



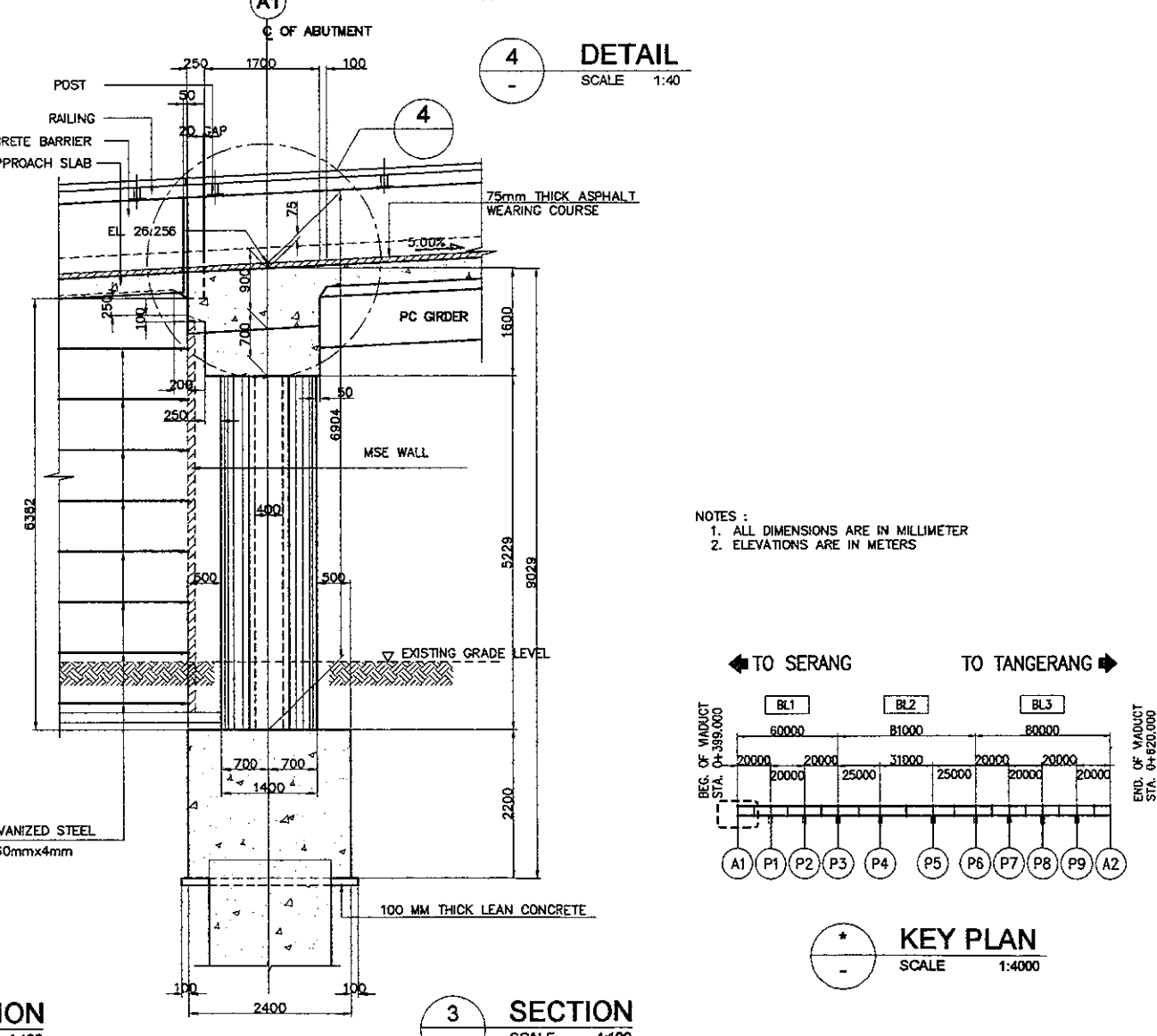
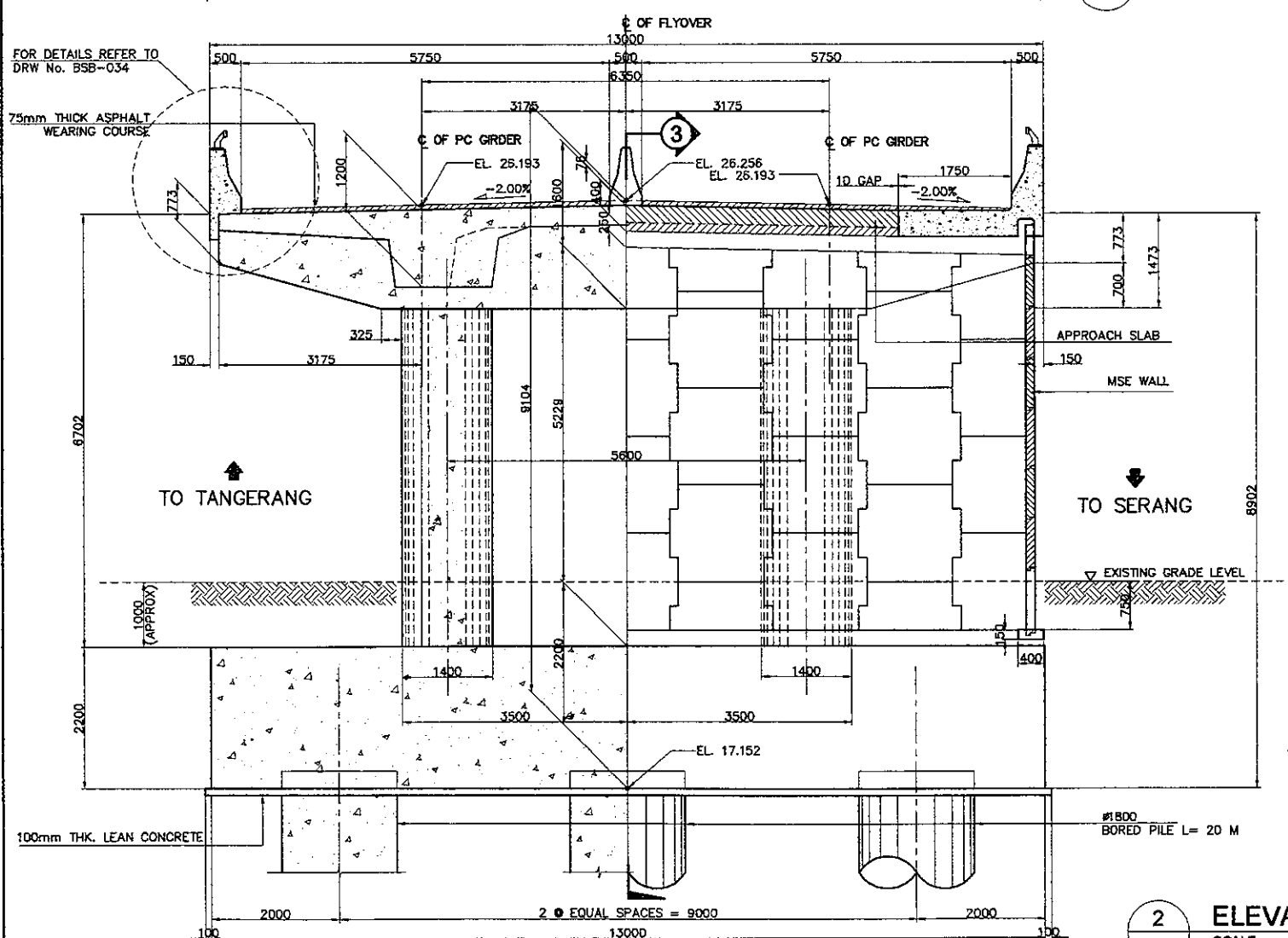
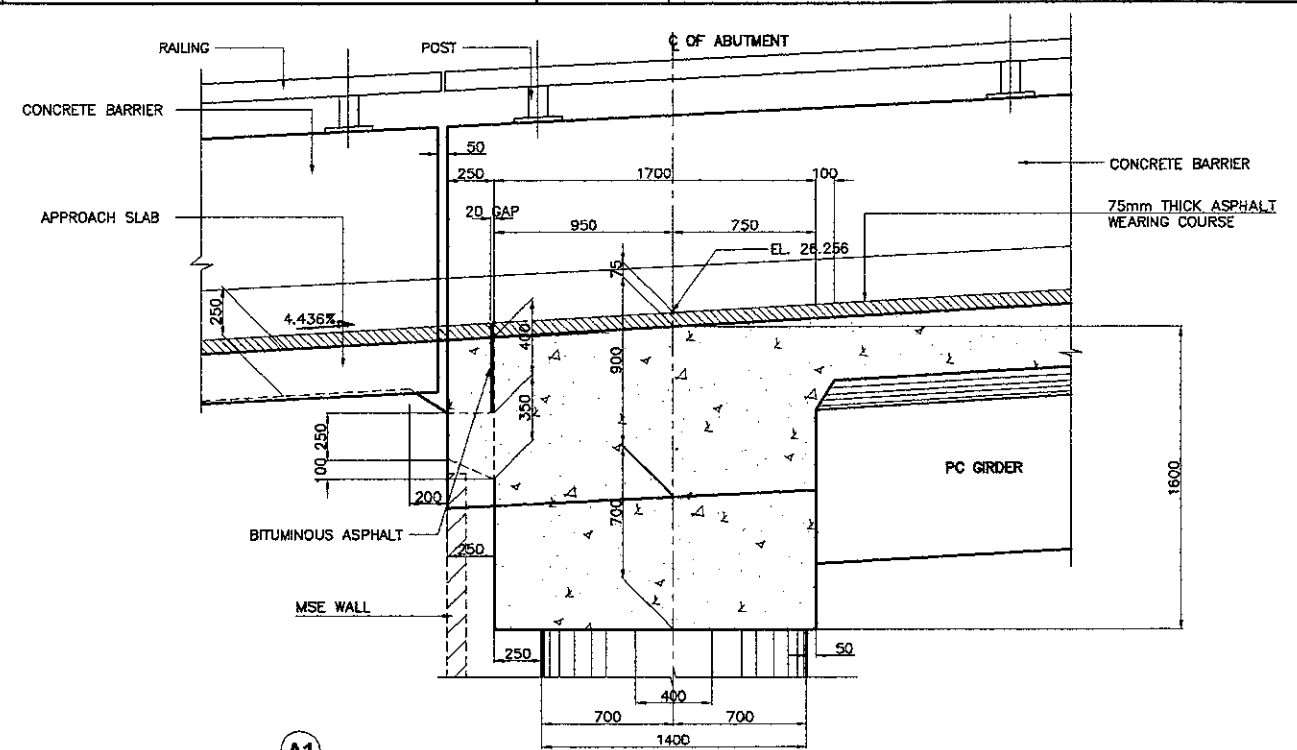
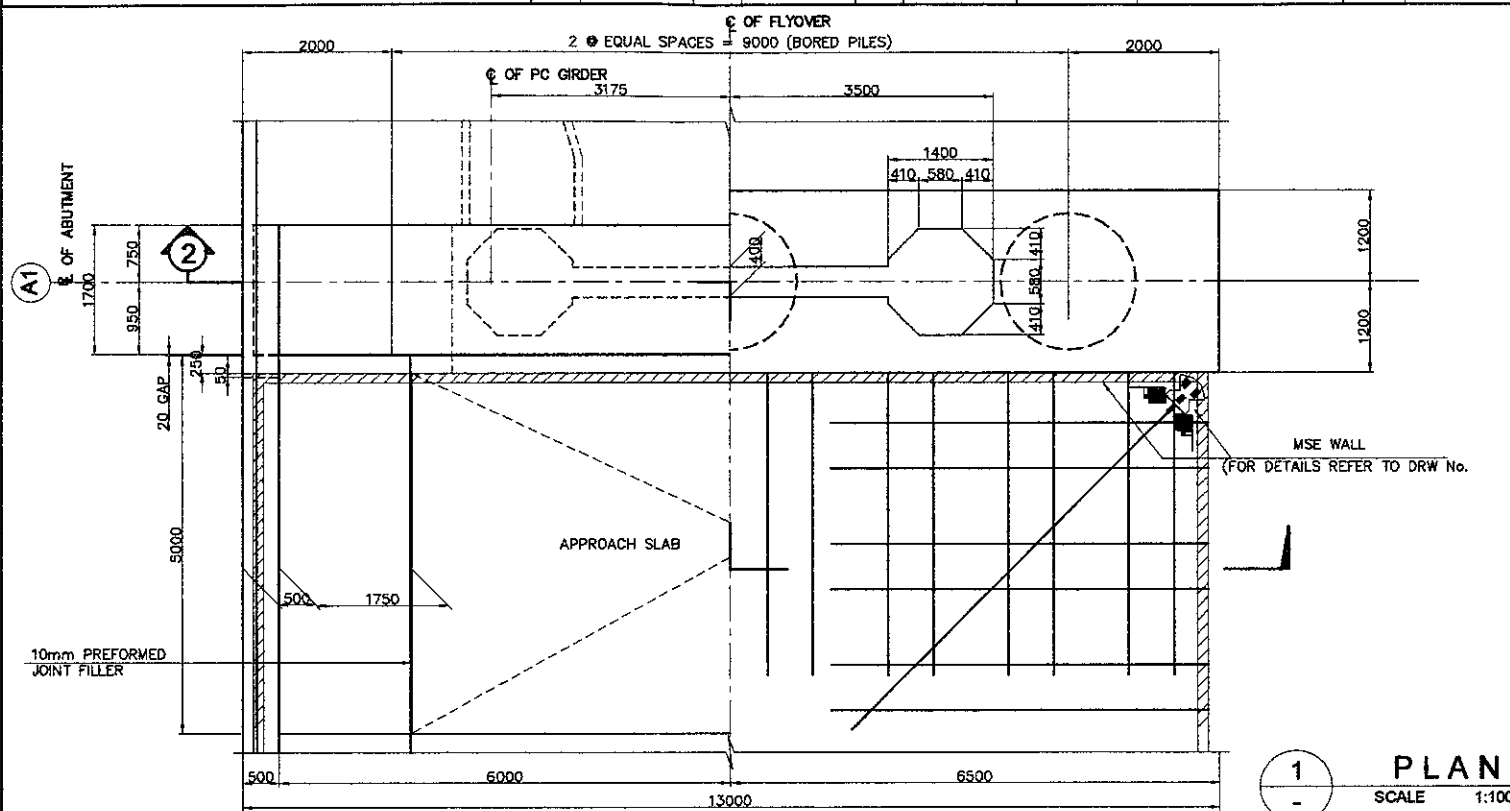
JAPAN INTERNATIONAL  
COOPERATION AGENCY



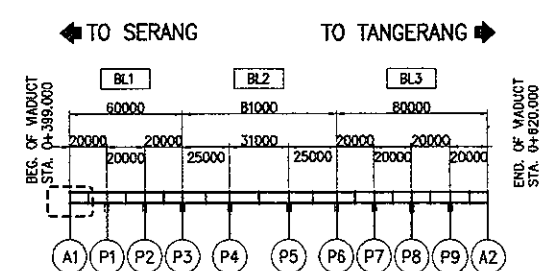
DIRECTORATE GENERAL OF HIGHWAY  
MINISTRY OF PUBLIC WORKS  
REPUBLIC OF INDONESIA

# SUBSTRUCTURES

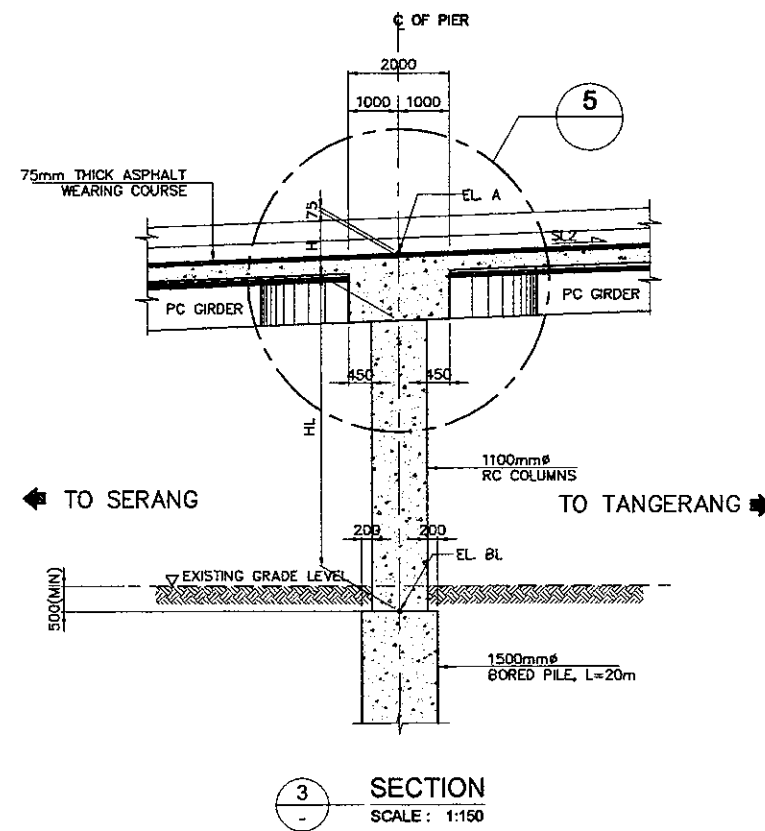
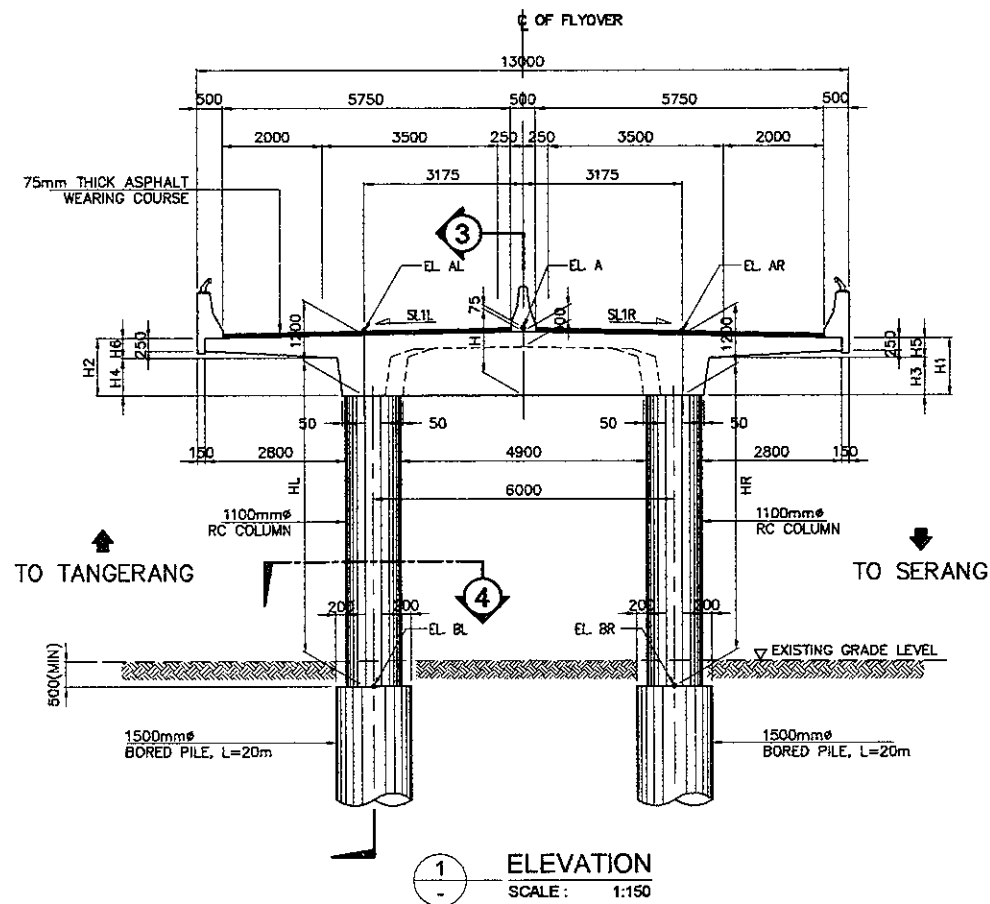
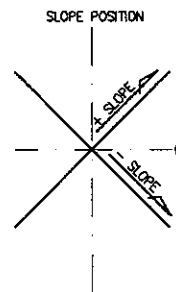
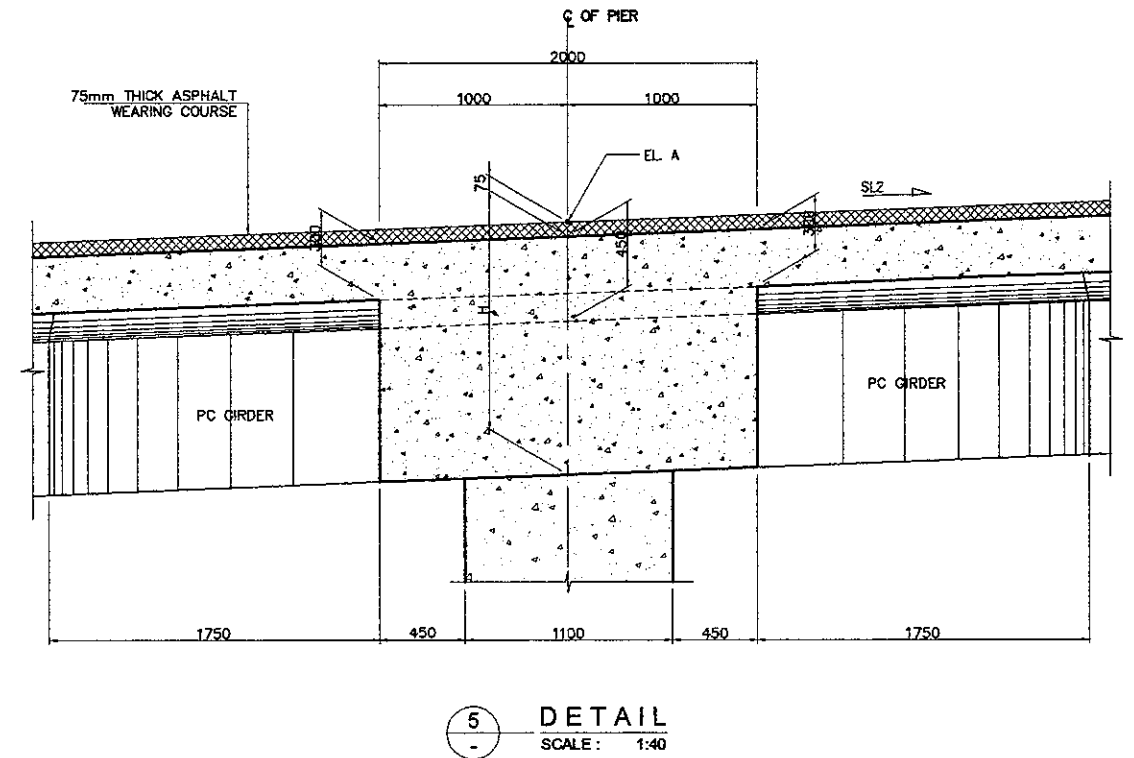
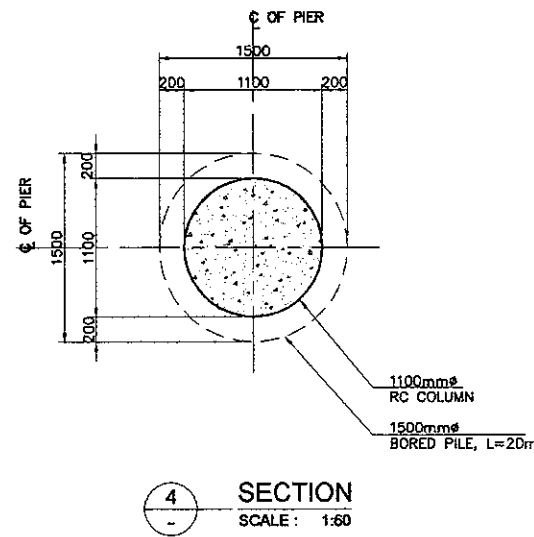
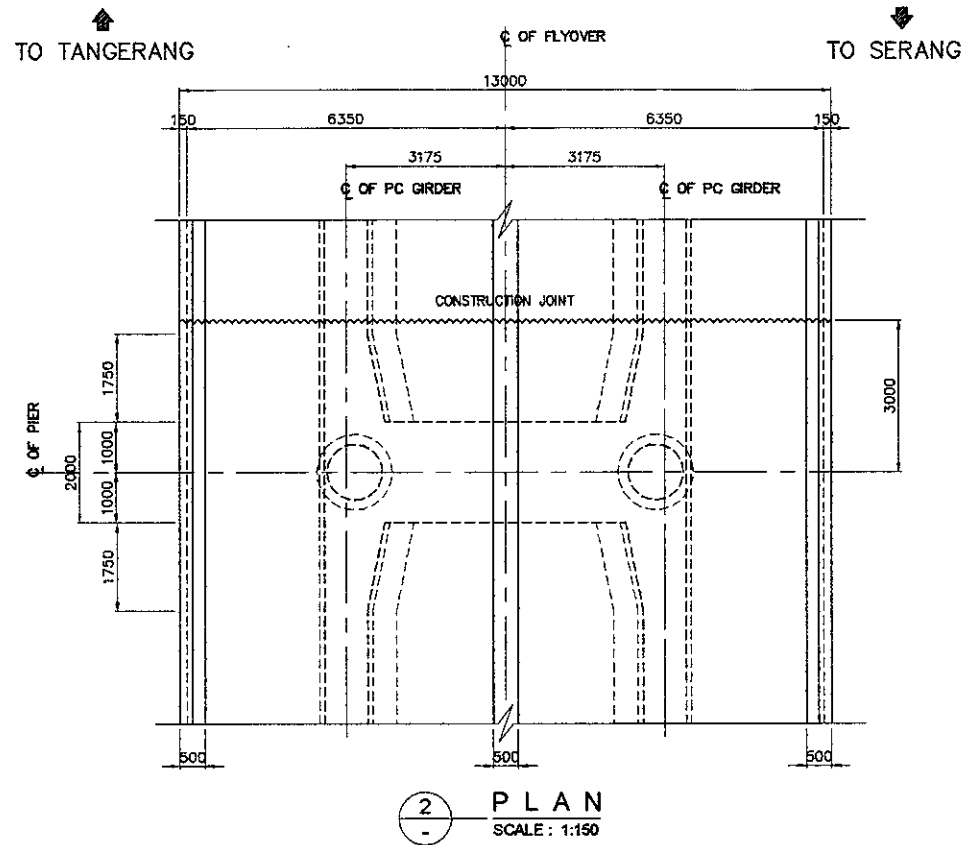
 **Kei** KATAHIRA & ENGINEERS INTERNATIONAL



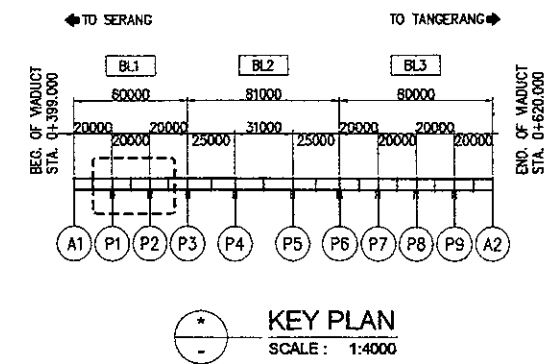
NOTES :  
 1. ALL DIMENSIONS ARE IN MILLIMETER  
 2. ELEVATIONS ARE IN METERS

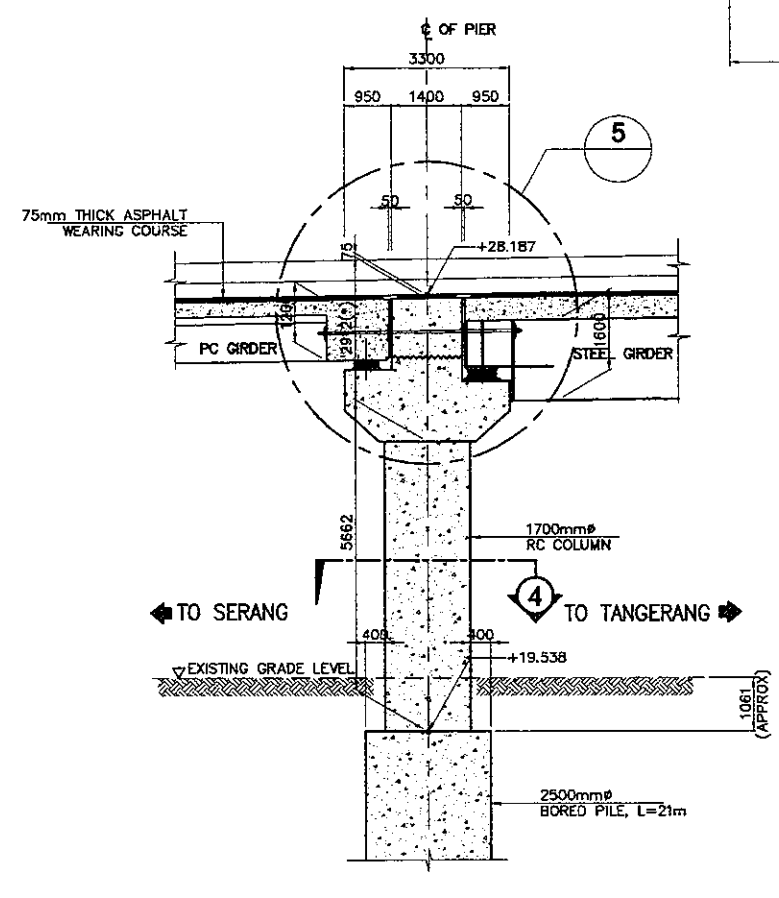
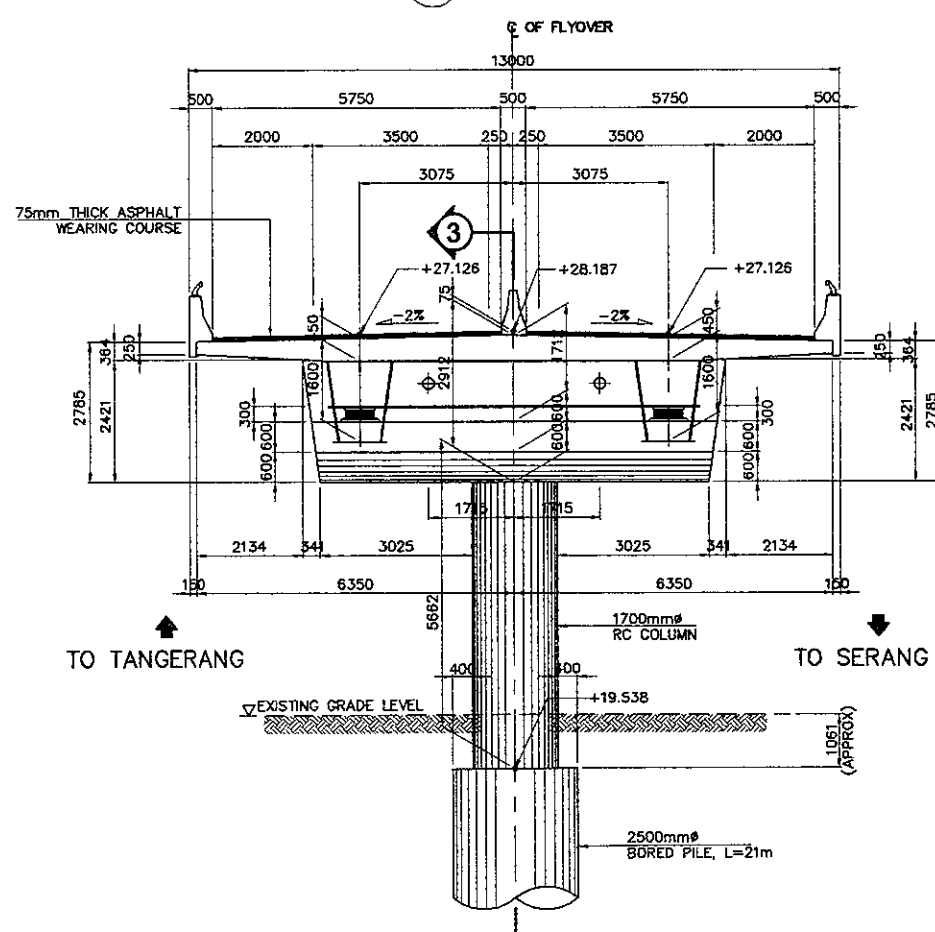
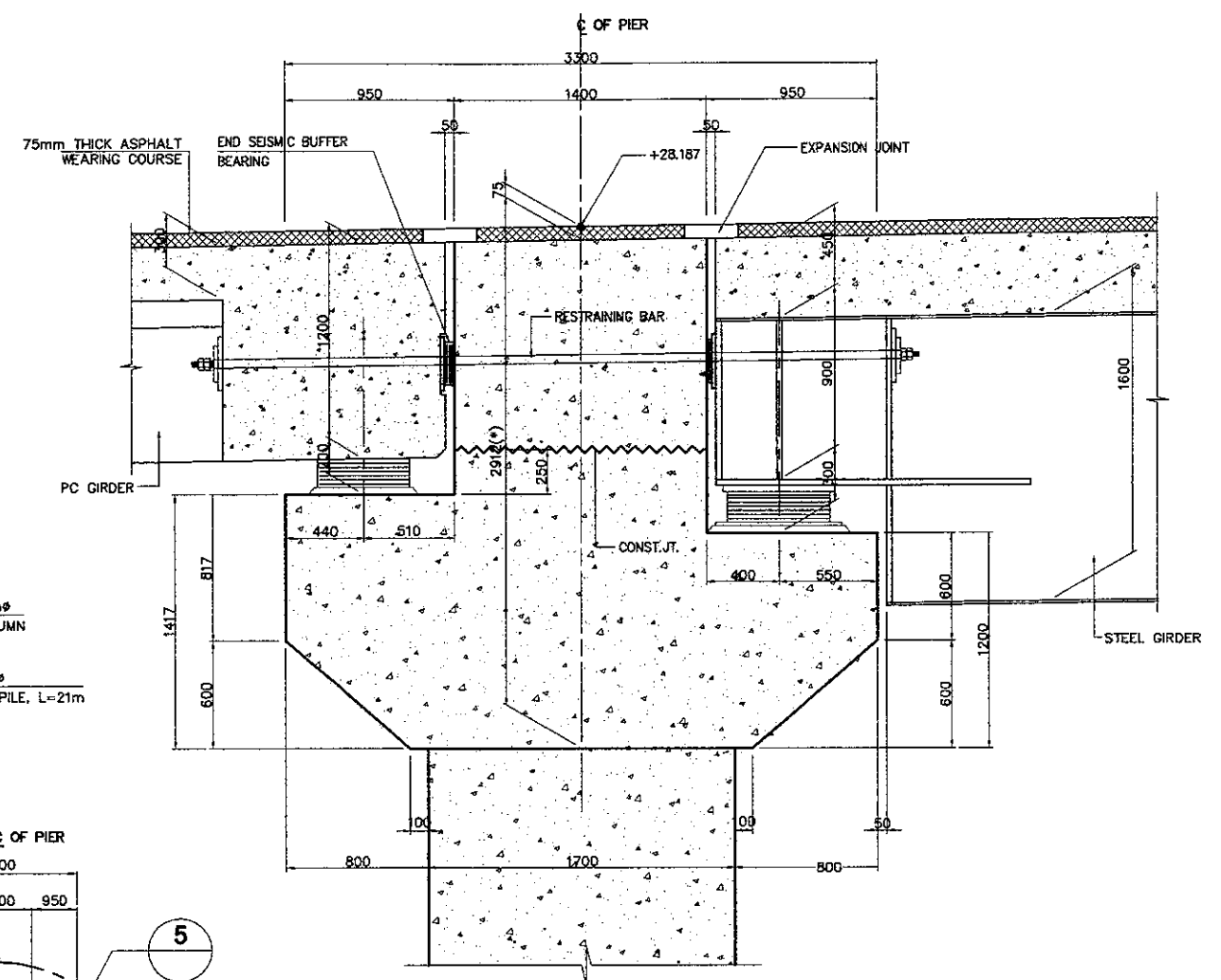
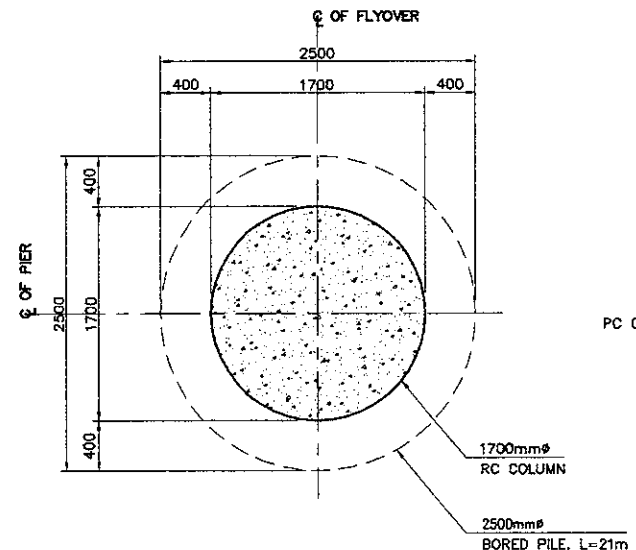
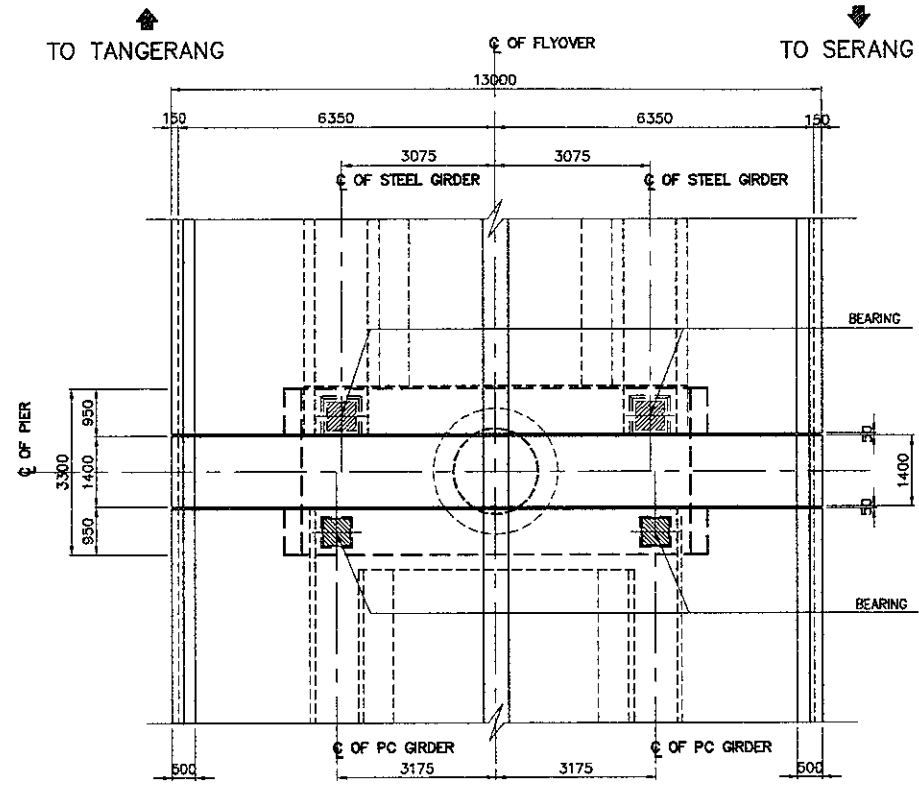


PIER	EL. A	EL. AL	EL. AR	EL. BL	EL. BR	SL. 1L	SL. 1R	SL. 2	H	HL	HR	H1	H2	H3	H4	H5	H6
P1	27.121	27.056	27.056	18.752	18.752	-2.000%	-2.000%	+4.450%	1264	7029	7029	1137	1137	739	739	397	397
P2	27.777	27.714	27.714	19.410	19.410	-2.000%	-2.000%	+4.450%	1264	7029	7029	1137	1137	739	739	397	397



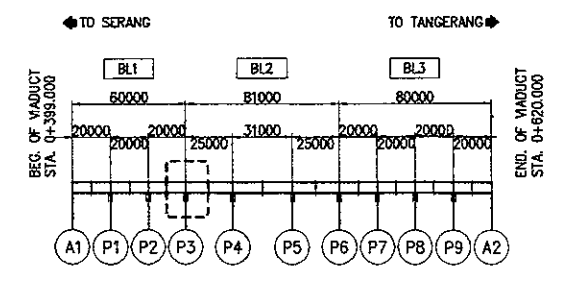
NOTES :  
 1. ALL DIMENSIONS ARE IN MILLIMETER  
 2. ELEVATIONS ARE IN METERS

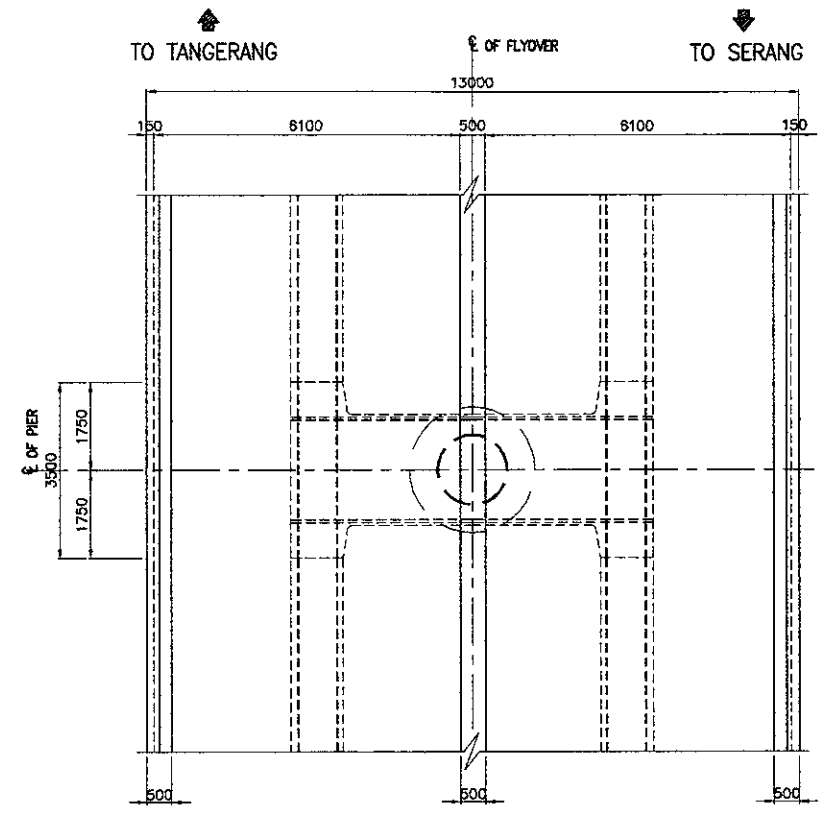




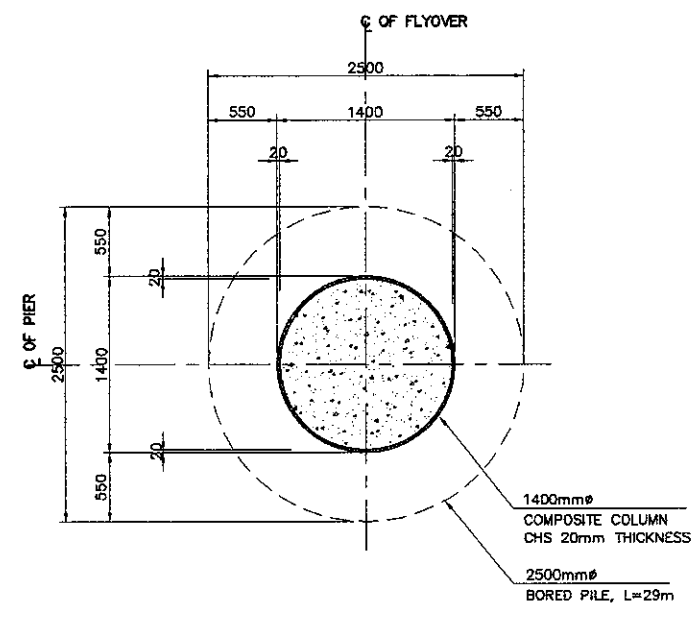
(\*) NOTES :  
 1. DIMENSION GIVEN AT ? ALIGNMENT OF FLYOVER  
 2. DIMENSION VARIES AT CROSS DECK

NOTES :  
 1. ALL DIMENSIONS ARE IN MILLIMETER  
 2. ELEVATIONS ARE IN METERS



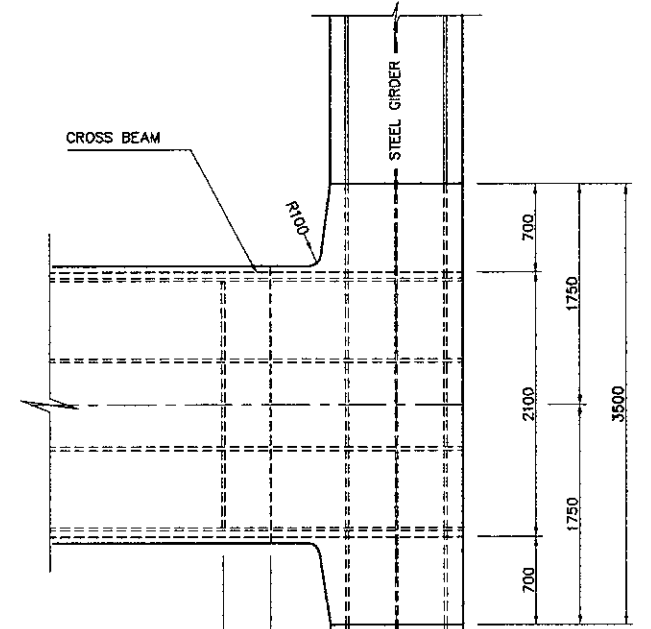


2 PLAN  
 SCALE : 1:150

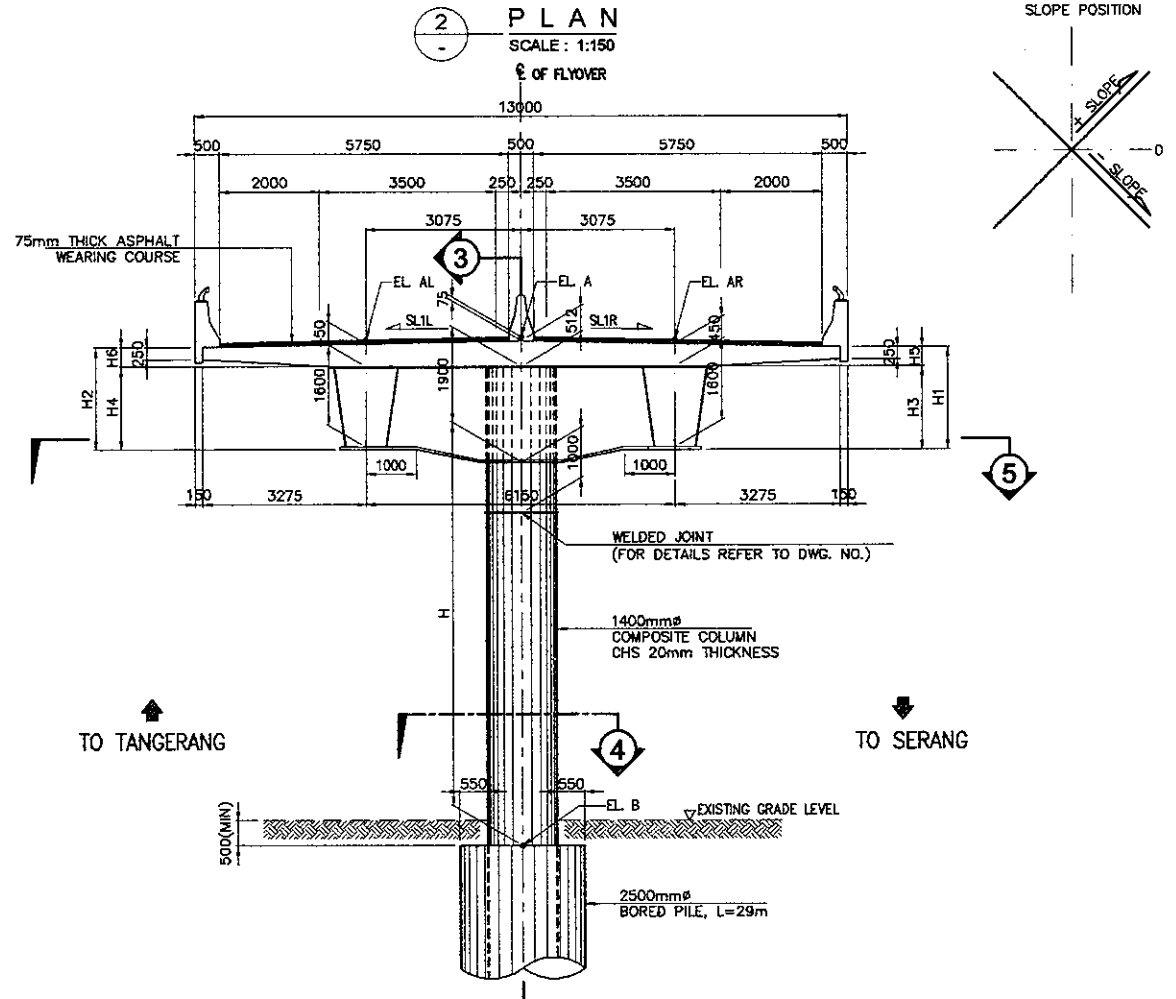


4 SECTION  
 SCALE : 1:60

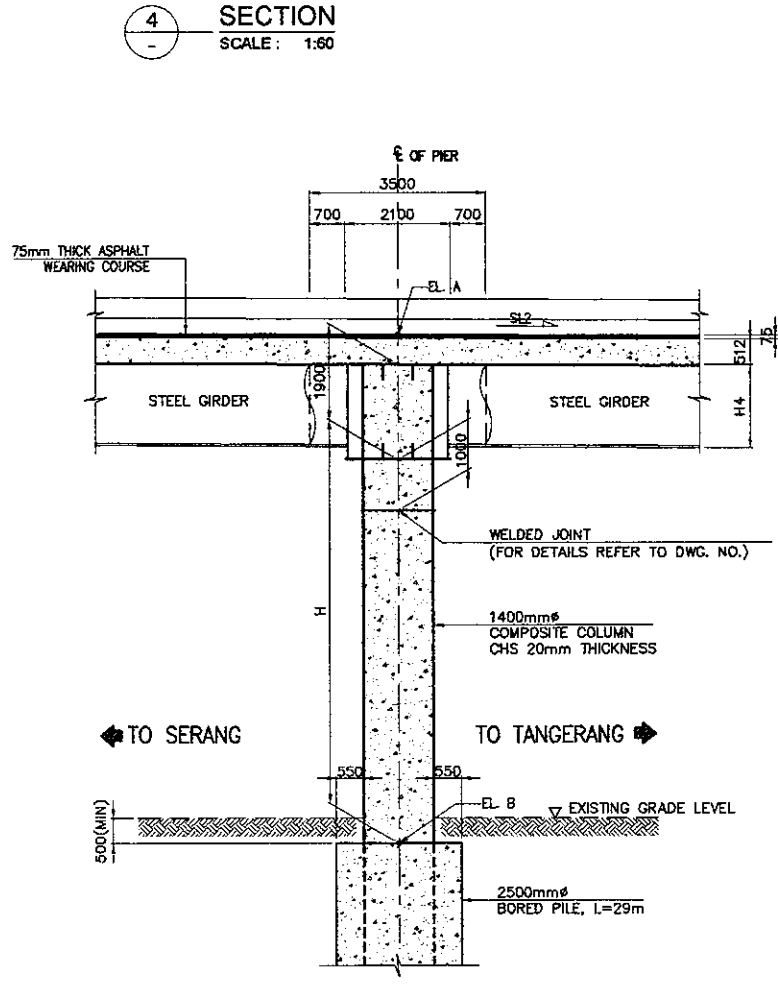
SCHEDULE OF PIERS (FIXED)														
PIER	EL. A	EL. AL	EL. AR	EL. B	SL. 1L	SL. 1R	SL. 2	H	H1	H2	H3	H4	H5	H6
P4	28.354	28.293	28.293	18.867	-2.000%	-2.000%	-0.472%	7000	2029	2029	1644	1644	385	385
P5	28.218	28.157	28.157	18.831	-2.000%	-2.000%	-0.472%	6900	2029	2029	1644	1644	385	385



5 SECTION  
 SCALE : 1:60

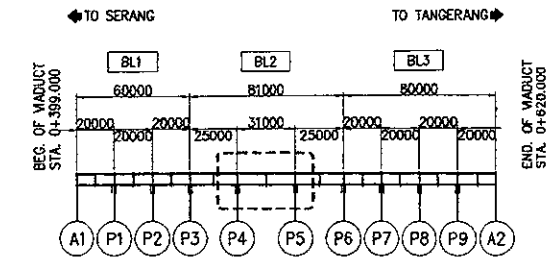


1 ELEVATION  
 SCALE : 1:150

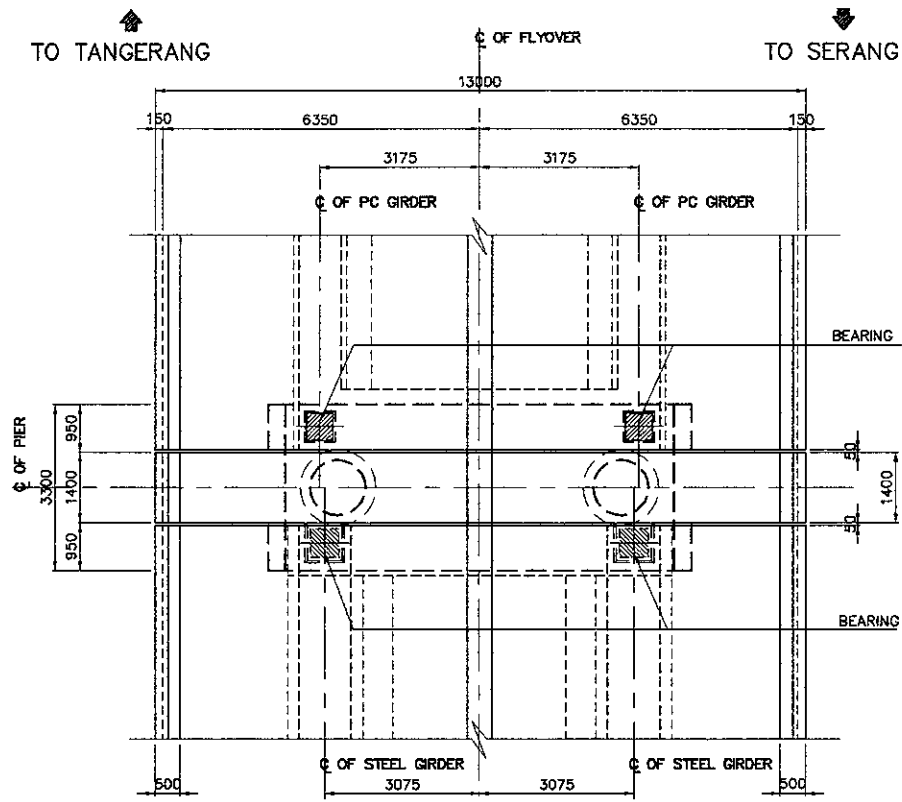


3 SECTION  
 SCALE : 1:150

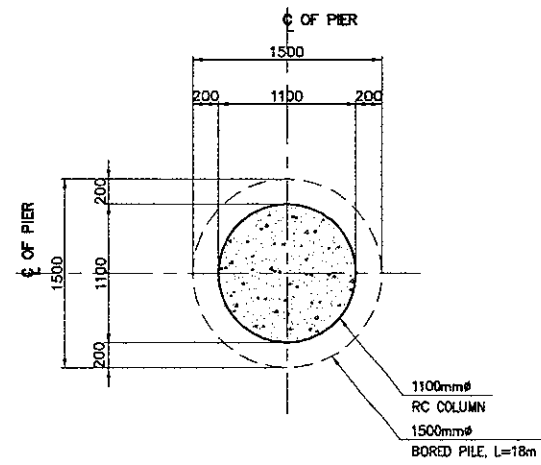
NOTES :  
 1. ALL DIMENSIONS ARE IN MILLIMETER  
 2. ELEVATIONS ARE IN METERS



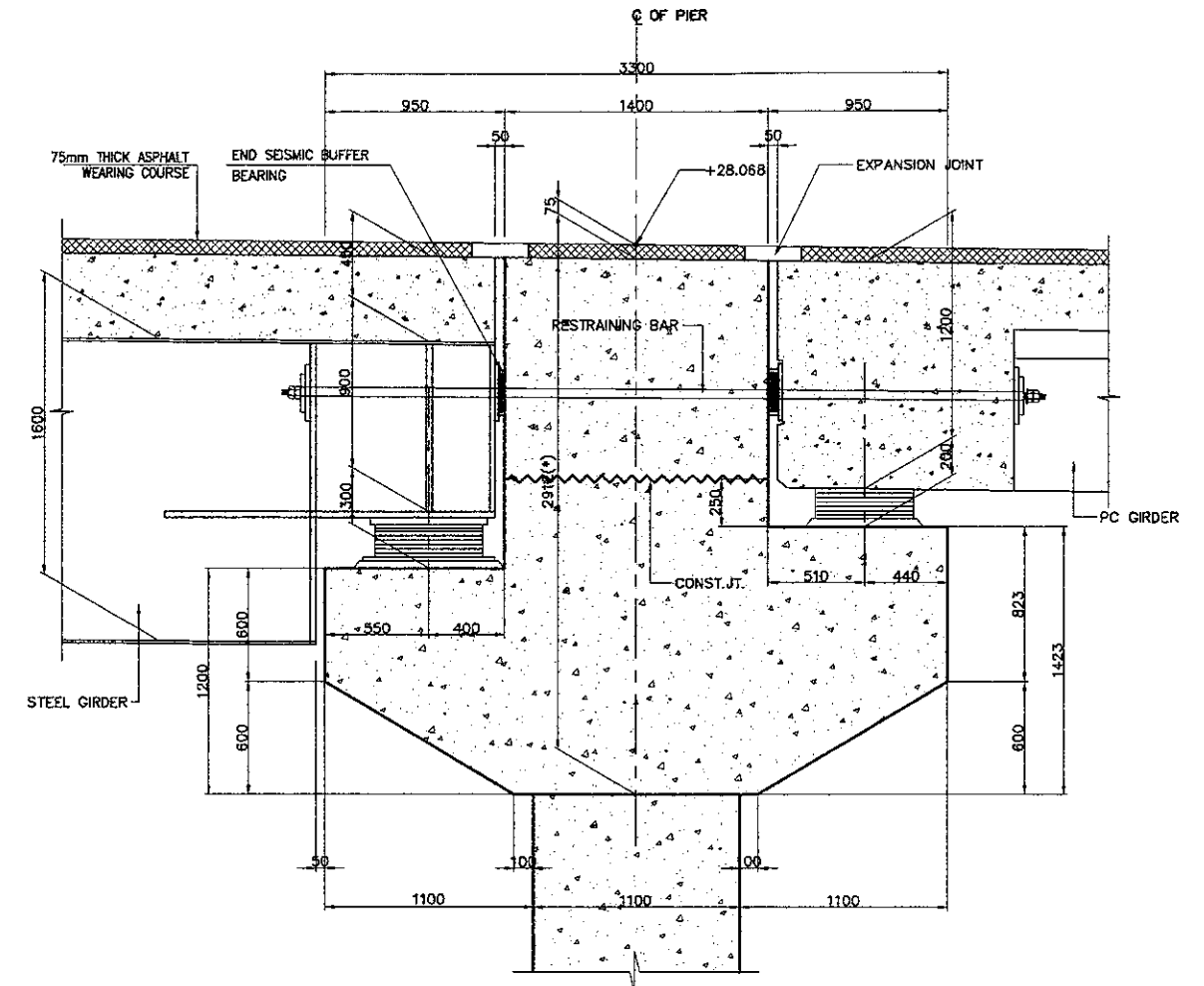
KEY PLAN  
 SCALE : 1:4000



**2 PLAN**  
 SCALE: 1:150

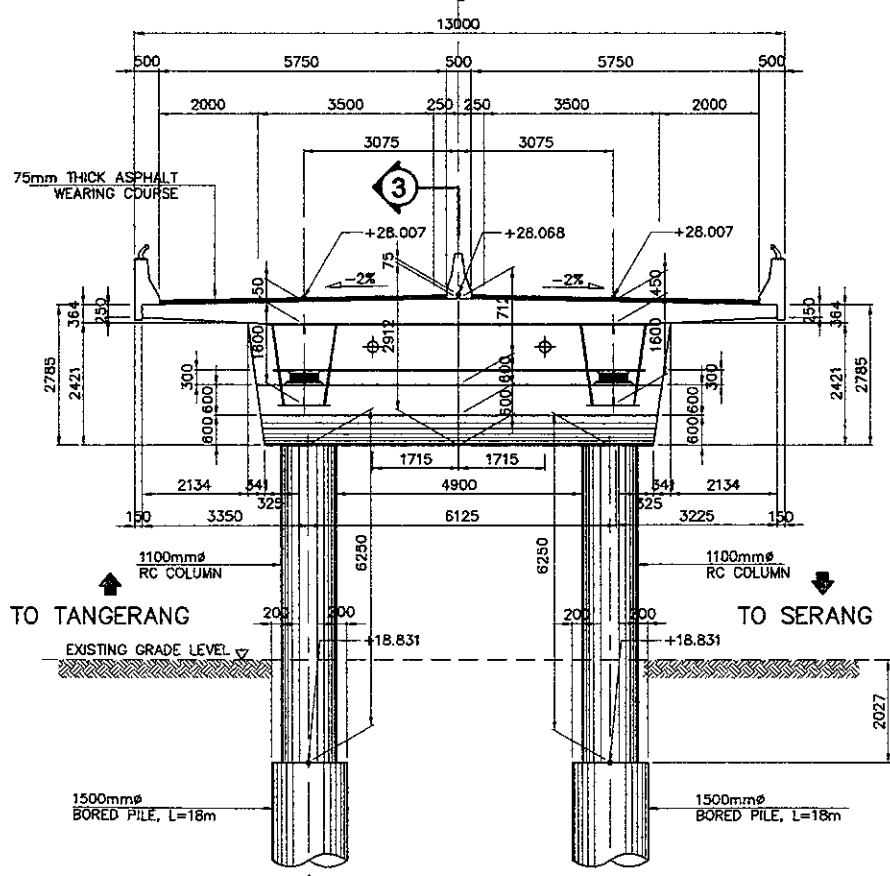


**4 SECTION**  
 SCALE: 1:60

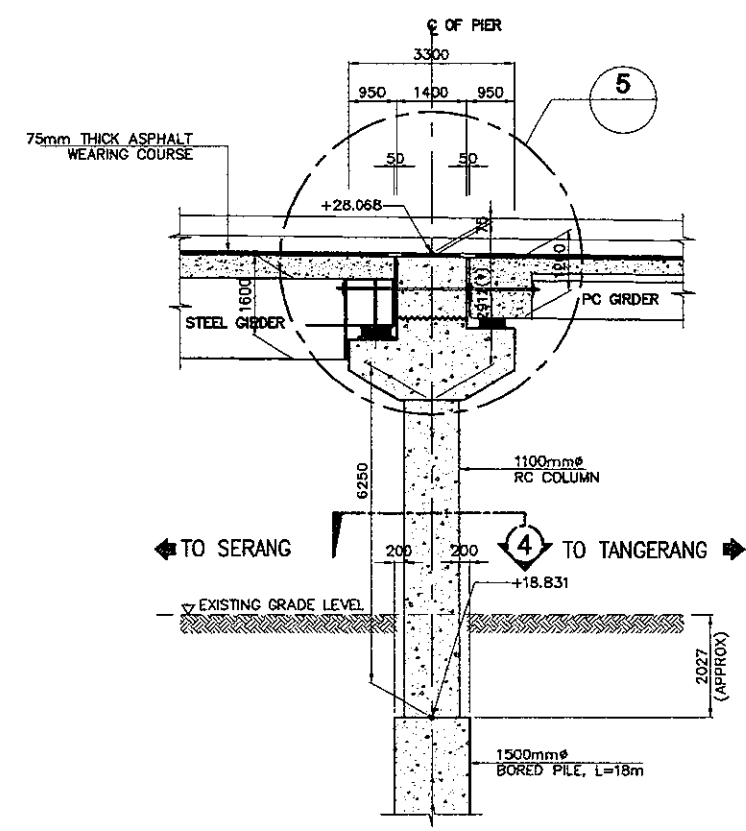


**5 DETAIL**  
 SCALE: 1:40

(\* NOTES :  
 1. DIMENSION GIVEN AT ? ALIGNMENT OF FLYOVER  
 2. DIMENSION VARIES AT CROSS DECK

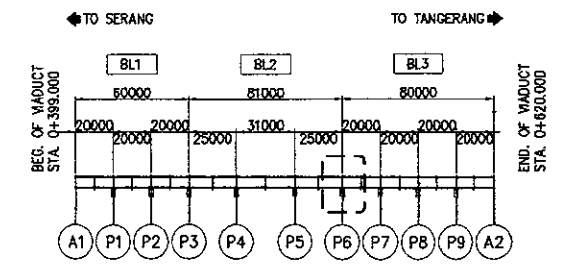


**1 ELEVATION**  
 SCALE: 1:150

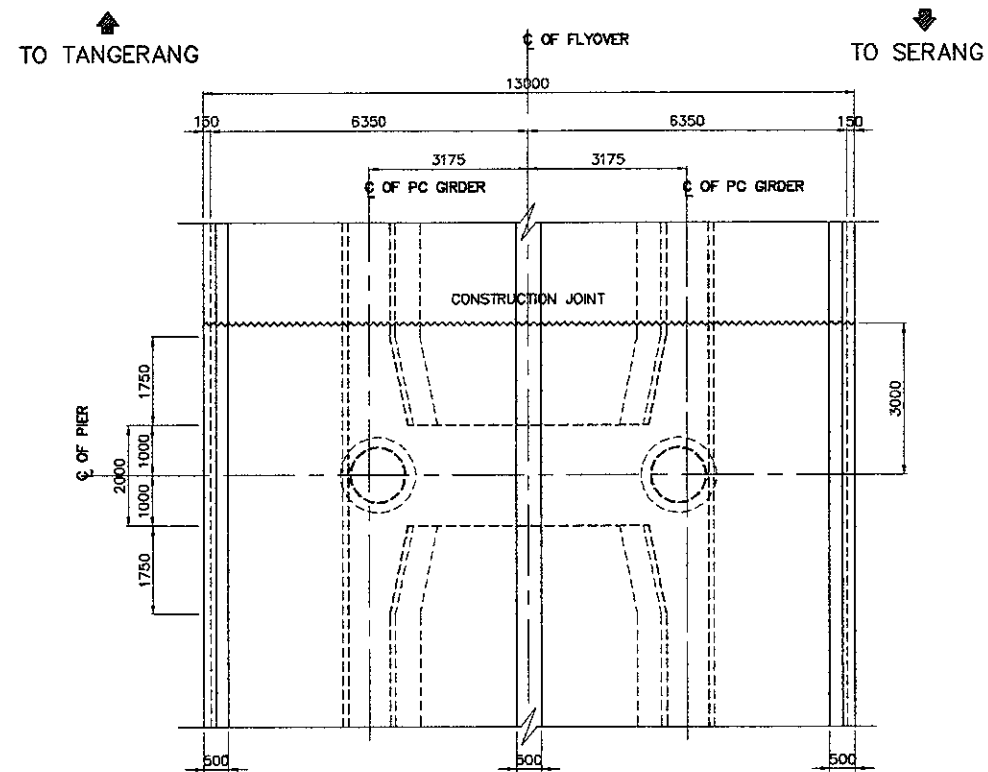


**3 SECTION**  
 SCALE: 1:150

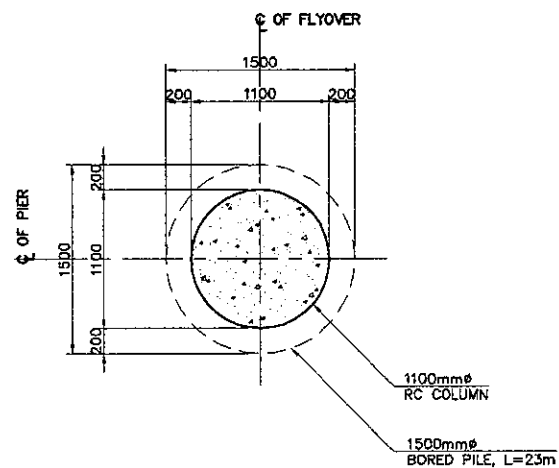
NOTES :  
 1. ALL DIMENSIONS ARE IN MILLIMETER  
 2. ELEVATIONS ARE IN METERS



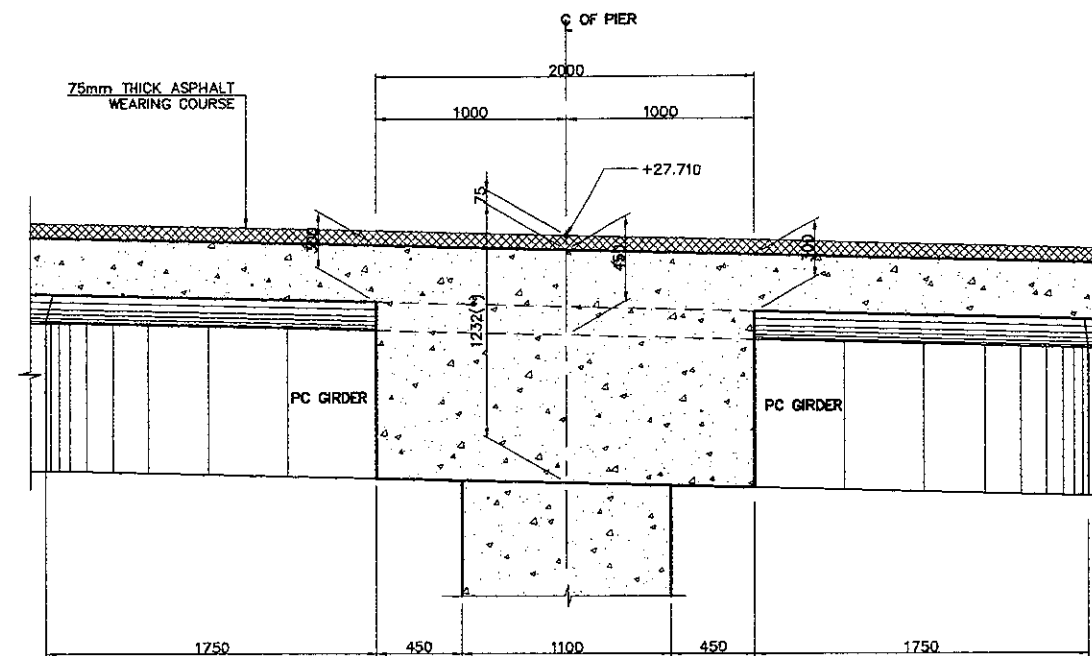
**KEY PLAN**  
 SCALE: 1:4000



**2 PLAN**  
 SCALE: 1:150

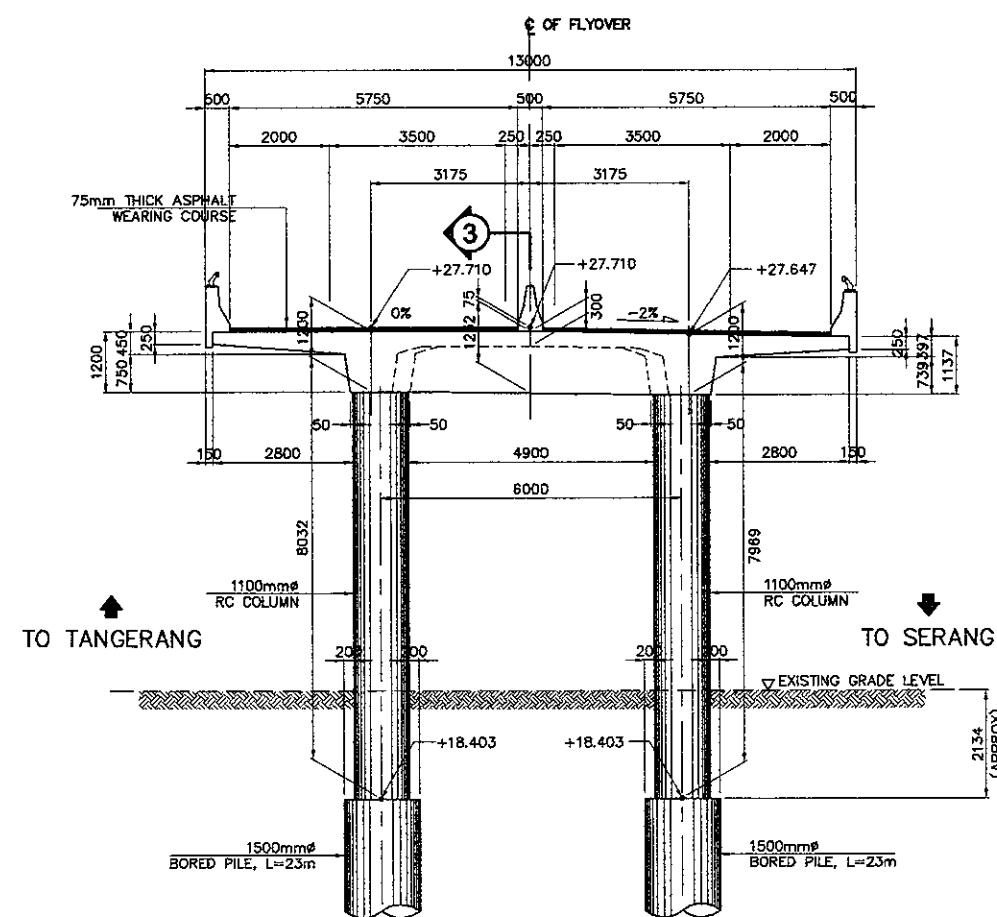


**4 SECTION**  
 SCALE: 1:60

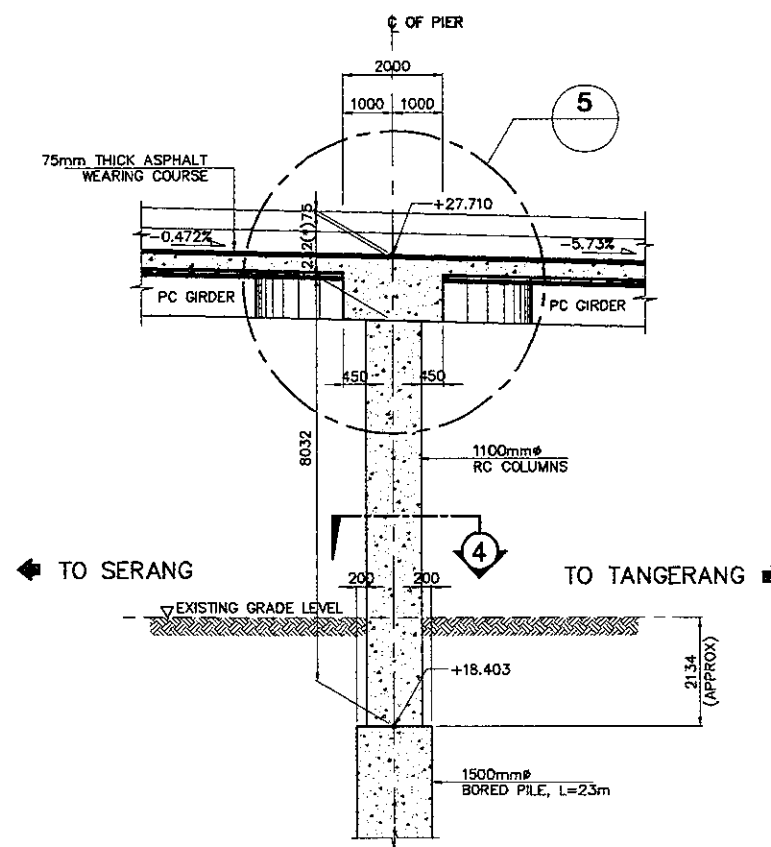


**5 DETAIL**  
 SCALE: 1:40

(\*) NOTES:  
 1. DIMENSION GIVEN AT ? ALIGNMENT OF FLYOVER  
 2. DIMENSION VARIES AT CROSS DECK

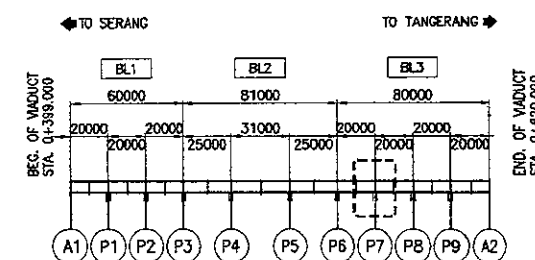


**1 ELEVATION**  
 SCALE: 1:150



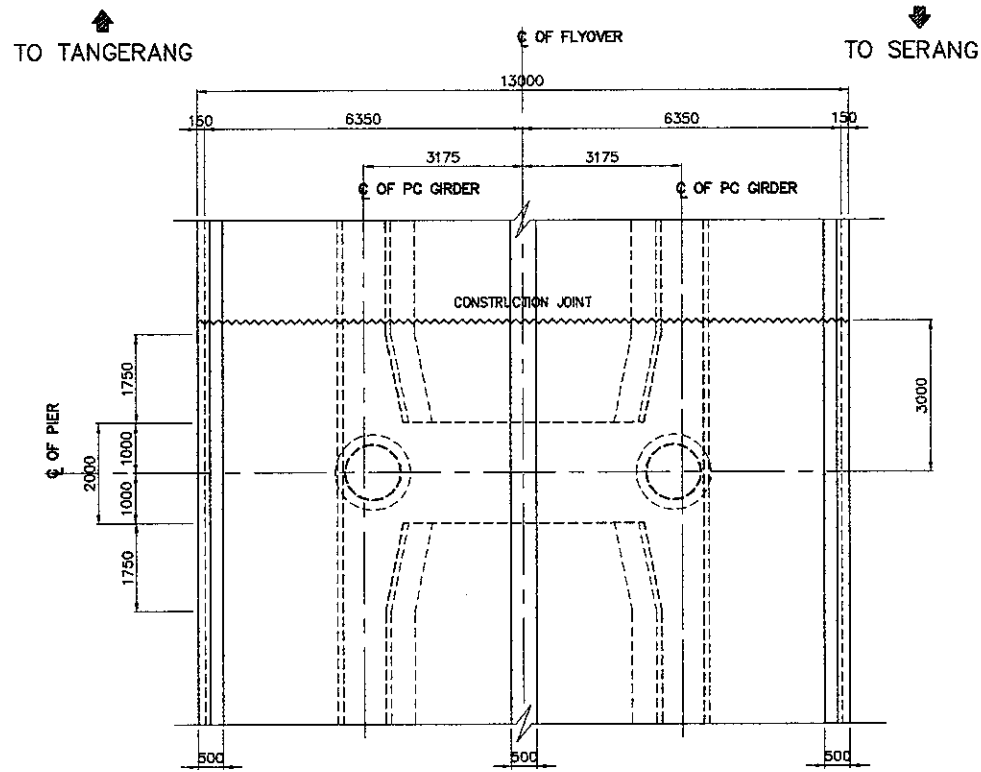
**3 SECTION**  
 SCALE: 1:150

NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETER  
 2. ELEVATIONS ARE IN METERS

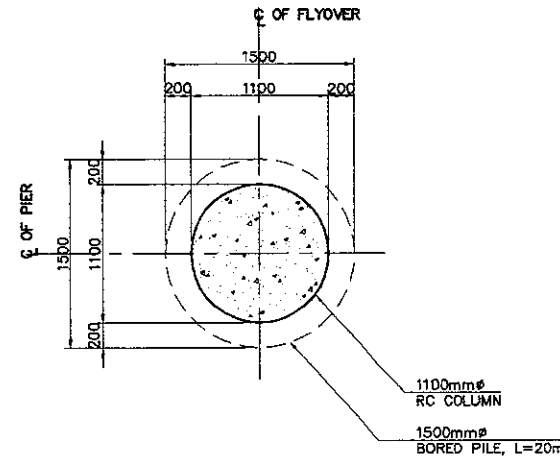


**KEY PLAN**  
 SCALE: 1:4000

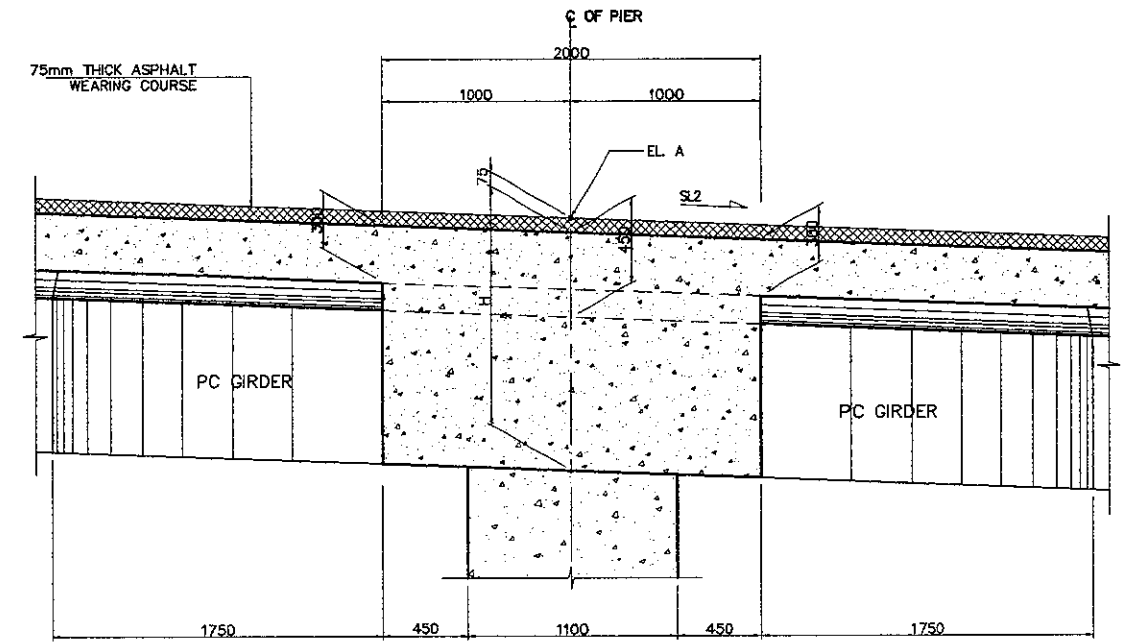
PIER	EL. A	EL. AL	EL. AR	EL. BL	EL. BR	SL. 1L	SL. 1R	SL. 2	H	HL	HR	H1	H2	H3	H4	H5	H6
P8	27.090	27.187	26.993	18.815	18.815	+3.057%	-3.057%	-5.730%	1200	7097	6903	1103	1297	734	786	369	531
P9	26.207	26.371	26.043	17.932	17.932	+5.171%	-5.171%	-5.730%	1200	7164	6836	1036	1364	723	777	313	587



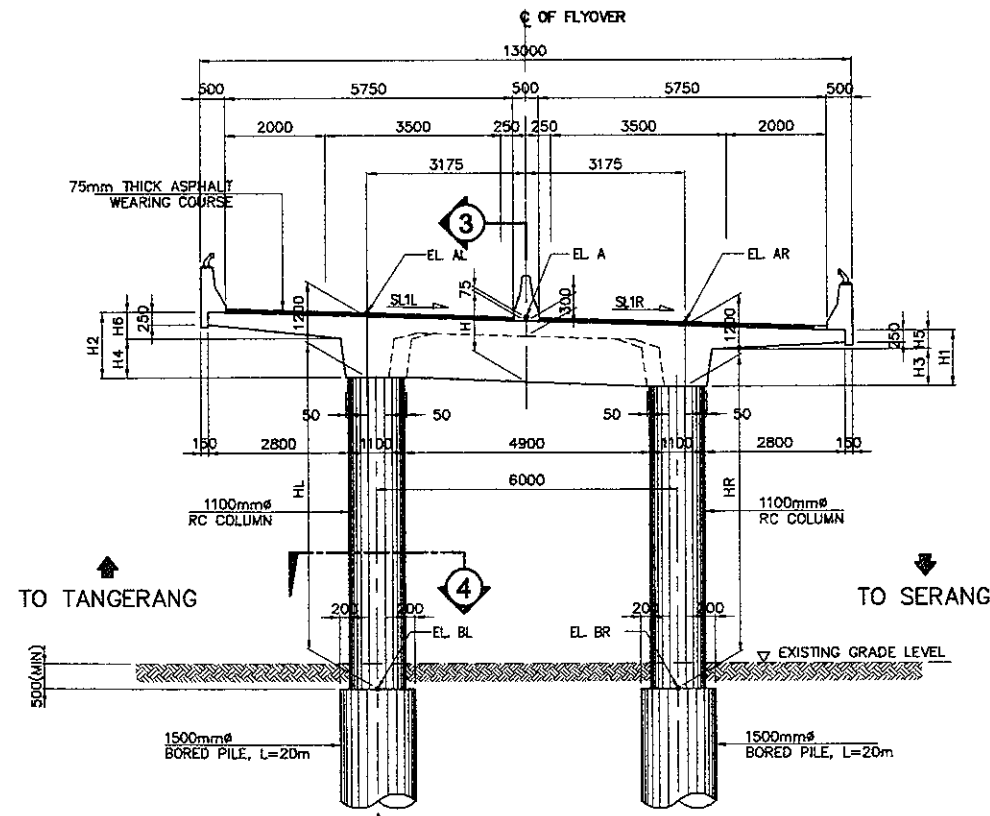
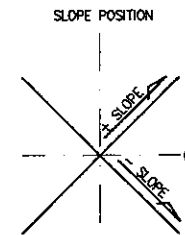
**2 PLAN**  
 SCALE: 1:150



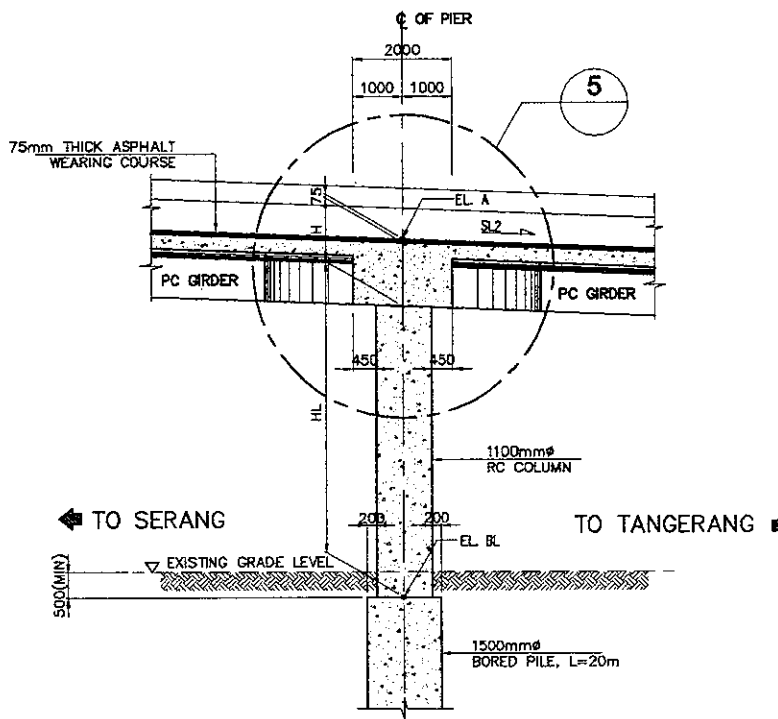
**4 SECTION**  
 SCALE: 1:60



**5 DETAIL**  
 SCALE: 1:40

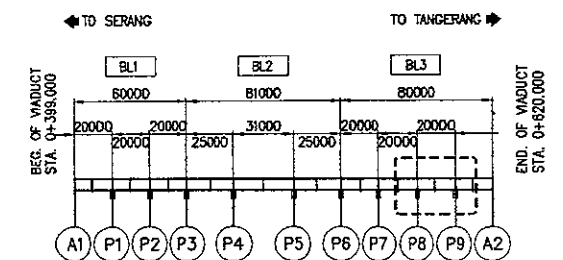


**1 ELEVATION**  
 SCALE: 1:150



**3 SECTION**  
 SCALE: 1:150

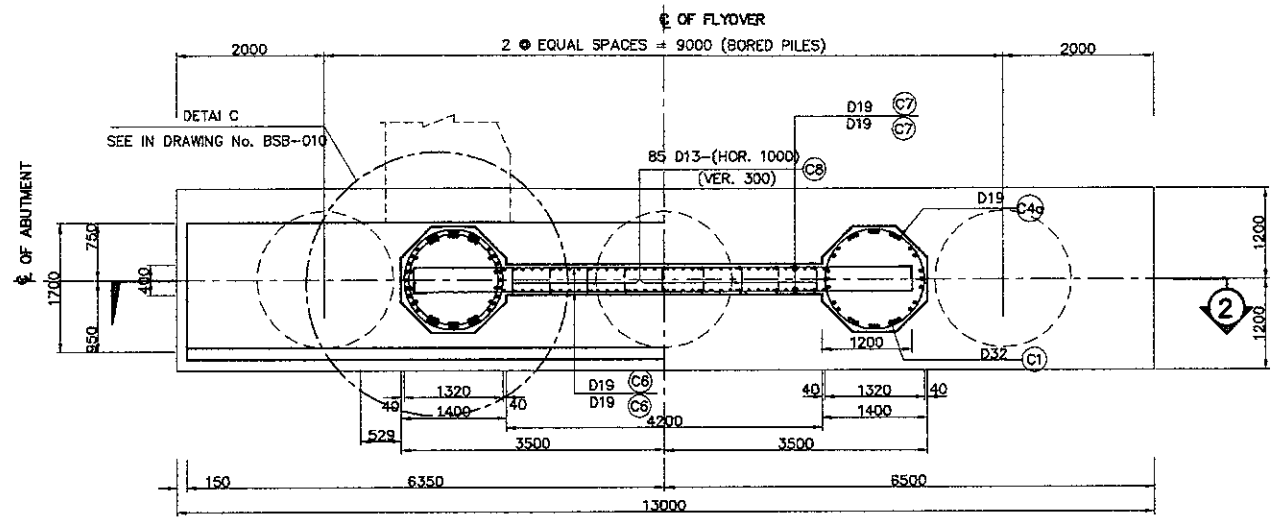
NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETER  
 2. ELEVATIONS ARE IN METERS



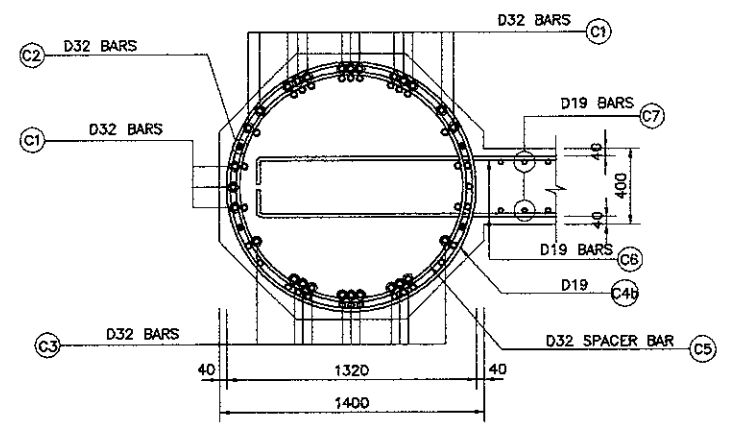
**KEY PLAN**  
 SCALE: 1:4000



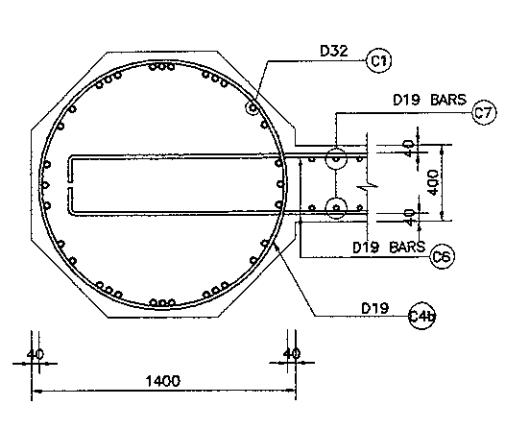




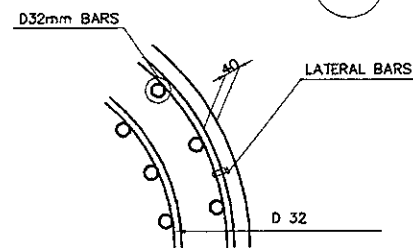
**1 PLAN**  
 SCALE 1:100



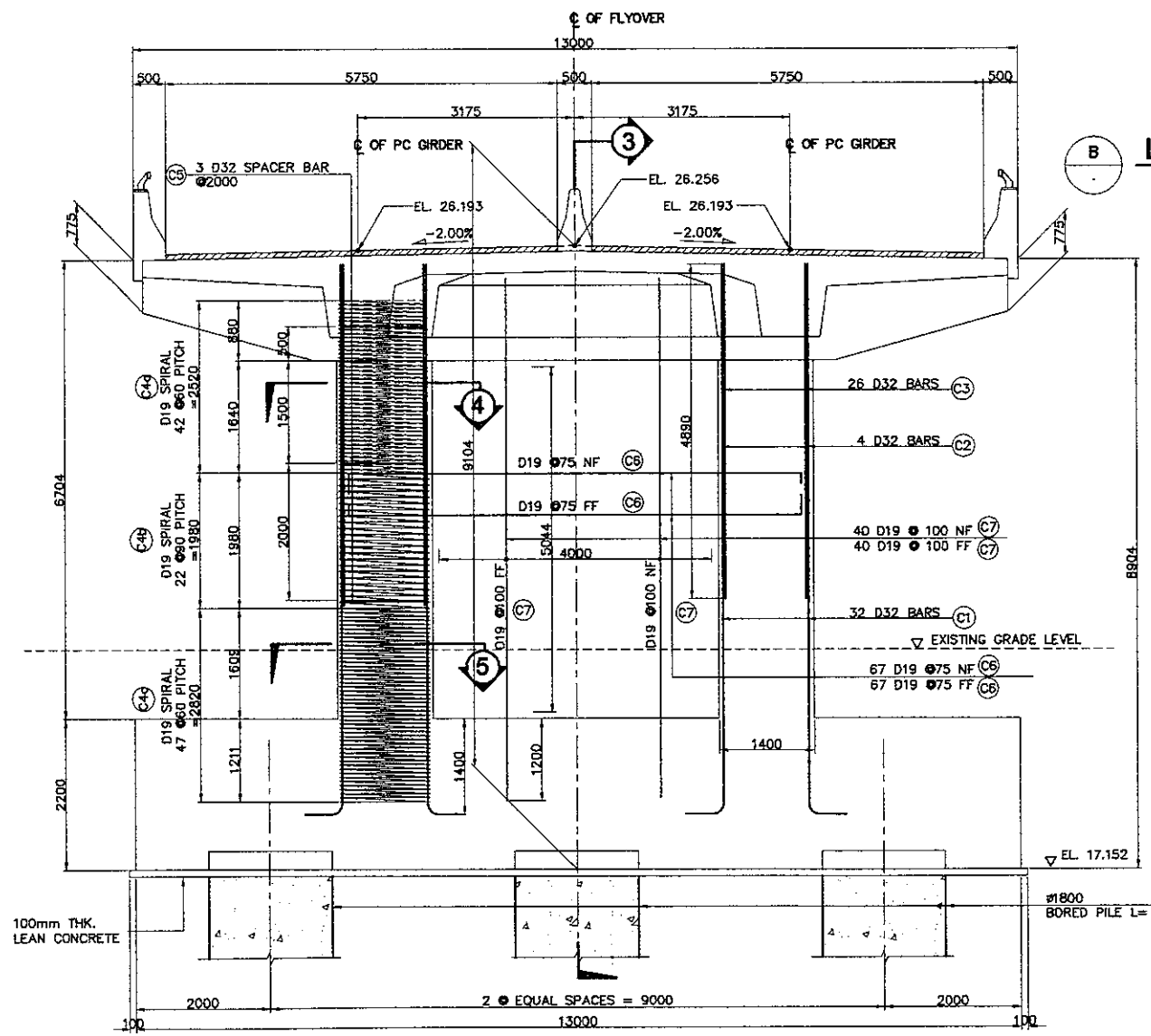
**4 SECTION**  
 SCALE 1:40



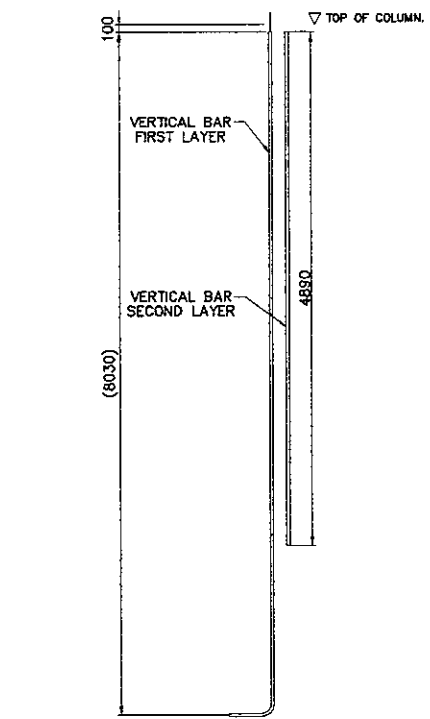
**5 SECTION**  
 SCALE 1:40



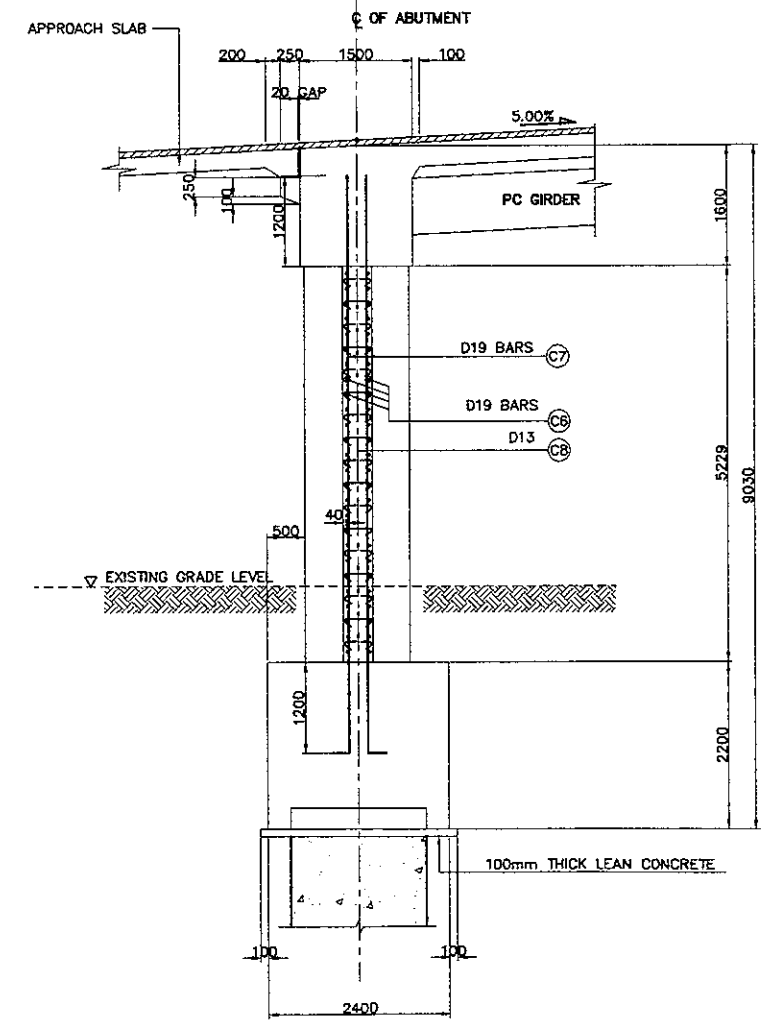
**TYPICAL BAR LAYOUT DETAIL**  
 NOT TO SCALE



**2 ELEVATION**  
 SCALE 1:100

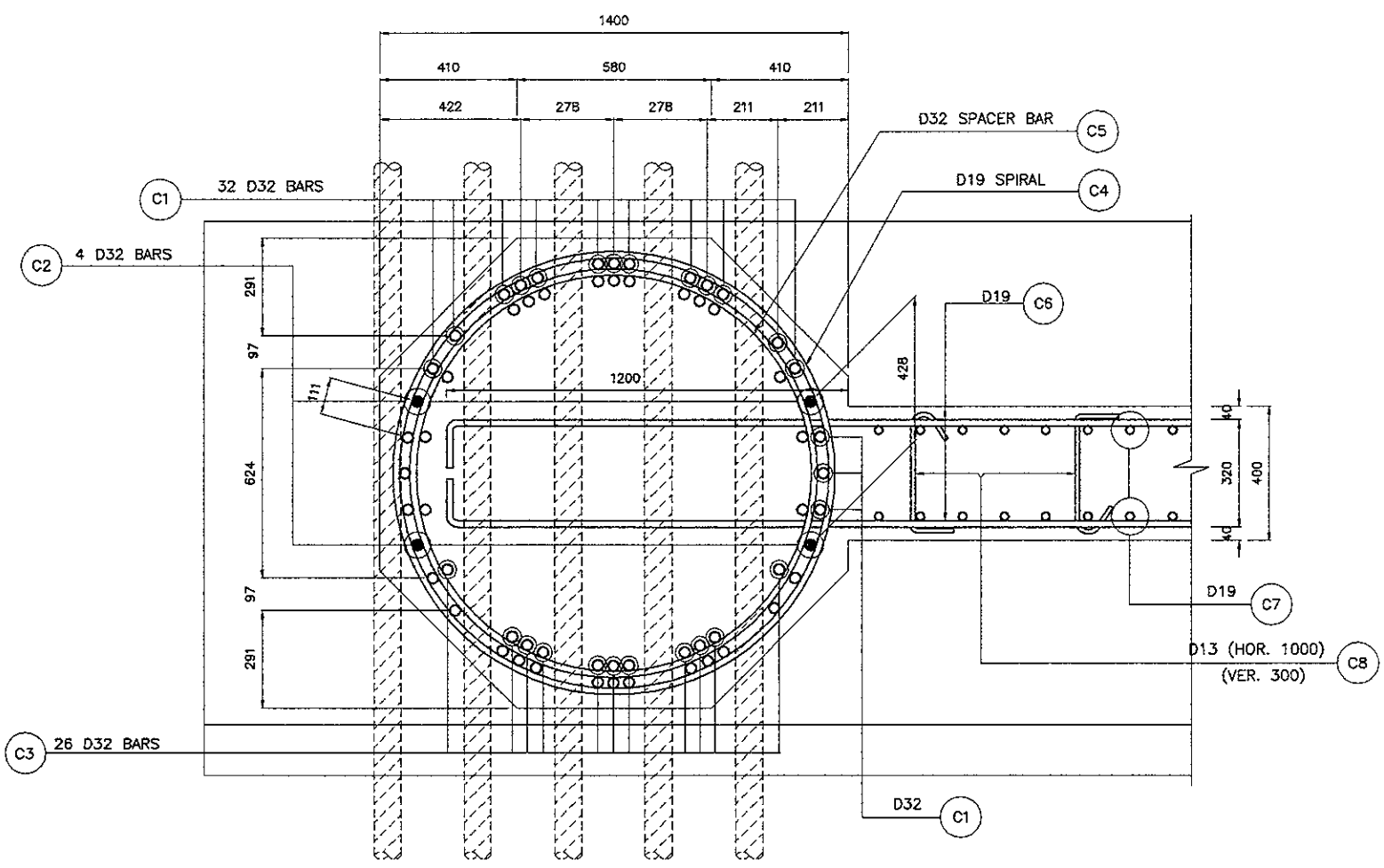


**A SCHEMATIC DETAIL**  
 NOT TO SCALE

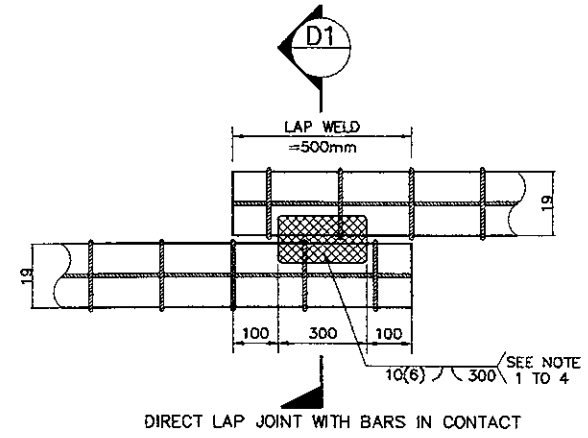


**3 SECTION**  
 SCALE 1:100

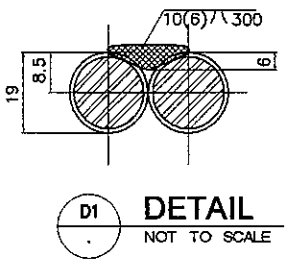
- NOTES :
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. ELEVATION ARE IN METERS
  3. CONCRETE ABUTMENT AND FOOTING  $f_c' = 30 \text{ MPa}$
  4. REINFORCING STEEL : YIELD STRENGTH =  $390 \text{ N/mm}^2$



**C** DETAIL  
 SCALE 1:20



**D** DETAIL OF SPIRAL REINF.  
 FULL LAP-WELD CONNECTION  
 NOT TO SCALE



**D1** DETAIL  
 NOT TO SCALE

- NOTES ON LAP-WELD CONNECTION :
1. SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
  2. WELDING SHOULD CONFORM TO AWS (D1.4)  
 \*STRUCTURAL WELDING CODE REINFORCED STEEL.\*
  3. USE ELECTRODE E90XX.
  4. CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN BARS DURING WELDING.

BAR BENDING DIAGRAM												
1		2		3								
4		5		6								

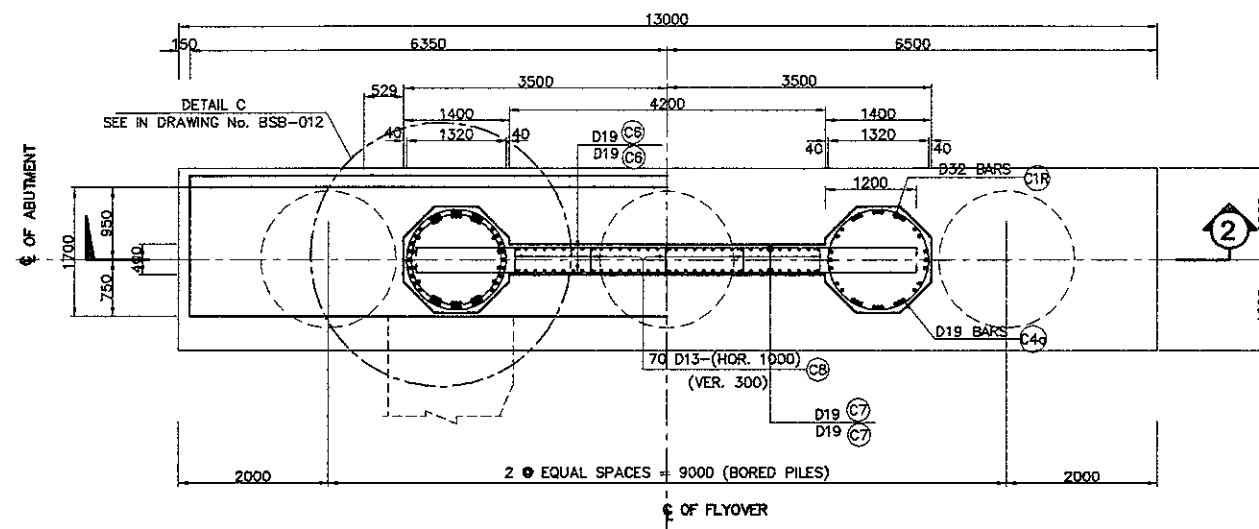
  

SCHEDULE OF REINFORCEMENT															
LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION (mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m.)	WEIGHT (kg.)	VOLUME OF CONC. (M³)	
				a	b	c	d	e	f						
ABUTMENT (A)	COLUMN														
	C1	32	1	8030	550						8580	32	6.31	1732	8.492
	C2	32	2	4890							4890	4	6.31	123	
	C3	32	2	4890							4890	26	6.31	802	
	C4a	19	3	60	1320	500					181427	1	2.23	405	
	C4b	19	3	90	1320	500					95033	1	2.23	212	
	C4c	19	3	60	1320	500					203025	1	2.23	453	
	C5	32	4	1275	500						4506	3	6.31	85	
												TOTAL WEIGHT = 3,813 kg.		16.984	
	WALL														
C6	19	5	300	6800						7200	134	2.23	2152	8.785	
C7	19	1	7630	500						8130	82	2.23	1487		
C8	13	6	110	320	160					590	85	1.04	52		
											TOTAL (B) WALL = 3,691 kg.				
											TOTAL WEIGHT (A + B) = 11,316 kg.		25.789		

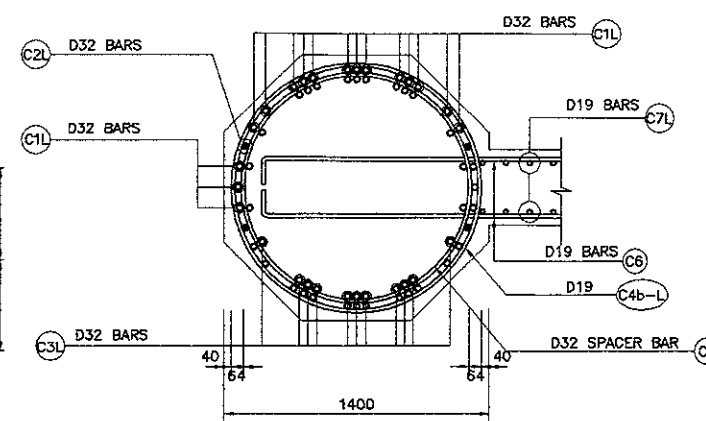
THE REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY. THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

- NOTES :
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. ELEVATION ARE IN METERS
  3. CONCRETE ABUTMENT AND FOOTING  $f_c' = 30 \text{ MPa}$
  4. REINFORCING STEEL : YIELD STRENGTH =  $390 \text{ N/mm}^2$

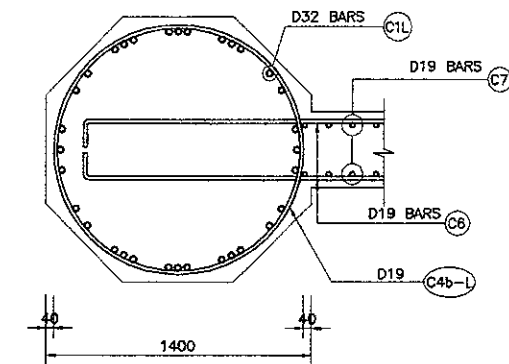
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name A. GOURLEY	Name T. OKUMURA	Name M. KIUCHI
Sign	Sign	Sign
Date	Date	Date



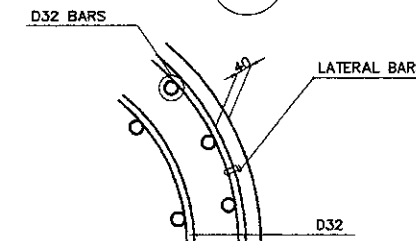
**1 PLAN**  
 SCALE 1:100



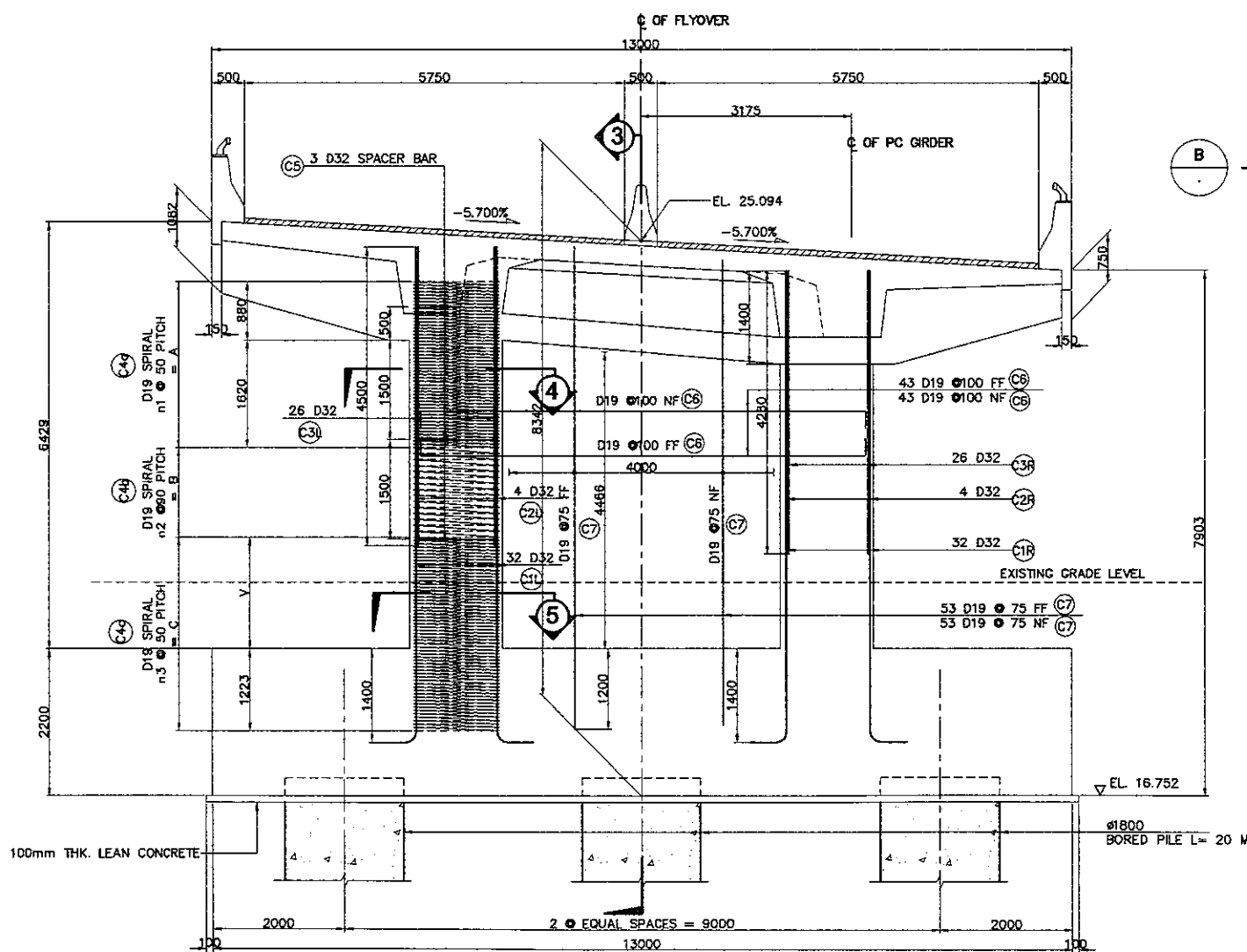
**4 SECTION**  
 SCALE 1:40



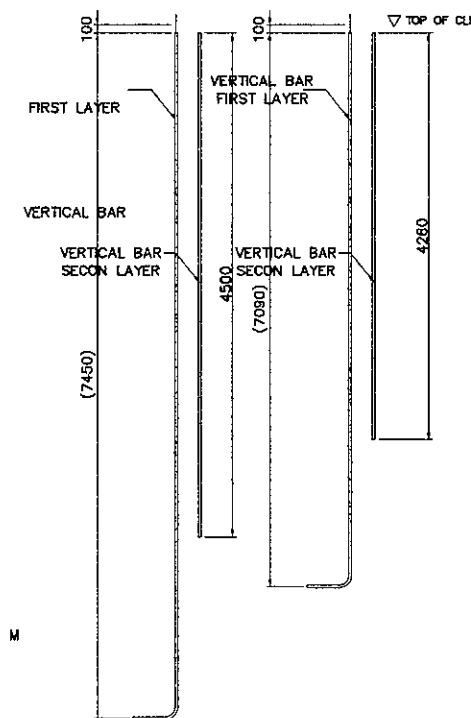
**5 SECTION**  
 SCALE 1:40



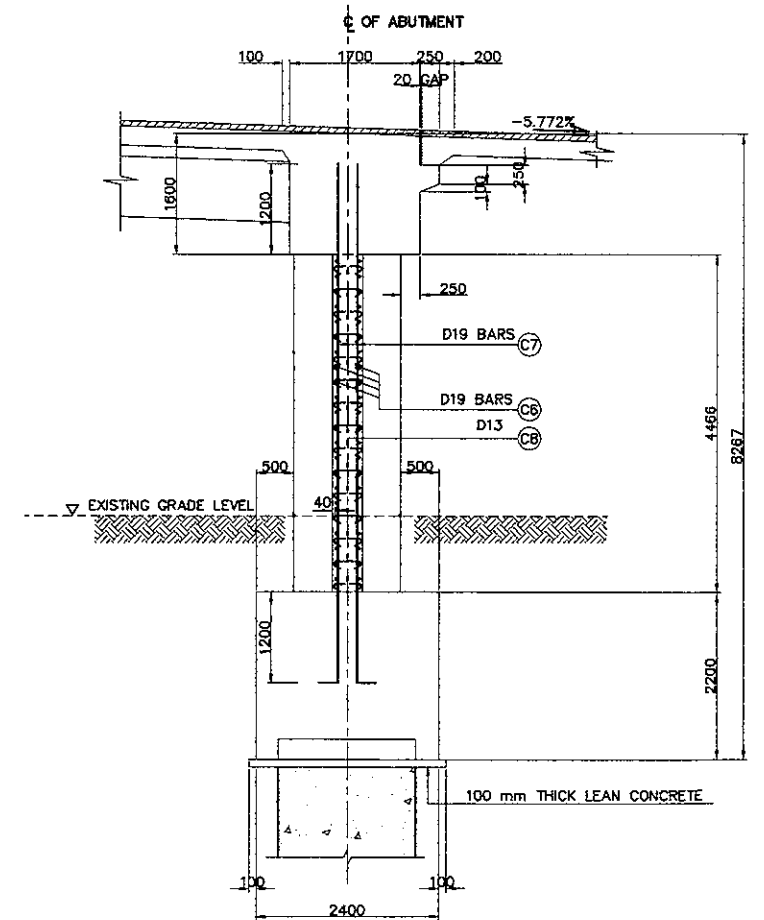
**TYPICAL BAR LAYOUT DETAIL**  
 NOT TO SCALE



**2 ELEVATION**  
 SCALE 1:100

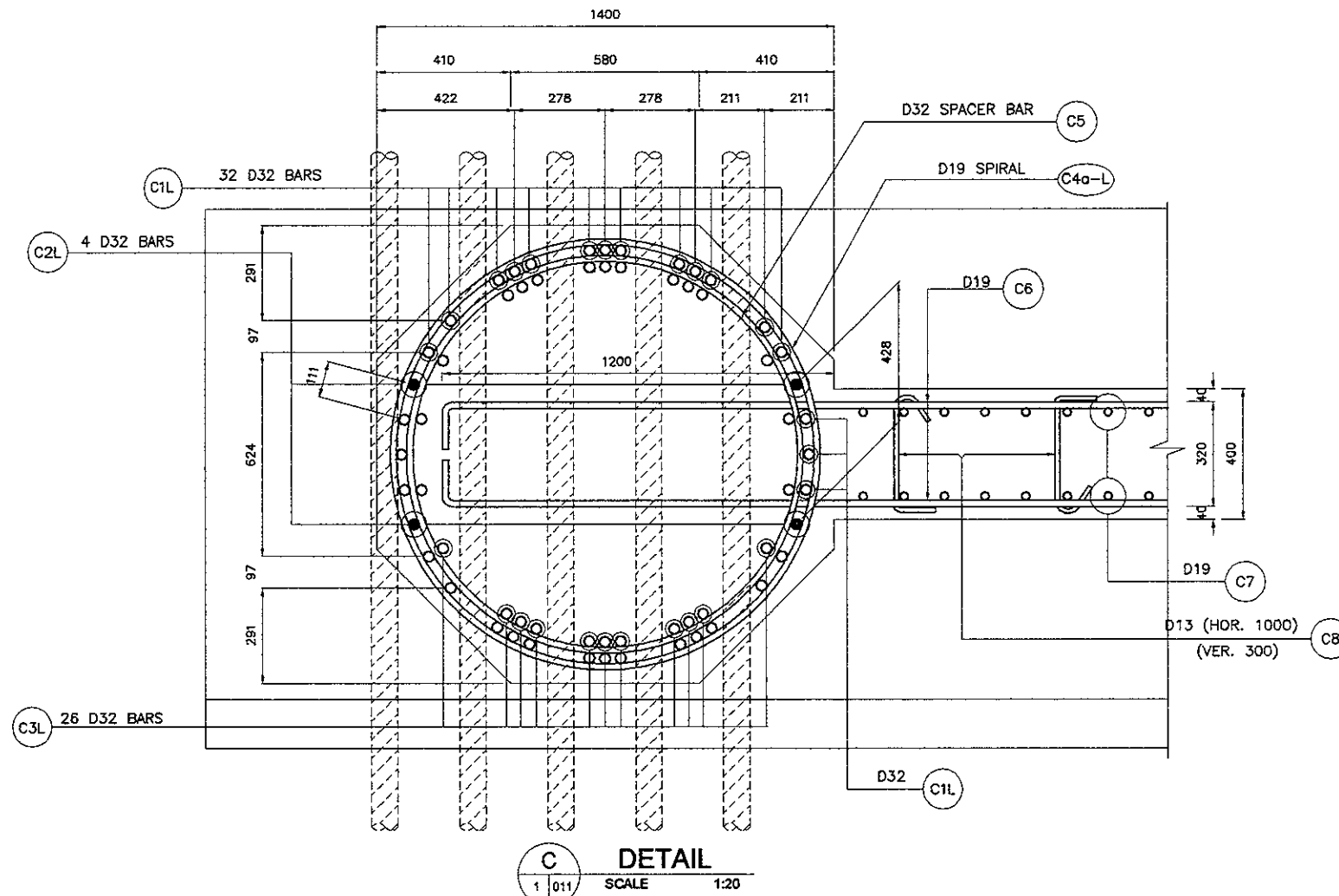


**A SCHEMATIC DETAIL**  
 NOT TO SCALE

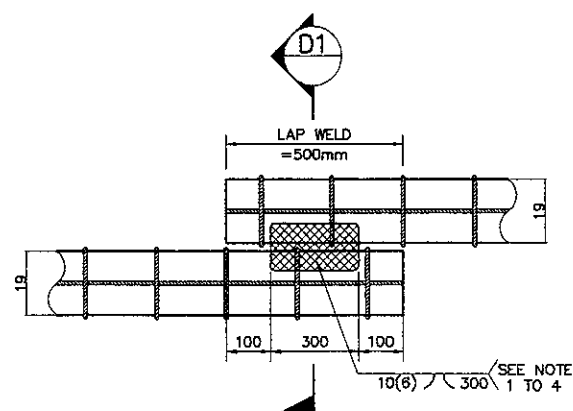


**3 ELEVATION**  
 SCALE 1:100

- NOTES :
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. ELEVATION ARE IN METERS
  3. CONCRETE ABUTMENT AND FOOTING  $f_c' = 30 \text{ MPa}$
  4. REINFORCING STEEL : YIELD STRENGTH =  $390 \text{ N/mm}^2$

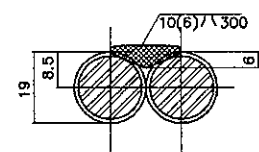


**C**  
 1 011  
 SCALE 1:20  
 DETAIL



DIRECT LAP JOINT WITH BARS IN CONTACT

**D**  
 DETAIL OF SPIRAL REINF.  
 FULL LAP-WELD CONNECTION  
 NOT TO SCALE



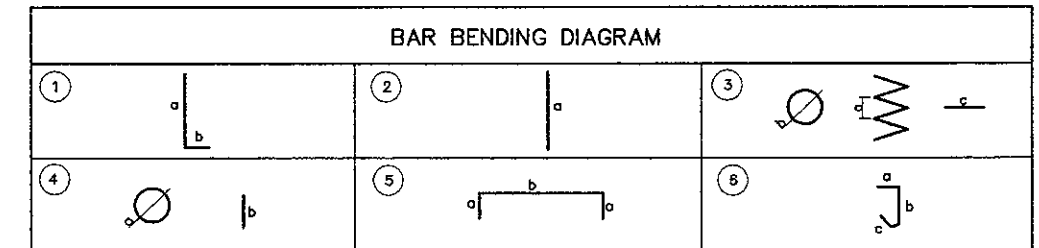
**SECTION-D1**  
 SINGLE FLARED-V-GROOVE WELD

**NOTES ON LAP-WELD CONNECTION :**

1. SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
2. WELDING SHOULD CONFORM TO AWS (D1.4)  
 \*STRUCTURAL WELDING CODE REINFORCED STEEL.\*
3. USE ELECTRODE E90XX.
4. CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN BARS DURING WELDING.

**NOTES :**

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ELEVATION ARE IN METERS
3. CONCRETE ABUTMENT AND FOOTING  $f_c' = 30 \text{ MPa}$
4. REINFORCING STEEL : YIELD STRENGTH = 390 N/mm<sup>2</sup>



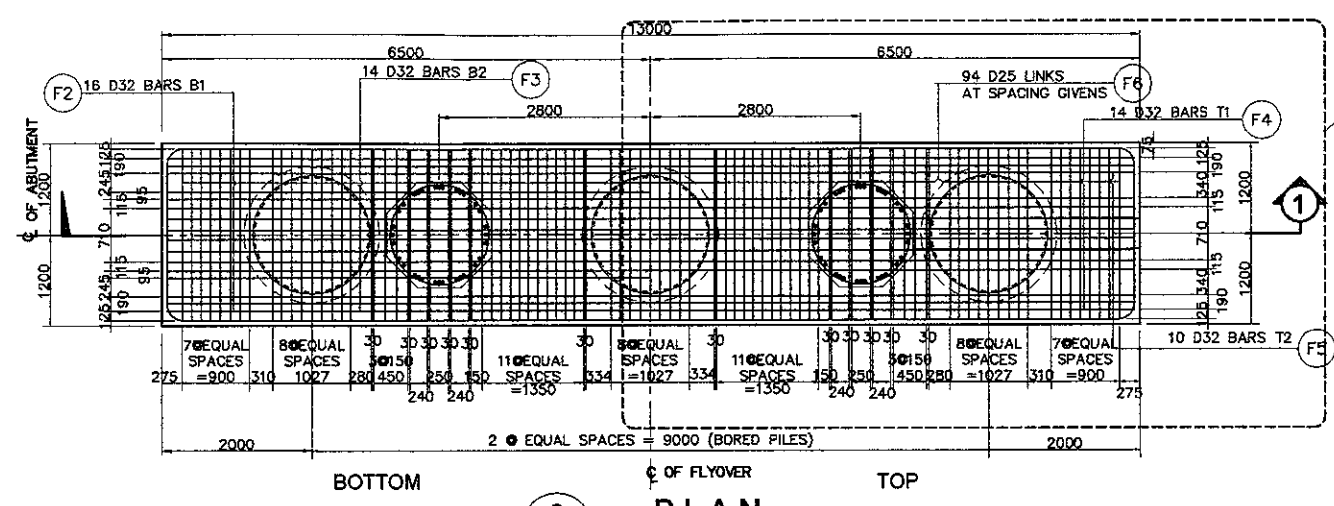
**SCHEDULE OF REINFORCEMENT**

LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION (mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m)	WEIGHT (kg)	VOLUME OF CONC. (M <sup>3</sup> )	
				a	b	c	d	e	f						
ABUTMENT (A2)	<b>COLUMN</b>														
	C1L	32	1	7450	550						8000	32	6.31	1615	7.546
	C2L	32	2	4500							4500	4	6.31	114	
	C3L	32	2	4500							4500	26	6.31	738	
	C4a-L	19	3	50	1320	500					215984	1	2.23	482	
	C4b-L	19	3	90	1320	500					64795	1	2.23	144	
	C4c-L	19	3	50	1320	500					250542	1	2.23	559	
	C5	32	4	1275	500						4506	3	2.23	30	
	<b>TOTAL WEIGHT COLUMN (L) = 3,882 kg.</b>														
	C1R	32	1	7080	550						7630	32	6.31	1541	6.963
	C2R	32	2	4260							4260	4	6.31	108	
	C3R	32	2	4260							4260	26	6.31	699	
	C4a-R	19	3	50	1320	500					215984	1	2.23	482	
C4b-R	19	3	90	1320	500					51836	1	2.23	116		
C4c-R	19	3	50	1320	500					246222	1	2.23	549		
C5	32	4	1275	500						4506	3	2.23	30		
<b>TOTAL WEIGHT COLUMN (R) = 3,525 kg.</b>															
<b>TOTAL (A) WEIGHT ABUTMENT A2 ( L + R ) = 7,207 kg.</b>												14.509			
<b>WALL</b>															
C6	19	5	300	6600						7200	86	2.23	1380	7.505	
C7	19	1	6870	500						7370	106	2.23	1741		
C8	13	6	110	320	160					590	75	1.04	46		
<b>TOTAL (B) WALL = 3,167 kg.</b>															
<b>TOTAL WEIGHT (A + B) = 10,374 kg.</b>												21.564			

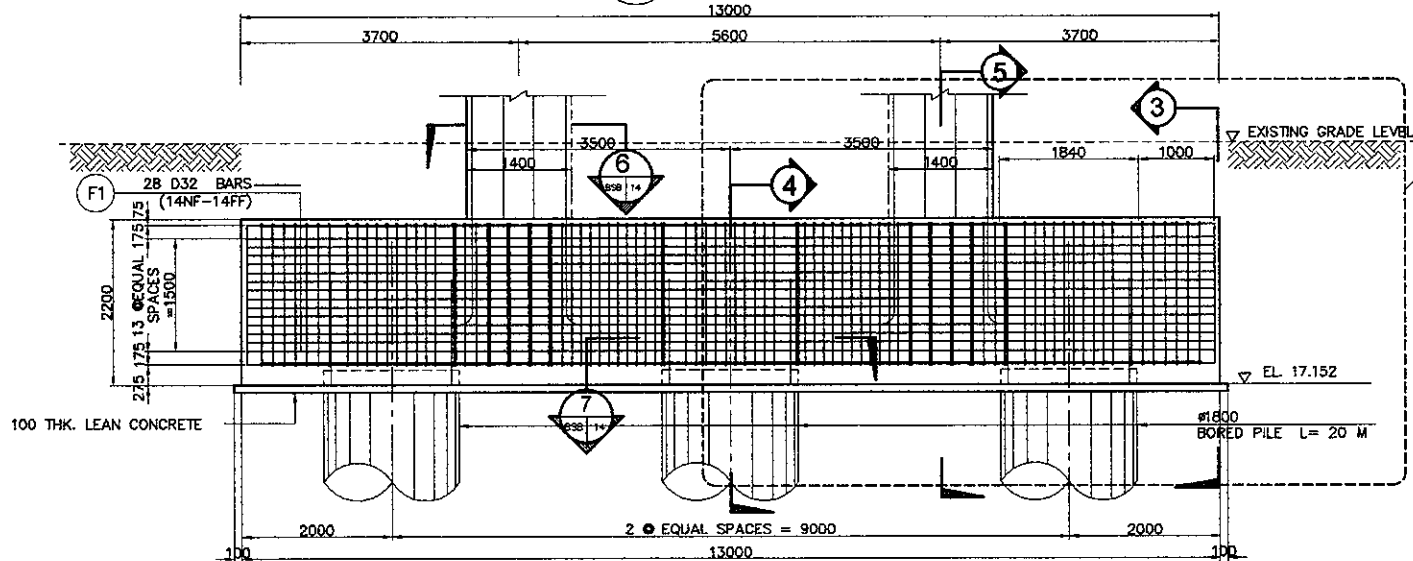
THE REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY. THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

No. OF COLUMN	SCHEDULE OF COLUMN						
	A (mm)	B (mm)	C (mm)	V (mm)	n1	n2	n3
A2 ( L )	2500	1350	2900	1677	50	15	58
A2 ( R )	2500	1080	2850	1627	50	12	57

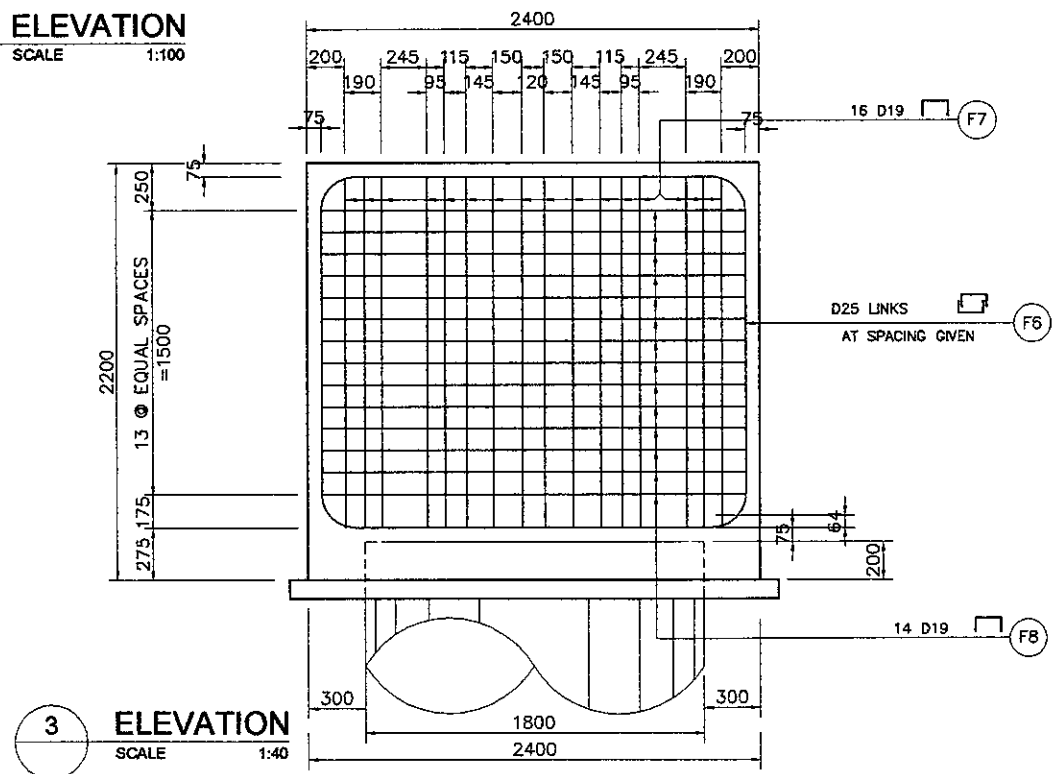
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: A. GOURLEY	Name: T. OKUMURA	Name: M. KIUCHI
Sign: _____	Sign: _____	Sign: _____
Date: _____	Date: _____	Date: _____



**2 PLAN**  
 SCALE 1:100



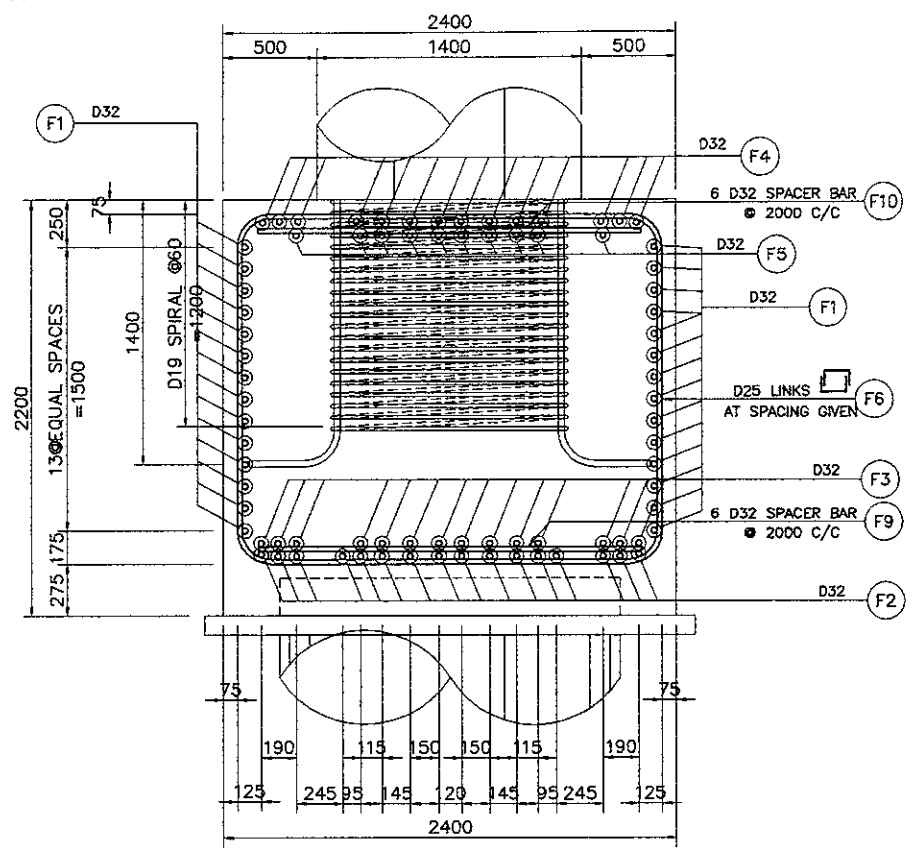
**1 ELEVATION**  
 SCALE 1:100



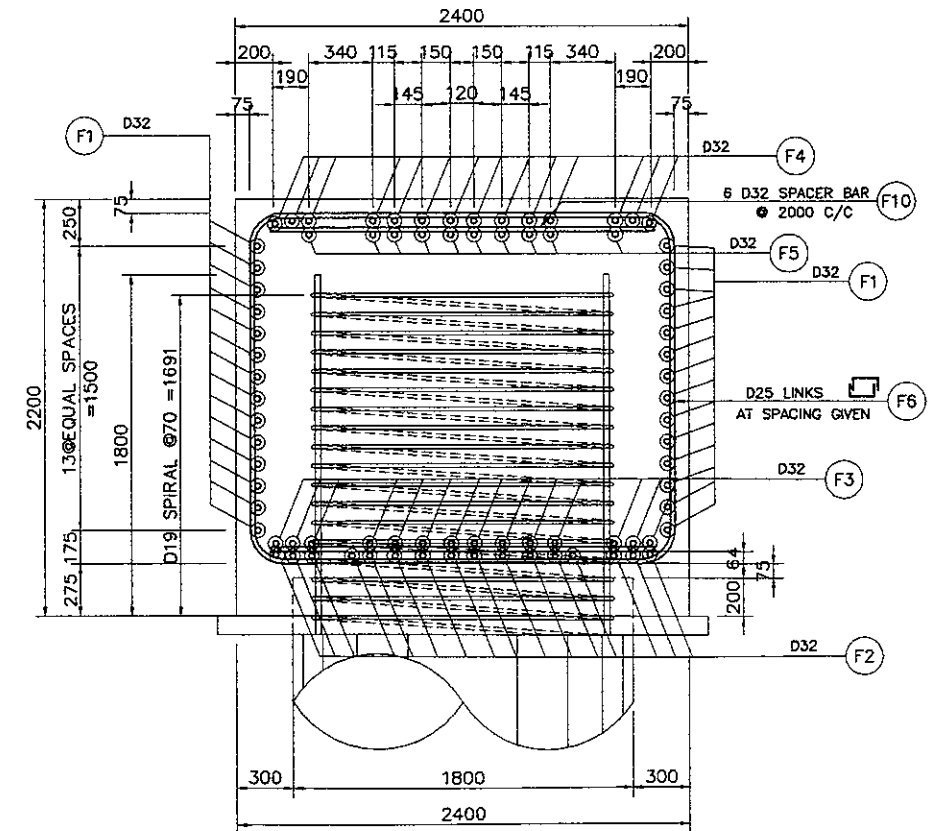
**3 ELEVATION**  
 SCALE 1:40

DETAIL A  
 SEE DRAWING NO. BSB-014

DETAIL B  
 SEE DRAWING NO. BSB-014

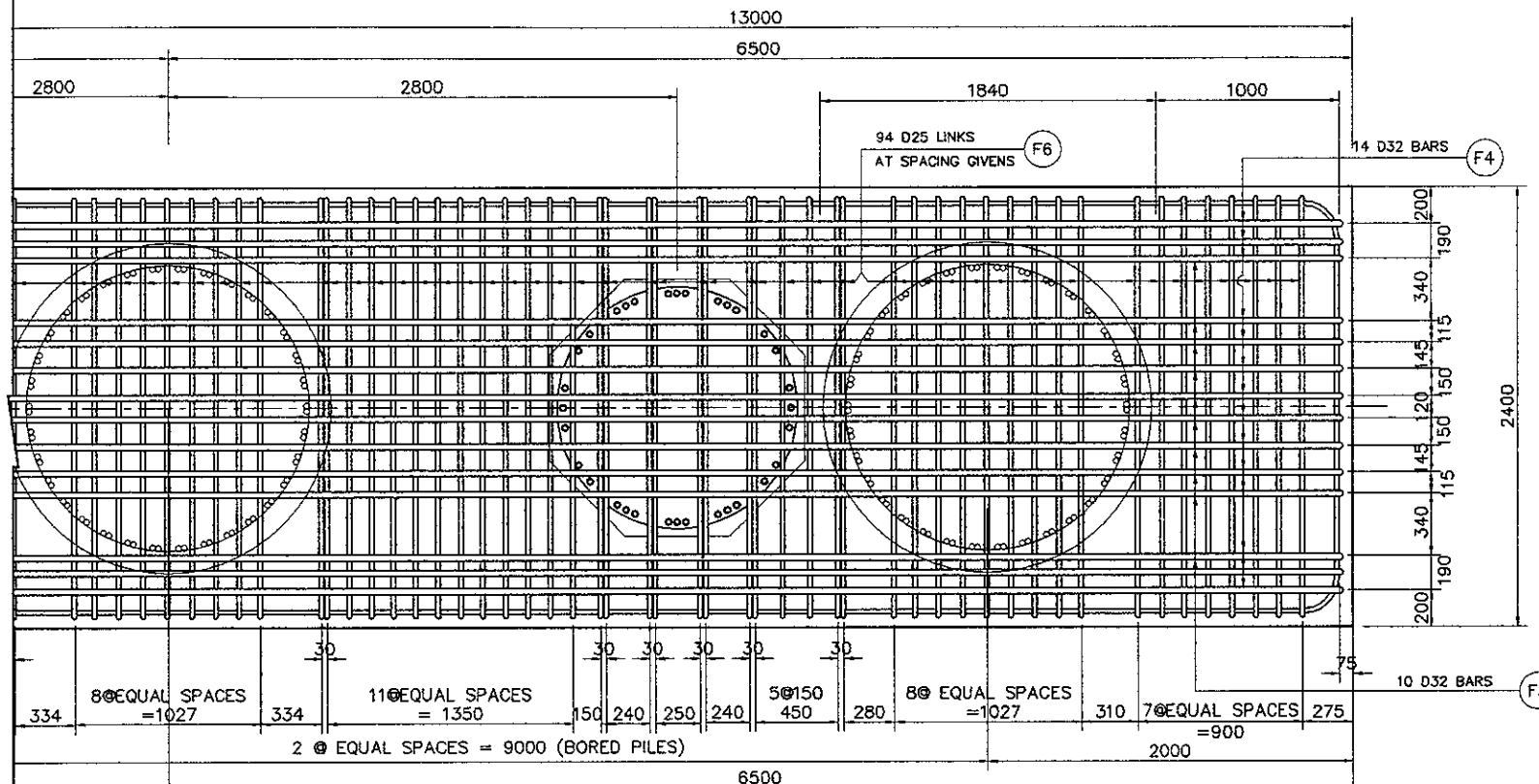


**5 SECTION**  
 SCALE 1:40

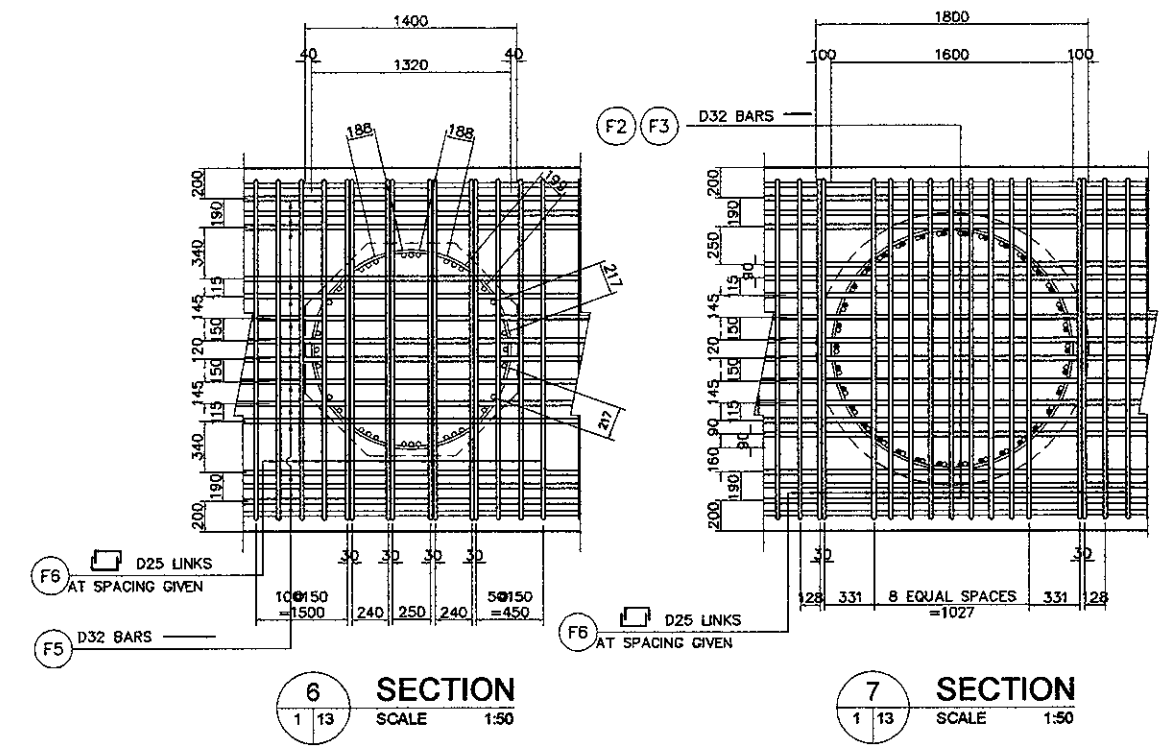


**4 SECTION**  
 SCALE 1:40

- NOTES :
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. ELEVATION ARE IN METERS
  3. CONCRETE ABUTMENT AND FOOTING  $f'_c = 30 \text{ MPa}$
  4. REINFORCING STEEL : YIELD STRENGTH = 390 N/mm<sup>2</sup>

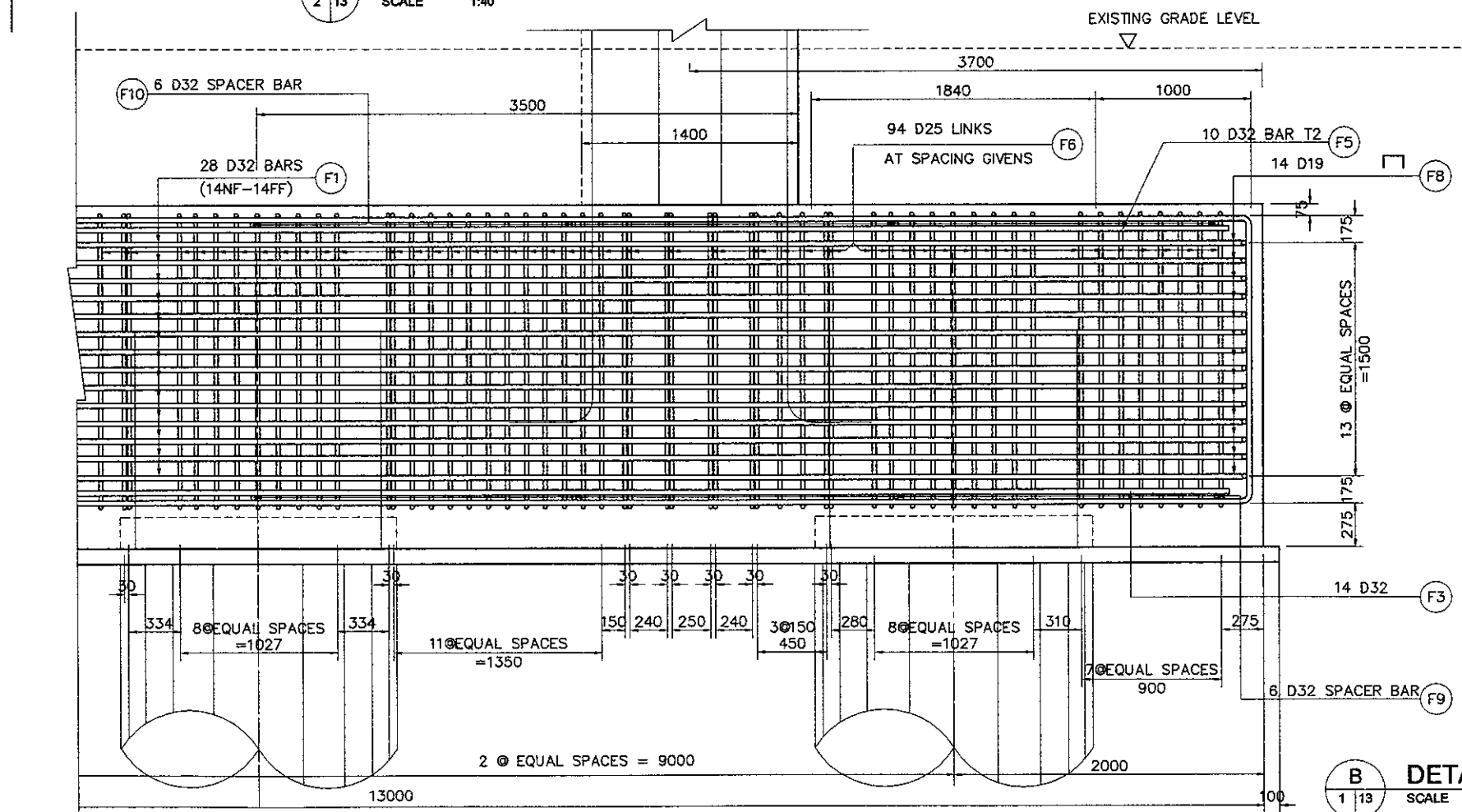


**A** **DETAIL**  
 2 / 13 SCALE 1:40



**6** **SECTION**  
 1 / 13 SCALE 1:50

**7** **SECTION**  
 1 / 13 SCALE 1:50



**B** **DETAIL**  
 1 / 13 SCALE 1:40

**BAR BENDING DIAGRAM**

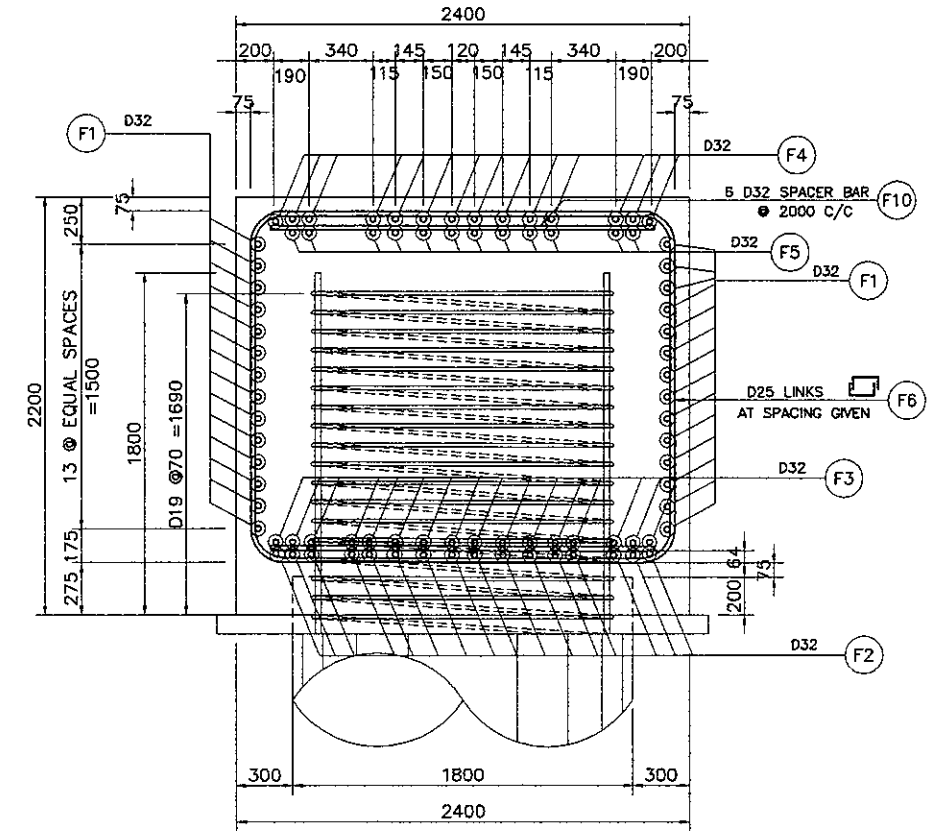
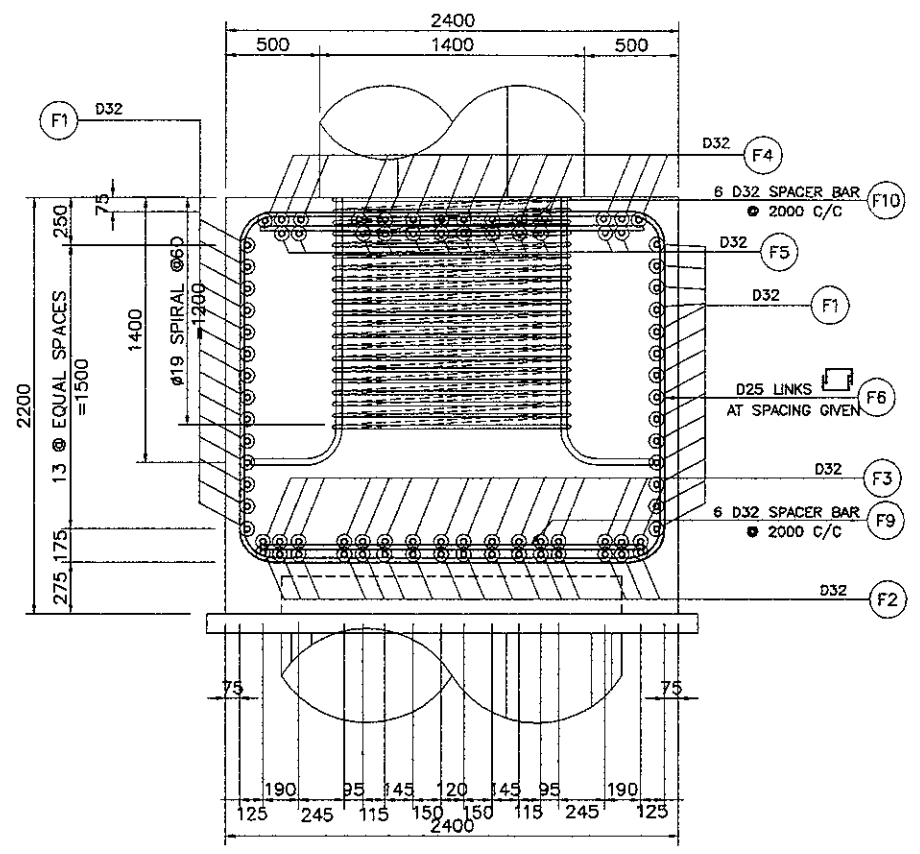
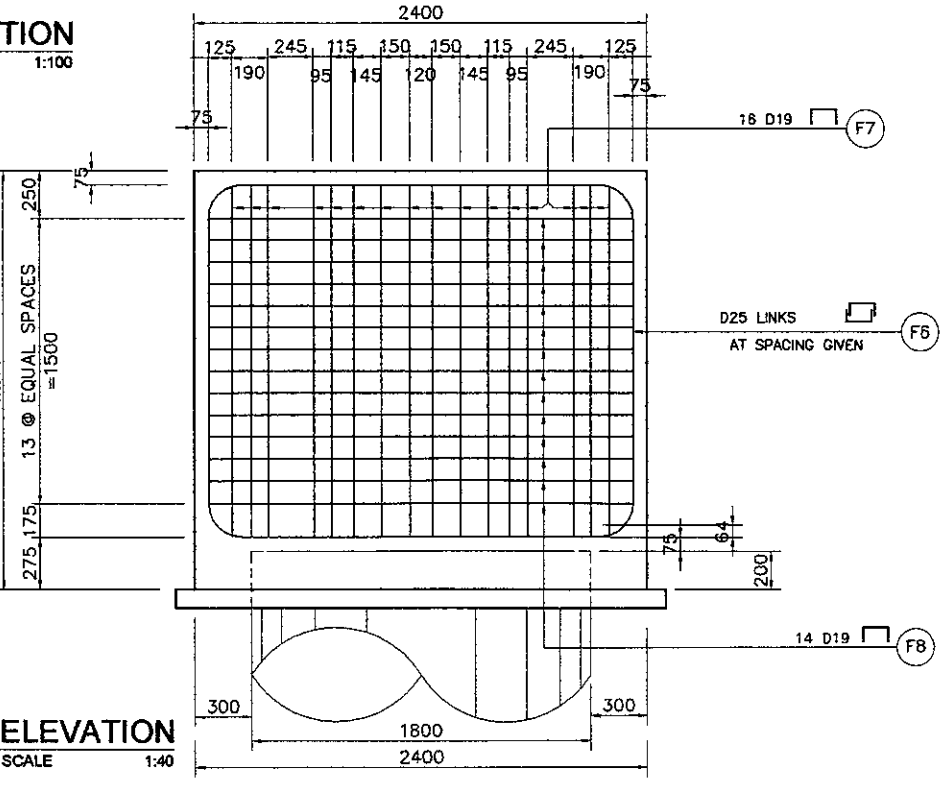
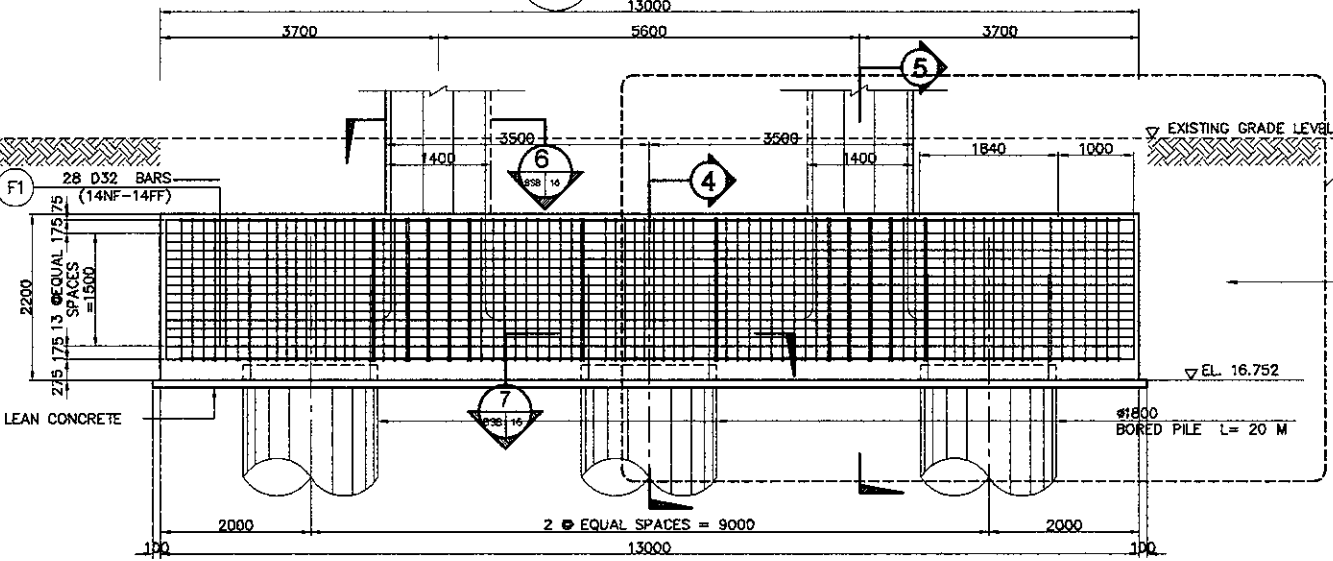
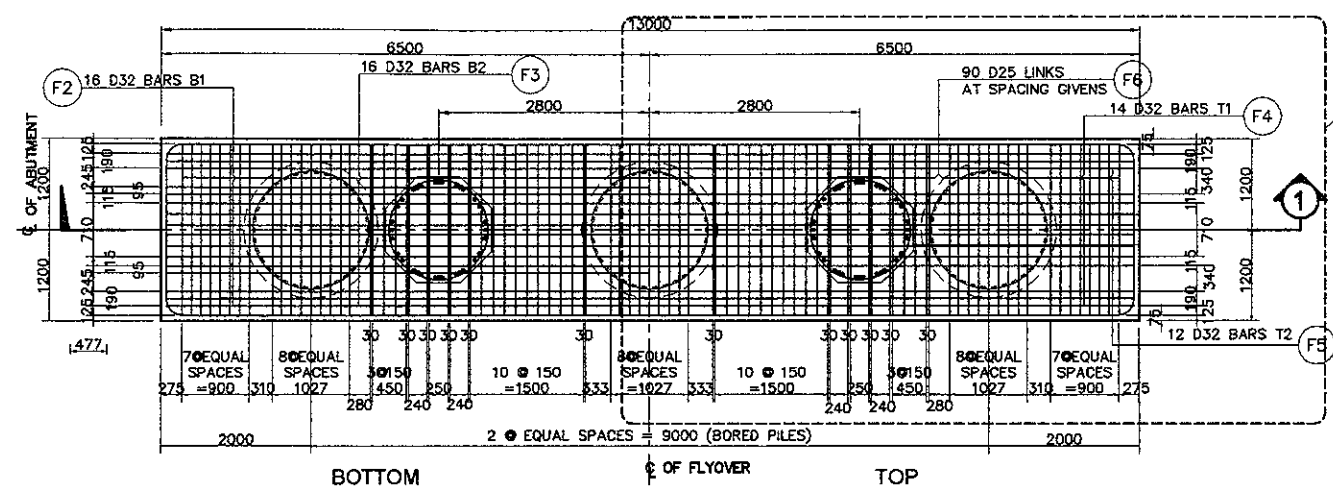
**SCHEDULE OF REINFORCEMENT**

LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION (mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m)	WEIGHT (kg.)	
				a	b	c	d	e	f					
ABUTMENT (A1)	F1	32	1	12800							12800	28	6.31	2261
	F2	32	1	12800							12800	16	6.31	1292
	F3	32	1	12800							12800	14	6.31	1131
	F4	32	1	12800							12800	14	6.31	1131
	F5	32	1	12800							12800	10	6.31	808
	F6	25	3	2250	1800						5450	188	3.85	3945
	F7	19	2	1800	500						2800	32	2.23	200
	F8	19	2	2250	500						3250	28	2.23	203
	F9	32	1	2000							2000	6	6.31	76
	F10	32	1	2000							2000	6	6.31	76
TOTAL WEIGHT PER 1 FOOTING = 11,123 kg.														
CONCRETE VOLUME PER 1 FOOTING = 68.64 M3														
LEAN CONCRETE VOLUME PER 1 FOOTING = 3.38 M3														

THE REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY, THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

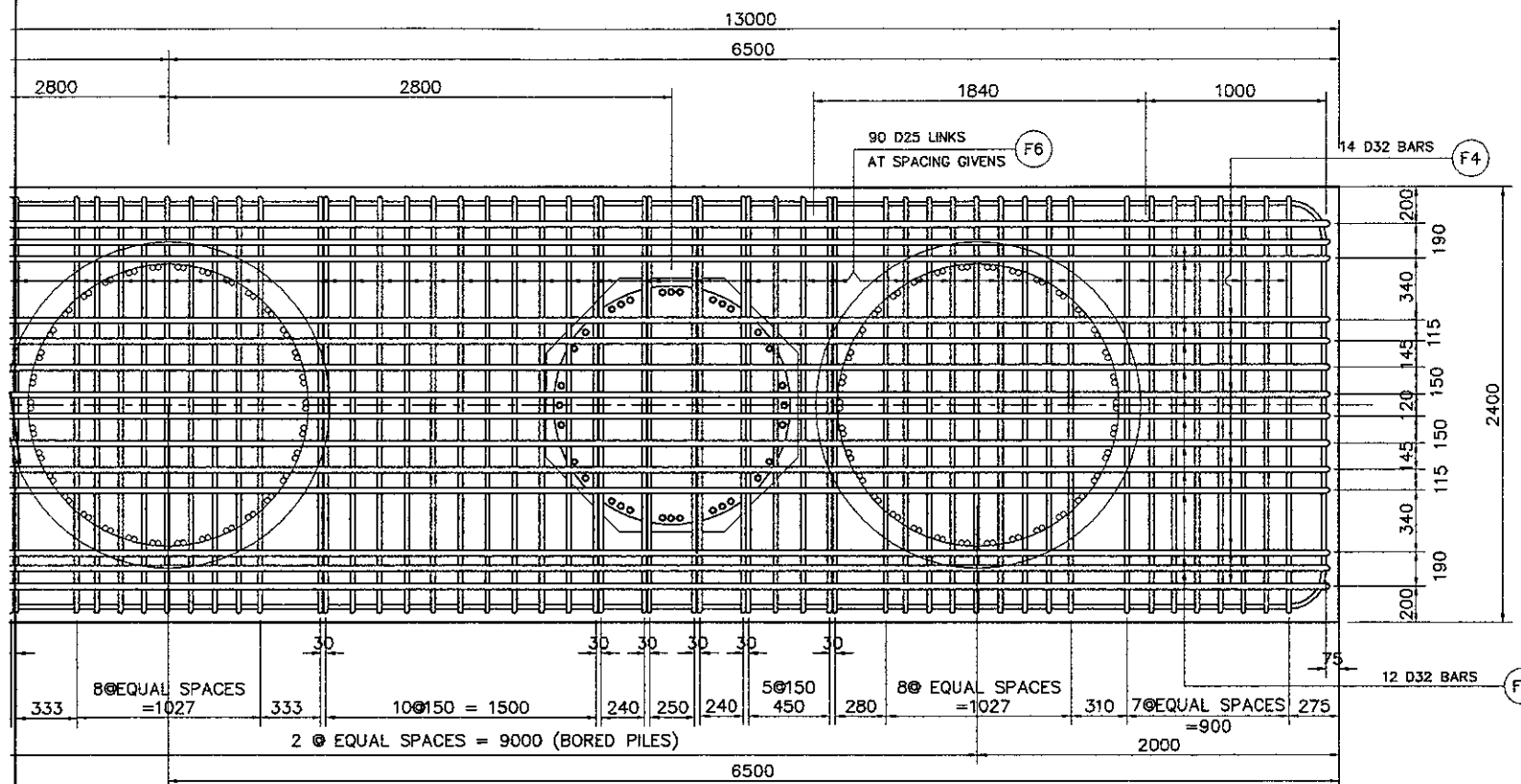
- NOTES :**
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. ELEVATION ARE IN METERS
  3. CONCRETE ABUTMENT AND FOOTING  $f_c' = 30 \text{ MPa}$
  4. REINFORCING STEEL : YIELD STRENGTH = 390 N/mm<sup>2</sup>



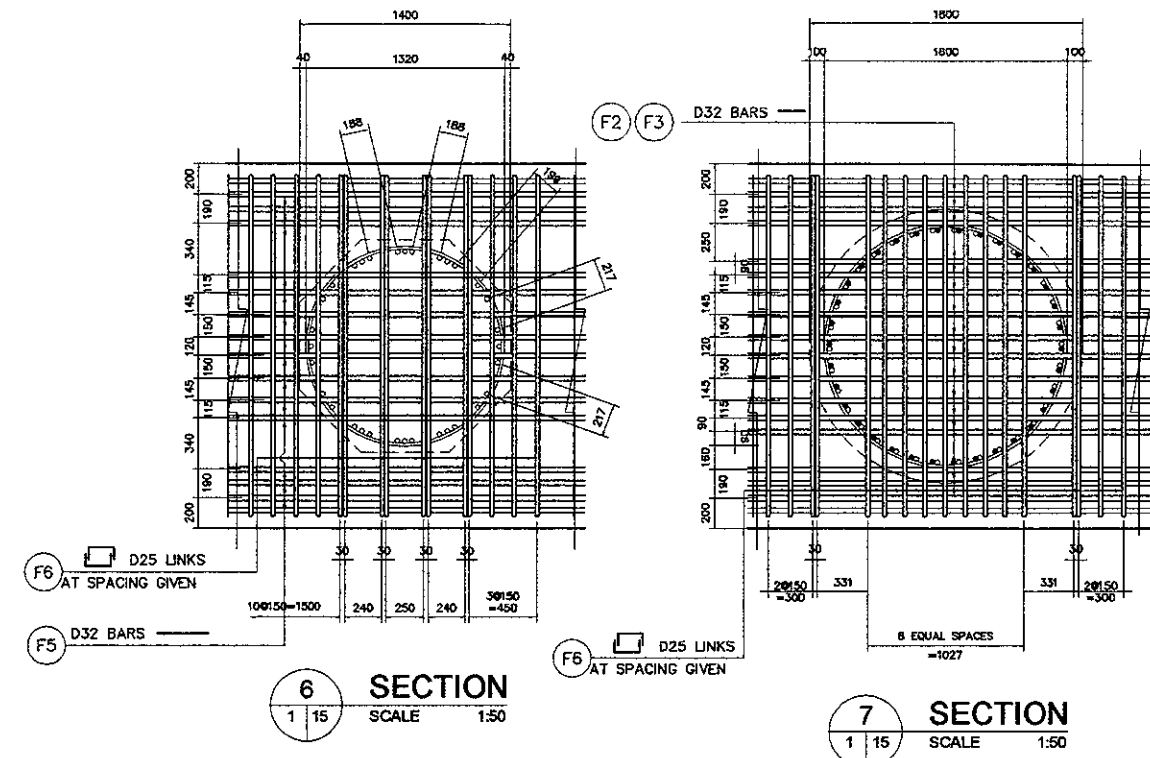


- NOTES :
- ALL DIMENSIONS ARE IN MILLIMETERS
  - ELEVATION ARE IN METERS
  - CONCRETE ABUTMENT AND FOOTING  $f_c' = 30 \text{ MPa}$
  - REINFORCING STEEL : YIELD STRENGTH =  $390 \text{ N/mm}^2$



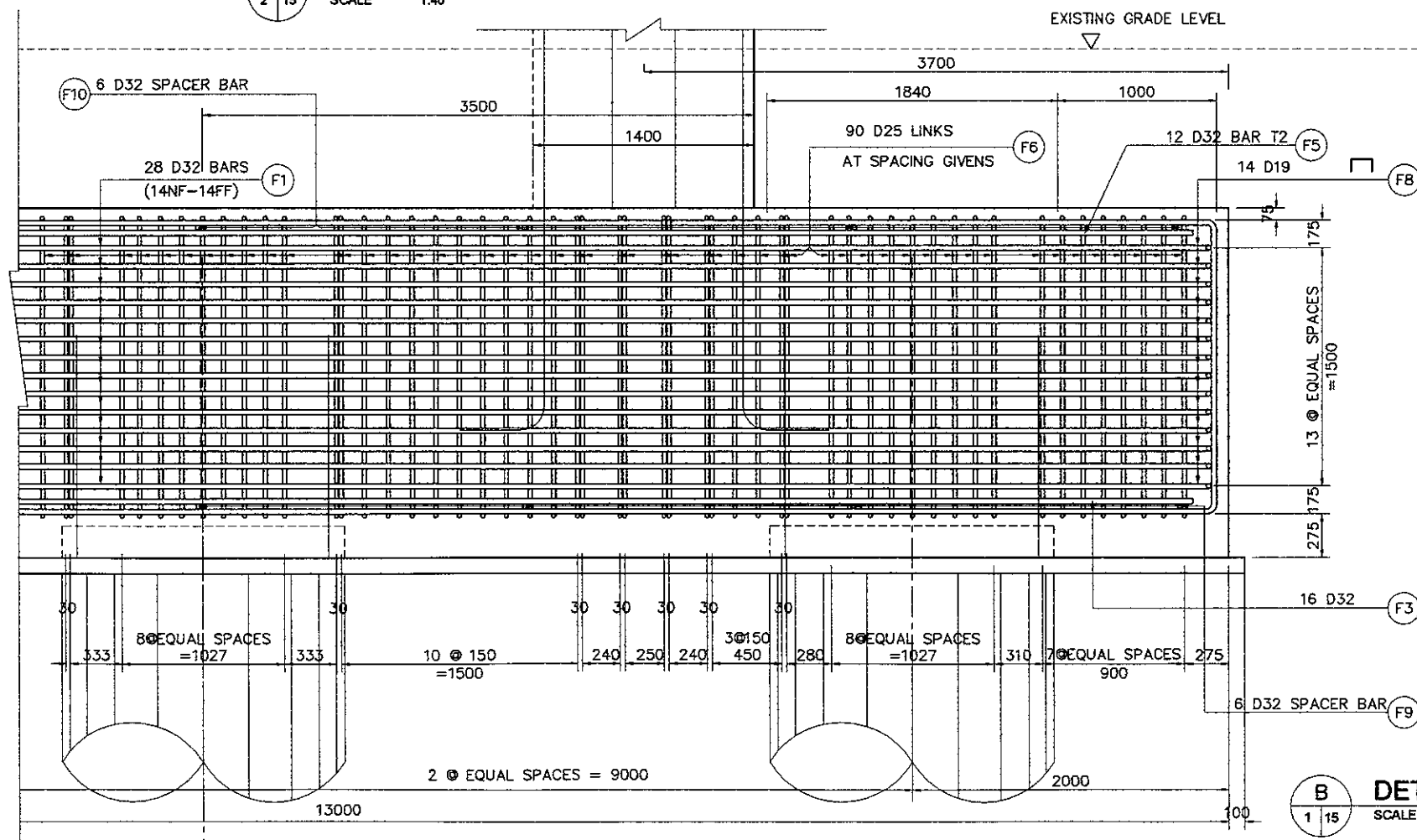


**A**  
2 / 15  
SCALE 1:40  
**DETAIL**



**6**  
1 / 15  
SCALE 1:50  
**SECTION**

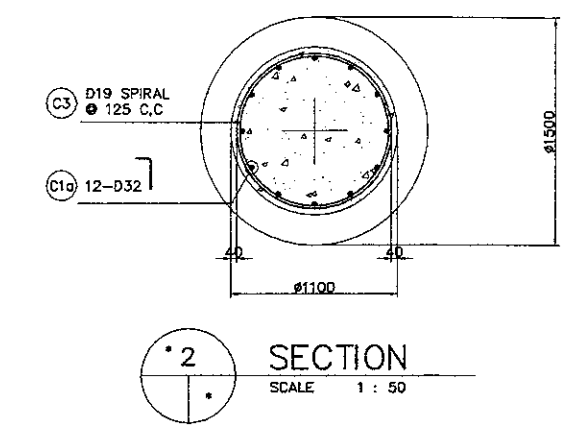
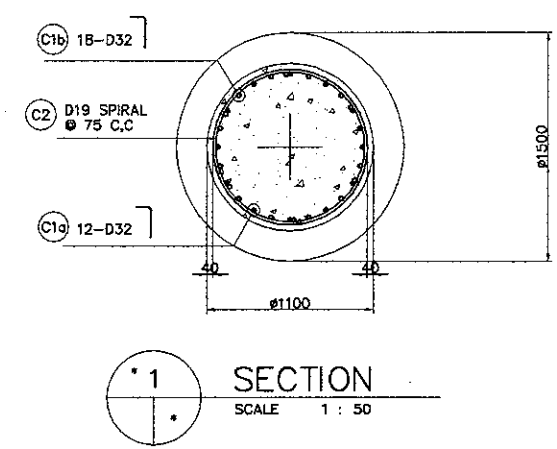
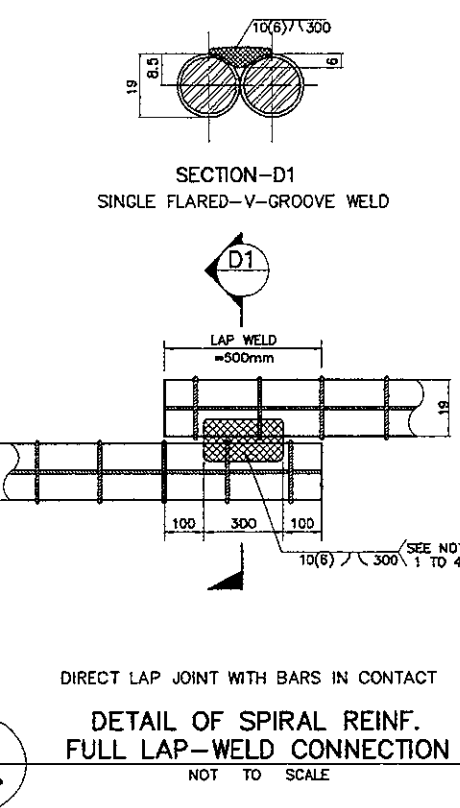
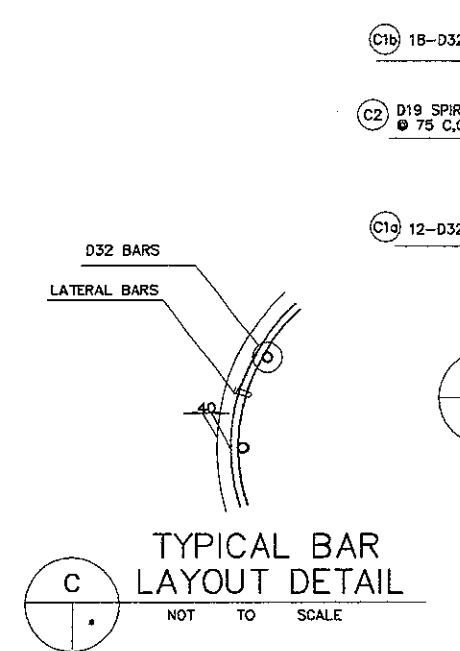
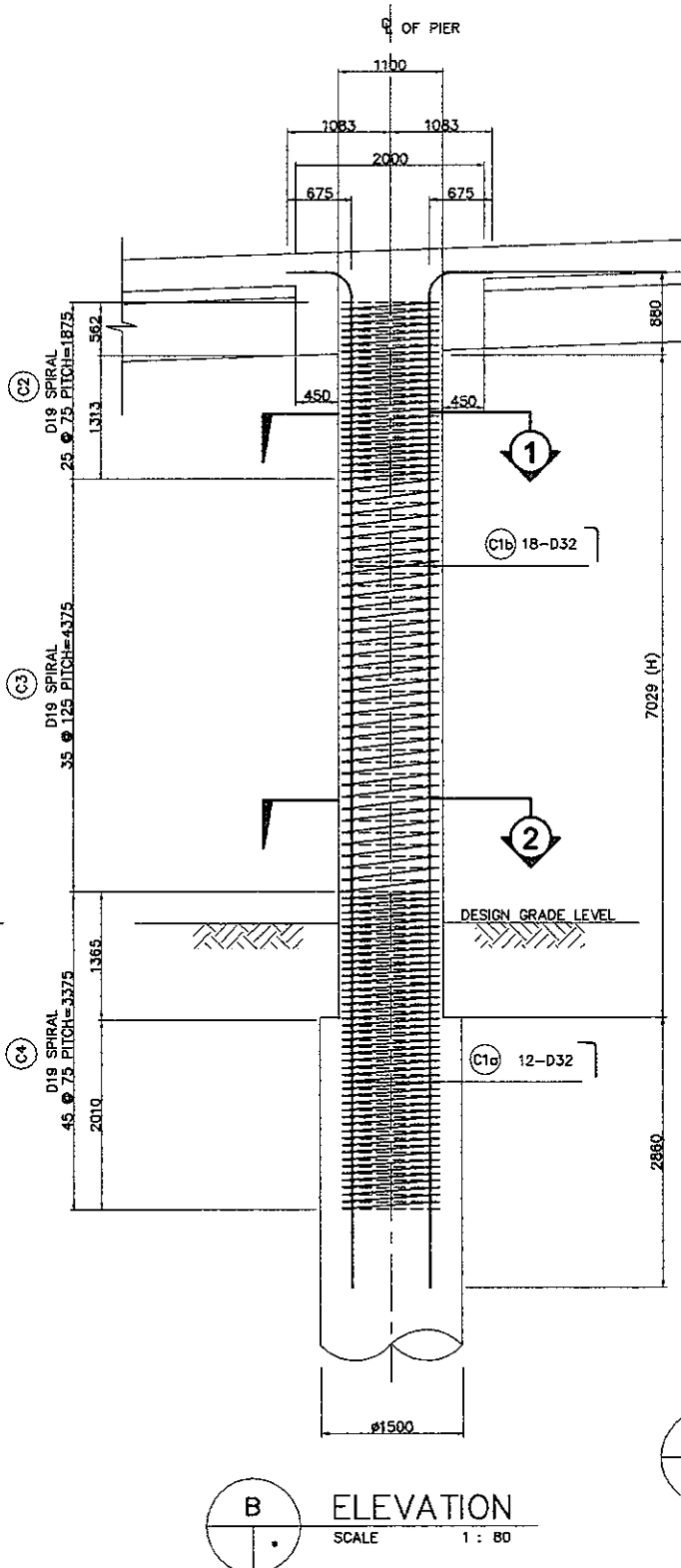
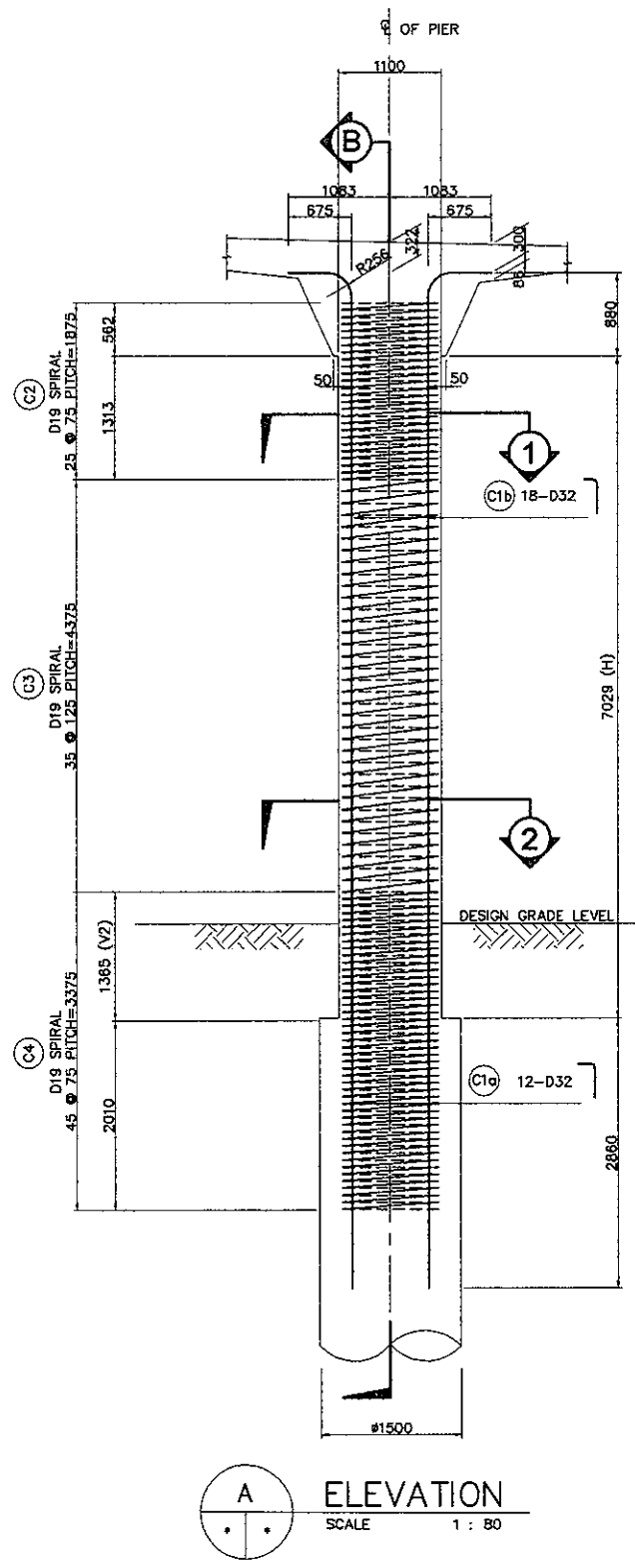
**7**  
1 / 15  
SCALE 1:50  
**SECTION**



**B**  
1 / 15  
SCALE 1:40  
**DETAIL**

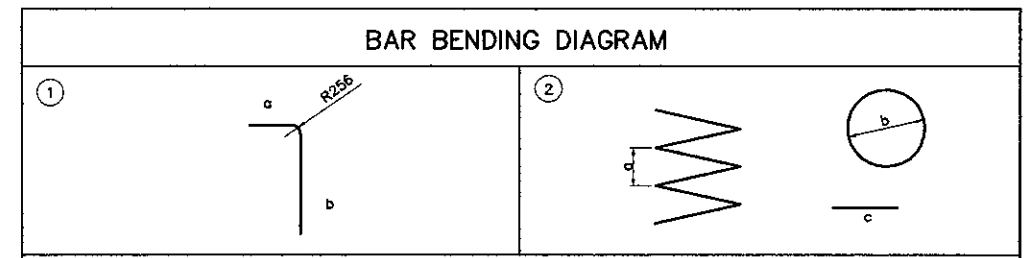
BAR BENDING DIAGRAM														
SCHEDULE OF REINFORCEMENT														
LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION (mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m.)	WEIGHT (kg.)	
				a	b	c	d	e	f					
ABUTMENT (A2)	F1	32	1	12800							12800	28	6.31	2261
	F2	32	1	12800							12800	16	6.31	1292
	F3	32	1	12800							12800	16	6.31	1292
	F4	32	1	12800							12800	14	6.31	1131
	F5	32	1	12800							12800	12	6.31	969
	F6	25	3	2250	1600						5450	180	3.85	3777
	F7	19	2	1800	500						2800	32	2.23	200
	F8	19	2	2250	500						3250	28	2.23	203
	F9	32	1	2000							2000	6	6.31	76
	F10	32	1	2000							2000	6	6.31	76
TOTAL WEIGHT PER 1 FOOTING = 11,277 kg.														
CONCRETE VOLUME PER 1 FOOTING = 68.64 M <sup>3</sup>														
LEAN CONCRETE VOLUME PER 1 FOOTING = 3.38 M <sup>3</sup>														
THE REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY, THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.														

- NOTES :
- ALL DIMENSIONS ARE IN MILLIMETERS
  - ELEVATION ARE IN METERS
  - CONCRETE ABUTMENT AND FOOTING  $f_c' = 30 \text{ MPa}$
  - REINFORCING STEEL : YIELD STRENGTH = 390 N/mm<sup>2</sup>



COLUMN TYPE	CL-BF01
SIZE (mm)	Ø 1100
SIZE (mm)	32
NO. LAYERS	1
NO. OF PCS (a)	12
NO. OF PCS (b)	18
SPIRAL	SIZE (mm) 19

- NOTES ON LAP-WELD CONNECTION :**
- SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
  - WELDING SHOULD CONFORM TO AWS (D1.4)  
 \*STRUCTURAL WELDING CODE REINFORCED STEEL.\*
  - USE ELECTRODE E90XX.
  - CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN BARS DURING WELDING.

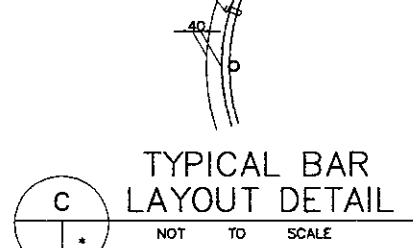
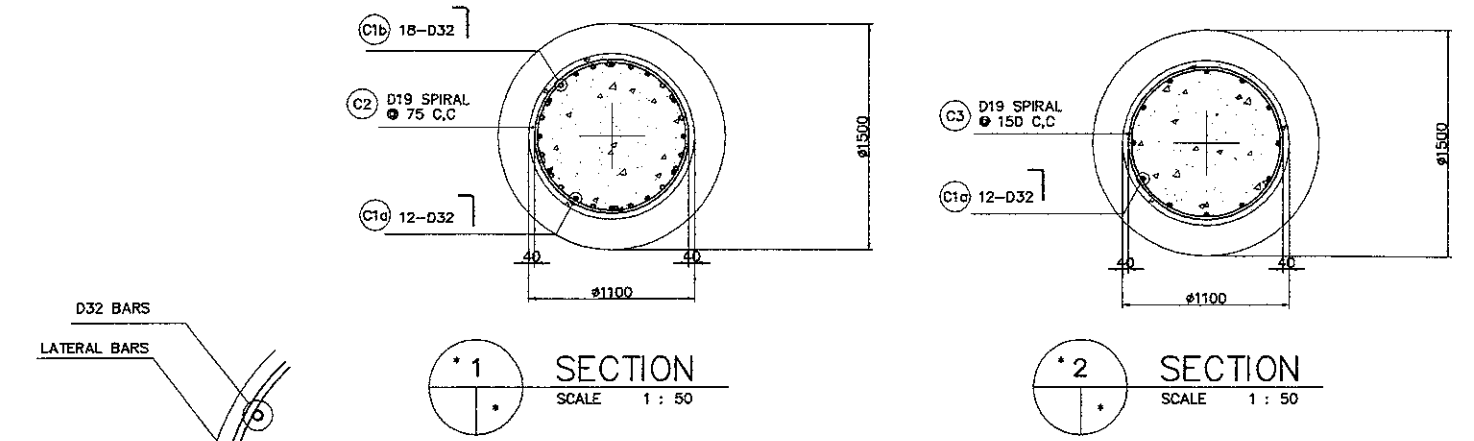
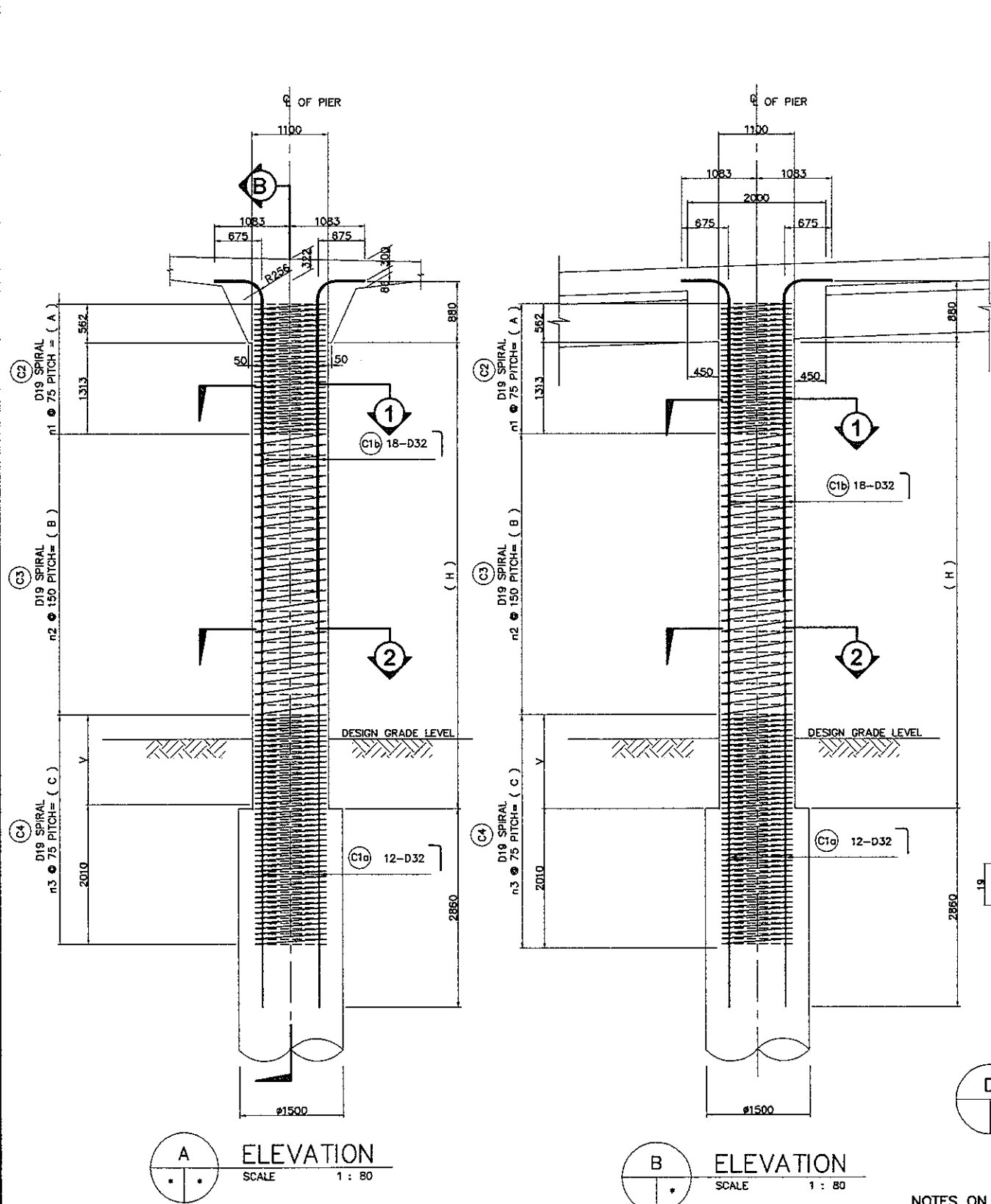


**SCHEDULE OF REINFORCEMENT**

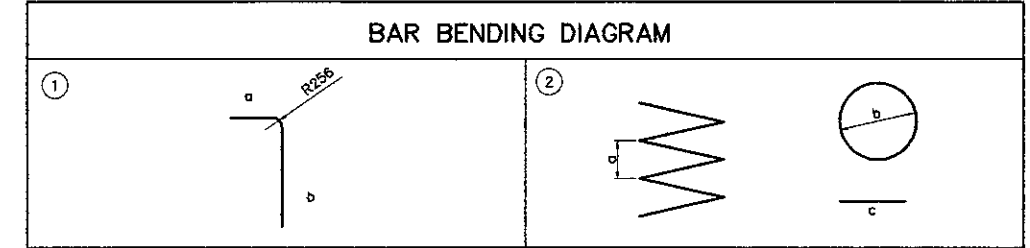
LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION(mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m)	WEIGHT (kg)	VOLUME OF CONC. (M <sup>3</sup> )		
				a	b	c	d	e	f							
P1L	C1a	32	1	675	10769						11444	12	6.31	867	6.680	
	C1b	32	1	675	5320						5995	18	6.31	681		
	C2	19	2	75	1020	500					83449	1	2.23	186		
	C3	19	2	125	1020	500					116828	1	2.23	260		
	C4	19	2	75	1020	500					150207	1	2.23	335		
											SUB TOTAL =		2,329	Kgs		
P1R	C1a	32	1	675	10769						11444	12	6.31	867	6.680	
	C1b	32	1	675	5320						5995	18	6.31	681		
	C2	19	2	75	1020	500					83449	1	2.23	186		
	C3	19	2	125	1020	500					116828	1	2.23	261		
	C4	19	2	75	1020	500					150207	1	2.23	335		
											SUB TOTAL =		2,329	Kgs		
												TOTAL P1 =		4,658	Kgs	13.359

THE SCHEDULE OF REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY. THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

- NOTES :**
- ALL DIMENSIONS ARE IN MILLIMETERS
  - CONCRETE :  $f_c' = 30 \text{ MPa}$
  - REINFORCING STEEL : YIELD STRENGTH = 390 N/mm<sup>2</sup>



COLUMN TYPE	CL-BF01
SIZE (mm)	1100 Ø
MAIN BARS	
SIZE (mm)	32
NO. LAYERS	1
NO. OF PCS (a)	12
NO. OF PCS (b)	18
SPIRAL	
SIZE (mm)	19



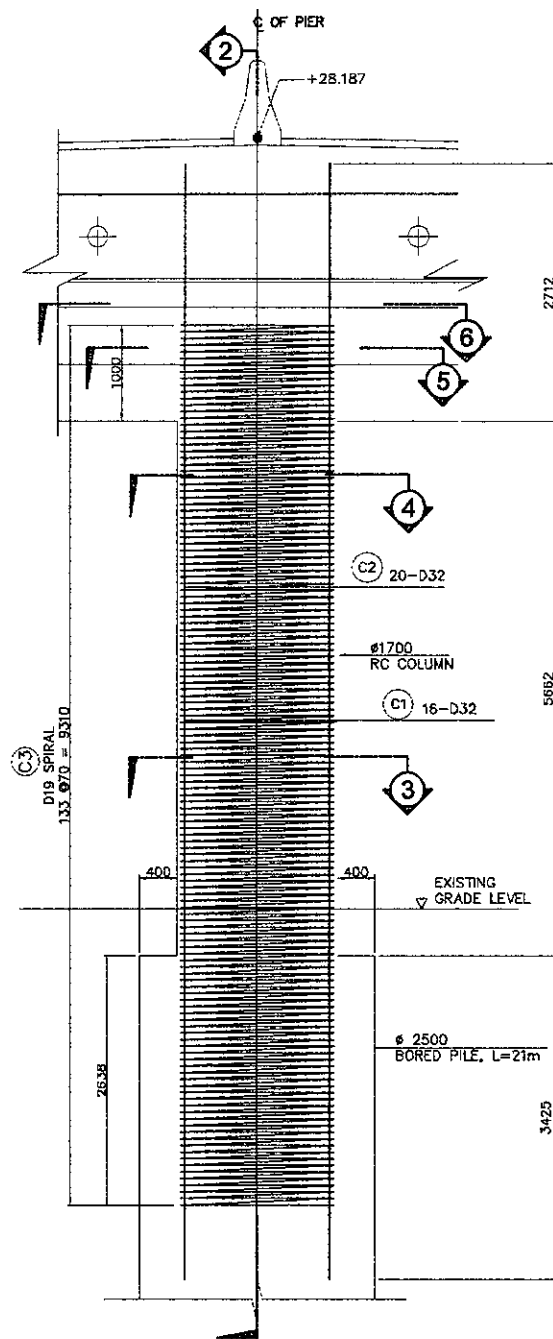
LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION(mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m)	WEIGHT (kg)	VOLUME OF CONC. (M³)
				a	b	c	d	e	f					
P2L	C1a	32	1	675	10769					11444	12	6.31	867	6.680
	C1b	32	1	675	5320					5995	18	6.31	681	
	C2	19	2	75	1020	500				83449	1	2.23	186	
	C3	19	2	150	1020	500				96800	1	2.23	216	
P2R	C4	19	2	75	1020	500				150207	1	2.23	335	6.680
	C1a	32	1	675	10769					11444	12	6.31	867	
	C1b	32	1	675	5320					5995	18	6.31	681	
	C2	19	2	75	1020	500				83449	1	2.23	186	
P9L	C3	19	2	150	1020	500				96800	1	2.23	216	6.808
	C4	19	2	75	1020	500				150207	1	2.23	335	
	C1a	32	1	675	10904					11579	12	6.31	877	
	C1b	32	1	675	5400					6075	18	6.31	690	
P9R	C2	19	2	75	1020	500				83449	1	2.23	186	6.496
	C3	19	2	150	1020	500				100138	1	2.23	223	
	C4	19	2	75	1020	500				150207	1	2.23	335	
	C1a	32	1	675	10576					11251	12	6.31	852	
TOTAL P2	C1b	32	1	675	5200					5875	18	6.31	667	4.569
	C2	19	2	75	1020	500				83449	1	2.23	186	
	C3	19	2	150	1020	500				93462	1	2.23	208	
	C4	19	2	75	1020	500				150207	1	2.23	335	
SUB TOTAL = 2,284 Kgs												13.359		
TOTAL P2 = 4,569 Kgs												13.304		

THE SCHEDULE OF REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY. THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

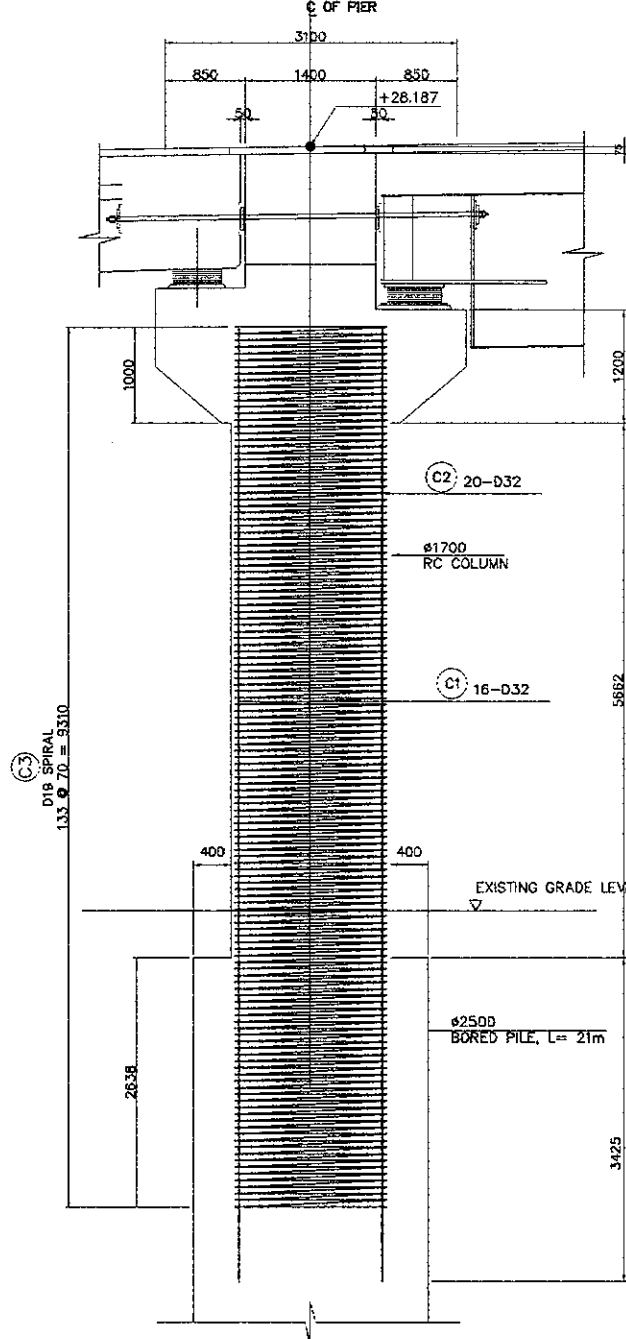
PIER NO.	HEIGHT H (mm)	A (mm)	B (mm)	C (mm)	V (mm)	n1	n2	n3
P2L	7029	1875	4350	3375	1365	25	29	45
P2R	7029	1875	4350	3375	1365	25	29	45
P9L	7184	1875	4500	3375	1365	25	30	45
P9R	6836	1875	4200	3375	1365	25	28	45

- NOTES :
- ALL DIMENSIONS ARE IN MILLIMETERS
  - CONCRETE :  $f_c' = 30 \text{ MPa}$
  - REINFORCING STEEL : YIELD STRENGTH =  $390 \text{ N/mm}^2$

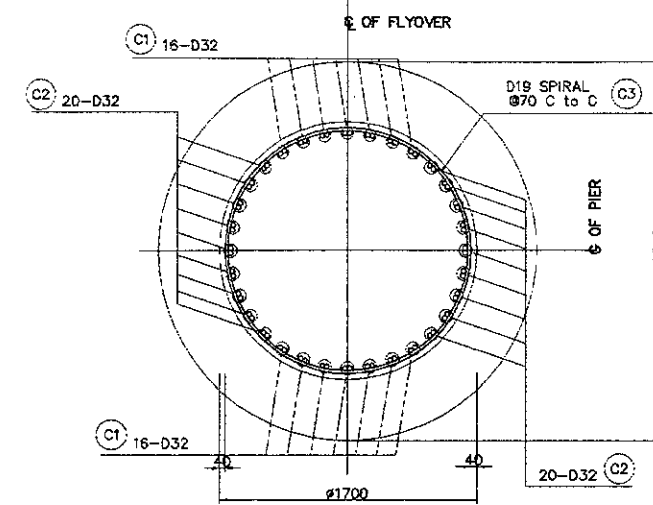
- NOTES ON LAP-WELD CONNECTION :
- SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
  - WELDING SHOULD CONFORM TO AWS (D1.4)  
\*STRUCTURAL WELDING CODE REINFORCED STEEL\*
  - USE ELECTRODE E90XX.
  - CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN BARS DURING WELDING.



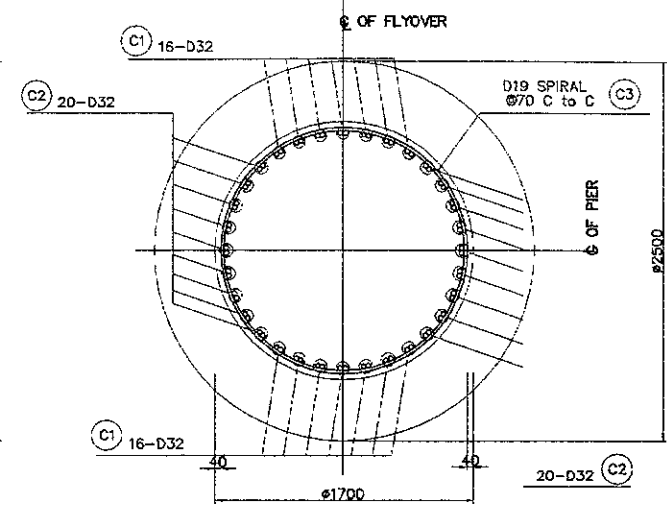
**1 ELEVATION**  
 SCALE 1:80



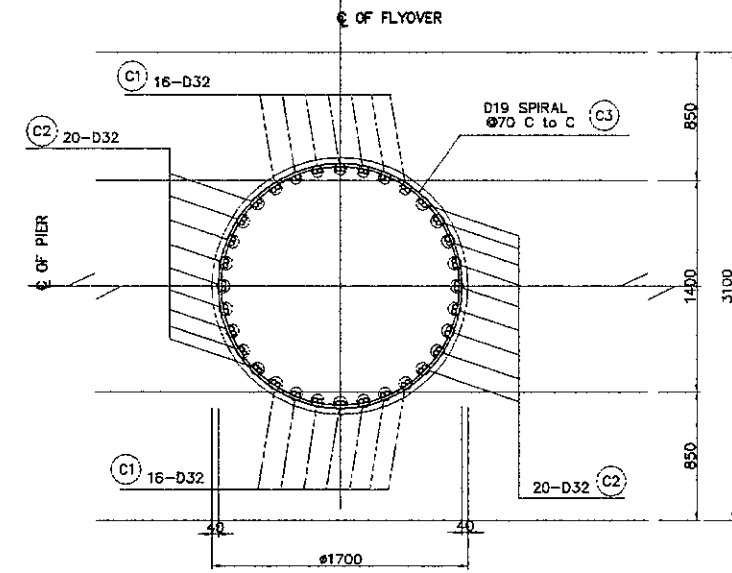
**2 SECTION**  
 SCALE 1:80



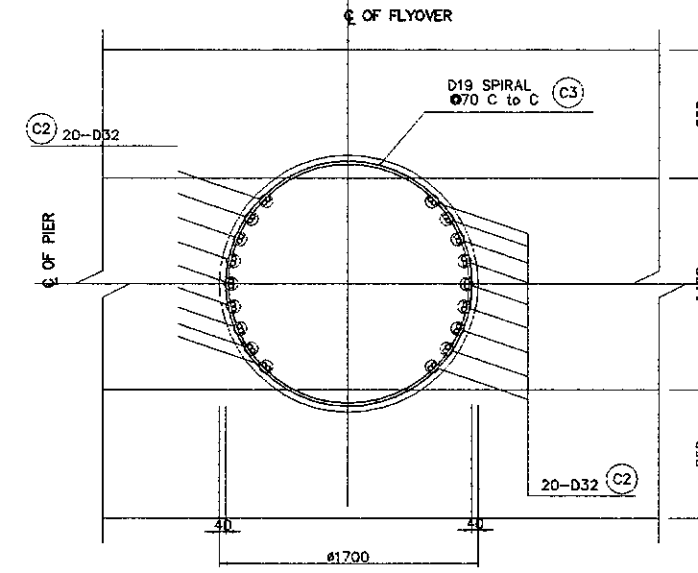
**3 SECTION**  
 SCALE 1:50



**4 SECTION**  
 SCALE 1:50

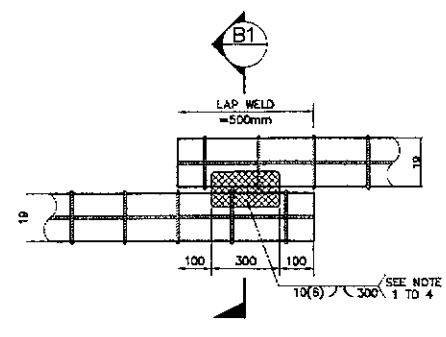
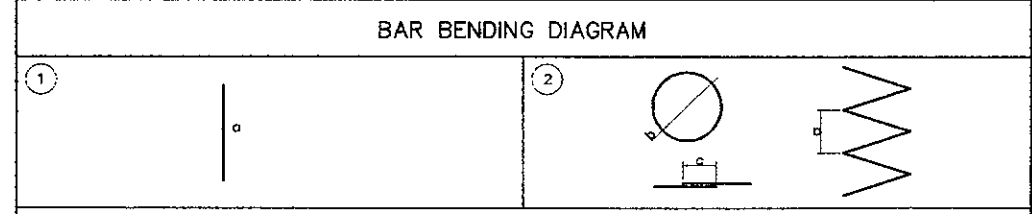


**5 SECTION**  
 SCALE 1:50

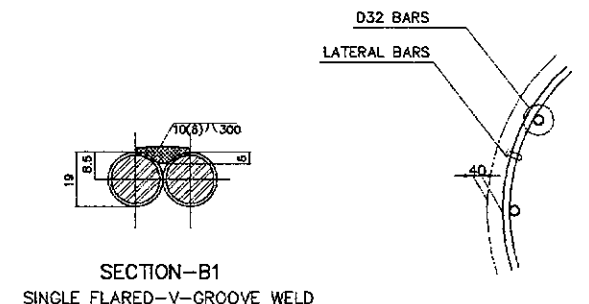


**6 SECTION**  
 SCALE 1:50

COLUMN TYPE	CL-BF06	
SIZE (mm)	1700 ø	
MAIN BARS	SIZE (mm)	32
	NO. LAYERS	1
	NO. OF PCS (1)	14
	NO. OF PCS (2)	18
SPIRAL	SIZE (mm)	19



**DETAIL OF SPIRAL REINF.  
 FULL LAP-WELD CONNECTION**  
 NOT TO SCALE



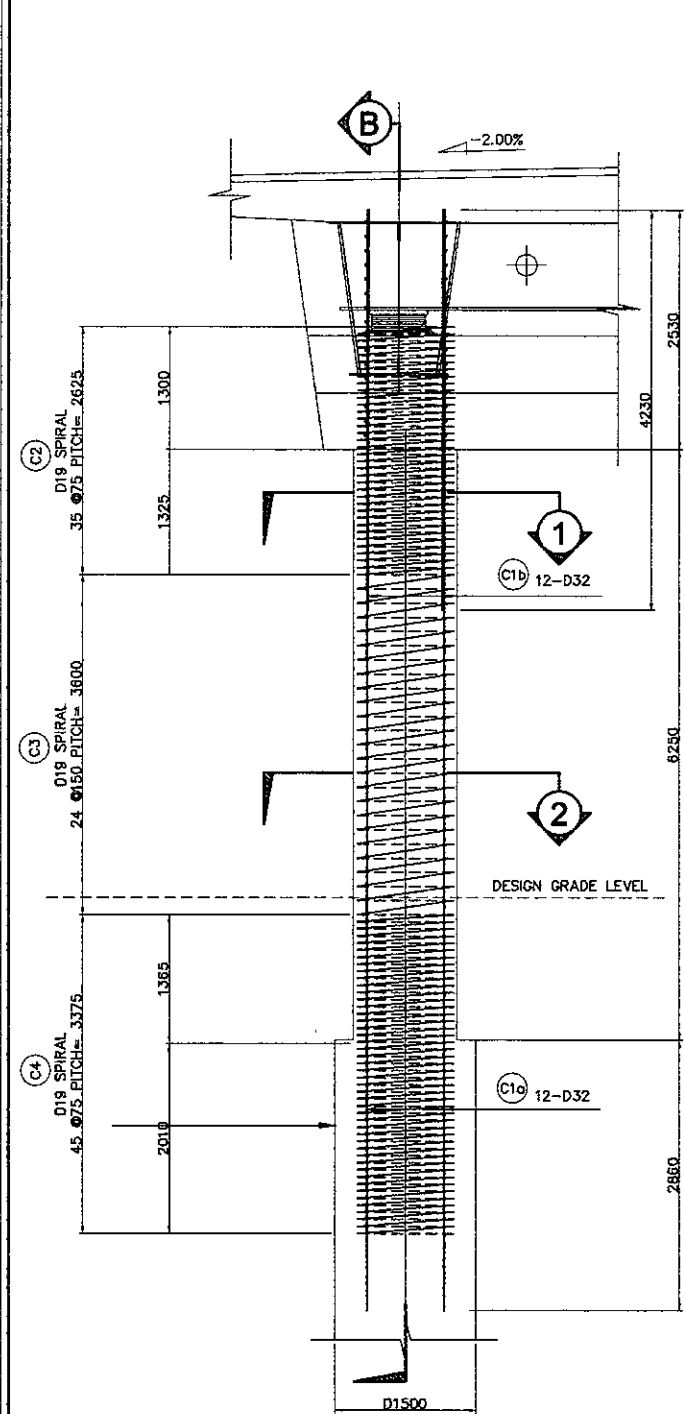
**TYPICAL BAR LAYOUT DETAIL**  
 NOT TO SCALE

- NOTES ON LAP-WELD CONNECTION :**
- SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
  - WELDING SHOULD CONFORM TO AWS (D1.4) \*STRUCTURAL WELDING CODE REINFORCED STEEL\*
  - USE ELECTRODE E90XX.
  - CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN BARS DURING WELDING.

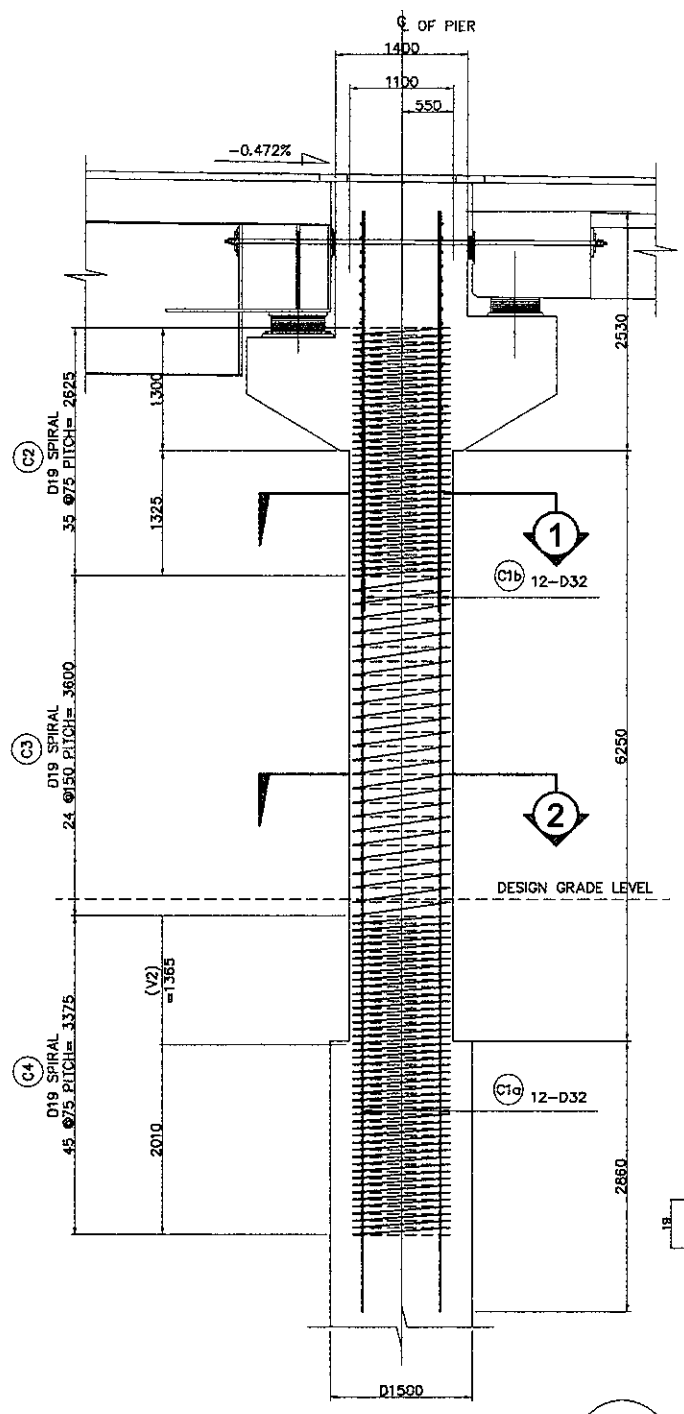
- NOTES :**
- ALL DIMENSIONS ARE IN MILLIMETERS
  - CONCRETE :  $f_c' = 30 \text{ MPa}$
  - REINFORCING STEEL : YIELD STRENGTH =  $390 \text{ N/mm}^2$

LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION (mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m.)	WEIGHT (kg.)	VOLUME OF CONCRETE (m <sup>3</sup> )
				a	b	c	d	e	f					
COLUMN PIER 3	C1	32	1	11805						11805	32	6.31	2383	12.852
	C2	32	1	9300						9300	40	6.31	2347	
	C3	19	2	70	1620	500				676975	1	2.23	1510	
<b>TOTAL WEIGHT (ONE COLUMN) = 6,240 kg.</b>														

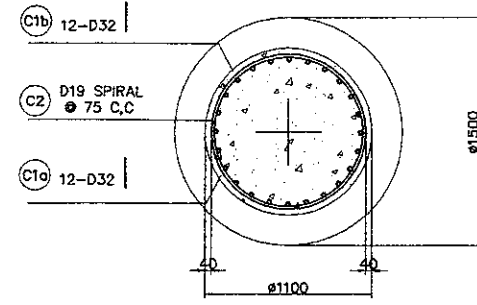
THE REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY, THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.



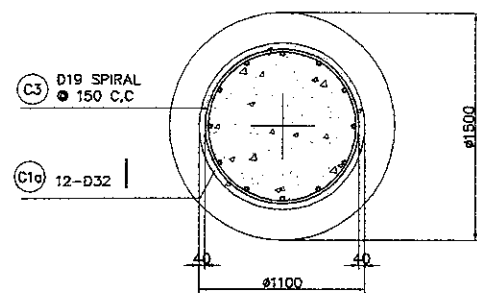
**A** ELEVATION  
 SCALE 1 : 80



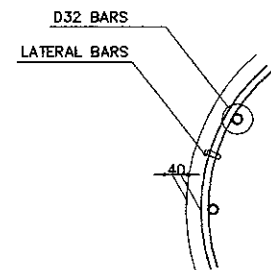
**B** ELEVATION  
 SCALE 1 : 80



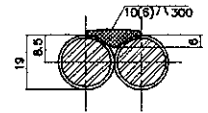
**1** SECTION  
 SCALE 1 : 50



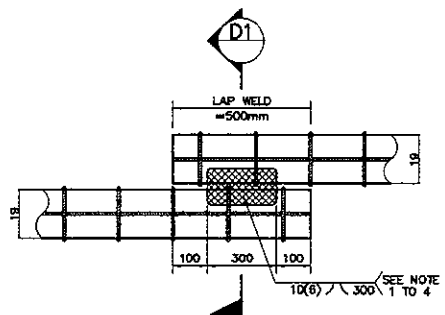
**2** SECTION  
 SCALE 1 : 50



**C** TYPICAL BAR LAYOUT DETAIL  
 NOT TO SCALE

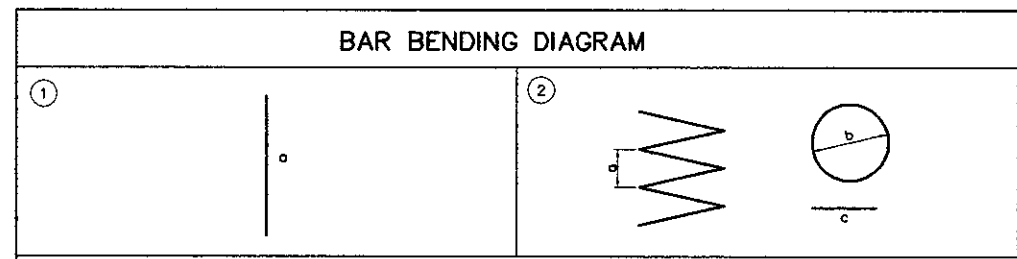


**D1** SECTION-D1  
 SINGLE FLARED-V-GROOVE WELD



**D** DIRECT LAP JOINT WITH BARS IN CONTACT  
 DETAIL OF SPIRAL REINF.  
 FULL LAP-WELD CONNECTION  
 NOT TO SCALE

- NOTES ON LAP-WELD CONNECTION :
1. SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
  2. WELDING SHOULD CONFORM TO AWS (D1.4)  
 \*STRUCTURAL WELDING CODE REINFORCED STEEL.\*
  3. USE ELECTRODE E90XX.
  4. CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN BARS DURING WELDING.

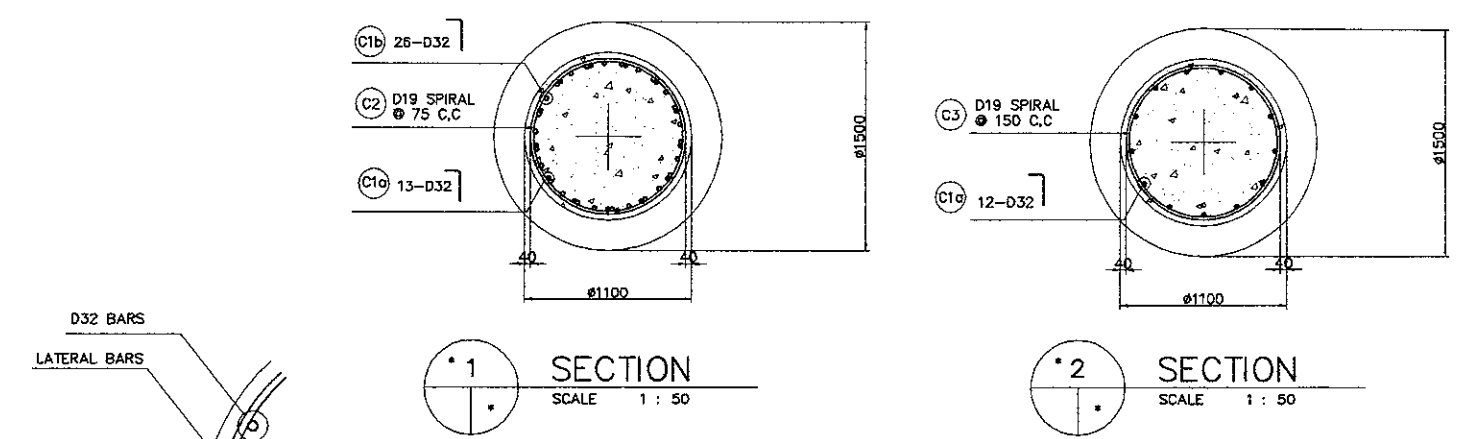
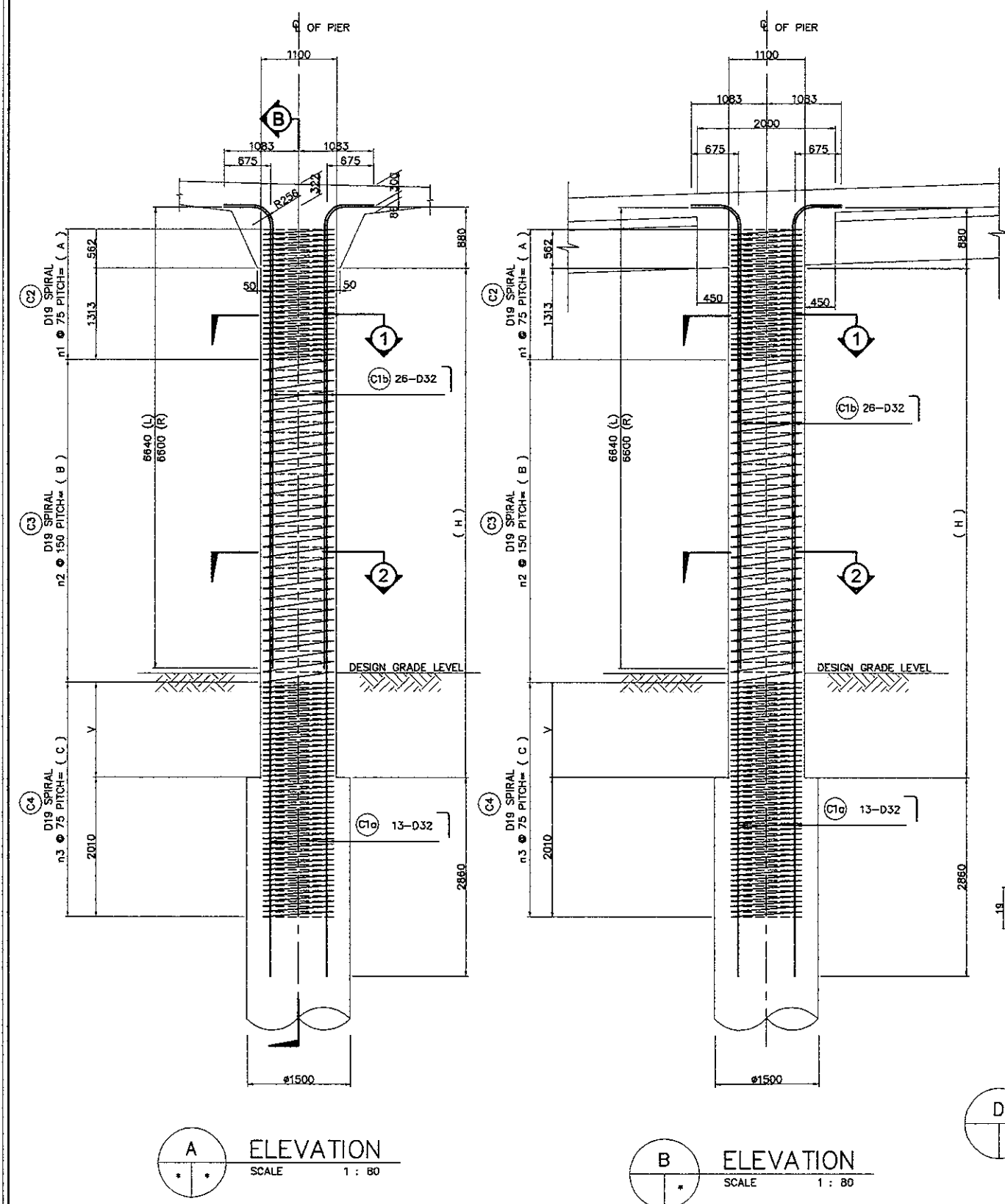


SCHEDULE OF REINFORCEMENT														
LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION(mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m)	WEIGHT (kg)	VOLUME OF CONC. (M <sup>3</sup> )
				a	b	c	d	e	f					
P6L	C1a	32	1	11640						11640	12	6.31	881	5.939
	C1b	32	1	4230						4230	12	6.31	320	
	C2	19	2	75	1020	500				116828	1	2.23	261	
	C3	19	2	150	1020	500				80111	1	2.23	179	
	C4	19	2	75	1020	500				150207	1	2.23	335	
												SUB TOTAL = 1,978 Kgs		
P6R	C1a	32	1	11640						11640	12	6.31	881	5.939
	C1b	32	1	4230						4230	12	6.31	320	
	C2	19	2	75	1020	500				116828	1	2.23	261	
	C3	19	2	150	1020	500				80111	1	2.23	179	
	C4	19	2	75	1020	500				150207	1	2.23	335	
												SUB TOTAL = 1,976 Kgs		
												TOTAL = 3,952 Kgs		11.879

THE SCHEDULE OF REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY. THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

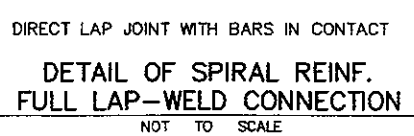
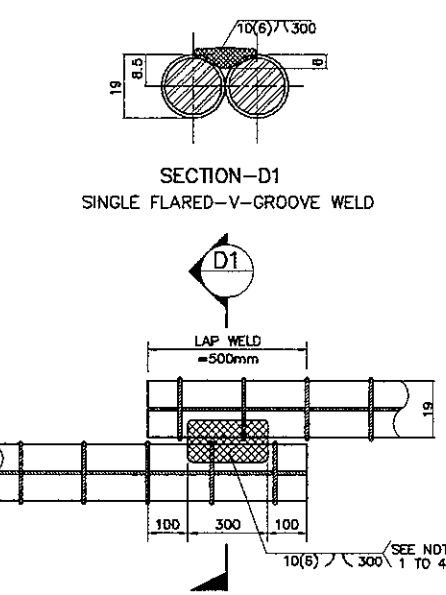
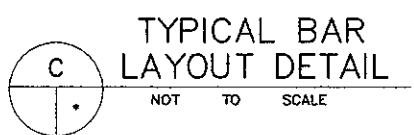
- NOTES :
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. CONCRETE :  $f_c' = 30$  MPa
  3. REINFORCING STEEL : YIELD STRENGTH = 390 N/mm<sup>2</sup>

COLUMN TYPE	CL-BF02	
SIZE (mm)	1100 $\phi$	
MAIN BARS	SIZE (mm)	32
	NO. LAYERS	1
	NO. OF PCS.(a)	12
	NO. OF PCS.(b)	12
SPIRAL	SIZE (mm)	19



COLUMN TYPE		CL-BF03
SIZE (mm)		1100 Ø
MAIN BARS	SIZE (mm)	32
	NO. LAYERS	1
	NO. OF PCS (a)	13
SPIRAL	NO. OF PCS (b)	26
	SIZE (mm)	19

- NOTES ON LAP-WELD CONNECTION :
- SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
  - WELDING SHOULD CONFORM TO AWS (D1.4) \*STRUCTURAL WELDING CODE REINFORCED STEEL.\*
  - USE ELECTRODE E90XX.
  - CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN BARS DURING WELDING.



BAR BENDING DIAGRAM

SCHEDULE OF REINFORCEMENT

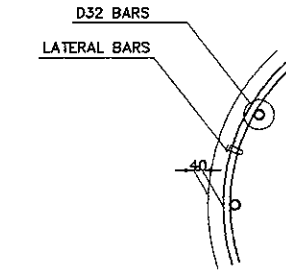
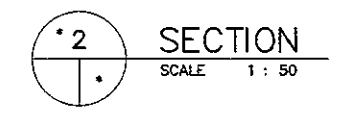
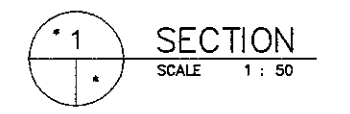
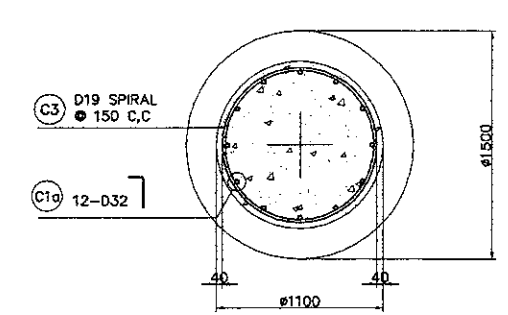
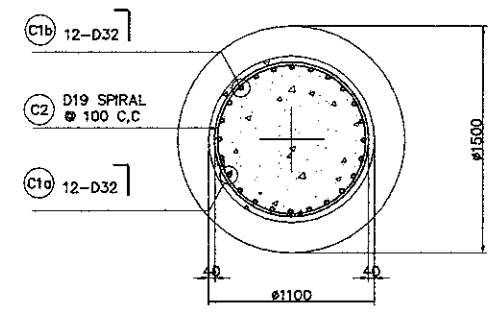
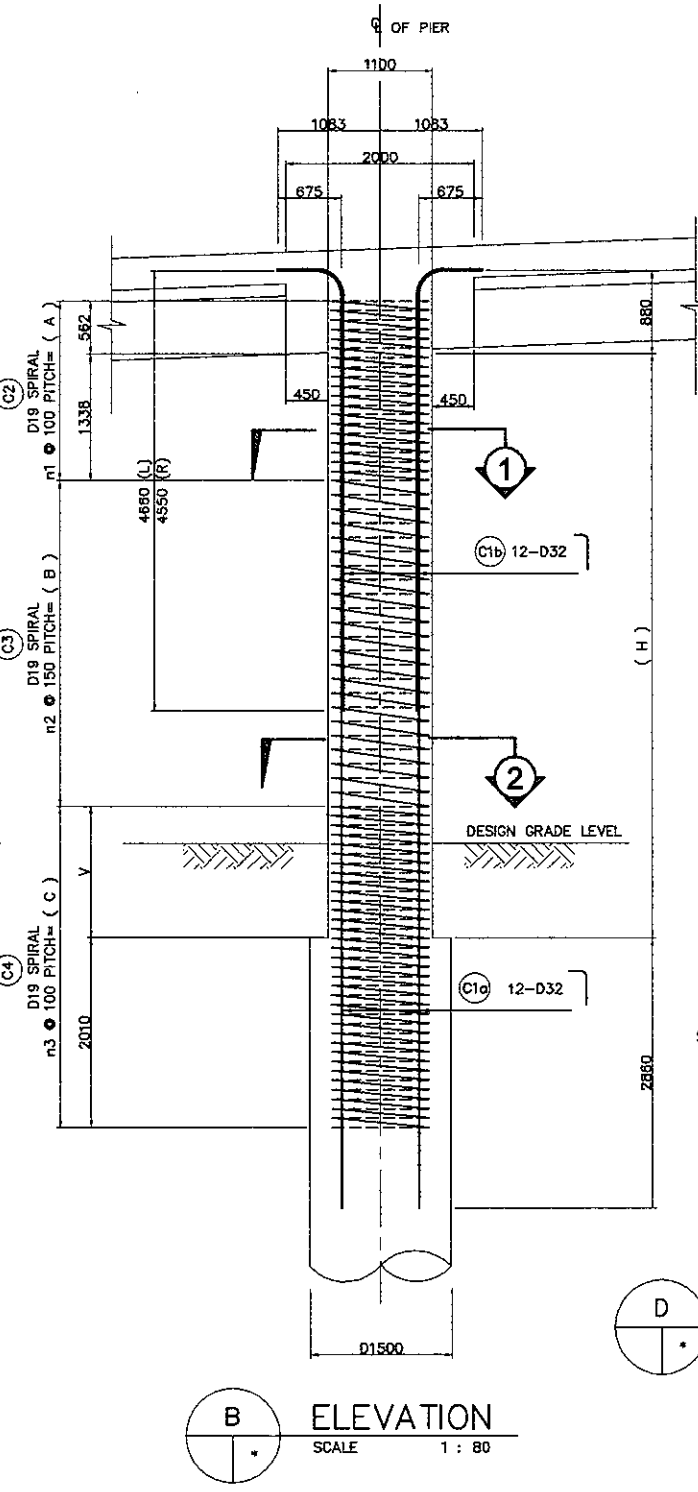
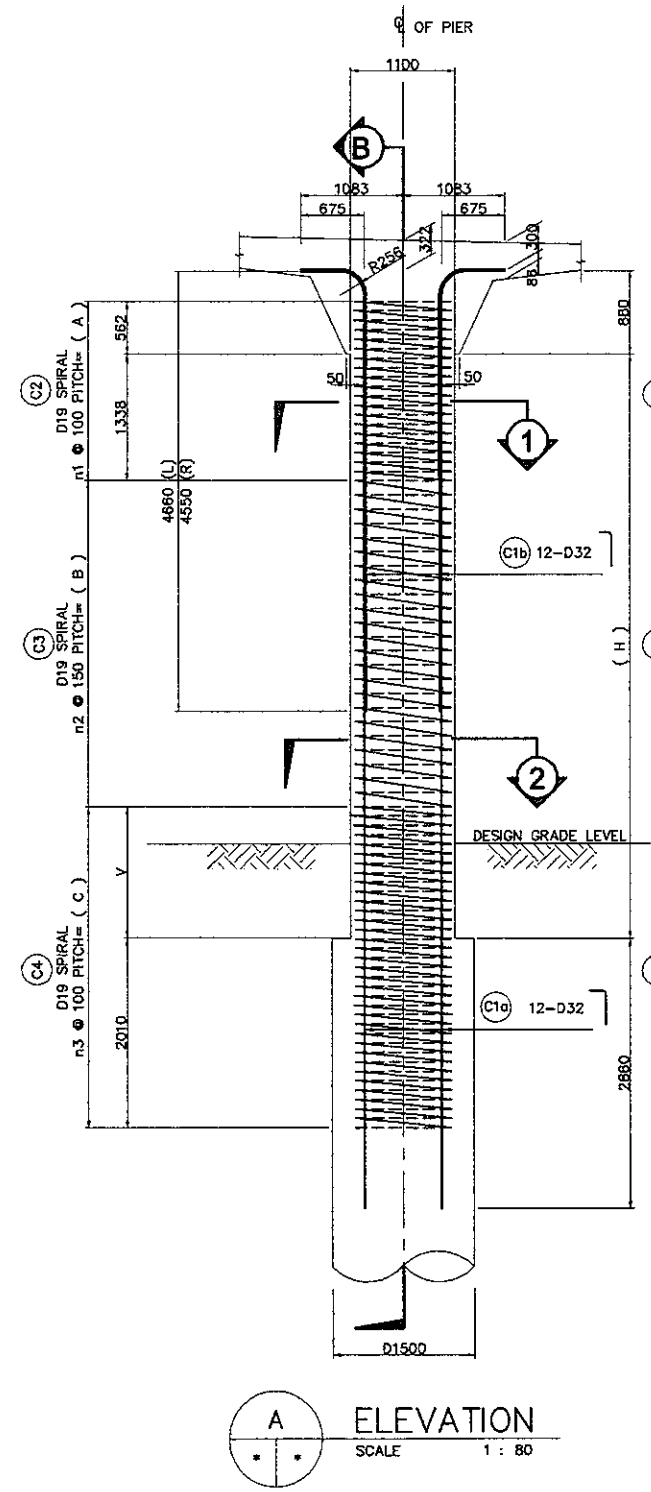
LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION(mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m)	WEIGHT (kg)	VOLUME OF CONG. (M³)	
				a	b	c	d	e	f						
P7L	C1a	32	1	675	11772						12447	13	6.31	1021	7.633
	C1b	32	1	675	6640						7315	26	6.31	1200	
	C2	19	2	75	1020	500					83448	1	2.23	186	
	C3	19	2	150	1020	500					120166	1	2.23	268	
	C4	19	2	75	1020	500					150207	1	2.23	335	
											SUB TOTAL =		3,010	Kgs	
P7R	C1a	32	1	675	11709						12384	13	6.31	1016	7.573
	C1b	32	1	675	6600						7275	26	6.31	1194	
	C2	19	2	75	1020	500					83448	1	2.23	186	
	C3	19	2	150	1020	500					116828	1	2.23	261	
	C4	19	2	75	1020	500					153545	1	2.23	342	
											SUB TOTAL =		2,999	Kgs	
											TOTAL =		6,009	Kgs	15.206

THE SCHEDULE OF REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY. THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

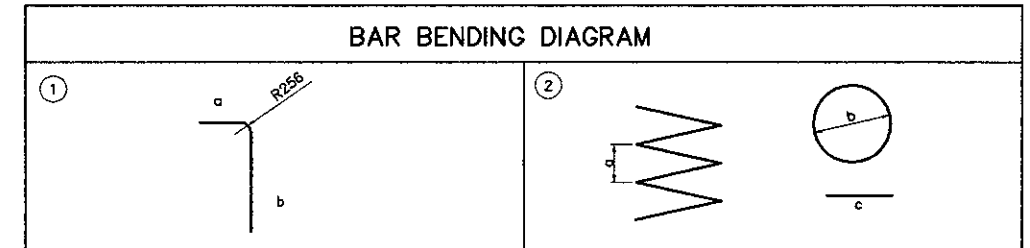
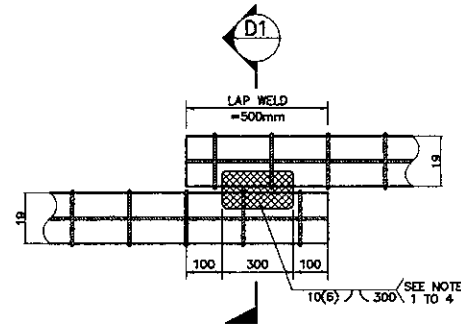
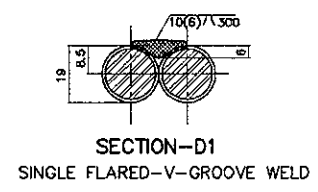
SCHEDULE OF PIER

PIER NO.	HEIGHT H (mm)	A (mm)	B (mm)	C (mm)	V (mm)	n1	n2	n3
P7L	8032	1875	5400	3375	1365	25	36	45
P7R	7969	1875	5250	3450	1440	25	35	46

- NOTES :
- ALL DIMENSIONS ARE IN MILLIMETERS
  - CONCRETE :  $f_c' = 30 \text{ MPa}$
  - REINFORCING STEEL : YIELD STRENGTH =  $390 \text{ N/mm}^2$



- NOTES ON LAP-WELD CONNECTION :**
1. SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
  2. WELDING SHOULD CONFORM TO AWS (D1.4)  
\*STRUCTURAL WELDING CODE REINFORCED STEEL.\*
  3. USE ELECTRODE E90XX.
  4. CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN BARS DURING WELDING.



LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION(mm) OUT TO OUT				LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m)	WEIGHT (kg)	VOLUME OF CONC. (M <sup>3</sup> )
				a	b	c	d					
PBL	C1a	32	1	675	10853			11528	12	6.31	873	6.759
	C1b	32	1	675	4660			5335	12	6.31	404	
	C2	19	2	100	1020	500		63421	1	2.23	141	
	C3	19	2	150	1020	500		96800	1	2.23	216	
								113490	1	2.23	253	
SUB TOTAL =											1,887 Kgs	
PBR	C1a	32	1	675	10643			11318	12	6.31	857	6.560
	C1b	32	1	675	4550			5225	12	6.31	396	
	C2	19	2	100	1020	500		63421	1	2.23	141	
	C3	19	2	150	1020	500		93462	1	2.23	208	
								113490	1	2.23	253	
SUB TOTAL =											1,855 Kgs	
TOTAL =											3,742 Kgs	13.319

THE SCHEDULE OF REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY. THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

COLUMN TYPE	CL-BFD2
SIZE (mm)	1100 #
MAIN BARS	
SIZE (mm)	32
NO. LAYERS	1
NO. OF PCS (a)	12
NO. OF PCS (b)	12
SPIRAL	
SIZE (mm)	19

- NOTES :**
1. ALL DIMENSIONS ARE IN MILLIMETERS
  2. CONCRETE :  $f_c' = 30$  MPa
  3. REINFORCING STEEL : YIELD STRENGTH = 390 N/mm<sup>2</sup>

PIER NO.	HEIGHT H (mm)	A (mm)	B (mm)	C (mm)	V (mm)	n1	n2	n3
PBL	7113	1900	4350	3400	1390	19	29	34
PBR	6903	1900	4200	3400	1390	19	28	34



SCHEDULE OF COLUMN

CL--BF01  
**PIER P1, P2 & P9**

COLUMN TYPE	CL--BF01	
SIZE (mm)	1100 D	
MAIN BARS	SIZE (mm)	32
	NO. LAYERS	1
	NO. OF PCS.	30
SPIRAL SIZE (mm)	19	
STEEL RATIO, $\rho$	2.50%	

CL--BF02  
**PIER P6 & P8**

COLUMN TYPE	CL--BF02	
SIZE (mm)	1100 D	
MAIN BARS	SIZE (mm)	32
	NO. LAYERS	1
	NO. OF PCS.	24
SPIRAL SIZE (mm)	19	
STEEL RATIO, $\rho$	2.00%	

CL--BF03  
**PIER P7**

COLUMN TYPE	CL--BF03	
SIZE (mm)	1100 D	
MAIN BARS	SIZE (mm)	32
	NO. LAYERS	1
	NO. OF PCS.	39
SPIRAL SIZE (mm)	19	
STEEL RATIO, $\rho$	3.00%	

CL--BF04  
**ABUTMENT A1 & A2**

COLUMN TYPE	CL--BF04	
SIZE (mm)	1400	
MAIN BARS	SIZE (mm)	32
	NO. LAYERS	2
	NO. OF PCS (1)	36
	NO. OF PCS (2)	26
SPIRAL SIZE (mm)	19	
STEEL RATIO, $\rho$	3.00%	

CL--BF05  
**PIER P4 & P5**

COLUMN TYPE : COMPOSITE COLUMN  
 SIZE (mm) : 1400

CL--BF06  
**PIER P3**

COLUMN TYPE	CL--BF06	
SIZE (mm)	1700 D	
MAIN BARS	SIZE (mm)	32
	NO. LAYERS	1
	NO. OF PCS.	64
SPIRAL SIZE (mm)	19	
STEEL RATIO, $\rho$	4.00%	

NOTES :

- LAP SPICE OF COLUMN MAIN BARS WILL NOT BE ALLOWED IN ANY LOCATION.

PLAN

SECTIONS

A. SINGLE

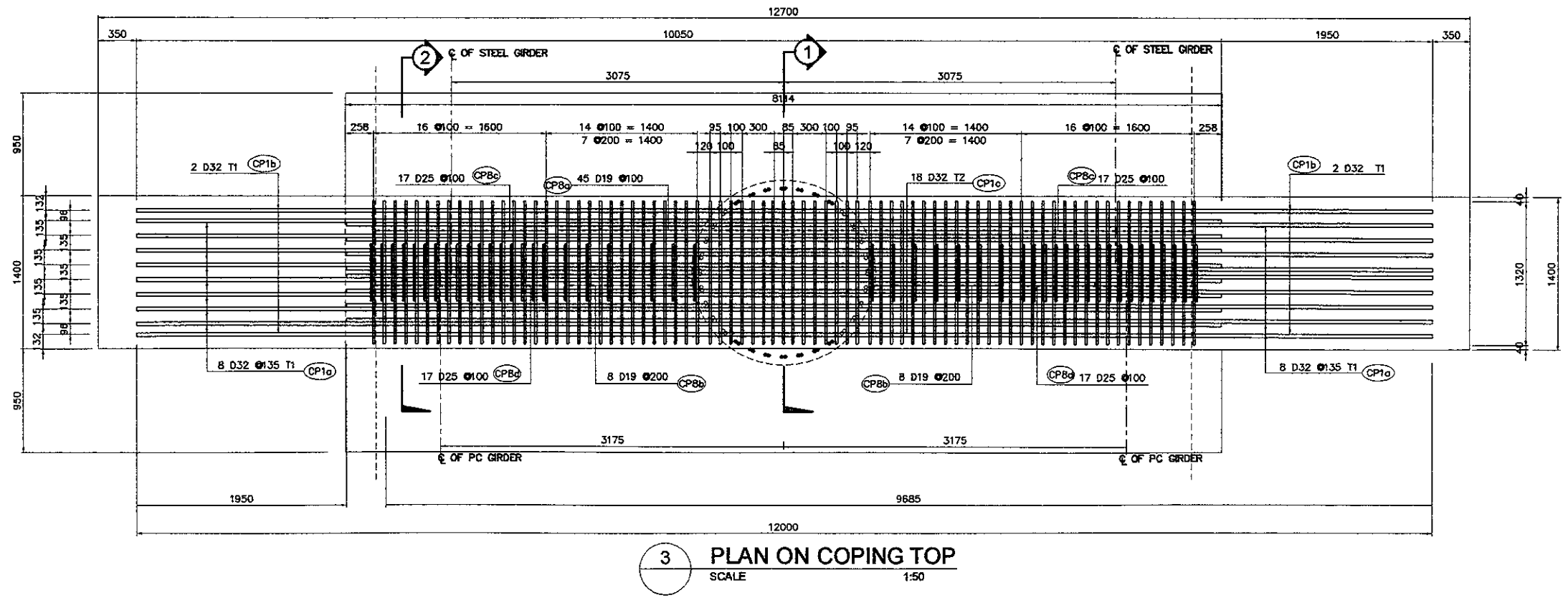
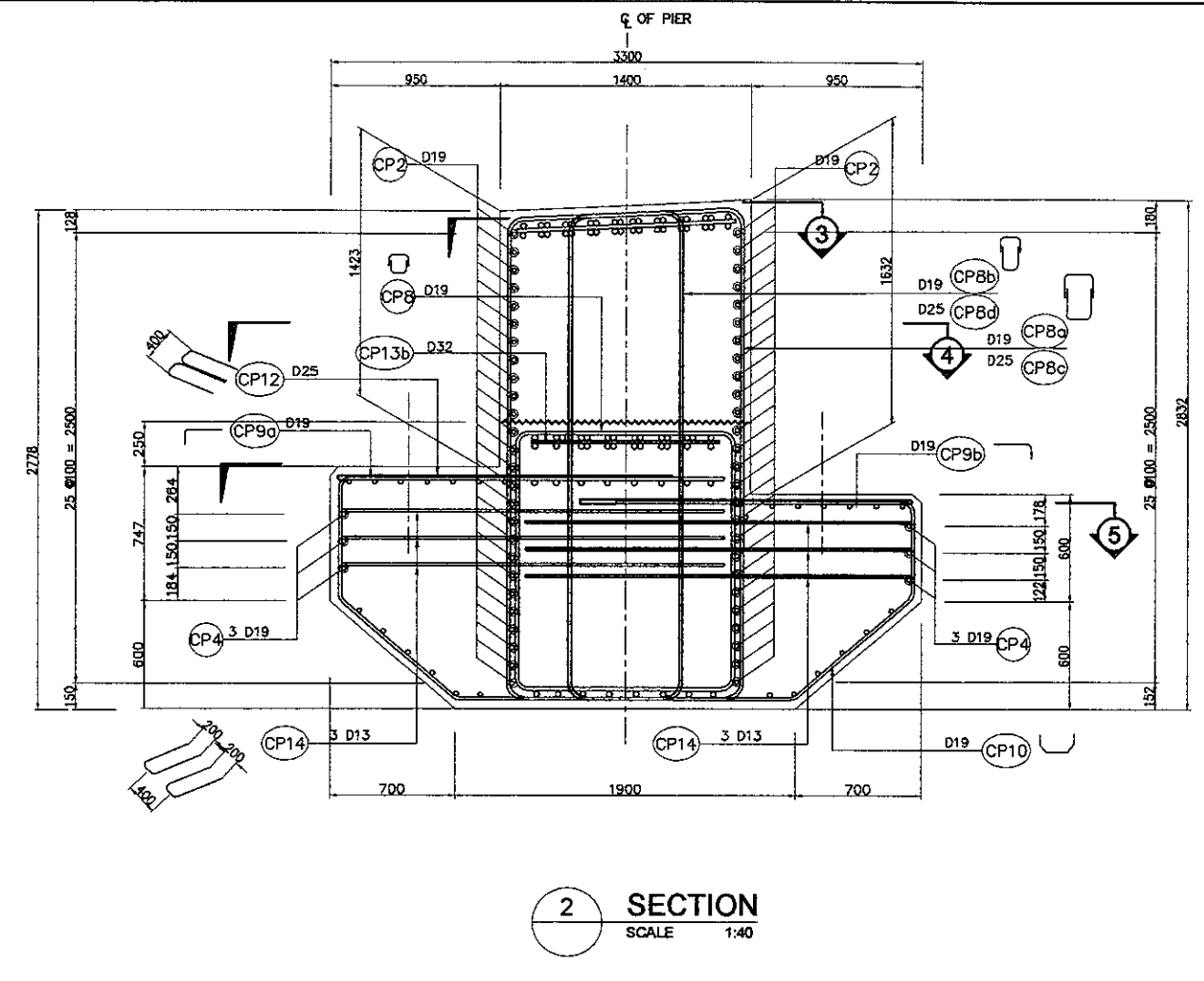
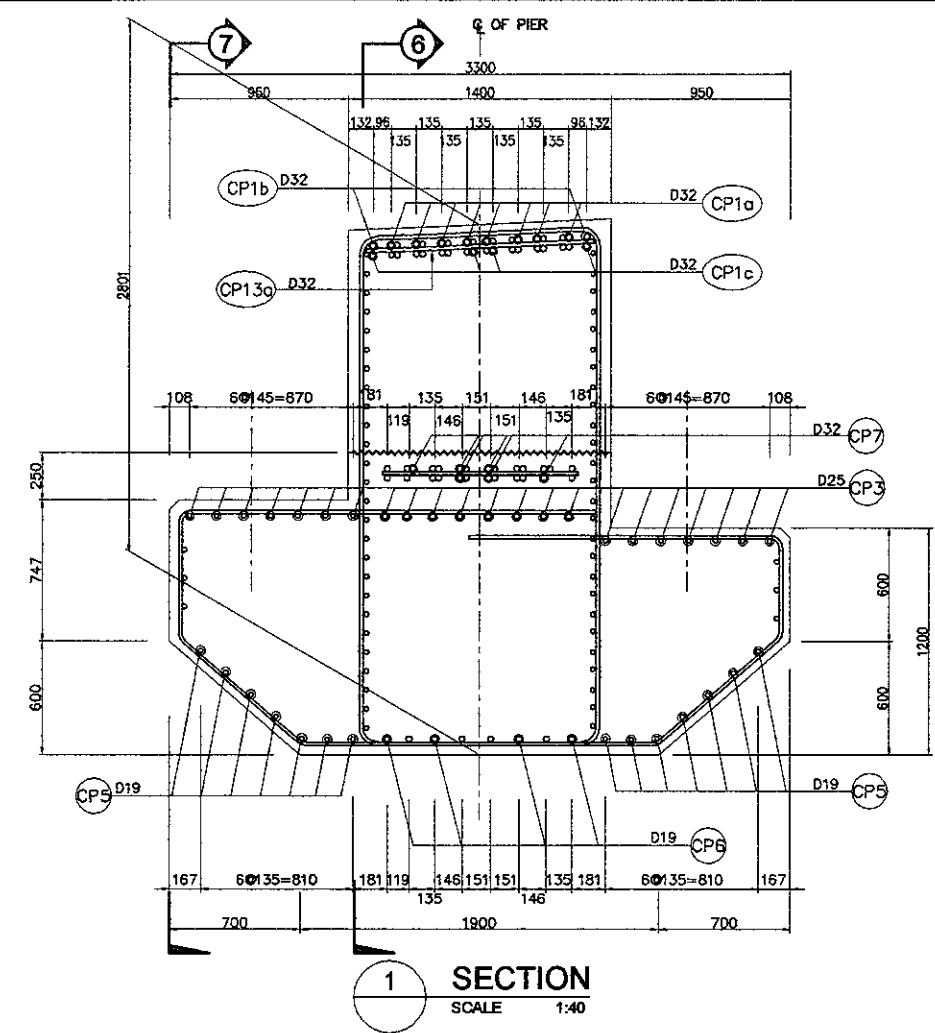
B. DOUBLE

WHERE: S = RADIUS OF REINFORCING BAR  
 E = EFFECTIVE THROAT

DETAILS OF LAP WELD SPICE FOR SPIRAL

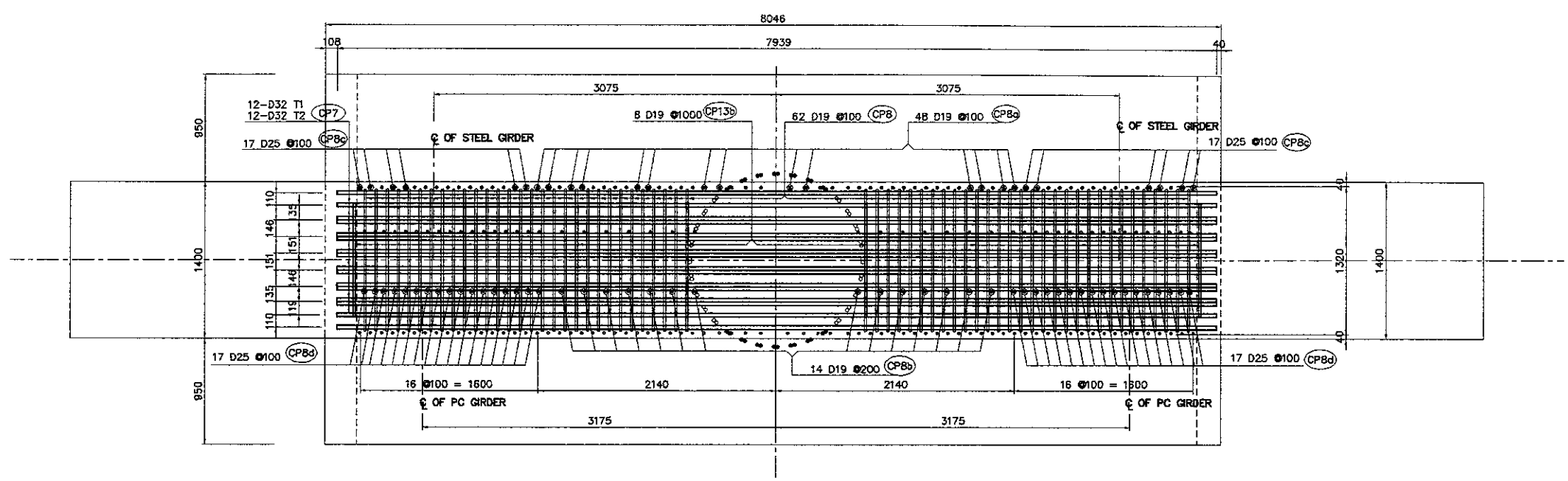


DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: A. GOURLEY	Name: T. OKUMURA	Name: M. KIUCHI
Sign: _____	Sign: _____	Sign: _____
Date: _____	Date: _____	Date: _____

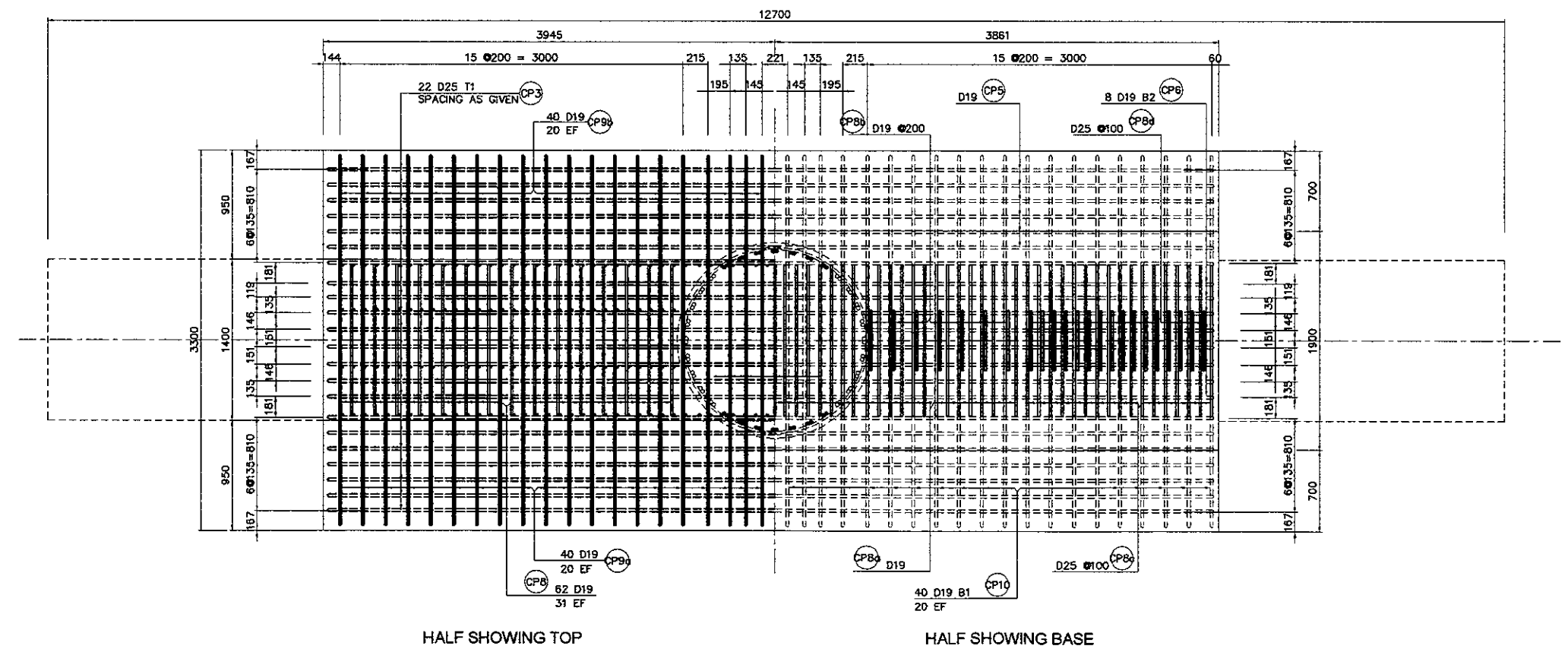


- NOTES :**
- ALL DIMENSIONS ARE IN MILLIMETERS.
  - CONCRETE :  $F_c' = 30\text{MPa}$
  - REINFORCING STEEL =  
 D51 : YIELD STRENGTH = 345 N/mm<sup>2</sup>  
 OTHERS : YIELD STRENGTH = 390 N/mm<sup>2</sup>

DESIGNED BY	CHECKED BY	SUBMITTED BY
Name A. GOURLEY	Name T. OKUMURA	Name M. KIUCHI
Sign	Sign	Sign
Date	Date	Date



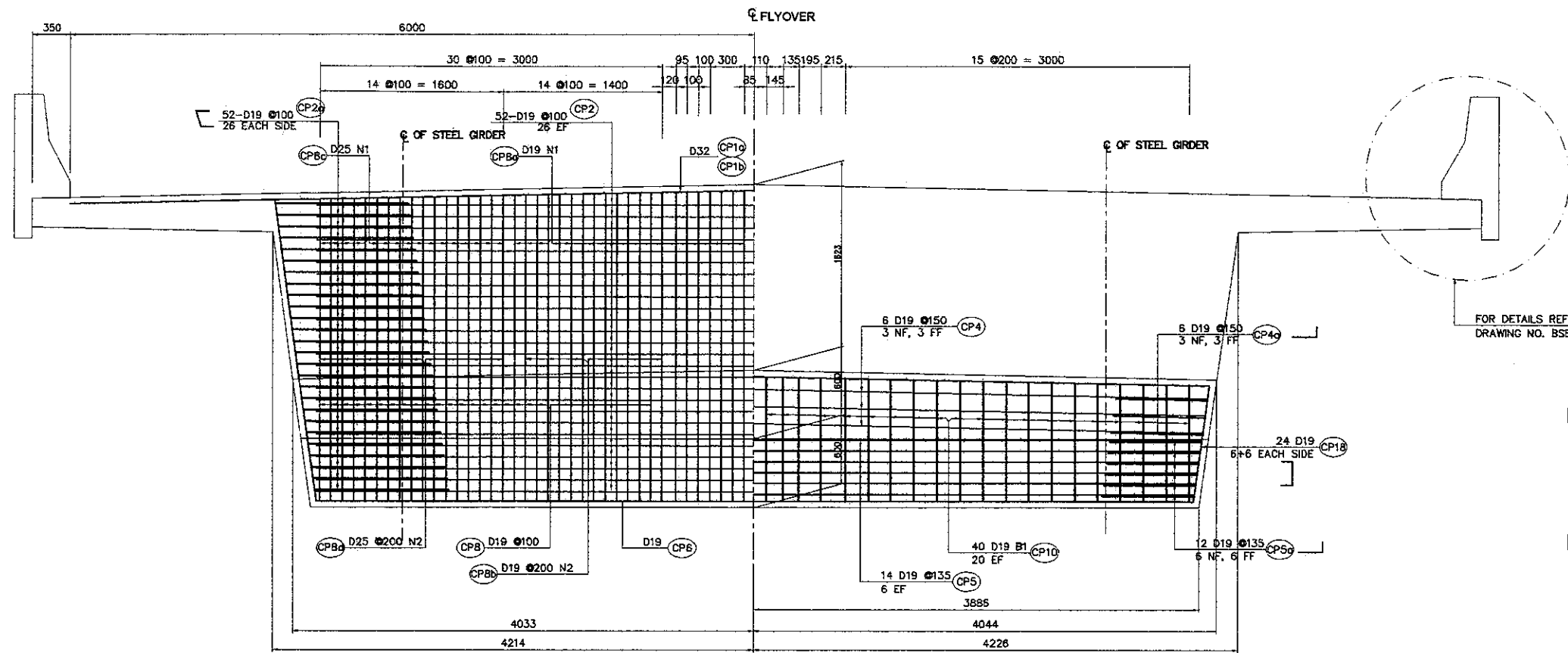
**4 PLAN AT CONSTRUCTION JOINT**  
 SCALE 1:50



**5 PLAN ON BEAM LEDGE**  
 SCALE 1:50

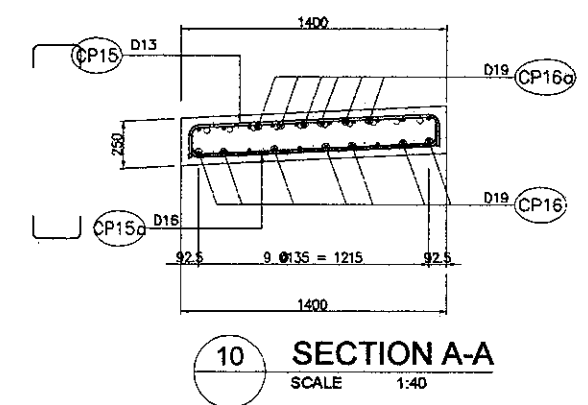
- NOTES :**
- ALL DIMENSIONS ARE IN MILLIMETERS.
  - CONCRETE :  $F_c' = 30\text{MPa}$
  - REINFORCING STEEL =  
 D51 : YIELD STRENGTH = 345 N/mm<sup>2</sup>  
 OTHERS : YIELD STRENGTH = 390 N/mm<sup>2</sup>

DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: A. GOURLEY	Name: T. OKUMURA	Name: M. KRUCHI
Sign: _____	Sign: _____	Sign: _____
Date: _____	Date: _____	Date: _____

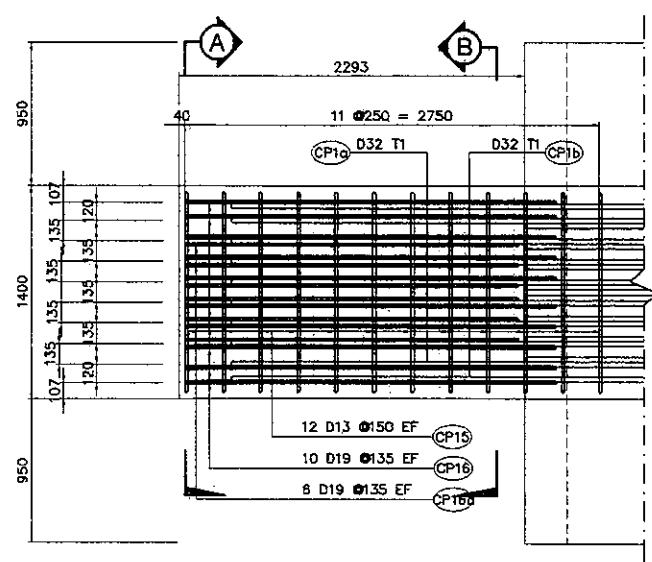


**6 ELEVATION ON COPING**  
 SCALE 1 : 50

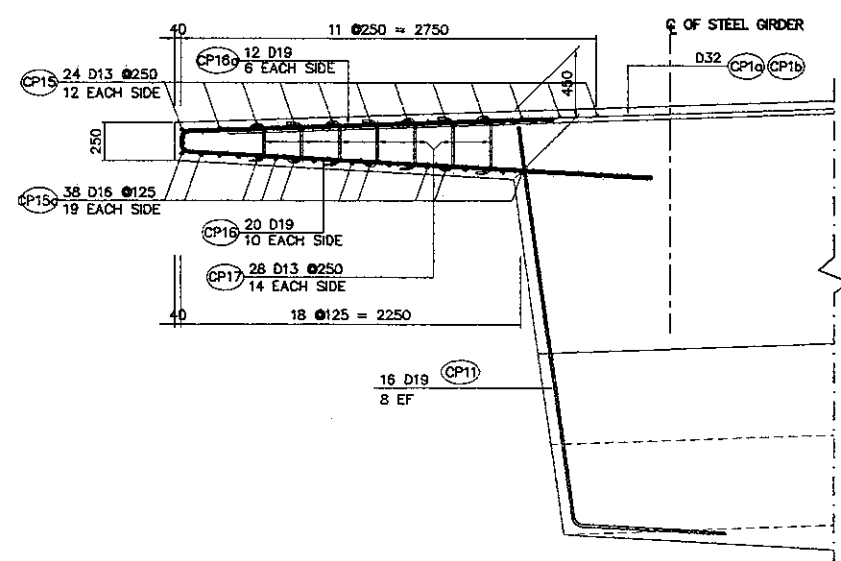
**7 ELEVATION ON BEAM LEDGE**  
 SCALE 1 : 50



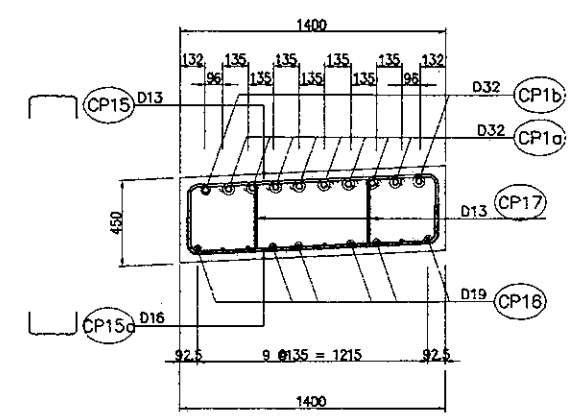
**10 SECTION A-A**  
 SCALE 1:40



**8 PLAN ON COPING CANTILEVER**  
 SCALE 1 : 50

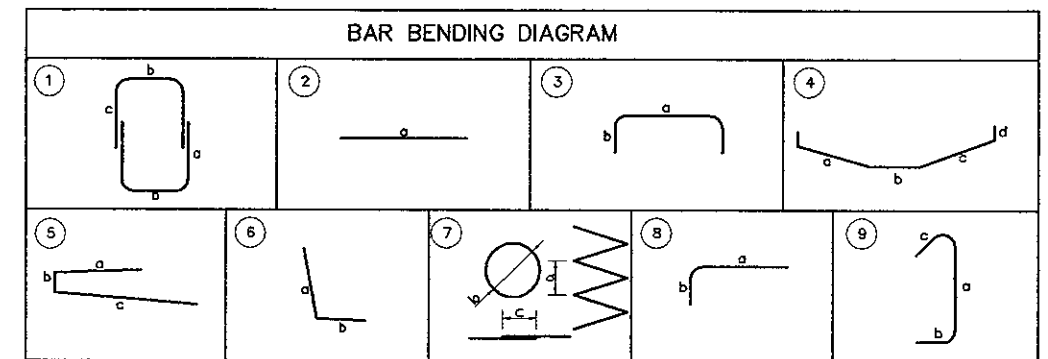
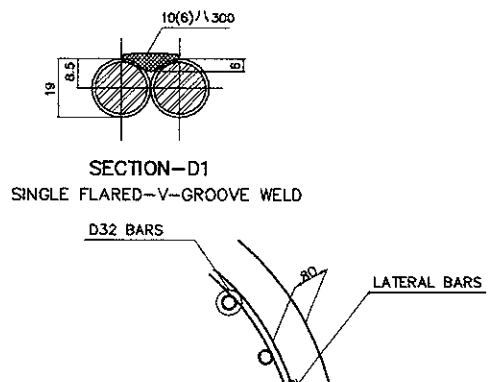
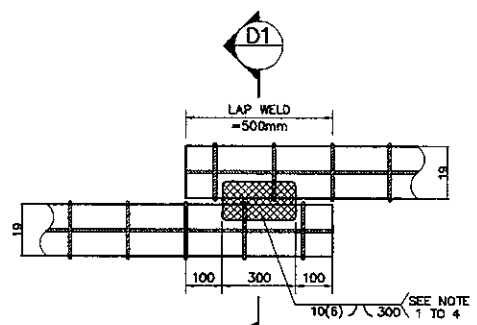
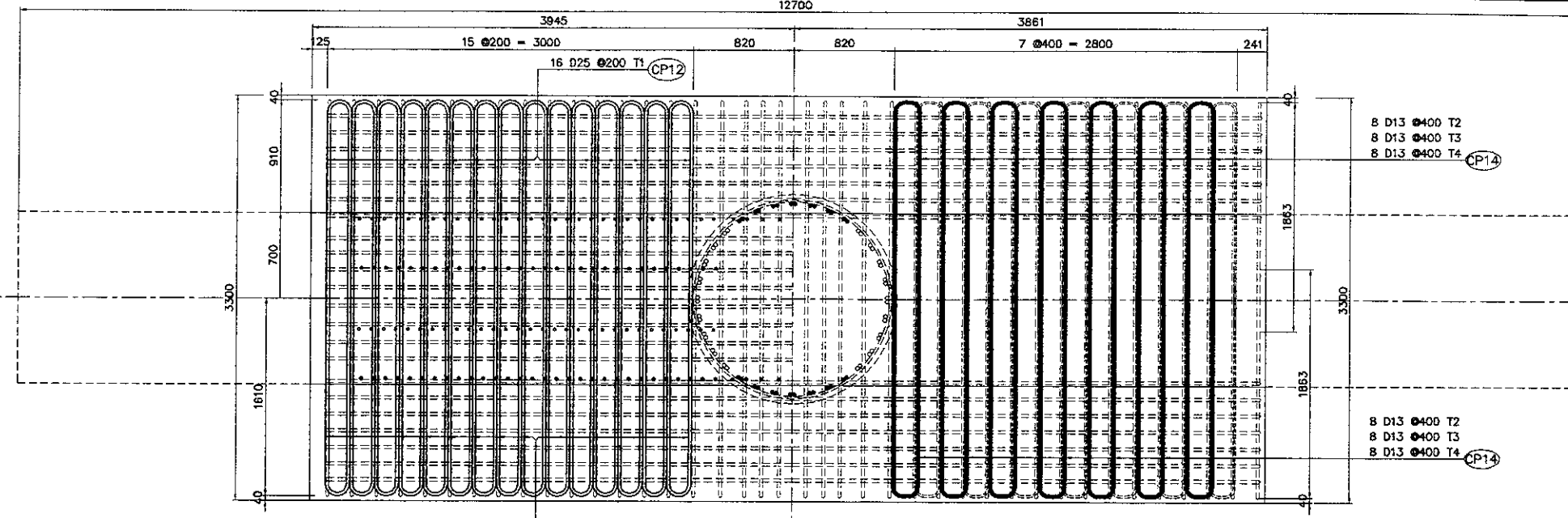
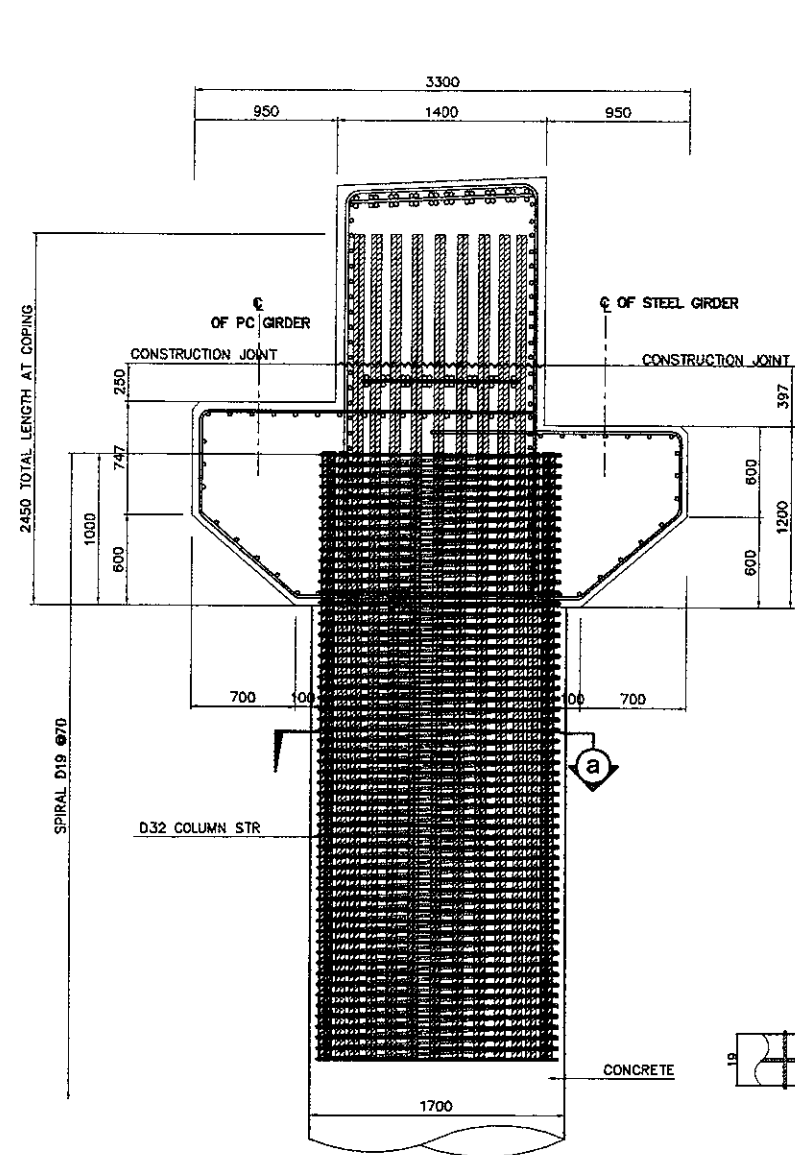


**9 ELEVATION ON COPING CANTILEVER**  
 SCALE 1 : 50



**11 SECTION B-B**  
 SCALE 1:40

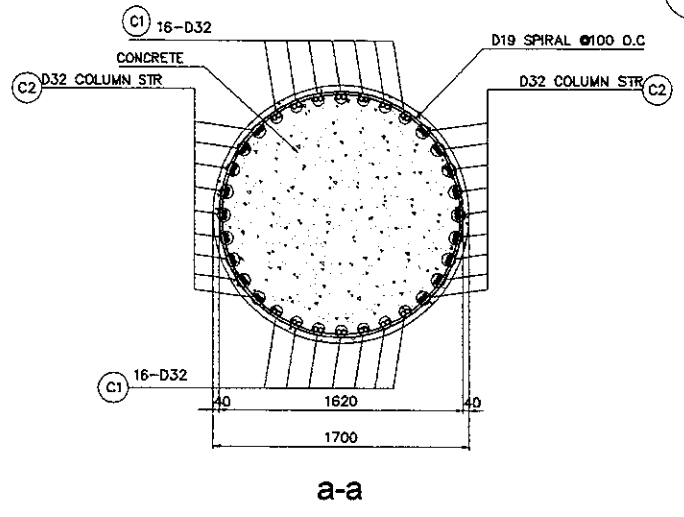
- NOTES :
- ALL DIMENSIONS ARE IN MILLIMETERS.
  - CONCRETE :  $F_c' = 30\text{MPa}$
  - REINFORCING STEEL=
    - D51 : YIELD STRENGTH = 345 N/mm<sup>2</sup>
    - OTHERS : YIELD STRENGTH = 390 N/mm<sup>2</sup>



**SCHEDULE OF REINFORCEMENT**

LOCATION	BAR MARK	SIZE (mm)	BEND TYPE	DIMENSION (mm) OUT TO OUT						LENGTH (mm)	NO. REQ'D.	UNIT WEIGHT (kg/m)	WEIGHT (kg.)	VOLUME OF CONCRETE (m <sup>3</sup> )
				a	b	c	d	e	f					
COPING PIER 3	CP1a	32	2	10050						10050	16	6.31	1015	48.52
	CP1b	32	2	12000						12000	2	6.31	151	
	CP1c	32	2	8100						8100	18	6.31	920	
	CP2	19	2	7500						7500	52	2.23	870	
	CP2a	19	3	1280	1250					3780	52	2.23	438	
	CP3	25	2	7800						7800	22	3.85	661	
	CP4	19	2	7600						7600	6	2.23	102	
	CP4a	19	8	1580	800					2380	12	2.23	64	
	CP5	19	2	7750						7750	14	2.23	242	
	CP5a	19	8	1345	800					2145	24	2.23	115	
	CP6	19	2	7665						7665	8	2.23	137	
	CP7	32	2	7900						7900	26	6.31	1296	
	CP8	19	1	1445	1225	1200				7740	62	2.23	1070	
	CP8a	19	1	2700	1300	800				5300	45	2.23	532	
	CP8b	19	1	2700	600	800				8200	14	2.23	256	
	CP8c	25	1	2700	1300	1150				10300	34	3.85	1348	
	CP8d	25	1	2700	600	1150				8900	34	3.85	1185	
	CP9a	19	8	2150	650					3450	40	2.23	308	
CP9b	19	8	1665	510					2885	40	2.23	240		
CP10	19	4	850	1885	870	515			4635	40	2.23	413		
CP11	19	6	2650	1000					3650	16	2.23	130		
CP12	25	3	200	1800					3800	64	3.85	936		
CP13a	32	2	1200						1200	8	6.31	61		
CP13b	32	2	1050						1050	8	6.31	53		
CP14	13	3	200	1800					3800	96	1.04	380		
CP15	13	3	1300	200					1700	24	1.04	42		
CP15a	16	3	1300	350					2000	36	1.58	114		
CP16	19	5	2200	165	3000				5365	20	2.23	240		
CP16a	19	5	2200	165	165				2530	12	2.23	68		
CP17	13	9	350	165	165				680	28	1.04	20		
CP18	19	5	400	1100	400				1900	24	2.23	102		

TOTAL WEIGHT FOR / COPING = 13,076 Kgs.



**NOTES ON LAP-WELD CONNECTION :**

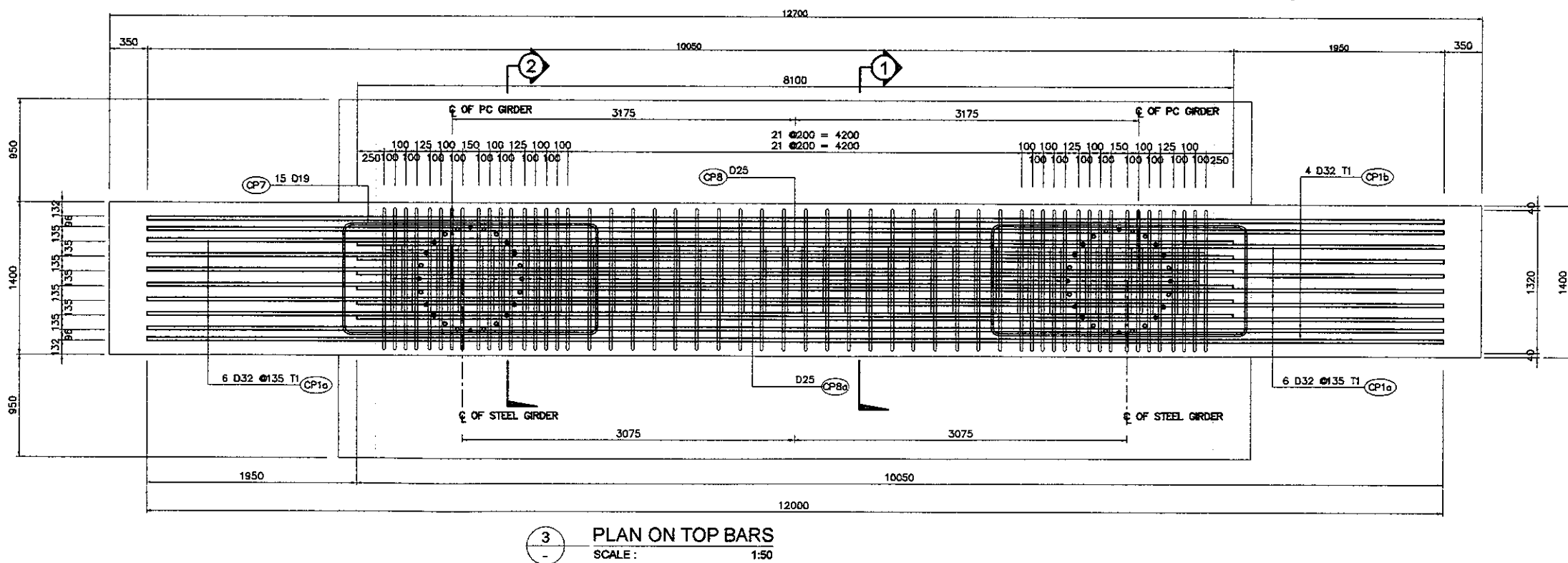
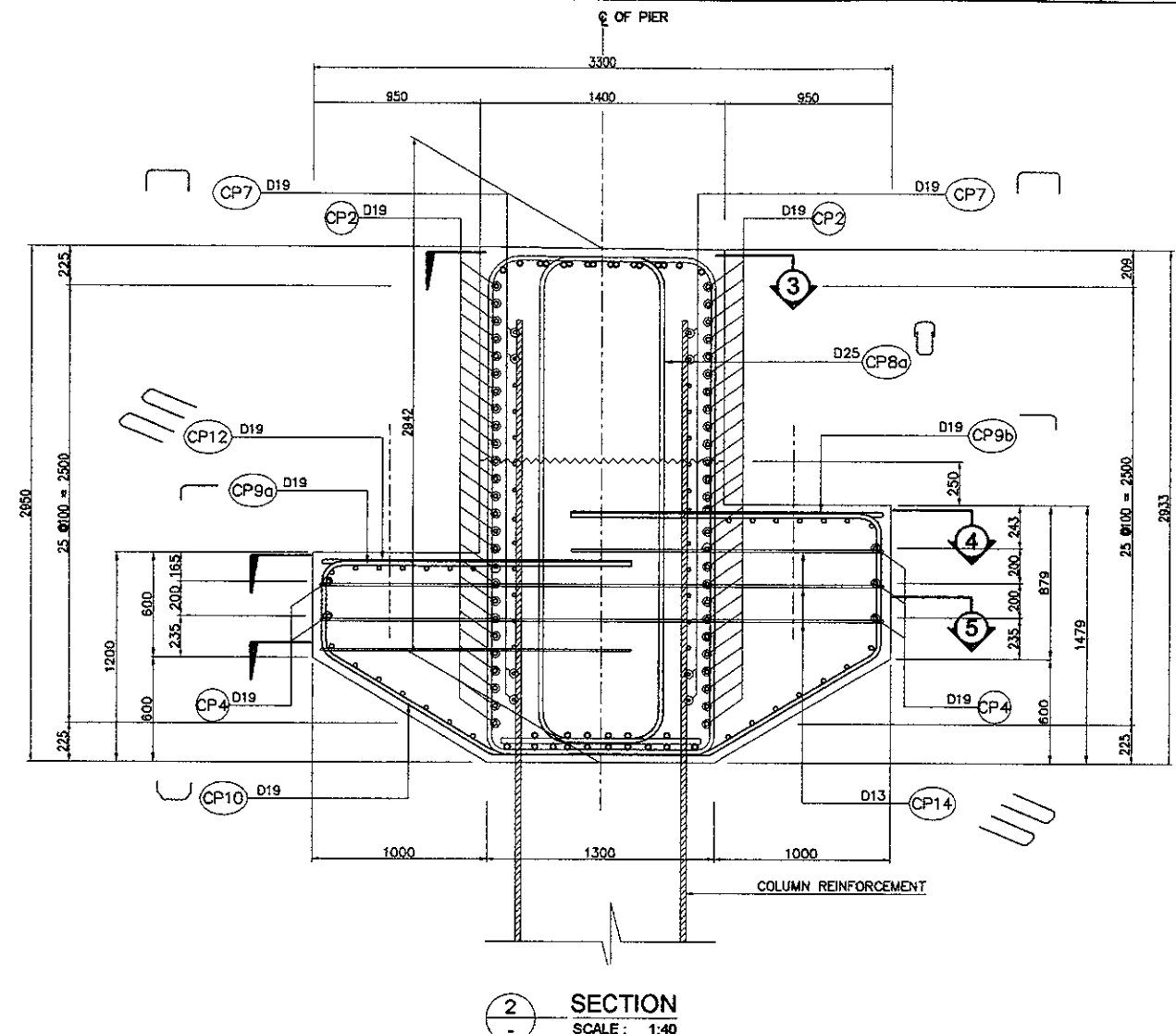
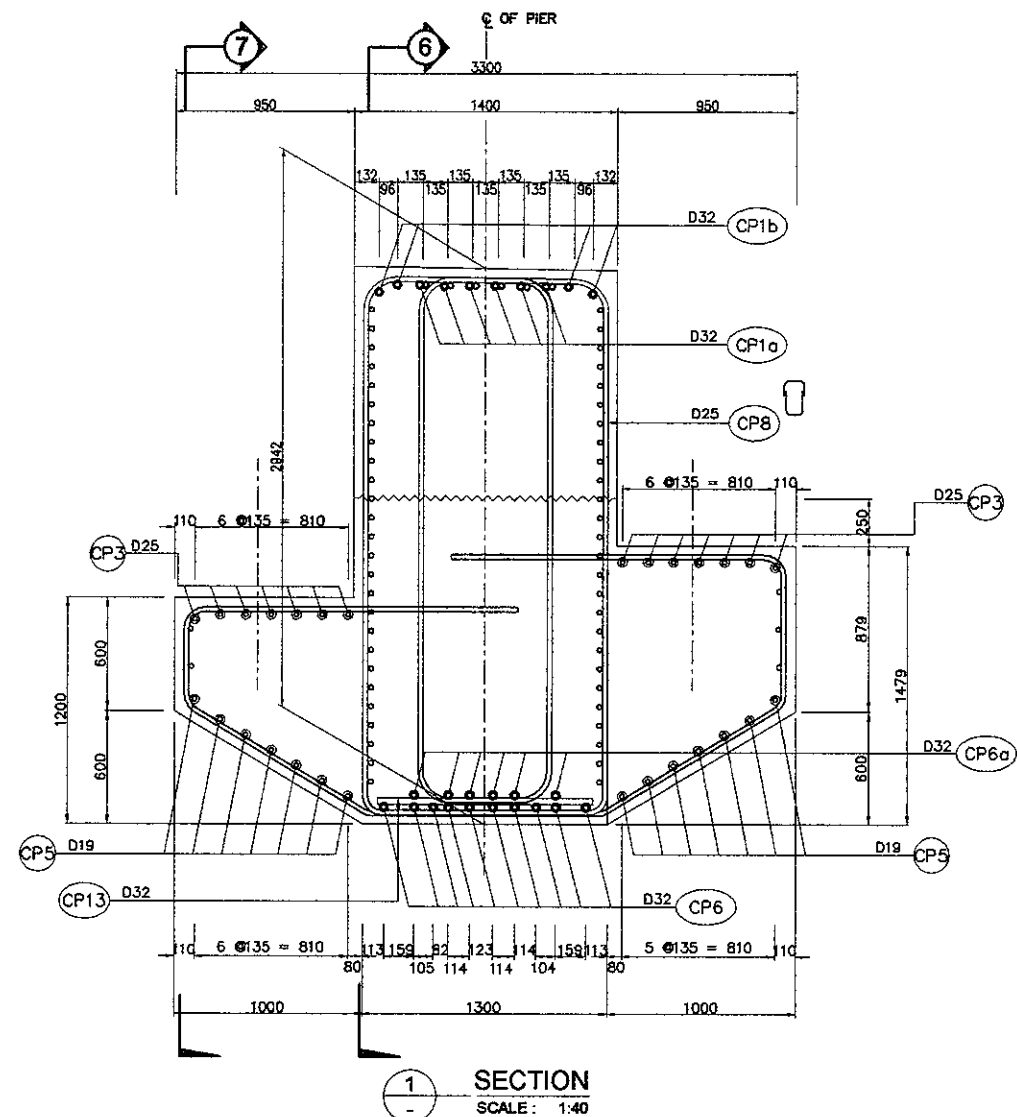
- SPIRAL REINFORCEMENT ARE LAP-WELD CONNECTED (FLARED-V-GROOVE TYPE)
- WELDING SHOULD CONFORM TO AWS (D1.4) \*STRUCTURAL WELDING CODE REINFORCED STEEL\*
- USE ELECTRODE E90XX.
- CARE SHOULD BE TAKEN NOT TO DAMAGE THE COLUMN MAIN DURING WELDING.

**NOTES :**

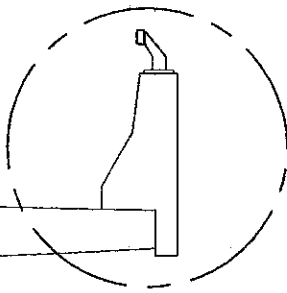
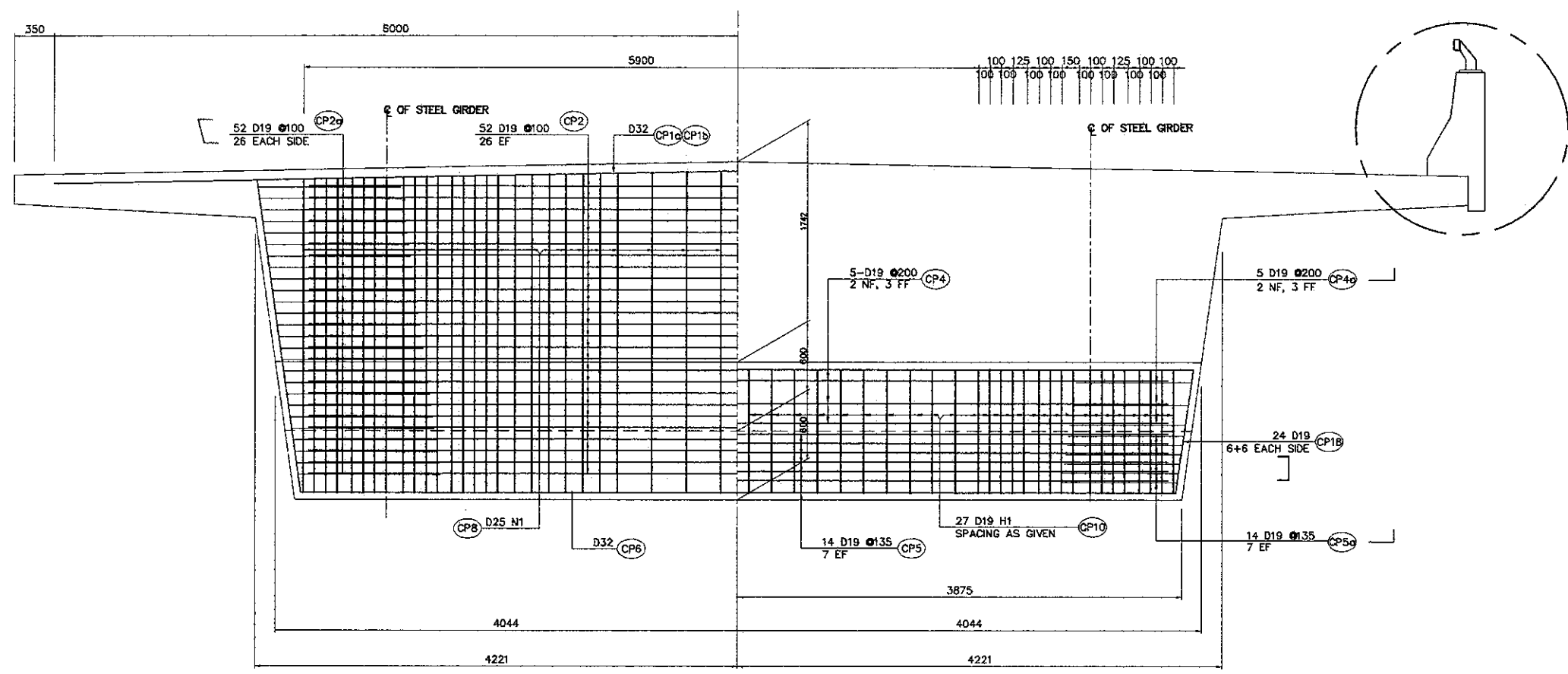
- ALL DIMENSIONS ARE IN MILLIMETERS.
- CONCRETE :  $f_c' = 30\text{MPa}$
- REINFORCING STEEL-  
 D51 : YIELD STRENGTH = 345 N/mm<sup>2</sup>  
 OTHERS : YIELD STRENGTH = 390 N/mm<sup>2</sup>

THE REINFORCEMENT SHOWN ON THIS TABLE IS FOR REFERENCE ONLY, THE CONTRACTOR SHOULD CHECKED AND VERIFY ALL DIMENSIONS, SIZES AND QUANTITIES OF REINFORCEMENT.

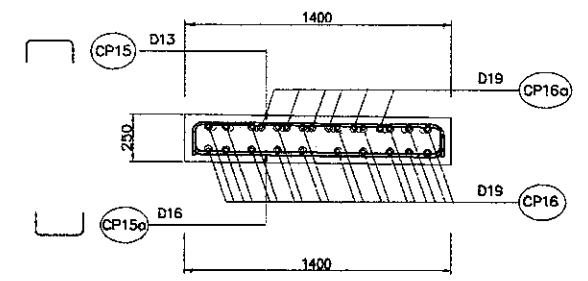
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: A. GOURLEY	Name: T. OKUMURA	Name: M. KIUCHI
Sign:	Sign:	Sign:
Date:	Date:	Date:



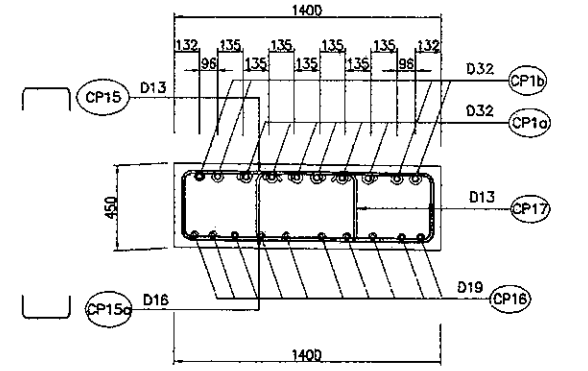




FOR DETAILS REFER TO  
 DRAWING NO. BSB-034



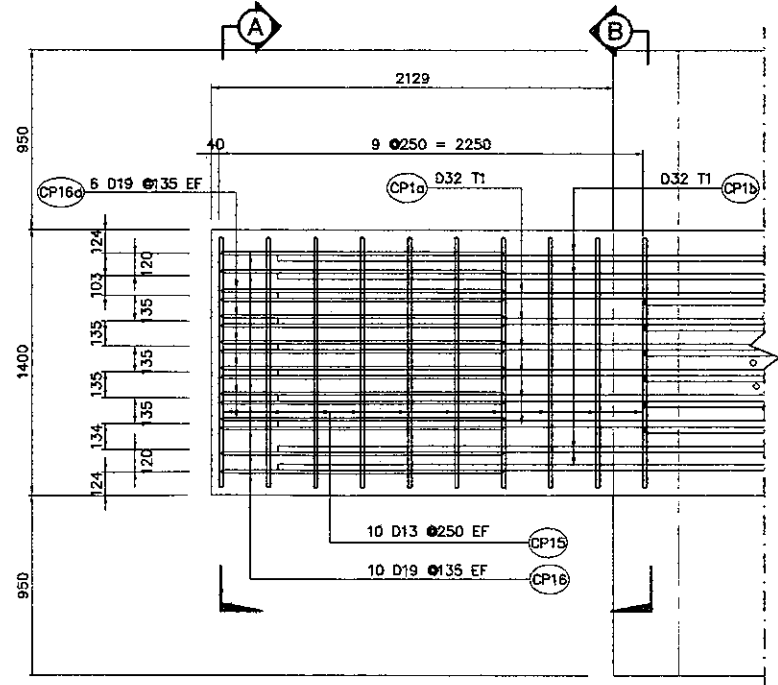
10 SECTION A-A  
 SCALE : 1:40



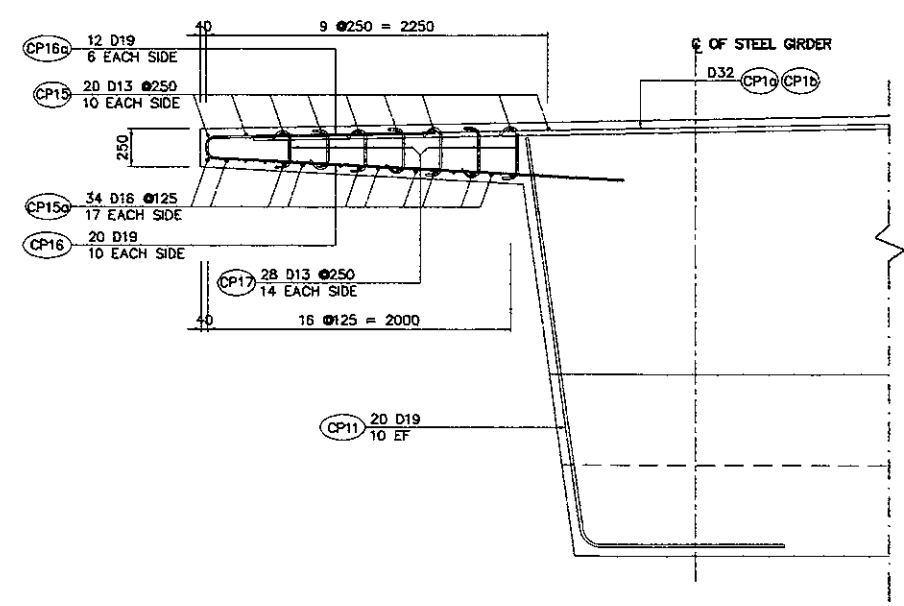
11 SECTION B-B  
 SCALE : 1:40

6 ELEVATION ON COPING TOP  
 SCALE : 1:50

7 ELEVATION ON BEAM LEDGE  
 SCALE : 1:50



8 PLAN ON COPING CANTILEVER  
 SCALE : 1:40



9 ELEVATION ON COPING CANTILEVER  
 SCALE : 1:50