x 10 CM. THICKNESS 6 MM. FIXED IN PRESTRESSED CONCRETE GIRDER AND RC. WALL RESPECTIVELY.
     - BALUSTER Ø 1" THICKNESS 1.2 MM. (MIN.) BOTHSIDE IS WELDED WITH POST.
8. WELDING SHALL CONFORM AISC SPECIFICATIONS.
9. STAIRS, PIER AND WALL SHALL BE NOT RENDERING.
10. DETAIL OF CONCRETE BARRIER SHALL CONFORM THIS DRAWING OR ENGINEER APPROVAL.
11. ALL DIMENSIONS SHOWN ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.

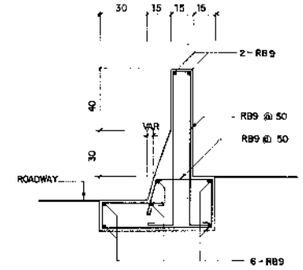
INSTALLATION CONCRETE BARRIER 1:50



SECTION (A) - (A) 1:20



SECTION (B) - (B) 1:20

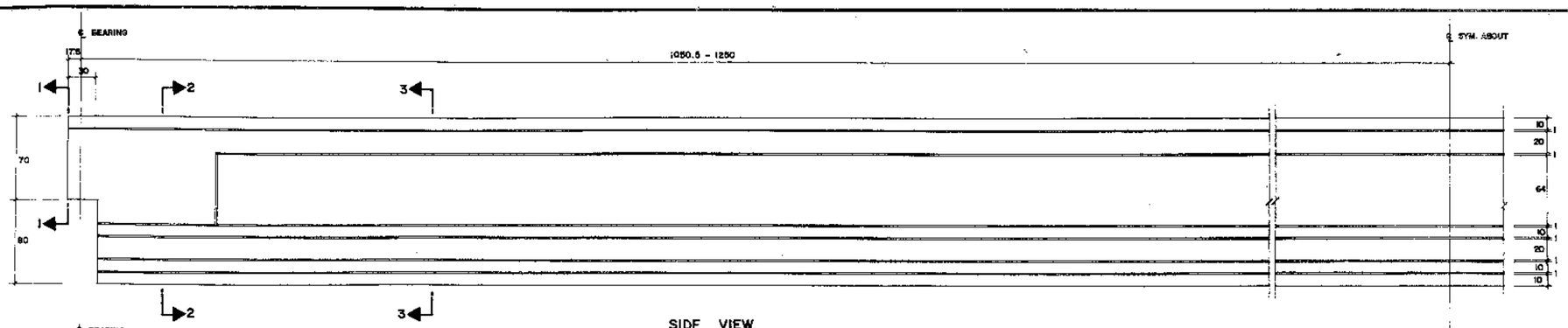


SECTION (C) - (C) 1:20

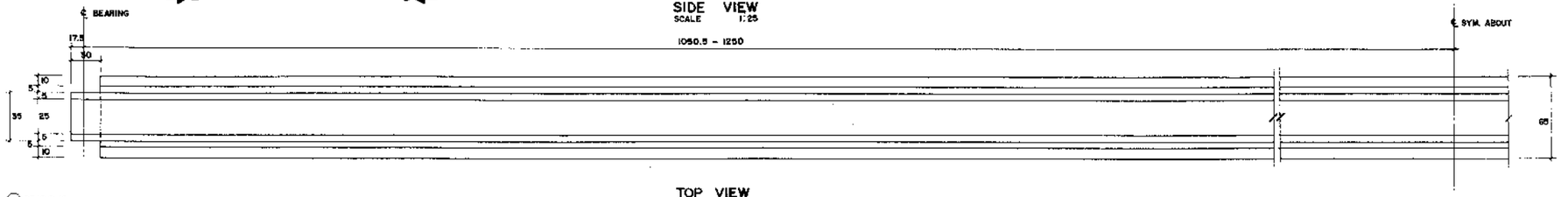
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
PEDESTRAIN BRIDGE
CONSTRUCTION SPECIFICATION AND MISCELLENEOUS DETAILS

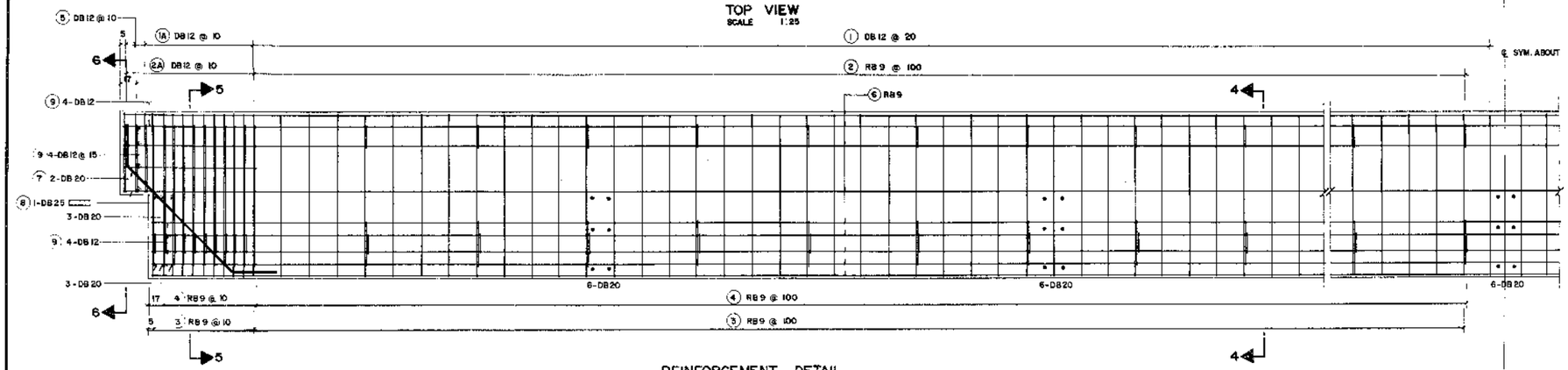
DESIGNER : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PS-12
		SHEET NO. 211



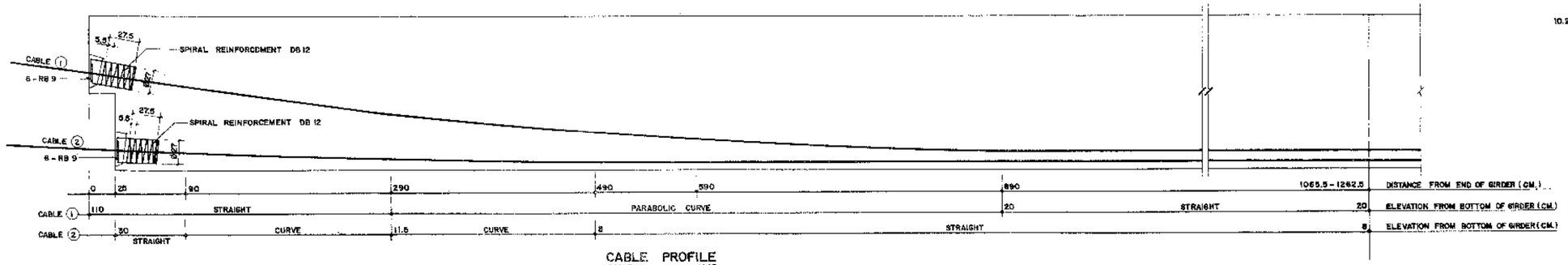
SIDE VIEW
SCALE 1:25



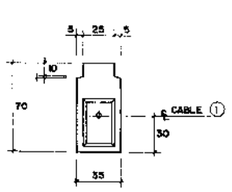
TOP VIEW
SCALE 1:25



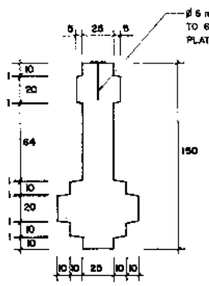
REINFORCEMENT DETAIL
SCALE 1:25



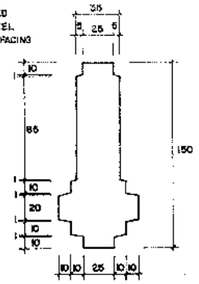
CABLE PROFILE
SCALE 1:25



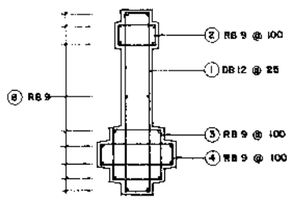
SECTION 1 - 1
SCALE 1:25



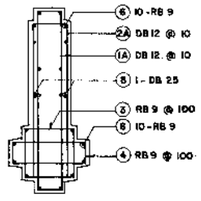
SECTION 3 - 3
SCALE 1:25



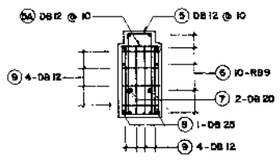
SECTION 2 - 2
SCALE 1:25



SECTION 4 - 4
SCALE 1:25



SECTION 5 - 5
SCALE 1:25



SECTION 6 - 6
SCALE 1:25

NOTES :

1. ALL DIMENSIONS ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
2. NO CHAMFERS SHALL BE PROVIDED.
3. PRESTRESSING SYSTEM SHALL CONFORM TO THE LATEST AASHTO OR BRITISH STANDARD.
4. PRESTRESSING TENDONS HAVE 2 CABLES WITH EACH BEARING LOAD NOT LESS THAN 2,200 KN. WITH THE CORRESPONDING YIELD STRENGTH AND ULTIMATE STRENGTH NOT LESS THAN 1,670 AND 1,860 N./mm.^{2} RESPECTIVELY.
5. JACKING FORCE OF EACH CABLE SHALL BE 1,540 KN. EXCLUDING PROVISION FOR SLIPING.
6. GROUT ALL CABLE DUCTS WITH CEMENT SLURRY APPLY EPOXY RESIN TO THE RECESSES AT BOTH ENDS OF THE GIRDER JUST BEFORE FILLING THEM WITH MORTAR.
7. CLEAR CONCRETE COVER SHALL BE 3 CM. UNLESS OTHERWISE INDICATED.
8. REINFORCING STEEL
   - 8.1 ROUND BAR (RB) SHALL CONFORM TIS 20 CLASS SR 24.
   - 8.2 DEFORMED BAR (DB) SHALL CONFORM TIS 24 CLASS SD 30.
9. CONCRETE SHALL HAVE THE 28 DAYS MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASE ON 15x15x15 CM. CUBE SAMPLES, OF 40 N./mm.^{2} AND MAXIMUM SLUMP OF 8 CM.
10. BRIDGE BEARING
    - 10.1 BRIDGE BEARINGS SHALL BE LAMINATED BEARING CONFORMING TO THE LATEST AASHTO OR BRITISH STANDARD AND SHALL MEET WITH THE FOLLOWING PERFORMANCE REQUIREMENTS

MAX. VERT. LOAD	= 300	KN.
MIN. VERT. LOAD	= 150	KN.
HOR. LONG. LOAD (FIXED BEARING)	= 10	KN.
HOR TRANS. LOAD	= 8	KN.
HOR. MOVEMENT (FREE BEARING)	= —	
EXPANSION	= 3	MM.
CONTRACTION	= 8	MM.
ROTATION	= 0.05	RAD.

    - 10.2 BRIDGE BEARING MUST BE PLACED HORIZONTALLY. NON SHRINKAGE MATERIAL SHALL BE USED IF ANY ADJUSTMENT TO THE BRIDGE BEARING SEATINGS IS REQUIRED.

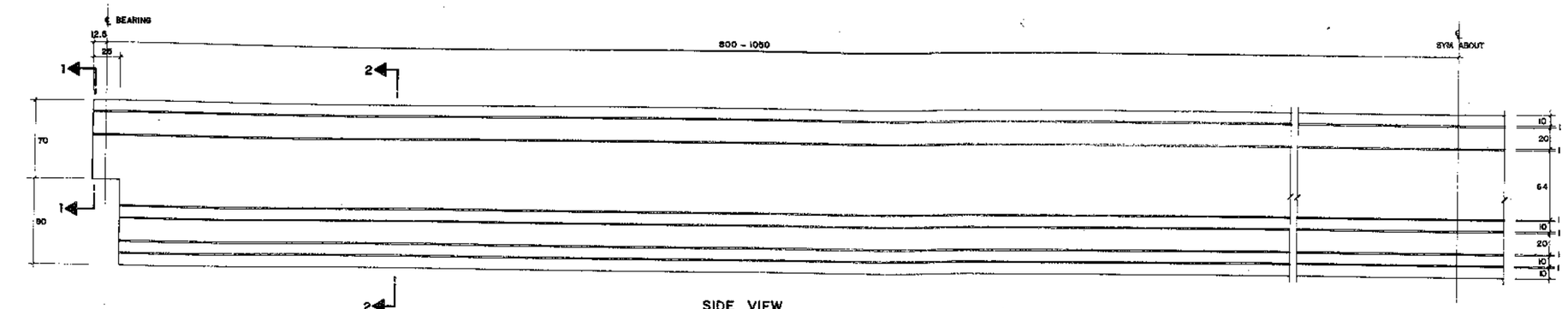
TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
(1)	DB 12	
(1A)	DB 12	
(2)	RB 9	
(2A)	DB 12	
(3)	RB 9	
(4)	RB 9	
(5)	DB 12	
(5A)	DB 12	
(6)	RB 9	
(7)	DB 20	
(8)	DB 25	
(9)	DB 12	

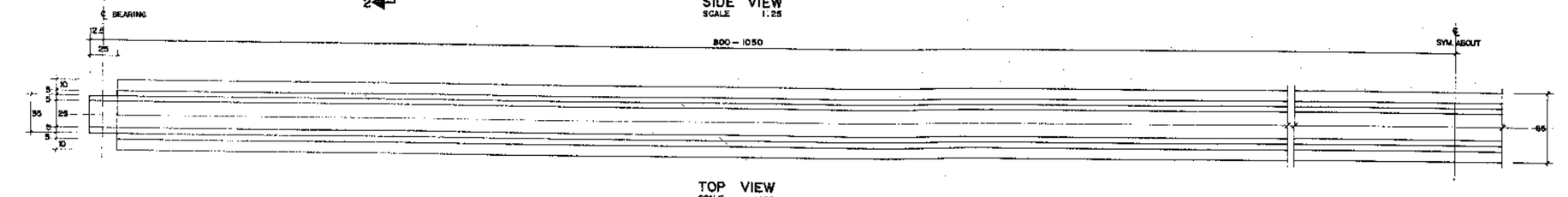
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING
PRESTRESSED CONCRETE GIRDER
FOR SPAN 21.01 – 25.00 M. (PC 8801)

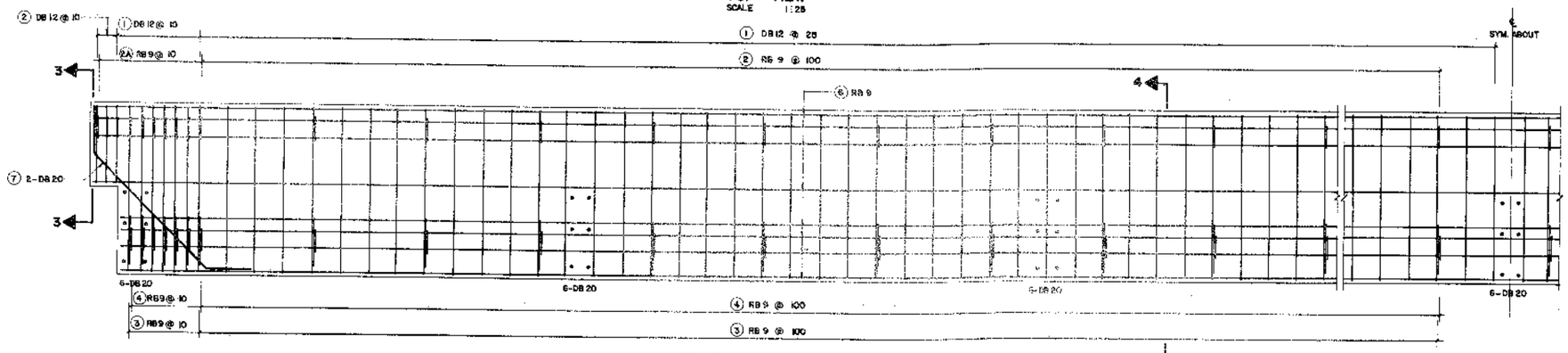
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
		DWG. NO. PS-13
APPROVED : (DIRECTOR GENERAL)		SHEET NO. 212



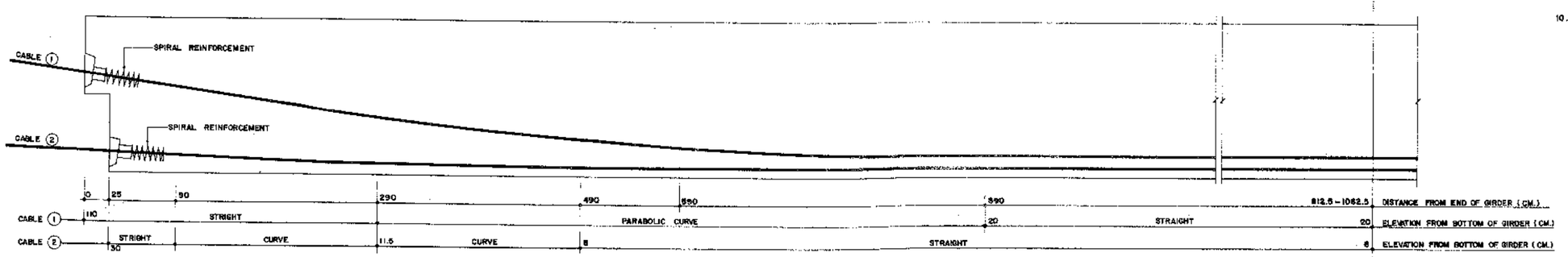
SIDE VIEW
SCALE 1:25



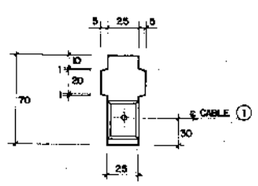
TOP VIEW
SCALE 1:25



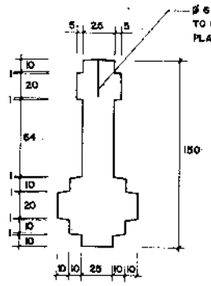
REINFORCEMENT DETAIL
SCALE 1:25



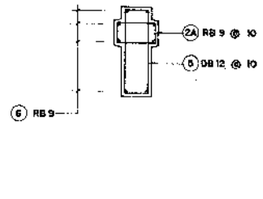
CABLE PROFILE
SCALE 1:25



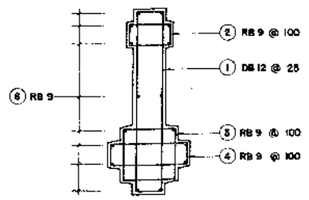
SECTION 1 – 1
SCALE 1:25



SECTION 2 – 2
SCALE 1:25



SECTION 3 – 3
SCALE 1:25



SECTION 4 – 4
SCALE 1:25

NOTES :

1. ALL DIMENSIONS ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED.
2. NO CHAMFERS SHALL BE PROVIDED.
3. PRESTRESSING SYSTEM SHALL CONFORM TO THE LATEST AASHTO OR BRITISH STANDARD.
4. PRESTRESSING TENDONS HAVE 2 CABLES WITH EACH BEARING LOAD NOT LESS THAN 1,250 KN. WITH THE CORRESPONDING YIELD STRENGTH AND ULTIMATE STRENGTH NOT LESS THAN 1,670 AND 1,860 N/mm^2 RESPECTIVELY.
5. JACKING FORCE OF EACH CABLE SHALL BE 875 KN. EXCLUDING PROVISION FOR SLIPING.
6. GROUT ALL CABLE DUCTS WITH CEMENT SLURRY APPLY EPOXY RESIN TO THE RECESSES AT BOTH ENDS OF THE GIRDER JUST BEFORE FILLING THEM WITH MORTAR.
7. CLEAR CONCRETE COVER SHALL BE 3 CM. UNLESS OTHERWISE INDICATED.
8. REINFORCING STEEL
   - 8.1 ROUND BAR (RB) SHALL CONFORM TIS 20 CLASS SR24.
   - 8.2 DEFORMED BAR (DB) SHALL CONFORM TIS 24 CLASS SD 30.
9. CONCRETE SHALL HAVE THE 28 DAYS MINIMUM ULTIMATE COMPRESSIVE STRENGTH, BASE ON 15x15x15 CM. CUBE SAMPLES, OF 40 N/mm^2 AND MAXIMUM SLUMP OF 8 CM.
10. BRIDGE BEARING
    - 10.1 BRIDGE BEARINGS SHALL BE LAMINATED BEARING CONFORMING TO THE LATEST AASHTO OR BRITISH STANDARD SHALL MEET WITH THE FOLLOWING PERFORMANCE REQUIREMENTS :

MAX. VERT. LOAD	=	250	KN.
MIN. VERT. LOAD	=	125	KN.
HOR. LONG. LOAD (FIXED BEARING)	=	10	KN.
HOR. TRANS. LOAD	=	8	KN.
HOR. MOVEMENT (FREE BEARING)	=		
EXPANSION	=	3	MM.
CONTRACTION	=	8	MM.
ROTATION	=	0.05	RAD.

    - 10.2 BRIDGE BEARING MUST BE PLACED HORIZONTALLY. NON SHRINKAGE MATERIAL SHALL BE USED IF ANY ADJUSTMENT TO THE BRIDGE BEARING SEATINGS IS REQUIRED.

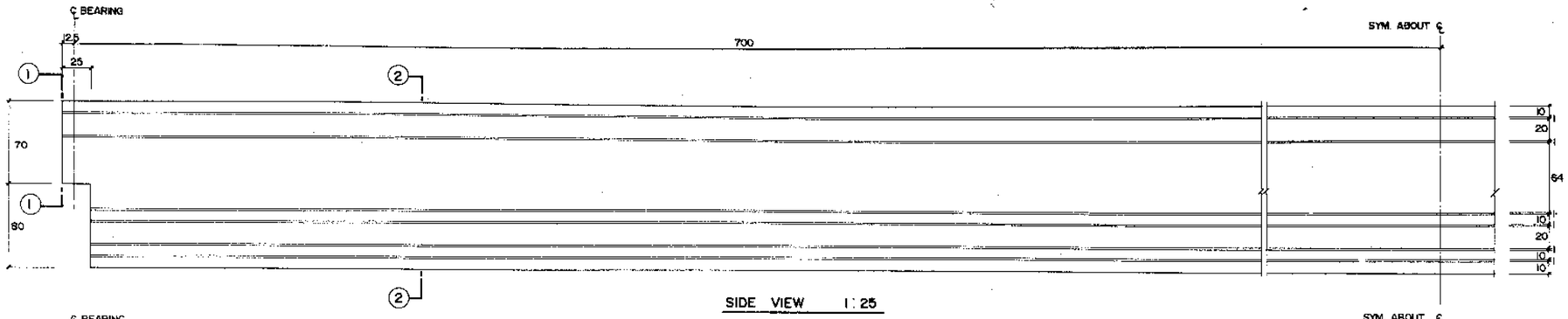
TABLE OF REINFORCEMENT

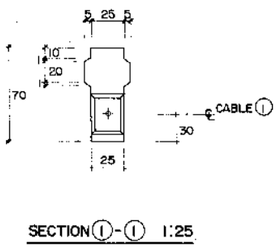
BAR MARK	BAR DIA. (MM.)	BAR BENDING DIAGRAM
①	DB 12	
②&(2A)	RB 9	
③	RB 9	
④	RB 9	
⑤	DB 12	
⑥	RB 9	
⑦	DB 20	

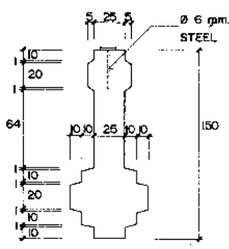
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

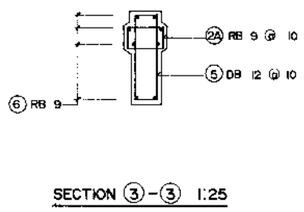
STANDARD DRAWING
PRESTRESSED CONCRETE GIRDER
FOR SPAN 16.01 – 21.00 M. (PC 8802)

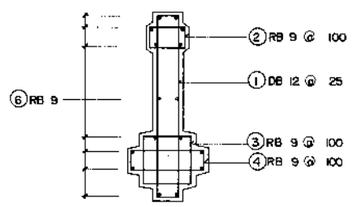
DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE	JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE	AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO.	PS-14
		SHEET NO.	213

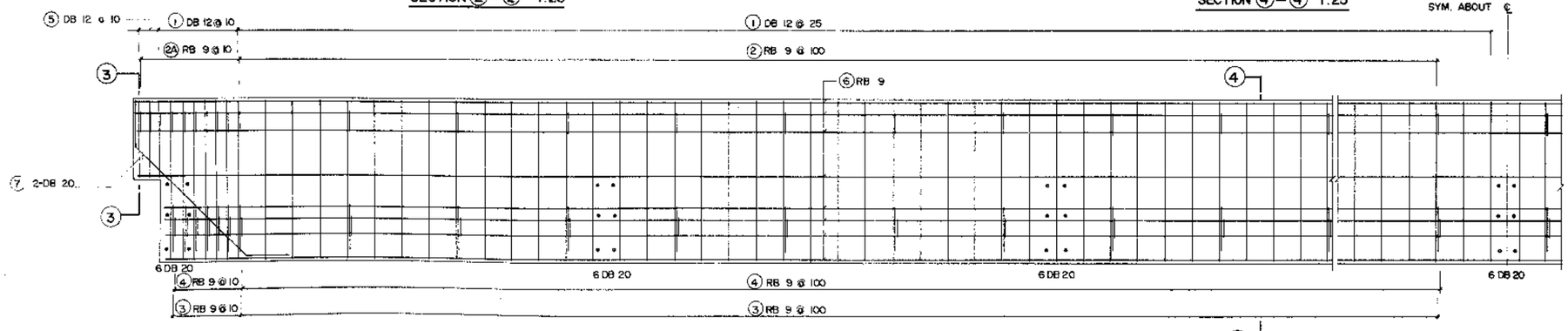


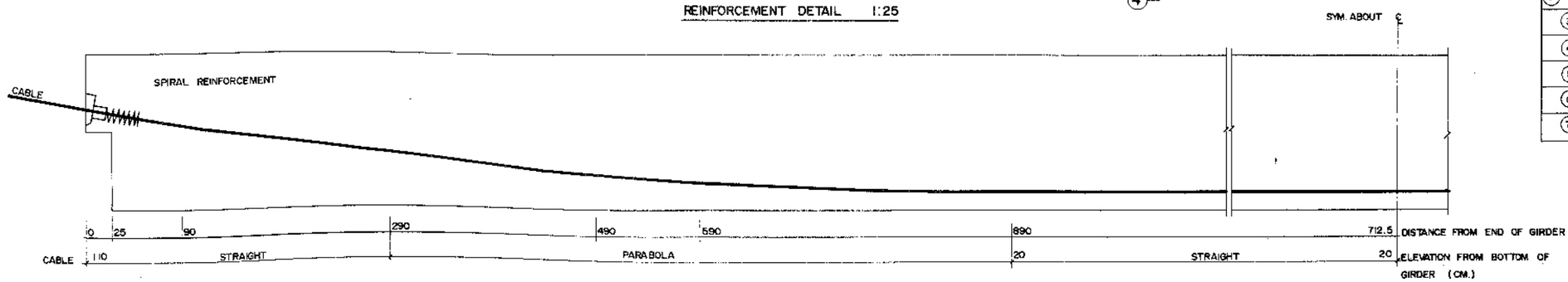












NOTES

1. ALL DIMENSIONS ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED
2. NO CHAMFERS SHALL BE PROVIDED
3. PRESTRESSING SYSTEM SHALL CONFORM TO THE LATEST AASHTO OR BRITISH STANDARD
4. PRESTRESSING TENDONS HAVE 1 CABLES WITH EACH BREAKING LOAD NOT LESS THAN 1250 KN. WITH THE CORRESPONDING YIELD STRENGTH AND ULTIMATE STRENGTH NOT LESS THAN 1670 AND 1860 N/mm^2 RESPECTIVELY.
5. JACKING FORCE OF EACH CABLE SHALL BE 875 KN. EXCLUDING PROVISION FOR SLIPING.
6. GROUT ALL CABLE DUCTS WITH CEMENT SLURRY APPLY EPOXY RASIN TO THE RECESSES AT BOTH ENDS OF GIRDER JUST BEFORE FILLING THEM WITH MORTAR.
7. CLEAR CONCRETE COVER SHALL BE 3 CM. UNLESS OTHERWISE INDICATED.
8. REINFORCING STEEL
   - 8.1 ROUND BAR (RB) SHALL CONFORM TIS 20 CLASS SR 24
   - 8.2 DEFORMED BAR (DB) SHALL CONFORM TIS 24 CLASS SD 30
9. CONCRETE SHALL HAVE THE 28 DAYS MINIMUM ULTIMATE COMPRESSIVE STRENGH, BASED ON 15 x 15 x 15 CM. CUBE SAMPLES, OF 40 N/mm^2 AND MAXIMUM SLUMP OF 8 CM.
10. BRIDGE BEARING
    - 10.1 BRIDGE BEARING SHALL BE LAMINATED BEARING CONFORMING TO THE LATEST AASHTO OR BRITISH STANDARD AND SHALL MEET WITH THE FOLLOWING PERFORMANCE REQUIREMENTS.

MAX VERT. LOAD	= 200	KN.
MIN VERT. LOAD	= 100	KN.
HOR. LONG LOAD (FIXED BEARING)	= 10	KN.
HOR. TRANS. LOAD	= 8	KN.
HOR. MOVEMENT (FREE BEARING)	= –	
EXPANSION	= 3	MM.
CONTRACTION	= 8	MM.
ROTATION	= 0.05	RAD

    - 10.2 BRIDGE BEARING MUST BE PLACED HORIZONTALLY. NON SHRINKAGE MATERIAL SHALL BE USED IF ANY ADJUSTMENT TO THE BRIDGE BEARING SEATINGS IS REQUIRED.

TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (mm.)	BAR BENDING DIAGRAM
①	DB 12	
② & ②A	RB 9	
③	RB 9	
④	RB 9	
⑤	DB 12	
⑥	RB 9	
⑦	DB 20	

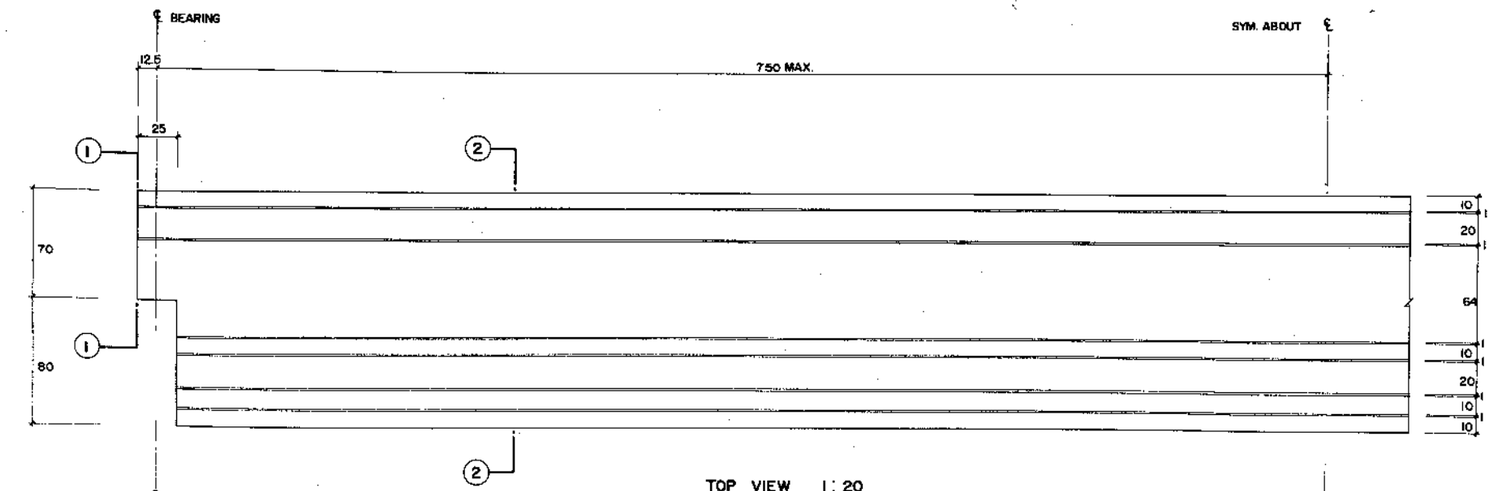
KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

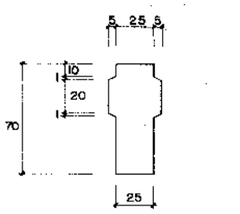
STANDARD DRAWING

PEDESTRIAN BRIDGE

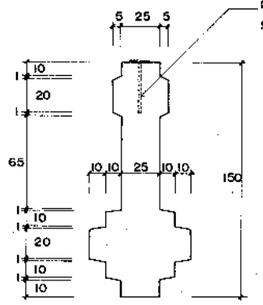
PRESTRESSED CONCRETE GIRDER FOR SPAN 14.00 M. (PC-8803)

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : (DIRECTOR GENERAL)		DWG. NO. PS-15
		SHEET NO. 214

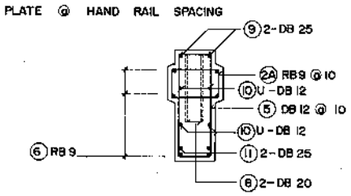




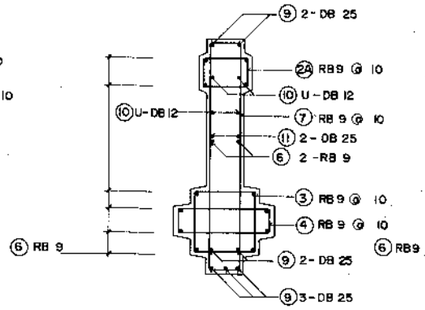
SECTION ①-① 1 : 20



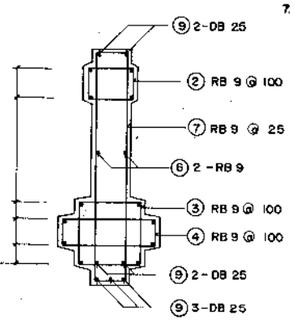
SECTION ②-② 1 : 20



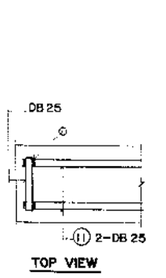
SECTION ③-③ 1 : 20



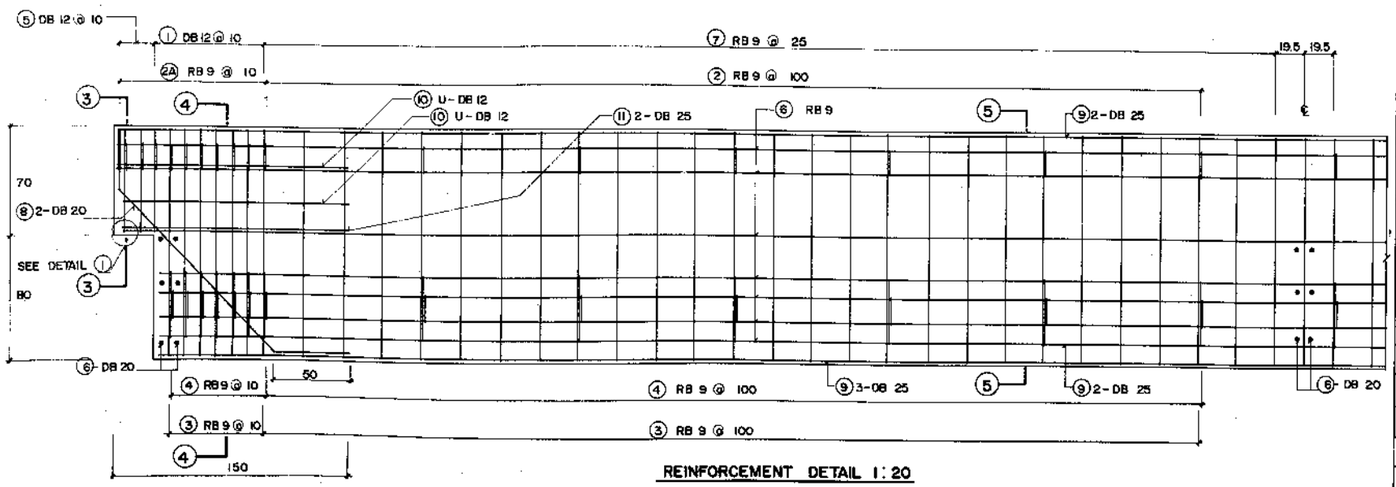
SECTION ④-④ 1 : 20



SECTION ⑤-⑤ 1 : 20



DETAIL I 1 : 10



REINFORCEMENT DETAIL 1 : 20

NOTES

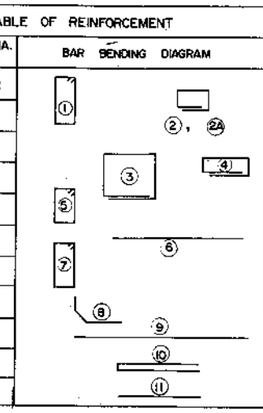
1. ALL DIMENSIONS ARE IN CENTIMETERS UNLESS OTHERWISE INDICATED
2. NO CHAMFERED SHALL BE PROVIDED
3. REINFORCING STEEL
   - 3.1 ROUND BAR (RB) SHALL CONFORM TIS 20 CLASS SR 24
   - 3.2 DEFORMED BAR (DB) SHALL CONFORM TIS 24 CLASS SD 30
4. CONCRETE
   - 4.1 A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 30 N/mm^2 FOR A 15 x 15 x 15 CM. CUBE AT 28 DAYS
   - 4.2 CONCRETE SLUMP, MAX 6.0 CM.
5. CLEAR CONCRETE COVER SHALL BE 3.0 CM. UNLESS OTHERWISE INDICATED
6. BEARING
   - 6.1 BEARING SHALL BE LAMINATED BEARING CONFORMING TO THE LATEST AASHTO OR BRITISH STANDARDS AND SHALL MEET WITH THE FOLLOWING PERFORMANCE REQUIREMENTS

MAX VERT. LOAD	= 217 KN.
MIN VERT. LOAD	= 145 KN.
HOR. LONG LOAD (FIXED BEARING)	= 44 KN.
HOR. TRANS. LOAD	= 27 KN.
HOR. MOVEMENT	= 4 MM.
EXPANSION	= 2 MM.
CONTRACTION	= 3 MM.
ROTATION	= 0.003 RAD.

   - 6.2 BEARING MUST BE PLACED HORIZONTALLY. NON SHRINKAGE MATERIAL SHALL BE USED IF ANY ADJUSTMENT TO THE BRIDGE BEARING SEATINGS IS REQUIRED.
7. LAP LENGTH SHALL NOT BE LESS THAN 40 DIAMETERS OF BIGGER BAR FOR PLAIN BAR AND 24 DIAMETERS OF BIGGER BAR FOR DEFORMED BAR.

TABLE OF REINFORCEMENT

BAR MARK	BAR DIA. (mm.)	BAR BENDING DIAGRAM
①	DB 12	
② & 2A	RB 9	
③	RB 9	
④	RB 9	
⑤	DB 12	
⑥	RB 9	
⑦	RB 9	
⑧	DB 20	
⑨	DB 25	
⑩	DB 12	
⑪	DB 25	



KINGDOM OF THAILAND
MINISTRY OF TRANSPORT AND COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

STANDARD DRAWING

PEDESTRIAN BRIDGE

REINFORCED CONCRETE GIRDER FOR SPAN = 15.00 M. (RC-920/11)

DESIGNED : DOH & CONSULTANTS	CHECKED :	DATE JULY 1994
SUBMITTED : (DIRECTOR OF LOCATION & DESIGN DIVISION)		SCALE AS SHOWN
APPROVED : FOR (DIRECTOR GENERAL)		DWG. NO. PS-16
		SHEET NO. 215