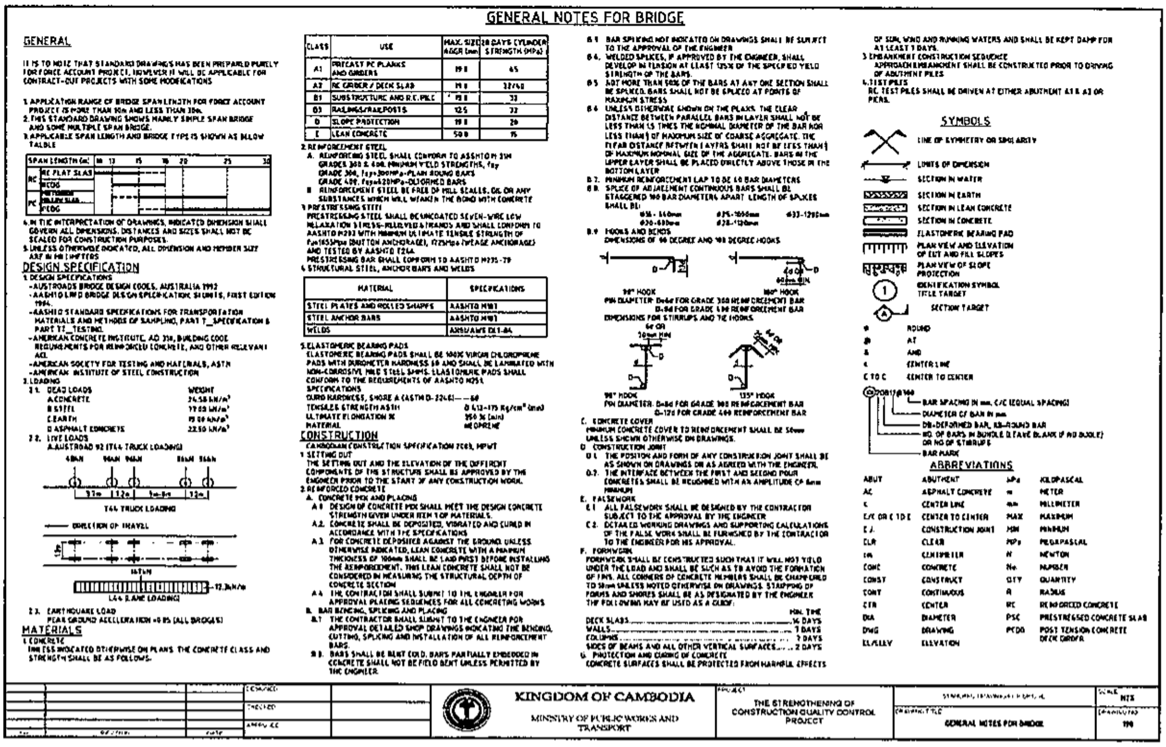
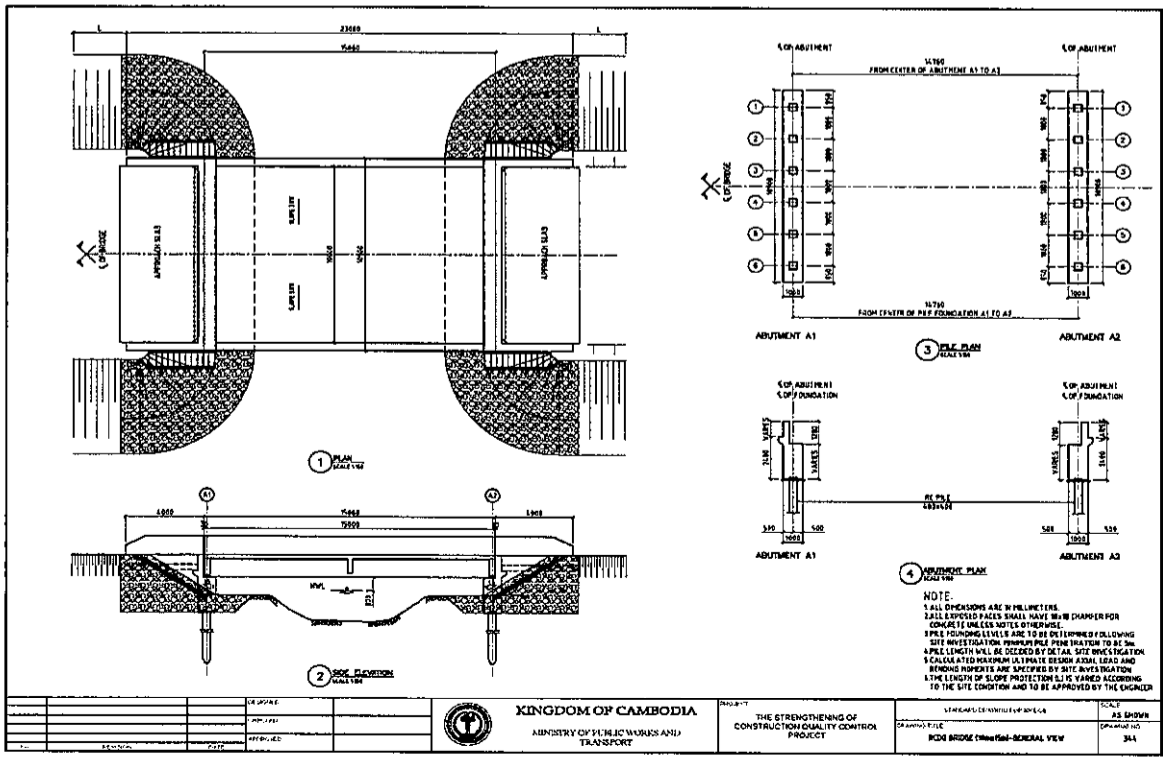
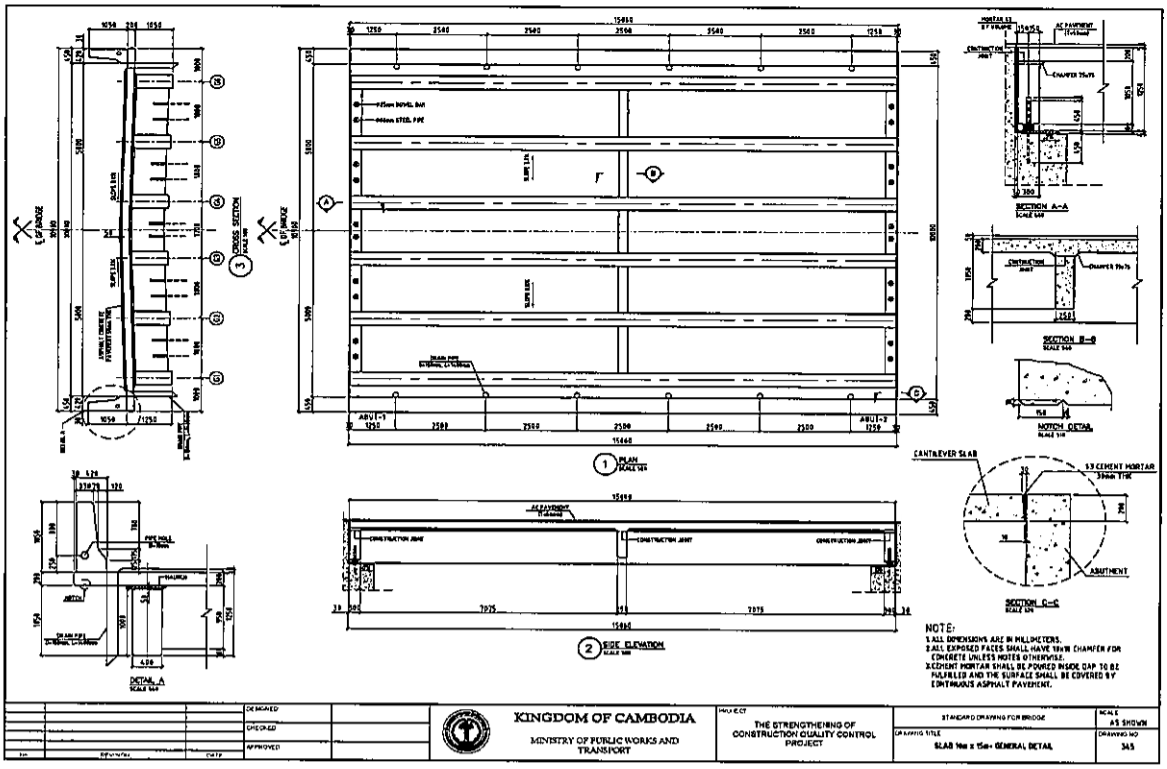
Part-2 Road Structure

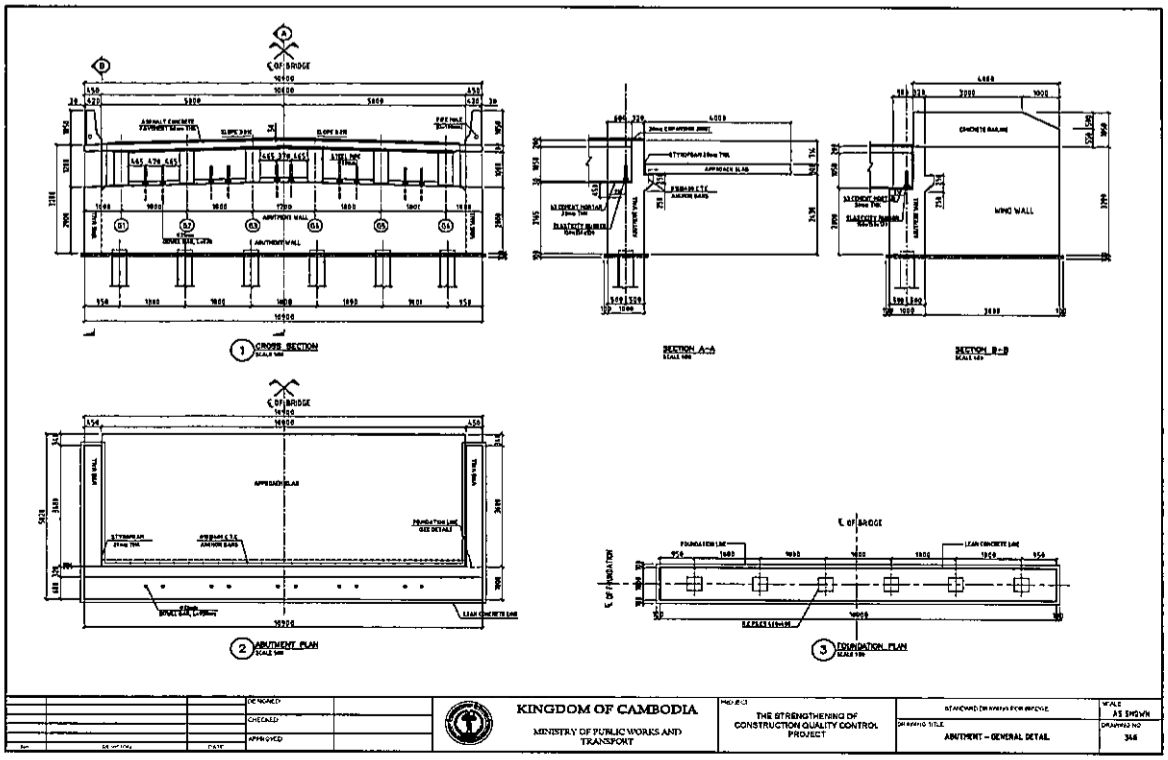
Vol.3 Bridge

(1) RCDG 10mx15m

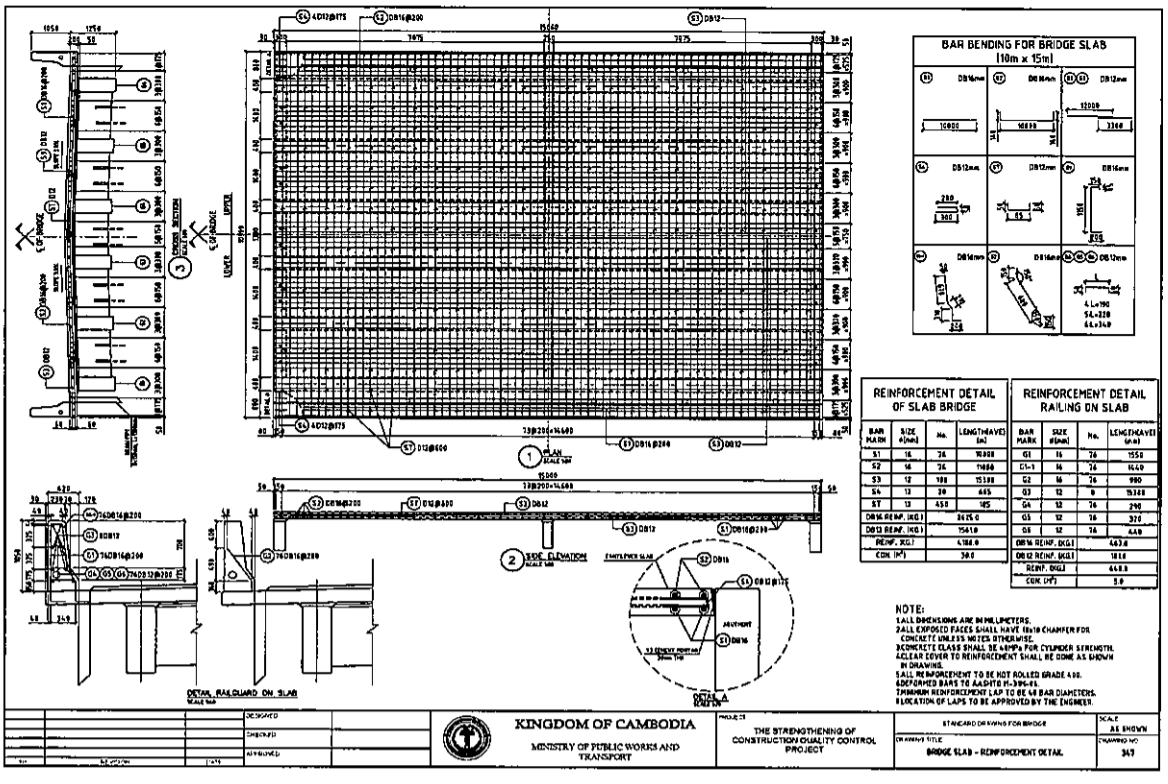



1 PLAN
2 SIDE ELEVATION
3 PILE PLAN
4 ABUTMENT PLAN
ABUTMENT A1
ABUTMENT A2
NOTE.
1.ALL DIMENSIONS ARE IN MILLIMETERS.
2.ALL EXPOSED FACES SHALL HAVE 18mm CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
3.PILE FOUNDING LEVELS ARE TO BE DETERMINED FOLLOWING SITE INVESTIGATION. MINIMUM PILE PENETRATION TO BE 5m.
4.PILE LENGTH WILL BE DECIDED BY DETAIL SITE INVESTIGATION
5.CALCULATED MAXIMUM ULTIMATE DESIGN AXIAL LOAD AND BENDING MOMENTS ARE SPECIFIED BY SITE INVESTIGATION
6.THE LENGTH OF SLOPE PROTECTION(L) IS VARIED ACCORDING TO THE SITE CONDITION AND TO BE APPROVED BY THE ENGINEER
KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT
THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT
STANDARD DRAWING FOR BRIDGE
SCALE AS SHOWN
DRAWING TITLE
RCC BRIDGE (16m Flat)-GENERAL VIEW
DRAWING NO 344


1 PLAN
2 SIDE ELEVATION
3 CROSS SECTION
DETAIL A
SECTION A-A
SECTION B-B
NOTCH DETAIL
CANTILEVER SLAB
ABUTMENT
SECTION C-C
NOTE:
1.ALL DIMENSIONS ARE IN MILLIMETERS.
2.ALL EXPOSED FACES SHALL HAVE 18mm CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
3.CEMENT MORTAR SHALL BE POURED INSIDE GAP TO BE FULFILLED AND THE SURFACE SHALL BE COVERED BY CONTINUOUS ASPHALT PAVEMENT.
KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT
THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT
STANDARD DRAWING FOR BRIDGE
SCALE AS SHOWN
DRAWING TITLE
SLAB 16m x 15m- GENERAL DETAIL
DRAWING NO 345



DESIGNED	KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWINGS FOR BRIDGE	SCALE: AS SHOWN
CHECKED			DRAWING TITLE: ABUTMENT – GENERAL DETAIL	DRAWING NO: 346
APPROVED				



BAR BENDING FOR BRIDGE SLAB
(10m x 15m)

REINFORCEMENT DETAIL OF SLAB BRIDGE

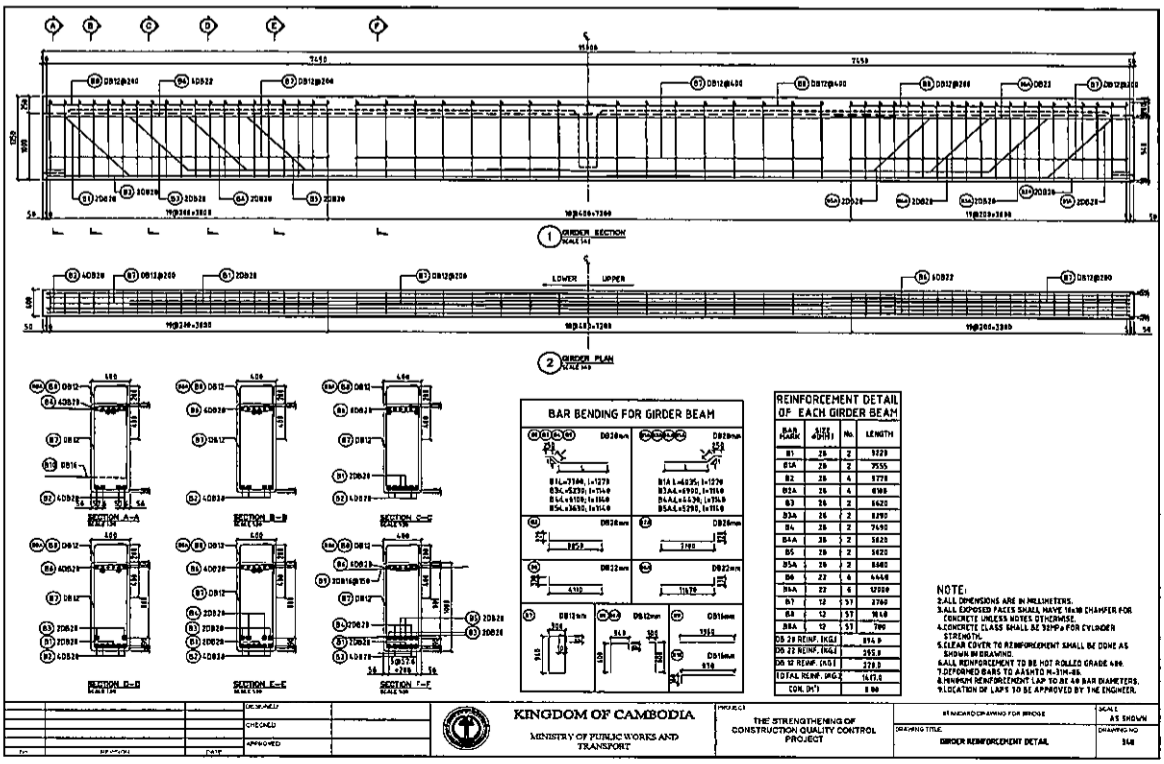
BAR MARK	SIZE d(mm)	No.	LENGTH(M) (m)
S1	16	26	10300
S2	16	26	11400
S3	12	198	15300
S4	12	30	445
S7	12	450	745
DB16 REINF. (KG)			8415.0
DB12 REINF. (KG)			7541.0
REINF. (KG)			4788.0
CON. (M^3)			300

REINFORCEMENT DETAIL RAILING ON SLAB

BAR MARK	SIZE d(mm)	No.	LENGTH(M) (m)
G1	16	76	1550
G1-1	16	76	1640
G2	16	76	980
G3	12	8	15300
G4	12	76	290
G5	12	76	320
G6	12	76	440
DB16 REINF. (KG)			4630
DB12 REINF. (KG)			1810
REINF. (KG)			6440
CON. (M^3)			5.0

NOTE:
1.ALL DIMENSIONS ARE IN MILLIMETERS.
2.ALL EXPOSED FACES SHALL HAVE 10x10 CHAMFER FOR CONCRETE UNLESS NOTED OTHERWISE.
3.CONCRETE CLASS SHALL BE 40MPa FOR CYLINDER SERENGTH.
4.CLEAR COVER TO REINFORCEMENT SHALL BE DONE AS SHOWN IN DRAWING.
5.ALL REINFORCEMENT TO BE HOT ROLLED GRADE A-III.
6.DEFORMED BARS TO AASHTO M-300-83.
7.MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS.
8.LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.

DESIGNED	KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWINGS FOR BRIDGE	SCALE: AS SHOWN
CHECKED			DRAWING TITLE: BRIDGE SLAB – REINFORCEMENT DETAIL	DRAWING NO: 347
APPROVED				



BAR BENDING FOR GIRDER BEAM

REINFORCEMENT DETAIL OF EACH GIRDER BEAM

BAR MARK	SIZE (MM)	No.	LENGTH
B1	28	2	9729
B1A	28	2	9555
B2	28	4	9778
B2A	28	4	6188
B3	28	2	6620
B3A	28	2	8290
B4	28	2	7490
B4A	28	2	5823
B5	28	2	5820
B5A	28	2	8660
B6	22	6	6648
B6A	22	6	12000
B7	12	57	3760
B8	12	57	1840
B8A	12	57	799
DB 28 REINF. (KG)			894.9
DB 22 REINF. (KG)			295.8
DB 12 REINF. (KG)			278.8
TOTAL REINF. (KG)			1469.8
CON. (M³)			8.88

NOTE:
2.ALL DIMENSIONS ARE IN MILLIMETERS.
3.ALL EXPOSED FACES SHALL HAVE 16x16 CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
4.CONCRETE CLASS SHALL BE 32MPa FOR CYLINDER STRENGTH.
5.CLEAR COVER TO REINFORCEMENT SHALL BE DONE AS SHOWN IN DRAWING.
6.ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400.
7.DEFORMED BARS TO AASHTO M-31M-96.
8.MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS.
9.LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.

DESIGNED | CHECKED | APPROVED | DATE

KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT

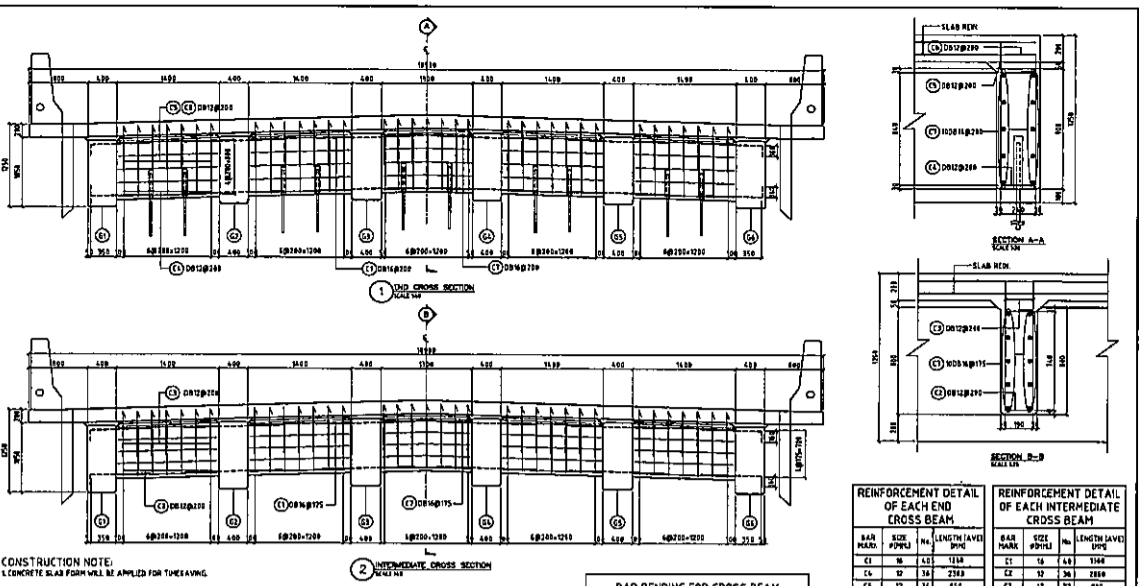
PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT

STANDARD DRAWING FOR BRIDGE

DRAWING TITLE: GIRDER REINFORCEMENT DETAIL

SCALE: AS SHOWN

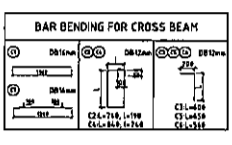
DRAWING NO: 348



CONSTRUCTION NOTE:
1.CONCRETE SLAB POUR WILL BE APPLIED FOR TIMES AVING.

NOTE:
2.ALL DIMENSIONS ARE IN MILLIMETERS.
3.ALL EXPOSED FACES SHALL HAVE 16x16 CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
4.CONCRETE CLASS SHALL BE 32MPa FOR CYLINDER STRENGTH.
5.CLEAR COVER TO REINFORCEMENT SHALL BE DONE AS SHOWN IN DRAWING.
6.ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400.
7.DEFORMED BARS TO AASHTO M-31M-96.
8.MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS.
9.LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.

BAR BENDING FOR CROSS BEAM



REINFORCEMENT DETAIL OF EACH END CROSS BEAM

BAR MARK	SIZE (MM)	No.	LENGTH (AVE) (MM)
C1	16	40	1150
C4	12	36	2360
C5	12	36	914
C6	12	36	760
C7	16	18	1260
B9	16	16	1260
B10	16	8	998
DB 16 REINF. (KG)			153.9
DB 12 REINF. (KG)			127.8
TOTAL REINF. (KG)			298.5
CON. (M³)			3.9

REINFORCEMENT DETAIL OF EACH INTERMEDIATE CROSS BEAM

BAR MARK	SIZE (MM)	No.	LENGTH (AVE) (MM)
C1	16	40	1160
C2	12	36	2850
C3	12	72	602
C7	16	10	1260
B9	16	16	1260
B10	16	8	998
DB 16 REINF. (KG)			153.9
DB 12 REINF. (KG)			116.0
TOTAL REINF. (KG)			271.8
CON. (M³)			2.8

DESIGNED | CHECKED | APPROVED | DATE

KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT

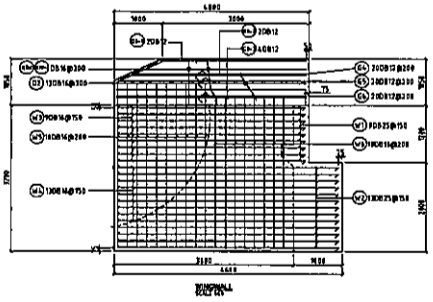
PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT

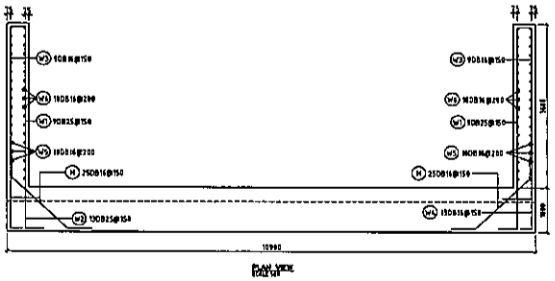
STANDARD DRAWING FOR BRIDGE

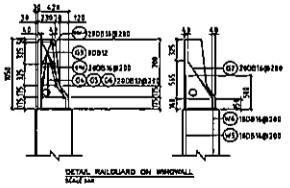
DRAWING TITLE: CROSS BEAM REINFORCEMENT DETAIL

SCALE: AS SHOWN

DRAWING NO: 349







DETAIL RAILGUARD ON WINGWALL

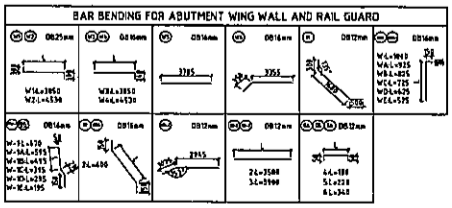
REINFORCEMENT DETAIL OF EACH RAIL GUARD ON WINGWALL

BAR MARK	SIZE #(MM)	No.	LENGTH(M)/EA (MM)
G1=A-E	16	28	1000
G1=A-E	16	28	875
G2	16	28	900
G3-1	12	2	3875
G3-2	12	2	3540
G3-3	12	4	3998
G4	12	28	250
G5	12	28	325
G6	12	28	440
Ø16 REINF. (KG)			86.6
Ø12 REINF. (KG)			44.5
TOTAL REINF. (KG)			131.0
CON. (M³)			2.0

REINFORCEMENT DETAIL OF EACH ABUTMENT WING WALL

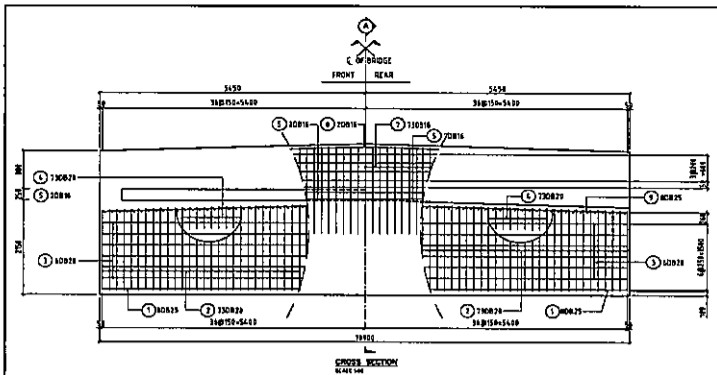
BAR MARK	SIZE #(MM)	No.	LENGTH(M)/EA (MM)
W1	25	9	4530
W2	25	13	5210
W3	16	9	4890
W4	16	13	4530
W5	16	18	3795
W6	16	18	3795
H	16	25	2660
Ø25 REINF. (KG)			618.8
Ø16 REINF. (KG)			666.8
TOTAL REINF. (KG)			861.6
CON. (M³)			8.0

BAR BENDING FOR ABUTMENT WING WALL AND RAIL GUARD

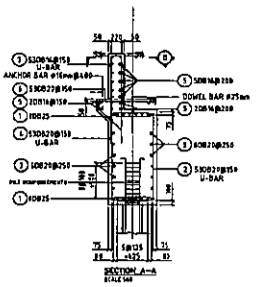


NOTE:
1.ALL DIMENSIONS ARE IN MILLIMETERS
2.ALL EXPOSED FACES SHALL HAVE 16x16 CHAMFER FOR CONCRETE UNLESS NOTED OTHERWISE.
3.CONCRETE CLASS SHALL BE 32MPa FOR CYLINDER STRENGTH.
4.CLEAR COVER TO REINFORCEMENT SHALL BE DONE AS SHOWN IN DRAWING.
5.ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400.
6.DEFORMED BARS TO AASHTO M-31M-96.
7.MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS.
8.LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.

			DESIGNED		KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE ABUTMENT WINGWALL REINFORCEMENT DETAIL
			CHECKED				SCALE: AS SHOWN DRAWING NO: 350
			APPROVED				
No.	DESCRIPTION	DATE					



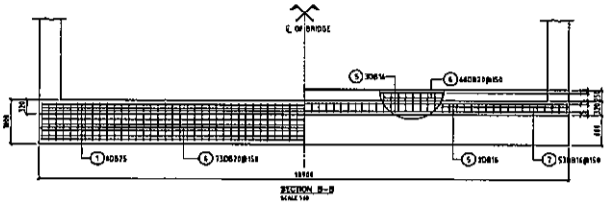
CROSS SECTION



SECTION A-A

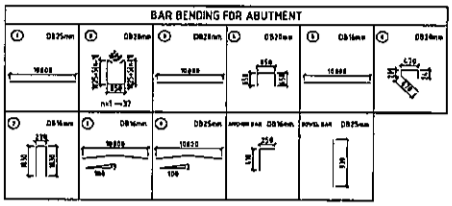
REINFORCEMENT DETAIL OF EACH ABUTMENT

BAR MARK	SIZE #(MM)	No.	LENGTH(M)/EA (MM)
1	25	9	10990
2	20	93	5320
3	20	12	10990
4	20	93	3750
5	16	16	10990
6	20	66	1590
7	16	93	3660
8	16	2	10990
9	25	4	10990
ANCHOR BAR,@16mm		24	680
DOWEL BAR,@25mm		18	930
Ø25 REINF. (KG)			619.8
Ø20 REINF. (KG)			2329.6
Ø16 REINF. (KG)			788.0
TOTAL REINF. (KG)			3438.0
CON. (M³)			29.8



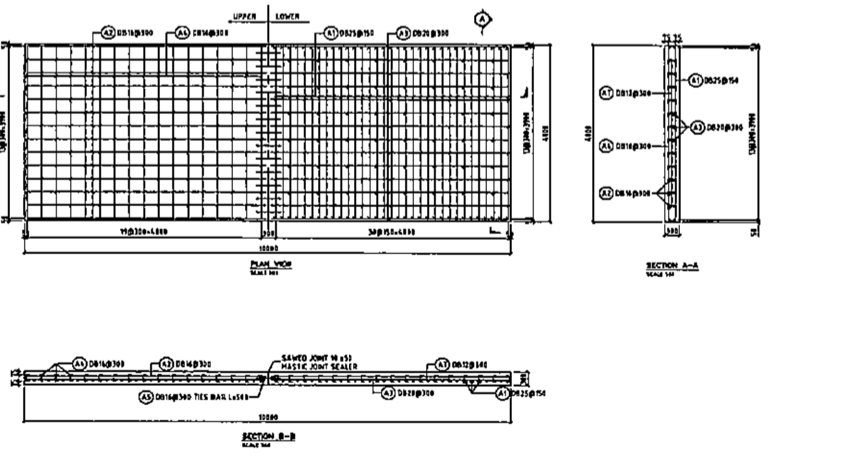
SECTION B-B

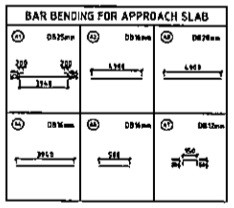
BAR BENDING FOR ABUTMENT



NOTE:
1.ALL DIMENSIONS ARE IN MILLIMETERS.
2.ALL EXPOSED FACES SHALL HAVE 16x16 CHAMFER FOR CONCRETE UNLESS NOTED OTHERWISE.
3.CONCRETE CLASS SHALL BE 32MPa FOR CYLINDER STRENGTH.
4.CLEAR COVER TO REINFORCEMENT SHALL BE DONE AS SHOWN IN DRAWING.
5.ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400.
6.DEFORMED BARS TO AASHTO M-31M-96.
7.MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS.
8.LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.

			DESIGNED		KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE ABUTMENT REINFORCEMENT DETAIL
			CHECKED				SCALE: AS SHOWN DRAWING NO: 351
			APPROVED				
No.	DESCRIPTION	DATE					

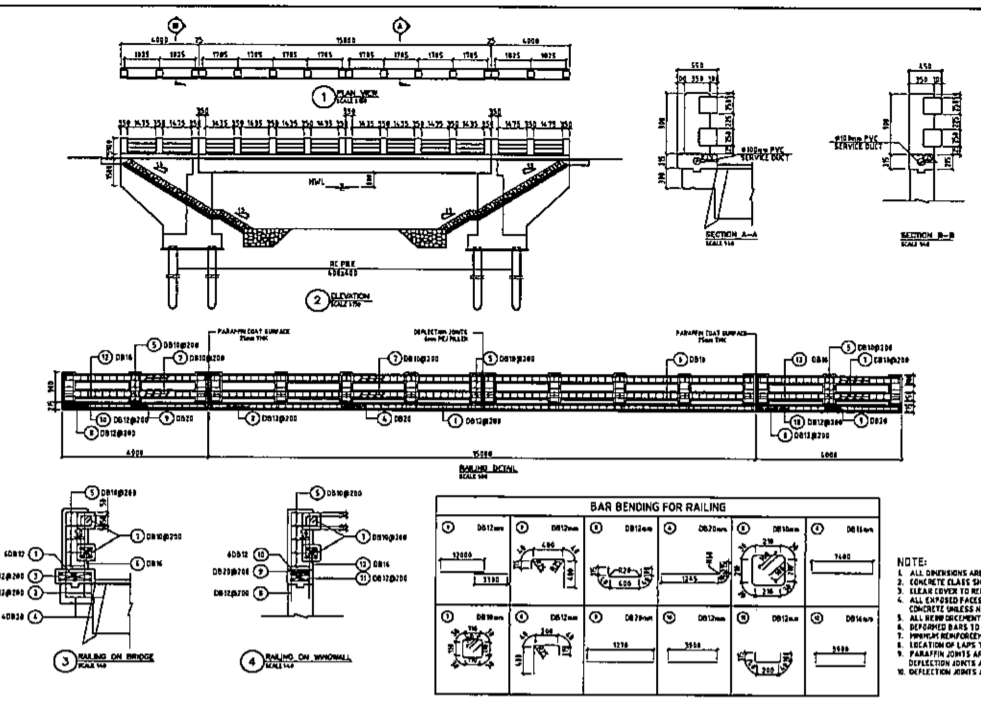




REINFORCEMENT DETAIL OF EACH APPROACH SLAB			
BAR MARK	SIZE Φ(MM)	No.	LENGTH (MM)
A1	25	56	4640
A2	16	28	4900
A3	20	28	4900
A4	16	24	3940
A5	16	13	500
A7	12	204	350
DB25 REINF. (KG.)		1380.0	
DB20 REINF. (KG.)		433.0	
DB16 REINF. (KG.)		64.0	
DB12 REINF. (KG.)		339.0	
REINF. (KG.)		2022.0	
CONC. (M³)		12.0	

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL EXPOSED FACES SHALL HAVE 10x10 CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
3. CONCRETE CLASS SHALL BE 32MPa FOR CYLINDER STRENGTH.
4. CLEAR COVER TO REINFORCEMENT SHALL BE DONE AS SHOWN IN DRAWING.
5. ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400.
6. DEFORMED BARS TO AASHTO M-31M-06.
7. MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS.
8. LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.

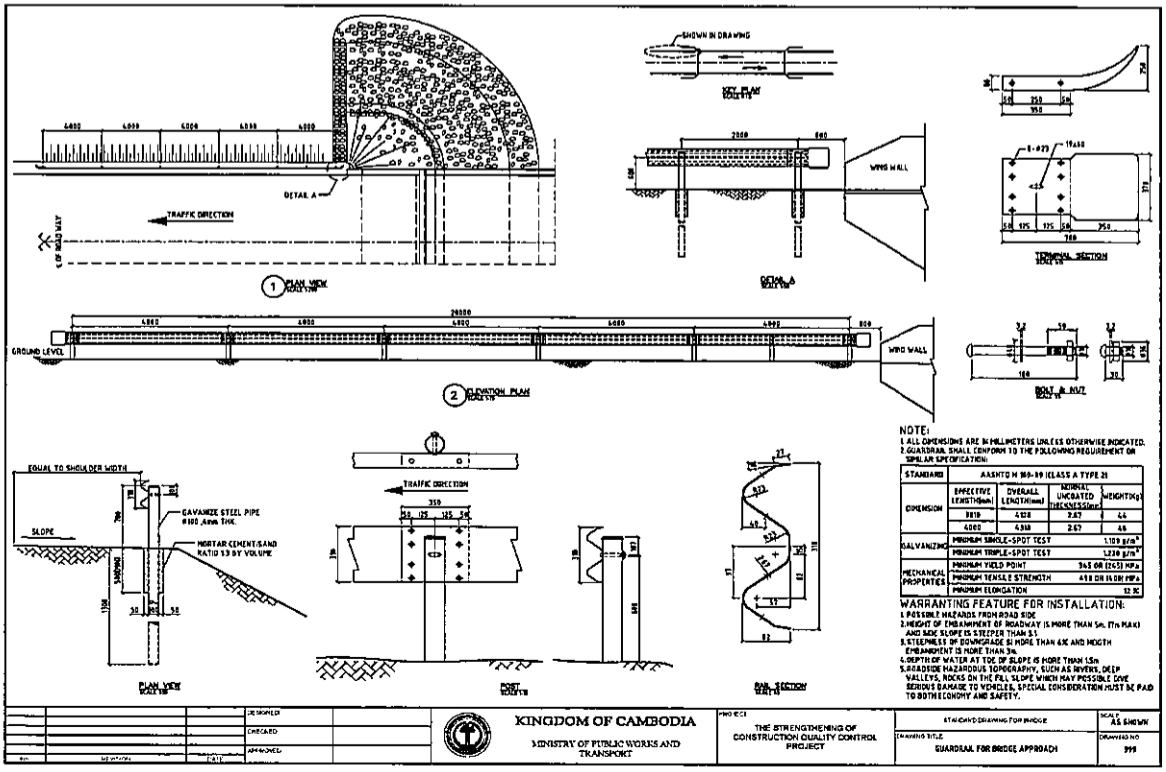
DESIGNED / CHECKED / APPROVED	KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE DRAWING TITLE: APPROACH SLAB GENERAL REINFORCEMENT DETAIL-10m	SCALE: AS SHOWN DRAWING NO: 990



REINFORCEMENT DETAIL OF EACH RAILING			
BAR MARK	SIZE Φ(MM)	No.	LENGTH(AVE) (MM)
1	12	6	15300
2	12	75	995
3	12	75	695
4	20	48	1560
5	10	128	1140
6	16	16	3400
7	10	190	760
8	12	40	785
9	12	24	1270
10	12	12	3900
11	12	40	695
12	16	16	3900
DB10 REINF. (KG.)		175.0	
DB12 REINF. (KG.)		340.0	
DB16 REINF. (KG.)		166.0	
DB20 REINF. (KG.)		185.0	
TOTAL REINF. (KG.)		955.0	
CON. (M³)		11.0	

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. CONCRETE CLASS SHALL BE 25MPa FOR CYLINDER STRENGTH.
3. CLEAR COVER TO REINFORCEMENT SHALL BE 50mm.
4. ALL EXPOSED FACES SHALL HAVE 10x10 CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
5. ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400
6. DEFORMED BARS TO AASHTO M-31M-06.
7. MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS
8. LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.
9. PARAFFIN JOINTS ARE REQUIRED AT CENTER LINE OF PIERS DEFLECTION JOINTS ARE REQUIRED AT THE MIDSPAN LOCATION.
10. DEFLECTION JOINTS ARE REQUIRED AT MIDSPAN LOCATIONS.

DESIGNED / CHECKED / APPROVED	KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE DRAWING TITLE: HANDRAIL DETAIL-15m	SCALE: AS SHOWN DRAWING NO: 994

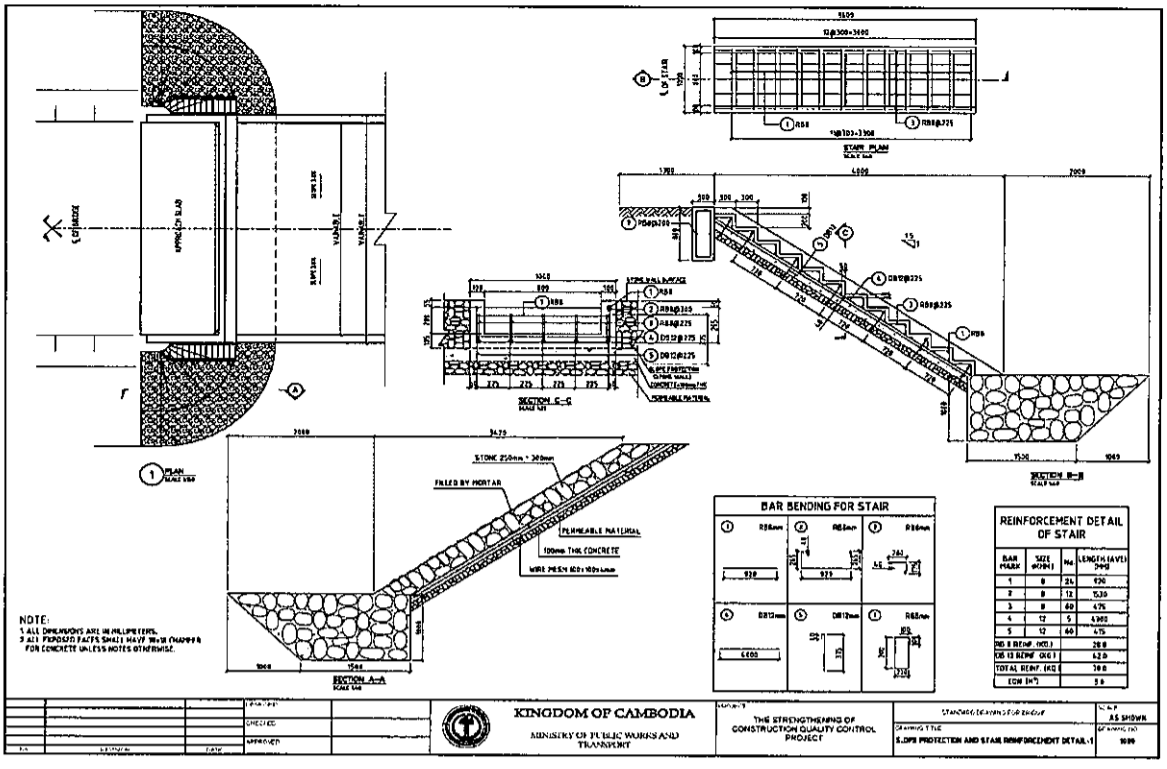


NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. GUARDRAIL SHALL CONFORM TO THE FOLLOWING REQUIREMENT OR SIMILAR SPECIFICATION:

STANDARD		AASHTO M 180-89 (CLASS A TYPE 2)		
DIMENSION	EFFECTIVE LENGTH(mm)	OVERALL LENGTH(mm)	NOMINAL UNCOATED THICKNESS(mm)	WEIGHT(kg)
	3810	4318	2.67	44
	4060	4318	2.67	46
GALVANIZING	MINIMUM SINGLE-SPOT TEST			1,109 g/m²
	MINIMUM TRIPLE-SPOT TEST			1,230 g/m²
MECHANICAL PROPERTIES	MINIMUM YIELD POINT			345 OR (265) MPa
	MINIMUM TENSILE STRENGTH			448 OR (448) MPa
	MINIMUM ELONGATION			12 %

WARRANTING FEATURE FOR INSTALLATION:
1. POSSIBLE HAZARDS FROM ROAD SIDE
2. HEIGHT OF EMBANKMENT OF ROADWAY IS MORE THAN 5m. (7m MAX) AND SIDE SLOPE IS STEEPER THAN 3:1
3. STEEPNESS OF DOWNGRADE IS MORE THAN 6% AND WIDTH EMBANKMENT IS MORE THAN 3m.
4. DEPTH OF WATER AT TOE OF SLOPE IS MORE THAN 1.5m
5. ROADSIDE HAZARDOUS TOPOGRAPHY, SUCH AS RIVERS, DEEP VALLEYS, ROCKS ON THE FILL SLOPE WHICH MAY POSSIBLE GIVE SERIOUS DAMAGE TO VEHICLES, SPECIAL CONSIDERATION MUST BE PAID TO BOTH ECONOMY AND SAFETY.

		DESIGNED	KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE	SCALE: AS SHOWN
		CHECKED			DRAWING TITLE: GUARDRAIL FOR BRIDGE APPROACH	DRAWING NO: 998
		APPROVED				
NO.	REVISION	DATE				



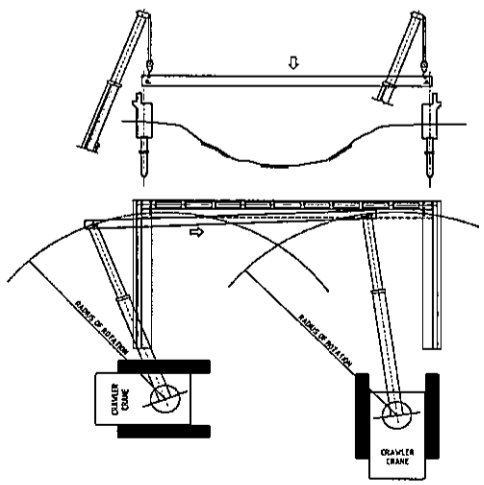
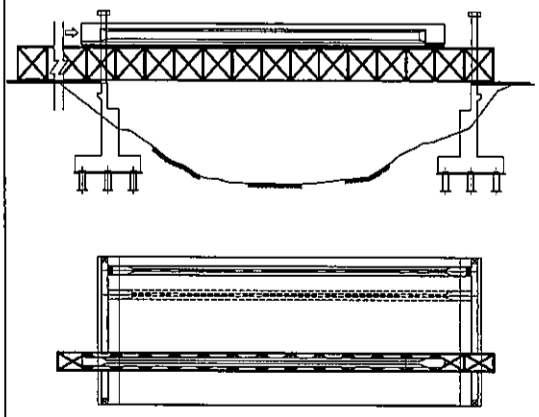
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. ALL EXPOSED FACES SHALL HAVE 19MM CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.

BAR BENDING FOR STAIR

REINFORCEMENT DETAIL OF STAIR

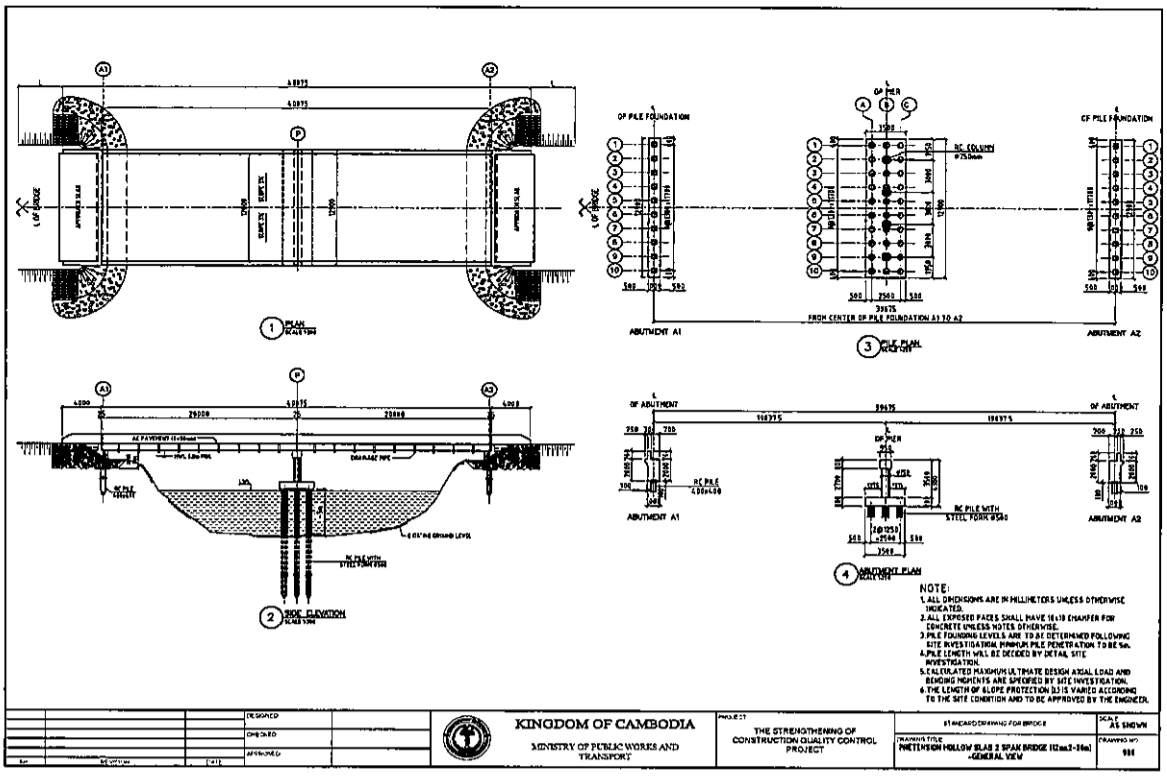
BAR MARK	SIZE (mm)	No.	LENGTH (AVE) (mm)
1	8	24	930
2	8	12	5,530
3	8	60	475
4	12	5	4,900
5	12	60	475
NO 8 REINF. (KG)			28.8
NO 12 REINF. (KG)			42.0
TOTAL REINF. (KG)			70.8
CON (M³)			5.9

		DESIGNED	KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE	SCALE: AS SHOWN
		CHECKED			DRAWING TITLE: S.DPS PROTECTION AND STAIR REINFORCEMENT DETAIL-1	DRAWING NO: 1000
		APPROVED				
NO.	REVISION	DATE				

	TRUCK/ CRAWLER CRANE ERECTION METHOD	ERECTION GIRDER METHOD
CONCEPT DRAWING		
DESCRIPTION	• 2 TRUCK CRANES OR CRAWLER CRANES SHALL BE APPLIED IN THE CASE OF PIER ABUTMENT AS FOR PRECAST CONCRETE GIRDER. • TOTAL CONSTRUCTION PERIOD IS SHORTER THAN OTHER ERECTION METHOD AND LOW COST. • THIS METHOD CAN BE USED IN DRY SEASON. • GIRDER WEIGHT AND CAPACITY OF CRANE SHOULD BE SELECTED PROPERLY.	PROCESS OF ERECTION OR METHODOLOGY 1. GATE TYPE CRANE IS INSTALLED ON ABUTMENT AS TEMPORARY WORK. 2. ERECTION GIRDER IS LAUNCHED BETWEEN ABUTMENTS. 3. GIRDER IS TRANSPORTED ON THE ERECTION GIRDER. 4. CONCRETE GIRDER IS SET DOWN BY USING GATE TYPE CRANE. TOTAL ERECTION PERIOD IS LONGER THAN OTHER ERECTION METHOD.

			DESIGNED		KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE SCALE: AS SHOWN
			CHECKED				DRAWING TITLE TYPICAL ERECTION METHOD DRAWING NO 1011
No.	Description	Date	APPROVED				

(2) Pretension Hollow Slab Bridge
(2-Span 12mx25m)



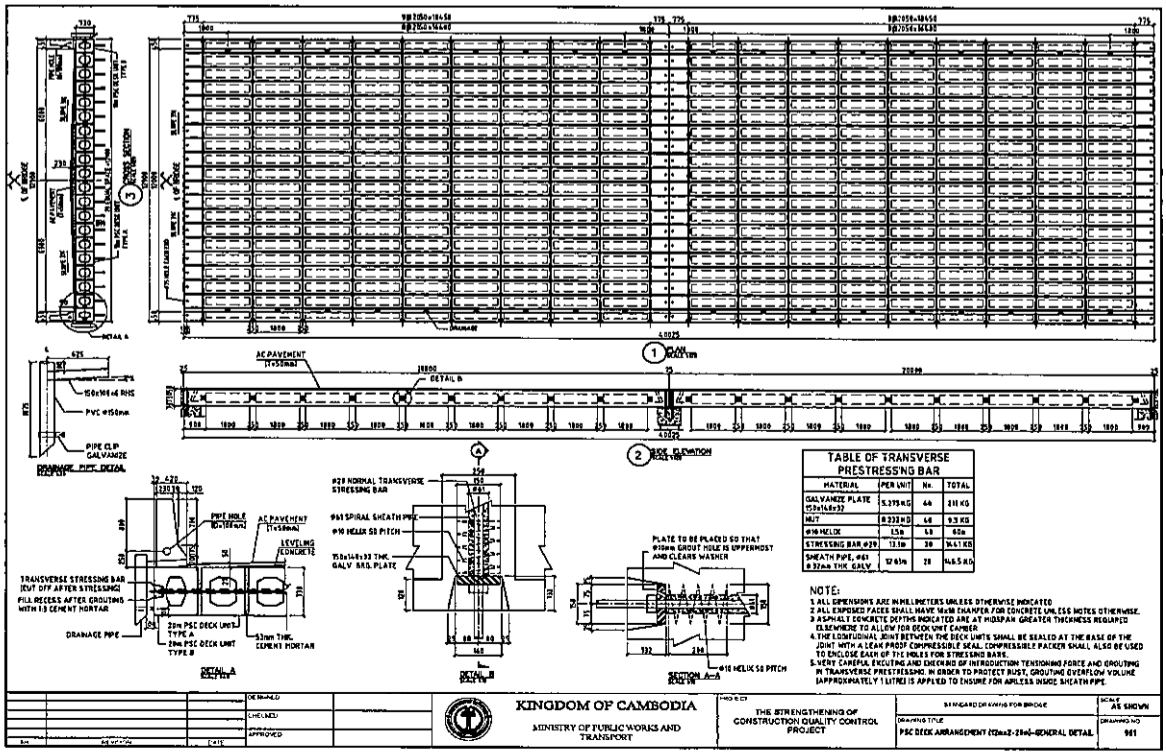
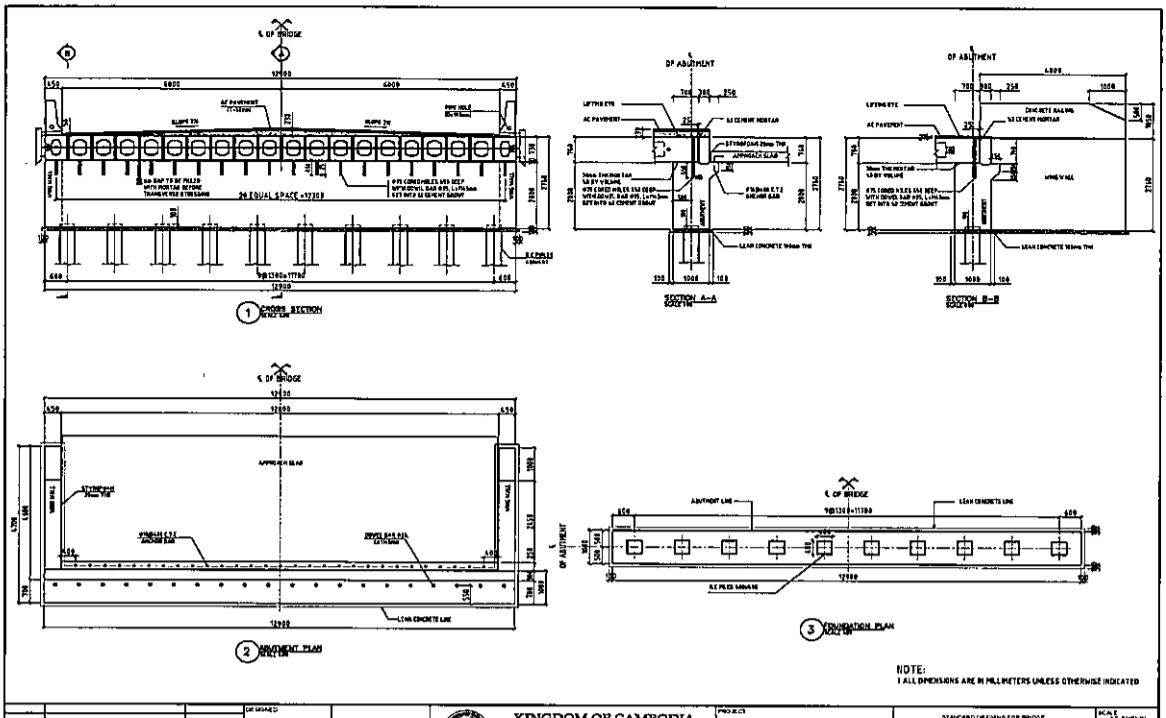


TABLE OF TRANSVERSE PRESTRESSING BAR			
MATERIAL	PER UNIT	No.	TOTAL
GALVANIZE PLATE 150x140x22	5.295 KG	44	233 KG
NUT	0.333 KG	44	9.3 KG
#10 HELIX	1.5 m	44	66m
STRESSING BAR ø29	13.1m	28	366.8 KG
SHEATH PIPE, ø61 ø 32mm THK. GALV	12.61m	28	465.8 KG

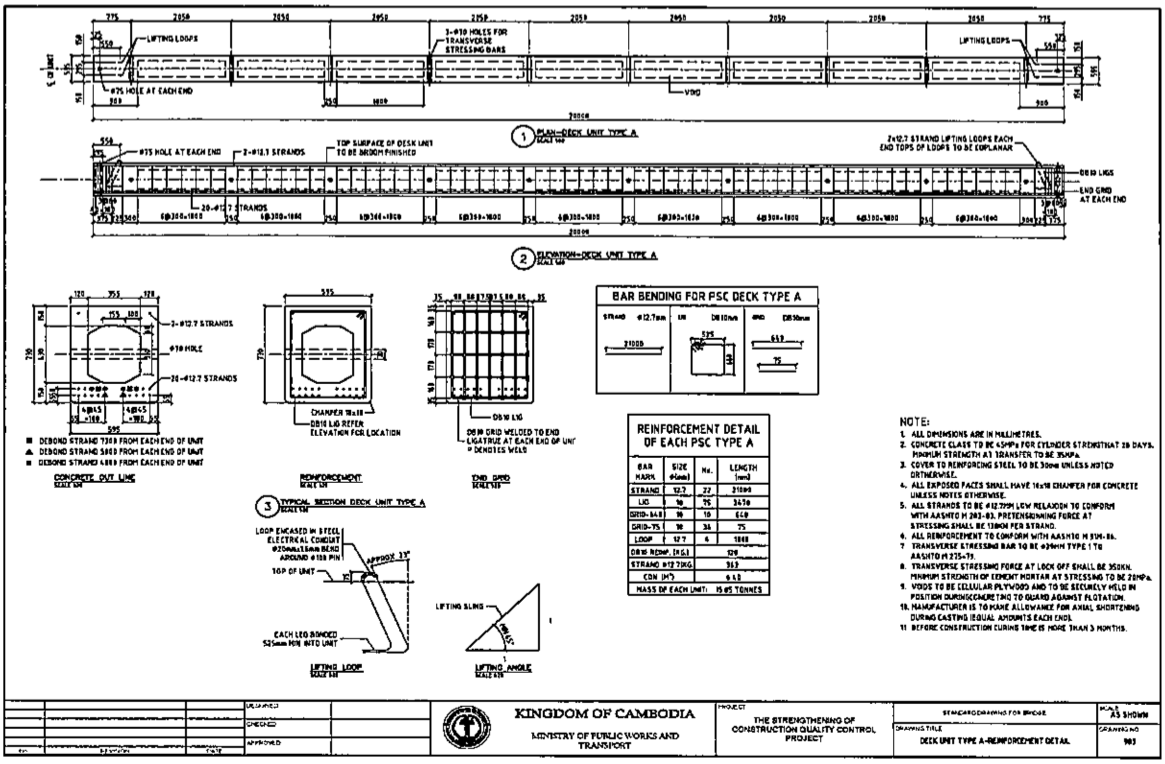
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. ALL EXPOSED FACES SHALL HAVE 16x16 CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
3. ASPHALT CONCRETE DEPTHS INDICATED ARE AT MIDSPAN GREATER THICKNESS REQUIRED ELSEWHERE TO ALLOW FOR DECK CAMBER.
4. THE LONGITUDINAL JOINT BETWEEN THE DECK UNITS SHALL BE SEALED AT THE BASE OF THE JOINT WITH A LEAK PROOF COMPRESSIBLE SEAL. COMPRESSIBLE PACKER SHALL ALSO BE USED TO ENCLOSE EACH OF THE HOLES FOR STRESSING BARS.
5. VERY CAREFUL EXCUTING AND CHECKING OF INTRODUCTION TENSIONING FORCE AND GROUTING IN TRANSVERSE PRESTRESSING. IN ORDER TO PROTECT RUST, GROUTING OVERFLOW VOLUME (APPROXIMATELY 1 LITRE) IS APPLIED TO ENSURE FOR AIRLESS INSIDE SHEATH PIPE.

		DESIGNED		KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE	SCALE: AS SHOWN
		CHECKED				DRAWING TITLE: PSC DECK ARRANGEMENT (12m×2-20m)-GENERAL DETAIL	DRAWING NO: 961
		APPROVED					
No.	REVISIONS	DATE					



NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED

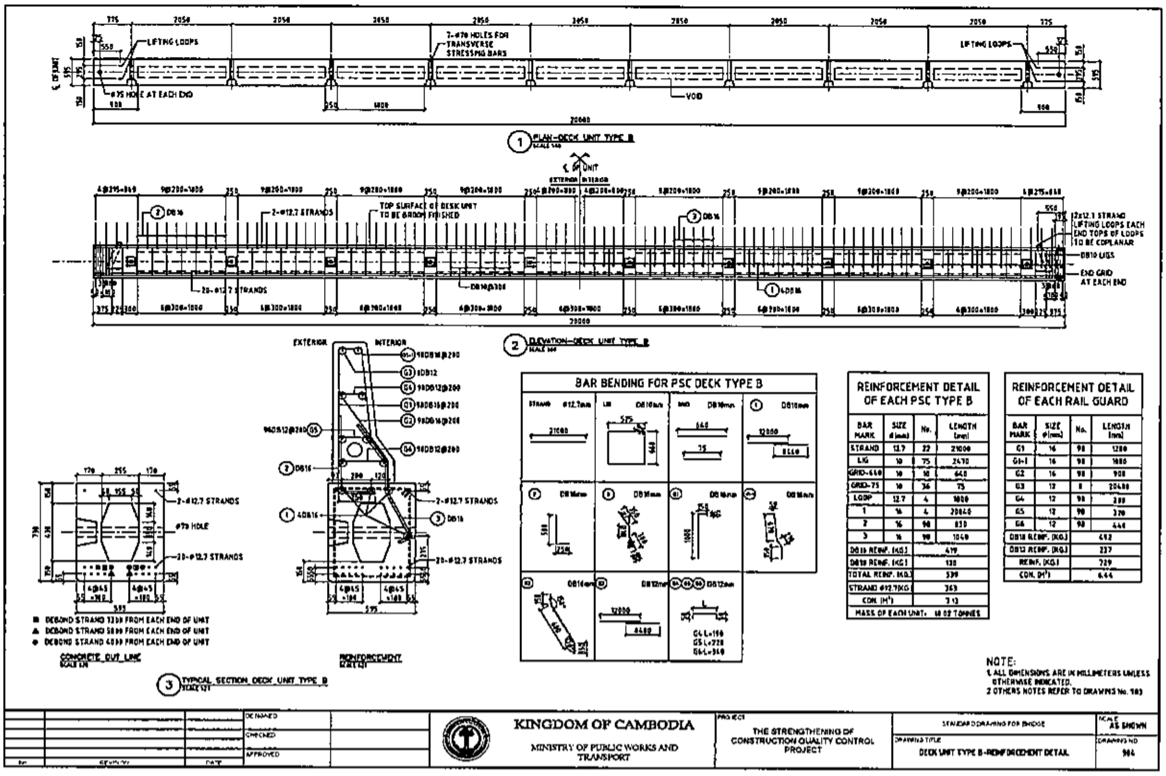
		DESIGNED		KINGDOM OF CAMBODIA MINISTRY OF PUBLIC WORKS AND TRANSPORT	PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE	SCALE: AS SHOWN
		CHECKED				DRAWING TITLE: ABUTMENT-GENERAL DETAIL	DRAWING NO: 997
		APPROVED					
No.	REVISIONS	DATE					



REINFORCEMENT DETAIL OF EACH PSC TYPE A			
BAR MARK	SIZE Ø(mm)	No.	LENGTH (mm)
STRAND	12.7	22	21000
LIG	10	75	2470
GRID-640	10	10	640
GRID-75	10	36	75
LOOP	12.7	4	1000
DB10 REINF. (KG)		120	
STRAND Ø12.7(KG)		363	
CON (M³)		6.40	
MASS OF EACH UNIT: 15.05 TONNES			

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. CONCRETE CLASS TO BE 45MPa FOR CYLINDER STRENGTHAT 28 DAYS. MINIMUM STRENGTH AT TRANSFER TO BE 35MPa.
3. COVER TO REINFORCING STEEL TO BE 30mm UNLESS NOTED ORTHERWISE.
4. ALL EXPOSED FACES SHALL HAVE 18x18 CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
5. ALL STRANDS TO BE Ø12.7MM LOW RELAXION TO CONFORM WITH AASHTO M 203-83. PRETENSIONNING FORCE AT STRESSING SHALL BE 138KN PER STRAND.
6. ALL REINFORCEMENT TO CONFORM WITH AASHTO M 31M-86.
7. TRANSVERSE STRESSING BAR TO BE Ø29MM TYPE 1 TO AASHTO M 275-79.
8. TRANSVERSE STRESSING FORCE AT LOCK OFF SHALL BE 350KN. MINIMUM STRENGTH OF CEMENT MORTAR AT STRESSING TO BE 20MPa.
9. VOIDS TO BE CELLULAR PLYWOOD AND TO BE SECURELY HELD IN POSITION DURINGCONCRETING TO GUARD AGAINST FLOTATION.
10. MANUFACTURER IS TO MAKE ALLOWANCE FOR AXIAL SHORTENING DURING CASTING (EQUAL AMOUNTS EACH END).
11. BEFORE CONSTRUCTION CURING TIME IS MORE THAN 3 MONTHS.

KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT
PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT
STANDARD DRAWING FOR BRIDGE
SCALE: AS SHOWN
DRAWING TITLE: DECK UNIT TYPE A-REINFORCEMENT DETAIL
DRAWING NO: 903

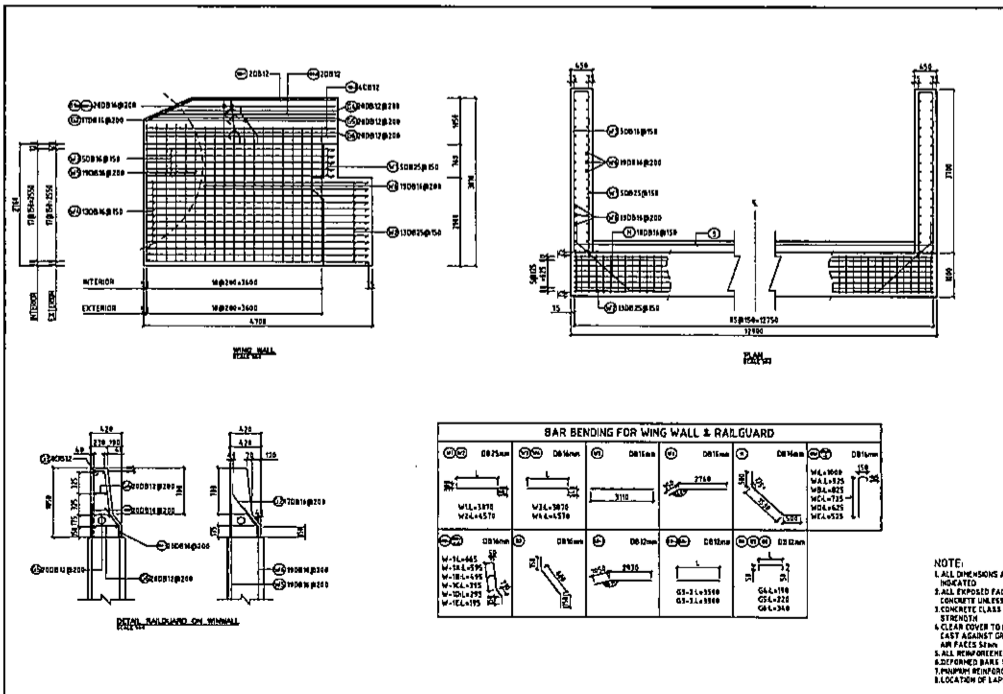


REINFORCEMENT DETAIL OF EACH PSC TYPE B			
BAR MARK	SIZE Ø(mm)	No.	LENGTH (mm)
STRAND	12.7	22	21000
LIG	10	75	2470
GRID-640	10	10	640
GRID-75	10	36	75
LOOP	12.7	4	1000
1	16	4	20840
2	16	90	830
3	16	90	1040
DB16 REINF. (KG)		419	
DB10 REINF. (KG)		120	
TOTAL REINF. (KG)		539	
STRAND Ø12.7(KG)		363	
CON (M³)		7.12	
MASS OF EACH UNIT: 10.02 TONNES			

REINFORCEMENT DETAIL OF EACH RAIL GUARD			
BAR MARK	SIZE Ø(mm)	No.	LENGTH (mm)
G1	16	90	1200
G1-1	16	90	1000
G2	16	90	900
G3	12	8	20400
G4	12	90	300
G5	12	90	370
G6	12	90	440
DB16 REINF. (KG)		492	
DB12 REINF. (KG)		237	
REINF. (KG)		729	
CON. (M³)		6.44	

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. OTHERS NOTES REFER TO DRAWING No. 903

KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT
PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT
STANDARD DRAWING FOR BRIDGE
SCALE: AS SHOWN
DRAWING TITLE: DECK UNIT TYPE B-REINFORCEMENT DETAIL
DRAWING NO: 904



REINFORCEMENT DETAIL OF EACH WING WALL & RAILGURAD			
BAR MARK	SIZE Ø(MM)	No.	LENGTH(AVE)
W1	25	5	4550
W2	25	13	5250
W3	16	5	4110
W4	16	13	4810
W5	16	19	3110
W6	16	19	3110
H	16	18	2530
DB25 REINF. (KG.)		351	
DB16 REINF. (KG.)		389	
TOTAL REINF. (KG.)		740	
CON. (M³)		4.55	
G1W	16	20	(1200)
G1W-1	16	20	(1180)
G2	16	17	800
G3-1	12	2	3580
G3-2	12	2	3580
G3-3	12	4	3900
G4	12	20	210
G5	12	20	320
G6	12	20	640
DB16 REINF. (KG.)		97	
DB12 REINF. (KG.)		46	
TOTAL REINF. (KG.)		143	
CON. (M³)		1.22	

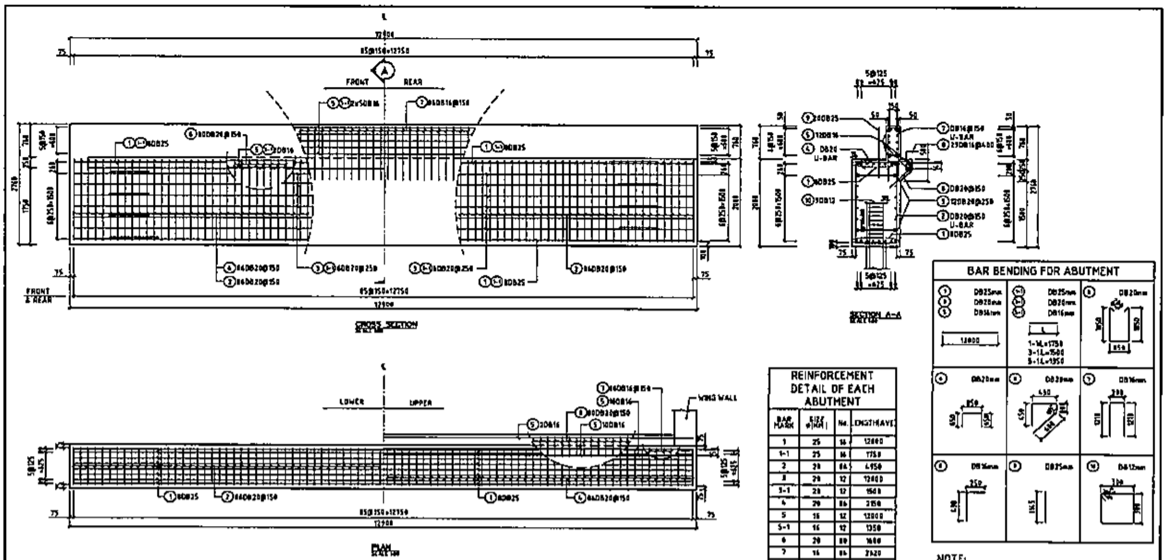
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. ALL EXPOSED FACES SHALL HAVE 10x10 CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
3. CONCRETE CLASS SHALL BE 32MPa FOR CYLINDER STRENGTH
4. CLEAR COVER TO REINFORCEMENT SHALL BE AT LEAST CAST AGAINST GROUND 75mm AIR FACES 50mm
5. ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400
6. DEFORMED BARS TO AASHTO M-31M-06.
7. MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS
8. LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.

DESIGNED / CHECKED / APPROVED

KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT

PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT

STANDARD DRAWING FOR BRIDGE — SCALE: AS SHOWN
DRAWING TITLE: ABUTMENT WINGWALL REINFORCEMENT DETAIL — DRAWING NO: 905



REINFORCEMENT DETAIL OF EACH ABUTMENT			
BAR MARK	SIZE Ø(MM)	No.	LENGTH(AVE)
1	25	16	12000
1-1	25	16	1750
2	20	86	4950
3	20	12	12000
3-1	20	12	1500
4	20	86	2150
5	16	12	12000
5-1	16	12	1350
6	20	88	1600
7	16	86	2620
8	16	29	600
9	25	20	1145
10	12	96	1300
DB25 REINF. (KG.)		936	
DB20 REINF. (KG.)		2236	
DB16 REINF. (KG.)		639	
DB12 REINF. (KG.)		146	
TOTAL REINF. (KG.)		3915	
CON (M³)		29.95	

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. ALL EXPOSED FACES SHALL HAVE 10x10 CHAMFER FOR CONCRETE UNLESS NOTES OTHERWISE.
3. CONCRETE CLASS SHALL BE 32MPa FOR CYLINDER STRENGTH
4. CLEAR COVER TO REINFORCEMENT SHALL BE AT LEAST CAST AGAINST GROUND 75mm AIR FACES 50mm
5. ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400
6. DEFORMED BARS TO AASHTO M-31M-06.
7. MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS
8. LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.

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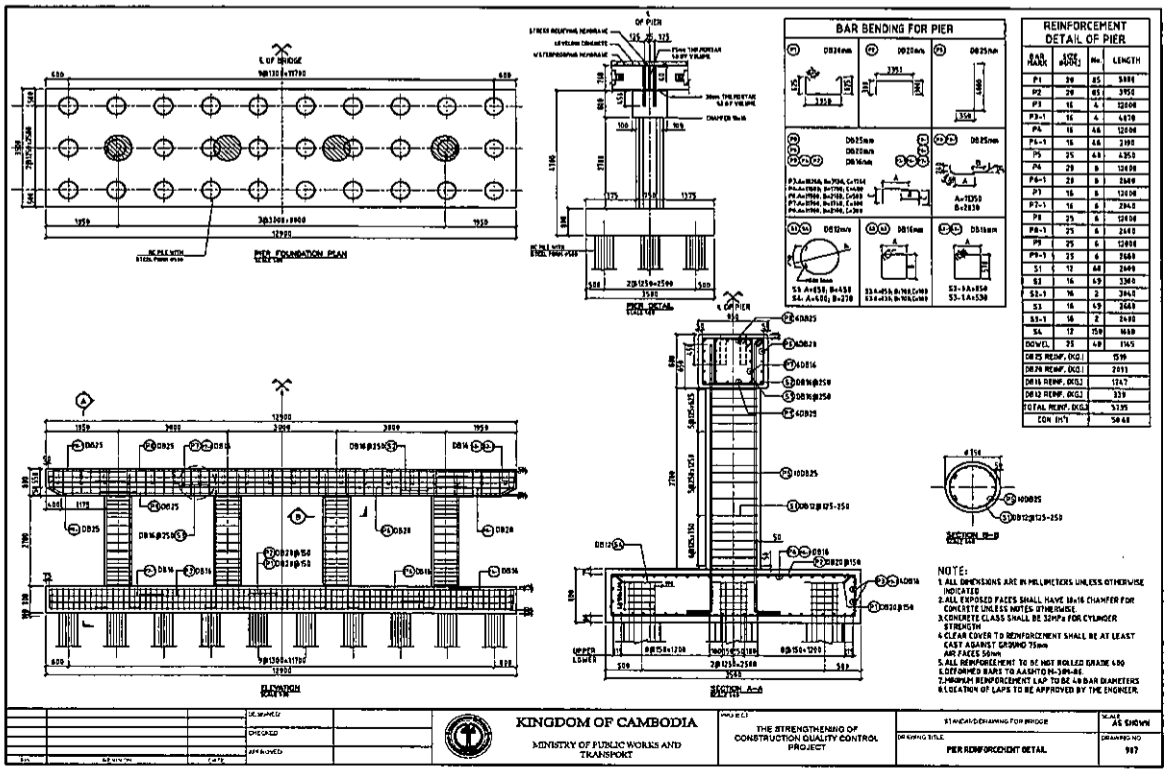
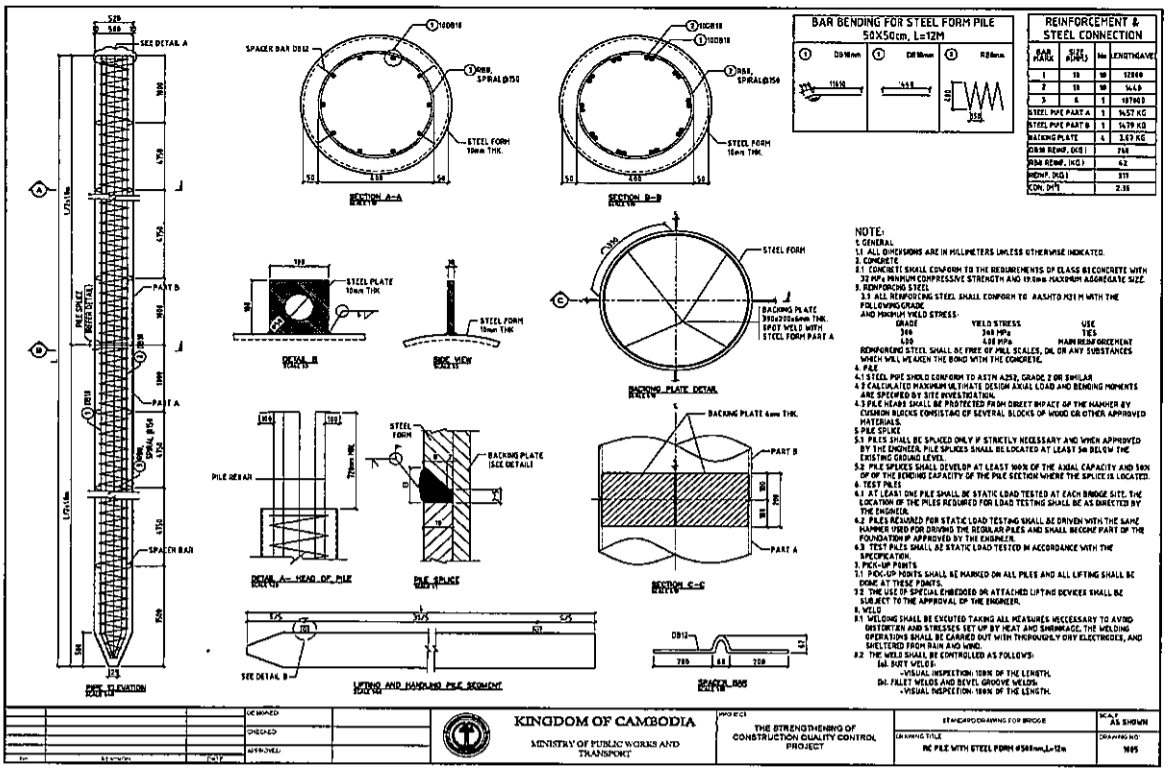
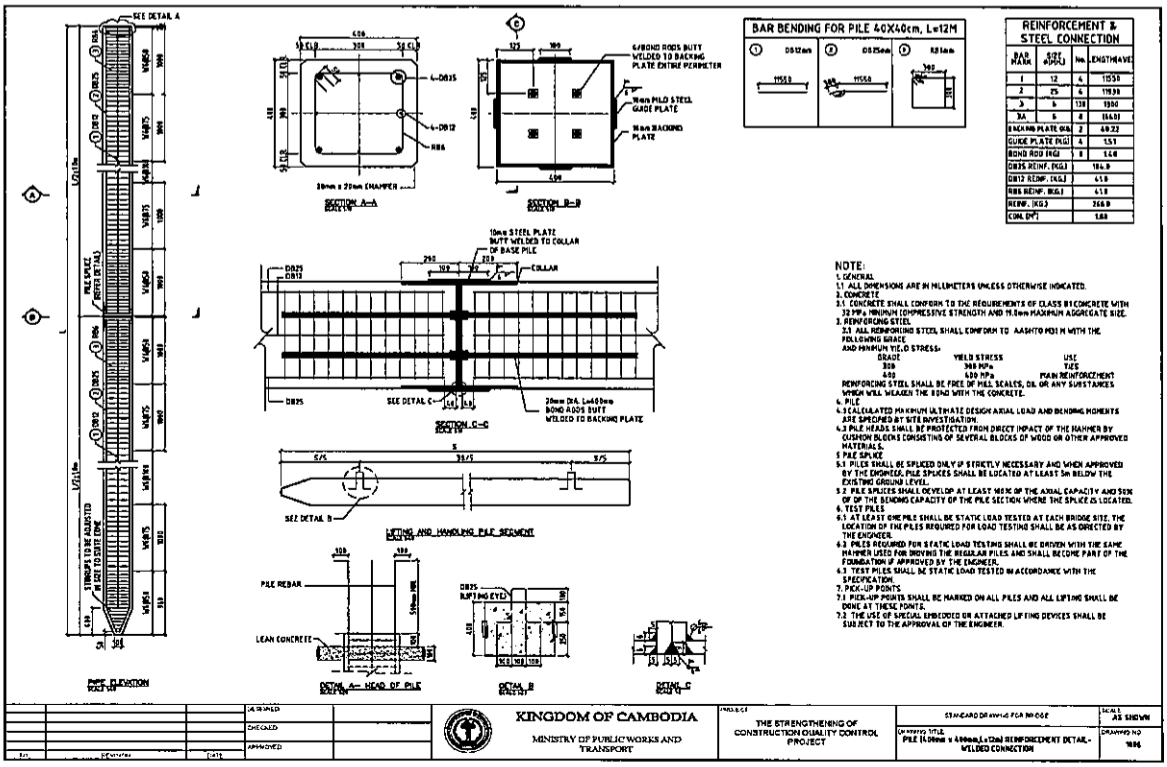
KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT

PROJECT: THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT

STANDARD DRAWING FOR BRIDGE — SCALE: AS SHOWN
DRAWING TITLE: ABUTMENT REINFORCEMENT DETAIL — DRAWING NO: 906


BAR BENDING FOR PIER
REINFORCEMENT DETAIL OF PIER
PIER FOUNDATION PLAN
PIER DETAIL
ELEVATION
SECTION A-A
SECTION B-B
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED
2. ALL EXPOSED FACES SHALL HAVE 18x18 CHAMFER FOR CONCRETE UNLESS NOTED OTHERWISE.
3.CONCRETE CLASS SHALL BE 32MPa FOR CYLINDER STRENGTH
4.CLEAR COVER TO REINFORCEMENT SHALL BE AT LEAST CAST AGAINST GROUND 75mm
AIR FACES 50mm
5. ALL REINFORCEMENT TO BE HOT ROLLED GRADE 400
6.DEFORMED BARS TO AASHTO M-31M-06.
7.MINIMUM REINFORCEMENT LAP TO BE 40 BAR DIAMETERS
8.LOCATION OF LAPS TO BE APPROVED BY THE ENGINEER.
KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT
THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT
PIER REINFORCEMENT DETAIL
AS SHOWN
907


BAR BENDING FOR STEEL FORM PILE 50X50cm, L=12M
REINFORCEMENT & STEEL CONNECTION
SECTION A-A
SECTION B-B
DETAIL B
SIDE VIEW
BACKING PLATE DETAIL
DETAIL A- HEAD OF PILE
PILE SPLICE
SECTION C-C
LIFTING AND HANDLING PILE SEGMENT
SPACER BAR
NOTE:
1. GENERAL
1.1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. CONCRETE
2.1 CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF CLASS B1 CONCRETE WITH 32 MPa MINIMUM COMPRESSIVE STRENGTH AND 19 mm MAXIMUM AGGREGATE SIZE.
3. REINFORCING STEEL
3.1 ALL REINFORCING STEEL SHALL CONFORM TO AASHTO M31 M WITH THE FOLLOWING GRADE AND MINIMUM YIELD STRESS:
GRADE 400 — YIELD STRESS 400 MPa — USE TIES
GRADE 400 — YIELD STRESS 400 MPa — USE MAIN REINFORCEMENT
REINFORCING STEEL SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCES WHICH WILL WEAKEN THE BOND WITH THE CONCRETE.
4. PILE
4.1 STEEL PIPE SHALL CONFORM TO ASTM A252, GRADE 2 OR SIMILAR
4.2 CALCULATED MAXIMUM ULTIMATE DESIGN AXIAL LOAD AND BENDING MOMENTS ARE SPECIFIED BY SITE INVESTIGATION.
4.3 PILE HEADS SHALL BE PROTECTED FROM DIRECT IMPACT OF THE HAMMER BY CUSHION BLOCKS CONSISTING OF SEVERAL BLOCKS OF WOOD OR OTHER APPROVED MATERIALS.
5. PILE SPLICE
5.1 PILES SHALL BE SPLICED ONLY IF STRICTLY NECESSARY AND WHEN APPROVED BY THE ENGINEER. PILE SPLICES SHALL BE LOCATED AT LEAST 5m BELOW THE EXISTING GROUND LEVEL.
5.2 PILE SPLICES SHALL DEVELOP AT LEAST 100% OF THE AXIAL CAPACITY AND 50% OF THE BENDING CAPACITY OF THE PILE SECTION WHERE THE SPLICE IS LOCATED.
6. TEST PILES
6.1 AT LEAST ONE PILE SHALL BE STATIC LOAD TESTED AT EACH BRIDGE SITE. THE LOCATION OF THE PILES REQUIRED FOR LOAD TESTING SHALL BE AS DIRECTED BY THE ENGINEER.
6.2 PILES REQUIRED FOR STATIC LOAD TESTING SHALL BE DRIVEN WITH THE SAME HAMMER USED FOR DRIVING THE REGULAR PILES AND SHALL BECOME PART OF THE FOUNDATION IF APPROVED BY THE ENGINEER.
6.3 TEST PILES SHALL BE STATIC LOAD TESTED IN ACCORDANCE WITH THE SPECIFICATION.
7. PICK-UP POINTS
7.1 PICK-UP POINTS SHALL BE MARKED ON ALL PILES AND ALL LIFTING SHALL BE DONE AT THESE POINTS.
7.2 THE USE OF SPECIAL RHEBODED OR ATTACHED LIFTING DEVICES SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
8. WELD
8.1 WELDING SHALL BE EXCUTED TAKING ALL MEASURES NECCESSARY TO AVOID DISTORTION AND STRESSES SET UP BY HEAT AND SHRINKAGE. THE WELDING OPERATIONS SHALL BE CARRIED OUT WITH THOROUGHLY DRY ELECTRODES, AND SHELTERED FROM RAIN AND WIND.
8.2 THE WELD SHALL BE CONTROLLED AS FOLLOWS:
(a). BUTT WELDS:
-VISUAL INSPECTION: 100% OF THE LENGTH.
(b). FILLET WELDS AND BEVEL GROOVE WELDS.
-VISUAL INSPECTION: 100% OF THE LENGTH.
KINGDOM OF CAMBODIA
MINISTRY OF PUBLIC WORKS AND TRANSPORT
THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT
RC PILE WITH STEEL FORM Φ500mm,L=12m
AS SHOWN
1005



BAR BENDING FOR PILE 40X40cm, L=12M

REINFORCEMENT & STEEL CONNECTION			
BAR MARK	SIZE (ØMM)	No.	LENGTH(M)
1	12	4	11550
2	25	4	11930
3	6	138	1380
3A	6	8	1440
BACKING PLATE (KG)		2	49.23
GUIDE PLATE (KG)		4	1.51
BOND ROD (KG)		8	1.48
DØ25 REINF. (KG)			184.9
DØ12 REINF. (KG)			41.8
RØ6 REINF. (KG)			41.8
REINF. (KG)			268.9
CONC. (M^3)			1.88

NOTE:

1. GENERAL
1.1 ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. CONCRETE
2.1 CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF CLASS B1 CONCRETE WITH 32 MPa MINIMUM COMPRESSIVE STRENGTH AND 19.0mm MAXIMUM AGGREGATE SIZE.
3. REINFORCING STEEL
3.1 ALL REINFORCING STEEL SHALL CONFORM TO AASHTO M31 M WITH THE FOLLOWING GRADE AND MINIMUM YIELD STRESS:

GRADE	YIELD STRESS	USE
300	300 MPa	TIES
400	420 MPa	MAIN REINFORCEMENT

REINFORCING STEEL SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCES WHICH WILL WEAKEN THE BOND WITH THE CONCRETE.
4. PILE
4.1 CALCULATED MAXIMUM ULTIMATE DESIGN AXIAL LOAD AND BENDING MOMENTS ARE SPECIFIED BY SITE INVESTIGATION.
4.2 PILE HEADS SHALL BE PROTECTED FROM DIRECT IMPACT OF THE HAMMER BY CUSHION BLOCKS CONSISTING OF SEVERAL BLOCKS OF WOOD OR OTHER APPROVED MATERIALS.
5 PILE SPLICE
5.1 PILES SHALL BE SPLICED ONLY IF STRICTLY NECESSARY AND WHEN APPROVED BY THE ENGINEER. PILE SPLICES SHALL BE LOCATED AT LEAST 5m BELOW THE EXISTING GROUND LEVEL.
5.2 PILE SPLICES SHALL DEVELOP AT LEAST 100% OF THE AXIAL CAPACITY AND 50% OF THE BENDING CAPACITY OF THE PILE SECTION WHERE THE SPLICE IS LOCATED.
6. TEST PILES
6.1 AT LEAST ONE PILE SHALL BE STATIC LOAD TESTED AT EACH BRIDGE SITE. THE LOCATION OF THE PILES REQUIRED FOR LOAD TESTING SHALL BE AS DIRECTED BY THE ENGINEER.
6.2 PILES REQUIRED FOR STATIC LOAD TESTING SHALL BE DRIVEN WITH THE SAME HAMMER USED FOR DRIVING THE REGULAR PILES AND SHALL BECOME PART OF THE FOUNDATION IF APPROVED BY THE ENGINEER.
6.3 TEST PILES SHALL BE STATIC LOAD TESTED IN ACCORDANCE WITH THE SPECIFICATION.
7. PICK-UP POINTS
7.1 PICK-UP POINTS SHALL BE MARKED ON ALL PILES AND ALL LIFTING SHALL BE DONE AT THESE POINTS.
7.2 THE USE OF SPECIAL EMBEDDED OR ATTACHED LIFTING DEVICES SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

			DESIGNED		KINGDOM OF CAMBODIA	PROJECT OF THE STRENGTHENING OF CONSTRUCTION QUALITY CONTROL PROJECT	STANDARD DRAWING FOR BRIDGE
			CHECKED		MINISTRY OF PUBLIC WORKS AND TRANSPORT		DRAWING TITLE: PILE (1.00mm x 400mm, L=12m) REINFORCEMENT DETAIL- WELDED CONNECTION
			APPROVED				SCALE: AS SHOWN
No.	DESCRIPTION	DATE					DRAWING NO: 1006

7-2 User's Manual for Data Searching System for Road and Road Structure Standard Drawings

TABLE OF CONTENTS

LIST OF FIGURES

1. System description

1.1. Objective of system

To search standard drawing of road, road structure and bill of quantity by using excel sheet.

This system may be used as:

- Quick searching
- Quick delivery database by electronic system

1.2. System function

The four work sheets contain different type of structure:

- Road
- Pipe culvert
    - 1 pipe culvert
    - 2 pipe culvert
    - 3 pipe culvert
- Box culvert
    - 1 box culvert
    - 2 box culvert
    - 3 box culvert
- Bridge
    - R.C. flat slab
    - R.C. Deck girder
    - Pretension hollow slab
    - Post tension deck girder

2. Usage

2.1. Preparation

Ensure that there is “DATA SEARCHING SYSTEM” folder that contain

1. “BOQ OF ROAD STRUCTURE” folder
2. “ROAD” folder
3. “ROAD STRUCTURE” folder
4. DATA SEARCHING SYSTEM (excel file)

In order to process this system, Microsoft Excel and Adobe Acrobat are required.

2.2. Procedure

In “DATA SEARCHING SYSTEM”, open excel file named “DATA SEARCHING SYSTEM”. It will appear as shown in figure 1, please follow the instruction below:

- Step 1: Choose type of structure on work sheet (road, pipe culvert, box culvert, or bridge)
- Step 2: Select required output (drawing or BOQ)
- Step 3: Click on link button in order to find the file that relate to title of drawing. The result of drawing will be shown in PDF file and BOQ is shown in Excel file.

Below is an example of how the program works.

1. Type of structure: Pipe culvert
2. Output selection: Single pipe culvert (D=1.0m)
3. Result of selection: Drawing & BOQ (see section 2.3)

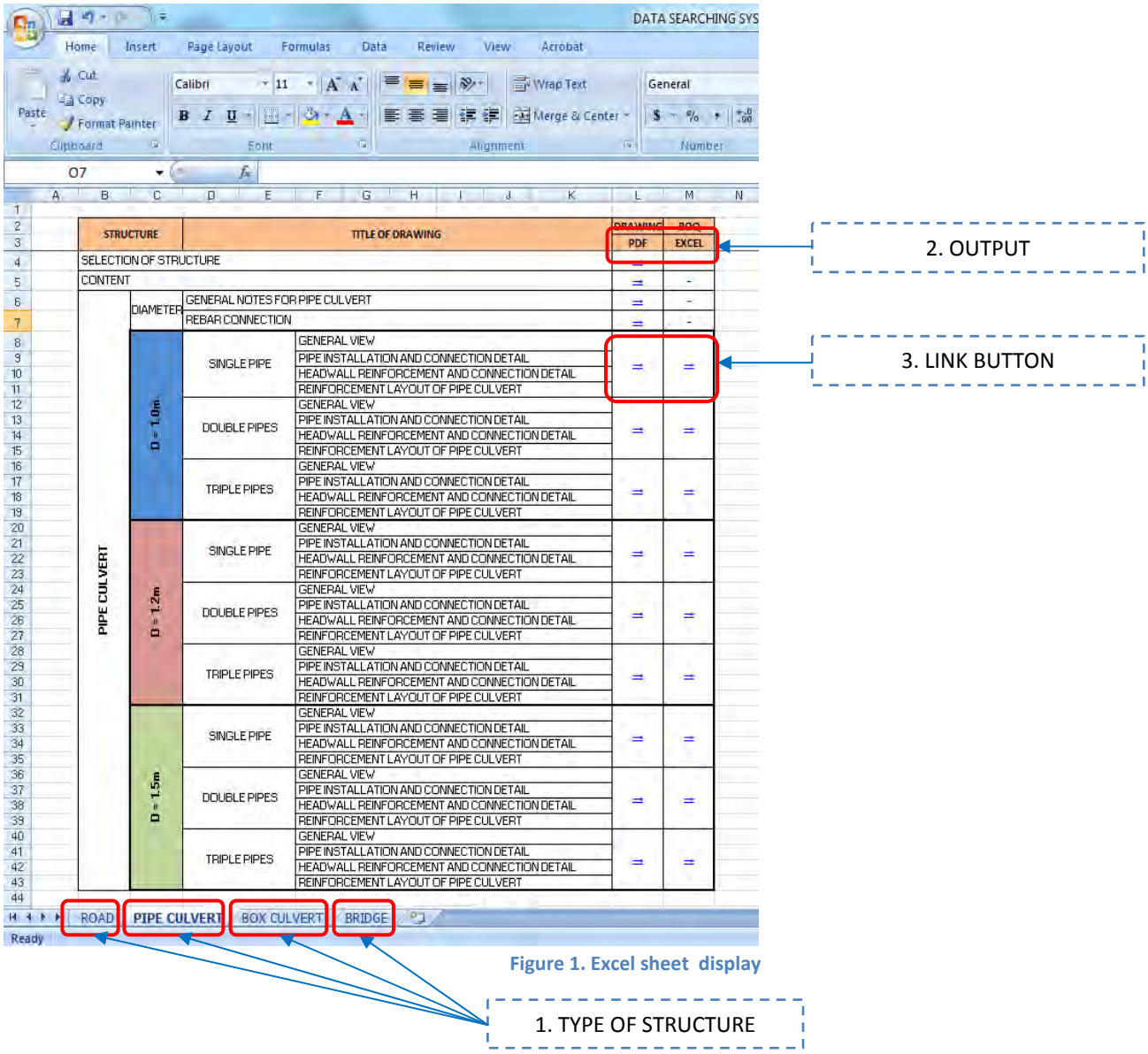


Figure 1. Excel sheet display

2.3. Output

- Output when we click on: PIPE CULVERT/LINK BUTTON /Drawing-PDF

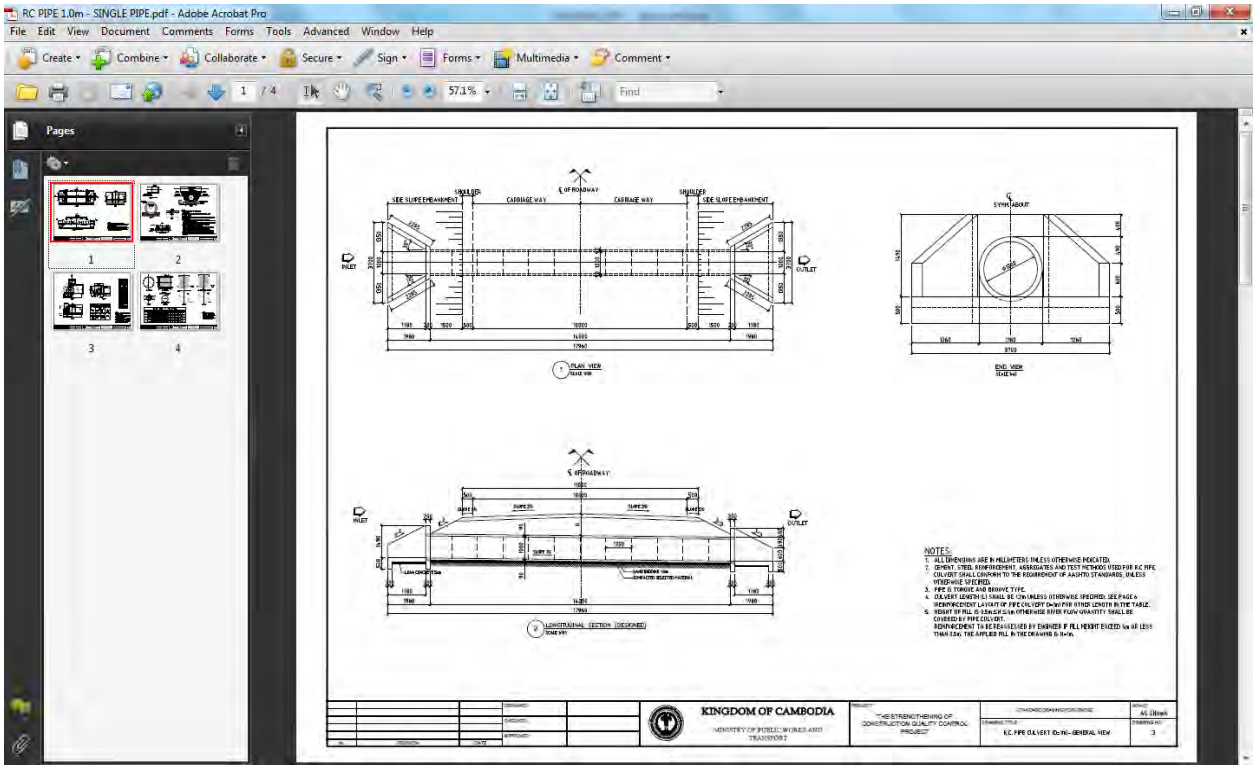
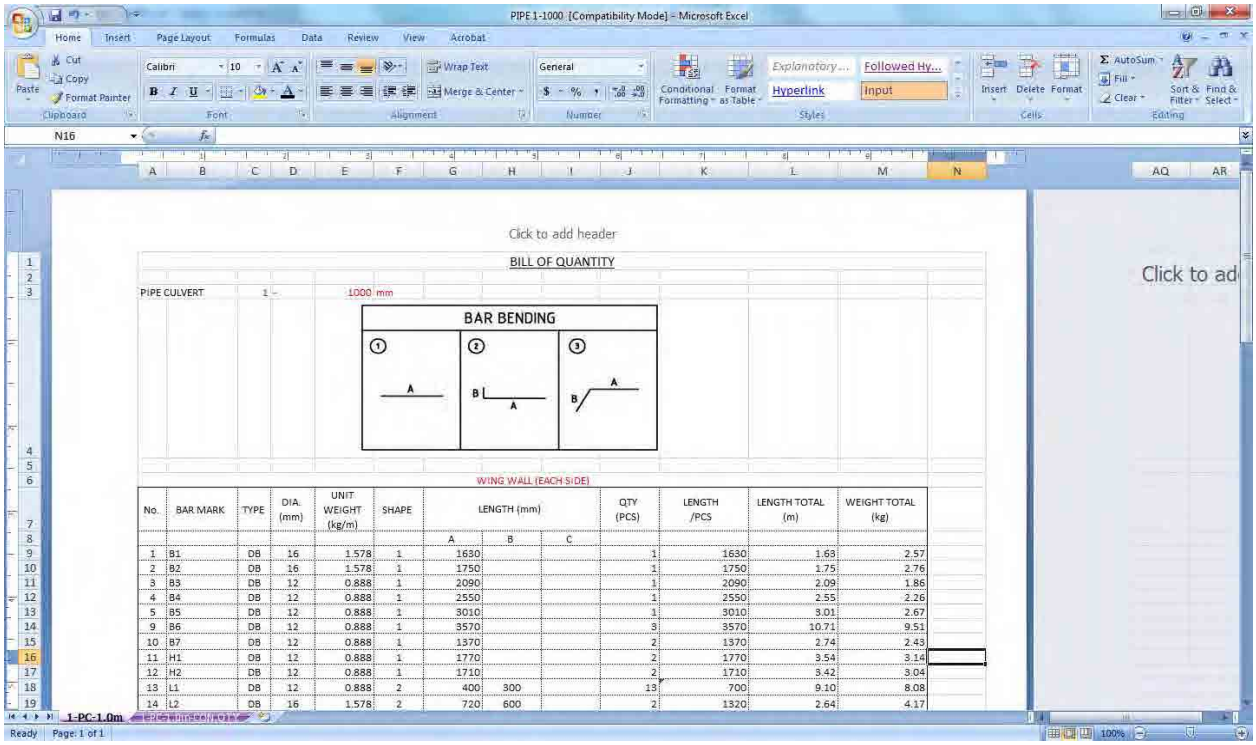


Figure 2. Pipe culvert/D=1.0m/Single pipe/Drawing

- Output when we click on: PIPE CULVERT/LINK BUTTON/BOQ-Excel



No.	BAR MARK	TYPE	DIA. (mm)	UNIT WEIGHT (kg/m)	SHAPE	LENGTH (mm) A	LENGTH (mm) B	LENGTH (mm) C	QTY (PCS)	LENGTH /PCS	LENGTH TOTAL (m)	WEIGHT TOTAL (kg)
1	B1	DB	16	1.578	1	1630			1	1630	1.63	2.57
2	B2	DB	16	1.578	1	1750			1	1750	1.75	2.76
3	B3	DB	12	0.888	1	2090			1	2090	1.86	
4	B4	DB	12	0.888	1	2550			1	2550	2.55	2.26
5	B5	DB	12	0.888	1	3010			1	3010	3.01	2.67
9	B6	DB	12	0.888	1	3570			3	3570	10.71	9.51
10	B7	DB	12	0.888	1	1370			2	1370	2.74	2.43
11	H1	DB	12	0.888	1	1770			2	1770	3.54	3.14
12	H2	DB	12	0.888	1	1710			2	1710	3.42	3.04
13	L1	DB	12	0.888	2	400	300		13	700	9.10	8.08
14	L2	DB	16	1.578	2	720	600		2	1320	2.64	4.17

Figure 3. Pipe culvert/D=1.0m/Single pipe/BOQ

3. Attention

In folder “DATA SEARCHING SYSTEM”:

1. Do not change any folder names.
2. Do not change any files names.
3. Do not move out or delete any the folders and files, all folders and files must be maintained in “DATA SEARCHING SYSTEM” only.

Contents of Searching program of Standard Drawings

(1) Road

SECTION	TITLE OF DRAWING	DRAWING No.	DRAWING PDF
SECTION 1	FORMAT OF DRAWING		
001	FORMAT SHEET DRAWING	S1- FSD - 001	→
002	SYMBOLE AND LEGEND	S1- SL - 002	→
003	LINE TYPES AND ANNOTAION	S1- LA - 003	→
004	ABBREVIATION	S1- AB - 004	→
005	LOCATION AND KEY MAP	S1- LK - 005	→
006	SPECIAL NOTE	S1- SN - 006	→
SECTION 2	ROAD GEOMETRY DESIGN		
001	ROAD STANDARDS	S2- RS - 001	→
002	ROAD CLASSIFICATION	S2- RC - 002	→
003	TYPICAL CROSS SECTION BY ROAD CLASSIFICATION	S2- TC - 003	→
004	TYPICAL SIDE SLOPE	S2- TSS - 004	→
005	TYPICAL PAVEMENT DESIGN	S2- TPD - 005	→
006	SUPERELEVATION	S2- SE - 006	→
007	PAVEMENT WIDENING ON CURVES	S2- PW - 007	→
008	TYPE OF JUNCTION 1	S2- TJ1 - 008	→
009	TYPE OF JUNCTION 2	S2- TJ2 - 009	→
010	JUNCTION DESIGN AND SIGHT DISTANCE	S2- JD - 010	→
011	MEDIAN 1	S2- MD1 - 011	→
012	MEDIAN 2	S2- MD2 - 012	→
013	FRONTAGE ROAD	S2- FR - 013	→
SECTION 3	ROAD SLOPE PROTECTION		
001	VERTIVER GRASS LINING SLOPE PROTECTION	S3- VGL - 001	→
002	VERTIVER GRASS HOLE SLOPE PROTECTION	S3- VGH - 002	→
003	GROUTED RIP-RAP SLOPE PROTECTION	S3- GRS - 003	→
004	RENO MATTRESS SLOPE PROTECTION	S3- RM - 004	→
005	PLAIN/MORTAR RIP-RAP PROTECTION AND CEMENT TREATED SOIL PROTECTION	S3- SP - 005	→
SECTION 4	ROAD DRAINAGE		
001	R.C. DITCH 1	S4- D1 - 001	→
002	R.C. DITCH 2	S4- D2 - 002	→
003	CATCH BASIN	S4- CB - 003	→
004	MANHOLE	S4- MH - 004	→
005	OPEN DRAIN	S4- OD - 005	→
006	SUBSOIL DRAIN 1	S4- SD1 - 006	→
007	SUBSOIL DRAIN 2	S4- SD2 - 007	→
SECTION 5	ROAD TRAFFIC DEVICES		
001	RUMBLE STRIPS	S5- RS - 001	→
002	TYPICAL INSTALLATION OF RUMBLE STRIPS 1	S5- RS1 - 002	→
003	TYPICAL INSTALLATION OF RUMBLE STRIPS 2	S5- RS2 - 003	→
004	LONGITUDINAL AND TRANSVERSE MARKINGS	S5- MK - 004	→
005	TYPICAL PAINTING OF LONGITUDINAL AND TRANSVERSE MARKINGS A HORIZONTAL AND VERTICAL CURVE SECTION	S5- TP - 005	→
006	ARROW MARKINGS 1	S5- AM1 - 006	→
007	ARROW MARKINGS 2	S5- AM2 - 007	→
008	ROAD HUMP AND OTHER MARKINGS	S5- RH - 008	→
009	ROAD SIGNS INSTALLATION	S5- RS - 009	→
010	KILOMETER POST FOR 1 KM INTERVAL	S5- KP1 - 010	→
011	KILOMETER POST FOR 10 KM INTERVAL	S5- KP10 - 011	→
012	DELINEATION AND GUIDE POSTS	S5- DL - 012	→
013	TYPICAL CURB	S5- TC - 013	→
014	RIGHT OF WAY MONUMENT	S5- RW - 014	→
015	CONCRETE BARRIER AT BRIDGE APPROACH	S5- CB - 015	→
016	GUARDRAIL LAYOUT AT BRIDGE	S5- GR - 016	→
SECTION 6	ATTACHMENT: SAMPLE OF DRAWING		
001	SAMPLE OF LEGEND	S6- SL - 001	→
002	SAMPLE OF LOCATION AND KEY MAP	S6- SLK - 002	→
003	SAMPLE OF BM COORDINATE AND ELEVATION	S6- SBM - 003	→
004	SAMPLE OF PLAN AND PROFILE	S6- SPP - 004	→
005	SAMPLE OF CROSS SECTION	S6- SCS - 005	→
006	BENCH-MARK	S6- BM - 006	→

(2) Pipe culvert

STRUCTURE		TITLE OF DRAWING		DRAWING PDF	BOQ EXCEL
SELECTION OF STRUCTURE				→	-
CONTENT				→	-
PIPE CULVERT	DIAMETER	GENERAL NOTES FOR PIPE CULVERT		→	-
		REBAR CONNECTION		→	-
	D = 1.0m	SINGLE PIPE	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		
		DOUBLE PIPES	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		
		TRIPLE PIPES	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		
	D = 1.2m	SINGLE PIPE	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		
		DOUBLE PIPES	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		
		TRIPLE PIPES	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		
	D = 1.5m	SINGLE PIPE	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		
		DOUBLE PIPES	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		
		TRIPLE PIPES	GENERAL VIEW	→	→
			PIPE INSTALLATION AND CONNECTION DETAIL		
			HEADWALL REINFORCEMENT AND CONNECTION DETAIL		
			REINFORCEMENT LAYOUT OF PIPE CULVERT		

(3) Box culvert

STRUCTURE		TITLE OF DRAWING			DRAWING PDF	BOQ EXCEL
SELECTION OF STRUCTURE					→	-
CONTENT					→	-
BOX CULVERT	1 CELL BOX CULVERT	WIDTH	HEIGHT	GENERAL NOTES FOR BOX CULVERT	→	-
				REBAR CONNECTION	→	-
		1.5m	1.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			1.5	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
		2.0m	1.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
		2.5m	1.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			3.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
		3.0m	2.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			3.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
	2 CELLS BOX CULVERT	1.5m	1.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
		2.0m	1.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
		2.5m	2.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			3.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
		3.0m	2.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			2.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
			3.0m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
		1.5m	1.5m	GENERAL VIEW APRON AND WINGWALL REINFORCEMENT AND BAR BENDING BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM	→	→
				GENERAL VIEW		

Box culvert, direct loading type, Miscellaneous

STRUCTURE				TITLE OF DRAWING	DRAWING PDF	BOQ EXCEL
	3 CELLS BOX CULVERT	2.0m	1.5m	APRON AND WINGWALL REINFORCEMENT AND BAR BENDING	→	→
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
			2.0m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
			2.5m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
		2.5m	2.0m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
			2.5m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
			3.0m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
		3.0m	2.0m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
			2.5m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
			3.0m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
BOX CULVERT (DIRECT LOADING TYPE)	1 CELL BOX CULVERT	3.0m	2.0m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
	2 CELL BOX CULVERT	3.0m	2.0m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
	3 CELL BOX CULVERT	3.0m	2.0m	GENERAL VIEW	→	→
				APRON AND WINGWALL REINFORCEMENT AND BAR BENDING		
				BODY CULVERT REINFORCEMENT AND BAR BENDING DIAGRAM		
MISCELLANEOUS	HANDRAIL	2.0m	2.5m	RAILING DETAIL – 1 CELL BOX CULVERT – 1	→	→
		3.0m	2.5m	RAILING DETAIL – 1 CELL BOX CULVERT – 2	→	→
		2.5m	3.0m	RAILING DETAIL – 1 CELL BOX CULVERT – 3	→	→
		3.0m	3.0m	RAILING DETAIL – 1 CELL BOX CULVERT – 4	→	→
		2.0m	2.5m	RAILING DETAIL – 2 CELLS BOX CULVERT – 1	→	→
		3.0m	2.5m	RAILING DETAIL – 2 CELLS BOX CULVERT – 2	→	→
		2.5m	3.0m	RAILING DETAIL – 2 CELLS BOX CULVERT – 3	→	→
		3.0m	3.0m	RAILING DETAIL – 2 CELLS BOX CULVERT – 4	→	→
		2.0m	2.5m	RAILING DETAIL – 3 CELLS BOX CULVERT – 1	→	→
		3.0m	2.5m	RAILING DETAIL – 3 CELLS BOX CULVERT – 2	→	→
		2.5m	3.0m	RAILING DETAIL – 3 CELLS BOX CULVERT – 3	→	→
		3.0m	3.0m	RAILING DETAIL – 3 CELLS BOX CULVERT – 4	→	→
	OTHER			APPROACH SLAB AND BRACKET REINFORCEMENT DETAIL	→	–

(4) Bridge

Flat Slab Bridge

STRUCTURE		TITLE OF DRAWING		DRAWING PDF	BOQ EXCEL
SELECTION OF STRUCTURE				→	-
CONTENT				→	-
R.C FLAT SLAB BRIDGE	SPAN	CARRIAGE WAY	GENERAL NOTES FOR BRIDGE	→	-
			REBAR CONNECTION	→	-
	10.0m	7.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		10.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
	12.0m	7.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		10.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		7.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		

Flat Slab Bridge, RC Deck Girder Bridge

STRUCTURE		TITLE OF DRAWING		DRAWING PDF	BOQ EXCEL
	15.0m		ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		10.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
	18.0m	7.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		10.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		10.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
			GENERAL VIEW		

RC Deck Girder Bridge

STRUCTURE		TITLE OF DRAWING			DRAWING PDF	BOQ EXCEL
	RC GIRDER BRIDGE	15.0m	12.0m	BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			7.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			6.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
		18.0m	7.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		

RC Deck Girder Bridge, Pretension Hollow Slab Bridge

STRUCTURE		TITLE OF DRAWING			DRAWING PDF	BOQ EXCEL
			12.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT - GENERAL DETAIL		
				BRIDGE SLAB - REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
	PRETENSION HOLLOW SLAB BRIDGE	15.0m	7.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
		18.0m	7.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			11.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			7.0m	GENERAL VIEW		
				ABUTMENT - GENERAL DETAIL		
				DECK UNIT TYPE A - REINFORCEMENT DETAIL		
				DECK UNIT TYPE B - REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
				GENERAL VIEW		

Pretension Hollow Slab Bridge, Post tension Hollow Slab Bridge

STRUCTURE		TITLE OF DRAWING			DRAWING PDF	BOQ EXCEL
		20.0m	8.0m	ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW		
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
		25.0m	7.0m	GENERAL VIEW		
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW		
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW		
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
		15.0m	7.0m	GENERAL VIEW		
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW		
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		

Post tension Hollow Slab Bridge

STRUCTURE				TITLE OF DRAWING	DRAWING PDF	BOQ EXCEL
BRIDGE (SIMPLE SPAN)	POST TENSION HOLLOW SLAB BRIDGE	18.0m		ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW	→	→
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			7.0m	GENERAL VIEW	→	→
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW	→	→
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW	→	→
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW	→	→
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
		20.0m	7.0m	GENERAL VIEW	→	→
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW	→	→
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
				HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW	→	→
				HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
				ABUTMENT-GENERAL DETAIL		
				PRESTRESSED STRAND DETAIL		
				HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		

Post tension Hollow Slab Bridge, Post tension Deck Girder Bridge (I-shape)

STRUCTURE			TITLE OF DRAWING	DRAWING PDF	BOQ EXCEL
			HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW	→	→
			HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
			ABUTMENT-GENERAL DETAIL		
			PRESTRESSED STRAND DETAIL		
			HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
			HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		7.0m	GENERAL VIEW	→	→
			HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
			ABUTMENT-GENERAL DETAIL		
			PRESTRESSED STRAND DETAIL		
			HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
			HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW	→	→
			HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
			ABUTMENT-GENERAL DETAIL		
			PRESTRESSED STRAND DETAIL		
			HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
			HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
	25.0m	10.0m	GENERAL VIEW	→	→
			HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
			ABUTMENT-GENERAL DETAIL		
			PRESTRESSED STRAND DETAIL		
			HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
			HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW	→	→
			HOLLOW SLAB ARRANGEMENT-GENERL DETAIL		
			ABUTMENT-GENERAL DETAIL		
			PRESTRESSED STRAND DETAIL		
			HOLLOW SLAB TYPE A-REINFORCEMENT DETAIL		
			HOLLOW SLAB TYPE B-REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		7.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
	18.0m	10.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		

Post tension Deck Girder Bridge (I-shape)

STRUCTURE	TITLE OF DRAWING			DRAWING PDF	BOQ EXCEL
POST TENSION GIRDER BRIDGE (I-SHAPE)	20.0m	[illegible]	GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT - GENERAL DETAIL		
			BRIDGE SLAB - REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		7.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT - GENERAL DETAIL		
			BRIDGE SLAB - REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT - GENERAL DETAIL		
			BRIDGE SLAB - REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		10.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT - GENERAL DETAIL		
			BRIDGE SLAB - REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT - GENERAL DETAIL		
			BRIDGE SLAB - REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
	25.0m	7.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT - GENERAL DETAIL		
			BRIDGE SLAB - REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT - GENERAL DETAIL		
			BRIDGE SLAB - REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		[illegible]	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT - GENERAL DETAIL		

Post tension Deck Girder Bridge (I-shape), Post tension Deck Girder Bridge (T-shape)

STRUCTURE			TITLE OF DRAWING	DRAWING PDF	BOQ EXCEL
		10.0m	BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
	30.0m	7.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		10.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
	18.0m	7.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			INTERNAL GIRDER REINFORCEMENT DETAIL		
			EXTERNAL GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW		
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			INTERNAL GIRDER REINFORCEMENT DETAIL		
			EXTERNAL GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		

Post tension Deck Girder Bridge (T-shape)

STRUCTURE		TITLE OF DRAWING		DRAWING PDF	BOQ EXCEL
POST TENSION GIRDER BRIDGE (T-SHAPE)	[illegible]	10.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			INTERNAL GIRDER REINFORCEMENT DETAIL		
			EXTERNAL GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			INTERNAL GIRDER REINFORCEMENT DETAIL		
			EXTERNAL GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
	20.0m	7.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			INTERNAL GIRDER REINFORCEMENT DETAIL		
			EXTERNAL GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		8.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			INTERNAL GIRDER REINFORCEMENT DETAIL		
			EXTERNAL GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		10.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			INTERNAL GIRDER REINFORCEMENT DETAIL		
			EXTERNAL GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		
		12.0m	GENERAL VIEW	→	→
			BRIDGE SLAB DETAIL		
			ABUTMENT – GENERAL DETAIL		
			BRIDGE SLAB – REINFORCEMENT DETAIL		
			INTERNAL GIRDER REINFORCEMENT DETAIL		
			EXTERNAL GIRDER REINFORCEMENT DETAIL		
			CROSS BEAM REINFORCEMENT DETAIL		
			ABUTMENT WINGWALL REINFORCEMENT DETAIL		
			ABUTMENT REINFORCEMENT DETAIL		

Post tension Deck Girder Bridge (T-shape)

STRUCTURE		TITLE OF DRAWING			DRAWING PDF	BOQ EXCEL
		25.0m	8.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				INTERNAL GIRDER REINFORCEMENT DETAIL	→	→
				EXTERNAL GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				INTERNAL GIRDER REINFORCEMENT DETAIL	→	→
				EXTERNAL GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				INTERNAL GIRDER REINFORCEMENT DETAIL	→	→
				EXTERNAL GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
		30.0m	7.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				INTERNAL GIRDER REINFORCEMENT DETAIL	→	→
				EXTERNAL GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				INTERNAL GIRDER REINFORCEMENT DETAIL	→	→
				EXTERNAL GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				INTERNAL GIRDER REINFORCEMENT DETAIL	→	→
				EXTERNAL GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW		
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				INTERNAL GIRDER REINFORCEMENT DETAIL	→	→
				EXTERNAL GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		

Two span Bridge (RC Deck Girder Bridge, Pretension Hollow Slab Bridge)

STRUCTURE				TITLE OF DRAWING	DRAWING PDF	BOQ EXCEL
BRIDGE (TWO SPANS)	R.C GIRDER BRIDGE	15.0m	7.0m	GENERAL VIEW	→	→
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
				PIER REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW	→	→
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
				PIER REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW	→	→
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
				PIER REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW	→	→
				BRIDGE SLAB DETAIL		
				ABUTMENT – GENERAL DETAIL		
				BRIDGE SLAB – REINFORCEMENT DETAIL		
				GIRDER REINFORCEMENT DETAIL		
				CROSS BEAM REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
				PIER REINFORCEMENT DETAIL		
	PRETENSION HOLLOW SLAB BRIDGE	20.0m	7.0m	GENERAL VIEW	→	→
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
				PIER REINFORCEMENT DETAIL		
			8.0m	GENERAL VIEW	→	→
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
				PIER REINFORCEMENT DETAIL		
			10.0m	GENERAL VIEW	→	→
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		
				PIER REINFORCEMENT DETAIL		
			12.0m	GENERAL VIEW	→	→
				ABUTMENT – GENERAL DETAIL		
				DECK UNIT TYPE A – REINFORCEMENT DETAIL		
				DECK UNIT TYPE B – REINFORCEMENT DETAIL		
				ABUTMENT WINGWALL REINFORCEMENT DETAIL		
				ABUTMENT REINFORCEMENT DETAIL		

Miscellaneous

(Approach Slab, Handrails, Guard rail, Slope Protection, Retaining Wall, Pile, Signage Post, Typical Erection Method)

STRUCTURE		TITLE OF DRAWING	DRAWING PDF	BOQ EXCEL
		PIER REINFORCEMENT DETAIL		
MISCELLANEOUS	APPROACH SLAB	APPROACH SLAB REINFORCEMENT DETAIL – 7m	→	→
		APPROACH SLAB REINFORCEMENT DETAIL – 8m	→	→
		APPROACH SLAB REINFORCEMENT DETAIL – 10m	→	→
		APPROACH SLAB REINFORCEMENT DETAIL – 12m	→	→
	HANDRAILS	HANDRAIL DETAIL – 10m	→	→
		HANDRAIL DETAIL – 12m	→	→
		HANDRAIL DETAIL – 15m	→	→
		HANDRAIL DETAIL – 18m	→	→
		HANDRAIL DETAIL – 20m	→	→
		HANDRAIL DETAIL – 25m	→	→
		HANDRAIL DETAIL – 30m	→	→
	GUARD RAIL	GUARD RAIL FOR BRIDGE APPROACH	→	-
	SLOPE PROTECTION AND STAIR	SLOPE PROTECTION AND STAIR REINFORCEMENT DETAIL -1	→	-
		SLOPE PROTECTION AND STAIR REINFORCEMENT DETAIL -2	→	-
	RETAINING WALL	RETAINING WALL – GENERAL VIEW	→	-
		RETAINING WALL – REINFORCEMENT DETAIL		-
	FORM PANEL	PANEL REINFORCEMENT DETAIL	→	-
	PILE	RC PILE WITH STEEL FORM (ø 500mm, L=12.0m)	→	-
		PILE (400mmx400mm, L=12.0m) – WELDED CONNECTION	→	-
		PILE (400mmx400mm, L=12.0m)– MALE/FEMALE CONNECTION	→	-
		PILE (300mmx300mm, L=12.0m) – WELDED CONNECTION	→	-
		PILE (300mmx300mm, L=12.0m) – MALE/FEMALE CONNECTION	→	-
	OTHERS	SIGNAGE BOARD DETAIL	→	-
		TYPICAL ERECTION METHOD	→	-

Appendix 8 Meeting Minutes

- **First JCC Meeting on October 13, 2010**
- **Second JCC Meeting on December 21, 2011**
- **Third JCC Meeting on August 30, 2012**
- **First EC Meeting on January 6, 2010**
- **Second EC Meeting on June 4, 2010**
- **Third EC Meeting on September 1, 2010**
- **Fourth EC Meeting on December 9, 2010**
- **Fifth EC Meeting on August 4, 2011**

STRENGTHENING OF CONSTRUCTION QUALITY CONTROL

MINUTES

THE JOINT COORDINATNG COMMITTEE MEETING NO 1

Subject : Progress Report and Approval on the Standard Guideline and Regulation for Force Account Project in MPWT.

Location : Conference Room, MPWT.

Time & Date : 13 October 2010, 09:00

Participants : <Attendant list is enclosed>

A. Introduction

1. The Strengthening Construction Quality Control Project is the cooperation project of the Government of Japan through JICA with the Ministry of Public Works and Transport. The Project is to encourage in improving the ability of the technical personnel of MPWT in the supervision of construction and rehabilitation of road and bridge infrastructures.

2. H.E. Minister honorably gave the welcome remarks to the First Joint Coordination Committee Meeting. In his remarks, he mentioned on the establishment of the Project, the objective of having the Strengthening of Construction of Quality Control Project and the necessity of the establishment of the Standard Guideline and Regulation.

3. The meeting reviewed, discussed and approved to the Standard Guideline and Regulation for strengthening of construction quality of the works in particular for the force account projects.

B. Presentations:

4. Following H.E. Minister's welcome remarks, H.E. Tauch Chankosal, Secretary of State of MPWT, briefed the main tasks comprising in the Strengthening of Construction Quality Control Project including:

- Task 1(Output 1-1) : Establishment of Standard Guidelines & Regulation
- Task 2 (output 1-2) : Improvement of the Laboratory equipment
- Task 3 (output 2) : Establishment of Database Management System for Completion Documents
- Task 4 (output 3-1) : Draft of Training Program for Quality Control. C/P Overseas Training in Japan
- Task 5 (output 3-2) : Preparation Work for the Compiling the Road & Structure Standard Drawings.

The outcomes of implemented in the years 2009 and 2010; and the plan for the years 2011 and 2012 were also reported to the meeting.

5. One of the purposes for strengthening of construction quality of the works in particular for the force account projects is the establishment of the Standard Guideline and Regulation. The meeting was presented in details the contents of the Standard Guideline and Regulation for force account projects to get the participants familiar with this document for review, discussion and approval. The presentation was

made by Mr. Samrangdy Namo. The Standard Guideline and Regulation was prepared and disclosed to the related departments of MPWT and the provincial departments of public works.

C. Discussions

6. H.E. Minister noted that up to date, in the force account projects, the supervision fee does not include in the project costs. But when starting to introduce the supervision and the strengthening of construction quality control, the project costs will certainly be higher than previous project cost. However, by strengthening the quality of the works, the budget for maintenance will be decreased.

7. H.E. Minister requested to review scopes of supervision for routine maintenance works whether it is necessary or not because routine maintenance is normally involved with the very minor works like pothole patching, repair to depression, swelling, or cracking etc.

8. By observing several pilot projects implemented in the year 2010, Mr. Yamauchi, the JICA expert pointed out that it was found the quality control tests has been inadequately taken and no proper records were kept. In addition, although there is some supervision team inspected the construction site, but no it was not in the permanent or regular basic.

   He highlighted in the construction, the advanced planning and quality control tests are two of the very important factors. The quality of the construction cannot be compromised while the schedule of construction can be delayed as well as the construction costs can be adjusted based upon the certain circumstance.

9. Dr. Yit Bunna, Under Secretary of State highlighted that the four parties involved in the works as defined in the Standard Guideline and Regulation would contribute to the better quality of the works. In addition, he raised the concern about the double checking system over the supervision team. He suggested having the technical audit for ensuring the quality of the works.

10. There was the clarification to note raised by the Dean of Construction Faculty of the Cambodia Technical University on the term of "Inspector". "Inspector" in the Regulation document is Party D in the contract relationship. It is represented by PEAC committee and General Department of Inspectorate of MPWT and is responsible for review the Contract prior signing of the agreement between Party A and Party B, to inspect upon request from Party B through Party C for payments. The other tem "Inspector" in the site organization is referred to the "Site Supervisor". Therefore, although, the terminology is the same but they are different organization and have different duties.

11. The representative from MEF raised his concern over the contract relationship and transparency in implementation of the works by RID. In RID, there are the Bridge and Road Units are responsible for the construction of the roads and bridges. In addition, RID also has the Technical and Planning Unit who taking part in supervision as Party C together with PWRC.

    In this regards, Mr. Nou Vaddhanak, Director of RID clarified that firstly in his capacity as the Director of RID, he is doing the best and manage for construction of the roads and bridges with good quality and integrity because it's the reputation of RID. Secondly, it is the duties instructed by MPWT's Senior Management. RID did not do anything by himself without permission.

    H.E. Tauch Chankosal suggested the works carried by RID may be supervised by the other, but not RID themselves except for internal supervision.

12. H.E. Suzuki, Chief Representative of JICA Cambodia expressed his sympathy and support to the works which have been completed by the Project Team, especially to the establishment of the 1st edition

of the Standard Guideline and Regulation for the force account projects. It is the very important document for the use in improving the quality of the works. These documents will be soon applied for the pilot projects. During its application, the revision and update to these documents might be required to suit the actual working conditions.

H.E. Suzuki highlighted that the outputs achieving from the Strengthening of Construction Quality Control Project, including the Standard Guideline and Regulation, are completed by Cambodia counterpart with the advises from JICA experts.

D. Conclusions and Recommendations

13. H.E. Minister appreciated JICA for supporting the SCQC Project.

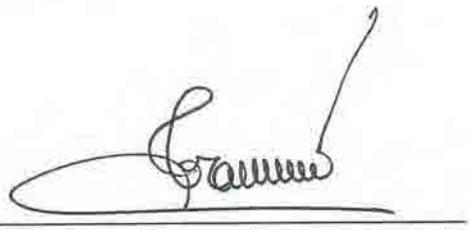
14. The SCQC project will become a mechanism and the sample implementation in force account projects for MPWT. He also reminded on tanking care for quality of the works through strengthening of construction quality control.

15. There is a Cambodia Construction Specification that is in used in MPWT. H.E. Minister recommended giving the training to on the Cambodia Construction Specification. In addition he also suggested having the training session on The Standard Guideline and Regulation.

16. The meeting endorsed the Standard Guideline and Regulation for implementation on the pilot projects set for the year 2011. H.E. Minister also recommended the team to review and update the Standard Guideline and Regulation after it will be implemented on the Pilot projects to accustom the actual conditions. He reminded of the necessity in taking care for strengthening of construction quality control.

- **Enclosure:**
  - H.E. Minister's opening remarks

Approved by:



H.E. Minister Tram Iv Tek

Chairperson

Joint Coordinating Committee

Mr. Tadao Kuwano

Chief Advisor

Representative of SCQC Project

MINUTES

Second Joint Coordinating Committee Meeting (JCC)
The Strengthening Construction Quality Control Project

21 December 2011

Date/Time: 21 December 2011 at 08:00 hrs.

Venue: Conference Room, MPWT

Participants:

- Chairperson — H.E. Minister Tram Iv Tek
- Vice-Chairpersons — H.E. Tauch Chankosal (Secretary of State)
  H.E. Lim Sedenine (Secretary of State)
- Permanent Member — H.E. Dr. Yit Bunna (Under Secretary of State)
- Members
  H.E. Prum Chansovannary (Under Secretary of State)
  H.E. Oun Song (Under Secretary of State)
  H.E. Sok Mathoeung (Minister's Advisor)
  Mr. Phy Lyda (Director of HEC)
  Mr. Khun Srun (Director of Laboratory)
  Mr. Phem Phirun (General Inspector)
  Mr. Ien Chhut (Deputy Director of Water Department)
  Mr. Nou Vaddhanak (Director of RID)
  Mr. Heng Rothpiseth (Director of SPIED)
  Mr. Tan Tera (Deputy Director of SPIED)
  Mr. Ket Chandararith (Deputy Director of ICD)
  Mr. Dary Chetana (Chief, MEF)
  Mr. Chhan Sopheap (Deputy Chief of DPID3, MEF)
  Mr. Sim Rinnaroth (DPID3 Officer, MEF)
  Mr. Nhar Heng (Deputy Director, MRD)
  Mr. Noun Chamnab (Representative of Board of Engineers Cambodia)
  Mr. Chhouk Chhay Houng (Representative of ITC)

- SCQC Project
  Project Director — H.E. Kem Borey (Director General of Public Works)
  Project Manager — Mr. Koun Bunthoeun (Director of PWRC)
  Project Coordinator — Mr. Khun Sokha (Deputy Director of PWRC)
  Mr. Samrangdy Namo (Deputy Director of PWRC)
  Cambodian Counterparts
  Mr. Kry Thong — Mr. Chao Sopheak Phibal
  Mr. Meng Leang — Mr. You Dara

Mr. Uy Sophal	Mr. Bou Veasna
Mr. Phy Ratha	Mr. Laing Onit
Mr. Nin Menakak	Mr. Pou Manith

JICA Experts

Mr. Tadao Kuwano	Mr. Masafumi Yamauchi
Mr. Kazuo Yumita	Mr. Taturo Maeda
Mr. Mamoru Izawa	Mr. Kazuki Ishida

- JICA Evaluation Team

1. Introduction:

On 21 December 2011, the Second Joint Coordinating Committee Meeting was held to discuss the progress of the project, issues related to the implementation of the project and also to review, discuss and endorse the approval to the Standard Drawings for road and road structure.

The meeting was chaired by H.E. Tram Iv Tek, Minister of Public Works and Transport with the attendance of Mr. Yukiharu KOBAYASHI, Senior Representative of JICA Cambodia Office, with participation of JICA Experts for the Project and all stakeholders including MPWT, Representatives from MEF, Ministry of Rural Development, Technology Institute of Cambodia and Engineering Association of Cambodia.

In his opening speech, H. E. Minister expressed his serious concern over the quality of the works and the quality assurance process in the construction. At the same time, H.E. Minister encouraged the discussion on the implementation and the outcomes of the project

By coincidence with the Second Joint Coordinating Committee Meeting, JICA's Evaluation Team has conducted the mid-term review on the implementation of this Project to observe the implementation process, the results of the performance, and recommendation courses of actions for successful realization of this Project

2. Presentations:

The presentations on the general of the Project, progress of the individual tasks including:

a) Output 1 – Establishment of Standard Guideline and Regulation and its trial application to the pilot projects for the year 2011 for: (i) the National Road No 71 in Kampong Cham Province with the length of 2.5 km with pavement width of double bituminous surface treatment (DBST) of 6m and laterite shoulders of 1.5 m each side of the road; (ii) The Provincial Road No 110 in Kandal Province with the length of 3.1 km with pavement width of double bituminous surface treatment (DBST) of 6 m and laterite shoulders of 1.0 m each side of the road for observing the adequacy of quality control process and quality control documentation.

   Based on the evaluation from the implementation of these pilot projects, Standard Guideline and Regulation will be updated.

b) Output 1.2 – Provision of the laboratory equipment to the provinces where the pilot projects are undertaken and to MPWT's Laboratory; monitor testing record of those provided laboratory equipment; review and preparation for unification and improvement of laboratory testing forms; and conduct of training to laboratory staff.

c) Output 2 – Establishment of database system and library for centralization of previous construction documentations like as-built drawings and completion reports etc., and books for records and access for wider range of users.
d) Output 3.1 – Implementation of technical training for MPWT technical personnel including training of trainers, training of standard guideline and regulation, and training of counterpart in Japan.
e) Output 3.2 – Establishment of standard drawings for road and road structure.

The outcomes of the mid-term evaluation together with the recommendation were also presented by the JICA Mid-term Evaluation team Dr. Watanabe, Mr. Egami and Mr. Katsuta.

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3. Discussions:

The following issues were discussed during the JCC meeting:

- **Budget**: H.E. Minister mentioned that in many cases the construction of the roads is based on the availability of the finance, therefore sometime because of the budget constrain the road construction must adopt the lower standard to cope with the existence of the budget. He also added that most the roads, the application of the base course is done only on the main carriageway but not the shoulders. Therefore, the damages to the shoulders mostly occurred and spread to the main carriageway.

- **Quality of the Works**: Taking as an example on the road damages, His Excellency Minister commented on the damages of the section of the road NR6 and NR5 stretching from Siem Reap to Poipet the Border with Thailand which was improved using the finance from Asian Development Bank (ADB) during the flood in the year 2009. In fact, the damages were caused by flood waters, but overweight of vehicles have also heavily contributed to the damages. The overweight issue is the very concern issue for MPWT. In addition, it is suspected that the designs may probably partly cause to the damages.

  He also pointed out the requirement for MPWT / DPWT engineers to pay more attention on the quality control and quality assurance of the works. This would require the improvement in their technical capability through training processes, the change in the way of thinking and behavior for achieving the quality of the works for avoiding public criticism.

- **Standard Drawings**: By having the Standard Guideline and Regulation, especially the standard drawings for road and road structure, H.E. Minister suggested that MPWT will have the stronger position in discussion or negotiation with the major donor partners on the technical matters.

  In clarification to the question on whether the standard drawings would be compulsory requirements for road design, H.E. Minister stated that the standard drawings would not be compulsory to follow but standard drawings are utilized for efficiency and effectiveness of the works.

- **Road Design**: The JICA expert informed the meeting that road design is generally determined based on survey results and forecast of traffic demand (traffic volume and weight) and how to deal with those result and forecast would be up to MPWT. The expert added that engineer / designer judgment would be the key for use of design standard.

Related to the question on the design, the standard drawings provide the general note showing those design criteria. In regards to the flood level, it was clarified that the subgrade of road shall be determined at least at the flood level plus a certain margin. Therefore, in order to protect the road, the information on the flood level is a very important issue.

In regards to the pavement design, it was clarified that it is usually adopted for 10 years period and would be re-paved in each 10 year.

4. Conclusions:

Based on the discussion at Second Joint Coordinating Committee meeting today the standard drawings for the road and road structure prepared by the Strengthening Construction Quality Project were approved by the member of the JCC. In addition, JCC's member also agreed with the Report of Mid-term Evaluation, after discussions.

5. Recommendation

H.E. Minister offered some recommendation to the JCC meeting on the following:

a) JICA is requested to assist in maintenance of asphaltic pavement type of the roads.

b) MPWT engineers are requested to pay more attention on the quality of the works and improvement technical capability to work more effectively and efficiently. One of the means in strengthening of the above is training for quality control as well as design standard would be highly important.

c) It was also recommended to have the same design for the main carriage way and shoulders for preventing damages

The meeting was adjourned at approx 12:00 hrs.

Approved by

H.E. Minister Tram Iv Tek
Chairperson
Joint Coordinating Committee

Mr. Tadao Kuwano
Chief Advisor
Representative of SCQC Project

Minute of Meeting
The Third Joint Coordinating Committee

1. Date : August 30, 2012, 08:30
2. Venue : MPWT Conference Room
3. Attendance :
   - Chairman H.E. Minister Tram Iv Tek
   - Vice-Chairpersons H.E. Tauch Chankosal (Secretary of State)
     Lim Sedenine (Secretary of State)
   - Permanent Member H.E. Yit Bunna (Under Secretary of State)
   - Members
     - H.E. Prum Chansovannary (Under Secretary of State)
     - H.E. Oun Song (Under Secretary of State)
     - H.E. Sok Mathoeung (Minister's Advisor)
     - Mr. Phy Lyda (Director of HEC)
     - Mr. Khun Srun (Director of Laboratory)
     - Mr. Phem Phirun (General Inspector)
     - Mr. Ien Chhut (Deputy Director of Water Department)
     - Mr. Nou Vaddhanak (Director of RID)
     - Mr. Heng Rothpiseth (Director of SPIED)
     - Mr. Tan Tera (Deputy Director of SPIED)
     - Mr. Ket Chandararith (Deputy Director of ICD)
     - Mr. Khun Juline (Director of DIC, MEF)
     - Mr. Dary Chetana (Chief, MEF)
     - Mr. Chhan Sopheap (Deputy Chief of DPID3, MEF)
     - Mr. Sim Rinnaroth (DPID3 Officer, MEF)
     - Mr. Nhar Heng (Deputy Director, MRD)
     - Mr. Noun Chamnab (Representative of Board of Engineers Cambodia)
     - Mr. Chhouk Chhay Houng (Representative of ITC)
   - SCQC Project

Project Director	H.E. Kem Borey	(Director General of Public Works)
Project Manager	Mr. Koun Bunthoeun	(Director of PWRC)
Project Coordinator	Mr. Khun Sokha	(Deputy Director of PWRC)
	Mr. Samrangdy Namo	(Deputy Director of PWRC)

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Mr. Kry Thong	Mr. Chao Sopheak Phibal
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Mr. Nin Menakak	Mr. Pou Manith
Mr. Theng Socheat	

     JICA Experts

Mr. Tadao Kuwano	Mr. Masafumi Yamauchi
Mr. Kazuo Yumita	Mr. Yoshihisa Noda
Mr. Tomohiko Nakamura	Mr. Kazuki Ishida
   - JICA Evaluation Team

I. Opening Remarks

H.E. Minister Tram Iv Tek gave a welcome speech for all members attending the meeting.

II. Presentation

Following H.E. Minister's welcome remarks, Mr. Koun Bunthoeun, project manager of SCQC project, briefed the achievement of each task comprising in the Strengthening of Construction Quality Control Project including ;-

Achievement of Project

1) Task 1 (Output 1-1) (Chao Sopheak Phibal) : 2nd edition of Standard Guideline & Regulation
   (Pou Manith) : Pilot Project
   (Koun Bunthoeun) : Dispersive Soil Test Work
2) Task 3 (Output 2) (Phy Ratha) : Database Management System
3) Task 4 (Output 3-1) (Laing Onit) : Training Program for Quality Control
   (Nin Menakak) : Workshop for Standard Guideline & Regulation
4) Terminal Evaluation of the Project (JICA Team)
   - Achievement of the project
   - Evaluation Results by Five Criteria
     - Relevance: The project was well aligned with Cambodian and Japanese strategies and policies.
     - Effectiveness is high
     - Efficiency is fair
     - Impact of the project is relatively high. No negative impact by the project has been observed.
     - Sustainability of the project effect is relatively high; however, some concerns in financial aspects have been observed in term of library and database management.
   - Recommendation

III. Discussion and Others

1. Mr. Chhouk Chhay Houng, Representative of ITC gave comment that the translation of SG/RG into Khmer seems not to be in common use. The translation of some part is different due to individual's knowledge.
   Mr. Samrongdy Namo responded that there is still a shortage of knowledge in translation. Thus, he proposed to have one committee to finalize a practical translation.
2. Mr. Khun Juline, Director of DIC, MEF asked that concerning the ending of JICA project, what works have to continue effort in MPWT. And MPWT should take care of budget of library by themselves because the budget in Chapter 61 is already overloaded.
   H.E. Kem Borey responded MPWT determined to continue the quality control activities at least one project in each province. And he will request to MEF amount of 400 million riel for training and database system under budget in year 2013.
   But he praised the effort to establish SG/RG.
3. Mr. Nhar Heng, Deputy Director, MRD asked to share SG/RG to MRD as it is also related to responsible tasks to manage road under MRD control.
   He said that MRD has problem with the plan that connect rural area to urban area. Thus, he would like to ask JICA to support MRD to build master plan to connect the rural to urban area.
4. H.E. Tauch Chankosal accepted the report from JICA terminal evaluation team and added comment that the sustainability activities must be promising to apply QC/QA system in future projects and asked JICA to continue supporting to MPWT, especially about library and training.

IV. Conclusions

H.E Minister Tram Iv Tek ended the meeting by giving his conclusions as follow:

- The SCQC project is very important as it helped Cambodian engineers concentrated more on quality than before.
- Keeping the quality of roads and the weight of vehicles control should be done for sustainable use of roads.
- Establishment of SG/RG, setting of library, database system and compilation of standard drawings are all satisfactory.
- Training is very important. Thus, more training should be given to MPWT/DPWTs engineers to have more capacity to apply quality control activities in their works.
- Finally, H.E. Minister appreciated JICA and project team for supporting MPWT.

The meeting endorsed the 2nd edition of SG/RG and training program in conventional training course in MPWT.

The meeting ended at 12:00pm.

Approved by

H.E. Minister Tram Iv Tek	Mr. Tadao Kuwano
Chairperson	Chief Advisor
Joint Coordinating Committee	Representative of SCQC Project

Minutes of the 1st Executive Committee Meeting for the Strengthening of Construction Quality Control Project

January 06, 2010

Chairs	H.E. Tauch Chankosal	(Secretary of State, MPWT)		
	H.E. Lim Sidenine	(Secretary of State, MPWT)		
Present	H.E. Yit Bunna	(Undersecretary, MPWT)	<Project Director>	
	Mr. Phy Sophort	(Deputy Director General of Public Works)	H.E. Kem Borey	(Director General of Public Works)
	Mr. Nou Vaddhanak	(Director, Road Infrastructure Department)	<Project Manager>	
	Mr. Phy Lyda	(Director, Heavy Equipment Center)	Mr. Koun Bunthoeum	(Director, Public Works Research Center)
	Mr. Prum Chansovannary	(Director, Airport Construction Department)		
	Mr. Keo Leap	(Director General, MPWT Laboratory)	<JICA Expert>	
	Mr. Samrang Dynamo	(Deputy Director, Public Works Research Center)	Mr. Tadao Kuwano	(Chief Adviser, SCQC Project)
			Mr. Kazuki Ishida	(Project Coordinator, SCQC Project)
	Mr. Kry Thong	(Chief, Intervention Unit, Heavy Equipment Center)	Mr. Kazuo Yumita	(Expert, SCQC Project)
	Mr. Hou Makara	(Vice Chief, Airport Construction Department)	Mr. Tomohiko Nakamura	(Expert, SCQC Project)
	Mr. Sok Ponnareay	(Airport Construction Department)	Mr. Yoshihisa Noda	(Expert, SCQC Project)
	Mr. Kong Sophal	(Chief , Public Works Research Center)	Mr. Tatsuro Maeda	(Expert, SCQC Project)
	Mr. Chhum Bunheng	(Chief, The Office of Procurement and Construction)		
	Mr. Uy Sophal	(Inspector, General Inspectorate)	Ms. Nak Chanpisey	(Administration Staff, SCQC Project)
	Mr. Huot Vathna	(Deputy Director, Public Procurement Department/MEF)		
	Dr. Khun Sokha	(Deputy Director, Public Works Research Center)		
	Mr. Sang Sinabeth	(Public Works Research Center)		
	Mr. Min Menakak	(Public Works Research Center)	<Observer>	
			Mr. Atsushi Fujii	(JICA Expert, MPWT)
	Mr. Shingo Morihata	(JICA Cambodia Office)	Mr. Akio Nakamura	(JICA Expert, MPWT)
	Mr. Heng Salpiseth	(JICA Cambodia Office)		

The 1st Executive Committee meeting for the Strengthening of Construction Quality Control Project was called to order at 15:00 P.M. in the MPWT conference room by H.E. Tauch Chankosal.
After calling to order the meeting, H.E. Tauch Chankosal left the meeting because there is a need to attend the emergency meeting with the Minister of MPWT.
Instead of H.E. Tauch Chankosal, H.E. Lim Sidenine expressed his appreciation to the project team and the Cambodian members.

The Main discussion of the meeting concerned;

(1) The project structure/ Concept of the project activities
(2) The project work plan
(3) Report of outline of the basic survey in MPWT
(4) Allocation of the Cambodian counterparts for the project

《Content of Discussion》

Mr. Kuwano presented regarding the project structure/ concept of the project activities.	H.E. Lim Sidenine informed all the members that it is necessary to add some more matters or modify the project structure/ concept of the project activities.
H.E. Yit Bunna presented a requests as follows, - Set up the e-library in MPWT. - Set up the technical seminar and training course programs.	Mr. Morihata mentioned that the purpose of this meeting is to discuss together with the EC members and the project team how to implement the project efficiently and consequently it is not to request other matters from the Cambodian side to Japanese side at this time.
H.E. Lim Sidenine agreed to the comments from Mr. Morihata. In addition, he requested H.E. Kem Borey to give comments on the project structure/ concept of the project activities.	
H.E. Kem Borey commented on the project structure as follows, - The number of the Cambodian counterparts is far more than the Cambodian side supposed to be. - The Cambodian side worries whether they can allocate the counterparts or not. - According to the project work plan, we will conduct the pilot construction at three (3) different areas; however, even now, it is not decided yet the three (3) different areas. Therefore, we are worried about the short-term implementation of the pilot construction.	Mr. Morihata mentioned that both Cambodian and Japanese sides already confirmed the project concept and plan during the series of discussions with preparatory mission team in May 2009. Therefore, the Cambodian and Japanese sides should make efforts to achieve the project outputs.
H.E. Yit Bunna commented on some weak point in MPWT as follows, - Manage the NR-68 works - Set up the e-library - Pilot construction using the formulated Standards, Regulations and Guidelines, and Road and Bridge Structure Standard Drawing Collections - How should we improve the ability of MPWT staff? - How to improve quality of Quantity Surveying carried out by respective departments.	
Mr. Yumita explained about “Flow for formulation of Standard, Regulation & Guideline”	

In addition, he also explained about “Function of JCC & EC” and requested the Cambodian side to prepare for holding the JCC meeting in August 2010.	
With regards to Mr. Yumita’s explanation, H.E. Yit Bunna asked who will prepare “the Task Force Meeting”, and what is the meaning of “Key point”?	Mr. Yumita responded to the question of H.E. Yit Bunna as follows, - It will be prepared by both sides, the Cambodian counterparts and Japanese experts. - Task Force Meeting is attended to conduct by not only Task force members but also high ranking officers in MPWT. - The meaning of “Key point” is the importance and necessary condition for making the formulated Standards, Regulations and Guidelines.
H.E. Lim Sidenine commented that to function the project structure effectively, there is a need to add to the MPWT technical committee, two (2) deputy directors for the Port Department and the Railway Department.	Mr. Morihata mentioned that the main project focus is the field of road and bridge.
H.E. Lim Sidenine also commented as follows, - There are many Standards, Regulation and Guidelines in MPWT; however, it is very difficult to understand the contents of those documents because of English writing. Therefore, they must translate to Khmer language from English. - Concerning “Reasons lead to road damage ~ 21 points” prepared by MPWT technical committee. H.E. Yit Bunna agreed with the comments from H.E. Lim Sidenine that Standards, Regulation and Guidelines with English language in MPWT must be translated to Khmer language because there are not many MPWT staffs who can understand them. He added that the technical specification should be understood by the public. Therefore, he proposed for JICA support to create an internet forum or blog (online discussion site for public consultation) to disseminate regularly the output of the project to the public, so that interested professionals in the field can access to the information and provide their comments and recommendations on the posted output.	
Mr. Nakamura presented the documents regarding the outline of basic survey in MPWT.	H.E. Lim Sidenine requested the Cambodian counterparts reviewing the report of basic survey in MPWT that was conducted in December 2009 by JICA experts. H.E. Yit Bunna also comments on the basic survey in MPWT that it should look into the specific topic, for example, how to ensure quality control carried out by each department rather than the management issues in the Ministry as a whole.
Mr. Morihata highlighted that it is very important to get support from MEF for the sustainability of this project. Therefore, MEF was requested to join regularly not only in the EC meeting but also in the JCC meeting.	Person in charge of MEF mentioned that he just got documents in the meeting, so that he could not make any comments. H.E. Kem Borey mentioned that it is indispensable to have the cooperation and support of

	MEF for the project especially in sustainability and continuity in relation with the budget supporting.
The Meeting adjourned at 16:50 P.M.	

《Conclusion》

1. The project structure was approved by all EC members.
2. The concept of project activities was approved by all EC members.
3. The project work plan was approved by all EC members.
4. The outline of basic survey in MPWT was understood.

《Next Action Plan》

The EC Members	Project Team (Cambodian counterparts and Japanese experts)
The EC members will review the report of basic survey in MPWT that was conducted in December 2009 by JICA experts.	The project team will prepare the M/M not only in English version but also in Khmer version.
	The project team will set the 2nd Executive Committee Meeting by May 2010.
	The project team will set the 1st Joint Coordinating Committee Meeting by August 2010.

Chairman
the SCQCP Executive Committee Meeting

Representative of SCQC Project
Mr. Tadao Kuwano

The Minutes of the 2nd Executive Committee Meeting

Name of the Project	The Strengthening of Construction Quality Control Project
Place, Date and Time of the Meeting	(Place) MPWT Conference Room (Date) June 4, 2010 (Time) 09:10 ~ 11:30 A.M.
Kind of Meeting	The 2nd Executive Committee Meeting
Name of Chairman	H.E. Tauch Chankosal (Secretary of State, MPWT)
Attendees	(Committee Members) ▪ H.E. Yit Bunna (Under Secretary of State, MPWT) ▪ Mr. Nou Vaddhanak (Director, Road Infrastructure Department) ▪ Mr. Phy Lyda (Director, Heavy Equipment Center) ▪ Mr. Heng Rathpiseth (Deputy Director, Airport Construction Department) ▪ Mr. Shingo Morihata (Representative, JICA Cambodia Office) ▪ Mr. Huot Vathna (Deputy Director, Procurement Dept., MEF) ▪ Mr. Men Virort Vithiea (Representative of Ministry of Economy and Finance) ▪ Dr. Keo Leap (Director General, Public Works Laboratory) ▪ Mr. Ouk Chandara (Representative of Accounting and Finance Dept.) (Observer) Mr. Heng Salpiseth (Program Officer, JICA Cambodia Office) (Project Team) <The Cambodian Counterparts> • H.E. Kem Borey (Project Director) • Mr. Koun Bunthoeun (Project Manager) • Dr. Khun Sokha (Coordinator) • Mr. Samrangdy Namo (Coordinator) • Mr. Chao Sopheak Phibal (Technical Counterpart) • Mr. Kry Thong (Technical Counterpart) • Mr. Sok Pounnaraiy (Technical Counterpart) • Mr. You Dara (Technical Counterpart) • Mr. Uy Sophal (Technical Counterpart) • Mr. Phim Phirun (Technical Counterpart) • Mr. Meng Leang (Technical Counterpart) • Mr. Sang Sinaveth (Technical Counterpart) • Mr. Nin Menakak (Technical Counterpart) <The Japanese Experts> • Mr. Tadao Kuwano (Chief Adviser) • Mr. Kazuo Yumita (Leader/ Quality Control) • Mr. Masafumi Yamauchi (Contract Management) • Mr. Tatsuro Maeda (Material Testing) • Mr. Yoshihisa Noda (Pavement) • Mr. Tomohiko Nakamura (Geotechnical Engineering) • Mr. Kazuki Ishida (Project Coordinator)

Description of Discussion

H.E. Tauch Chankosal gave a welcome speech for all members attending the meeting. And he reminded the following points:

- JICA and MPWT had agreed to sign the agreement of SCQC project dated on 11th May 2009. Experts were dispatched from Japan from June 2009 by JICA, and the project aims to implement the project activities step by step. And this project life span is 3years and half from May 2009 to Oct 2012.
- The 1st EC Meeting was held on January 6, 2010 and the project purpose and activities were approved by the committee members.
- The project has been implementing 3 main activities with the Cambodian counterparts as follows:
  (1) Establishment of Standard Guidelines and Regulation of quality control
  (2) Preparation for training programs for the capacity building of engineers in MPWT and DPWT
  (3) Establishment of Database management system for completion documents

  Therefore, please cooperate and support to achieve the goals by both sides.
- The EC meeting has three (3) main duties; 1-is the establishment of project plan, 2- is the verification of the project activities and 3- is the evaluation of the progress report and find solution for the project.

H.E. Kem Borey also thanked all members in the meeting.

And he commented on the progress of the project as follows:

- The 5th project management meeting was held on May 21, between the Cambodian side and the Japanese side. And he understood that the project activities are in good progress.
- He informed that MPWT did not think about the Quality in the past. What we focused was the Quantity only because of not having enough money in MPWT. That's why MPWT made a proposal to request JICA for the assistance to the strengthening of construction quality control as well as to improve the capacity for construction maintenance and management.

Mr. Koun Bunthoeun gave a presentation on "Project Brief and Activities for Year 2010" as follows:

- Outline of the Project (Background/ Issues)
- Activities in year 2010
- Outcome in year 2010
- Pilot Project

  The implementation of the pilot project will start in 2011 after the completion of application of Standard Guidelines and Regulation, which the project team will have finished in July 2010.
- The project will dispatch three (3) engineers to Japan as C/P training program from July 2010.
- A national seminar will be held in 2010.

Mr. Chao Sopheak Phibal gave a presentation on "Task 1 (Output 1-1)" as follows:

- Plan in 2010
- Standard Guideline for MPWT force account project
  - ① Intensive Tests & New Design Concept
  - ② Daily Quality Control
  - ③ Nomination of Supervisory Party
  - ④ Improvement of Inspections
- Regulation
  - ① Project Formation
  - ② Role of Party A/B
  - ③ Role of Party C/D

④ Life Cycle Cost

⑤ Supervision Fee/ Design Change

In the past experiences of the international contracts, the supervision fee is within 10%~14%. However, the cost of supervision is proposed 2% in the exits standard guideline and regulation. Because the quality control process is quite critical. Therefore, the project team suggested for consideration whether it is possible to increase the supervision fee.

Mr. Meng Leang gave a presentation on "Task 2 (Output 1-2)" as follows:

- Condition of Laboratory
  - ① The work loads, and the kind of works
  - ② Daily activities
  - ③ Equipment (existing condition and plan)
- The improvement of test report

Mr. Samrangdy Namo gave a presentation on "Task 3 (Output 2)" as follows:

- Database management system
  - ① Scopes
  - ② Pre-work progress
  - ③ Tentative implementation schedule
  - ④ Plan
  - ⑤ Feature of the system

Mr. You Dara gave a presentation on "Task 4 (Output 3-1)" as follows:

- Previous activities
  - ① Review and analysis of current status of training in MPWT
  - ② Capacity gap assessment
- Current activities
  - ① Preparation of training program
  - ② Method of capacity improvement
- Next activities
  - ① Selection of training courses
  - ② Detail decision for training courses based on new standard guideline
  - ③ Planning of schedule for implementation

Mr. Uy Sophal gave a presentation on "Task 5 (Output 3-2)" as follows:

- Procedures of compilation of road structure drawings
- Status as of May 2010
- Plan in 2010

Mr. Nin Menakak gave a presentation on "Plan of Annual Technical Seminar in MPWT" as follows:

- Concept
- Components
- Field
- Reports and contents of reports
- Schedule and procedure of seminar

H.E. Tauch Chankosal agreed with the idea that the project relevant and entities documents and other documents, such as completion reports and as-built documents shall be provided to library and keep in the database for further use. And regarding to the quality of works, he mentioned that it is requires more budget for the improvement of the

quality control of road and bridge works. Therefore, he asked for comments and suggestions from the committee members, especially from representative of MEF.

Mr. Phy Lyda asked three (3) questions as follows:

- What does the slide “Flow of Activities on MPWT force account project on year 2010 and year 2011” means?
- What does the slide “Intensive Tests & New Design Concept” means?
- What does the contents of project formation means?

Mr. Chao Sopheak Phibal replied to the questions of Mr. Phy Lyda as follow;

- Upon the study and review the documents collected our task force has found that the basic design and detailed design for the Sub-base and Base Course have the same 200mm thickness in all soil types.
  Concerning to the proposed new design concept as shown on the slide, the detailed thickness could be altered based on the soil condition (result of CBR of sub-grade and traffic volume). For example on the slide, the basic design in swamp area the thickness of sub-base is 200mm while in the detailed design if CBR=3% or 4% the thickness of sub-base is 175mm and if the CBR>=5% the sub-base is 225mm without capping layer. This is new design scheme in reference to the TRL Oversea Road Note 31.

H.E. Kem Borey added to respond to the questions of Mr. Phy Lyda as follow:

- MPWT will continue implementing this plan until next year, and follow the Four Party System for the force account project.
- He informed that he is preparing a letter of planning or recommendation for the Flow of Activities on MPWT force account project of next year in June 2010, and he will send to the implementation units.
- In regard to the Intensive Tests & New Design Concept, MPWT will not follow the old design method, it means, MPWT will accept the new design concept which is offered by the project team.
- In response to the QA/ QC, we should conduct one more study research before the construction activities start.

Mr. Yoshihisa Noda explained in relation to the questions of Mr. Phy Lyda as follows:

- It represents and shows the cycle of activities of year 2010 and 2011.
- Regarding the basic design, it will be done based on the geographical condition, and in case of detailed design, actual soil investigation result will be taken into account.

Mr. Masafumi Yamauchi also explained as follows:

- According to his experiences, the key for quality in construction is capable engineers, which means Party C. In this sense, project team recommended the Four Party System in force account project to have clear-cut and no compromise for quality between executor Party B and supervisor Party C.
  Three important points are:
  ①□Party C leads project team in order to achieve good quality works.
  ②□Party C shows the way for quality control to project team, which is in fact provided in the standard guideline.
  ③□Party C acts as an engineer in international project specified in FIDIC. He has every authority to manage the works and at the same time carries heavy responsibility for the works, particularly in quality.

Mr. Shingo Morihata thanked to all members and the Cambodian counterparts, and gave some comments as follows:

- He was clear with the project activities due to the presentation of the Cambodian counterparts.
- The tasks in this project are hard, but it has shown that the project is making results step by step with cooperation between the Cambodian side and the Japanese side.
- He appreciated the Cambodian side for having allocated the counterparts and always strongly supporting the project. Therefore, the project is getting better than previous stage. And he requested the Cambodian side to continuously cooperate and support the project because the activities of year 2010 and 2011 are the key sole of

achievement of the project goal, especially the implementation of the pilot project in year 2010 and 2011.
In addition, he mentioned that the Cambodian counterparts should concentrate on their responsible in the project, and requested the MPWT must give a priority to activities of the project for the Cambodian counterparts.

H.E. Yit Bunna asked following the questions:

- In the project formation, who shall control or check the action of party C?
- Why don't we consider the traffic count for the designing of road formation?
- Why is the design showing base course so thick?
- How can we sustain the database management system as well as the structure of library?

Mr. Masafumi Yamauchi responded as follows:

- Party C should have enough knowledge and capability in engineering and construction. In the formation, Party A and party D could check or control the action of party C.
  The project team will provide training to the staff of RID, PWRC and others for the improvement of their knowledge and capability in engineering and construction.
- Scope for consultant in international project is usually detailed design and supervision during construction.

Mr. Yoshihisa Noda replied as follows:

- The project team found that the traffic volume in the rural area was very minimal in the old survey data. However, we have no intention to ignore the traffic count since the activity of traffic count has been clearly shown in the Flow of Activities on MPWT Force Account Project in the presented material. So, we will describe more details in terms of the traffic count for the detailed design in the guideline.
- The borrow pit for the sub-base course material should be found near the project site to minimize the construction cost. The table is just introducing the conversion procedure from sub-base and capping layer to base course in case the sub-base and capping layer materials cannot be found in the borrow pit. The converted thickness of the base course is less than the original total thickness of the sub-base and capping layer considering the coefficient values of each soil.

H.E. Kem Borey add to the explanation as follows:

- Basically, he agreed to put a project formation, a role of Party A to D, a life cycle cost and a supervision fee into the new regulation.
  However, it is important that we consider the traffic count which H.E. Yit Bunna recommended for the designing of road formation.
- He wondered who will be assigned in Party A to D, and one important thing of the project formation is how to consider the function of Party D and access the Party B and C.

H.E. Yit Bunna commented as follows:

- He requested that the project team should support to the provision of laboratory equipment and improvement for not only the capability of staffs but also the working procedure and system (test report, test procedure etc.) in the MPWT laboratory.

Mr. Yoshihisa Noda replied as follows:

- According to the laboratory system (test report, test procedure etc.), we will include in the established Standard Guidelines and Regulation after the discussion with the Cambodian counterparts in the project team.

H.E. Tauch Chankosal commented and asked the representative of MEF as follows:

- Though we have a lot of responsibility in the project, it seems difficult to achieve the activities without enough budgets. Therefore, he asked for some idea on how to increase the budget for special project.

Representative of the Ministry of Economic and Finance answered as follows:

- He understood that there are many complaints about the quality of road work; therefore, he totally agreed with

the purpose and activities of this project.

- He supposed that new standard guideline and regulation shall be applied to the practice at site.
- He agreed that the amount allocated for the supervision is small and may not sufficient. He might discuss with his colleague and MEF's senior management for the possibility of increasing the supervision fee in order to ensure better quality of works.

H.E. Tauch Chankosal commented as follows:

- He will request for more support and help from MEF for the sake of getting better in quality of road and bridge in Cambodia in the future.
- The MEF will support and help the project with the improvement of QC system.

Mr. Kazuo Yumita conformed the project schedule as follows:

- The 1st draft of standard guideline and regulation will be finished in the middle of June 2010.
- After discussion of contents of the 1st draft of standard guideline and regulation, it will be finalized within July.
- The 3rd EC meeting will be held in August to get the approval of the final draft of standard guideline and regulation by the committee members.
- We hope the 1st Joint Coordinating Committee Meeting will be held in September.

H.E. Tauch Chankosal expressed his sincere thanks in the closing address to all participants.

Mr. Koun Bunthoeun appreciated the chairman, committee members and the project counterparts for their cooperation and good results.

The Meeting adjourned at 11:30 A.M.

Conclusion

- ◆ The project brief and activities for year 2010 was approved.
- ◆ The project activities of Output 1~3 up to date were approved.
- ◆ The project schedule was approved.

Next Action Plan

- ➢ The project team will finish the final draft of standard guideline and regulation before the 3rd Executive Committee Meeting is held.
- ➢ The project team will prepare the M/M not only in English version but also in Khmer version.
- ➢ The project team will set the 3rd Executive Committee Meeting in August 2010.
- ➢ The project team will set the 1st Joint Coordinating Committee Meeting in September 2010.

Approved by :

H.E. Tauch Chankosal	Mr. Tadao Kuwano
Chairman	Chief Adviser
SCQCP Executive Committee Meeting	Representative of SCQC Project

The Minutes of the 3rd Executive Committee Meeting

Name of the Project	The Strengthening of Construction Quality Control Project
Place, Date and Time of the Meeting	(Place) MPWT Conference Room (Date) September 1, 2010 (Time) 08:40 A.M. ~ 11:10 A.M.
Kind of Meeting	The 3rd Executive Committee Meeting
Name of Chairman	H.E. Tauch Chankosal (Secretary of State, MPWT) H.E. Lim Sidenine (Secretary of State, MPWT)
Agenda	➢ Progress Report (June ~ August) ➢ Explanation of the 1st edition of Standard Guideline and Regulation for Force Account Project ➢ Others ➢ Discussion/ Comments
Attendees	(Committee Members) ▪ H.E. Yit Bunna (Under Secretary of State, MPWT) ▪ H.E. Phy Sophort (Deputy Director General, Public Works) ▪ Mr. Nou Vaddhanak (Director, Road Infrastructure Department) ▪ Mr. Kang Phirith (Deputy Director, Heavy Equipment Center) ▪ Mr. Hou Makara (Representative, Airport Construction Department) ▪ Dr. Keo Leap (Director General, Public Works Laboratory) ▪ Mr. Phim Phirum (Representative, General Inspectorate) ▪ Mr. Men Viort Vithiea (Representative of Ministry of Economy and Finance) ▪ Mr. Keo Sokhann (Representative of Ministry of Economy and Finance) ▪ Mr. Shingo Morihata (Representative, JICA Cambodia Office) ▪ Mr. Heng Salpiseth (Representative, JICA Cambodia Office) (Observer) ◆ Mr. Atsushi Fujii (Expert, MPWT) (Project Team) <The Cambodian Counterparts> • H.E. Kem Borey (Project Director) • Dr. Khun Sokha (Coordinator) • Mr. Samrangdy Namo (Coordinator) • Mr. Chao Sopheak Phibal (Technical Counterpart) • Mr. Kry Thong (Technical Counterpart) • Mr. Sok Pounnaraiy (Technical Counterpart) • Mr. Uy Sophal (Technical Counterpart) • Mr. Hum Vuthy (Technical Counterpart) • Mr. Phy Ratha (Technical Counterpart) • Mr. Sang Sinaveth (Technical Counterpart) • Mr. Nin Menakak (Technical Counterpart) <The Japanese Experts> • Mr. Tadao Kuwano (Chief Adviser) • Mr. Kazuo Yumita (Leader/ Quality Control) • Mr. Masafumi Yamauchi (Contract Management) • Mr. Kazuki Ishida (Project Coordinator)

Description of Discussion
H.E. Tauch Chankosal gave a welcome speech for all members attending the meeting. And he reminded the agenda.
Dr. Khun Sokha, the Cambodian counterpart, gave a presentation on the Progress Report during June to August as follows: - Task 1 (Establishment of Standard Guidelines & Regulation) (1) Confirmation of Party A, B, C and D system for QC (2) Preparation of draft Standard Guideline and Regulation (3) Explanation to related parties and provincials & acceptance of comments (4) Selection of the pilot project - Task 2 (Improvement of the Laboratory equipment) (1) Analysis of capability for the equipment & information of procurement plan (2) Formulation of format for materials, inspection sheets and etc. - Task 3 (Establishment of Database management System for completion documents) (1) Inputting and scanning the data drawing (2) Data programs and connection to the present network - Task 4 (Technical training program for QC and Counterpart training in Japan) (1) Conducting the capacity gap assessment (2) Confirmation of counterpart training program in Japan (3) Implementation of counterpart training in Japan - Task 5 (Preparation work for the compiling the road and structure standard drawings) (1) Collection and analysis for road structure drawings
H.E. Yit Bunna asked two (2) questions as follows: - According to Task 1, the project team already has selected the five (5) pilot projects. However, he is not clear why and how the project team selected those five (5) pilot projects. - According to Task 3, the project team had already prepared the completion documents relevant to the building of the Database Management System in the library, and how many data had the project team already prepared? And how many dates will it being prepared in the future?
Mr. Yumita replied as follows: - The project team will observe the pilot projects within this year. It means that we would like to observe what kind of guideline, technical standard and specification which as used at the construction site. Therefore, we will observe, evaluate and analyze the progress work until the end of this year, and we will implement the pilot projects from next year applying the new Standard Guideline and Regulation. - Regarding the building of the database management system, the project team already finished 8,000 more data from the completion documents. In addition, we will plan to prepare 1,000 data more for the building of the Database Management System.
Mr. Yamauchi replied as follows: - According to observation of the pilot projects which we selected, the Provincial Road 118 is approximately 80% finished the construction work, and National Roads 7 & 155 are already done completely and a final report will be made shortly.
H.E. Yit Bunna suggested as follows: - He supposed that the draft and CD-ROM were already sent to all DPWT and relevant departments in MPWT but their comments and feedback are not enough, especially the technicians in DPWT and MPWT. Therefore, he would request that the project team upload the draft of Standard Guideline and Regulation onto the MPWT's website for receiving comments and feedback from users.
H.E. Tauch Chankosal mentioned as follows: - We shall reconsider uploading the draft of Standard Guideline and Regulation onto the MPWT's

Website because it is still in the drafting stage.

Mr. Yamauchi mentioned as follows:

- This is one of idea for a public relation method for the Standard Guideline and Regulation. However, he thinks that we should upload the draft of Standard Guideline and Regulation onto the MPWT's Website after it is approved by the JCC meeting in October 2010.

H.E. Yit Bunna mentioned as follows:

- Concerning the uploading of the documents onto the website, for example, when the Transport Sector of the government always produces the draft of documents, they upload onto the website for collecting some recommendations from outside because we sometimes cannot find any mistakes by ourselves.

H.E. Kem Borey mentioned as follows:

- Regarding the suggestion form H.E. Yit Bunna, we have three (3) responsible parties: the Project Team, the Executive Committee and the Inter-ministries Committee.
  Therefore, after the Executive Committee agrees to the draft of Standard Guideline and Regulation as a second responsible party, we will send the documents to relevant ministries and institutions such as the Ministry of Rural Development, the Engineering Institute of Cambodia, the Board of Engineers in Cambodia and others. Then we will go to a next step.
  After we receive the official agreement for new Standard Guideline and Regulation from the Inter-ministries committee, we usually will use a public method to get some comments and criticisms from general users. This is a common practice of our new Standard Guideline and Regulation

Mr. Yamauchi mentioned as follows:

- He quite agreed with the opinion of H.E. Kem Borey. We will discuss in the project team with the Cambodian counterparts at first and the new Standard Guideline and Regulation will be announced if it is approved by the JCC meeting.

Mr. Nou Vaddhanak requested as follows:

- Regarding the Standard Guideline and Regulation prepared by the project team, it is not new for us because almost all MPWT staff is used to those kinds of standard guidelines and regulations during a construction work with the World Bank or other donors.
  However, those standard guidelines and regulations were limited for the implementation of construction work because of a lack of budget for testing and follow up on the project.
- He would like to request to confirm the location of the pilot projects in 2011 because RID or HEC will inform to DPWT so that they can prepare their staff and equipment to implement the pilot projects.

H.E. Tauch Chankosal mentioned as follows:

- We will discuss more details in the pilot projects again after the JCC meeting. However, we should confirm to the EC members that the project team will observe and collect the information from pilot projects in 2010 and will implement the construction work at the pilot projects, applying new Standard Guideline and Regulation in 2011.
- The Cambodian side (MPWT) must make a plan to the specific work activities that we will do in 2011 at first. The project team will select the pilot projects the following MPWT's work activities plan.

H.E. Kem Borey mentioned as follows:

- The period of SCQC project is from 2009 until 2012. The project team has already prepared the draft of Standard Guideline and Regulation, and implemented the observation and inspection at the project sites.
  Therefore, we will be able to select for relevant departments or locations the pilot projects in 2011 after receiving the approval from the JCC members in October 2010.
  In addition, we also will be able to compare what we did in the past and what will be needed if the construction works applying new Standard Guideline and Regulation will be implemented.

- The project team will discuss or negotiate with MEF as the project team wishes that new Standard Guideline and Regulation should be implemented in 2012.

Mr. Chao Sopheak Phibal, the Cambodian project counterpart, gave a presentation on the Standard Guideline as follows:

- Flow of activities on MPWT Force Account Project
- Intensive Tests & New Design Concept
- Daily Quality Control
- Documentation for Improvement (check-list)
- Improvement of Inspections
- Issues to be tackled

H.E. Tauch Chankosal mentioned as follows:

- If we implement new Standard Guideline, we should consider to four(4) points as follows:
  (1) Whether MEF accepts the content of new Standard Guideline.
  (2) How about a budget if we apply to new Standard Guideline?
  (3) How about a budget for inspector?
  (4) How to make a structure for the implementation system.

Mr. Men Viort Vithiea, representative of MEF replied as follows:

- MEF agreed on the flow of activities on MPWT force account project.
- It is different between the estimation in the Standard Guideline and the real situation because we use old machinery in Cambodia. Therefore, he would like to request to review the Standard Guideline in MPWT.
- In addition to a QC construction, a person of quality should be found to implement the construction works.
- Regarding the budget for an inspector, they should prepare the implementation system because it cannot include a salary for it.

H.E. Tauch Chankosal mentioned as follows:

- The category of budget for an inspector is supplemental to the mission but we have to spend a long time for this mission. So what should we do and what item should we include in the budget according to the inspection work and testing?
- When he had a meeting with Mr. Chan Sothy, he suggested separating the budget for the inspection work from another work. Therefore, we will prepare another salary for the inspector if MEF agrees.
- He would like to request that all members in the EC meeting should review the standard documents whether it is correct or not. Because translators sometimes cannot find the mistake by themselves.

H.E. Lim Sidenine mentioned as follows:

- According to the translation of new Standard Guideline and Regulation, it should be discussed again after the 1st JCC meeting.
- We will revise the new Standard Guideline and Regulation through the evaluation of pilot projects as we still have a problem with the supervision.

H.E. Yit Bunna suggested as follows:

- He suggested that the project team will make a technical translation group for the translation of new Standard Guideline and Regulation.
- Regarding the supervision, we should prepare the internal and external inspection for a double check system.

H.E. Lim Sidenine mentioned as follows:

- Concerning the internal and external inspection, we are just starting to implement it as a first step. He thought we will consider the external inspection as a next step.

Mr. Nou Vaddhanak mentioned as follows:

- Concerning the supervision, for example, it cost more than US $ 3 million for supervision

excluding transportation fare and others in NR 1. In addition, seventy-five projects necessary to the budget every year from MEF. Therefore, it is difficult to agree about the internal and external supervision.

H.E. Tauch Chankosal mentioned as follows:

- The project team will decide the sites of pilot projects in 2011 and they will show us what is problem and how to implement construction work.
  According to those results from the project team, we will discuss with MEF.
- Concerning the translation of new Standard Guideline and Regulation, we will respect the project activities plan and it will be translated by the Cambodian counterpart in the project team.

Mr. Samrangdy Namo, the Cambodian counterpart, gave a presentation on the regulation for Force Account project as follows:

- The 1st draft of Standard Guideline and Regulation started from March 2010 and finished in June 2010.
  We already sent these documents to Pursat, Kandal, Phnom Penh and Kampong Cham directly by the project team. Other DPWTs were sent by mail from PWRC. As a result, the project team did not receive a lot of comments or the advice from each DPWT but we had received some comments from DPWT during the seminar on the explanation of Standard Guideline and Regulation on August 27.
- According to the above these circumstances, he gave a presentation on the Regulation for Force Account project.
  1) Basic survey and design
  2) Preliminary cost estimate
  3) Negotiation
  4) Budget confirmation
  5) Detailed survey and design
  6) Detailed cost estimation
  7) Final negotiation
  8) Contract
     (1) Formation in Project Implementation
  9) Implementation
     (1) Subcontract
     (2) Contract documents and As-build
     (3) Unforeseen Physical Conditions
     (4) Programme, Progress and Meeting
     (5) Quality control
     (6) Stop order and suspension
     (7) Extension of time
     (8) Inspection (interim/ completion/ warranty)
     (9) Variations
     (10) Payments
     (11) Force majeure

H.E. Tauch Chankosal mentioned as follows:

- We already agreed about the formation in project implementation (Party A, B, C and D) and their functions. When we had an unofficial discussion with the MEF, they suggested that Party C (supervisor) should be an independent unit. And according to the discussion with the MEF, he discussed with H.E. Lim Sidenine and they considered that the PWRC will take a responsibility for maintenance and inspection and RID will take a responsibility for management. However, we will discuss this matter continually.
- Regarding the cost estimation, MEF will not be able to provide 100% of budget and to keep 10% budget for defection to Party B because Party B is a non-profit unit. So, how can they do

construction work with 90% of a budget? - If the social circumstance change (jump in prices etc.) during the implementation of the projects, how will they continue the implementation of project?
H.E. Kem Borey mentioned as follows: - According to the budget, not only the project team but also MPWT should continue to discuss with MEF because of the achievement of our goal. - According to the word of "Force Account Project", he would like to consider that the word of "Force Account Project" would be better in the Khmer language equivalent of "government agency". - According to Party D on the formation in project implementation, we are recommending an organization such as PEAC or General Department of Inspection in MPWT as an inspector in Party D, but we should discuss which organization is the best as Party D.
H.E. Kem Borey asked to the representative of JICA as follows: - He would like to reconfirm the cost sharing between MPWT and JICA about implementation of the pilot projects.
Mr. Morihata replied as follows: - According to the cost sharing between MPWT and JICA, the both sides already decided on the Minutes of the meeting on May 11, 2009. It means that JICA will prepare the business trip expenses (accommodation, daily allowance, transportation) and other necessary expenses, except construction costs for the pilot projects.
H.E. Tauch Chankosal suggested as follows: - Before we will implement the pilot projects, we should make a list of cost sharing about the pilot projects, which items will be from the national budget of MPWT or the budget from JICA.
The Meeting adjourned at 11:10 A.M.
Conclusion
◆ The 1st edition of Standard Guideline and Regulation was accepted by the Executive Committee. ◆ The activities plan concerning the pilot projects was accepted. ◆ The contents of the 1st edition of Standard Guideline and Regulation will be discussed in the 1st JCC meeting.
Next Action Plan
➢ The project team will set the 1st Joint Coordinating Committee Meeting in October 2010. ➢ The project team will prepare the list of pilot project sites on 2011 as soon as possible. ➢ The project team will prepare the list of cost sharing between the Cambodian side and the Japanese side.

Approved by :

H.E. Tauch Chankosal Chairman	Mr. Tadao Kuwano Chief Adviser
SCQCP Executive Committee Meeting	Representative of SCQC Project

Minutes of Meeting
The 4th Executive Committee Meeting

1. Date : December 9, 2010
2. Place : MPWT Conference Room
3. Agenda :(1) Opening Remarks by H E. Tauch Chankosal
   (2) Presentation
   - Progress of the project (Mr. Koun Bunthoeun)
   - Plan of the Pilot Project (Mr. Chao SopheakPhibol)
   - Training of Trainers and Pilot Training (Mr. Samrangdy Namo)
   - Standard Drawing (Mr. Hum Vuthy)

   (3) Discussion and Others
   (4) Closing
4. Attendance :

- President
  - H.E. Tauch Chankosal (Secretary of State)
- Permanent Members
  - H.E. Yit Bunna (Under Secretary of State)
  - Mr. Sou Sounthera (Representative of Mr. Phy Lyda, Director of HEC)
  - Mr. Hou Makara (Representative of Director of ACD)
  - Mr. Shingo Morihata (Representative of JICA Cambodia Office)
- Members
  - Mr. Khun Srun (General Director, Public Works Laboratory)
  - Mr. Uy Sophal (Representative of Department General Inspectorate)
  - Ms. Nong Chandany (Ministry of Economic & Finance)
  - Mr. Dary Chetana (Ministry of Economic & Finance)
  - Mr. Keo Sokhann (Ministry of Economic & Finance)
  - Mr. Touch Borann (Ministry of Economic & Finance)
- Others
  - Mr. Seng Hong (PWRC, MPWT)
  - Mr. Heng Salpiseth (JICA Cambodia Office)
  - Mr. Akira Fuwa (JICA Senior Volunteers)
- SCQC Project

Project Director	H.E. Kem Borey	(Director General of Public Works)
Project Manager	Mr. Koun Bunthoeun	(Director of PWRC)
Coordinator	Dr. Khun Sokha	(Deputy Director of PWRC)
	Mr. Samrangdy Namo	(Deputy Director of PWRC)

Cambodian Counterparts

Mr Chao Sopheak Phibal Mr. Sok Pounnaraiy

Mr. You Dara	Mr. UySophal
Mr. Hum Vuthy	Mr. Phy Ratha
Mr. MengLeang	Mr. Sang Sinaveth
Mr. Nin Menakak	

JICA Experts

Mr. Tadao Kuwana	Mr. Kazuo Yumita
Mr. Mamoru Izawa	Mr. Tatsuro Maeda
Mr. Kazuki Ishida	

I. Opening Remarks

H.E. Tauch Chankosal gave a welcome speech for all members attending the meeting. And he reviewed the agenda.

II. Presentation

Mr. Koun Bunthoeun explained about the progress of the project as follows:

- Activities in year 2010
- Monthly progress about Task 1 to Task 5.

Mr. Chao Sopheak Phibol explained about the Plan of the Pilot Project in year 2011 as follows:

- Objectives
- Candidates for the pilot project
- Formation of candidates of the pilot project
- Document preparation
- Foreseen problems

Mr. Samrangdy Namo explained about the Training of Trainers and Pilot Training as follows:

- Objective and contents of the training of trainers
- Objective, implementation and analysis of each participant's evaluation of the pilot training

Mr. Hum Vuthy explained about the progress of Bridge and Road Structure Standard Drawing as follows:

- Result of collection of as-built drawings
- Schedule of preparation on standard drawing
- Answer of questionnaire on standard drawing
- Contents of standard drawing
- Sample of standard drawing on pipe culvert

III. Question and Comments

H.E. Yit Bunna gave questions and comments as follows:

- Dissemination of Standard Guideline & Regulation is not enough. And they are not uploaded onto the MPWT's website.
- Regarding the Training of Trainers (TOT), he suggested that the project team should be

implemented not only in Kandal province but also in other provinces as the first step.

- The laboratory checking list should be shared with both constructor and inspector during The construction.
- The project team should select the contents of Standard drawing and make a draft first of all. In addition, it must be uploaded onto the MPWT's website.
- The database management system should be revised because it is easy for all users to operate.

Mr. Koun Bunthoeun replied to the questions from H.E. Yit Bunna as follows:

- Regarding the dissemination of Standard Guideline & Regulation, he agreed with the comment from H.E. Yit Bunna. In the present state of affairs, the project team is waiting for the signature of approval from the Minister, and after receiving it we will start the public relations for Standard Guideline & Regulation.
- He agreed with the comment from H.E. Yit Bunna that the implementation of the pilot training should be in other provinces as many as possible.
- The project team has planned to submit the laboratory checking list to both parties after receiving the signature of approval from the Minister.
- Regarding the comment from H.E. Yit Bunna about the Standard drawing, he totally agreed with him.

Mr. Samrangdy Namo answered the question from H.E. Yit Bunna about the database management system as follows:

- The design of database management system had already been set up and JICA had provided one (1) PC and two (2) servers to the project. Therefore, after the data is installed in the two (2) servers, we will start the training program on how to use the database management system for users.

  Anyway, we will consider revising the program of database management system after we analyzed the evaluation of the training.

H.E. Tauch Chankosal suggested as follows:

- MEF shall review and make a decision on the budget of four (4) pilot projects.
- The project team should prepare and distribute it to the relevant sections in MPWT, to receive some comments and advices from them. In addition, the project team should consider which standard will use AASHTO or AUSTROAD for making the bridge and road structure standard drawing in the project because some roads and bridges in Cambodia were constructed by using AASHTO.

H.E. Kem Borey mentioned as follows:

- The pilot project will be implemented from January 2011 because all projects to be implemented by using the national budget should start from January 1, 2011. However, one (1) in four (4) pilot projects is still not cleared.
- The budget for the pilot project is classified into two categories; one is the national budget
- for the construction of roads and bridges, and the other is the project budget for inspection, survey and testing in the project site.

- According to the project budget, the Cambodian side already had requested at the 1st JCC meeting to provide full support to JICA for inspection, survey and testing in the project site.

Mr. Shingo Morihata replied as follows:

- Concerning budget for the pilot project, in conclusion, JICA will not be able to provide the budget for implementing the pilot project. However, we may provide the budget for the business trip (daily allowance, accommodation and transportation) between Phnom Penh and the pilot project sites. Therefore, MPWT should prepare the national budget for implementing the pilot project not only for construction of roads and bridges but also for the inspection, survey and testing in the project sites.

  In addition, JICA expect that MPWT will response promptly about the budget for implementing the pilot project and implement the pilot project according to the existing plan.

Mr. Kazuo Yumita gave additional comments as follows:

- The project team would like to request the acceptance on the activities plan, formation and sites of pilot project in year 2011 from all members in today's EC meeting. And after the project team accepted our plan in this meeting, we will start the preparation for the construction plan, detail design and the cost estimation for all expenses in the pilot project, especially, the allocation of full-time supervisors and material testing fee.

Mr. Mamoru Izawa gave some comments about Task 5 as follows:

- The load is the difference of 25% between AUSTROAD and AASHTO. Actual safety factor of existing bridges are kept from 2.5 to 3.0, and even 44-ton loading vehicles pass on the bridges, they will not deform. In addition, 80% of bridges in Japan applied equivalent AASHTO, though they are not reinforced.

H.E. Yit Bunna threw some questions as follows:

- Has the project team already prepared the format of laboratory checking list, and if it is done already, had the project team collected some comments about the laboratory checking list from the public?

Mr. Kazuo Yumita answered as follows:

- The laboratory checking list includes the 1st edition of Standard Guideline and Regulation, and the project team have planned to use it during implementation of the pilot project. Therefore, after using it, the project team will analyze, evaluate and revise it.

  Moreover, Mr. Maeda already had discussed and commented it with the laboratory staffs.

Representative of the MEF gave comments as follows:

- Concerning the tentative schedule of pilot project, it will be implemented from March to September. However, these terms are not good timing because of the rainy season in Cambodia. Therefore, we had better reconsider the implementation term for the pilot project.
- Concerning the database management system, will this system link to the RAMP (Road Asset Management Plan) project or not?

Mr. Kazuo Yumita answered as follows:

- This tentative schedule of pilot project is only a rough one. Therefore, the project team will prepare the realistic implementation plan for the pilot project with all matters considered.

Mr. Samrangdy Namo answered as follows:

- The contents of database management system is systematized for old documents like as-built drawing, study documents, contract documents and other related to the force account projects. On the other hand, the purpose of RAMP project are the planning formulation, procurement of private contractor, implementation of site work for road maintenance on 1-digit and 2-digit National Roads, and also capacity development programs for MPWT staff.

  Therefore, the contents are quite deferent between our database management system and RAMP project.

H.E. Tauch Chankosal summed up their main points in conclusion as follows:

- JICA will not be able to support the full budget for the implementation of pilot projects. Therefore, he requested that MEF should review and make a decision about budget for the four (4) pilot projects.
- He hoped the Training of Trainers (TOT) program for all staffs in MPWT and DPWT will be able to conduct, though we may not have enough time. Therefore, the project team should select the staffs in MPWT and DPWT.
- The project team will remake the realistic implementation plan for pilot project.
- We will be able to compare which is better for the implementation way between the use of the new standard guideline and regulation and the use of the old one about the amount of construction budget.

The Meeting adjourned at 17:00 P.M.

Approved by:

H.E. Tauch Chankosal Chairman SCQCP Executive Committee Meeting	Mr. Tadao Kuwano Chief Adviser Representative of SCQC Project

Minutes of Meeting
The 5th Executive Committee Meeting

1. Date : August 4, 2011
2. Place : MPWT Conference Room
3. Agenda :1) Opening Remarks by H E. Tauch Chankosal
   :2) Presentation
      (1) Progress of the project
         - General (Mr. Koun Bunthoeun)
         - Output 1-1 (Mr. Chao SopheakPhibol)
           (Mr. Chan Somardy)
           (Mr. Pou Manith)
           (Mr. Hum Vuthy)
         - Output 3-1 (Mr. Sang Sinaveth)
         - Output 3-2 (Mr. Nin Manakak)
      3) Discussion and Others
      4) Closing
4. Attendance :

- ❑ President
  H.E. Tauch Chankosal (Secretary of State)
- ❑ Vice President
  H.E. Lim Sidenine (Secretary of State)
- ❑ Permanent Members
  H.E. YitBunna (Under Secretary of State)
  Mr. Nay Chamnang (Representative of RID)
  Mr. Phy Lyda (Director of HEC)
  Mr. Heng RathPiseth (Director of Sub-national Public Infrastructure and Engineering)
  Mr. Masahiko Egami (Representative of JICA Cambodia Office)
- ❑ Members
  Mr. Khun Srun (General Director, Public Works Laboratory)
  Mr. Uy Sophal (Representative of Department of General Inspectorate)
  Mr. Ou Sophal (Accounting and Finance Department)
  Mr. Huot Vathna (Deputy Director of DPP, MEF)
  Mr. Dary Chetana (Chief, DIC, MEF)
  Mr. CheaSengyi (Chief, MEF)
  Mr. Ream Utdom (Deputy Chief, DIC, MEF)
  Mr. Phat Kong (Division officer, MEF)
  Mr. Rou Vitta (Division officer, MEF)
  Mr. Tong Rithy (MEF)

- ❑ Others
  - Mr. Akira Fuwa (JICA Senior Volunteers)
- ❑ SCQC Project

Project Director	H.E. Kem Borey	(Director General of Public Works)
Project Manager	Mr. Koun Bunthoeun	(Director of PWRC)
Coordinator	Dr. Khun Sokha	(Deputy Director of PWRC)
	Mr. SamrangdyNamo	(Deputy Director of PWRC)

Cambodian Counterparts

Mr Chao Sopheak Phibol	Mr. Uy Sophal
Mr. Hum Vuthy	Mr. Phy Ratha
Mr. Laing Onit	Mr. MengLeang
Mr. Sang Sinaveth	Mr. Nin Menakak

JICA Experts

Mr. Tadao Kuwana	Mr. Masafumi Yamauchi
Mr. Kazuo Yumita	Mr. Mamoru Izawa
Mr. Tatsuro Maeda	Mr. Kazuki Ishida

I. Opening Remarks

H.E. Tauch Chankosal gave a welcome speech for all members attending the meeting. And he reviewed the agenda.

II. Presentation

Mr. Koun Bunthoeun explained about the progress of the project as follows:

- Activities in year 2011
- Monthly progress about Task 1 to Task 5.

Mr. Chao Sopheak Phibol explained about the Plan of the Pilot Project (NR 71) as follows:

- Objectives
- Pilot project information
- Scope of works
  - Sections cut for repair and diagram
- Parties involved in the project
- Initial scope of work, visit and supervision
  - Office & Site visit (soil investigation)
  - Initial and detailed pavement design structure
  - Task schedule
- Problems and challenges

Mr. Chan Somardy explained about the Plan of the Pilot Project (NR 71) from the point of view of Party Bas follows:

- General
  - Location map

        - Reference
        - Organization chart
        - Brief report
    - Laboratory and Road design
        - Soil investigation
        - Summary of test results
        - Road design
        - Topography
        - Cross section

Mr. Pou Manith explained about the Plan of the Pilot Project (NR 71) from the point of view of Party C as follows:

- Role & Responsibilities of Party C
- Four (4) kinds of contract documents
    - Construction plan
    - Cost of construction works
    - Cost of test
    - Cost of supervision
- Project location
- Quality control
    - Structure
    - Quality control documents
        1) Quality control chart
        2) As-built measuring control chart
        3) Forms for quality control
        4) Forms for as-built measurement control

Mr. Hum Vuthy explained about the Plan of the Pilot Project (NR 110) as follows:

- Project organization
- Project location
- Soil investigation
- New pavement design
- New standard of contract documents

Mr. Sang Sinaveth explained about Output 3-1 (TF-4) activities as follows:

- Pilot Training in Kampong Cham
- Annual Technical Report & Seminar

Mr. Nin Menakak explained about Output 3-2 (TF-5) activities as follows:

<Bridge and Road Structure Standard Drawing>

- Schedule of preparation
- Procedure of checking Standard drawing
- Collection of comments from directors and staffs
- Progress of compiling Standard Drawings on pipe and box culverts
- Progress of compiling Standard Drawings on bridge
- Contents

- Selection of structure
- Sample of Standard Drawings

III. Question and Comments

H.E. Tauch Chankosal gave comments as follows:

- It is satisfied with progress of the project.
- Concerning the pilot project, it should be surveyed and/or reconfirmed about detail budget of the pilot project before submitting it to the MEF.
- Concerning the Standard Drawings, it should be made into not only a short-span bridge like the Hollow Slab Bridge and PCDG but also a long-span bridge.
- Concerning the location of library, we have discussed with the Minister about this matter and we have planned to move from the present location to the first floor at a new building after the complete construction of the new building in MPWT.
- Concerning the Training of Trainers program (TOT), we requested the project to continue conducting the TOT from the point of view of the human development in MPWT.

The representative of the MEF inquired as follows:

- Concerning Party C for National Rd 71 and National Rd 110 as a pilot project, there are two (2) deferent departments, Rd 71 is RID and Rd 110 is PWRC.
  Why is it not possible to combine the RID with PWRC as Party C due to the reduction of their budget?
- Concerning the scope of work in National Rd 71, the initial project cost was 1,172,000,000 Riels and the detailed cost estimate is 1,650,000,000 Riels.
  Why is there a different cost between the Initial project cost and the detailed cost estimation?
  And if the road construction cost exceeds the estimation during the initial stage, can we reduce the maintenance cost after the completion of the road construction?
- When will the MPWT implement the evaluation on the road condition between the road constructed as a pilot project and the previous construction?

Mr. Koun Bunthoeun replied to the questions from the representative from the MEF as follows:

- Because it is from the point of view of the human development capacity building and MPWT staffs do not have enough experience about the construction management for the quality control.

H.E. Kem Borey also replied to the questions from the representative of the MEF as follows:

- Their job responsibilities and roles of each department in MPWT have not been defined. Therefore, we would like them to experience the construction management for the sustainability of quality control of construction.
- The National Rd 71 and Rd 110 are a special project because we are following the contents of the 1st edition of Standard Guidelines and Regulations which our project developed. Therefore, it was the first experience for us to make the contract documents following contents of the 1st edition of Standard Guidelines and Regulations.
- If the construction cost exceeds the estimation during the initial stage following the contents of the 1st edition of Standard Guidelines and Regulations, the maintenance cost after completion of road construction will be reduced.

Mr. Masafumi Yamauchi mentioned about related questions from MEF as follows:

- Laboratory testing is very important for a quality control like a soil test. For example, we will be able to understand a soil condition if we conduct the CBR (California Bearing Raito) test. This means, the soil condition is good if CBR rate is high.
  Therefore, we have changed the initial pavement structure after the test results.
- Concerning the question from the MEF, we have changed the construction cost from 1,172,000,000 Riels as an Initial cost to 1,650,000,000 Riels as a Detailed cost because of the need to add the capping layer for the quality control.
  In addition, in case of the National Rd 71, if we do not add the capping layer, the road will damage easily and consequently, the maintenance cost will increase.
- Concerning the Supervision cost, we should conduct a test for the capping layer materials periodically during the construction.

Mr. Tadao Kuwano added to the answers for the representative from MEF as follows:

- We should have more experience on the basis of LCCA (Life-Cycle Cost Analysis). Concerning the LCCA, it is a new method for assessing the total cost of facility ownership and we are making a try and error for decreasing maintenance cost in the initial stage even in Japan.
  Therefore, what's important for road maintenance is to continue the monitoring for a long time.

H.E. Lim Sidenine gave comments as follows:

- Basically, he agreed on the project progress and its activities.
- MPWT & DPWT staffs must learn about not only the construction method, but also the construction management for the quality control.

H.E. Yit Bunna gave comments as follows:

- He requested that the project should manage the e-library system more actively.
- When we make the construction budget plan, we should consider the reserve budget for emergency case.
- In case of the condition of the National Rd 110 as one of the pilot project, it will be flooded when it rains.
  Therefore, we should take care of this problem during the construction.
- Concerning the pilot training, he requested that the project should conduct the pilot training not only in Kampong Cham and Kandal but also in other provinces.

Mr. Koun Bunthoeun mentioned as follows:

- He replied the comments from H.E. Yit Bunna about the e-library that the project would consider how to manage the e-library system more actively.
- The project have plan to conduct an inner seminar about the Standard Guidelines & Regulations from the point of view of their spread.
- He replied the comments from the representative of the MEF about the evaluation of road condition that the MPWT will evaluate the road condition after finishing the pilot project, and we will implement the post-evaluation after 4 to 5 years.

Mr. Masahiko Egami gave comments as follows:

- The project is in good progress, and it corresponds to receive the budget for pilot project.
  One of this project concepts is authenticate the correlation between increasing the initial cost and decreasing the maintenance cost through the implementation of pilot project.

Mr. Masahiko Egami gave comments as follows:

* The project is in good progress, and it corresponds to receive the budget for pilot project.

  One of this project concepts is authenticate the correlation between increasing the initial cost and decreasing the maintenance cost through the implementation of pilot project.

  Therefore, he requested the MEF to approve the budget for pilot project.
* Concerning the activities of library management, we have some budget for purchasing related equipment. Therefore, he strongly requested that the project should implement the activities positively with selection of suitable location.

H.E. Kem Borey mentioned as follows:

* The meaning of the implementation of pilot project is to find a solution to the problems and these experiences will be their knowledge in the future.

H.E. Tauch Chankosal summed up their main points in conclusion as follows:

* Concerning the pilot project, the project should consider how to implement and receive the budget with the MEF.
* Concerning the pilot training, the project should make a plan to conduct the pilot training at the provinces.
* The project should try to keep on for the quality control, and continue the capacity building for the MPWT staffs.

The Meeting adjourned at 18:00 P.M.

Approved by:

H.E. Tauch Chankosal
Chairman

SCQCP Executive Committee Meeting

Mr. Tadao Kuwano
Chief Adviser

Representative of SCQC Project