



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BUREAU OF DESIGN
BRIDGES DIVISION
MANILA

STANDARD MULTI SPAN FLAT SLAB BRIDGES

BOD SET NO. 2019-7 BrD

SUBMITTED:

BLESILDA S. RAMOS
OIC - CHIEF, BRIDGES DIVISION

DATE:

RECOMMENDING APPROVAL:

ARISTARCO M. DOROY
OFFICER-IN-CHARGE, BUREAU OF DESIGN

DATE: **DEC 27 2019**

APPROVED:

EMIL K. SADAIN, CESO I
UNDERSECRETARY FOR UPMO
OPERATION AND TECHNICAL SERVICES

DATE:

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 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE:	SHEET CONTENTS:	DESIGNED: <i>John Robert A. Mendoza</i> CHECKED: <i>Wilhemina L. Archeta</i> CADD: <i>Rolando C. Mediente</i>	SUBMITTED: <i>Blasilda S. Ramos</i> OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: SEE COVER SHEET ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: SEE COVER SHEET EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. 	SHEET NO. 
	STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE	GENERAL INDEX DRAWING						

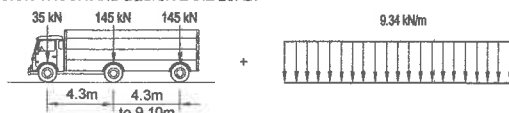
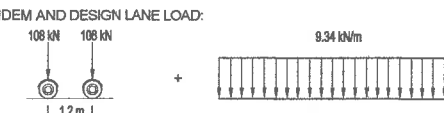
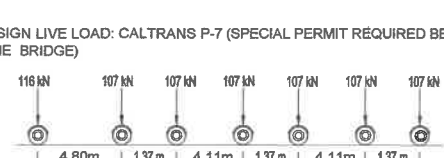
STANDARD MULTIPLE SPAN 10M

GENERAL NOTES

GENERAL

- IN THE INTERPRETATION OF DRAWINGS, INDICATED DIMENSIONS SHALL GOVERN. ALL DIMENSIONS, DISTANCES AND SIZES SHALL NOT BE SCALED FOR CONSTRUCTION PURPOSES.
- UNLESS OTHERWISE INDICATED, ALL DIMENSIONS AND MEMBER SIZES ARE IN MILLIMETERS.
- STATIONINGS ARE IN KILOMETERS + METERS. ELEVATIONS ARE IN METERS.

DESIGN CRITERIA

- DESIGN SPECIFICATION
 - DPWH DESIGN GUIDELINES CRITERIA AND STANDARDS (DGCS), 2015 EDITION, VOLUME 5 - BRIDGE DESIGN.
- LOADINGS
 - DEAD LOAD: WEIGHT OF THE STRUCTURE AND AN ALLOWANCE OF 1.10 kPa FOR FUTURE BITUMINOUS WEARING COURSE.
 - LIVE LOAD: HL - 93
 - DESIGN TRUCK AND DESIGN LANE LOAD:
 
 - DESIGN TANDEM AND DESIGN LANE LOAD:
 
 - PERMIT DESIGN LIVE LOAD: CALTRANS P-7 (SPECIAL PERMIT REQUIRED BEFORE PASSING THE BRIDGE)
 
- DYNAMIC LOAD ALLOWANCE (TABLE 10.8-1): IN ACCORDANCE WITH DGCS, VOLUME 5 - BRIDGE DESIGN
- PEDESTRIAN LOADS: 3.60 kPa
- SEISMIC LOAD: IN ACCORDANCE WITH DPWH- LRFD BRIDGE SEISMIC DESIGN SPECIFICATIONS (BDS) 1st EDITION, 2013
- OTHER LOADING IN ACCORDANCE WITH DGCS, VOLUME 5 - BRIDGE DESIGN

MATERIALS

1. CONCRETE

UNLESS OTHERWISE INDICATED, THE CONCRETE CLASS AND STRENGTH SHALL BE AS FOLLOWS:

STRUCTURAL MEMBER	CLASS	28-DAY CYLINDER STRENGTH MPa	MAX. SIZE OF COARSE AGGREGATE mm (in.)
WINGWALLS, BACKWALLS, COPING COLUMNS, FOOTINGS	A	27.58	20
SLAB	A	27.58	20
PRECAST R.C. PILE	C	27.58	25
THIN REINFORCED SECTIONS RAILING AND RAILPOST	C	27.58	12
LEAN CONCRETE	B	16.50	38

2. REINFORCEMENT STEEL

- REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO AASHTO M31 (ASTM A615). WITH MINIMUM YIELD STRENGTH AS FOLLOWS:
 $F_y = 414 \text{ MPa (Gr.60)}$ FOR 16mmØ AND LARGER
 $F_y = 276 \text{ MPa (Gr.40)}$ FOR 12mmØ AND SMALLER
- REINFORCING STEEL BARS SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCE WHICH WILL WEAKEN THE BOND WITH CONCRETE.

CONSTRUCTION

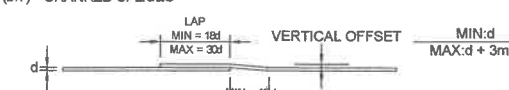
1. SPECIFICATION

STANDARD SPECIFICATIONS, 2013 EDITION VOLUME II - HIGHWAYS, BRIDGES AND AIRPORTS

2. SETTING OUT

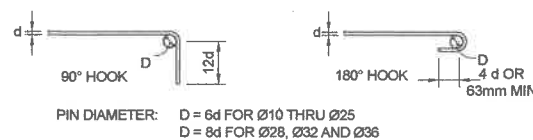
THE SETTING OUT AND THE ELEVATIONS OF THE DIFFERENT COMPONENTS OF THE STRUCTURE SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE START OF ANY CONSTRUCTION WORK.

3. REINFORCED CONCRETE

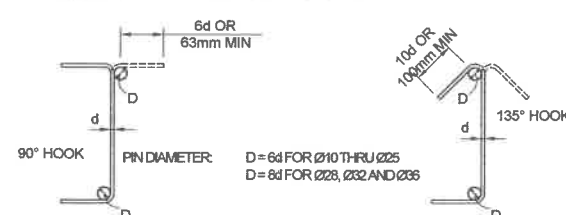
- CONCRETE MIX AND PLACING
 - DESIGN OF CONCRETE MIX SHALL MEET THE DESIGN CONCRETE STRENGTH GIVEN UNDER ITEM 1 OF MATERIALS.
 - CONCRETE SHALL BE DEPOSITED, VIBRATED AND CURED IN ACCORDANCE WITH THE SPECIFICATIONS.
 - FOR CONCRETE DEPOSITED AGAINST THE GROUND, LEAN CONCRETE WITH A MINIMUM THICKNESS OF 50mm SHALL LAID FIRST BEFORE INSTALLING THE REINFORCEMENT. THE LEAN CONCRETE SHALL NOT BE CONSIDERED IN MEASURING THE STRUCTURAL DEPTH OF CONCRETE SECTION.
 - THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL PLACING SEQUENCES FOR ALL CONCRETING WORKS.
- BAR BENDING, SPLICING AND PLACING
 - SHOP DRAWINGS OF ALL REINFORCING BARS INDICATING THE BENDING, CUTTING, SPLICING AND INSTALLATION SHALL BE SUBMITTED BY THE CONTRACTOR TO THE ENGINEER FOR APPROVAL.
 - BARS SHALL BE BENT COLD. BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT UNLESS PERMITTED BY THE ENGINEER.
 - BAR SPLICING NOT INDICATED ON DRAWINGS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
 - WELDED SPLICES, IF APPROVED BY THE ENGINEER, SHALL DEVELOP IN TENSION AT LEAST 125% OF THE SPECIFIED YIELD STRENGTH OF THE BARS.
 - NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION SHALL BE SPLICED.
 - UNLESS OTHERWISE SHOWN ON DRAWINGS, THE CLEAR DISTANCE BETWEEN PARALLEL BARS IN A LAYER SHALL NOT BE LESS THAN 1.5 TIMES THE NOMINAL DIAMETER OF THE BAR NOR LESS THAN 1.5 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE. THE CLEAR DISTANCE BETWEEN LAYERS SHALL NOT BE LESS THAN 25mm NOR ONE BAR DIAMETER. THE BARS IN THE UPPER LAYER SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE BOTTOM LAYER.
 - CRANKED SPLICES
 

(b.8) HOOKS AND BENDS

DIMENSIONS OF 90- DEGREE AND 180- DEGREE HOOKS



DIMENSIONS FOR STIRRUPS AND THE HOOKS



- CONCRETE COVER TO REINFORCEMENT UNLESS OTHERWISE INDICATED, CONCRETE COVER TO REINFORCEMENT SHALL BE AS FOLLOWS:

STRUCTURAL MEMBER	CLEAR COVER (mm)
TOP OF SLAB	50
COLUMNS / SHAFT, FOOTINGS & WINGWALLS	75
BOTTOM OF SLAB & RAILINGS	25
RC PILES	AS SHOWN

d.) CONSTRUCTION JOINT

- THE POSITION AND FORM OF ANY CONSTRUCTION JOINT SHALL BE AS SHOWN ON DRAWINGS OR AS AGREED WITH THE ENGINEER.
- THE INTERFACE BETWEEN THE FIRST AND SECOND POUR CONCRETES SHALL BE ROUGHENED WITH AN AMPLITUDE OF 6mm MINIMUM.

e. FALSEWORK

ALL FALSEWORK SHALL BE DESIGNED BY THE CONTRACTOR SUBJECT TO THE APPROVAL BY THE ENGINEER.

f. FORMWORKS

FORMWORKS SHALL BE CONSTRUCTED SUCH THAT IT WILL NOT YIELD UNDER THE LOAD AND SHALL BE SUCH AS TO AVOID THE FORMATION OF FINS. ALL CORNERS OF CONCRETE MEMBERS SHALL BE CHAMFERED TO 20mm UNLESS NOTED OTHERWISE ON DRAWINGS. STRIPPING OF FORMS AND SHORES SHALL BE AS DESIGNATED BY THE ENGINEER. THE FOLLOWING MAYBE USED AS A GUIDE:

	MIN. TIME
SHORING UNDER GIRDERS, BEAMS, FRAMES.	14 DAYS
DECK SLABS.	14 DAYS
WALLS.	7 DAYS
COLUMNS / SHAFT.	7 DAYS
SIDES OF BEAMS AND ALL OTHER VERTICAL SURFACES.	2 DAYS

g. PROTECTION AND CURING OF CONCRETE

CONCRETE SURFACES SHALL BE PROTECTED FROM HARMFUL EFFECTS OF SUN, WIND AND RUNNING WATERS AND SHALL BE KEPT DAMP FOR AT LEAST 7 DAYS.

4. SHORING

CAMBER FOR REINFORCED CONCRETE SUPERSTRUCTURES WERE DETERMINED BASED ON THE USE OF SHORING DURING CONSTRUCTION.

5. EMBANKMENT CONSTRUCTION SEQUENCE

APPROACH EMBANKMENT SHALL BE CONSTRUCTED PRIOR TO DRIVING OF ABUTMENT PILES.

SYMBOLS

LINE OF SYMMETRY OR SIMILARITY

NORTH ARROW

INDICATION OF ELEVATION

LIMITS OF DIMENSION

SECTION IN WATER

SECTION IN EARTH

SECTION IN STRUCTURAL STEEL

SECTION IN CONCRETE

SECTION IN EXISTING CONCRETE STRUCTURE

ELASTOMERIC BEARING PAD

BITUMINOUS WEARING SURFACE ON BRIDGES

PLAN VIEW AND ELEVATION OF CUT & FILL SLOPES

PLAN VIEW OF SLOPE PROTECTION

PLAN VIEW OF GROUTED RIPRAP ON SLOPE

BUNDLED BARS

SET NO. BUREAU OF DESIGN

YEAR-DWG SET NO. BRIDGES DIVISION

SHEET CONTENT

STANDARD CODE (SPAN LENGTH)

PAGE No. TOTAL NO. OF SHEET

TITLE TARGET

DRAWING NO.

STANDARD CODE (SPAN LENGTH)

SECTION LINE

DRAWING NO.

STANDARD CODE (SPAN LENGTH)

ROUND

SQUARE

AT

AND

CENTERLINE

PL PLATE

L ANGLE SHAPE

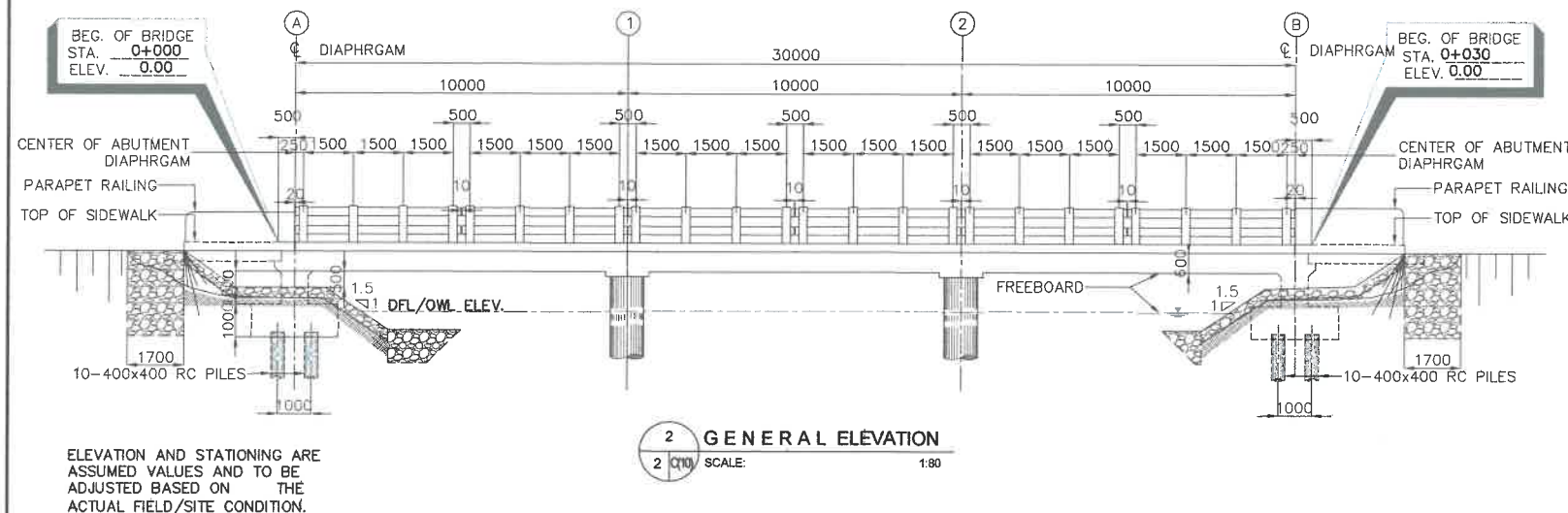
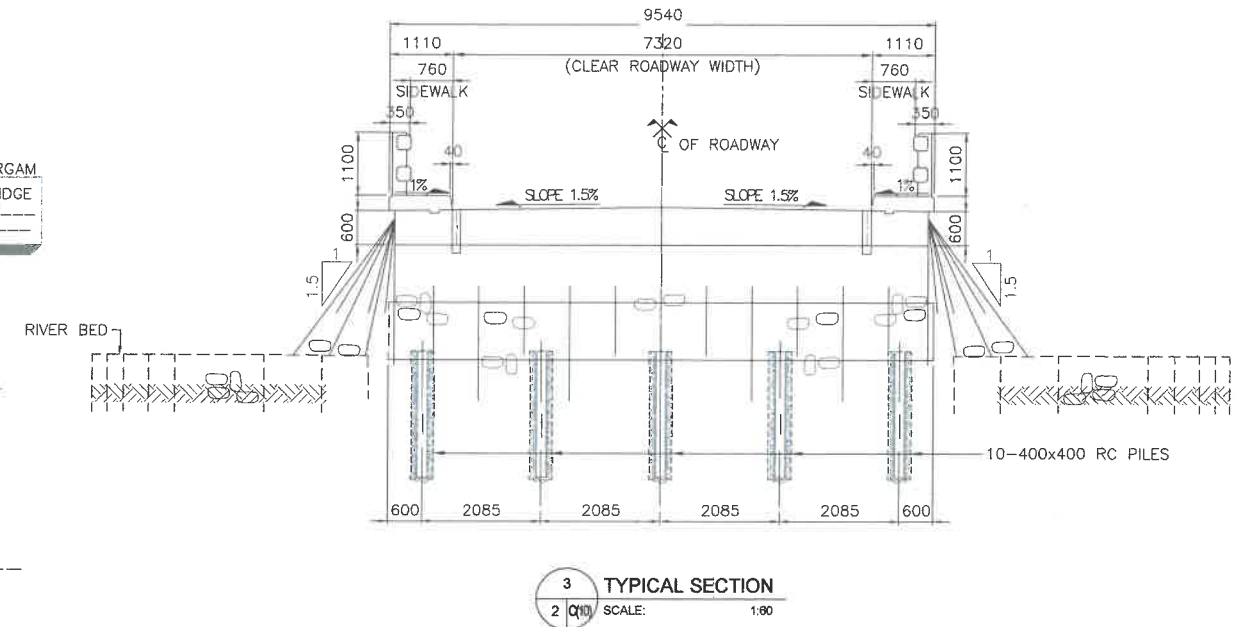
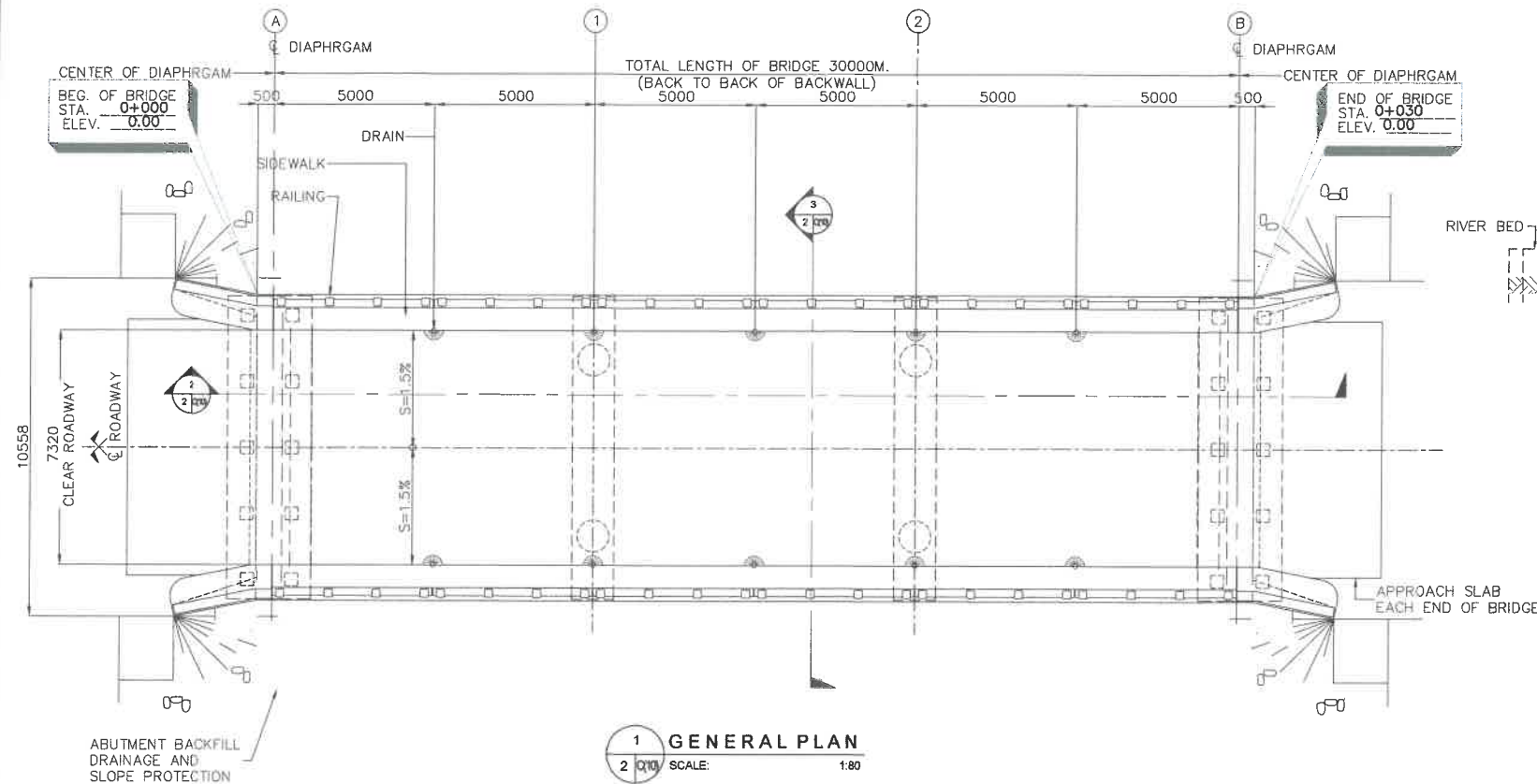
C/C, C to C CENTER TO CENTER

ABBREVIATIONS

ABT	ABOUT	kPa	KILOPASCAL
ABUT	ABUTMENT	m	METER
BEG	BEGINNING	mm	MILLIMETER
BET	BETWEEN	MAX	MAXIMUM
BOTT	BOTTOM	MFWL	MAX. FLOOD WATER LEVEL
BR	BRIDGE	MIN	MINIMUM
BRG	BEARING	MO	MIDDLE ORDINATE
CLR	CLEAR	MPa	MEGAPASCAL
cm	CENTIMETER	N	NEWTON
COL	COLUMN	NF	NEAR FACE
CONC	CONCRETE	No.	NUMBER
CONST	CONSTRUCTION	O.C.	ON CENTERS
CONT	CONTINUOUS	O.W.L	ORDINARY WATER LEVEL
CTR	CENTER	PEJ	PREMOULDED EXPANSION JOINT
DET	DETAIL	PVC	POLYVINYL CHLORIDE
DIA	DIAMETER	PVI	POINT OF VERTICAL INTERSECTION
DIAPH	DIAPHRAGM	QTY	QUANTITY
DWG	DRAWING	R	RADIUS
EA	EACH	RC	REINFORCED CONCRETE
EF	EACH FACE	RDWY	ROADWAY
ELEV	ELEVATION	REINF	REINFORCEMENT
ENGR	ENGINEER	SDWK	SIDEWALK
EQ	EQUAL	SL	SLOPE
EW	EACHWAY	SP	SPIRAL
EXP	EXPANSION	SPCD	SPACED
EXT	EXTERIOR	SPCS	SPACES
EXIST	EXISTING	STD	STANDARD
FF	FAR FACE	STIR	STIRRUP
FTG	FOOTING	STA	STATION
GEN	GENERAL	STRUCT	STRUCTURE
HOR	HORIZONTAL	SYMM	SYMMETRY
HW	HIGH WATER	THK	THICK
INT	INTERIOR	TYP	TYPICAL
INTERM	INTERMEDIATE	VAR	VARIABLE
JT	JOINT	VERT	VERTICAL
L	LENGTH	VOL	VOLUME
LG	LONG	W	WIDTH
kg	KILOGRAM	W	WITH
kN	KILONEWTON	&	AND

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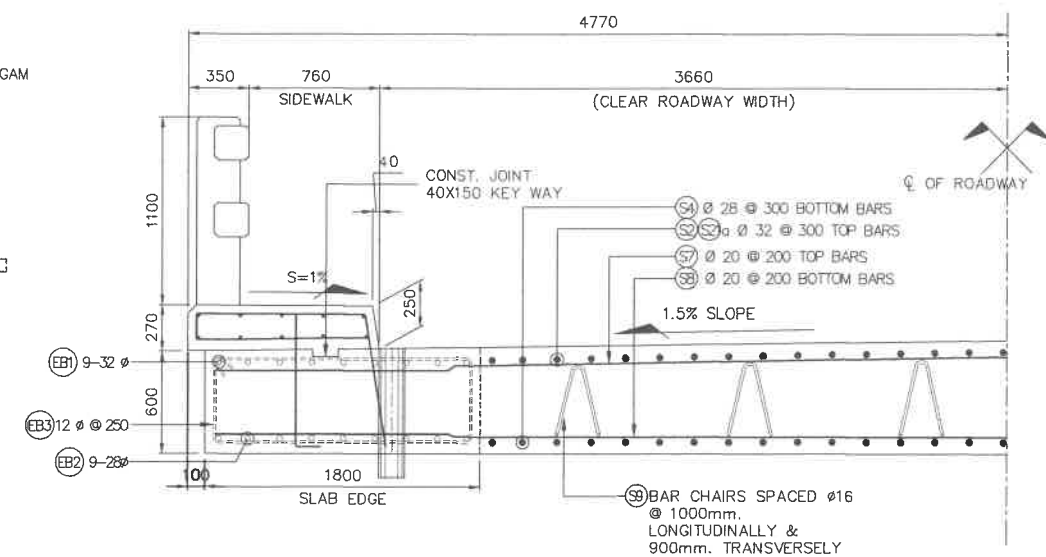
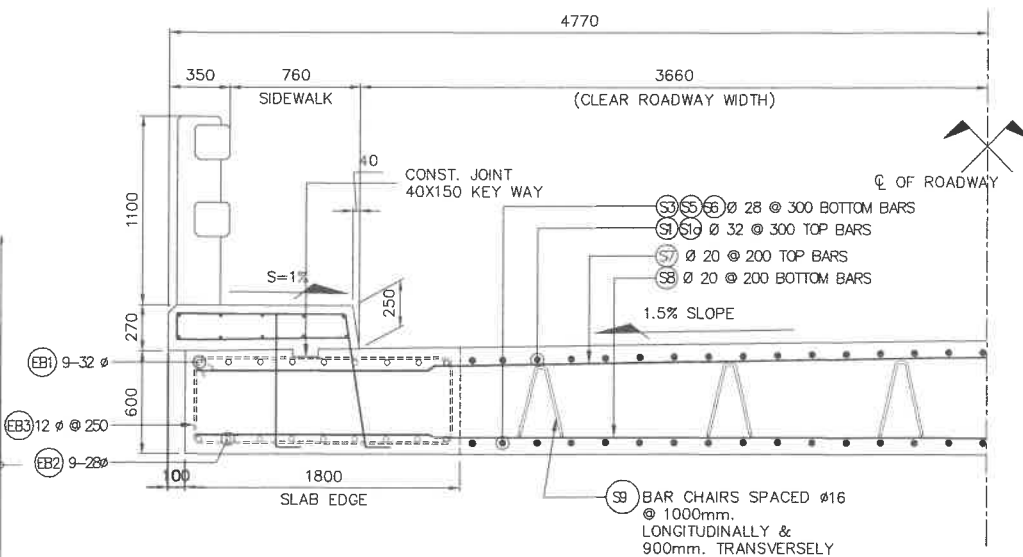
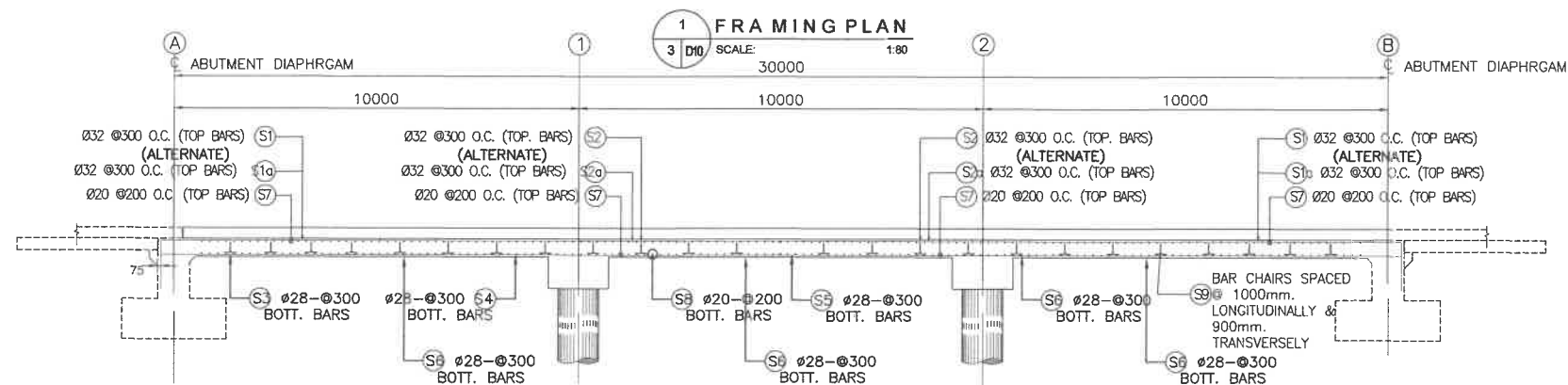
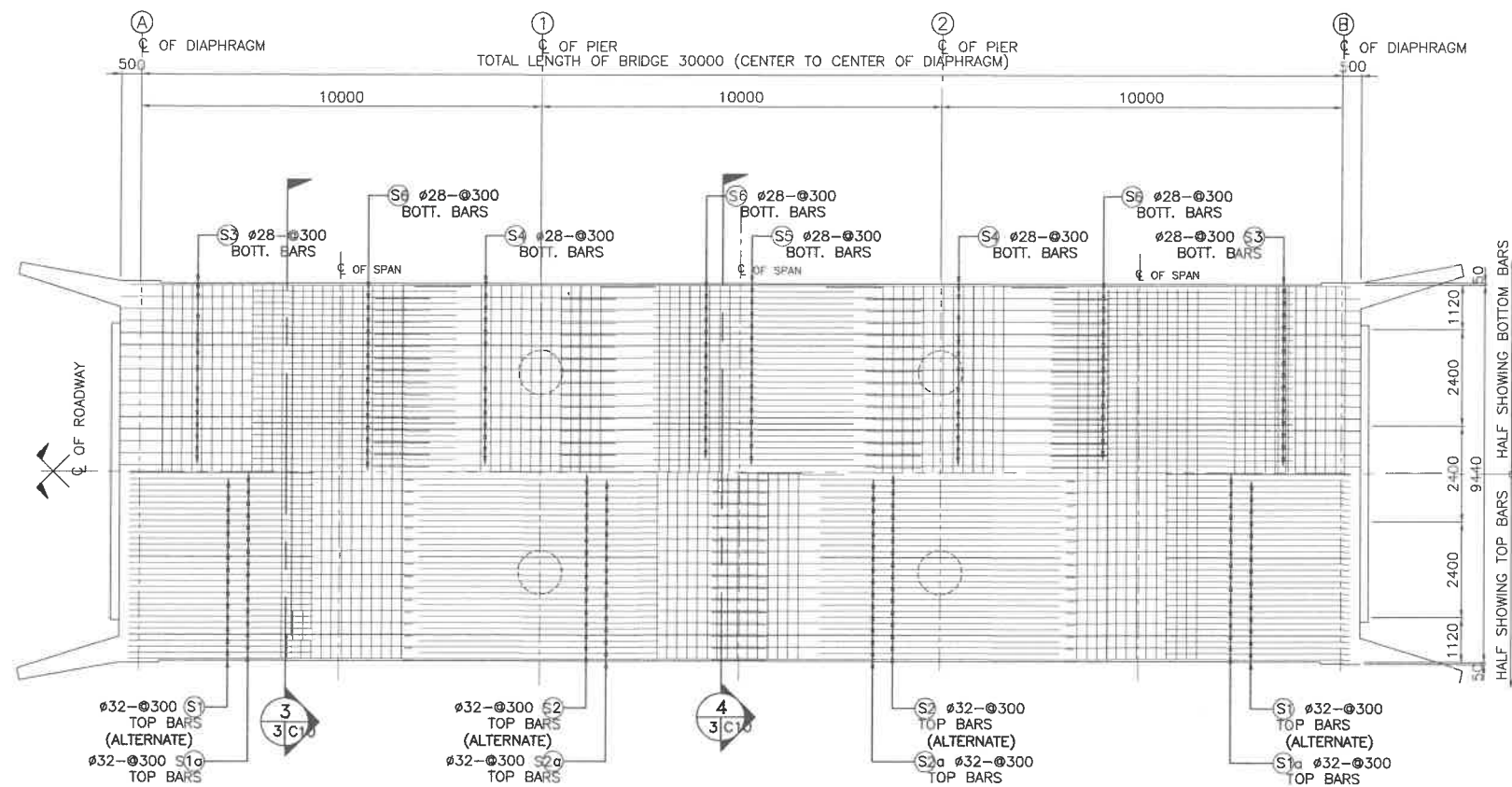
NOTE: DIRECTION OF FLOW TO BE INDICATED IN THE PLAN



NOTES:

1. THIS STANDARD PLAN IS FOR REFERENCE ONLY. STRUCTURAL ANALYSIS SHALL BE PREPARED BASED ON THE ACTUAL SURVEY, HYDRAULIC, HYDROLOGIC AND GEOTECHNICAL DATA ON THE PROJECT SITE.
2. INDICATED STATIONING & ELEVATIONS ARE ASSUMED ONLY. VERIFY / REPLACE BASED ON ACTUAL LOCATION / SITE CONDITION.
3. FREE BOARD CLEARANCE :
1.5M. FOR RIVERS CARRYING DEBRIS
1.0M. FOR OTHERS BRIDGES
4. LEGEND:
OWL - ORDINARY WATER LEVEL
DFL - DESIGN FLOOD LEVEL
5. PROTECTION WORKS FOR ABUTMENTS SHALL BE DESIGNED BY THE ENGINEER/ CONSULTANT. THE PROTECTION WORKS SHOWN HEREIN ARE FOR ILLUSTRATIVE PURPOSES ONLY AND SHALL NOT BE CONSTRUED AS THE FINAL DETAILS. HOWEVER, SLOPE FOR EMBANKMENT PROTECTION WORKS SHALL BE 1.5:1 OR FLATTER.
6. LENGTH OF REINFORCED CONCRETE PILES SHALL BE DETERMINED/DESIGNED BASED ON THE ACTUAL BORING DATA AT LOCATION OF FOUNDATION.

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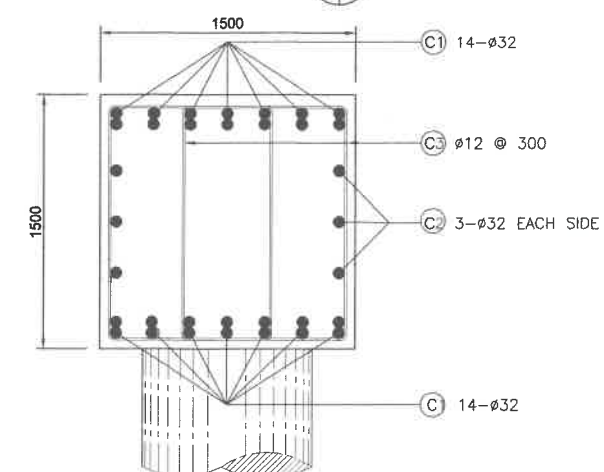
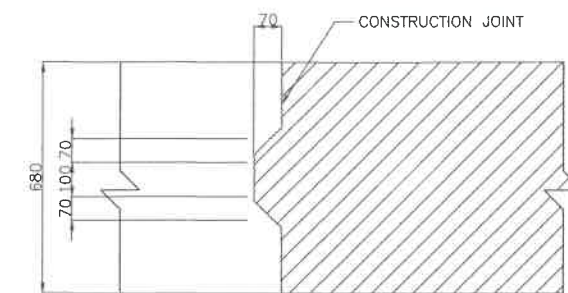


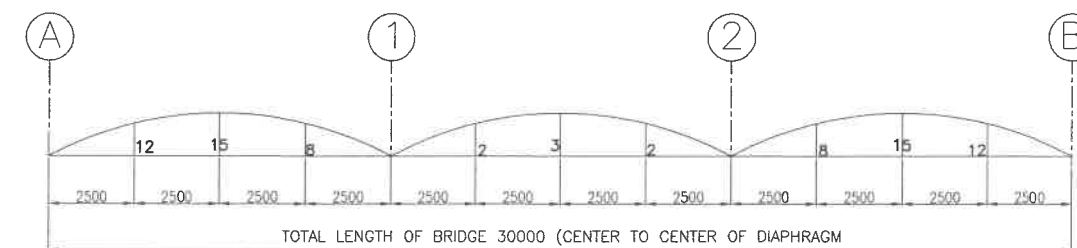
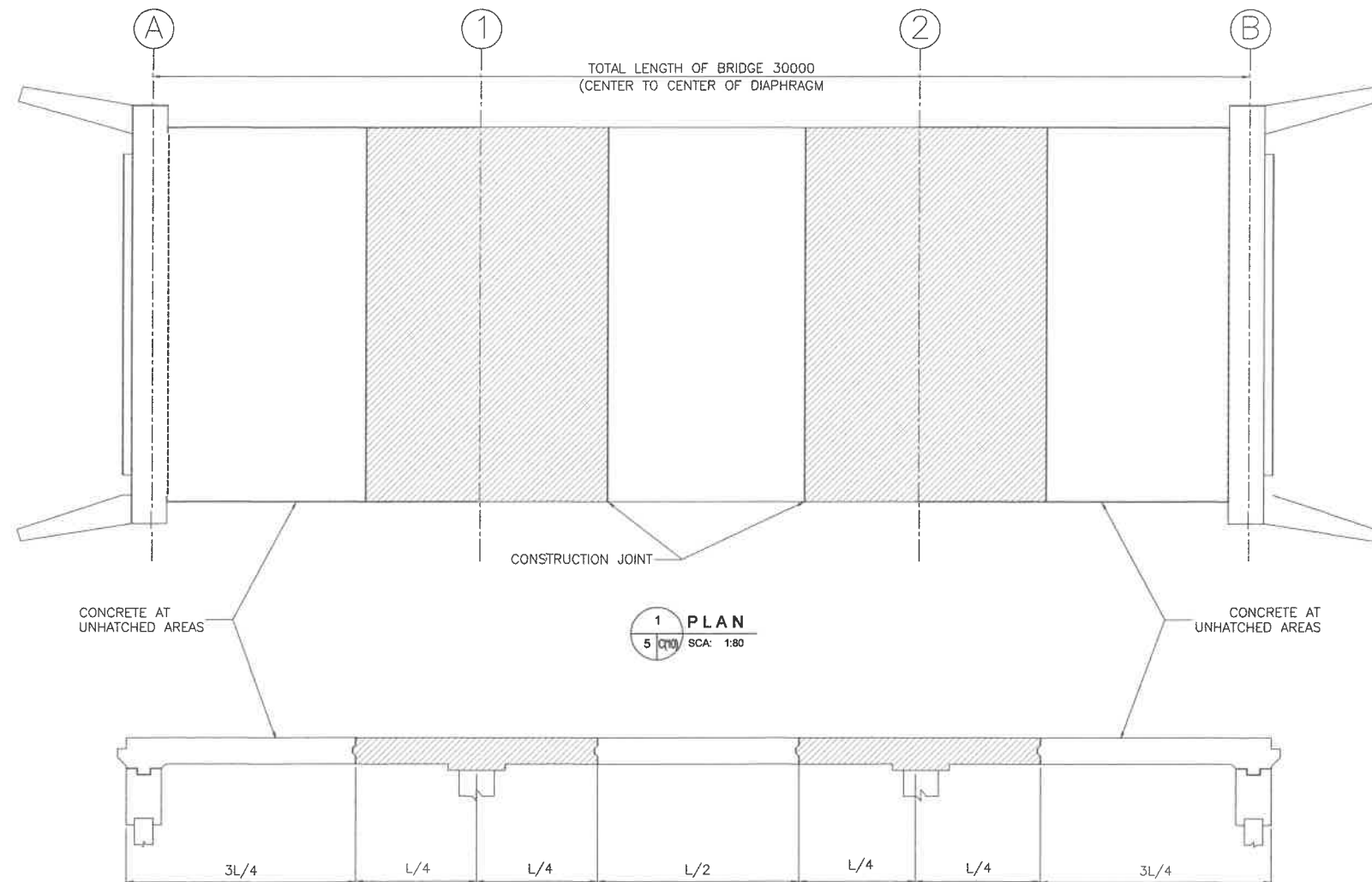
445
10 300 105
40X150 KEYWAY
SIDEWALK
680
4
FLATSLAB EDGE
340 LA

445
105 300 40
SLAB REINF.
SIDEWALK
680
4
FLATSLAB EDGE
DROP PANEL REINF.
SLAB REINF.

2 SECTION
4 1/10 SCALE: 1:10

3 SECTION
4 1/10 SCALE: 1:10





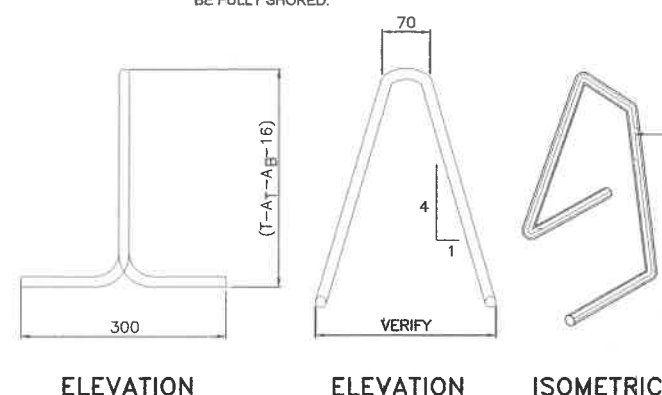
NOTE:
THE CAMBER SHOWN IN THE DIAGRAM IS THE AMOUNT OF CAMBER REQUIRED FOR DEAD LOAD DEFLECTION AND IN ADDITION TO THAT REQUIRED FOR CONFORMANCE WITH THE PROFILE OF THE HIGHWAY. PROPER ALLOWANCE SHALL BE MADE FOR THE DEFLECTION OF FALSEWORK

NOTES:

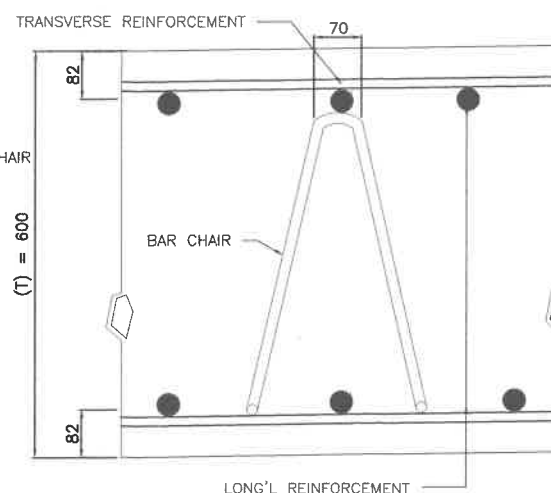
- CONCRETE AT HATCHED AREAS SHALL BE PLACED AT LEAST ONE DAY AHEAD OF CONCRETE AT UNHATCHED AREAS.
- REINFORCEMENT SHALL BE CONTINUOUS AT CONSTRUCTION JOINTS.
- CONSTRUCTION OF SUPERSTRUCTURE SHALL BE FULLY SHORED.

2 SECTION SCALE: 1:80

CONCRETE POURING SEQUENCE SCALE: 1:80



3 BAR CHAIR DETAIL SCALE: 1:5



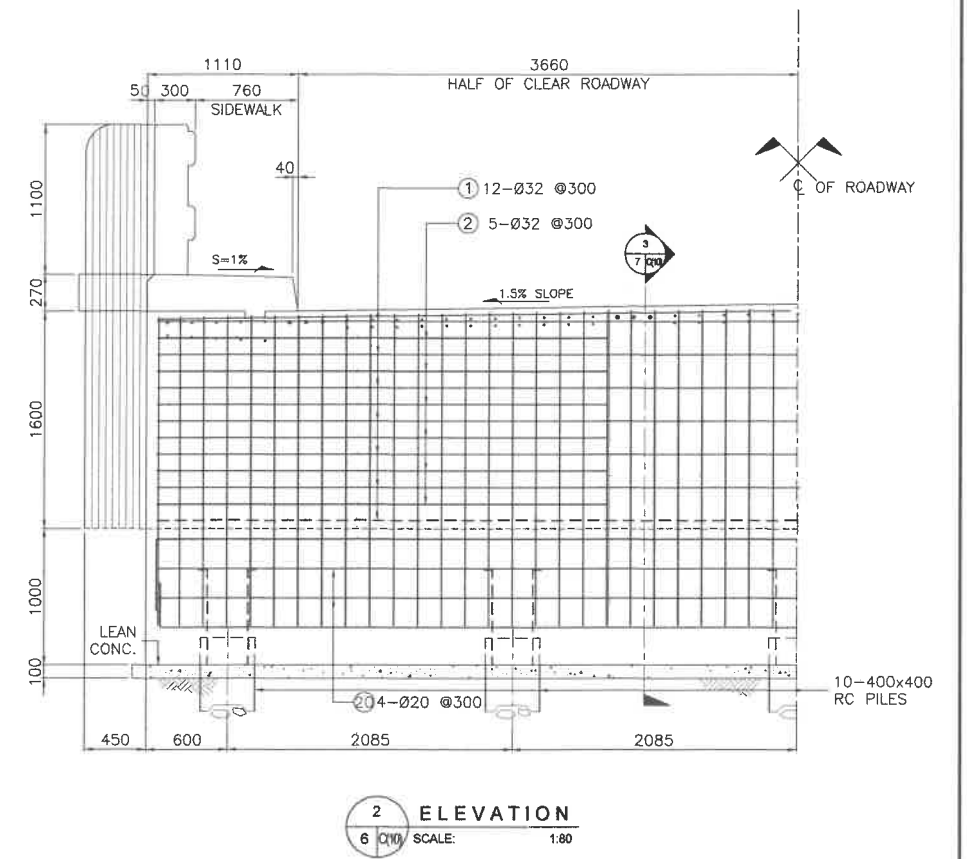
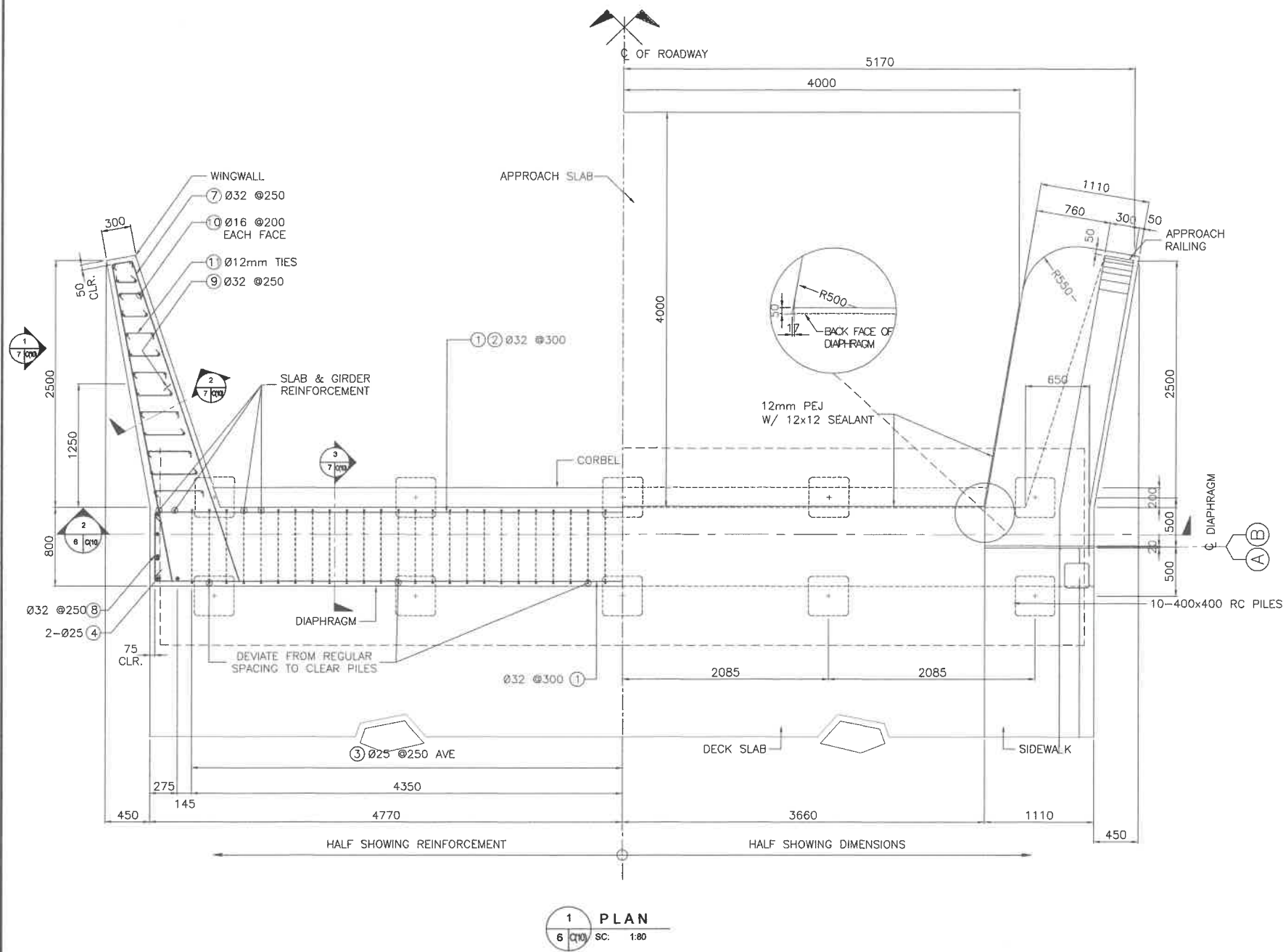
4 BAR SETTING DETAIL SCALE: 1:5

REINFORCEMENT SCHEDULE AND ESTIMATED QUANTITIES FOR SUPERSTRUCTURE OF 3-SPAN @ 10m

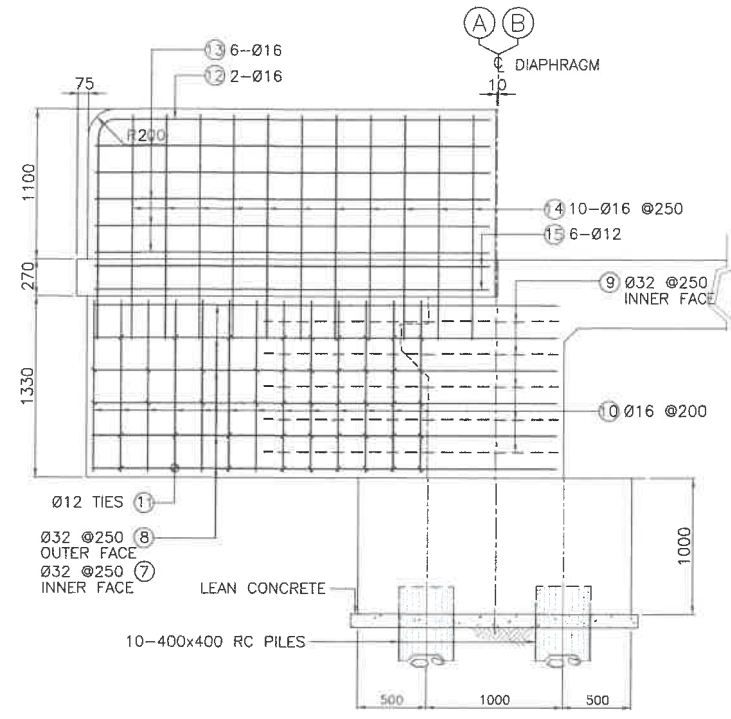
REINFORCEMENT																	
BENDING DIAGRAM	STRUCTURE COMPONENT	CONCRETE VOLUME (m³)	BAR MARK	BAR SIZE (mm)	QTY	SPACING (mm)	BAR SHAPE	BAR DIMENSIONS (mm)				LOCATION Lc	LENGTH PER BAR(m)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)	REMARKS
								a	b	c	d						
	DECK SLAB	124.00	S1	32	42	300	D	1300	6200	-	-	-	7.50	315.00	6.313	1,988.60	
			S1a	32	42	300	D	1300	3200	-	-	-	4.50	189.00	6.313	1,193.16	
			S2	32	42	300	A	12000	-	-	-	-	12.00	504.00	6.313	3,181.75	
			S2a	32	42	300	A	6000	-	-	-	-	6.00	252.00	6.313	1,590.88	
			S3	28	42	300	A	9000	-	-	-	-	9.00	378.00	4.833	1,826.87	
			S4	28	42	300	A	6000	-	-	-	-	6.00	252.00	4.833	1,217.92	
			S5	28	21	300	A	7500	-	-	-	-	7.50	157.50	4.833	761.20	
			S6	28	63	300	A	4500	-	-	-	-	4.50	283.50	4.833	1,370.16	
			S7	20	147	200	C	4620	-	-	-	-	9.24	1358.28	6.313	8575.29	
			S8	20	147	200	A	9240	-	-	-	-	9.24	1358.28	4.833	6565.4	
			S9	16	SEE DETAIL	1000L 900TRAN	SEE CHAIR BAR DETAIL					-	-	-	-	-	
												-		TOTAL =		28271.2130	
	EDGE BEAM	77.8	EB1	32	18	AS SHOWN	B	1300	36000	-	-	-	38.6	694.80	6.313	4386.27	
			EB2	28	18	AS SHOWN	A	36800	-	-	-	-	36.8	662.40	4.833	3201.38	
			EB3	12	290	250	C	1700	500	200	-	-	4.8	1392.00	0.888	1236.10	
														TOTAL =		8823.7476	
													GRAND TOTAL (GRADE 40) =		1236.0960		
													GRAND TOTAL (GRADE 60) =		35858.8646		

NOTE: FOR FLAT SLAB USE GRADE 40 FOR 12 & 16mmØ

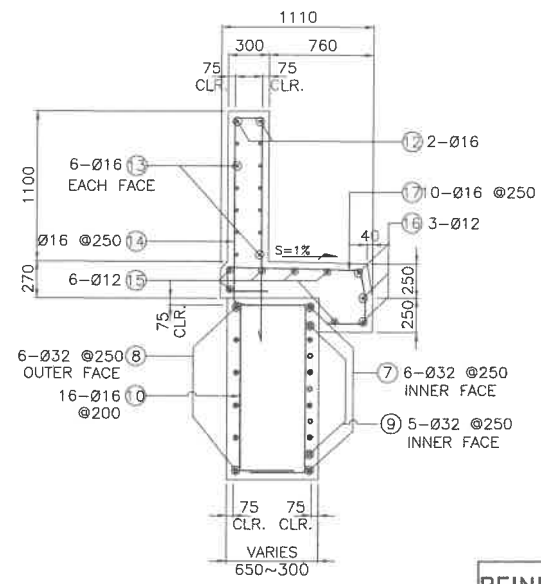
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE:	SHEET CONTENTS:	DESIGNED:	SUBMITTED:	RECOMMENDING APPROVAL:	APPROVED:	SET NO.	SHEET NO.
	STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=10-10-10M	CONCRETE POURING SEQUENCE, INTERMEDIATE DIAPHRAGM DETAILS, CAMBER DIAGRAM AND ESTIMATE OF QUANTITIES	JOHN ROBERT A. MENDOZA ENGINEER II	LARA MARCOS T. LINGUITO ENGINEER II	SEE COVER SHEET	SEE COVER SHEET	BOD 2019-7 BrD	C(10) 5/13
			CHECKED:	WILHELMINA L. RICHETA ENGINEER IV	BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMD OPERATIONS AND TECHNICAL SERVICES	



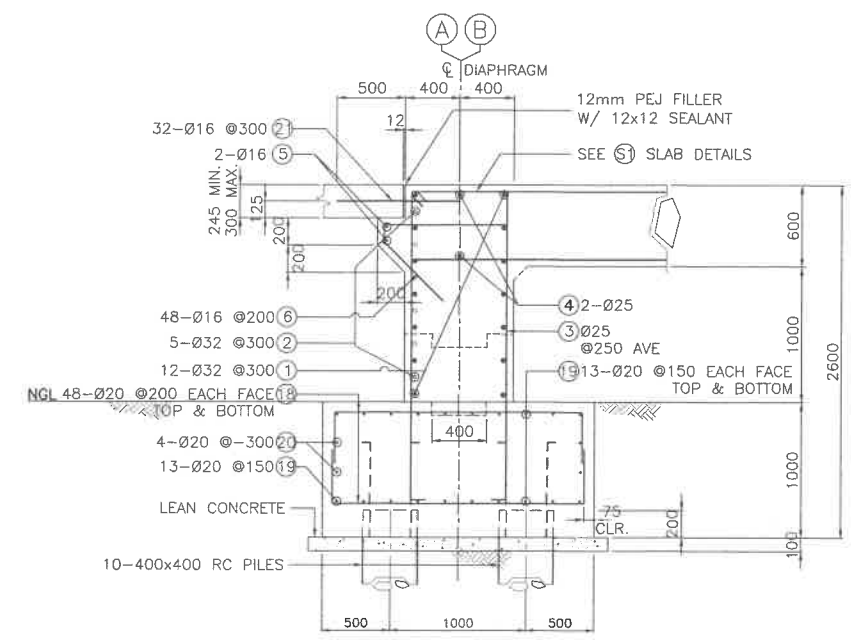
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=10-10-10M	SHEET CONTENTS: ABUTMENT DETAIL 1/2 PLAN AND ELEVATION	DESIGNED: <i>John Robert A. Mendoza</i> ENGINEER II CHECKED: <i>Lara Marisse T. Inquito</i> ENGINEER II CADD: <i>Wilhelmina L. Ancheta</i> ENGINEER IV <i>Rolanda C. Mediente</i> ENGINEER I	SUBMITTED: <i>Blesilda S. Ramos</i> OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: SEE COVER SHEET DEC 27 2019 ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: SEE COVER SHEET EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(10) 8 13
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1 WINGWALL ELEVATION
7/10 SCALE: 1:25

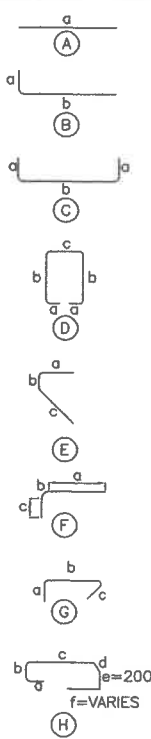


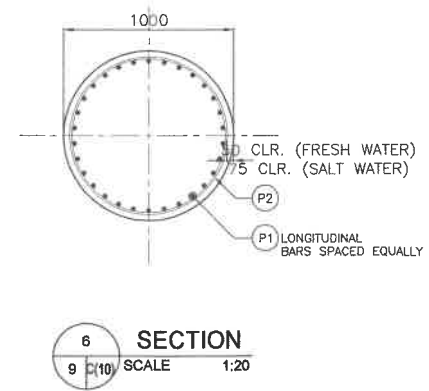
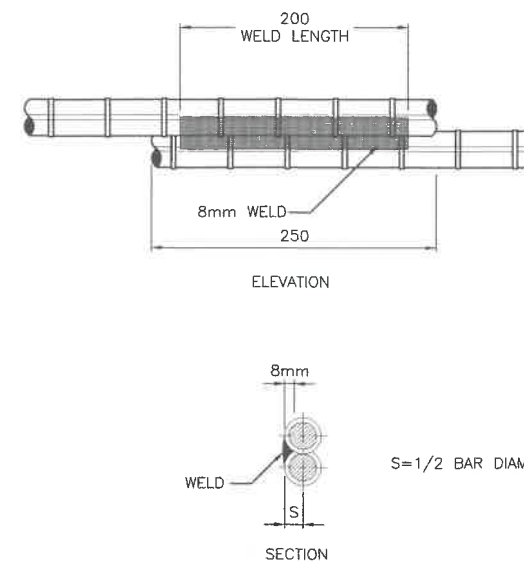
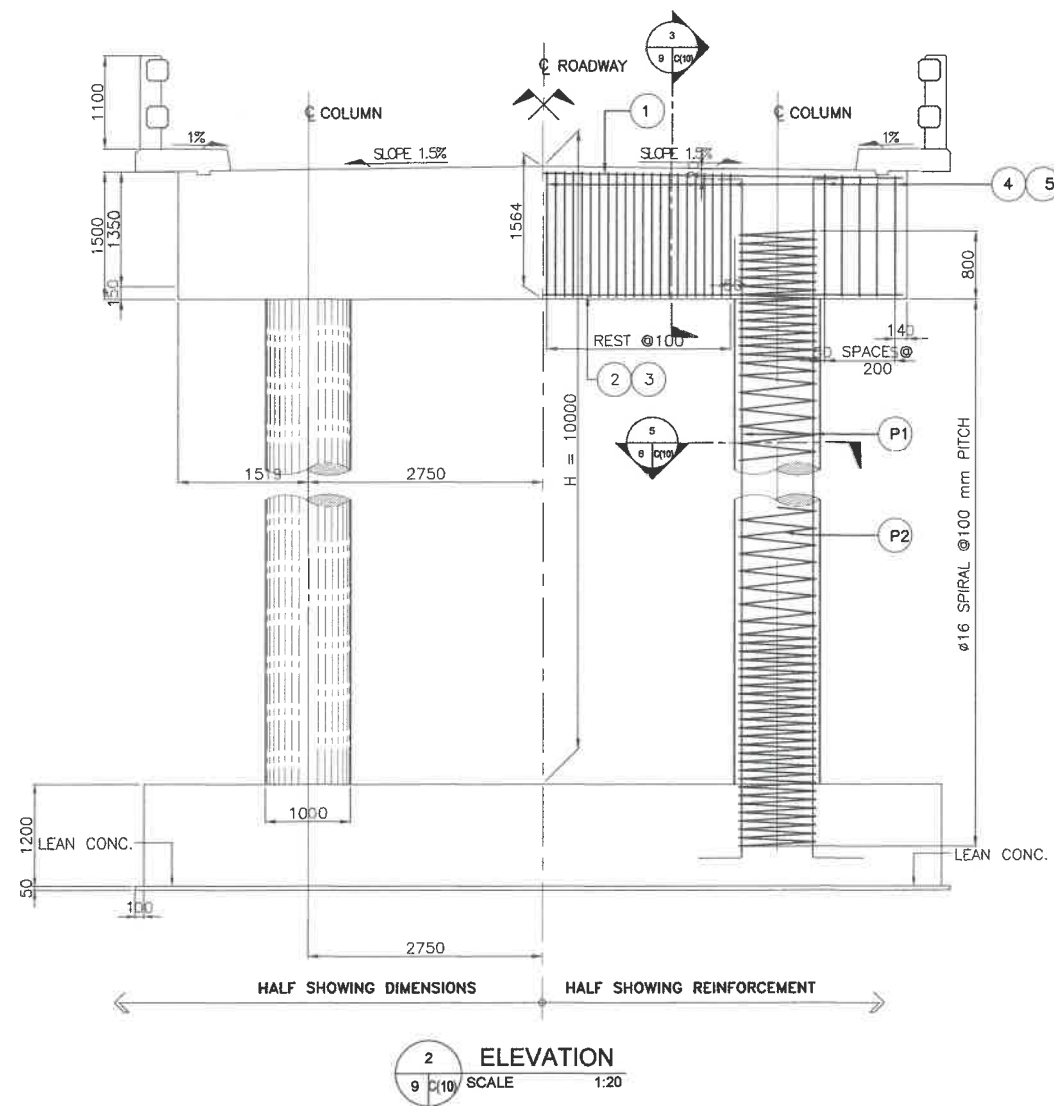
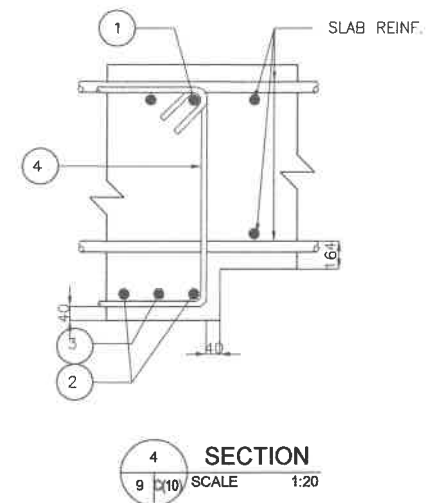
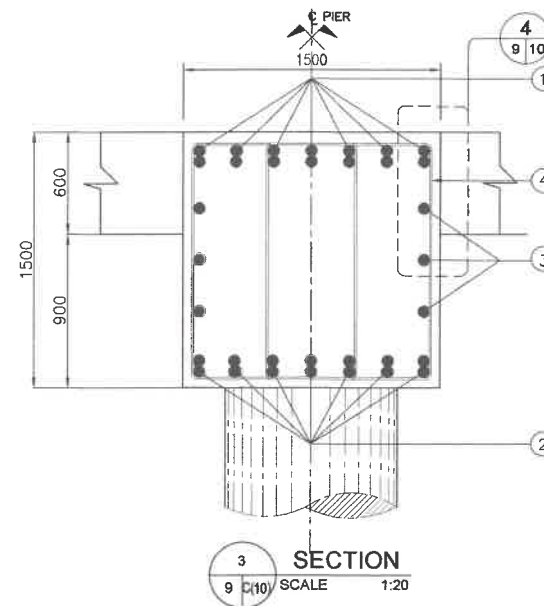
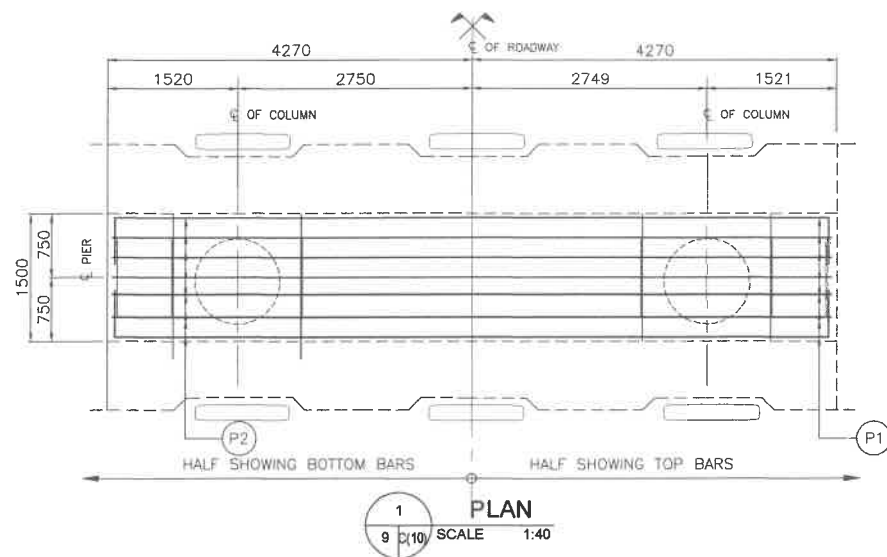
2 SECTION
7/10 SCALE: 1:25



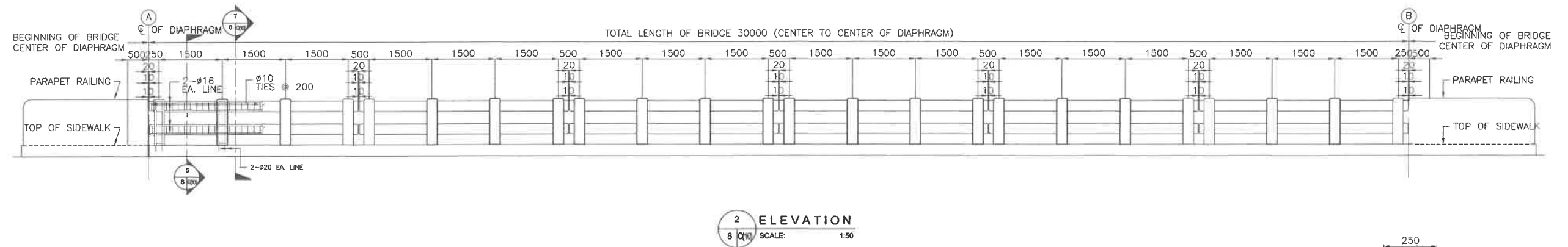
3 SECTION
7/10 SCALE: 1:25

NOTE:
TOP OF FOOTING
SHOULD BE EMBEDDED
BELOW NATURAL
GROUND LEVEL (NGL)

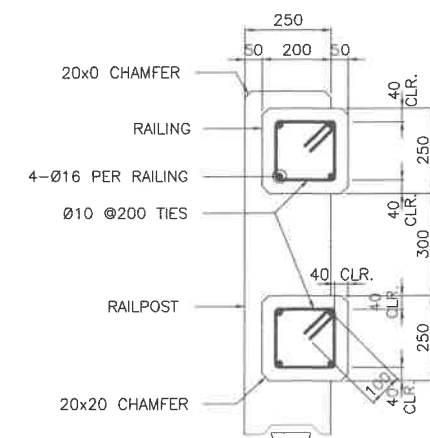
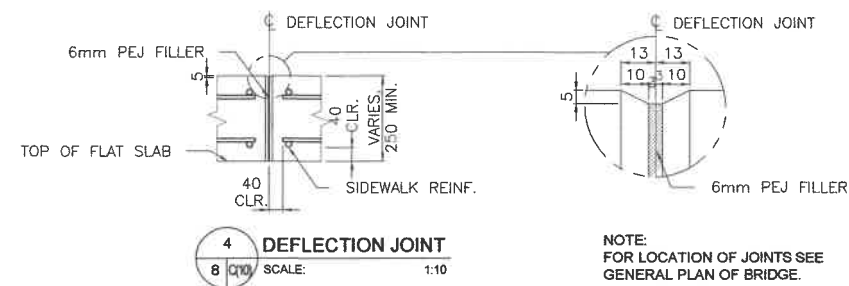
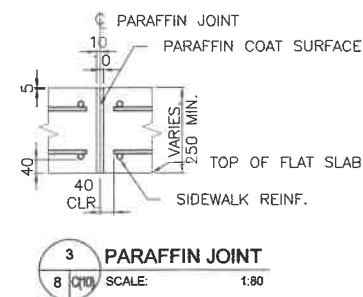
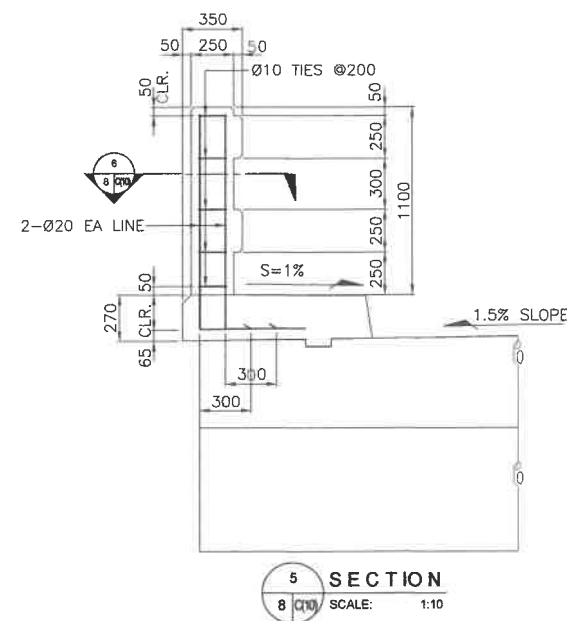
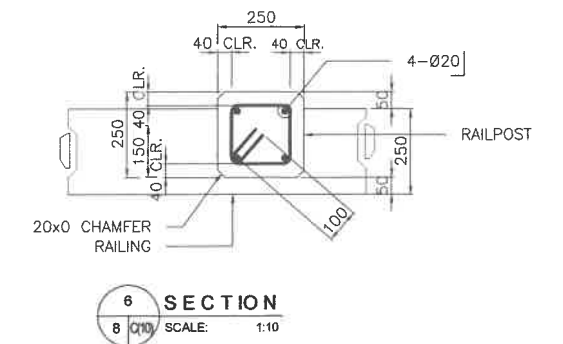
REINFORCEMENT SCHEDULE AND ESTIMATED QUANTITIES FOR ONE (1) ABUTMENT																
REINFORCEMENT																
BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF BARS)	BAR MARK	BAR SIZE (mm)	QTY	SPACING (mm)	BAR SHAPE	BAR DIMENSIONS (mm)						LENGTH EACH BAR(m)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)	CONCRETE VOLUME (m³)
						a	b	c	d	e	f					
	(1)	32	12	300	(C)	600	9390	-	-	-	-	10.59	127.08	6.313	802.26	39.000
	(2)	32	5	300	(B)	600	9390	-	-	-	-	9.99	49.95	6.313	315.33	
	(3)	25	39	250	(D)	110	2350	650	-	-	-	5.57	217.23	3.855	837.42	
	(4)	25	2	AS SHOWN	(A)	9390	-	-	-	-	-	9.39	18.78	3.855	72.40	
	(5)	16	2	AS SHOWN	(A)	9390	-	-	-	-	-	9.39	18.78	1.578	29.63	
	(6)	16	48	200	(E)	900	50	925	-	-	-	1.88	90.24	1.578	142.40	
	(7)	32	12	250	(B)	620	3315	-	-	-	-	3.94	47.28	6.313	298.48	
	(8)	32	12	250	(B)	600	3315	-	-	-	-	3.92	47.04	6.313	296.96	
	(9)	32	10	250	(B)	620	3315	-	-	-	-	3.94	39.04	6.313	246.46	
	(10)	16	32	200	(D)	200MIN 400MAX	1275	550	-	-	-	3.70	118.4	1.578	186.84	
	(11)	12	320	AS SHOWN	(G)	170	140MIN 490MAX	170	-	-	-	0.66	211.20	0.888	187.55	
	(12)	16	4	AS SHOWN	(F)	2915	235	1350	-	-	-	4.50	18	1.578	28.40	
	(13)	16	24	AS SHOWN	(A)	2915	-	-	-	-	-	2.92	70.08	1.578	110.59	
	(14)	16	20	250	(C)	200	1525	-	-	-	-	1.93	38.60	1.578	60.91	
	(15)	12	12	AS SHOWN	(A)	2600MIN 2850MAX	-	-	-	-	-	2.73	32.76	0.888	29.09	
	(16)	12	6	AS SHOWN	(F)	510	785	2725	-	-	-	4.02	24.12	0.888	21.42	
	(17)	16	20	250	(H)	450	120	950	350	200	300	2.37	47.4	1.578	74.80	
	(18)	20	96	200	(C)	500	1850	-	-	-	-	2.85	273.6	2.466	674.70	
	(19)	20	26	150	(B)	110	9390	-	-	-	-	9.50	247	2.466	609.10	
	(20)	20	8	300	(A)	9390	-	-	-	-	-	9.39	75.12	2.466	185.25	
	(21)	16	32	300	(A)	900	-	-	-	-	-	0.90	28.8	1.578	45.45	
													GRAND TOTAL =		5257.70	
													GRAND TOTAL (GRADE 40)		238.06	
													GRAND TOTAL (GRADE 60)		5019.64	



REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=10-10-10M	SHEET CONTENTS: PLAN, ELEVATION, SECTIONS & SPIRAL SPLICE DETAILS OF PIER	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER II CHECKED: WILHELMINA L. ANCHETA ENGINEER IV CADD: ROLANDO C. MEDIANTE DRAFTSMAN I	SUBMITTED: BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: ARISTARCO M. DORON OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(10) 8 13
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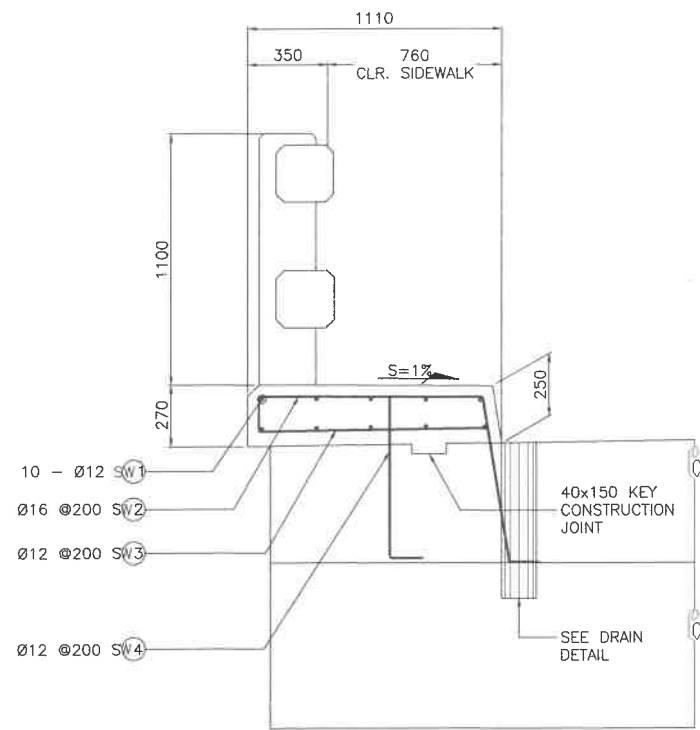


1. SIDEWALK SHALL BE PLACED AFTER THE SHORING UNDER THE SUPERSTRUCTURE HAS BEEN RELEASED SUFFICIENTLY TO PERMIT THE SPANS TO ATTAIN FULL DEAD LOAD DEFLECTION.
2. OTHER TYPES OF STANDARD BRIDGE RAILINGS CAN BE ADOPTED (REFER TO BOD SET NO. 2017-1-Brd)

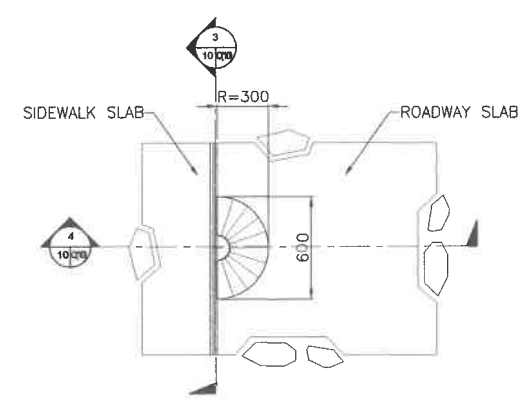


SCALE : AS SHOWN

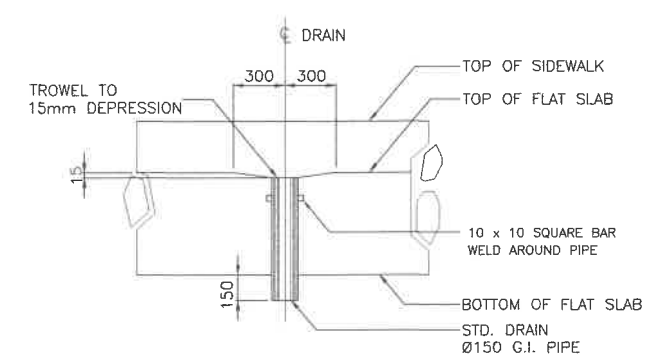
 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=10-10-10M	SHEET CONTENTS: TYPICAL RAILINGS DETAILS AND SECTION	DESIGNED: <i>[Signature]</i> JOHN ROBERT A. MENDOZA ENGINEER I	<i>[Signature]</i> LARA MARISSA T. INGUIO ENGINEER II	SUBMITTED: <i>[Signature]</i> BLE SILDIA S. RAMOS OIC-CHEF, BUREAU OF DESIGN	RECOMMENDING APPROVAL: SEE COVER SHEET ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: SEE COVER SHEET EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. 	SHEET NO. 
			CHECKED: <i>[Signature]</i> WILHELMINA ANCHETA ENGINEER IV	<i>[Signature]</i>					
			CADD: <i>[Signature]</i> ROLANDO S. MEDIANTE						



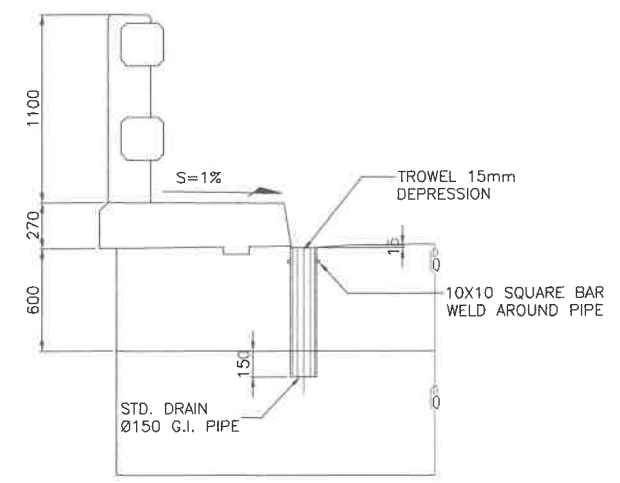
1 SIDEWALK DETAIL
SCALE: 1:15



2 PLAN
SCALE: 1:15



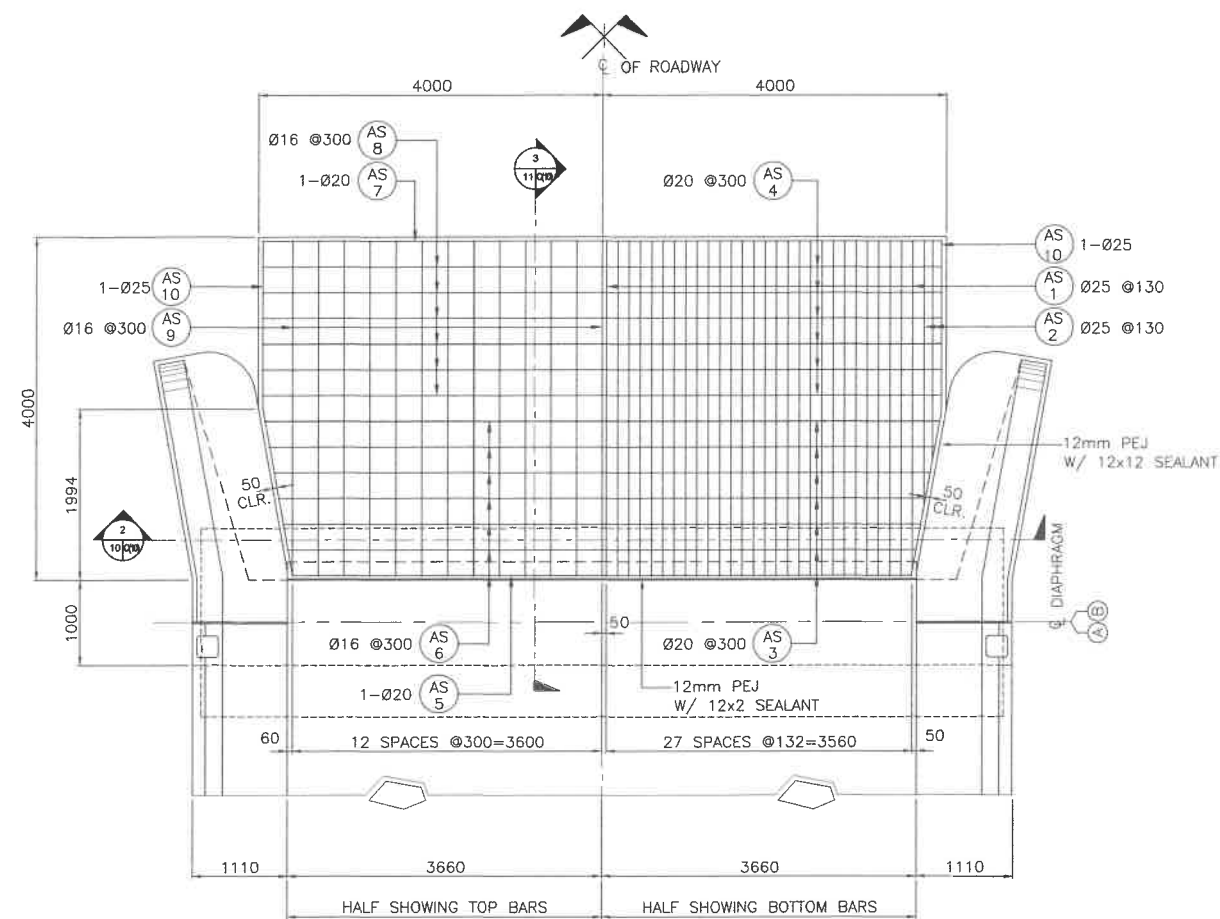
3 SECTION
SCALE: 1:15



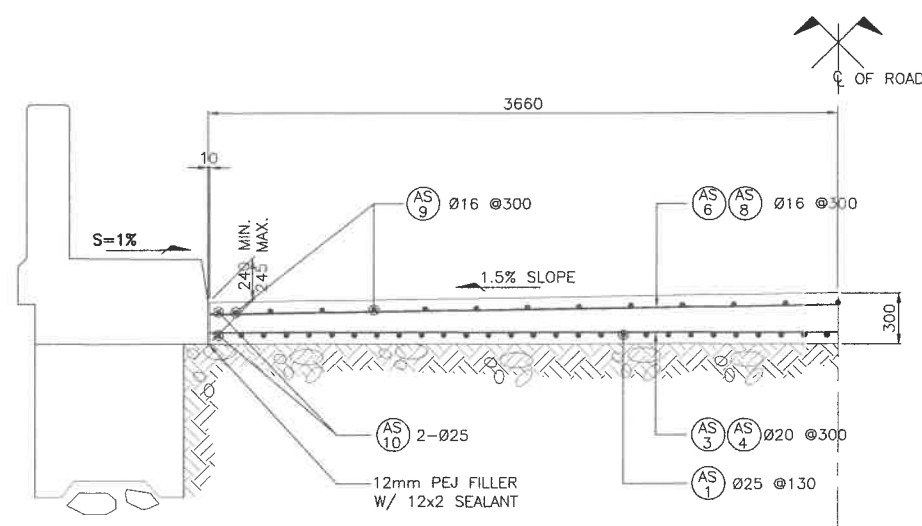
4 SECTION
SCALE: 1:15

TYPICAL DRAIN DETAILS
SC: AS SHOWN

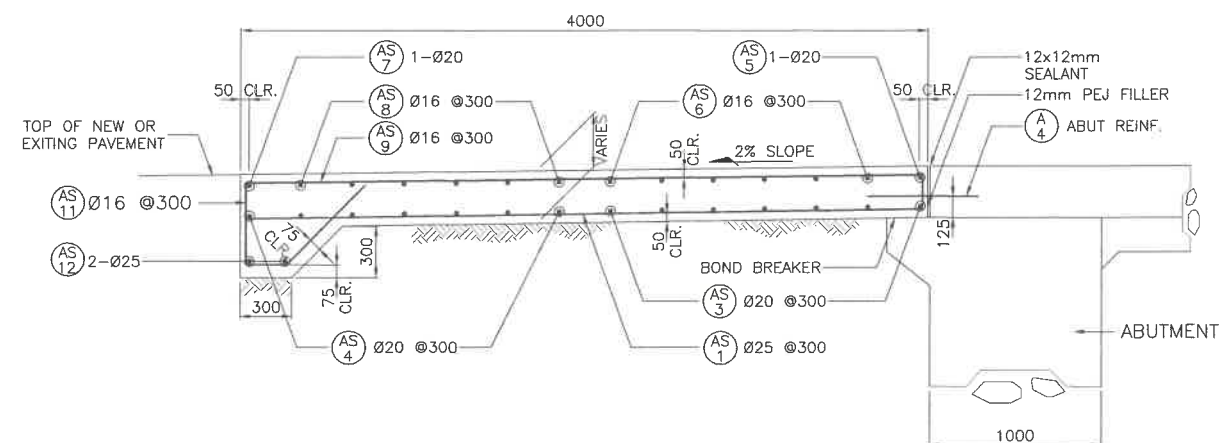
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=10-10-10M	SHEET CONTENTS: TYPICAL SIDEWALK AND DRAIN DETAILS	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER II CHECKED: WILHELMINA L. ANCHETA ENGINEER IV CADD: ROLANDO C. MEDIANTE DRAFTSMAN	SUBMITTED: BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: ARISTARCO M. DOROS OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(10) 10/13
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1 PLAN
SC: 1:40



2 SECTION
SC: 1:20

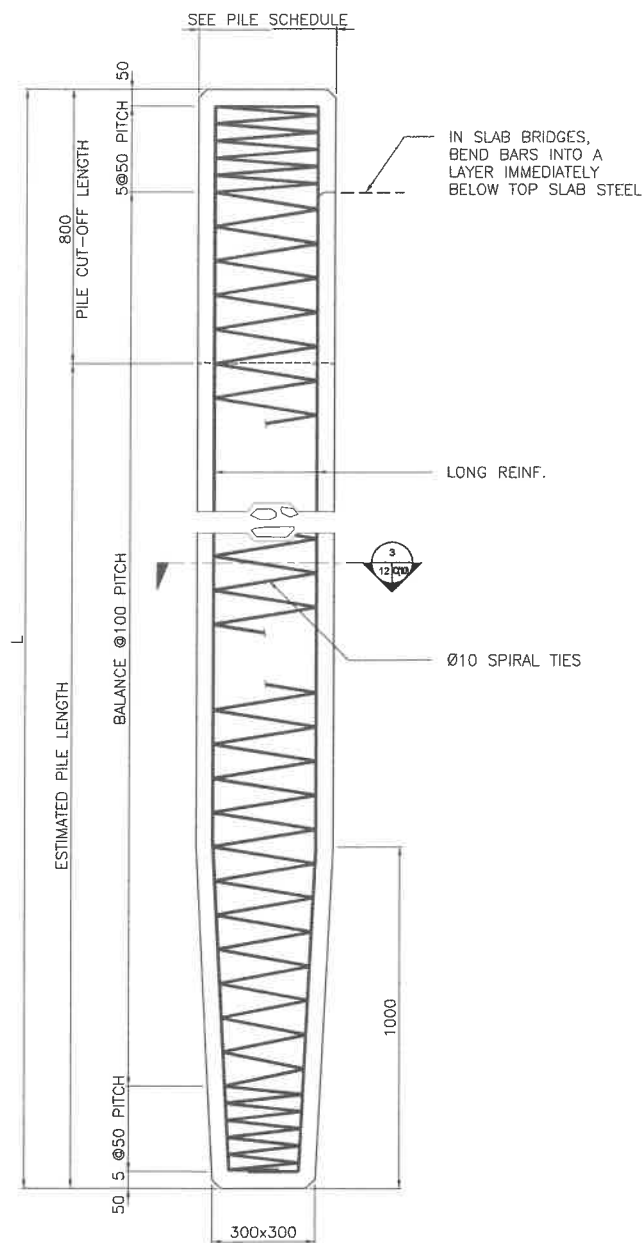


3 SECTION
SC: 1:20

REINFORCEMENT SCHEDULE AND ESTIMATED QUANTITIES FOR APPROACH SLAB

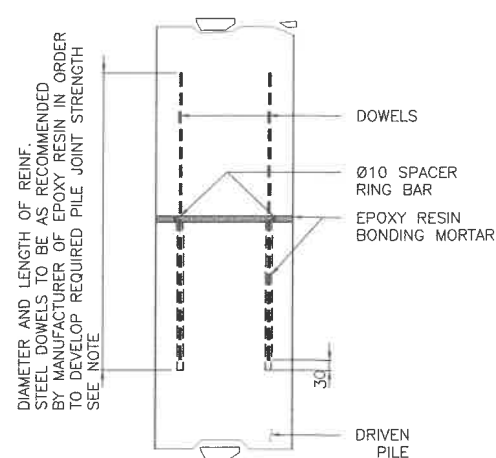
REINFORCEMENT														
BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF BARS)	BAR MARK	BAR SIZE (mm)	QTY	SPACING (mm)	BAR SHAPE	BAR DIMENSIONS (mm)			LENGTH PER BAR(m)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)	CONCRETE VOLUME (m³)	REMARKS
						a	b	c						
	AS 1	25	56	130	(B)	3900	150	-	4.07	227.92	3.853	877.18	1. QUANTITIES ARE FOR ONE (1) APPROACH SLAB	
	AS 2	25	4	130	(B)	2690 MIN 3412 MAX	150	-	3.56	14.25	3.853	54.87		
	AS 3	20	7	300	(A)	7221 MIN 7869 MAX	-	-	7.87	55.08	2.466	135.85		
	AS 4	20	7	300	(A)	7920	-	-	7.92	55.44	2.466	136.72		
	AS 5	20	1	AS SHOWN	(A)	7221	-	-	7.22	7.22	2.466	17.81		
	AS 6	16	6	300	(A)	7221 MIN 7869 MAX	-	-	7.87	47.21	1.578	74.51		
	AS 7	20	1	AS SHOWN	(A)	7920	-	-	7.92	7.92	2.466	19.53		
	AS 8	16	6	300	(A)	720	-	-	7.92	47.52	1.578	74.99		
	AS 9	16	25	300	(B)	3920	150	-	4.07	101.75	1.578	160.56		
	AS 10	25	4	AS SHOWN	(C)	2000	1951	-	3.95	15.8	3.853	60.88		
	AS 11	16	27	300	(D)	415 MIN 475 MAX	240	656	1.77	47.82	1.578	75.41		
	AS 12	25	2	AS SHOWN	(A)	7920	-	-	7.92	15.84	3.853	61.03		
										GRAND TOTAL =	1750.33	8.48		
										(GRAND TOTAL GRADE 40)	0.00	0.00	0.000	
										(GRAND TOTAL GRADE 60)	1750.33	0.00	0.000	

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE:	SHEET CONTENTS:	DESIGNED:	SUBMITTED:	RECOMMENDING APPROVAL:	APPROVED:	SET NO.	SHEET NO.
	STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=10-10-10M	TYPICAL APPROACH SLAB DETAIL	JOHN ROBERT A. MENDOZA ENGINEER II	WILSON M. L. ANCHETA ENGINEER IV	SEE COVER SHEET	SEE COVER SHEET	BOD 2019-7	C(10) 11/13
			CADD:	ROLANDO C. MEDIANTE DRAFTSMAN I	BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	



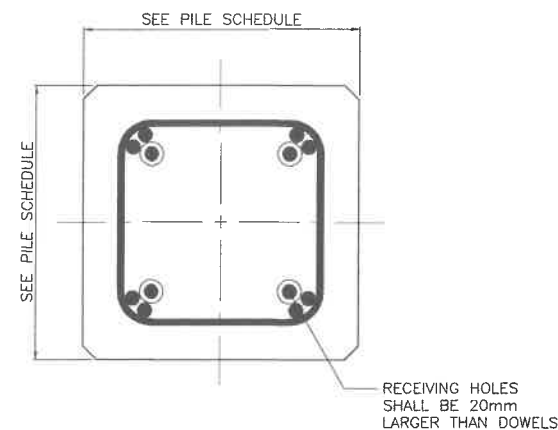
1 PILE ELEVATION
SCALE: NOT TO SCALE

PILE SCHEDULE		
SIZE (mm)	LONGITUDINAL REINFORCEMENT	
	QTY.	BAR SIZE
400x400	8	28
450x450	8	32

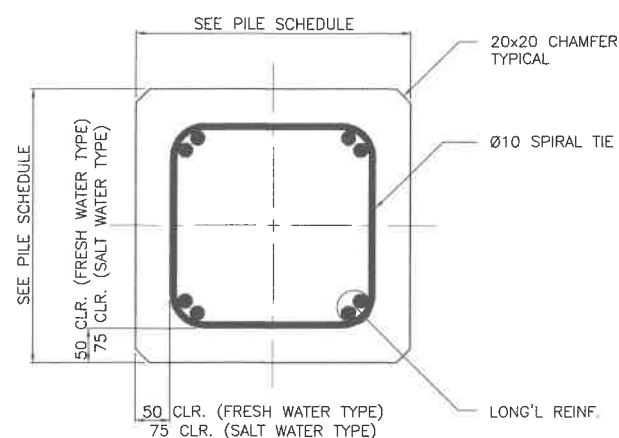


ELEVATION

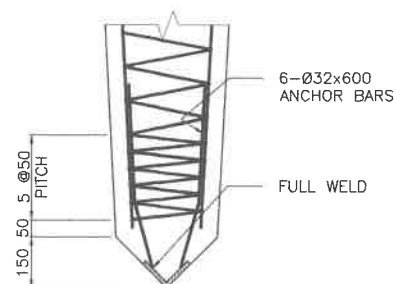
2 PILE SPLICE DETAIL
SCALE: TO NTS



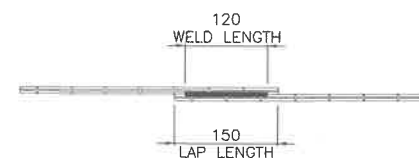
SECTION



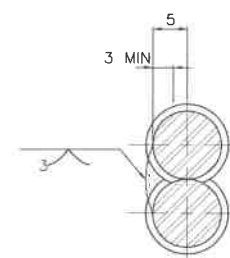
3 SECTION
SCALE: 1:5



4 PILE TIP FOR HARD DRIVING
SCALE: 1:10



ELEVATION



SECTION

5 WELDED SPIRAL-TIE DETAIL
SCALE: 1:10

SPECIFICATIONS:

- CONCRETE:**
CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF CLASS AA CONCRETE WITH 27.6 MPa CYLINDER STRENGTH AND 19.0mm MAXIMUM AGGREGATE SIZE
- REINFORCEMENT:**
 - REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO AASHTO M31 (ASTM A615) WITH MINIMUM YIELD STRENGTH AS FOLLOWS:
Fy = 414 MPa (Gr.60) FOR 16mmØ AND LARGER
Fy = 276 MPa (Gr.40) FOR 12mmØ AND SMALLER
 - SPLICES OF ADJACENT LONGITUDINAL STEEL SHALL BE STAGGERED 100 BAR DIAMETERS APART. LENGTH OF SPLICES SHALL BE 1000mm FOR Ø25 AND 1300mm FOR Ø28 AND 1700mm FOR Ø32.
- DRIVING:**
 - PILE HEADS SHALL BE PROTECTED FROM DIRECT IMPACT OF THE HAMMER BY CUSHION BLOCKS CONSISTING OF SEVERAL BLOCKS OF WOOD OR OF OTHER APPROVED MATERIALS.
 - PILE SHALL BE DRIVEN TO A DEPTH THAT WILL PRODUCE THE REQUIRED ALLOWABLE BEARING CAPACITY..
- PILE FOUNDATION DESIGN:**
 - N PILE-BENT PIERS, PILE LENGTHS SHALL BE DETERMINED BY THE ENGINEER/CONSULTANT BASED ON THE ALLOWABLE PILE BEARING CAPACITY SPECIFIED BELOW
 - IN COLUMN-BENT PIERS, THE NUMBER, LOCATION AND LENGTH OF PILES SHALL BE DETERMINED BY THE ENGINEERS/ CONSULTANT BASED ON THE LOADING INFORMATION GIVEN IN THE PIER DETAILS.
- PILE SPLICE:**
 - PILES MAY BE SPLICED ONLY IF STRICTLY NECESSARY AND APPROVED BY THE ENGINEER
 - PILE SPLICES SHALL BE LOCATED AT LEAST 10m BELOW THE EXISTING GROUND LEVEL
 - PILE SPLICES SHALL BE STAGGERED WITH AT LEAST 2.0m APART.
- ALLOWABLE PILE BEARING CAPACITY:**

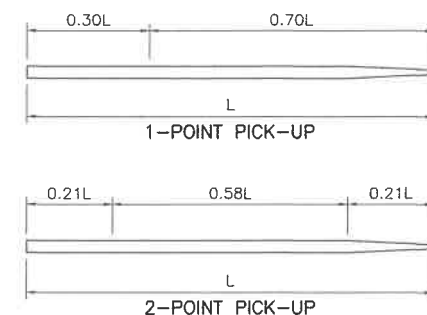
500 kN PER PILE (FOR 400x400 PILE)
700 kN PER PILE (FOR 450x450 PILE)
- MINIMUM HAMMER ENERGY RATING = 55 kN-m**
- BASIS FOR COMPUTING ALLOWABLE PILE BEARING CAPACITY:**

$$P_{all} = \left(\frac{167 eH_e F_H U}{S + 2.54} \right) \left(\frac{W_r + 0.16 W_p}{W_r + W_p} \right)$$

WHERE:

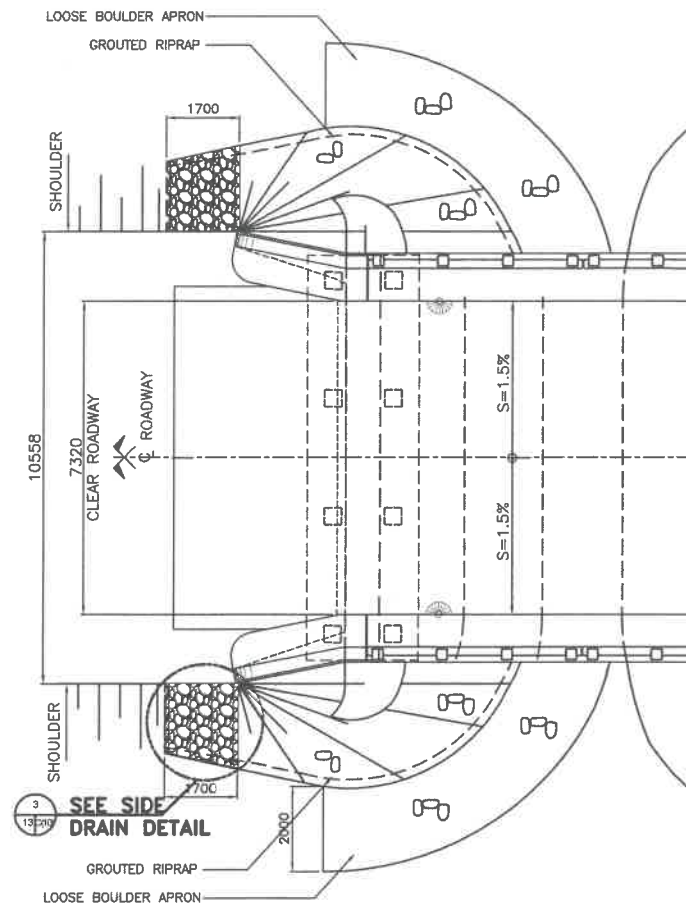
P_{all} = ALLOWABLE PILE BEARING CAPACITY (kN)
eH = HAMMER EFFICIENCY
EH = HAMMER ENERGY RATING (kN-m)
W_r = WEIGHT OF RAM (kN)
W_p = WEIGHT OF PILE AND OTHER DRIVEN WEIGHTS (kN)
S = AVERAGE PENETRATION PER BLOW FOR THE LAST 150mm OF DRIVING (mm)

- TEST PILES:**
TEST PILES SHALL BE DRIVEN WITH THE SAME HAMMER USED FOR DRIVING REGULAR PILES AND MAY BE PART OF FOUNDATION IF APPROVED BY THE ENGINEER.
- PICK-UP POINTS:**
PICK-UP POINTS SHALL BE MARKED ON ALL PILES AND ALL LIFTING SHALL BE DONE AT THESE POINTS.

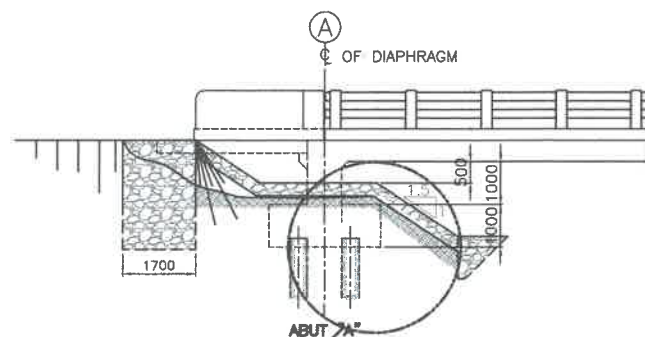


THE USE OF SPECIAL EMBEDDED OR ATTACHED LIFTING DEVICES SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

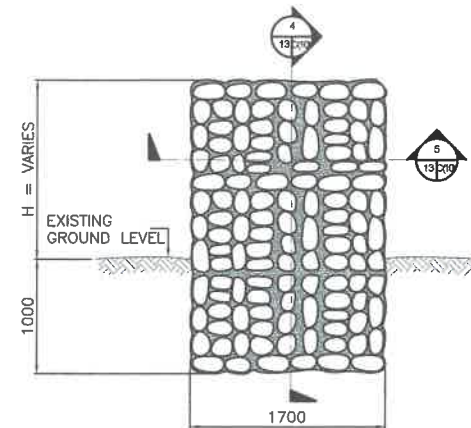
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=10-10-10M	SHEET CONTENTS: TYPICAL PRECAST CONCRETE PILE DETAIL	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER II	LARA MARISSE T. INQUITO ENGINEER II	SUBMITTED: BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: ARISTARCO M. DOROS OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(10) 12 13
			CHECKED: WILHELMINA L. ANCHETA ENGINEER IV						
			CADD: ROLANDO C. MEDIANTE DRAFTSMAN I						



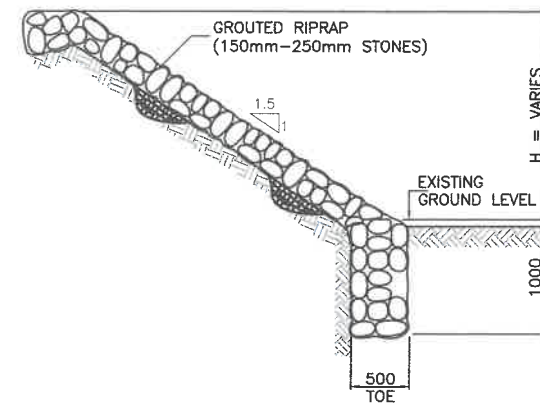
1 PLAN
SCALE: 1:80



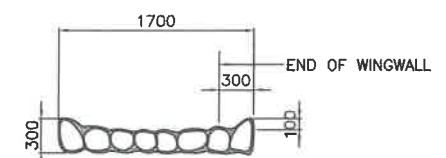
2 ELEVATION
SCALE: 1:80



3 ELEVATION
SCALE: 1:80

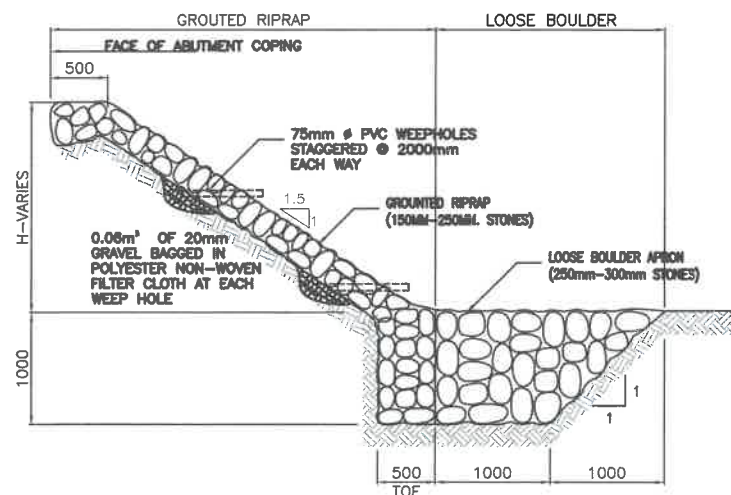


4 ELEVATION
SCALE: 1:80

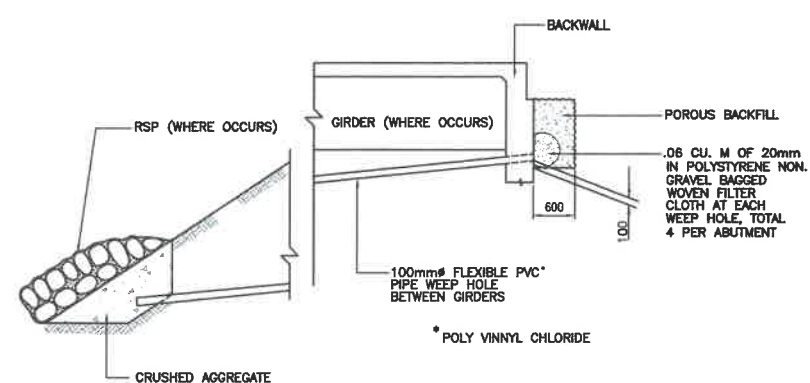


5 ELEVATION
SCALE: 1:30

SIDE DRAIN DETAILS
SCALE: AS SHOWN



6 RIPRAP DETAIL
SCALE: 1:30



7 ABUTMENT DRAINAGE
SCALE: 1:30

ABUTMENT RIPRAP CONSTRUCTION PROCEDURE:

1. THE BED FOR RIPRAP SHALL BE EXCAVATED TO THE REQUIRED DEPTHS AND PROPERLY COMPACTED, TRIMMED AND SHAPED.
2. THE RIPRAP SHALL BE FOUNDED IN A TOE TRENCH DUG BELOW THE DEPTH OF SCOUR AS SHOWN ON PLANS OR AS ORDERED BY THE ENGINEER. THE TOE TRENCH SHALL BE FILLED WITH STONE OF THE SAME CLASS AS THAT SPECIFIED FOR THE RIPRAP, UNLESS OTHERWISE SPECIFIED.
3. STONES SHALL BE PLACED BY HAND OR INDIVIDUALLY BY MACHINES. THEY SHALL BE LAID WITH CLOSE, BROKEN JOINTS AND SHALL BE FIRMLY BEDDED INTO THE SLOPE AND AGAINST THE ADJOINING STONES. EACH STONE SHALL BE LAID WITH EACH ADJACENT STONE. THE RIPRAP SHALL BE THOROUGHLY RAMMED INTO PLACE AS CONSTRUCTION PROGRESSES AND THE FINISHED SURFACE SHALL PRESENT AN EVEN, TIGHT SURFACE. INTERSTICES BETWEEN STONES SHALL BE FILLED WITH SMALL BROKEN FRAGMENTS FIRMLY RAMMED INTO PLACE.
4. THE SPACES BETWEEN THE STONES SHALL THEN BE FILLED WITH CEMENT MORTAR AS SPECIFIED IN SUBSECTION 504 2.3. MORTAR SHALL BE USED TO COMPLETELY FILL ALL VOIDS, EXCEPT THAT THE FACE SURFACE OF THE STONES SHALL BE LEFT EXPOSED.
5. GROUT SHALL BE PLACED FROM BOTTOM TO TOP OF THE SURFACE SWEEPED WITH STIFF BROOM. AFTER GROUTING IS COMPLETED, THE SURFACE SHALL BE CURED AS SPECIFIED IN ITEM 405, STRUCTURAL CONCRETE FOR A PERIOD OF AT LEAST THREE DAYS.

NOTE:

ABUTMENT DRAINAGE SHALL BE PROVIDED BEHIND ABUTMENTS, POROUS BACKFILL SHALL EXTEND LATERALLY THE FULL LENGTH OF THE BACK WALL.

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=10-10-10M	SHEET CONTENTS: ABUTMENT SLOPE PROTECTION AND DRAINAGE AND ABUTMENT RIPRAP CONSTRUCTION PROCEDURE	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER CHECKED: WILHEMINA L. ANCHETA ENGINEER DRAWN: ROLANZ S. MEDIANTE DRAFTSMAN	SUBMITTED: BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD SHEET NO. C(10) 13 13
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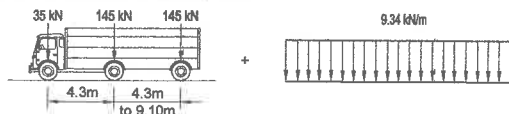
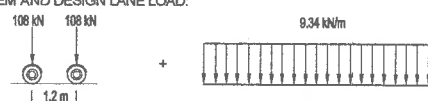
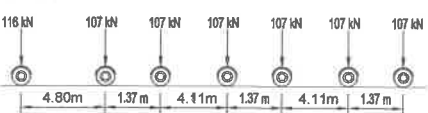
STANDARD MULTIPLE SPAN 12M

GENERAL NOTES

GENERAL

- IN THE INTERPRETATION OF DRAWINGS, INDICATED DIMENSIONS SHALL GOVERN. ALL DIMENSIONS, DISTANCES AND SIZES SHALL NOT BE SCALED FOR CONSTRUCTION PURPOSES.
- UNLESS OTHERWISE INDICATED, ALL DIMENSIONS AND MEMBER SIZES ARE IN MILLIMETERS.
- STATIONINGS ARE IN KILOMETERS + METERS. ELEVATIONS ARE IN METERS.

DESIGN CRITERIA

- DESIGN SPECIFICATION
 - DPWH DESIGN GUIDELINES CRITERIA AND STANDARDS (DGCS), 2015 EDITION, VOLUME 5 - BRIDGE DESIGN.
- LOADINGS
 - DEAD LOAD: WEIGHT OF THE STRUCTURE AND AN ALLOWANCE OF 1.10 kPa FOR FUTURE BITUMINOUS WEARING COURSE.
 - LIVE LOAD: HL - 93
 - DESIGN TRUCK AND DESIGN LANE LOAD:
 
 - DESIGN TANDUM AND DESIGN LANE LOAD:
 
 - PERMIT DESIGN LIVE LOAD: CALTRANS P-7 (SPECIAL PERMIT REQUIRED BEFORE PASSING THE BRIDGE)
 
- DYNAMIC LOAD ALLOWANCE (TABLE 10.8-1): IN ACCORDANCE WITH DGCS, VOLUME 5 - BRIDGE DESIGN
- PEDESTRIAN LOADS: 3.60 kPa
- SEISMIC LOAD: IN ACCORDANCE WITH DPWH- LRFD BRIDGE SEISMIC DESIGN SPECIFICATIONS (BSDS) 1st EDITION, 2013
- OTHER LOADING IN ACCORDANCE WITH DGCS, VOLUME 5 - BRIDGE DESIGN

MATERIALS

1. CONCRETE

UNLESS OTHERWISE INDICATED, THE CONCRETE CLASS AND STRENGTH SHALL BE AS FOLLOWS:

STRUCTURAL MEMBER	CLASS	28-DAY CYLINDER STRENGTH MPa	MAX. SIZE OF COARSE AGGREGATE mm (in.)
WINGWALLS, BACKWALLS, COPING COLUMNS, FOOTINGS	A	27.58	20
SLAB	A	27.58	20
PRECAST R.C. PILE	C	27.58	25
THIN REINFORCED SECTIONS RAILING AND RAILPOST	C	27.58	12
LEAN CONCRETE	B	16.50	38

2. REINFORCEMENT STEEL

- REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO AASHTO M31 (ASTM A615). WITH MINIMUM YIELD STRENGTH AS FOLLOWS:
 $F_y = 414 \text{ MPa (Gr.60)}$ FOR 16mmØ AND LARGER
 $F_y = 276 \text{ MPa (Gr.40)}$ FOR 12mmØ AND SMALLER
- REINFORCING STEEL BARS SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCE WHICH WILL WEAKEN THE BOND WITH CONCRETE.

CONSTRUCTION

1. SPECIFICATION

STANDARD SPECIFICATIONS, 2013 EDITION VOLUME II - HIGHWAYS, BRIDGES AND AIRPORTS

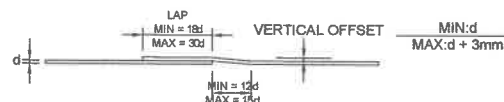
2. SETTING OUT

THE SETTING OUT AND THE ELEVATIONS OF THE DIFFERENT COMPONENTS OF THE STRUCTURE SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE START OF ANY CONSTRUCTION WORK.

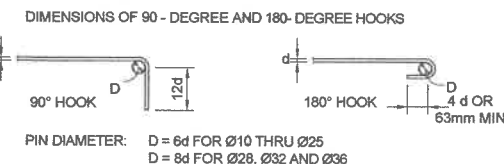
3. REINFORCED CONCRETE

- CONCRETE MIX AND PLACING
 - DESIGN OF CONCRETE MIX SHALL MEET THE DESIGN CONCRETE STRENGTH GIVEN UNDER ITEM 1 OF MATERIALS.
 - CONCRETE SHALL BE DEPOSITED, VIBRATED AND CURED IN ACCORDANCE WITH THE SPECIFICATIONS.
 - FOR CONCRETE DEPOSITED AGAINST THE GROUND, LEAN CONCRETE WITH A MINIMUM THICKNESS OF 50mm SHALL LAID FIRST BEFORE INSTALLING THE REINFORCEMENT. THE LEAN CONCRETE SHALL NOT BE CONSIDERED IN MEASURING THE STRUCTURAL DEPTH OF CONCRETE SECTION.
 - THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL PLACING SEQUENCES FOR ALL CONCRETING WORKS.
- BAR BENDING, SPLICING AND PLACING
 - SHOP DRAWINGS OF ALL REINFORCING BARS INDICATING THE BENDING, CUTTING, SPLICING AND INSTALLATION SHALL BE SUBMITTED BY THE CONTRACTOR TO THE ENGINEER FOR APPROVAL.
 - BARS SHALL BE BENT COLD. BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT UNLESS PERMITTED BY THE ENGINEER.
 - BAR SPLICING NOT INDICATED ON DRAWINGS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
 - WELDED SPLICES, IF APPROVED BY THE ENGINEER, SHALL DEVELOP IN TENSION AT LEAST 125% OF THE SPECIFIED YIELD STRENGTH OF THE BARS.
 - NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION SHALL BE SPLICED.
 - UNLESS OTHERWISE SHOWN ON DRAWINGS, THE CLEAR DISTANCE BETWEEN PARALLEL BARS IN A LAYER SHALL NOT BE LESS THAN 1.5 TIMES THE NOMINAL DIAMETER OF THE BAR NOR LESS THAN 1.5 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE. THE CLEAR DISTANCE BETWEEN LAYERS SHALL NOT BE LESS THAN 25mm NOR ONE BAR DIAMETER. THE BARS IN THE UPPER LAYER SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE BOTTOM LAYER.

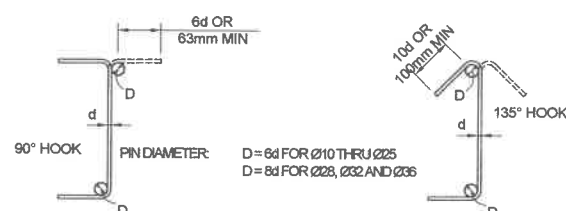
(b.7) CRANKED SPLICES



(b.8) HOOKS AND BENDS



DIMENSIONS FOR STIRRUPS AND THE HOOKS



- CONCRETE COVER TO REINFORCEMENT UNLESS OTHERWISE INDICATED, CONCRETE COVER TO REINFORCEMENT SHALL BE AS FOLLOWS:

STRUCTURAL MEMBER	CLEAR COVER (mm)
TOP OF SLAB	50
COLUMNS / SHAFT, FOOTINGS & WINGWALLS	75
BOTTOM OF SLAB & RAILINGS	25
RC PILES	AS SHOWN

d) CONSTRUCTION JOINT

- THE POSITION AND FORM OF ANY CONSTRUCTION JOINT SHALL BE AS SHOWN ON DRAWINGS OR AS AGREED WITH THE ENGINEER.
- THE INTERFACE BETWEEN THE FIRST AND SECOND POUR CONCRETES SHALL BE ROUGHENED WITH AN AMPLITUDE OF 6mm MINIMUM.

e. FALSEWORK

ALL FALSEWORK SHALL BE DESIGNED BY THE CONTRACTOR SUBJECT TO THE APPROVAL BY THE ENGINEER.

f. FORMWORKS

FORMWORKS SHALL BE CONSTRUCTED SUCH THAT IT WILL NOT YIELD UNDER THE LOAD AND SHALL BE SUCH AS TO AVOID THE FORMATION OF FINS. ALL CORNERS OF CONCRETE MEMBERS SHALL BE CHAMFERED TO 20mm UNLESS NOTED OTHERWISE ON DRAWINGS. STRIPPING OF FORMS AND SHORES SHALL BE AS DESIGNATED BY THE ENGINEER. THE FOLLOWING MAYBE USED AS A GUIDE:

	MIN. TIME
SHORING UNDER GIRDERS, BEAMS, FRAMES.	14 DAYS
DECK SLABS.	14 DAYS
WALLS.	14 DAYS
COLUMNS / SHAFT.	7 DAYS
SIDES OF BEAMS AND ALL OTHER VERTICAL SURFACES.	7 DAYS
	2 DAYS

g. PROTECTION AND CURING OF CONCRETE

CONCRETE SURFACES SHALL BE PROTECTED FROM HARMFUL EFFECTS OF SUN, WIND AND RUNNING WATERS AND SHALL BE KEPT DAMP FOR AT LEAST 7 DAYS.

4. SHORING

CAMBER FOR REINFORCED CONCRETE SUPERSTRUCTURES WERE DETERMINED BASED ON THE USE OF SHORING DURING CONSTRUCTION.

5. EMBANKMENT CONSTRUCTION SEQUENCE

APPROACH EMBANKMENT SHALL BE CONSTRUCTED PRIOR TO DRIVING OF ABUTMENT PILES.

SYMBOLS

LINE OF SYMMETRY OR SIMILARITY

NORTH ARROW

INDICATION OF ELEVATION

LIMITS OF DIMENSION

SECTION IN WATER

SECTION IN EARTH

SECTION IN STRUCTURAL STEEL

SECTION IN CONCRETE

SECTION IN EXISTING CONCRETE STRUCTURE

ELASTOMERIC BEARING PAD

BITUMINOUS WEARING SURFACE ON BRIDGES

PLAN VIEW AND ELEVATION OF CUT & FILL SLOPES

PLAN VIEW OF SLOPE PROTECTION

PLAN VIEW OF GROUTED RIPRAP ON SLOPE

BUNDLED BARS

SET NO. BUREAU OF DESIGN

YEAR-DWG SET NO. BRIDGES DIVISION

SHEET CONTENT STANDARD CODE (SPAN LENGTH)

PAGE No. TOTAL NO. OF SHEET

TITLE TARGET

DRAWING NO.

PAGE No. STANDARD CODE (SPAN LENGTH)

SECTION LINE

DRAWING NO.

PAGE No. STANDARD CODE (SPAN LENGTH)

ROUND

SQUARE

AT

AND

CENTERLINE

PL PLATE

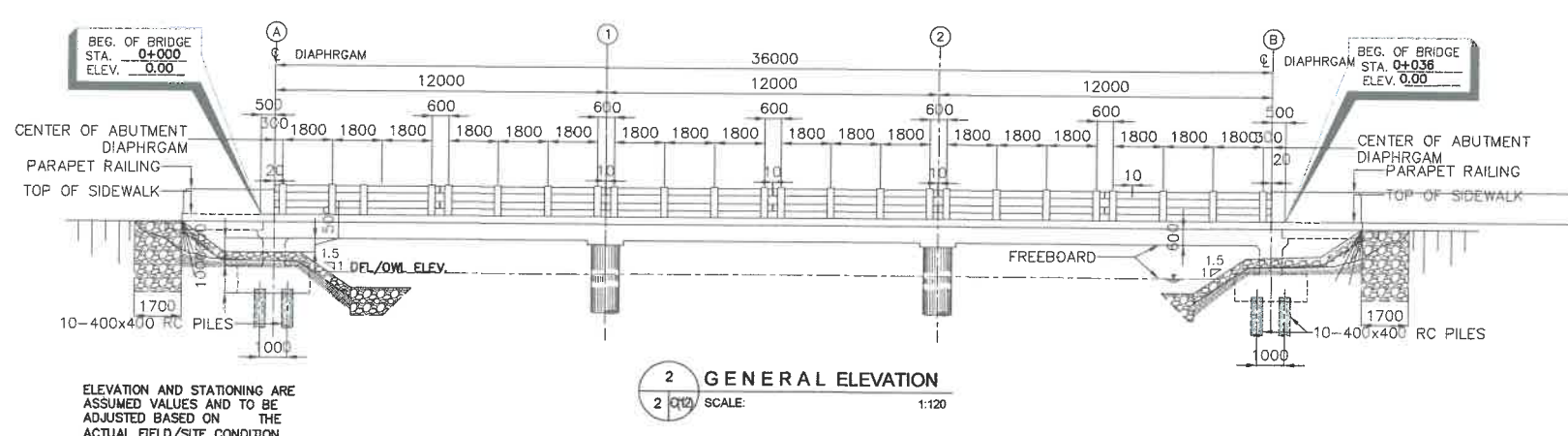
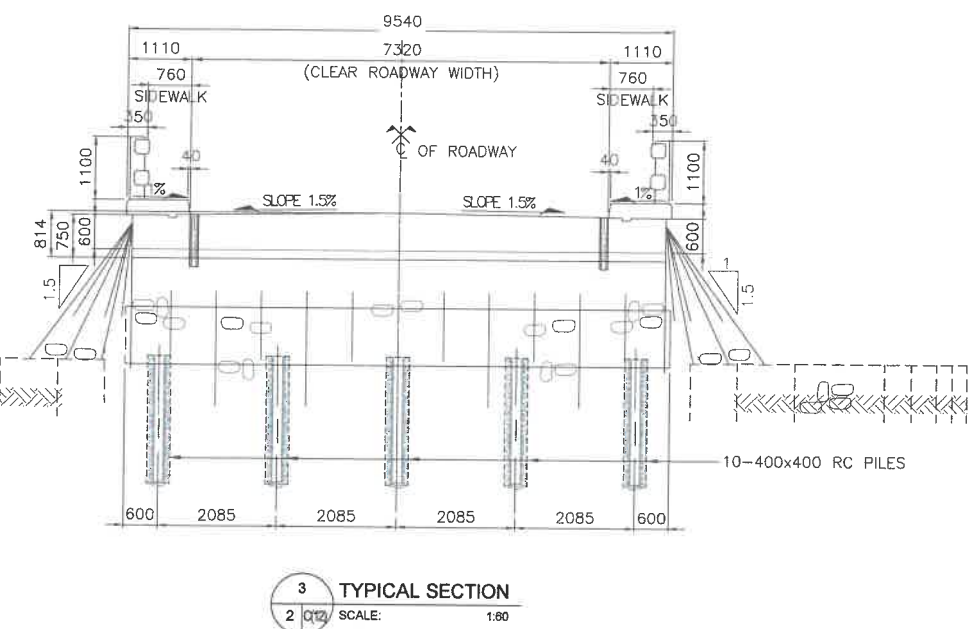
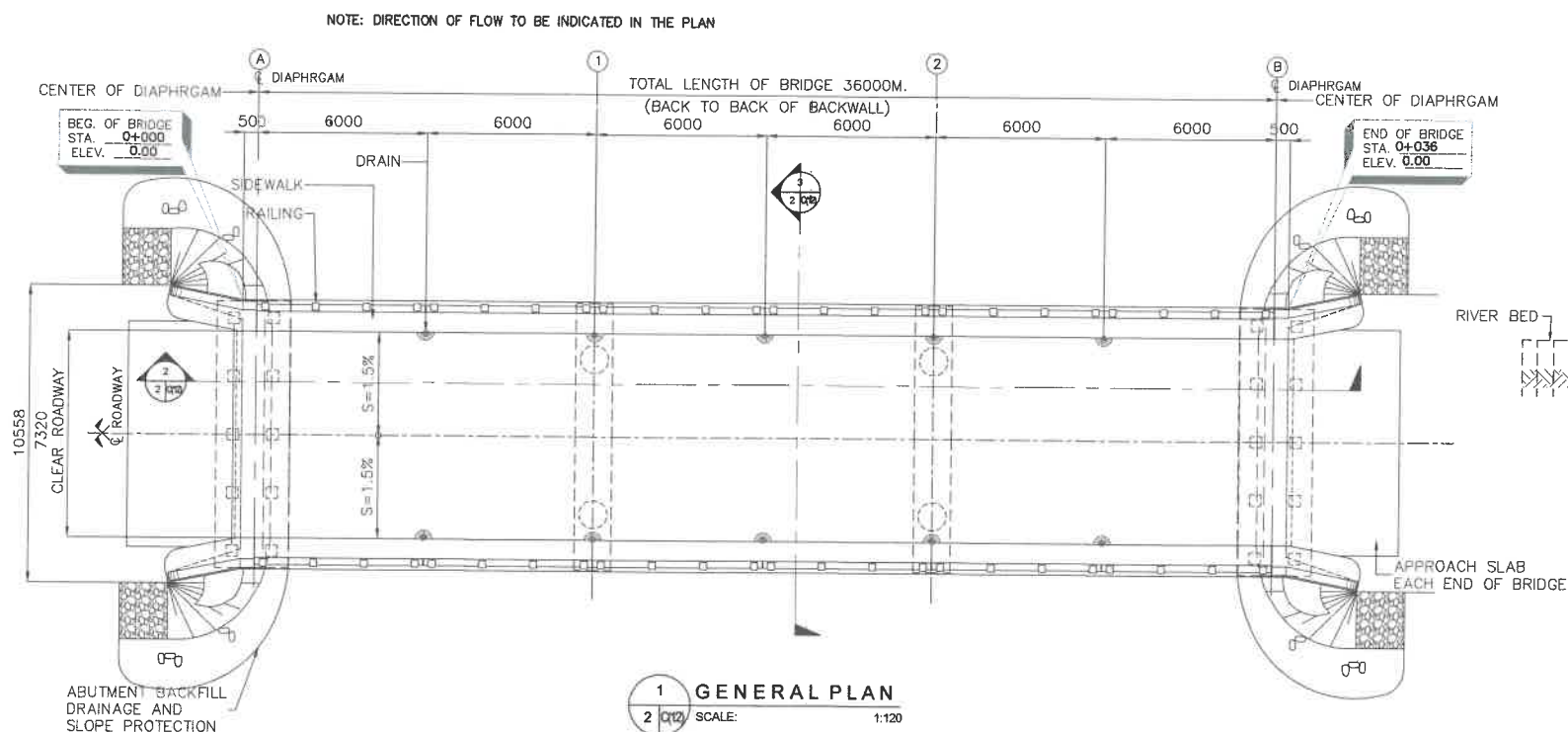
L ANGLE SHAPE

C/C, C to C CENTER TO CENTER

ABBREVIATIONS

ABT	ABOUT	kPa	KILOPASCAL
ABUT	ABUTMENT	m	METER
BEG	BEGINNING	mm	MILLIMETER
BET	BETWEEN	MAX	MAXIMUM
BOTT	BOTTOM	MFWL	MAX. FLOOD WATER LEVEL
BR	BRIDGE	MIN	MINIMUM
BRG	BEARING	MO	MIDDLE ORIGINATE
CLR	CLEAR	MPa	MEGAPASCAL
cm	CENTIMETER	N	NEWTON
COLE	COLUMN	NF	NEAR FACE
CONC	CONCRETE	No.	NUMBER
CONST	CONSTRUCTION	O.C.	ON CENTERS
CONT	CONTINUOUS	O.W.L	ORDINARY WATER LEVEL
CTR	CENTER	PEJ	PREMOULDED EXPANSION JOINT
DET	DETAIL	PVC	POLYVINYL CHLORIDE
DIA	DIAMETER	PVI	POINT OF VERTICAL INTERSECTION
DIAPH	DIAPHRAGM	QTY	QUANTITY
DWG	DRAWING	R	RADIUS
EA	EACH	RC	REINFORCED CONCRETE
EF	EACH FACE	RDWY	ROADWAY
ELEV	ELEVATION	REINF	REINFORCEMENT
ENGR	ENGINEER	SDWK	SIDEWALK
EQ	EQUAL	SL	SLOPE
EW	EACHWAY	SP	SPIRAL
EXP	EXPANSION	SPCD	SPACED
EXT	EXTERIOR	SPCS	SPACES
EXIST	EXISTING	STD	STANDARD
FF	FAR FACE	STIR	STIRRUP
FTG	FOOTING	STA	STATION
GEN	GENERAL	STRUCT	STRUCTURE
HOR	HORIZONTAL	SYMM	SYMMETRY
HW	HIGH WATER	THK	THICK
INT	INTERIOR	TYP	TYPICAL
INTERM	INTERMEDIATE	VAR	VARIABLE
JT	JOINT	VERT	VERTICAL
L	LENGTH	VOL	VOLUME
LG	LONG	W	WIDTH
KG	KILOGRAM	W/	WITH
KN	KILONEWTON	&	AND

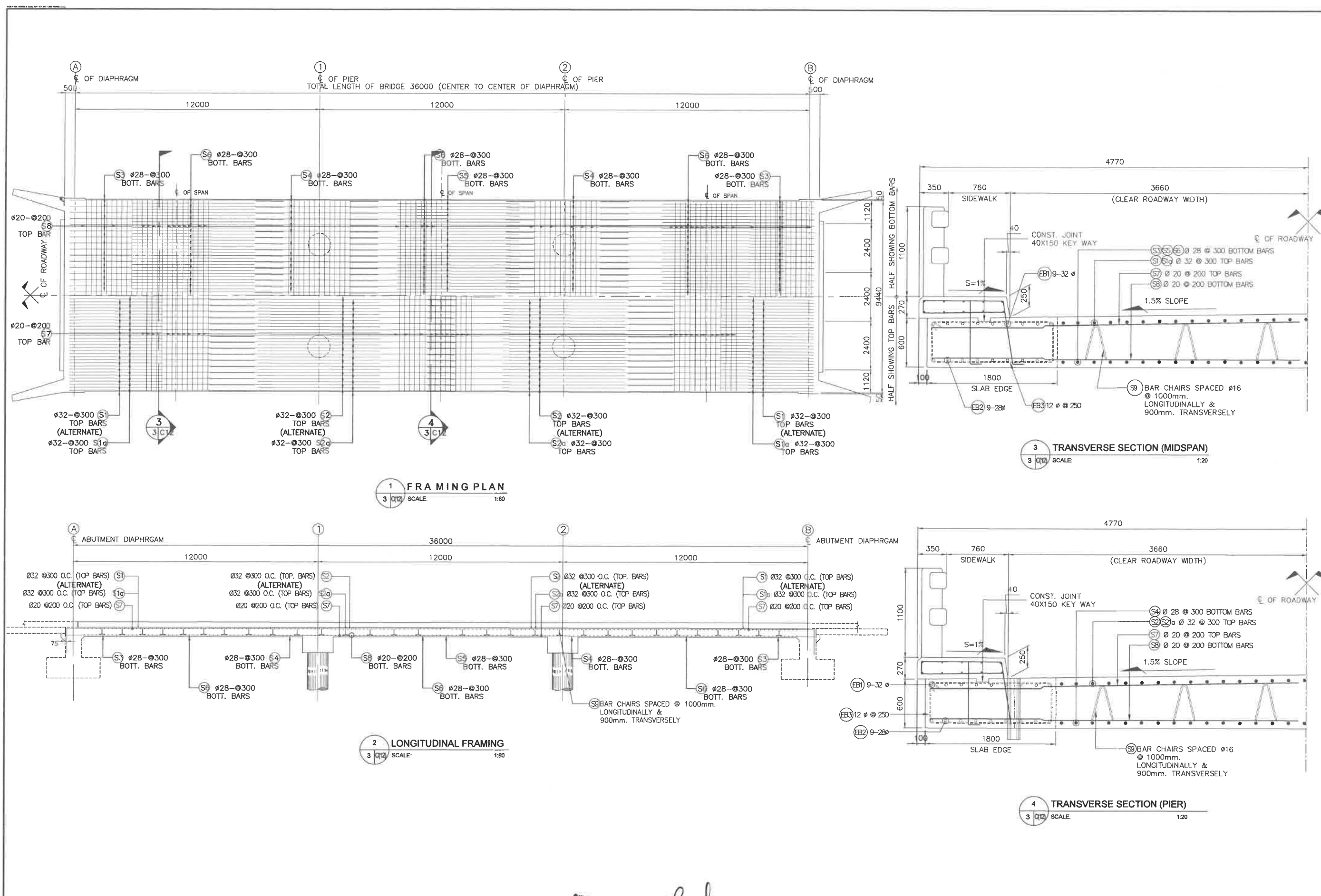
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	SHEET CONTENTS: GENERAL NOTES, SYMBOLS AND ABBREVIATIONS	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER II CHECKED: WILHELMINA L. ARCHETA ENGINEER IV CADD: ROLANDIS G. MEDIANTE DRAFTER I	SUBMITTED: BLESSILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: SEE COVER SHEET ARISTARCO M. DOROS OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: SEE COVER SHEET EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(12) 1/13
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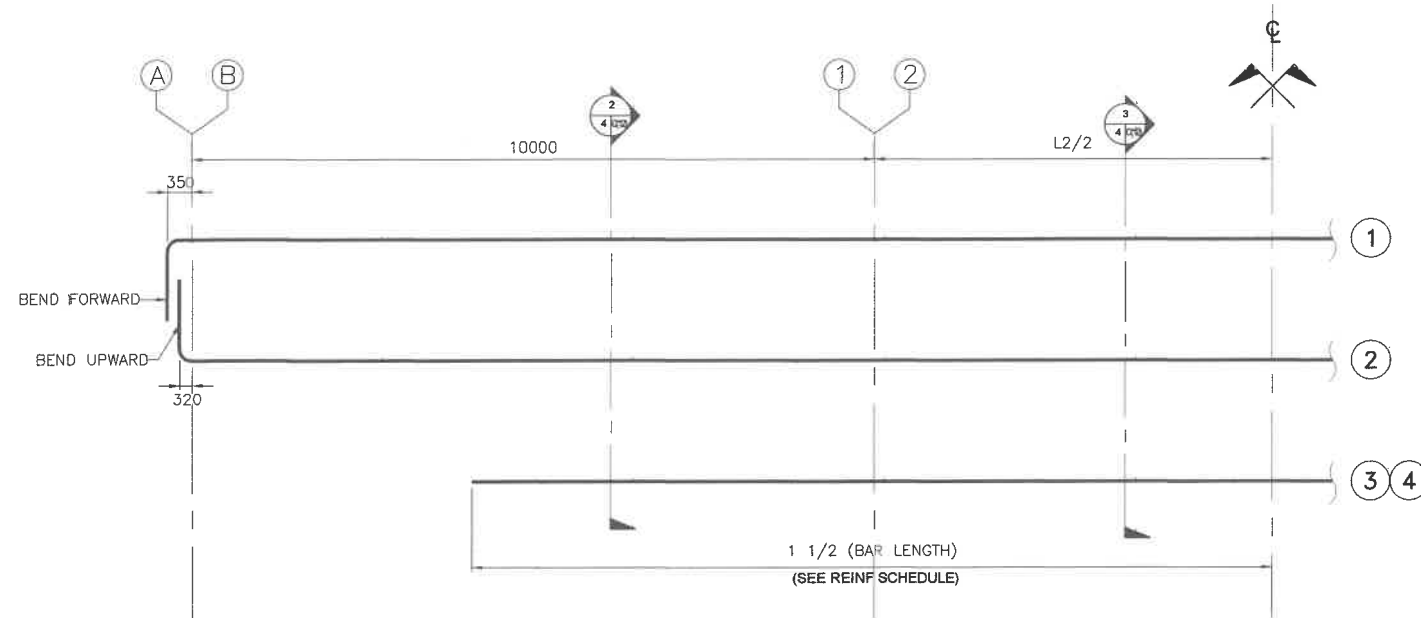
NOTES:

1. THIS STANDARD PLAN IS FOR REFERENCE ONLY. STRUCTURAL ANALYSIS SHALL BE PREPARED BASED ON THE ACTUAL SURVEY, HYDRAULIC, HYDROLOGIC AND GEOTECHNICAL DATA ON THE PROJECT SITE.
2. INDICATED STATIONING & ELEVATIONS ARE ASSUMED ONLY. VERIFY / REPLACE BASED ON ACTUAL LOCATION / SITE CONDITION.
3. FREE BOARD CLEARANCE :
1.5M. FOR RIVERS CARRYING DEBRIS
1.0M. FOR OTHERS BRIDGES
4. LEGEND:
OWL - ORDINARY WATER LEVEL
DFL - DESIGN FLOOD LEVEL
5. PROTECTION WORKS FOR ABUTMENTS SHALL BE DESIGNED BY THE ENGINEER/ CONSULTANT. THE PROTECTION WORKS SHOWN HEREIN ARE FOR ILLUSTRATIVE PURPOSES ONLY AND SHALL NOT BE CONSTRUED AS THE FINAL DETAILS. HOWEVER, SLOPE FOR EMBANKMENT PROTECTION WORKS SHALL BE 1.5:1 OR FLATTER.
6. LENGTH OF REINFORCED CONCRETE PILES SHALL BE DETERMINED/DESIGNED BASED ON THE ACTUAL BORING DATA AT LOCATION OF FOUNDATION.

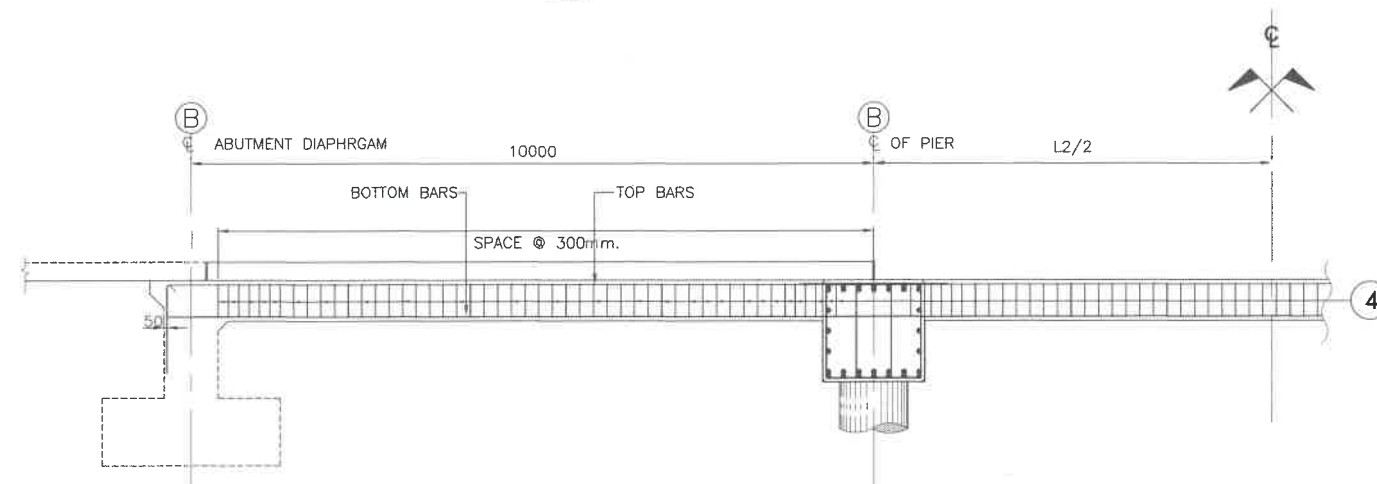
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	SHEET CONTENTS: GENERAL PLAN, GENERAL ELEVATION, TYPICAL SECTION, INDEX OF DRAWING & NOTES	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER I CHECKED: WILHELMINA L. ANCHETA ENGINEER II CADD: ROYAL C. MEDIANTE DRAFTSMAN I	SUBMITTED: BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: ARISTARCO M. DOROS OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. 800 2019-7 BrD	SHEET NO. C(12) 2 13
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REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	SHEET CONTENTS: FRAMING PLAN, LONGITUDINAL SECTION, TRANSVERSE SECTION	DESIGNED: <i>John Robert A. Mendoza</i> JOHN ROBERT A. MENDOZA ENGINEER II CHECKED: <i>Wilhelmina L. Ancheta</i> WILHEMINA L. ANCHETA ENGINEER IV CADD: <i>Rolando S. Dela Torre</i> ROLANDO S. DELA TORRE CADD	SUBMITTED: <i>Blesilda S. Ramos</i> BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: <i>Aristarco M. Doroy</i> ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: <i>Emil K. Sadain, CESO I</i> EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 Bd	SHEET NO. C(12) 3/13
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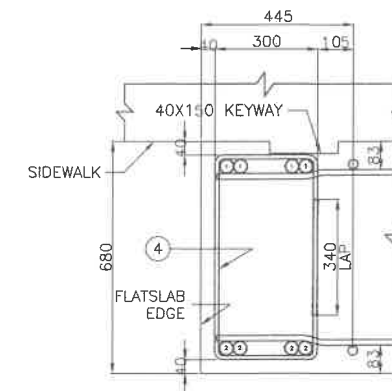


1 SCHEMATIC LAYOUT OF EDGE BEAM REINF.
SCALE: 1:50

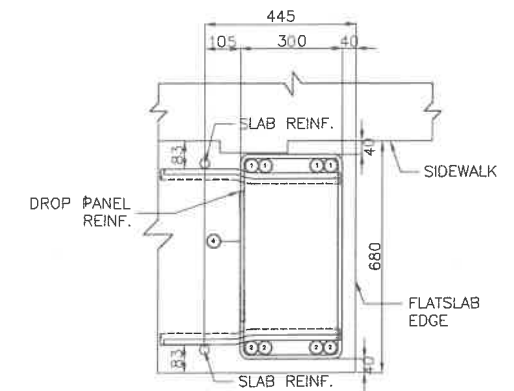


2 LONGITUDINAL SECTION
SCALE: 1:50

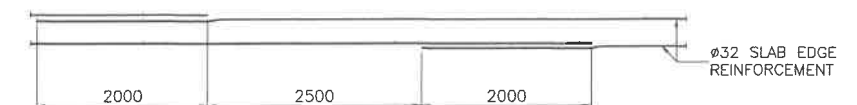
REINFORCEMENT COPING SCHEDULE AND ESTIMATED QUANTITIES												
REINFORCEMENT												
BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF BARS)	STRUCTURE COMPONENT	CONCRETE VOLUME M ³	BAR MARK	BAR SIZE (mm)	QTY	SPACING (mm)	BAR SHAPE	BAR DIMENSIONS (mm)				LENGTH EACH BAR (m)
								a	b	c	d	
	COPING	42.00	C1	32	56	AS SHOWN	A	9240	-	-	-	9.24
			C2	32	12	AS SHOWN	A	9240	-	-	-	9.24
			C3	12	128	300	C	964	1400	200	-	5.13
												GRADE 40
												582.87
												GRADE 60
												3966.58
												GRAND TOTAL =
												4549.45



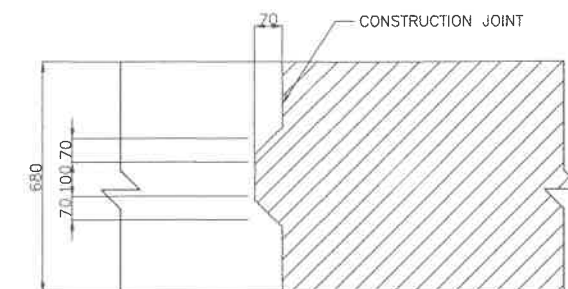
2 SECTION
SCALE: 1:10



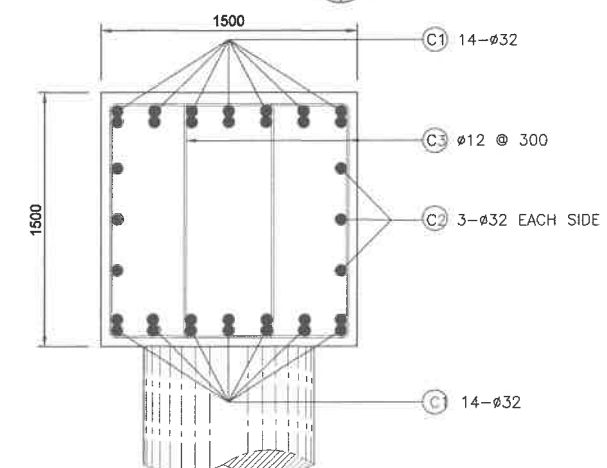
3 SECTION
SCALE: 1:10



4 TYPICAL SPLICE LAYOUT OF 2-BAR BUNDLE
SCALE: 1:40

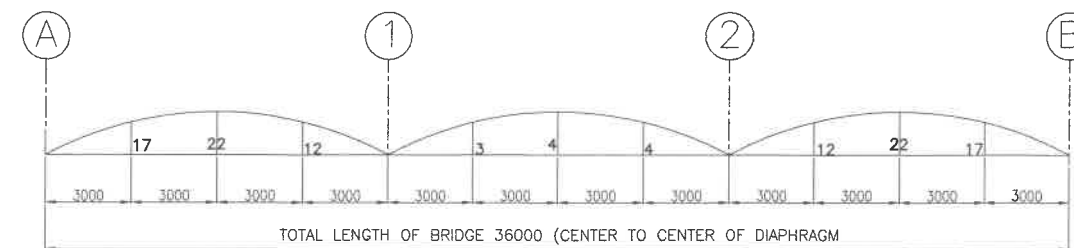
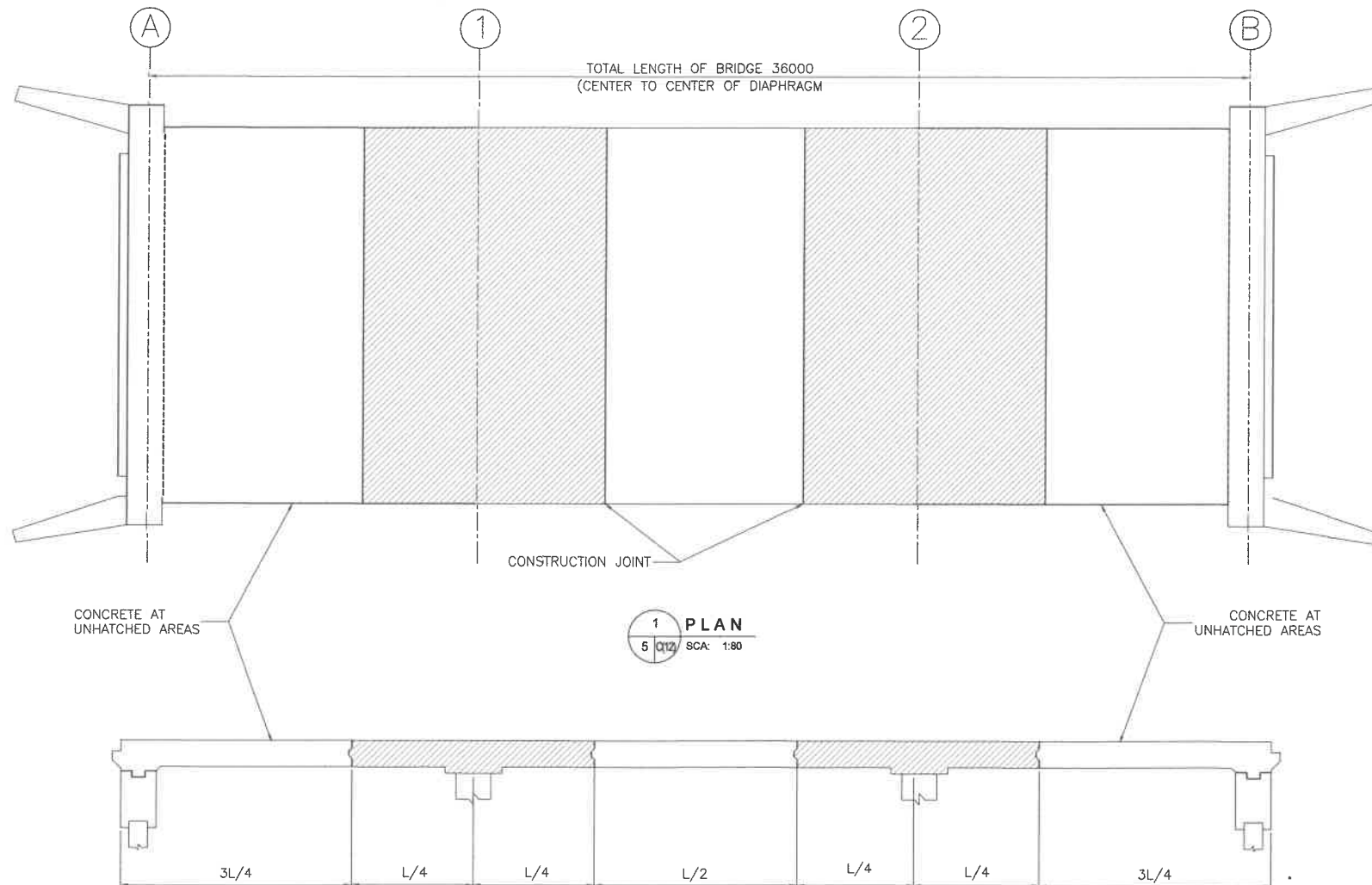


5 CONSTRUCTION JOINT
SCALE: 1:10



6 COPING DETAIL
SCALE: 1:20

	SHEET TITLE:	SHEET CONTENTS:	DESIGNED:	SUBMITTED:	RECOMMENDING APPROVAL:	APPROVED:	SET NO.	SHEET NO.	
	STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	SCHEMATIC LAYOUT OF FLAT SLAB EDGE REINF. LONGITUDINAL SECTION TYPICAL SPLICE LAYOUT OF 2-BAR BUNDLE	JOHN ROBERT A. MENDOZA ENGINEER II	 BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	SEE COVER SHEET ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	SEE COVER SHEET EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	BOD 2019-7 BrD	C(12) 4 13	
			CHECKED:						WILHELMINA L. ANCHETA ENGINEER IV
			CADD:						ROLANDO C. MEDIANTE ENGINEER II



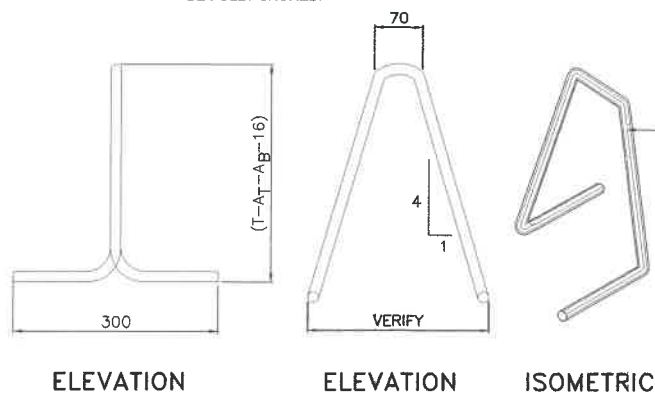
NOTE:
THE CAMBER SHOWN IN THE DIAGRAM IS THE AMOUNT OF CAMBER REQUIRED FOR DEAD LOAD DEFLECTION AND IN ADDITION TO THAT REQUIRED FOR CONFORMANCE WITH THE PROFILE OF THE HIGHWAY. PROPER ALLOWANCE SHALL BE MADE FOR THE DEFLECTION OF FALSEWORK.

NOTES:

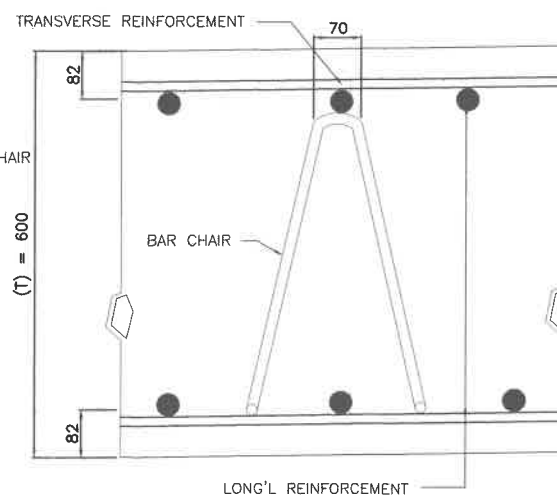
- CONCRETE AT HATCHED AREAS SHALL BE PLACED AT LEAST ONE DAY AHEAD OF CONCRETE AT UNHATCHED AREAS.
- REINFORCEMENT SHALL BE CONTINUOUS AT CONSTRUCTION JOINTS.
- CONSTRUCTION OF SUPERSTRUCTURE SHALL BE FULLY SHORED.

2 SECTION 5 Q12 SCALE: 1:80

CONCRETE POURING SEQUENCE SCALE: 1:80

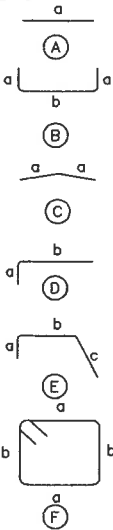
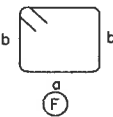


3 BAR CHAIR DETAIL 5 Q12 SCALE: 1:5



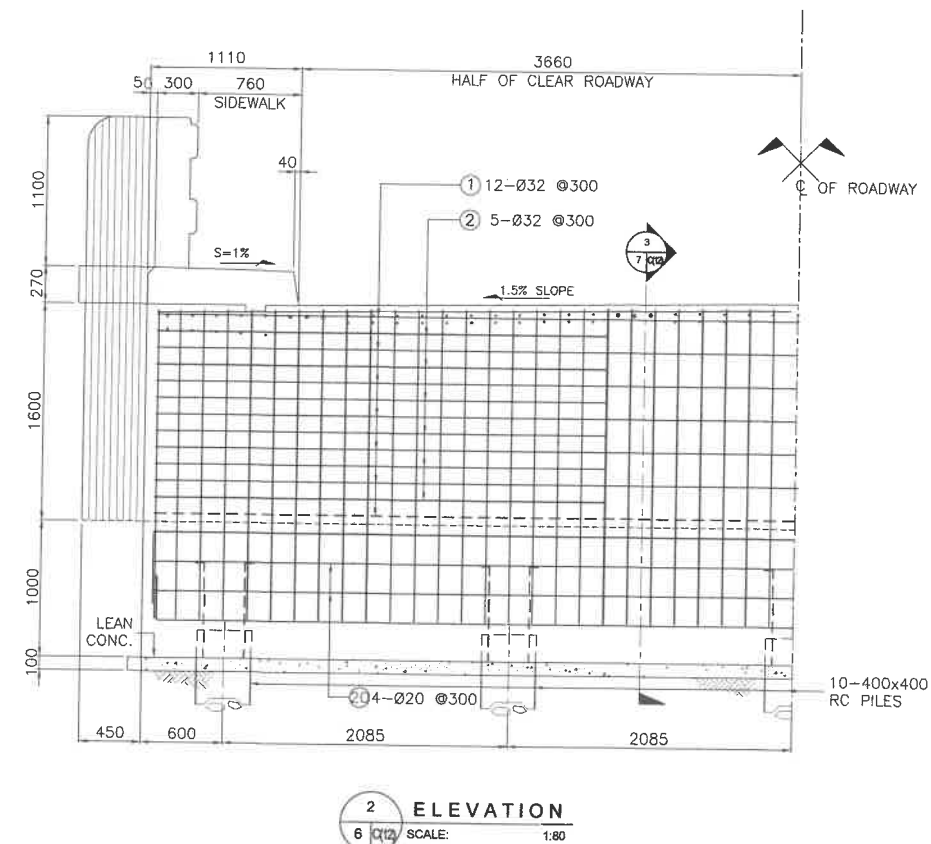
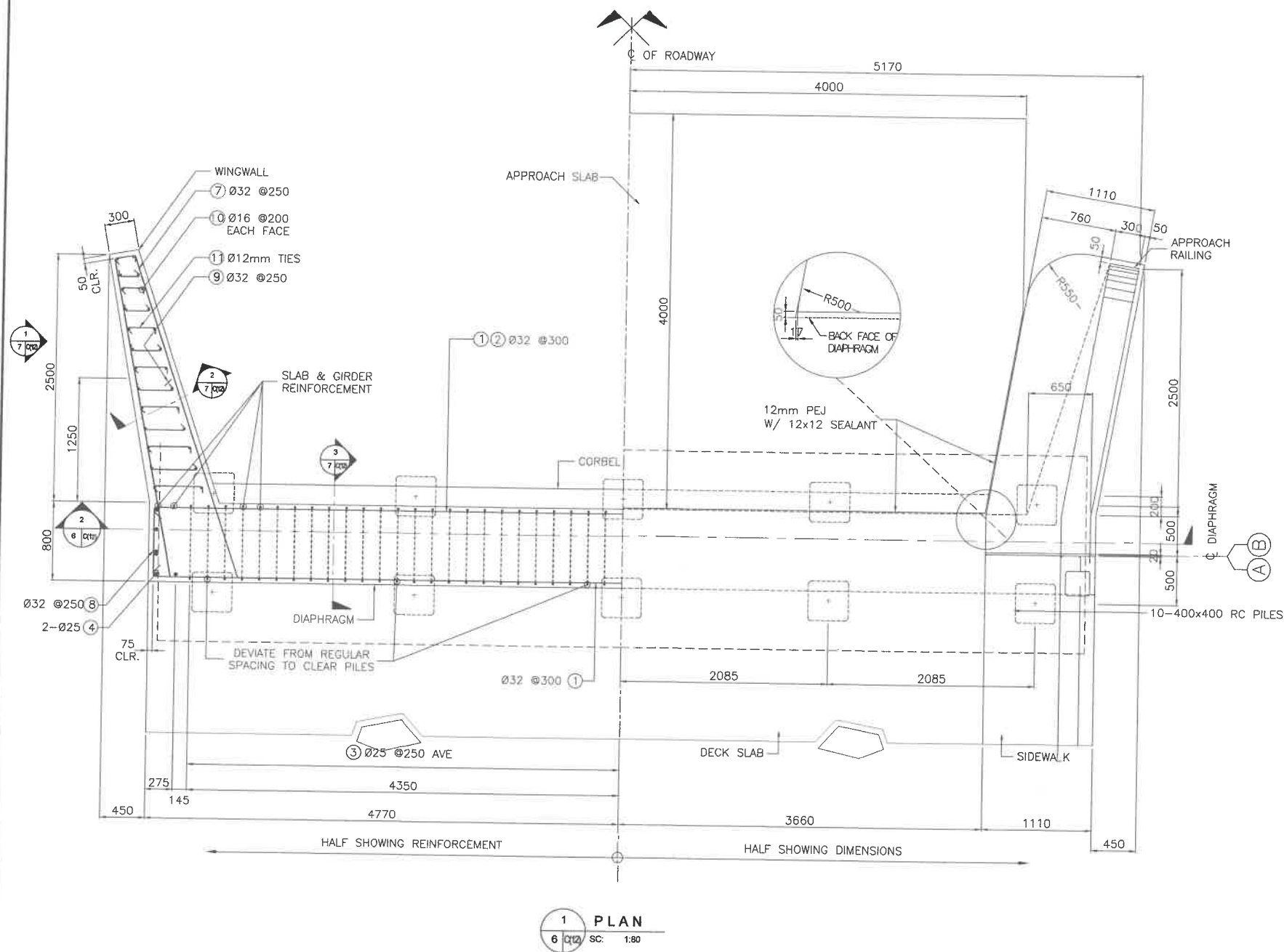
4 BAR SETTING DETAIL 5 Q12 SCALE: 1:5

REINFORCEMENT SCHEDULE AND ESTIMATED QUANTITIES FOR SUPERSTRUCTURE OF 3-SPAN @ 12m

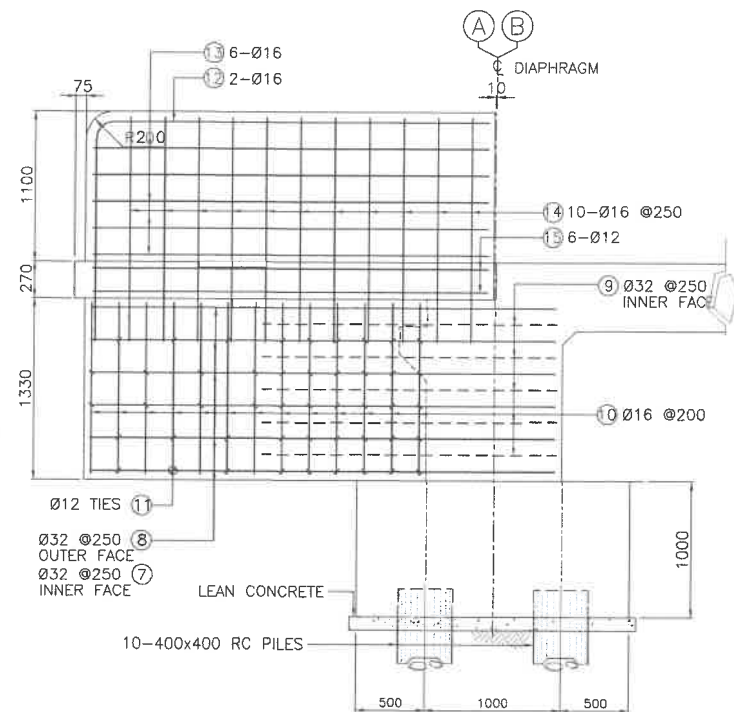
REINFORCEMENT																	
BENDING DIAGRAM	STRUCTURE COMPONENT	CONCRETE VOLUME (m³)	BAR MARK	BAR SIZE (mm)	QTY	SPACING (mm)	BAR SHAPE	BAR DIMENSIONS (mm)				LOCATION L _c	LENGTH PER BAR(m)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)	REMARKS
								a	b	c	d						
	DECK SLAB	124.00	(S1)	32	42	300	(D)	1300	9200	-	-	-	10.50	441.00	6.313	2,784.03	
			(S1g)	32	42	300	(D)	1300	4700	-	-	-	6.00	252.00	6.313	1,590.88	
			(S2)	32	42	300	(A)	12000	-	-	-	-	12.00	504.00	6.313	3,181.75	
			(S2g)	32	42	300	(A)	6000	-	-	-	-	6.00	252.00	6.313	1,590.88	
			(S3)	28	42	300	(A)	10500	-	-	-	-	10.50	441.00	4.833	2,131.35	
			(S4)	28	42	300	(A)	6000	-	-	-	-	6.00	252.00	4.833	1,217.92	
			(S5)	28	21	300	(A)	9000	-	-	-	-	9.00	189.00	4.833	913.44	
			(S6)	28	63	300	(A)	6000	-	-	-	-	6.00	378.00	4.833	1,826.87	
			(S7)	20	177	200	(C)	4620	-	-	-	-	9.24	1635.48	6.313	10325.35	
			(S8)	20	177	200	(A)	9240	-	-	-	-	9.24	1635.48	4.833	7905.35	
			(S9)	16	SEE DETAIL	1000L 900TRAN	SEE CHAIR BAR DETAIL				(4 EPs)	-	-	-	-		
											-		TOTAL =		33467.8170		
	EDGE BEAM	77.8	(EB1)	32	18	AS SHOWN	B	1300	36000	-	-	-	38.6	694.80	6.313	4386.27	
			(EB2)	28	18	AS SHOWN	A	36800	-	-	-	-	36.8	662.40	4.833	3201.38	
			(EB3)	12	290	250	C	1700	500	200	-	-	4.8	1392.00	0.888	1236.10	
			TOTAL =														
												GRAND TOTAL (GRADE 40) =		1236.0960			
												GRAND TOTAL (GRADE 60) =		41055.4686			

NOTE: FOR FLAT SLAB USE GRADE 40 FOR 12 & 16mmØ

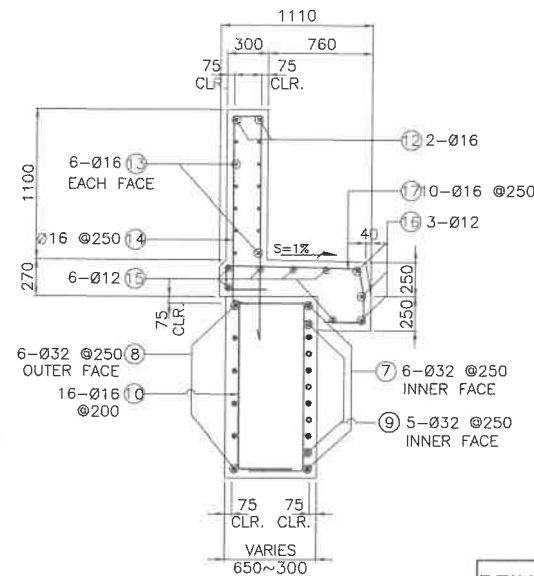
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE:	SHEET CONTENTS:	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER II	CHECKED: WILHELMINA L. ANCHETA ENGINEER II	CADD: ROLAND L. MEDIANTE ENGINEER II	SUBMITTED:	RECOMMENDING APPROVAL:	APPROVED:	SET NO.	SHEET NO.
	STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	CONCRETE POURING SEQUENCE, INTERMEDIATE DIAPHRAGM DETAILS, CAMBER DIAGRAM AND ESTIMATE OF QUANTITIES				BLE SIDA S. RAMOS	SEE COVER SHEET ARISTARCO M. DOROY	SEE COVER SHEET EMIL K. SADAIN, CESO I	BOD 2019-7 BrD	C(12) 5 13
						OIC-CHIEF, BRIDGES DIVISION	OFFICER-IN-CHARGE, BUREAU OF DESIGN	UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES		



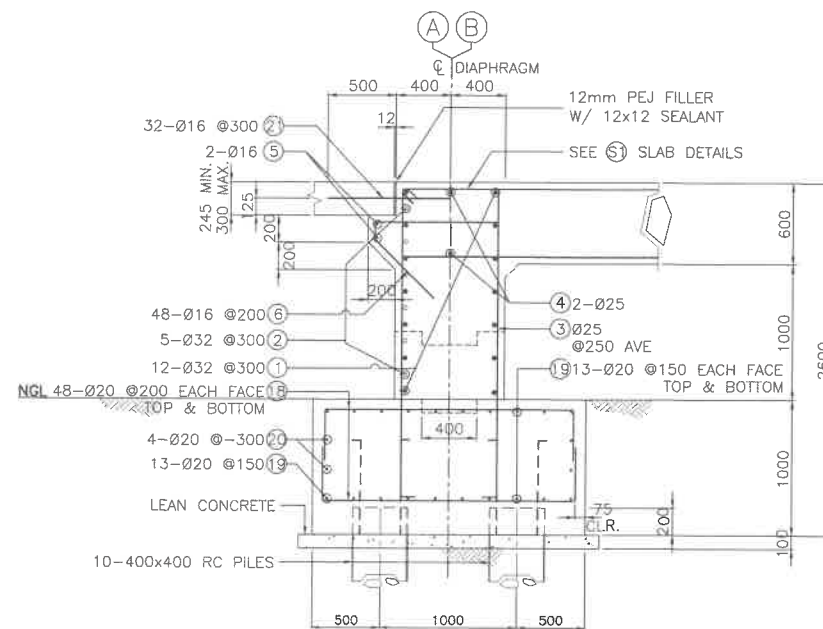
 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	SHEET CONTENTS: ABUTMENT DETAIL 1/2 PLAN AND ELEVATION	DESIGNED: <i>John Robert A. Mendoza</i> ENGINEER II CHECKED: <i>Wilhelmina Ancheta</i> ENGINEER II CADD: <i>Rolando Mediente</i> DRAFTSMAN	SUBMITTED: <i>Blessilda S. Ramos</i> OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: SEE COVER SHEET ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: SEE COVER SHEET EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(12) 6 13
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1 WINGWALL ELEVATION
7 (1/2) SCALE: 1:25



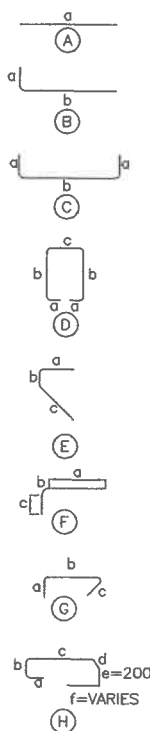
2 SECTION
7 (1/2) SCALE: 1:25

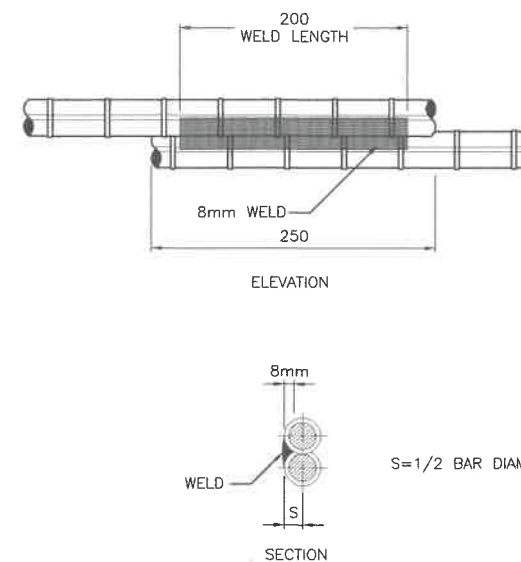
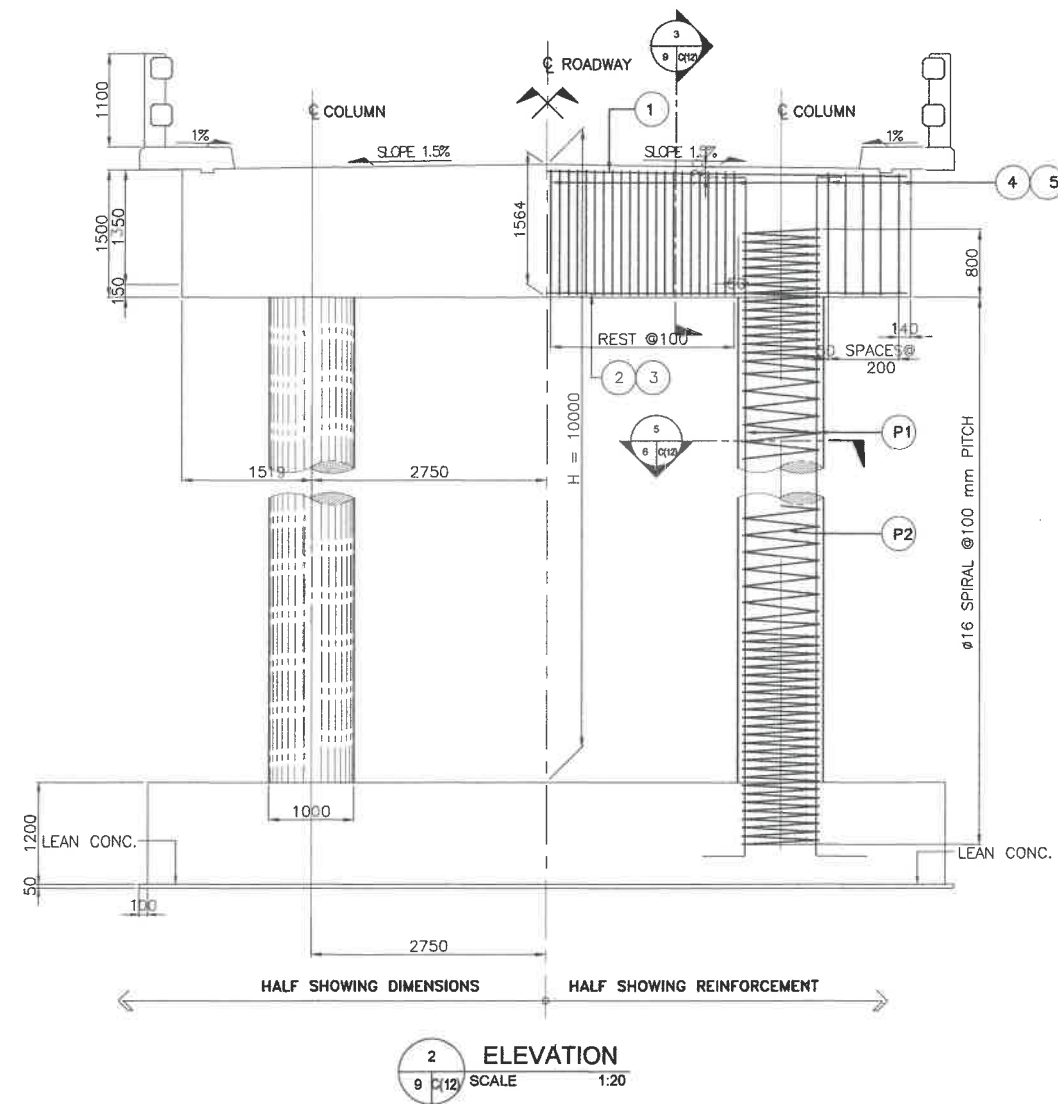
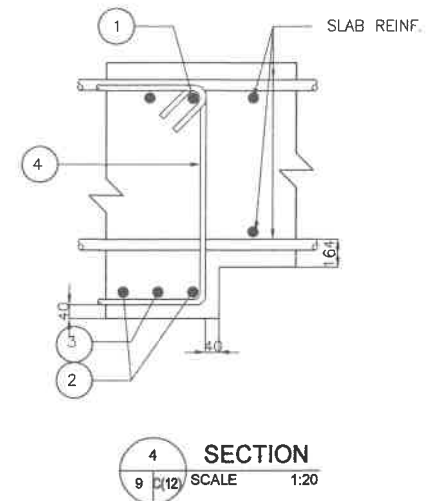
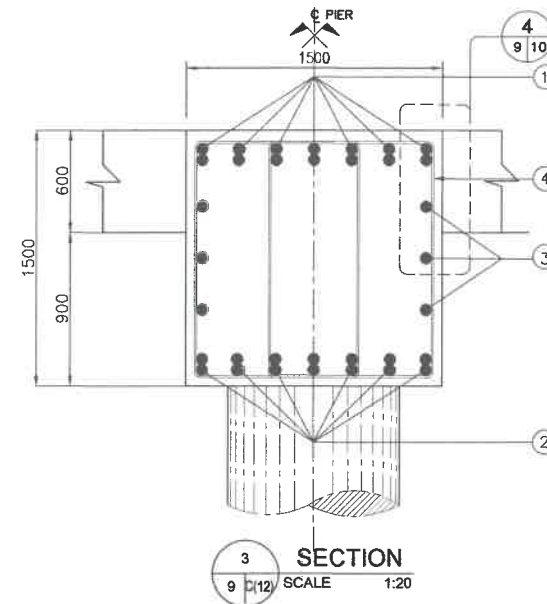
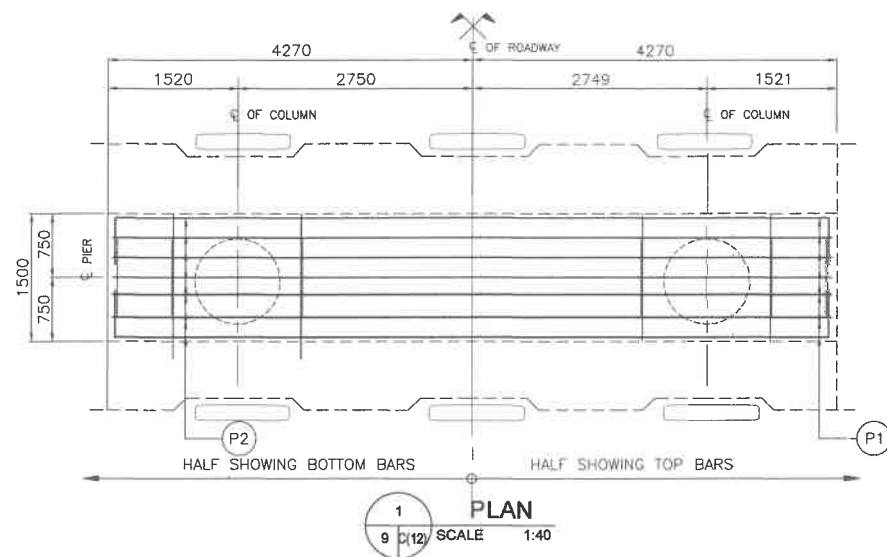


3 SECTION
7 (1/2) SCALE: 1:25

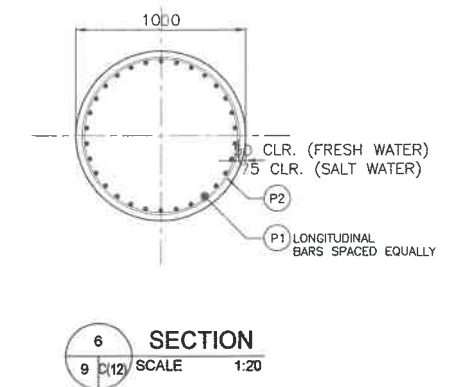
NOTE:
TOP OF FOOTING
SHOULD BE EMBEDDED
BELOW NATURAL
GROUND LEVEL (NGL)

REINFORCEMENT SCHEDULE AND ESTIMATED QUANTITIES FOR ONE (1) ABUTMENT

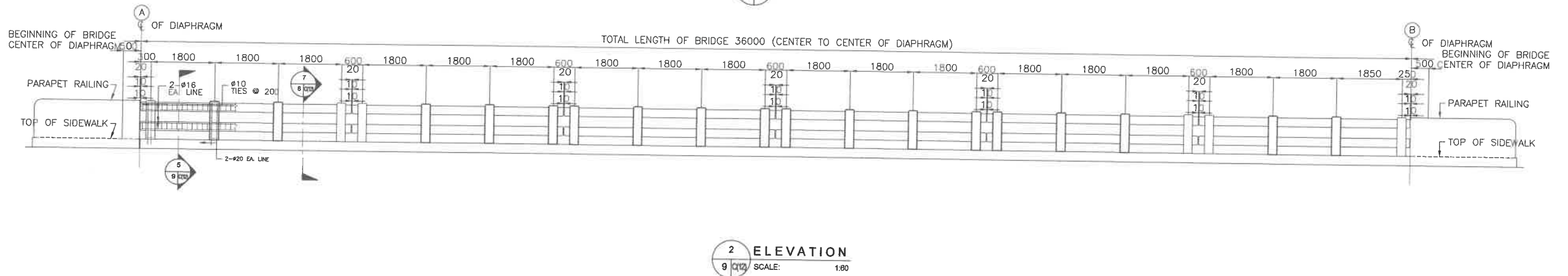
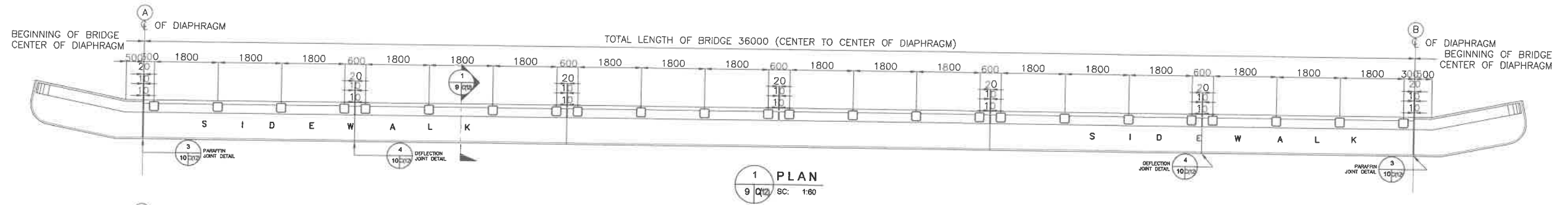
REINFORCEMENT																
BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF BARS)	BAR MARK	BAR SIZE (mm)	QTY	SPACING (mm)	BAR SHAPE	BAR DIMENSIONS (mm)						LENGTH EACH BAR(m)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)	CONCRETE VOLUME (m³)
						a	b	c	d	e	f					
	(1)	32	12	300	(C)	600	9390	-	-	-	-	10.59	127.08	6.313	802.26	39.000
	(2)	32	5	300	(B)	600	9390	-	-	-	-	9.99	49.95	6.313	315.33	
	(3)	25	39	250	(D)	110	2350	650	-	-	-	5.57	217.23	3.855	837.42	
	(4)	25	2	AS SHOWN	(A)	9390	-	-	-	-	-	9.39	18.78	3.855	72.40	
	(5)	16	2	AS SHOWN	(A)	9390	-	-	-	-	-	9.39	18.78	1.578	29.63	
	(6)	16	48	200	(E)	900	50	925	-	-	-	1.88	90	1.578	142.02	
	(7)	32	12	250	(B)	620	3315	-	-	-	-	3.94	47.22	6.313	298.10	
	(8)	32	12	250	(B)	600	3315	-	-	-	-	3.92	46.98	6.313	296.58	
	(9)	32	10	250	(B)	620	3315	-	-	-	-	3.94	39.35	6.313	248.42	
	(10)	16	32	200	(D)	200MIN 400MAX	1275	550	-	-	-	3.70	118.4	1.578	186.84	
	(11)	12	320	AS SHOWN	(G)	170	140MIN 490MAX	170	-	-	-	0.66	209.6	0.888	186.12	
	(12)	16	4	AS SHOWN	(F)	2915	235	1350	-	-	-	4.50	18	1.578	28.40	
	(13)	16	24	AS SHOWN	(A)	2915	-	-	-	-	-	2.92	69.96	1.578	110.40	
	(14)	16	20	250	(C)	200	1525	-	-	-	-	1.93	38.5	1.578	60.75	
	(15)	12	12	AS SHOWN	(A)	2600MIN 2850MAX	-	-	-	-	-	2.73	32.76	0.888	29.09	
	(16)	12	6	AS SHOWN	(F)	510	785	2725	-	-	-	4.02	24.12	0.888	21.42	
	(17)	16	20	250	(H)	450	120	950	350	200	300	2.37	47.4	1.578	74.80	
	(18)	20	96	200	(C)	500	1850	-	-	-	-	2.85	273.6	2.466	674.70	
	(19)	20	26	150	(B)	110	9390	-	-	-	-	9.50	247	2.466	609.10	
	(20)	20	8	300	(A)	9390	-	-	-	-	-	9.39	75.12	2.466	185.25	
	(21)	16	32	300	(A)	900	-	-	-	-	-	0.90	28.8	1.578	45.45	
													GRAND TOTAL =		5254.47	
													GRAND TOTAL (GRADE 40)		236.63	0.000
													GRAND TOTAL (GRADE 60)		5017.84	0.000



5 SPIRAL SPLICE DETAIL
SCALE 1:3

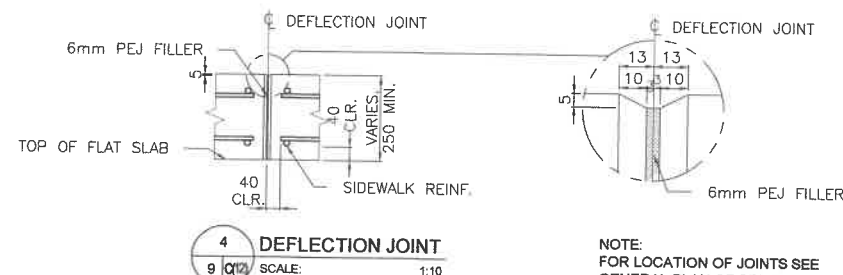
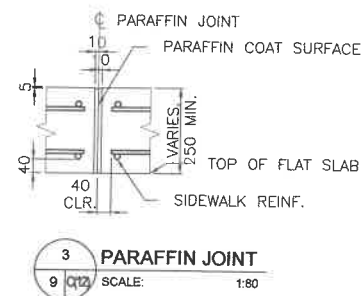
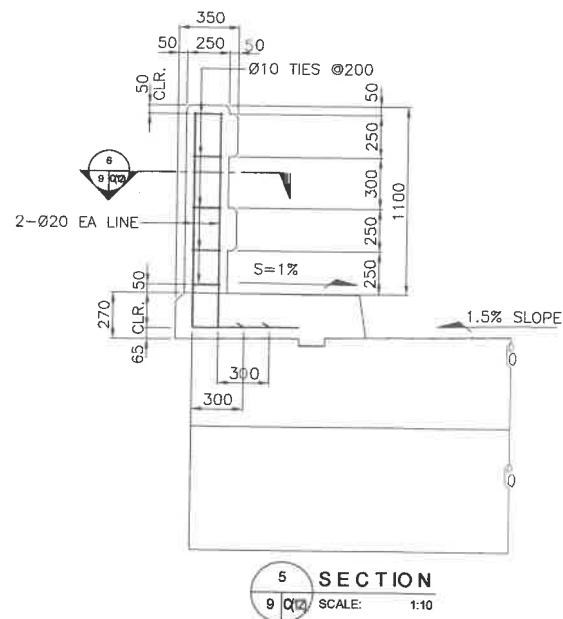


REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	SHEET CONTENTS: PLAN, ELEVATION, SECTIONS & SPIRAL SPLICE DETAILS OF PIER	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER II CHECKED: WILHELMINA L. ANTONETA ENGINEER IV CADD: ROLAN C. MEDIANTE JUNIOR (B101)	SUBMITTED: BLASILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: ARISTARCO M. DOROS OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(12) 8 13
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NOTE:

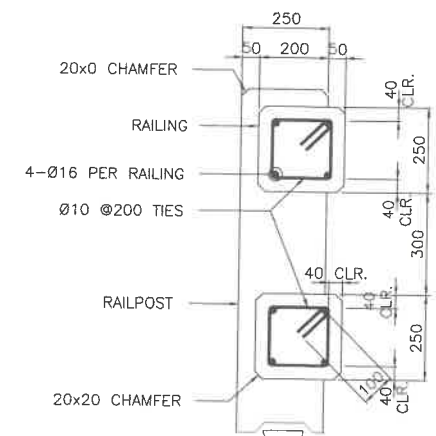
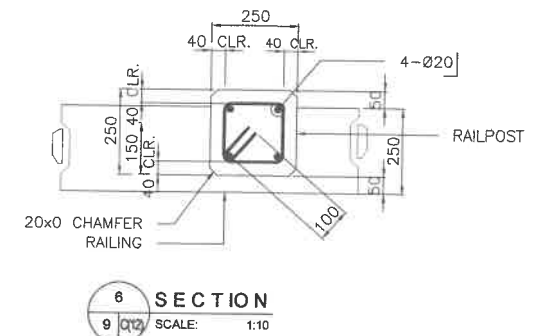
1. SIDEWALK SHALL BE PLACED AFTER THE SHORING UNDER THE SUPERSTRUCTURE HAS BEEN RELEASED SUFFICIENTLY TO PERMIT THE SPANS TO ATTAIN FULL DEAD LOAD DEFLECTION.
2. OTHER TYPES OF STANDARD BRIDGE RAILINGS CAN BE ADOPTED (REFER TO BOD SET NO. 2017-1-BrD)



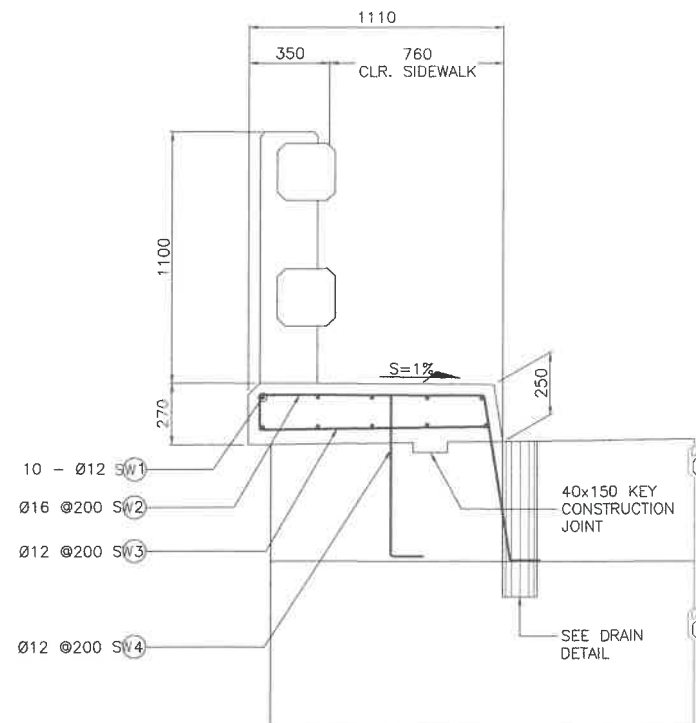
NOTE:
FOR LOCATION OF JOINTS SEE
GENERAL PLAN OF BRIDGE.

TYPICAL RAILING DETAILS

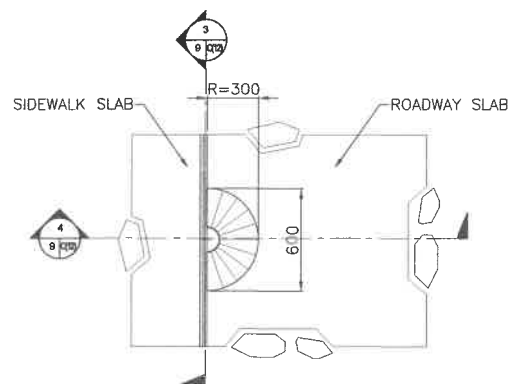
SCALE: AS SHOWN



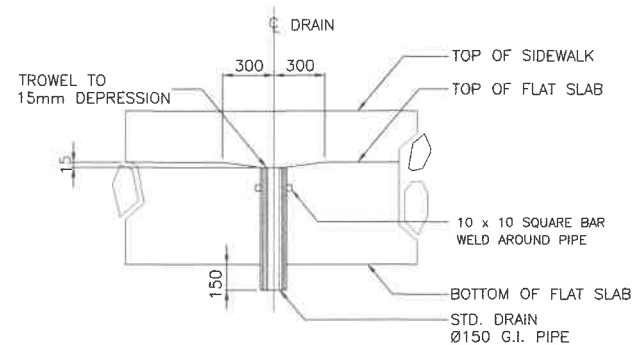
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	SHEET CONTENTS: TYPICAL RAILINGS DETAILS AND SECTION	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER I CHECKED: WILHELMINA ANCHETA ENGINEER IV CADD: ROLANDS C. MEDIANTE DRAFTSMAN I	SUBMITTED: BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: SEE COVER SHEET ARISTARCO M. DOROS OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: SEE COVER SHEET EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(12) 9 13
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1 SIDEWALK DETAIL
10/12 SC: 1:15

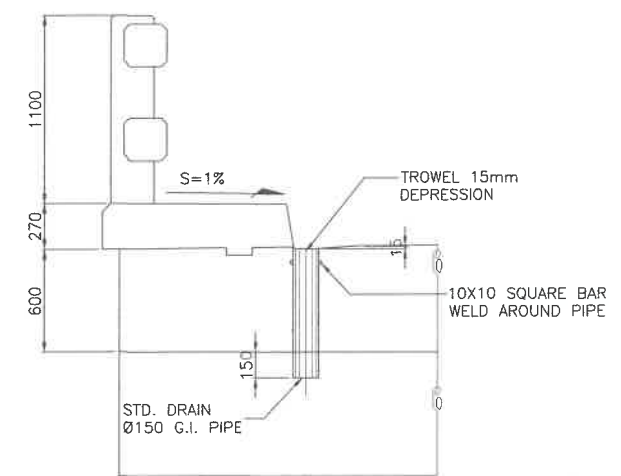


2 PLAN
10/12 SC: 1:15



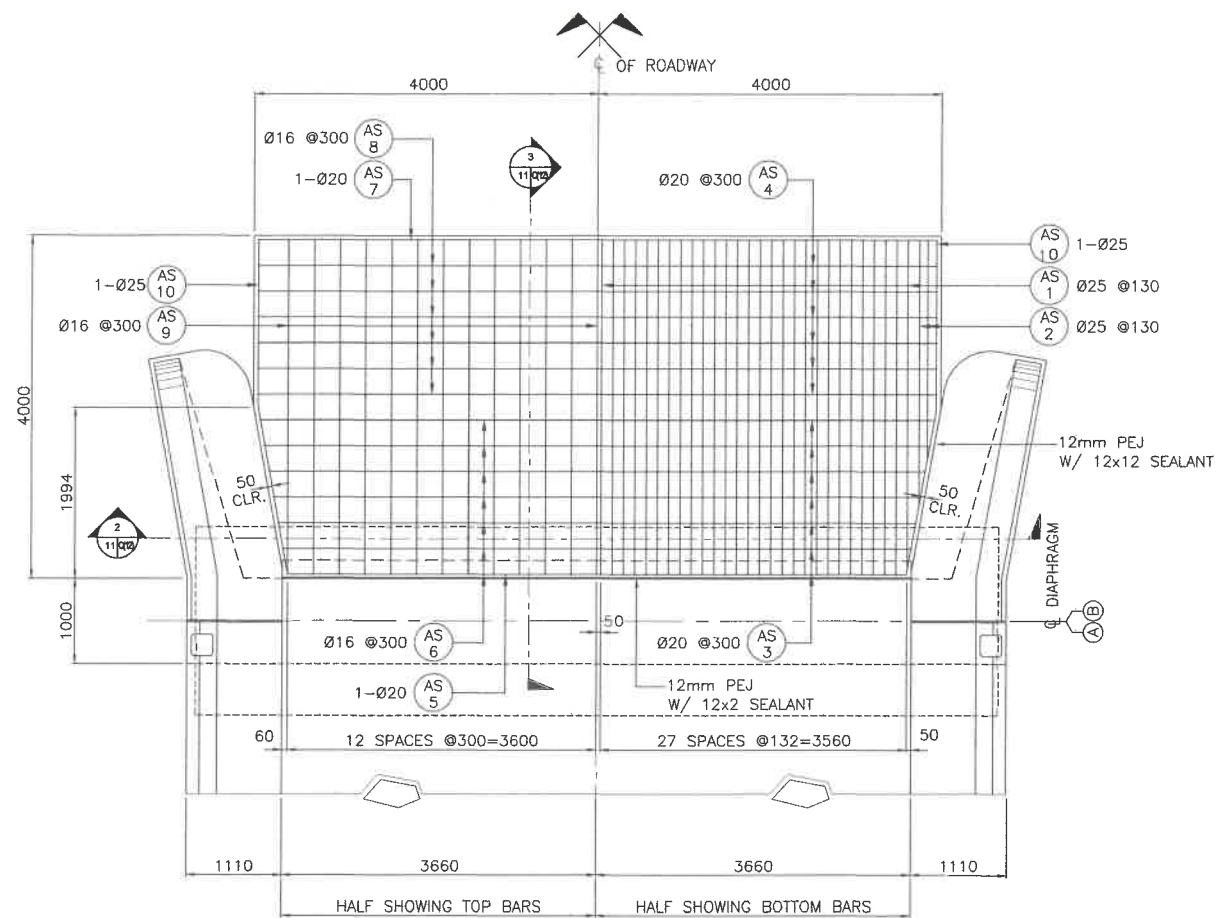
3 SECTION
10/12 SC: 1:15

TYPICAL DRAIN DETAILS
SC: AS SHOWN

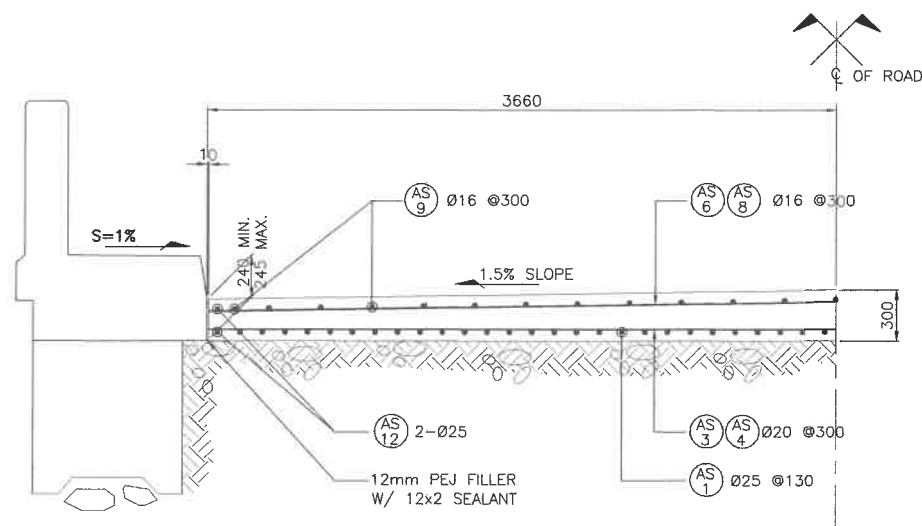


4 SECTION
10/12 SC: 1:15

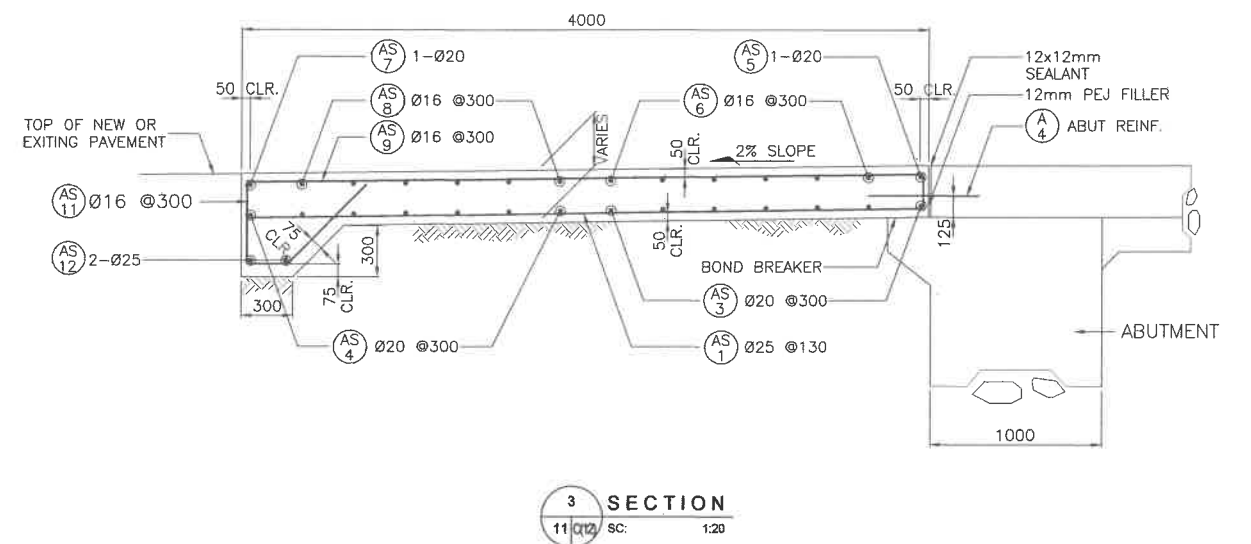
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12.12M	SHEET CONTENTS: TYPICAL SIDEWALK AND DRAIN DETAILS	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER IV CHECKED: WILHELMINA L. ANCIETA ENGINEER IV CADD: ROLANDO C. MEDIANTE DRAFTSMAN	SUBMITTED: BLESILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	RECOMMENDING APPROVAL: ARISTARCO M. DOROY OFFICER-IN-CHARGE, BUREAU OF DESIGN	APPROVED: EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	SET NO. BOD 2019-7 BrD	SHEET NO. C(12) 10/13
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1 PLAN
11/12 SC: 1:40



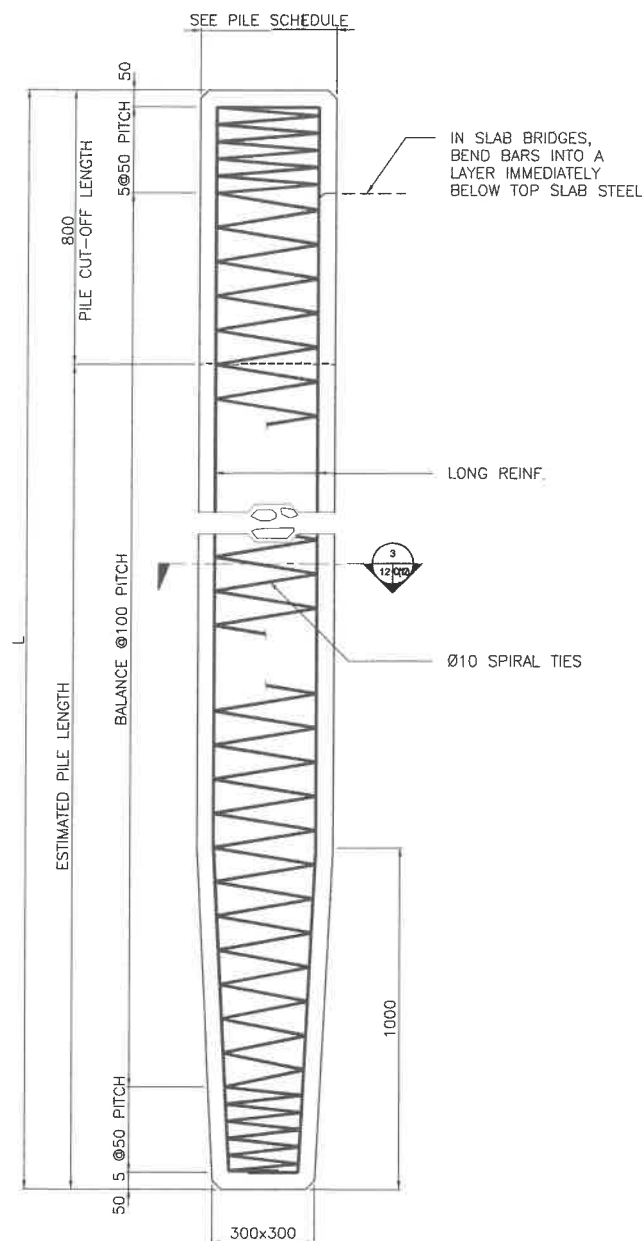
2 SECTION
11/12 SC: 1:20



3 SECTION
11/12 SC: 1:20

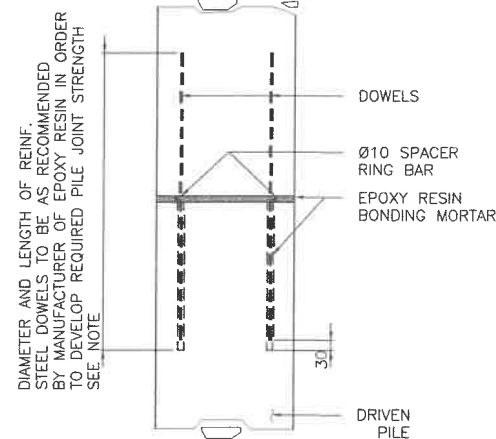
REINFORCEMENT SCHEDULE AND ESTIMATED QUANTITIES FOR APPROACH SLAB

REINFORCEMENT														
BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF BARS)	BAR MARK	BAR SIZE (mm)	QTY	SPACING (mm)	BAR SHAPE	BAR DIMENSIONS (mm)			LENGTH PER BAR(m)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)	CONCRETE VOLUME (m³)	REMARKS
						a	b	c						
	AS 1	25	56	130	(B)	3900	150	-	4.07	227.92	3.853	877.18	8.480	1. QUANTITIES ARE FOR ONE (1) APPROACH SLAB
	AS 2	25	4	130	(B)	2690 MIN 3412 MAX	150	-	3.56	14.25	3.853	54.90		
	AS 3	20	7	300	(A)	7221 MIN 7869 MAX	-	-	7.87	55.08	2.466	135.83		
	AS 4	20	7	300	(A)	7920	-	-	7.92	55.44	2.466	136.72		
	AS 5	20	1	AS SHOWN	(A)	7221	-	-	7.22	7.22	2.466	17.81		
	AS 6	16	6	300	(A)	7221 MIN 7869 MAX	-	-	7.87	47.21	1.578	74.50		
	AS 7	20	1	AS SHOWN	(A)	7920	-	-	7.92	7.92	2.466	19.53		
	AS 8	16	6	300	(A)	7920	-	-	7.92	47.52	1.578	74.99		
	AS 9	16	25	300	(B)	3920	150	-	4.07	101.75	1.578	160.56		
	AS 10	25	4	AS SHOWN	(C)	2000	1951	-	3.95	15.8	3.853	60.89		
	AS 11	16	27	300	(D)	415 MIN 475 MAX	240	656	1.77	47.82	1.578	75.46		
	AS 12	25	2	AS SHOWN	(A)	7920	-	-	7.92	15.84	3.853	61.03		
										GRAND TOTAL =	1,749.40	8.48		
									(GRAND TOTAL GRADE 40)		0.00	0.00	0.000	
									(GRAND TOTAL GRADE 60)		1,749.40	0.00	0.000	



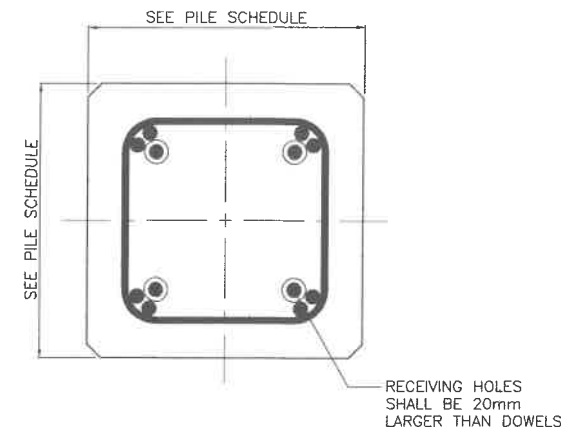
1 PILE ELEVATION
12/12 SCALE: NOT TO SCALE

PILE SCHEDULE		
SIZE (mm)	LONGITUDINAL REINFORCEMENT	
	QTY.	BAR SIZE
400x400	8	28
450x450	8	32

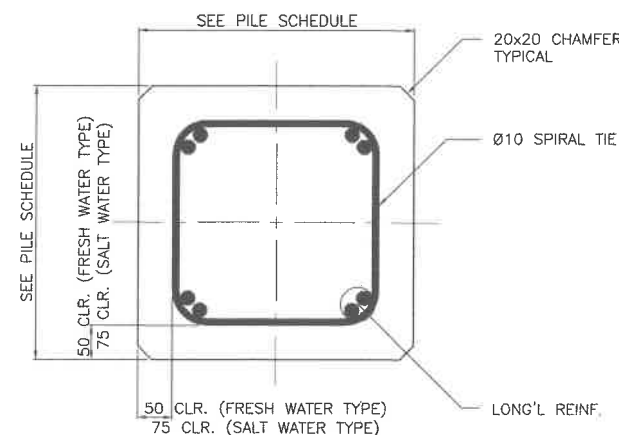


ELEVATION

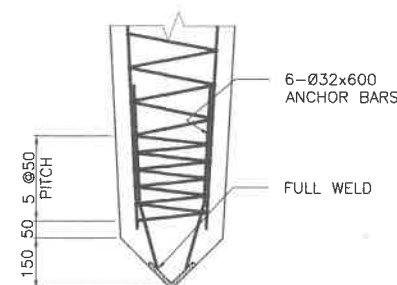
2 PILE SPLICE DETAIL
12/12 SCALE: TO NTS



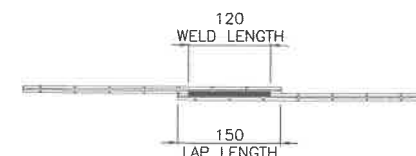
SECTION



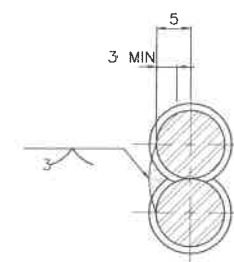
3 SECTION
12/12 SCALE: 1:5



4 PILE TIP FOR HARD DRIVING
12/12 SCALE: 1:10



ELEVATION



SECTION

5 WELDED SPIRAL-TIE DETAIL
12/12 SCALE: 1:10

SPECIFICATIONS:

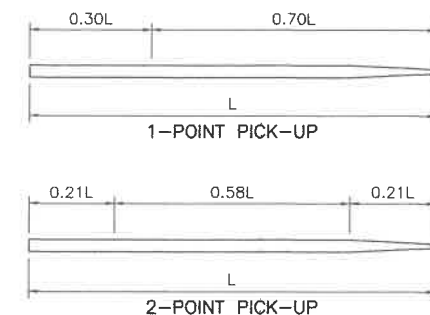
- CONCRETE:
CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF CLASS AA CONCRETE WITH 27.6 MPa CYLINDER STRENGTH AND 19.0mm MAXIMUM AGGREGATE SIZE
- REINFORCEMENT:
A. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO AASHTO M31 (ASTM A615), WITH MINIMUM YIELD STRENGTH AS FOLLOWS:
Fy = 414 MPa (Gr.60) FOR 18mmØ AND LARGER
Fy = 276 MPa (Gr.40) FOR 12mmØ AND SMALLER
B. SPLICES OF ADJACENT LONGITUDINAL STEEL SHALL BE STAGGERED 100 BAR DIAMETERS APART. LENGTH OF SPLICES SHALL BE 1000mm FOR Ø25 AND 1300mm FOR Ø28 AND 1700mm FOR Ø32.
- DRIVING:
A. PILE HEADS SHALL BE PROTECTED FROM DIRECT IMPACT OF THE HAMMER BY CUSHION BLOCKS CONSISTING OF SEVERAL BLOCKS OF WOOD OR OF OTHER APPROVED MATERIALS.
B. PILE SHALL BE DRIVEN TO A DEPTH THAT WILL PRODUCE THE REQUIRED ALLOWABLE BEARING CAPACITY..
- PILE FOUNDATION DESIGN:
A. IN PILE-BENT PIERS, PILE LENGTHS SHALL BE DETERMINED BY THE ENGINEER/CONSULTANT BASED ON THE ALLOWABLE PILE BEARING CAPACITY SPECIFIED BELOW
B. IN COLUMN-BENT PIERS, THE NUMBER, LOCATION AND LENGTH OF PILES SHALL BE DETERMINED BY THE ENGINEER/CONSULTANT BASED ON THE LOADING INFORMATION GIVEN IN THE PIER DETAILS.
- PILE SPLICE:
A. PILES MAY BE SPLICED ONLY IF STRICTLY NECESSARY AND APPROVED BY THE ENGINEER
B. PILE SPLICES SHALL BE LOCATED AT LEAST 10m BELOW THE EXISTING GROUND LEVEL
C. PILE SPLICES SHALL BE STAGGERED WITH AT LEAST 2.0m APART.
- ALLOWABLE PILE BEARING CAPACITY: 500 kN PER PILE (FOR 400x400 PILE)
700 kN PER PILE (FOR 450x450 PILE)
- MINIMUM HAMMER ENERGY RATING = 55 kN-m
- BASIS FOR COMPUTING ALLOWABLE PILE BEARING CAPACITY:

$$P_{all} = \left(\frac{167 \cdot eH \cdot F_H}{S + 2.54} \right) \left(\frac{W_r + 0.16 \cdot W_p}{W_r + W_p} \right)$$

WHERE:

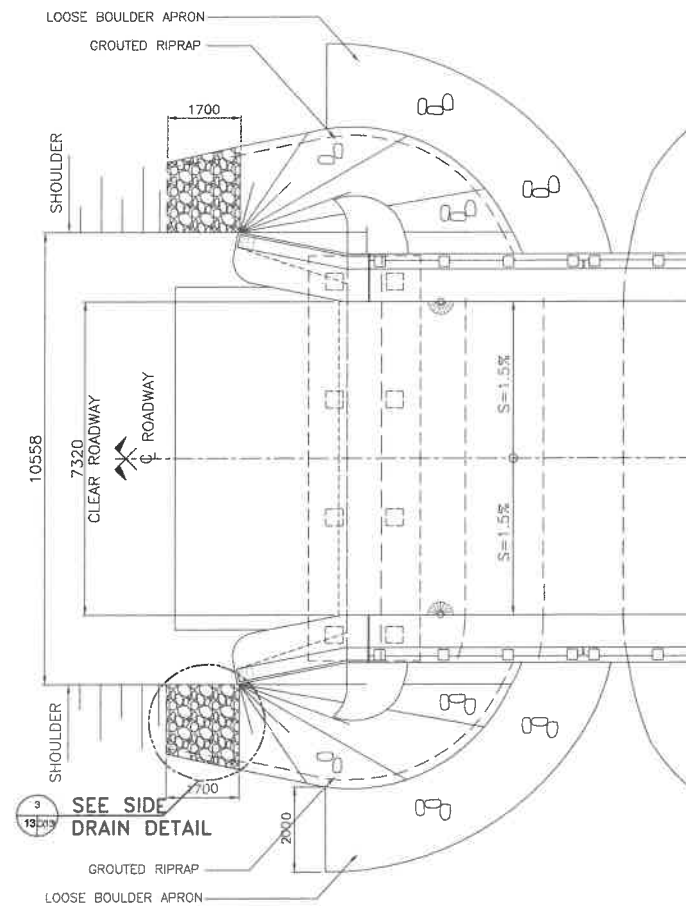
P_{all} = ALLOWABLE PILE BEARING CAPACITY (kN)
eH = HAMMER EFFICIENCY
EH = HAMMER ENERGY RATING (kN-m)
W_r = WEIGHT OF RAM (kN)
W_p = WEIGHT OF PILE AND OTHER DRIVEN WEIGHTS (kN)
S = AVERAGE PENETRATION PER BLOW FOR THE LAST 150mm OF DRIVING (mm)

- TEST PILES:
TEST PILES SHALL BE DRIVEN WITH THE SAME HAMMER USED FOR DRIVING REGULAR PILES AND MAY BE PART OF FOUNDATION IF APPROVED BY THE ENGINEER.
- PICK-UP POINTS:
PICK-UP POINTS SHALL BE MARKED ON ALL PILES AND ALL LIFTING SHALL BE DONE AT THESE POINTS.

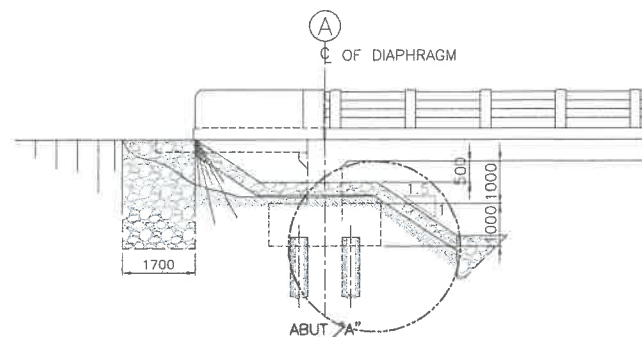


THE USE OF SPECIAL EMBEDDED OR ATTACHED LIFTING DEVICES SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

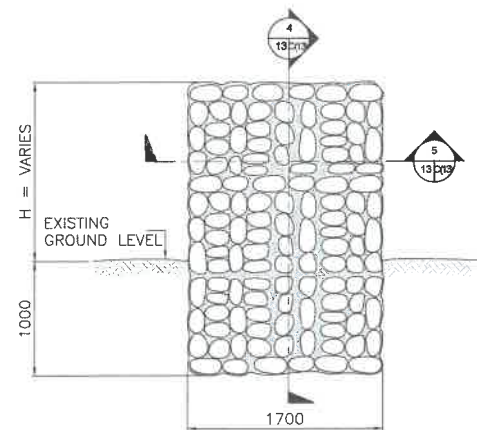
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE:	SHEET CONTENTS:	DESIGNED: JOHN ROBERT A. MENDOZA ENGINEER I	SUBMITTED:	RECOMMENDING APPROVAL:	APPROVED:	SET NO.	SHEET NO.
	STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=12-12-12M	TYPICAL PRECAST CONCRETE PILE DETAIL	CHECKED: WILHELM L. ANCHETA ENGINEER II CADD: ROLANDO C. MEDIANTE DRAFTSMAN I	BLASILDA S. RAMOS OIC-CHIEF, BRIDGES DIVISION	SEE COVER SHEET ARISTARCO M. DOROS OFFICER-IN-CHARGE, BUREAU OF DESIGN	SEE COVER SHEET EMIL K. SADAIN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	BOD 2019-7 BrD	C(12) 12/13



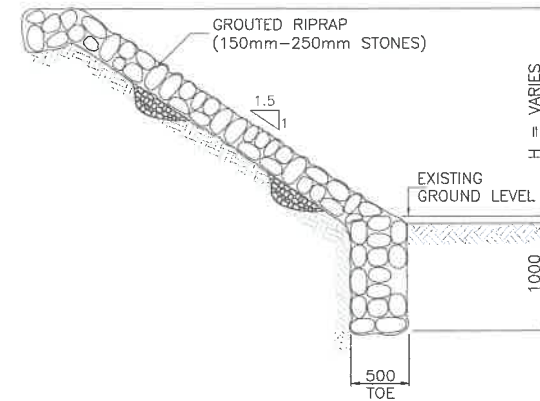
1 PLAN
13 13 SCALE: 1:80



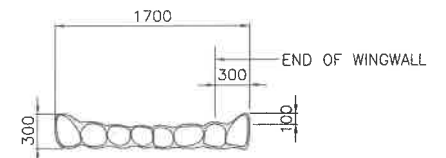
2 ELEVATION
13 13 SCALE: 1:80



3 ELEVATION
13 13 SCALE: 1:80

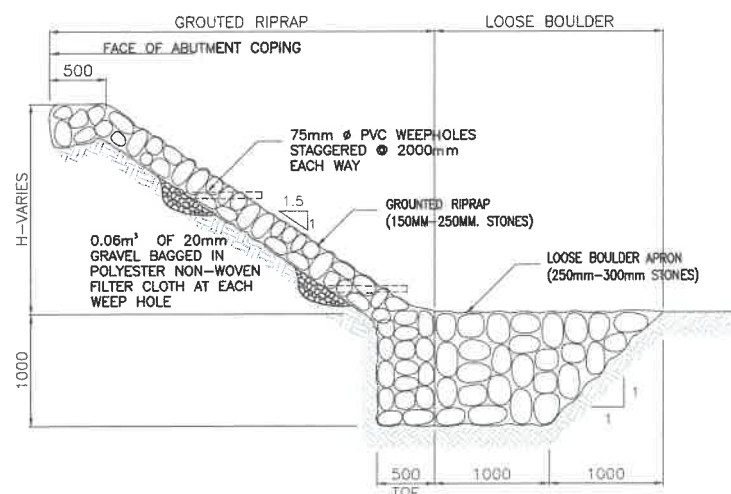


4 ELEVATION
13 13 SCALE: 1:80

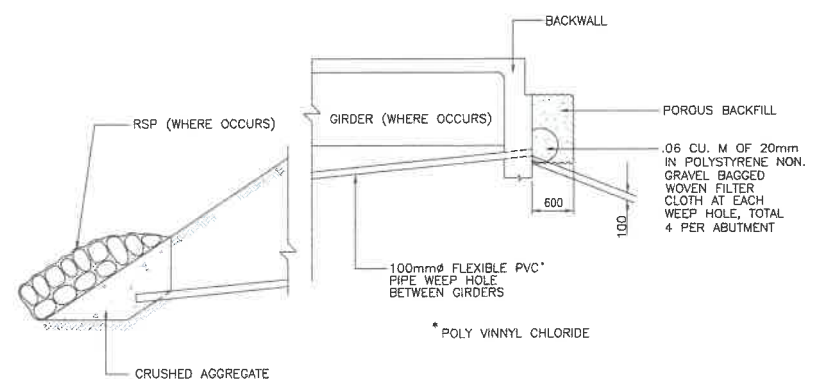


5 ELEVATION
13 13 SCALE: 1:30

SIDE DRAIN DETAILS
SCALE: AS SHOWN



6 RIPRAP DETAIL
13 13 SCALE: 1:30



7 ABUTMENT DRAINAGE
13 13 SCALE: 1:30

ABUTMENT RIPRAP CONSTRUCTION PROCEDURE:

1. THE BED FOR RIPRAP SHALL BE EXCAVATED TO THE REQUIRED DEPTHS AND PROPERLY COMPACTED, TRIMMED AND SHAPED.
2. THE RIPRAP SHALL BE FOUNDED IN A TOE TRENCH DUG BELOW THE DEPTH OF SCOUR AS SHOWN ON PLANS OR AS ORDERED BY THE ENGINEER. THE TOE TRENCH SHALL BE FILLED WITH STONE OF THE SAME CLASS AS THAT SPECIFIED FOR THE RIPRAP, UNLESS OTHERWISE SPECIFIED.
3. STONES SHALL BE PLACED BY HAND OR INDIVIDUALLY BY MACHINES. THEY SHALL BE LAID WITH CLOSE, BROKEN JOINTS AND SHALL BE FIRMLY BEDDED INTO THE SLOPE AND AGAINST THE ADJOINING STONES, EACH STONE SHALL BE LAID WITH EACH ADJACENT STONE. THE RIPRAP SHALL BE THOROUGHLY RAMMED INTO PLACE AS CONSTRUCTION PROGRESSES AND THE FINISHED SURFACE SHALL PRESENT AN EVEN, TIGHT SURFACE. INTERSTICES BETWEEN STONES SHALL BE FILLED WITH SMALL BROKEN FRAGMENTS FIRMLY RAMMED INTO PLACE.
4. THE SPACES BETWEEN THE STONES SHALL THEN BE FILLED WITH CEMENT MORTAR AS SPECIFIED IN SUBSECTION 504 2.3, MORTAR SHALL BE USED TO COMPLETELY FILL ALL VOIDS, EXCEPT THAT THE FACE SURFACE OF THE STONES SHALL BE LEFT EXPOSED.
5. GROUT SHALL BE PLACED FROM BOTTOM TO TOP OF THE SURFACE SWEEPED WITH STIFF BROOM. AFTER GROUTING IS COMPLETED, THE SURFACE SHALL BE CURED AS SPECIFIED IN ITEM 405, STRUCTURAL CONCRETE FOR A PERIOD OF AT LEAST THREE DAYS.

NOTE:

ABUTMENT DRAINAGE SHALL BE PROVIDED BEHIND ABUTMENTS, POROUS BACKFILL SHALL EXTEND Laterally THE FULL LENGTH OF THE BACK WALL

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN BRIDGES DIVISION BONIFACIO DRIVE PORT AREA, MANILA	SHEET TITLE: STANDARD MULTIPLE SPAN FLAT SLAB SUPERSTRUCTURE L=13-13M	SHEET CONTENTS: ABUTMENT SLOPE PROTECTION AND DRAINAGE AND ABUTMENT RIPRAP CONSTRUCTION PROCEDURE	DESIGNED: JOHN ROBERT A. MENDOZA (ENGINEER II) CHECKED: WILHELMINA L. ANCHETA (ENGINEER II) CADD: ROLANDO C. MEDIANTE (DRAFTSMAN I)	SUBMITTED: BLESILDA S. RAMOS (OIC-CHIEF, BRIDGES DIVISION)	RECOMMENDING APPROVAL: ARISTARCO M. DOROY (OFFICER-IN-CHARGE, BUREAU OF DESIGN)	APPROVED: EMIL K. SADAIN, CESO I (UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES)	SET NO. BOD 2019-7 BrD	SHEET NO. C(12) 13 13
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