

استاندارد سازه ها و گنتری های فلزی و بتنی
پستهای انتقال نیرو

نقشه های فونداسیون سازه گنتری ها و
پایه های تجهیزات بجز کلیدها

نشریه شماره ۶۴/۲۰۳

تحقیقات و فن آوری
استانداردها

محقق : شرکت مهندسی مشاور غرب نیرو

استاندارد سازه ها و گنتری های فلزی و بتنی پستهای انتقال نیرو

کمیسیون فنی نشریه " یکسان نمودن و ارائه نقشه های سازه تجهیزات و گنتری ها بجز کلیدها "

رئیس

ابراهیم نمازی (فوق لیسانس مدیریت)

سمت یا نمایندگی

سازمان مدیریت توانیر - دفتر استانداردها

محقق

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مهندسین مشاور غرب نیرو

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سازمان توسعه برق ایران

شرکت مهندسین مشاور قدس نیرو

پژوهشگاه نیرو

شرکت برق منطقه ای تهران

شرکت برق منطقه ای یزد

شرکت برق منطقه ای کرمان

شرکت برق منطقه ای زنجان

شرکت آونگان اراک

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پیشگفتار

استاندارد برحسب مورد عبارتست از تعیین تمام یا برخی از خصوصیات و مشخصات هر جوهره (محصول ، فرآیند ، سازمان یا فرد) و اطمینان از کیفیت آن از قبیل :

کالا (Material) شامل : اجزاء تشکیل دهنده ، ترکیب ، مواد اولیه ، جنس ، منشاء ، کمیت ، رنگ ، وضع ظاهر ، وزن ، ابعاد ، عیار ، فهرست مقادیر ، نحوه استفاده ، شرایط کاری ، شرایط محیطی و آب و هوایی ، مشخصات فنی ، توانائی ها ، قابلیت ها ، فهرست اطلاعات داده شده توسط خریدار ، فهرست اطلاعات خواسته شده از سازنده ، اطلاعات شرایط محیطی و آب و هوایی ، بسته بندی ، حمل و نقل و نگهداری.

مهندسی (Engineering) شامل : معیارها ، مبانی ، نیازها و خواسته ها ، اطلاعات مورد نیاز جهت طراحی و انتخاب ، نرم افزارها ، شاخص ها و پارامترهای مشخص کننده طراحی ، روش قدم به قدم طراحی ، یک نمونه طراحی ، جداول طراحی ، مشخصات فنی و قابلیت ها ، خواص ، ایمنی ، بهداشت ، اقتصاد ، نقشه ها ، طرح تفصیلی ، محاسبات ، دستورالعمل ها ، راهنمای کاربردی ، معیارهای طراحی ، شرایط محیطی و ضرایب اطمینان.

اجرایی (Construction) شامل : ساخت ، نشانه و علامت گذاری ، بسته بندی ، حمل و نقل ، نصب ، فونداسیون ، سازه ، ساختمان ، تاسیسات ، راه اندازی ، راهبری و بهره برداری ، ابزار و وسائل خاص ، فصل مشترک ها ، نگهداری و تعمیرات ، دستورالعمل نصب ، ابزار مخصوص و تنظیمات.

بازرسی (Inspection) شامل : کیفیت ، بازرسی ، آزمایش در طول ساخت ، آزمایش راه اندازی ، آزمایش دوره ای ، فرم های کنترل کیفی ، روش کنترل کیفی و تاییدها.

عمومی (General) شامل : فرم ها ، نحوه یکنواخت کردن اوراق اداری ، اسناد بازرگانی و مالی ، اولویت ها ، روش ها ، توصیه ها ، تفسیرها ، ملزومات ، مقررات و قوانین ، سیاست ها و استانداردهای مورد استفاده.

ساختار (Structure) شامل : طرح و ساختار گزارش و خلاصه آن ، تهیه و تدوین کنندگان منابع ، مراجعه و استانداردهای مورد استفاده ، عناوین ، هدف و دامنه کاربرد ، تعاریف ، متن اصلی ، عبارات ، جداول ، ... ، نظرات و پیشنهادات ، آمار و اطلاعات ، اشکال ، جداول ، منحنی ها ، نقشه ها ، فرمول ها ، نمودارها ، نتیجه ، واژگان ، پیوسته و سبک نگارش.

این استاندارد جهت استفاده در صنعت برق تهیه و به تصویب مقام محترم وزارت نیرو رسیده است بنابراین رعایت آن برای کلیه شرکت های تابعه و وابسته به وزارت نیرو الزامی می باشد.

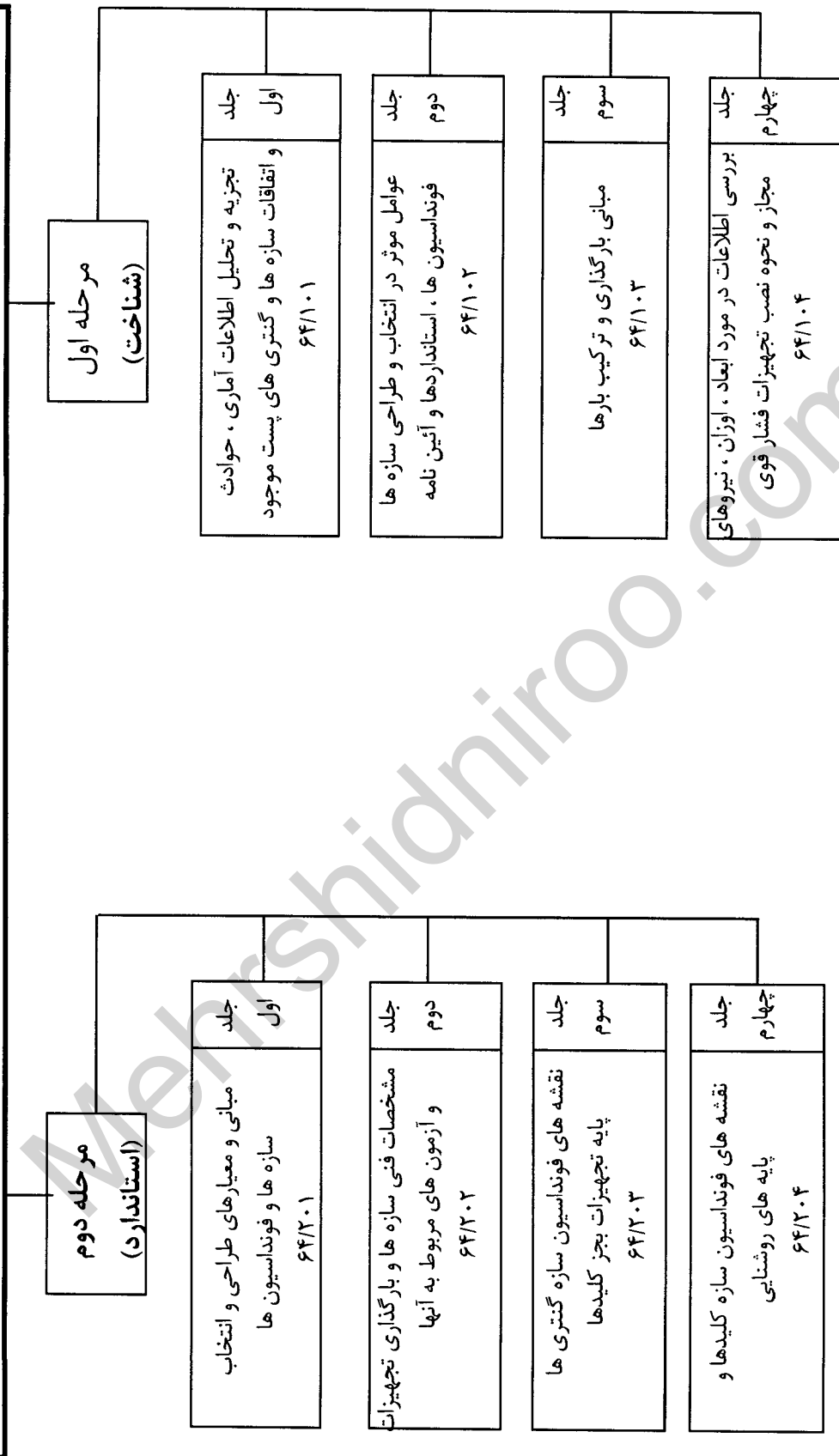
این استاندارد توسط گروهی مرکب از متخصصین و کارشناسان مجرب در زمینه های سازه های پستهای انتقال نیرو که دارای تجارب طولانی در صنعت برق و صنایع دیگر می باشند بر مبنای استانداردهای معتبر جهانی ، مراجع منتشره علمی ، مدارک فنی و تجارب کارشناسان ، متخصصین و صنعتگران تهیه شده و سپس به منظور بررسی و اظهار نظر برای اشخاص علاقمند و ذینفع شامل مهندسین مشاور ، شرکت های تابعه و وابسته ، صاحبان صنایع و حرف و اساتید دانشگاه ها ، مراکز علمی و تحقیقاتی ارسال و نظرات و پیشنهادات اصلاحی آنها

جمع آوری گردیده است. و در مرحله بعدی جلساتی با حضور متخصصین و صاحب نظران فوق الذکر تشکیل و در نهایت نظرات و پیشنهادات اصلاحی مورد تایید اعضاء جلسه در آن اعمال و بدین ترتیب این استاندارد حاصل شده است.

علیرغم تلاش های فوق الذکر بهیچ وجه ادعا نمی گردد استاندارد حاضر بدون عیب و کاستی باشد لذا هرگونه نظرات اصلاحی در جهت ارتقاء کیفیت آن در تجدید نظر بعدی مورد استقبال قرار خواهد گرفت.

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مقدمه :

در ادامه پیشبرد پروژه استاندارد گنتری ها و تجهیزات پستهای انتقال نیرو ، یکسان نمودن نقشه های فونداسیون تجهیزات و گنتری ها امری اجتناب ناپذیر و ضروری می باشد. لذا در تکمیل تحقیقات مربوط به این پروژه در جزوه حاضر ، تیپ فونداسیون های تجهیزات و پایه گنتری های پستهای انتقال نیرو براساس تغییرات مقاومت مجاز خاک از ۰/۵ کیلوگرم بر سانتیمترمربع تا ۲ کیلوگرم بر سانتیمترمربع همراه با جدول آرماتور ارائه گردیده است.

باید توجه داشت که این نقشه ها فقط جهت اسناد مناقصه مناسب می باشند و جهت اجرا ، ارائه دفترچه محاسبات الزامی می باشد.

۱- هدف و دامنه کاربرد :

این استاندارد و نقشه های پیوست برای پستهای ۲۳۰/۶۳ کیلوولت با در نظر گرفتن مقاومت مجاز خاک که براساس گزارش های مربوط به عملیات صحرائی و آزمایشگاهی مکانیکی خاک استخراج شده می تواند مورد استفاده قرار گیرد.

کلیه فونداسیون های تجهیزات و گنتری ها بر مبنای سه حالت مقاومت مجاز خاک qa طراحی و ارائه گردیده اند ، که این سه حالت براساس تحلیل ها و بررسی های آماری که روی پستها و نیروهای وارده صورت گرفته بدست آمده و عبارتند از :

$$qa = 0.5 \text{ kg/cm}^2$$

$$qa = 1.0 \text{ kg/cm}^2$$

$$qa = 2.0 \text{ kg/cm}^2$$

این استاندارد براساس تمامی مقررات لازمه جهت تامین ایمنی از لحاظ واژگونی و لغزش و پایداری و مقاومت طراحی و تنظیم گردیده است.

۲- منابع و مراجع

استاندارد 3 VOL-SSPB جهت بارگذاری

استاندارد IEC-628 جهت بارگذاری

استاندارد 89 - ACI جهت طراحی سازه های بتنی

۲- لیست نقشه ها

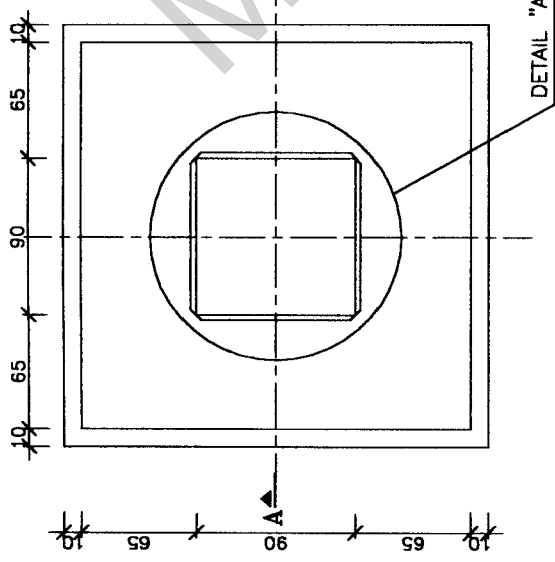
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ردیف	شماره نقشه	عنوان نقشه
1	STG - 800 - 001 Sheet :1	230 KV SUBSTATION C.T Foundation FORMWORK AND REINFORCEMENT qa = 0.5 kg/cm ²
2	STG - 800 - 001 Sheet :2	230 KV SUBSTATION C.T Foundation FORMWORK AND REINFORCEMENT qa = 1 kg/cm ²
3	STG - 800 - 001 Sheet :3	230 KV SUBSTATION C.T Foundation FORMWORK AND REINFORCEMENT qa = 2 kg/cm ²
4	STG - 800 - 002 Sheet :1	230 KV SUBSTATION C.V.T Foundation FORMWORK AND REINFORCEMENT qa = 0.5 kg/cm ²
5	STG - 800 - 002 Sheet :2	230 KV SUBSTATION C.V.T Foundation FORMWORK AND REINFORCEMENT qa = 1 kg/cm ²
6	STG - 800 - 002 Sheet :3	230 KV SUBSTATION C.V.T Foundation FORMWORK AND REINFORCEMENT qa = 2 kg/cm ²
7	STG - 800 - 003 Sheet :1	230 KV SUBSTATION P.I Foundation FORMWORK AND REINFORCEMENT qa = 0.5 kg/cm ²
8	STG - 800 - 003 Sheet :2	230 KV SUBSTATION P.I Foundation FORMWORK AND REINFORCEMENT qa = 1 kg/cm ²
9	STG - 800 - 003 Sheet :3	230 KV SUBSTATION P.I Foundation FORMWORK AND REINFORCEMENT qa = 2 kg/cm ²
10	STG - 800 - 004 Sheet :1	230 KV SUBSTATION L.A Foundation FORMWORK AND REINFORCEMENT qa = 0.5 kg/cm ²
11	STG - 800 - 004 Sheet :2	230 KV SUBSTATION L.A Foundation FORMWORK AND REINFORCEMENT qa = 1 kg/cm ²
12	STG - 800 - 004 Sheet :3	230 KV SUBSTATION L.A Foundation FORMWORK AND REINFORCEMENT qa = 2 kg/cm ²
13	STG - 800 - 005 Sheet :1	63 KV SUBSTATION P.I Foundation FORMWORK AND REINFORCEMENT qa = 0.5 kg/cm ²

ردیف	شماره نقشه	عنوان نقشه
14	STG - 800 - 005 Sheet :2	63 KV SUBSTATION P.I Foundation FORMWORK AND REINFORCEMENT qa = 1 kg/cm ²
15	STG - 800 - 005 Sheet :3	63 KV SUBSTATION P.I Foundation FORMWORK AND REINFORCEMENT qa = 2 kg/cm ²
16	STG - 800 - 006 Sheet :1	63 KV SUBSTATION L.A Foundation FORMWORK AND REINFORCEMENT qa = 0.5 kg/cm ²
17	STG - 800 - 006 Sheet :2	63 KV SUBSTATION L.A Foundation FORMWORK AND REINFORCEMENT qa = 1 kg/cm ²
18	STG - 800 - 006 Sheet :3	63 KV SUBSTATION L.A Foundation FORMWORK AND REINFORCEMENT qa = 2 kg/cm ²
19	STG - 800 - 007 Sheet :1	63 KV SUBSTATION C.V.T Foundation FORMWORK AND REINFORCEMENT qa = 0.5 kg/cm ²
20	STG - 800 - 007 Sheet :2	63 KV SUBSTATION C.V.T Foundation FORMWORK AND REINFORCEMENT qa = 1 kg/cm ²
21	STG - 800 - 007 Sheet :3	63 KV SUBSTATION C.V.T Foundation FORMWORK AND REINFORCEMENT qa = 2 kg/cm ²
22	STG - 800 - 008 Sheet :1	63 KV SUBSTATION C.T Foundation FORMWORK AND REINFORCEMENT qa = 0.5 kg/cm ²
23	STG - 800 - 008 Sheet :2	63 KV SUBSTATION C.T Foundation FORMWORK AND REINFORCEMENT qa = 1 kg/cm ²
24	STG - 800 - 008 Sheet :3	63 KV SUBSTATION C.T Foundation FORMWORK AND REINFORCEMENT qa = 2 kg/cm ²
25	STG - 800 - 009 Sheet :1	230 KV SUBSTATION Foundation for GANTRY qa = 0.5 kg/cm ²
26	STG - 800 - 009 Sheet :2	230 KV SUBSTATION Foundation for GANTRY qa = 1.0 kg/cm ²

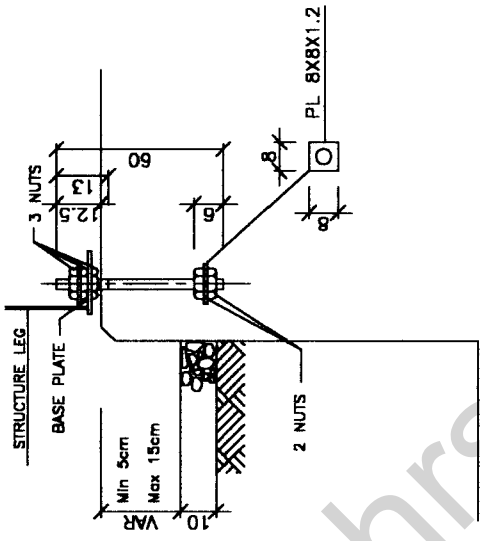
ردیف	شماره نقشه	عنوان نقشه
27	STG - 800 - 009 Sheet :3	230 KV SUBSTATION Foundation for GANTRY qa = 2.0 kg/cm ²
28	STG - 800 - 010 Sheet :1	63 KV SUBSTATION Foundation for GANTRY qa = 0.5 kg/cm ²
29	STG - 800 - 010 Sheet :2	63 KV SUBSTATION Foundation for GANTRY qa = 1.0 kg/cm ²
30	STG - 800 - 010 Sheet :3	63 KV SUBSTATION Foundation for GANTRY qa = 2.0 kg/cm ²

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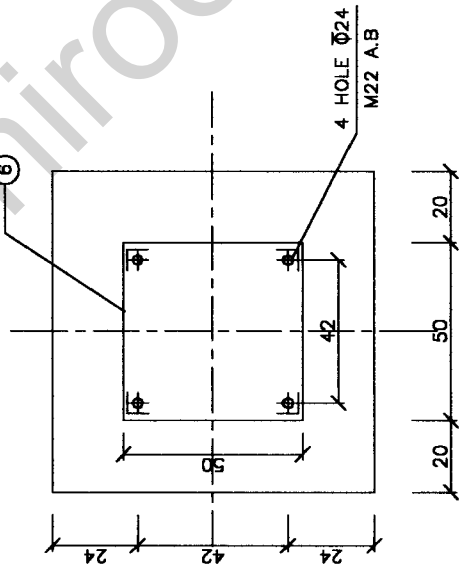


DETAIL "A"

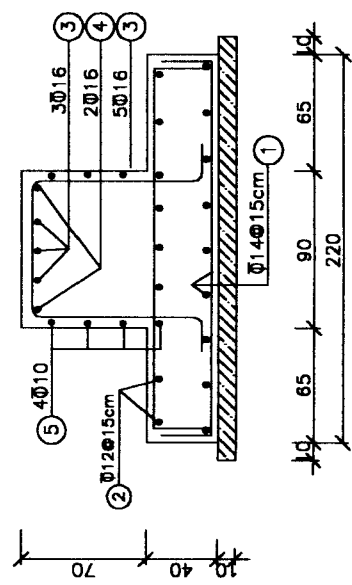
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ANCHOR BOLT DETAIL



DETAIL A

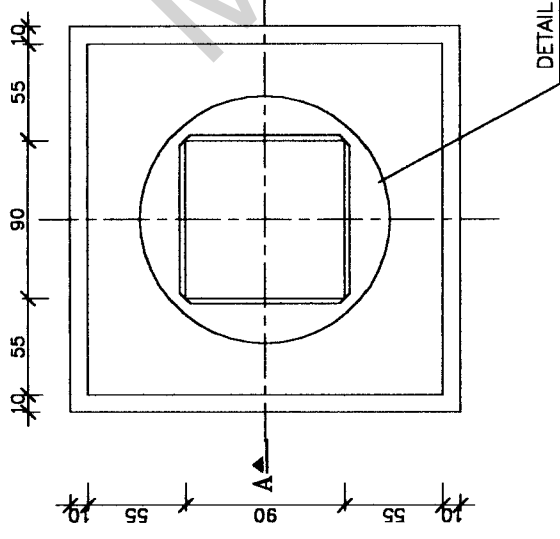


SECTION A-A

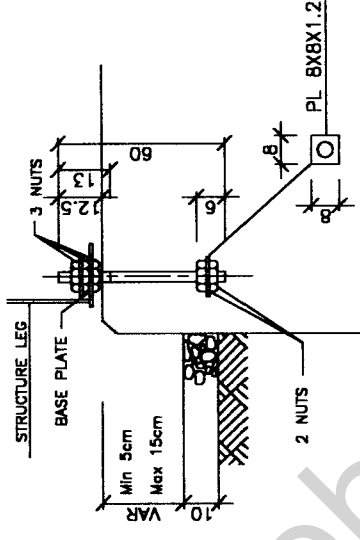
POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1	26 210 26	30	2.6			78	
2	26 210 26	30	2.5		75		
3	100 80 30 100 30 100 30 100 30	8	3.3			26.4	
4	10 10	2	1			2	
5	30 30 30 30 30 30 30 30 30 30	4	3.32	13.28			
6	PL 500x500x15	1					0.00375
total length				13.28	75	106.4	0.00375
unit weight				0.617	0.868	1.208	7855
total weight				8.2	66.6	128.5	29.45
W =				232.75		kg	
B-300 Concrete				2.503		m ³	
B-100 Concrete				0.576		m ³	

NOTE:

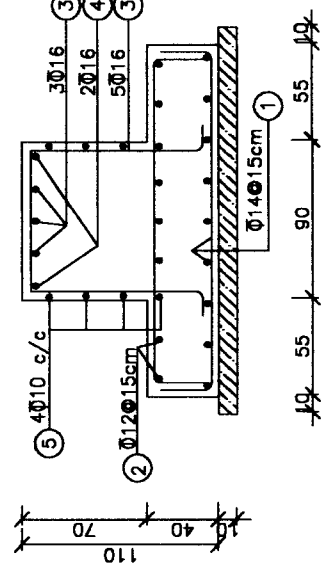
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



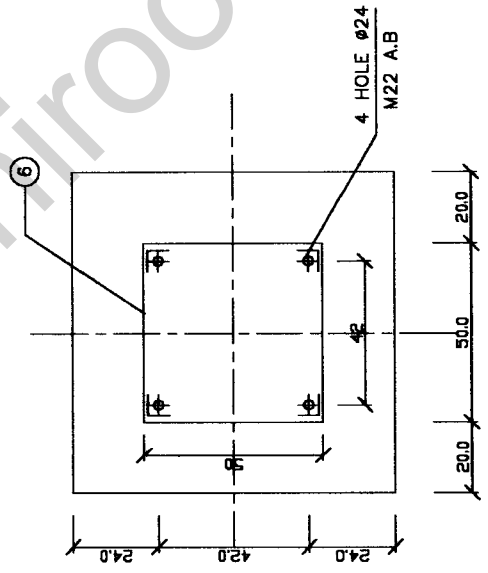
PLAN



ANCHOR BOLT DETAIL



SECTION A-A



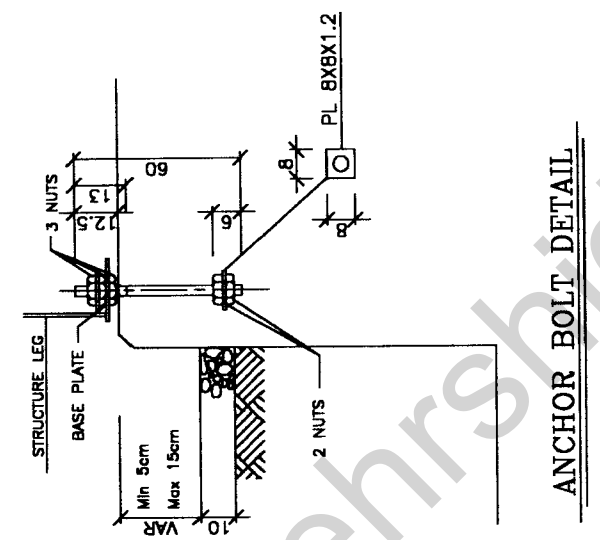
DETAIL A

POS	FORM	NO.	LENGTH m	Φ10	Φ12	Φ14	PL15 m ²	
1		28	2.4			67.2		
2		28	2.3		64.4			
3		8	3.3			26.4		
4		2	1			2		
5		4	3.32	13.28				
6	PL 300x500x15	1					0.00375	
		total length		13.28	64.4	95.6	0.00375	
		unit weight		0.617	0.888	1.208	7855	
		total weight		8.2	57.18	115.5	29.45	
		W =	210.33					kg
		B-300 Concrete	: 2.167					m ³
		B-100 Concrete	: 0.484					m ³

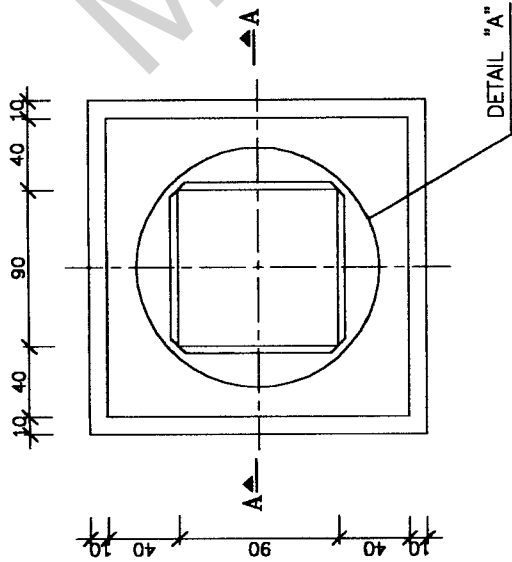
NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN CM
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1		24	2.1			50.4	
2		24	2		48		
3		8	3.3			26.4	
4		2	1			2	
5		4	3.32	13.28			
6	PL 500x500x15	1					0.00375
total length				13.28	48	78.8	0.00375
unit weight				0.617	0.888	1.208	7855
total weight				8.2	42.62	95.2	29.45
W =				175.47		kg	
B-300 Concrete				1.723		m ³	
B-100 Concrete				0.361		m ³	

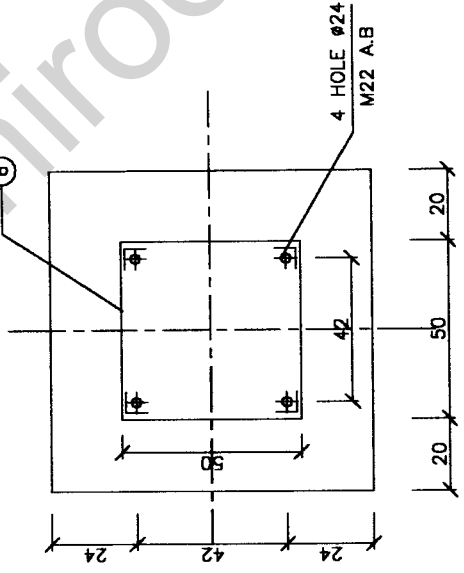


ANCHOR BOLT DETAIL

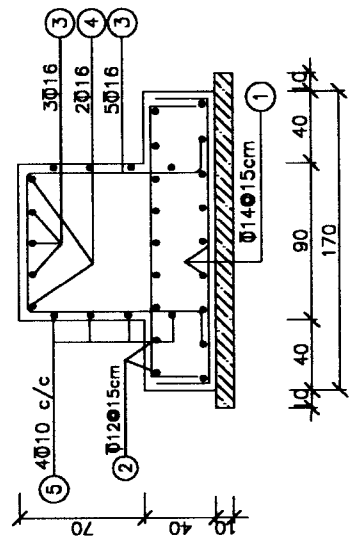


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DETAIL A



SECTION A-A

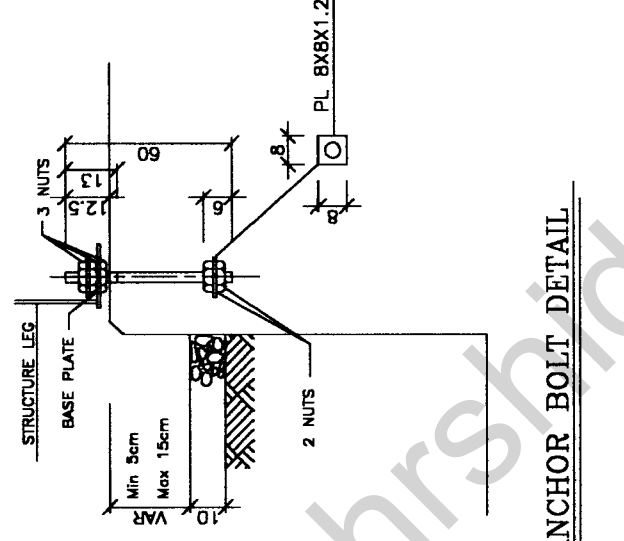
NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

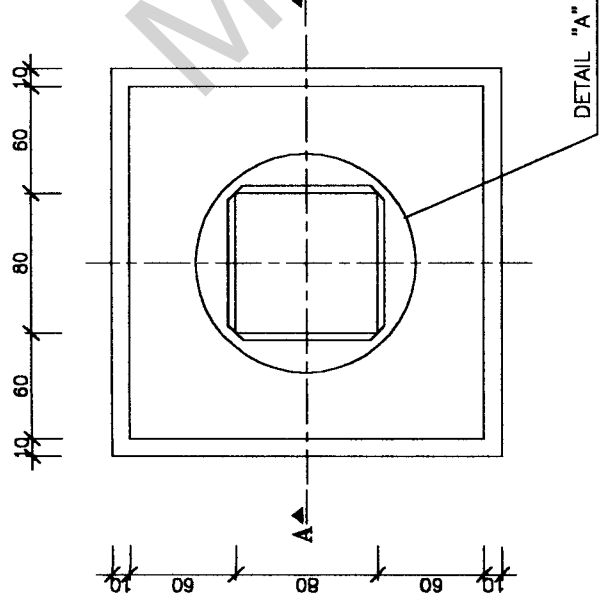
230 KV SUBSTATION
C.T FOUNDATION
FORMWORK AND REINFORCEMENT
 $q_a=2 \text{ Kg/Cm}^2$

P : *unio*

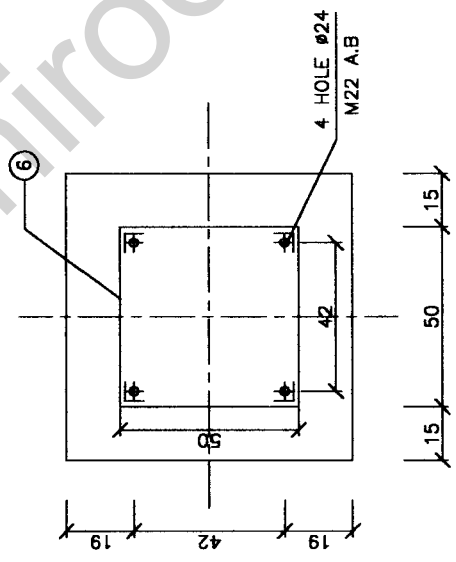
POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1	25 180 25	26	2.4			62.4	
2	30 180 30	26	2.3		59.8		
3	100 70 100 25 25	8	3.2		25.6		
4	10 70 10	2	0.9		1.8		
5	70 70 70	4	2.92	11.68			
6	PL 500x500x15	1					0.00375
total length				11.68	59.8	89.8	0.00375
unit weight				0.617	0.888	1.208	7855
total weight				7.2	53.1	108.47	29.45
W =				198.22			kg
B-300 Concrete				2.048			m ³
B-100 Concrete				0.484			m ³



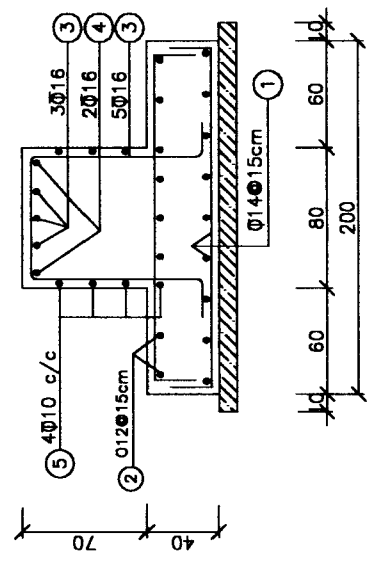
ANCHOR BOLT DETAIL



PLAN



DETAIL A

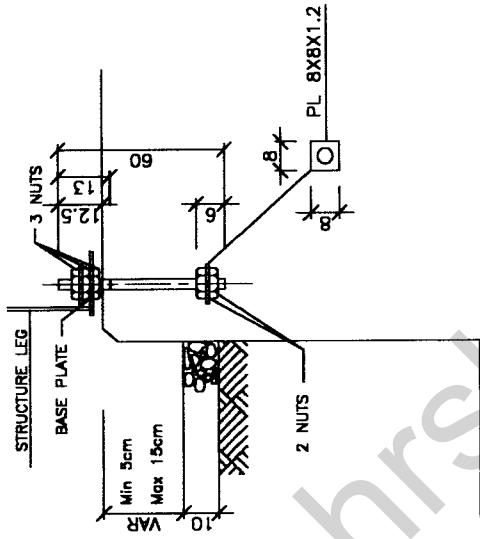


SECTION A-A

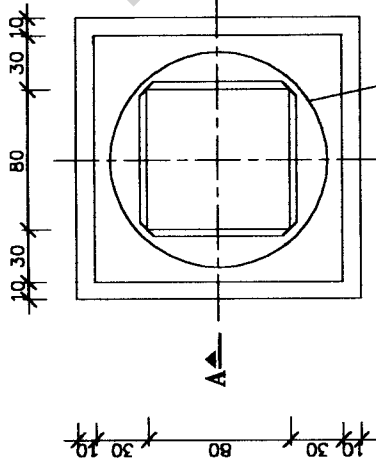
NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

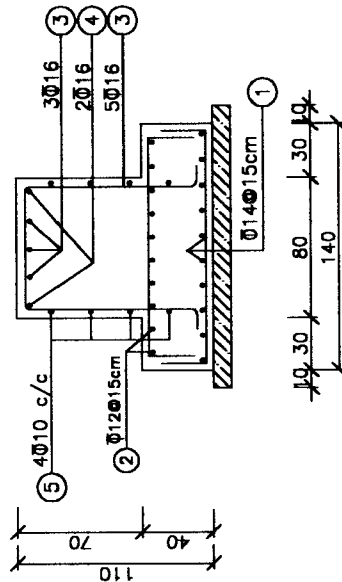
POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1	25 130	20	1.8			36	
2	20 130	20	1.7		34		
3	100 70 25 25	8	3.2			25.6	
4	70 16	2	0.9			1.8	
5	70 9 20	4	2.92	11.68			
6	PL 500x500x15	1					0.00375
total length				11.68	34	63.4	0.00375
unit weight				0.617	0.888	1.208	7855
total weight				7.2	30.2	76.08	29.45
W =				142.5			kg
B-300 Concrete				1.232			m ³
B-100 Concrete				0.256			m ³



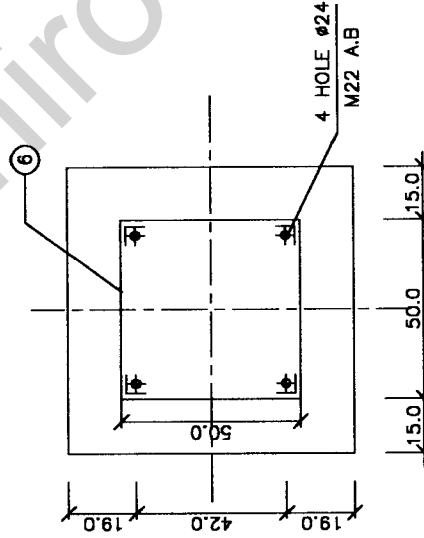
ANCHOR BOLT DETAIL



PLAN



SECTION A-A

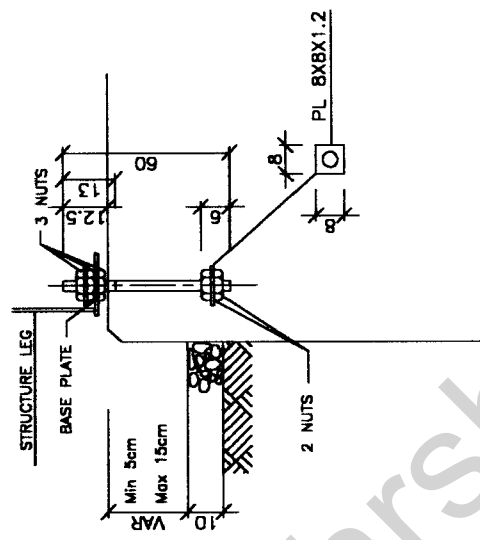


DETAIL A

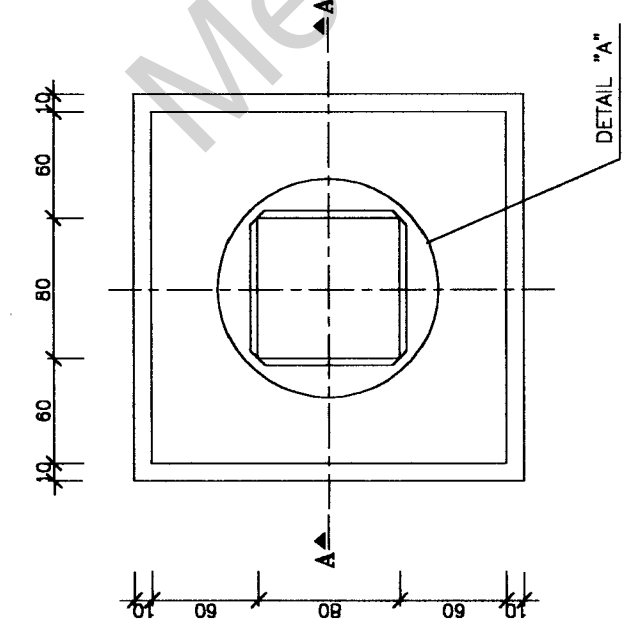
NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

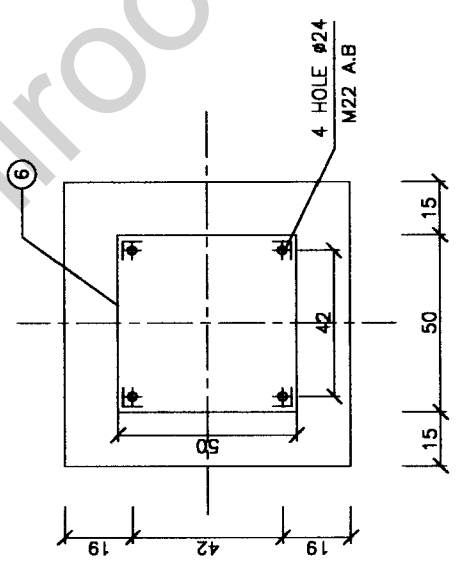
230 KV SUBSTATION
C.V.T FOUNDATION
FORMWORK AND REINFORCEMENT
90=2 Kg/Cm²



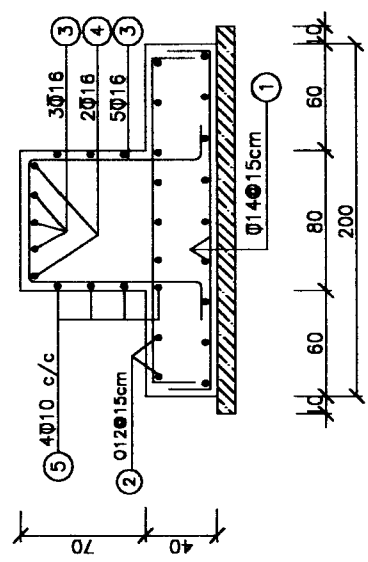
ANCHOR BOLT DETAIL



PLAN



DETAIL A



SECTION A-A

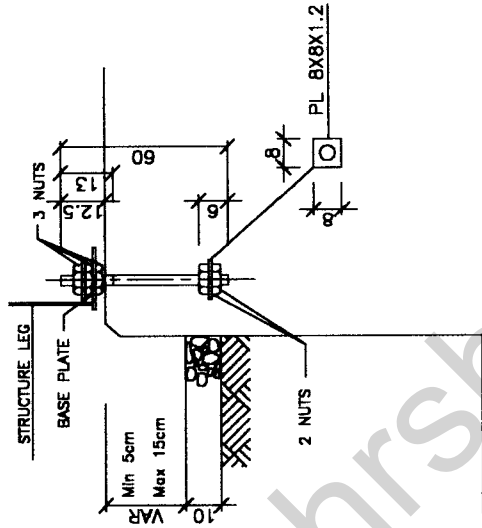
POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1	190 25	26	2.4			62.4	
2	190 20	26	2.3		59.8		
3	100 70 100 20	8	3.2			25.6	
4	70 10	2	0.9			1.8	
5	70 70 70	4	2.92	11.68			
6	PL 500x500x15	1					0.00375
		total length		11.68	59.8	89.8	0.00375
		unit weight		0.617	0.888	1.208	7855
		total weight		7.2	53.1	108.47	29.45
		W =		198.22		kg	
		B-300 Concrete		2.048		m ³	
		B-100 Concrete		0.484		m ³	

NOTE:

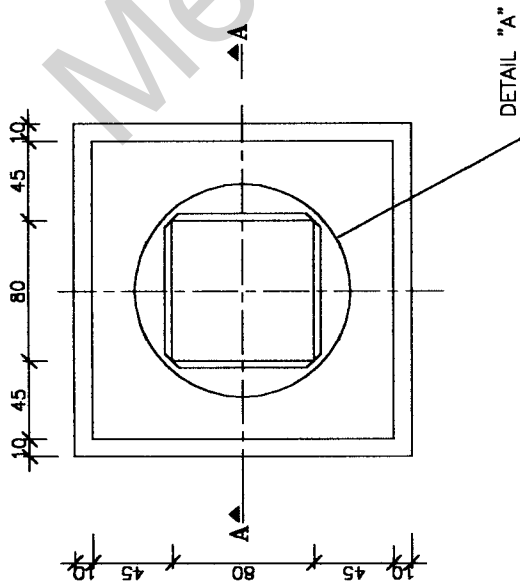
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

230 KV SUBSTATION
P.I FOUNDATION
FORMWORK AND REINFORCEMENT
qa=0.5 Kg/Cm²
Y : *axis*

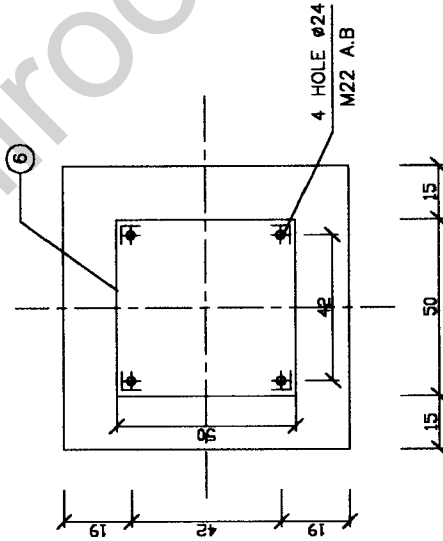
POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1		24	2.1			50.4	
2		24	2		48		
3		8	3.2			25.6	
4		2	0.9			1.8	
5		4	2.92	11.68			
6	PL 500x500x15	1					0.00375
total length				11.68	48	77.8	0.00375
unit weight				0.617	0.888	1.208	7855
total weight				7.2	42.62	94	29.45
W =				173.94			kg
B-300 Concrete				1.604			m ³
B-100 Concrete				0.361			m ³



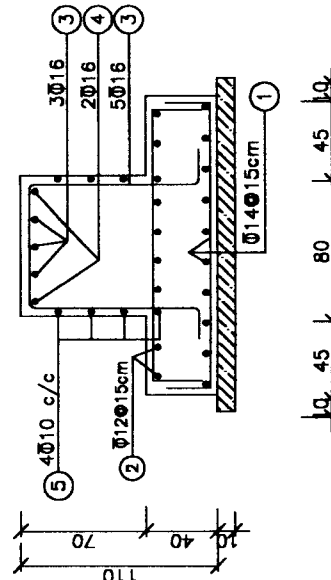
ANCHOR BOLT DETAIL



PLAN



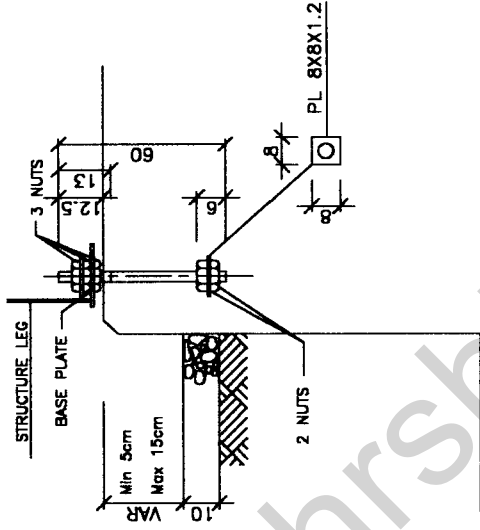
DETAIL A



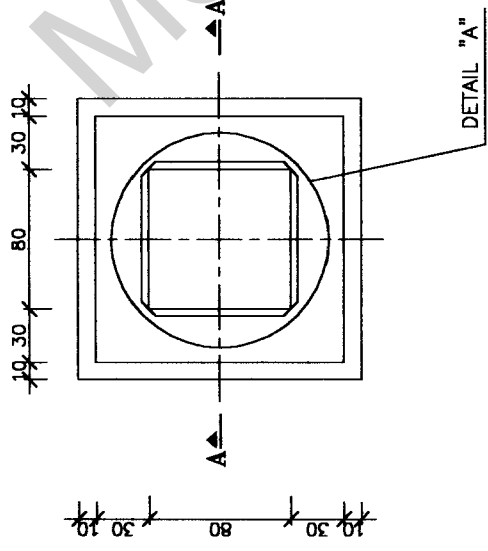
SECTION A-A

NOTE:

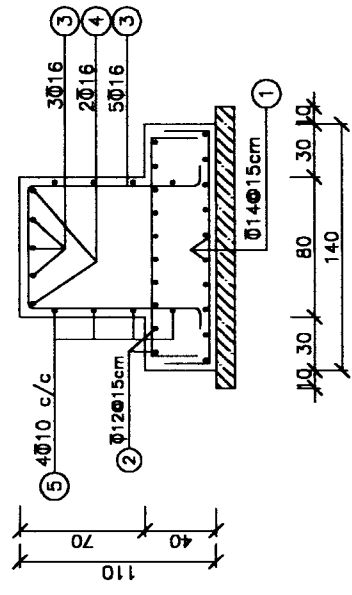
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN CM
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



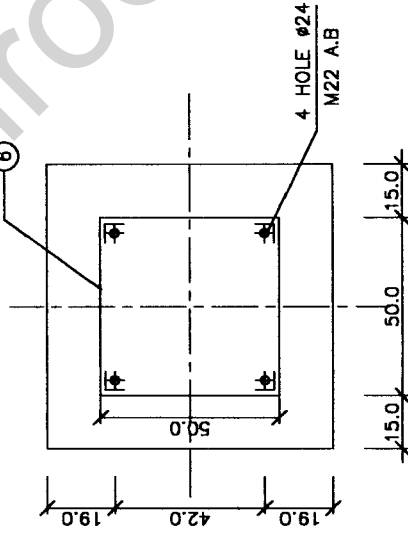
ANCHOR BOLT DETAIL



PLAN



SECTION A-A



DETAIL A

POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1		20	1.8			36	
2		20	1.7		34		
3		8	3.2			25.6	
4		2	0.9			1.8	
5		4	2.92	11.68			
6	PL 500x500x15	1					0.00375
total length				11.68	34	63.4	0.00375
unit weight				0.617	0.888	1.208	7855
total weight				7.2	30.2	76.6	29.45
W =				143.98		kg	
				B-300 Concrete : 1.232		m³	
				B-100 Concrete : 0.256		m³	

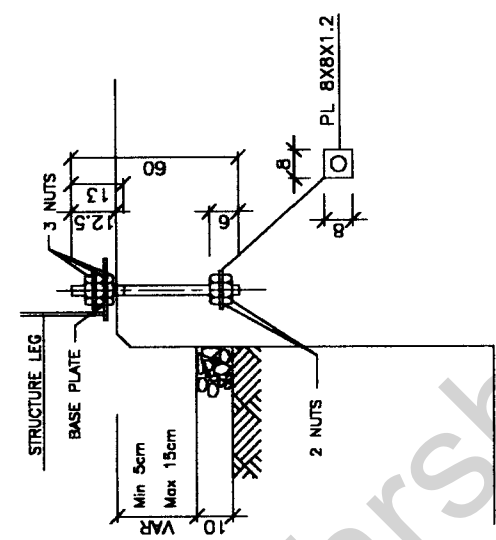
NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

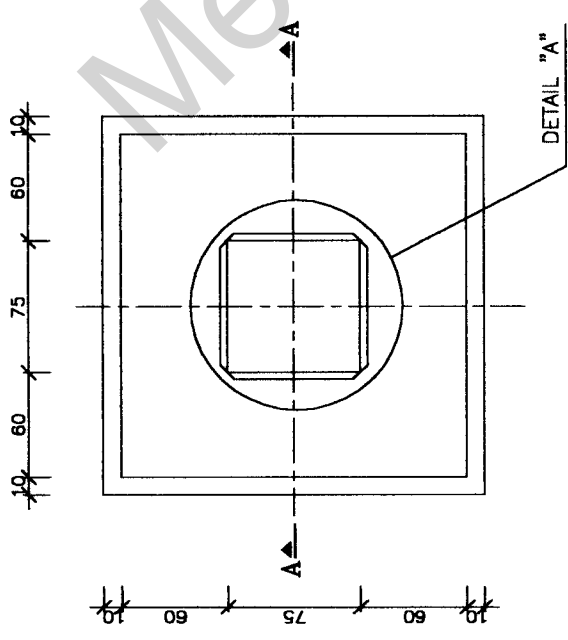
230 KV SUBSTATION
C.V.T FOUNDATION
FORMWORK AND REINFORCEMENT
qa=2 Kg/Cm²

1 : scale

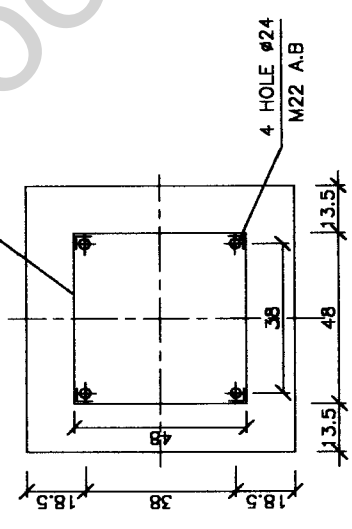
POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1		26	2.35			61.1	
2		26	2.25		58.5		
3		8	3.15			25.2	
4		2	0.85			1.7	
5		4	2.72	10.88			
6	PL 480x480x15	1					0.0034
total length				10.88	58.5	88	0.0034
unit weight				0.617	0.888	1.208	7855
total weight				6.71	51.95	106.3	26.7
W =				191.66		kg	
B-300 Concrete				1.915		m ³	
B-100 Concrete				0.462		m ³	



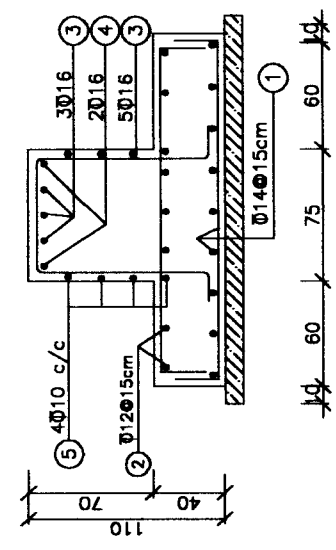
ANCHOR BOLT DETAIL



PLAN



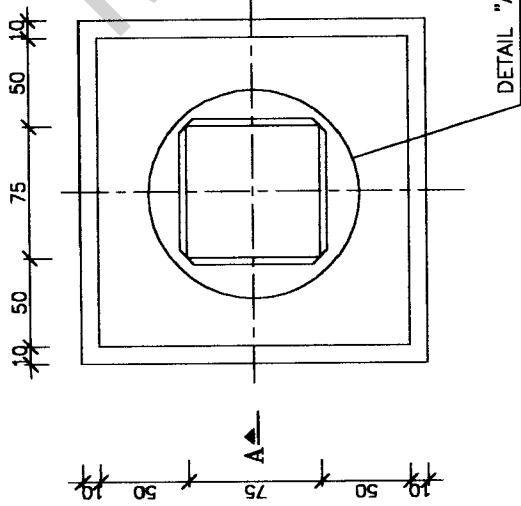
DETAIL A



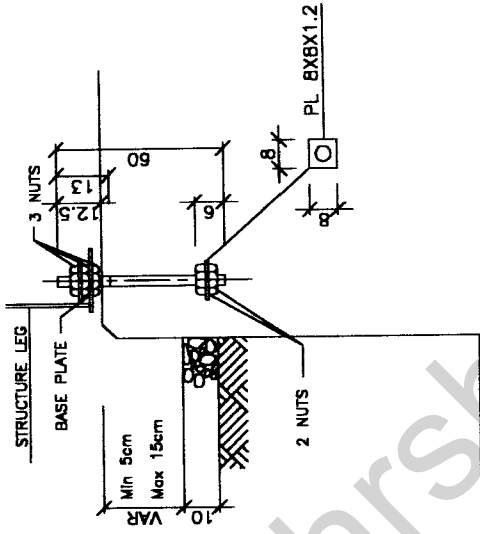
SECTION A-A

NOTE:

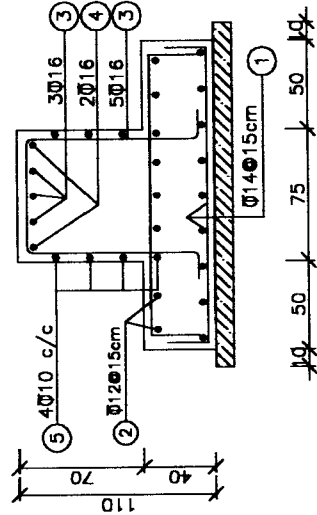
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



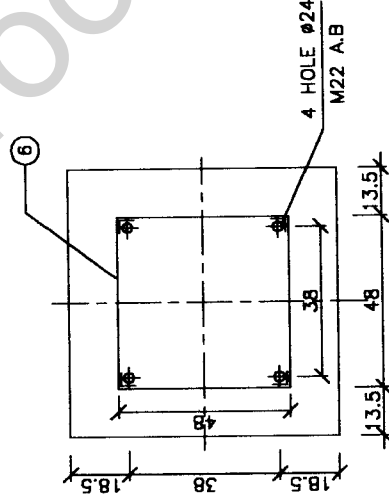
PLAN



ANCHOR BOLT DETAIL



SECTION A-A



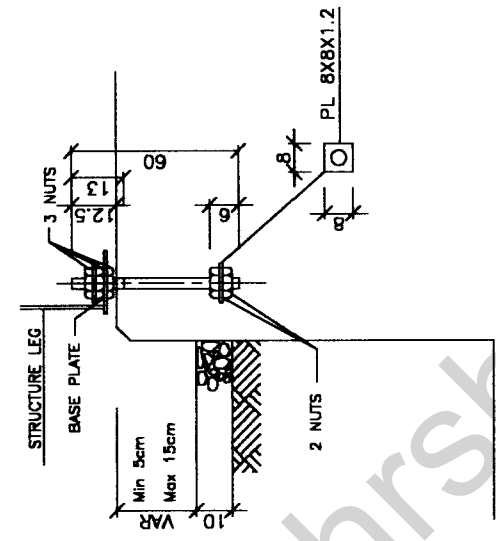
DETAIL A

POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1	20' 100' 20'	24	2.15			51.6	
2	20' 100' 20'	24	2.05	49.2			
3	100' 100' 100' 100'	8	3.15			25.2	
4	10' 10' 10'	2	0.85			1.7	
5	10' 10' 10' 10'	4	2.72	10.88			
6	PL 480x480x15	1					0.0034
total length				10.88	49.2	78.5	0.0034
unit weight				0.617	0.888	1.208	7855
total weight				6.71	43.6	94.83	26.7
W =				171.84			kg
B-300 Concrete				1.618			m ³
B-100 Concrete				0.38			m ³

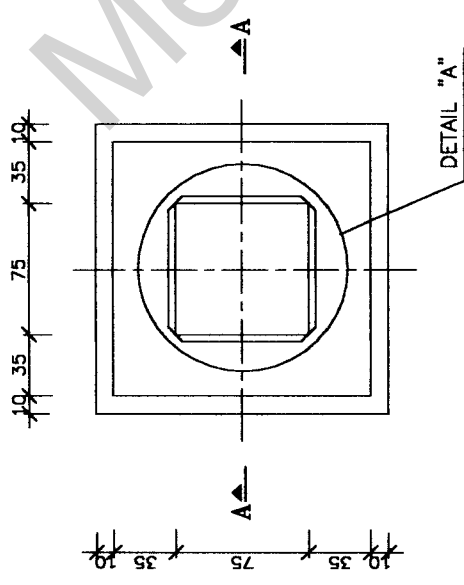
NOTE:

- FOUNDATION CONCRETE GRADE B-300
- LEAN CONCRETE GRADE B-100
- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- ALL DIMENSIONS IN cm
- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- CONCRETE COVER IS 5cm
- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

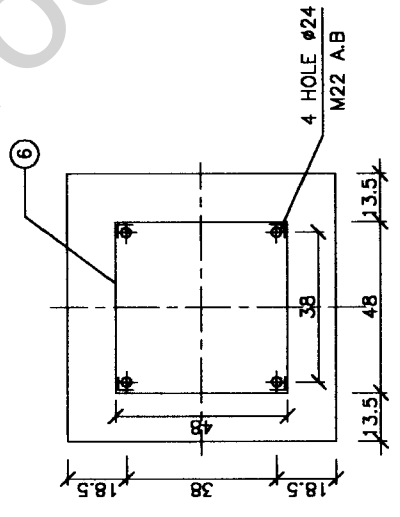
POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14	PL15 m ²
1		20	1.85			37	
2		20	1.75		35		
3		8	3.15			25.2	
4		2	0.85			1.7	
5		4	2.72	10.88			
6	PL 480x480x15	1					0.0034
		total length		10.88	35	63.9	0.0034
		unit weight		0.617	0.888	1.208	7855
		total weight		6.71	31.08	77.2	26.7
		W =		141.69		kg	
		B-300 Concrete	:	1.235		m³	
		B-100 Concrete	:	0.272		m³	



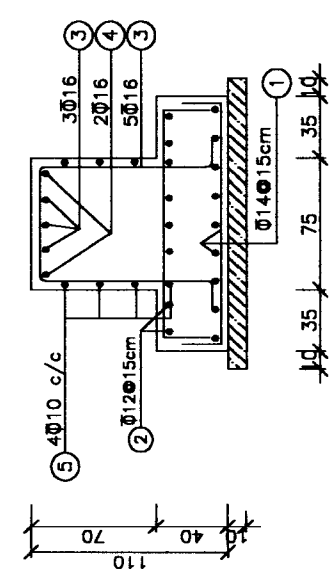
ANCHOR BOLT DETAIL



PLAN



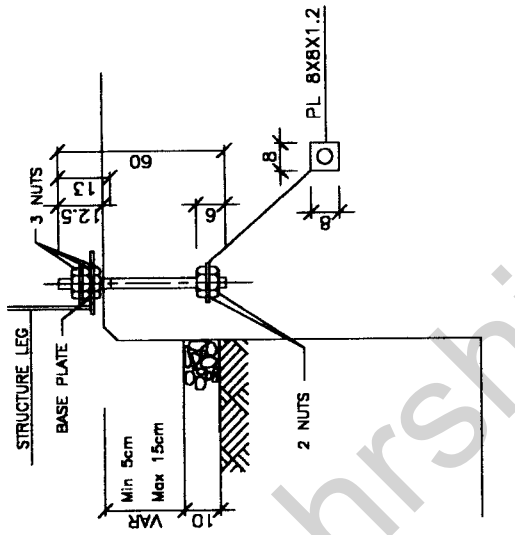
DETAIL A



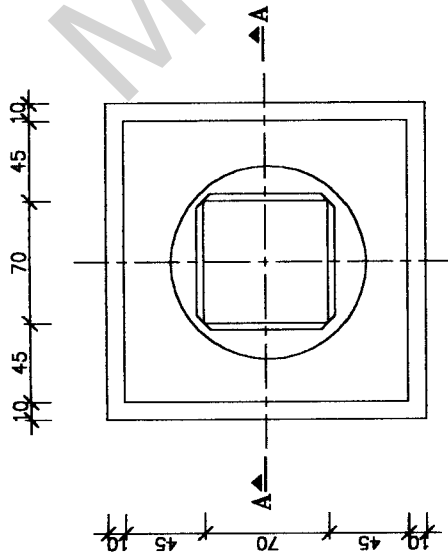
SECTION A-A

NOTE:

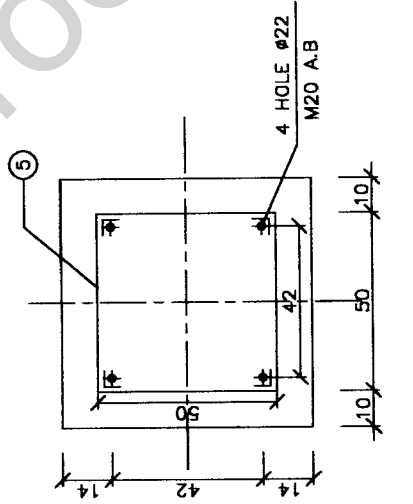
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN CM
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



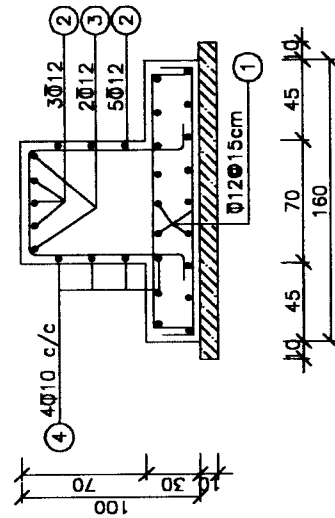
ANCHOR BOLT DETAIL



PLAN



DETAIL A

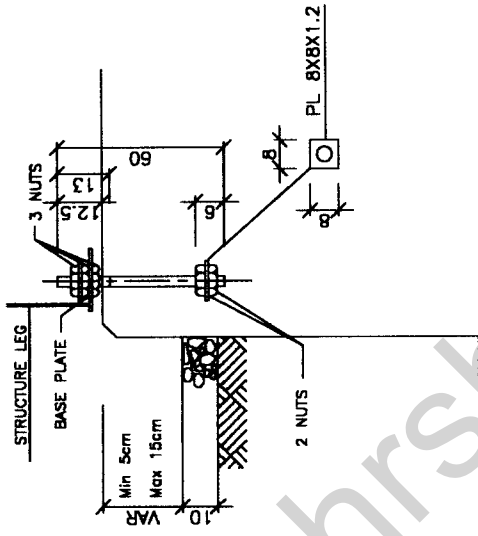


SECTION A-A

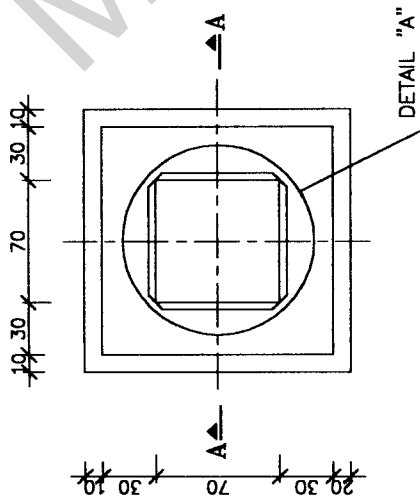
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²
1	20' $\frac{150}{20}$	44	1.9		83.6	
2	80' $\frac{80}{20}$	8	2.8		22.8	
3	10' $\frac{80}{10}$	2	0.8		1.6	
4	80' $\frac{80}{20}$	4	2.5	10.08		
5	PL 500x500x15	1				0.00375
6						
total length				10.08	108	0.00375
unit weight				0.617	0.888	7855
total weight				6.21	95.9	29.45
W =				131.56		kg
B-300 Concrete :				1.111		m ³
B-100 Concrete :				0.324		m ³

NOTE:

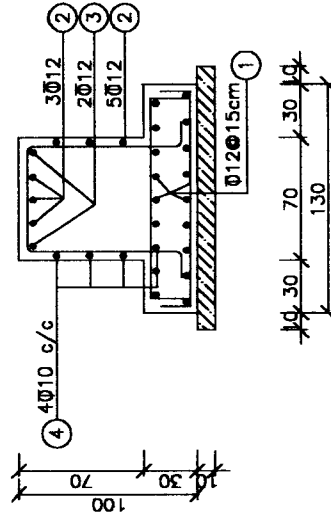
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



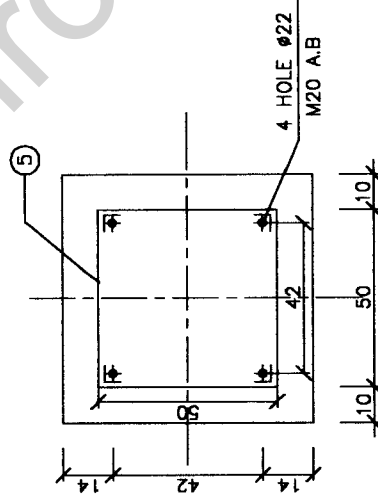
ANCHOR BOLT DETAIL



PLAN



SECTION A-A

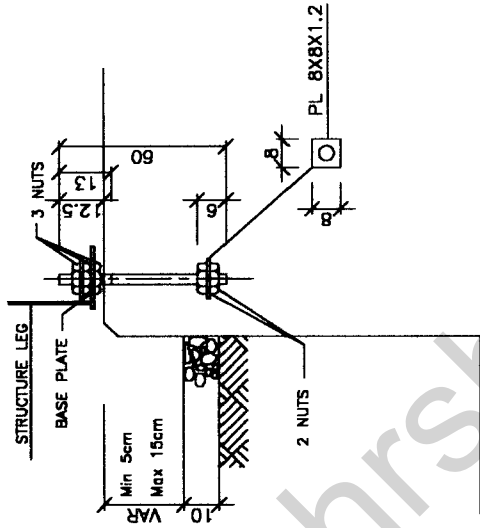


DETAIL A

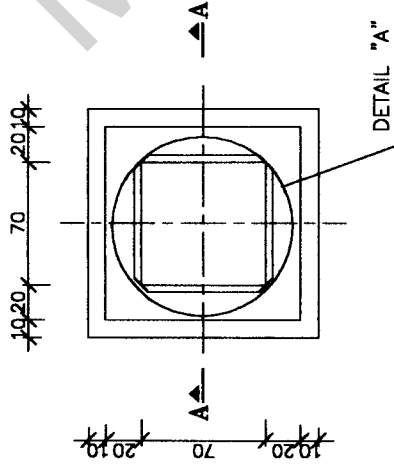
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²	-
1		36	1.6		57.6		
2		8	2.8		22.8		
3		2	0.8		1.6		
4		4	2.52	10.08			
5	PL 500x500x15	1				0.00375	
6							
		total length		10.08	82	0.00375	
		unit weight		0.617	0.888	7855	
		total weight		6.21	72.81	29.45	
W =				108.47		kg	
		B-300 Concrete :		0.85		m³	
		B-100 Concrete :		0.225		m³	

NOTE:

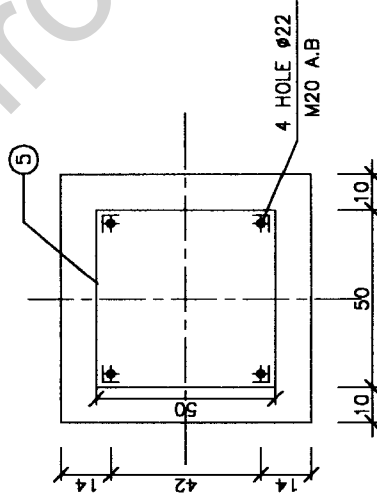
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



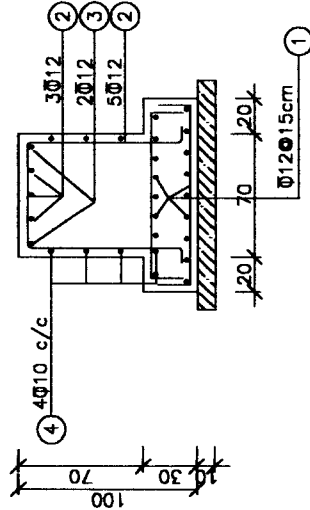
ANCHOR BOLT DETAIL



PLAN



DETAIL A

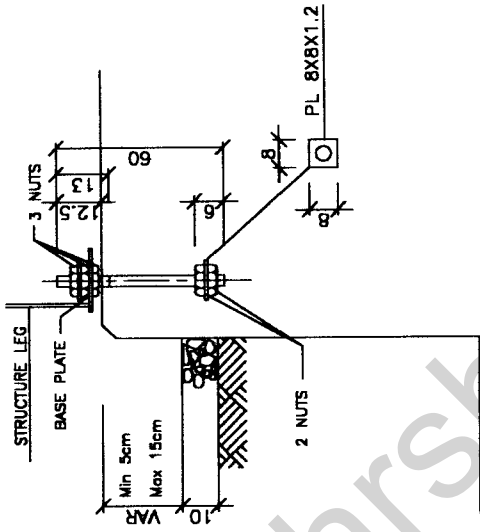


SECTION A-A

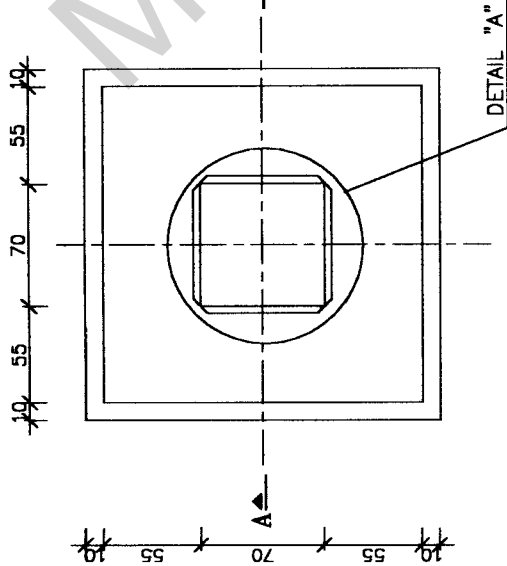
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²
1		32	1.4		44.8	
2		8	2.8		22.8	
3		2	0.8		1.6	
4		4		10.08		
5	PL 500x500x15	1				0.00375
6						
		total length		10.08	59.2	0.00375
		unit weight		0.617	0.888	7855
		total weight		6.21	61.45	29.45
W =				97.11		kg
		B-300 Concrete			0.706	m³
		B-100 Concrete			0.169	m³

NOTE:

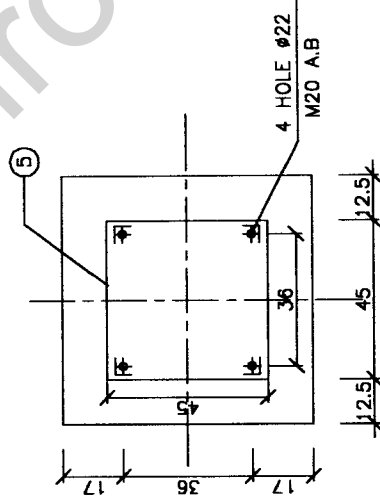
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



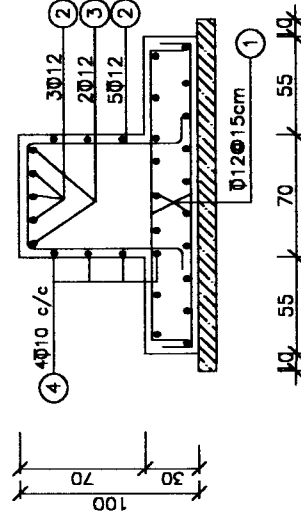
ANCHOR BOLT DETAIL



PLAN



DETAIL A

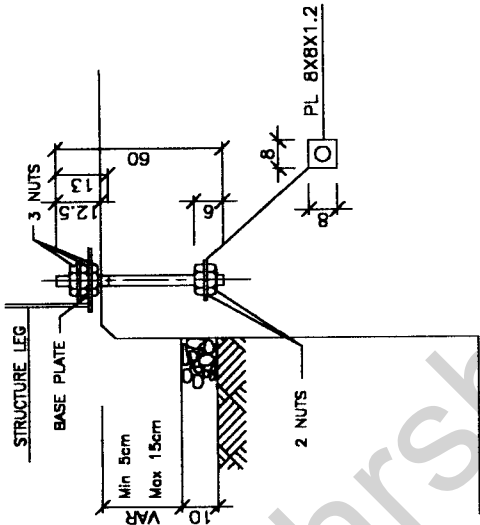


SECTION A-A

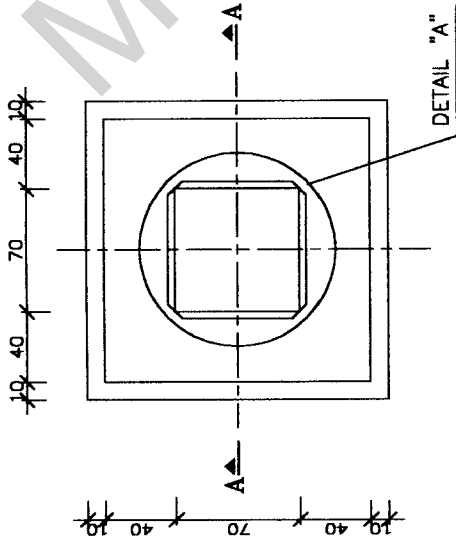
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²	-
1		48	2.1		100.8		
2		8	2.8		22.8		
3		2	0.8		1.6		
4		4	2.52	10.08			
5	PL 450x450x15	1				0.003	
6							
		total length		10.08	125.2	0.003	
		unit weight		0.617	0.888	7855	
		total weight		6.21	111.17	23.86	
		W =		141.24			kg
		B-300 Concrete		1.315			m ³
		B-100 Concrete		0.4			m ³

NOTE:

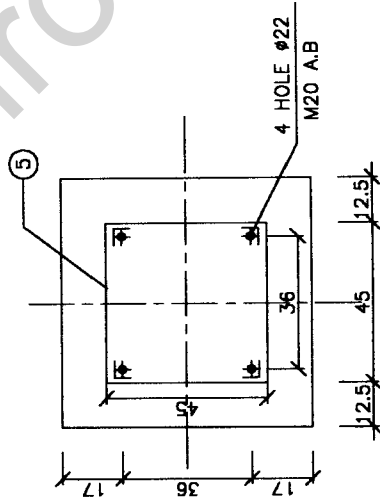
- FOUNDATION CONCRETE GRADE B-300
- LEAN CONCRETE GRADE B-100
- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- ALL DIMENSIONS IN CM
- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- CONCRETE COVER IS 5cm
- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



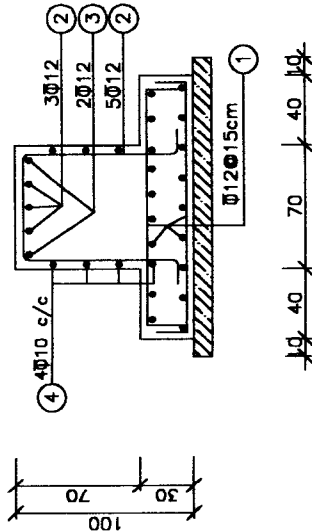
ANCHOR BOLT DETAIL



PLAN



DETAIL A

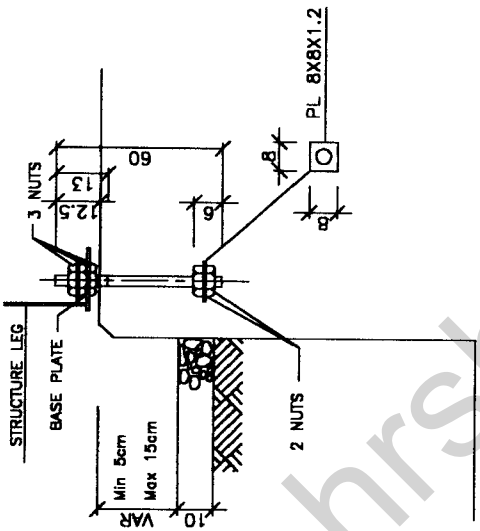


SECTION A-A

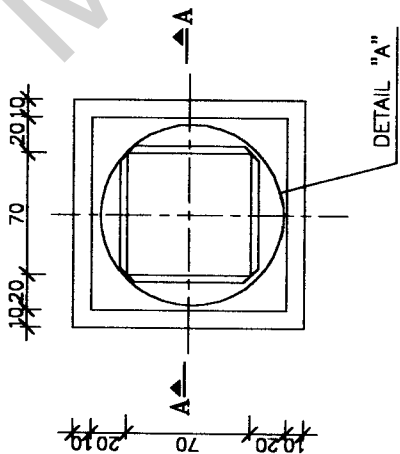
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²
1		40	1.8		72	
2		8	2.8		22.8	
3		2	0.8		1.6	
4		4	2.25	10.08		
5	PL 450x450x15	1				0.003
6						
		total length		10.08	96.4	0.003
		unit weight		0.617	0.888	7855
		total weight		6.21	85.6	23.86
		W =		115.67		kg
		B-300 Concrete		: 1.018		m ³
		B-100 Concrete		: 0.289		m ³

NOTE:

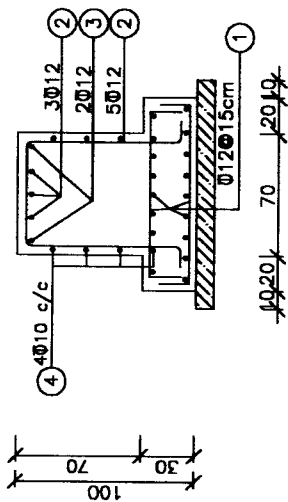
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



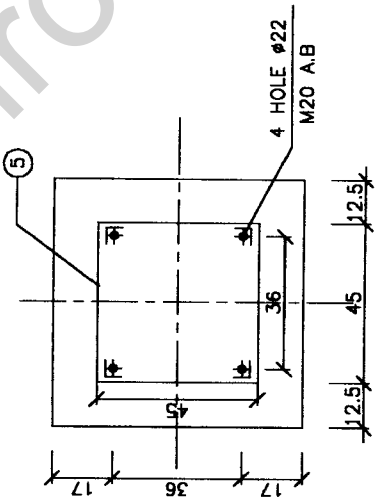
ANCHOR BOLT DETAIL



PLAN



SECTION A-A

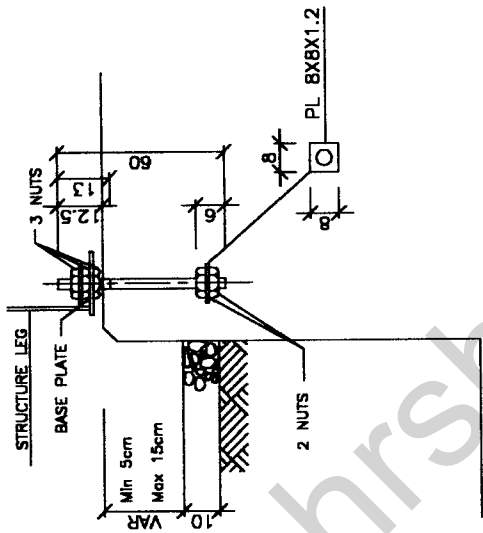


DETAIL A

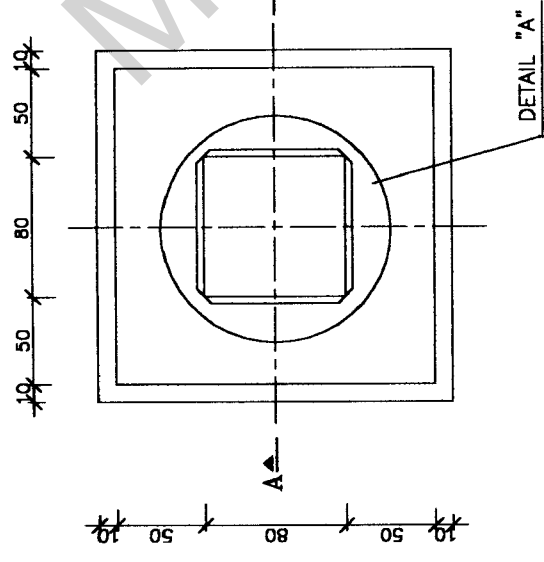
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²	-
1		32	1.4		44.8		
2		8	2.8		22.8		
3		2	0.8		1.6		
4		4	2.25	10.08			
5	PL 450x450x15	1				0.003	
6							
		total length		10.08	69.2	0.003	
		unit weight		0.617	0.888	7855	
		total weight		6.21	61.45	23.86	
		W =		91.52		kg	
		B-300 Concrete	: 0.706		m³		
		B-100 Concrete	: 0.169		m³		

NOTE:

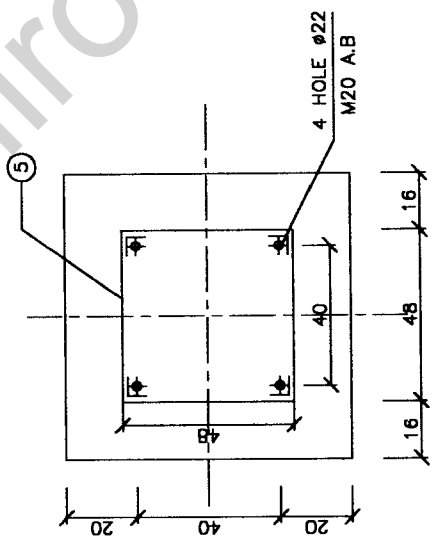
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



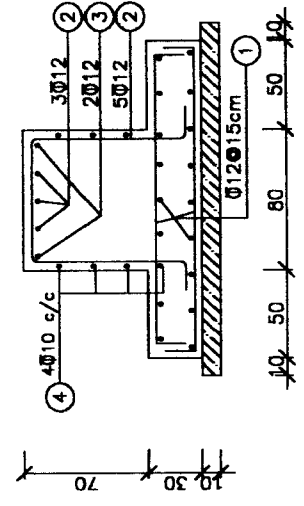
ANCHOR BOLT DETAIL



PLAN



DETAIL A

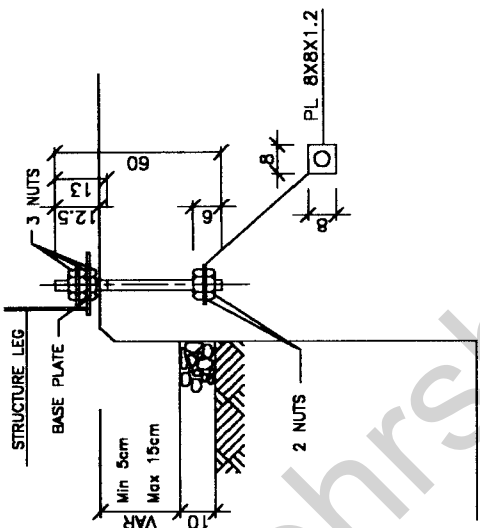


SECTION A-A

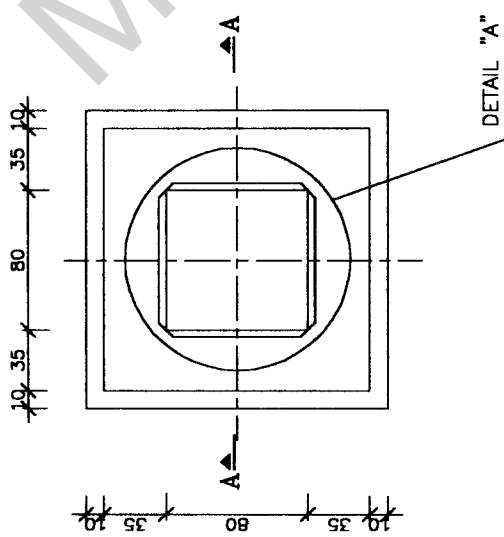
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²
1		48	2.1		100.8	
2		8	2.9		23.2	
3		2	0.8		1.8	
4		4	2.92	11.68		
5	PL 480x480x15	1				0.0034
6						
total length				11.68	125.8	0.0034
unit weight				0.617	0.888	7855
total weight				7.2	111.79	26.7
W =				145.61	kg	
B-300 Concrete		:		1.42	m ³	
B-100 Concrete		:		0.4	m ³	

NOTE:

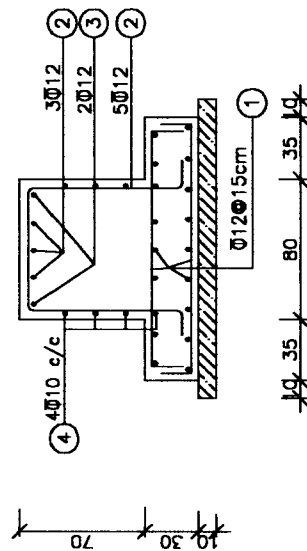
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



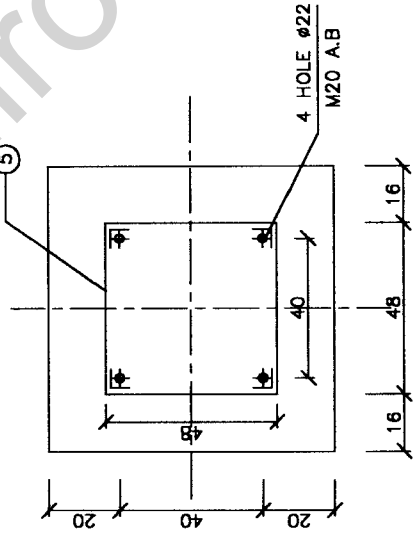
ANCHOR BOLT DETAIL



PLAN



SECTION A-A

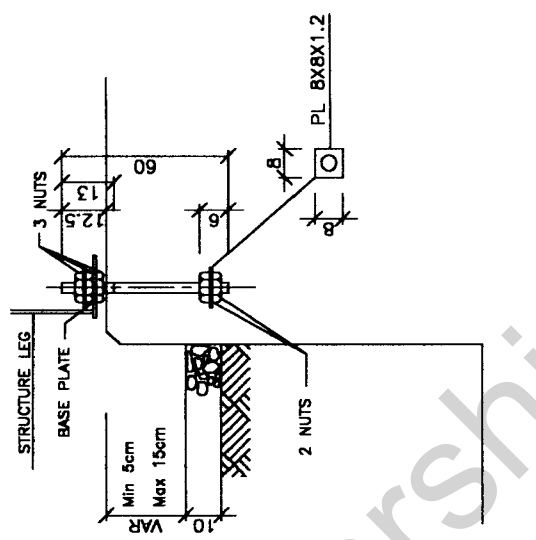


DETAIL A

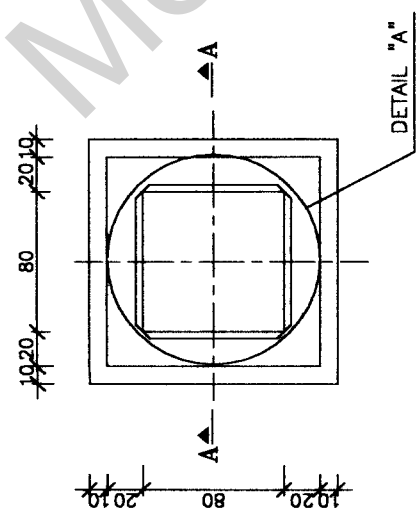
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²
1		40	1.9		76	
2		8	2.9		23.2	
3		2	0.9		1.8	
4		4	2.92	11.68		
5	PL 480x480x15	1				0.0034
6						
		total length		11.68	101	0.0034
		unit weight		0.617	0.888	7855
		total weight		7.2	89.69	26.7
		W =		123.56		kg
		B-300 Concrete :		1.123		m³
		B-100 Concrete :		0.289		m³

NOTE:

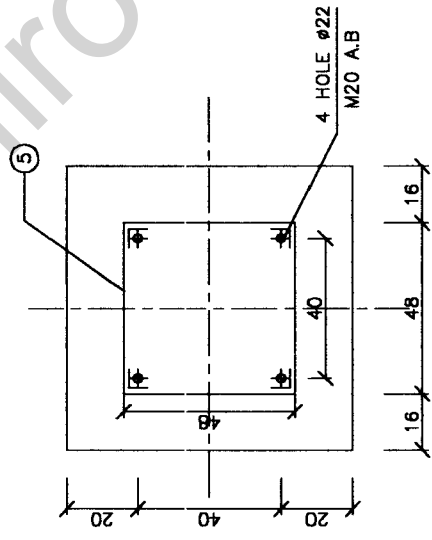
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN CM
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



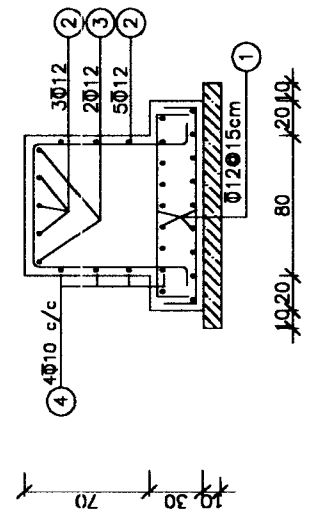
ANCHOR BOLT DETAIL



PLAN



DETAIL A

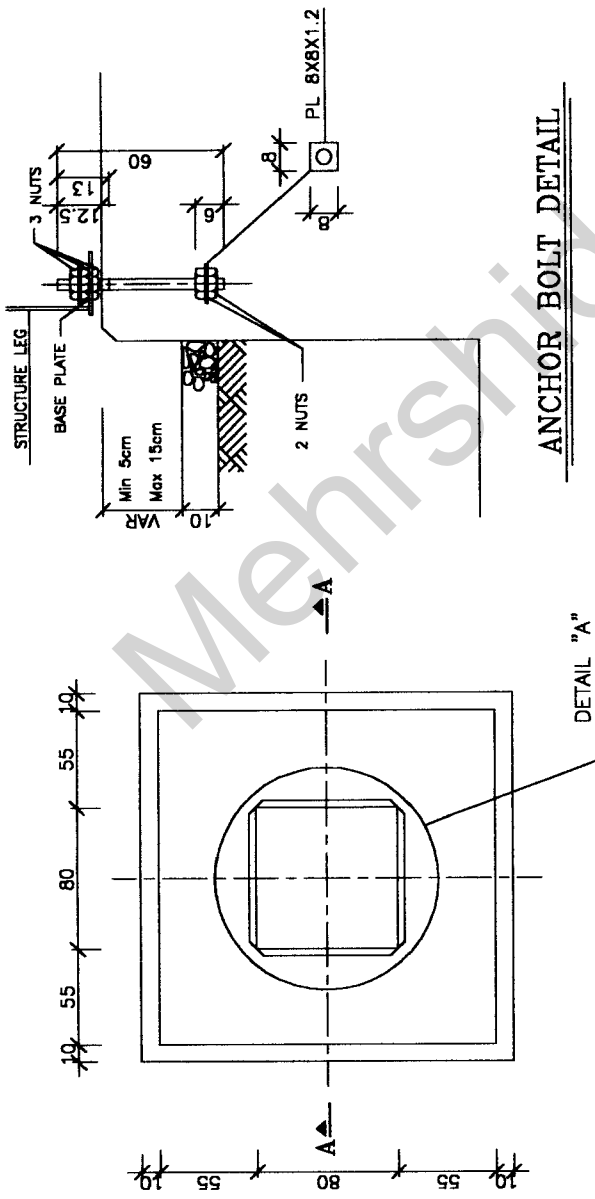


SECTION A-A

POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²	-
1		32	1.5		48		
2		8	2.9		23.2		
3		2	0.9		1.8		
4		4	2.92	11.68			
5	PL 480x480x15	1				0.0034	
6							
total length				11.68	73	0.0034	
unit weight				0.617	0.888	7855	
total weight				7.2	64.82	26.7	
W =				98.72			kg
B-300 Concrete				0.88			m ³
B-100 Concrete				0.196			m ³

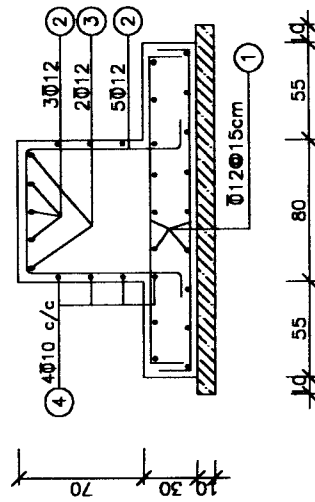
NOTE:

- 1- FOUNDATION CONCRET F GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN CM
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

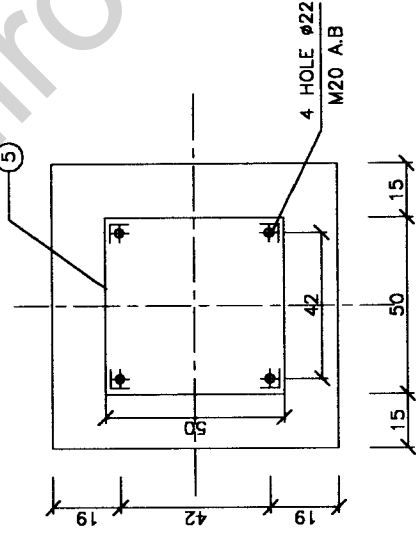


ANCHOR BOLT DETAIL

PLAN



SECTION A-A

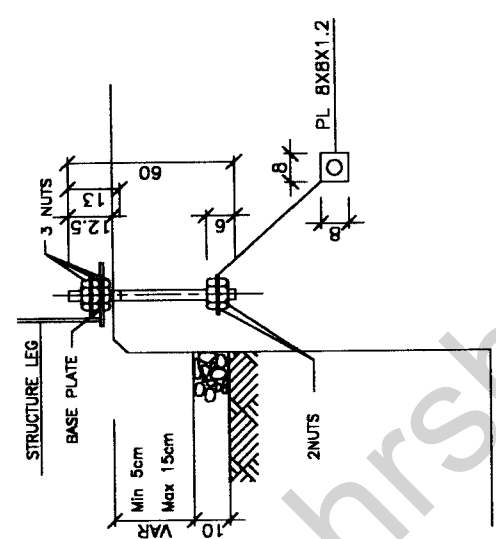


DETAIL A

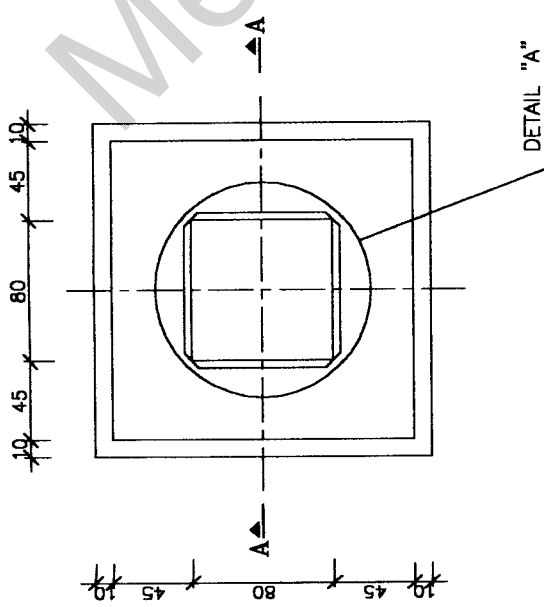
POS	FORM	NO.	LENGTH m	Φ10	Φ12	PL15 m ²
1		52	2.2		114.4	
2		8	2.9		23.2	
3		2	0.9		1.8	
4		4	2.92	11.68		
5	PL 500x500x15	1				0.00375
6						
		total length		11.68	139.4	0.00375
		unit weight		0.617	0.888	7855
		total weight		7.2	123.78	29.45
		W =	160.43			kg
		B-300 Concrete	: 1.531			m ³
		B-100 Concrete	: 0.441			m ³

NOTE:

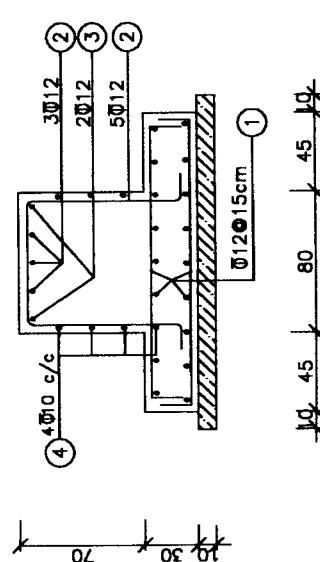
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



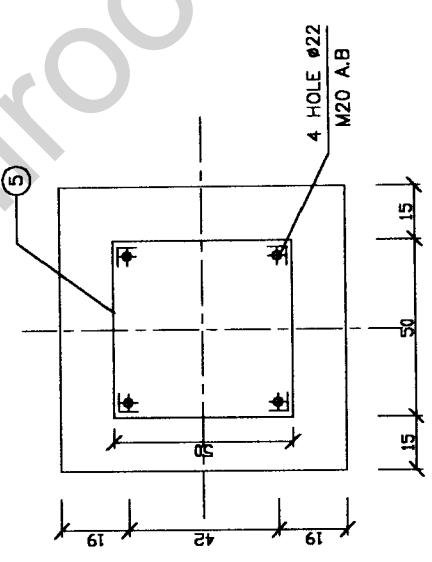
ANCHOR BOLT DETAIL



PLAN



SECTION A-A

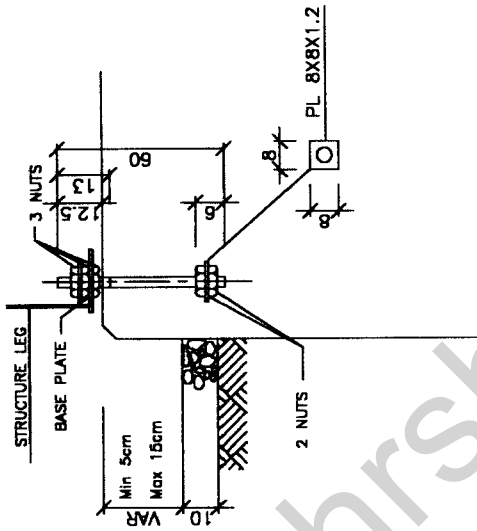


DETAIL A

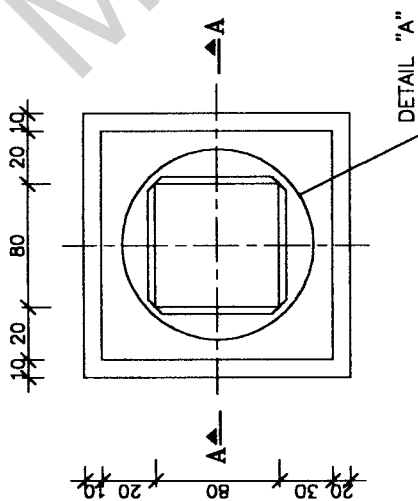
POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²
1		48	2	96		
2		8	2.9	23.2		
3		2	0.9	1.8		
4		4	2.92	11.68		
5	PL 500x800x15	1				0.00375
6						
total length				11.68	121	0.00375
unit weight				0.617	0.888	7855
total weight				7.2	107.45	29.45
W =				144.1		kg
B-300 Concrete				1.315		m ³
B-100 Concrete				0.361		m ³

NOTE:

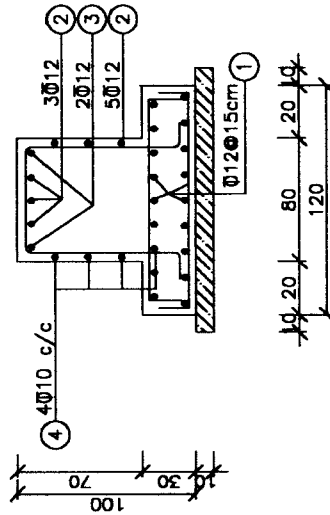
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



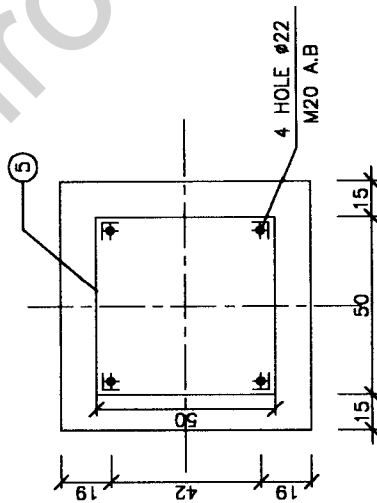
ANCHOR BOLT DETAIL



PLAN



SECTION A-A

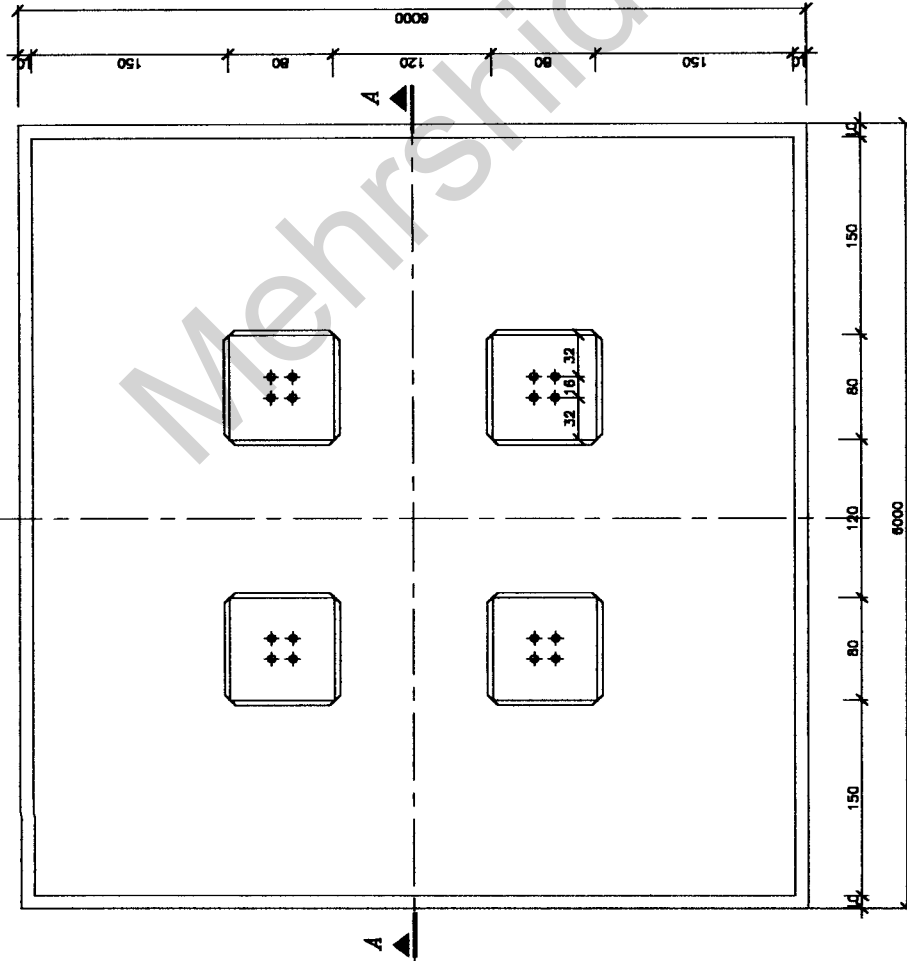


DETAIL A

POS	FORM	NO.	LENGTH m	Ø10	Ø12	PL15 m ²	-
1		32	1.5		48		
2		8	2.9		23.2		
3		2	0.9		1.8		
4		4	2.92	10.08			
5	PL 500x500x15	1				0.00375	
6							
		total length		11.68	73	0.00375	
		unit weight		0.617	0.888	7855	
		total weight		7.2	64.82	29.45	
		W =		98.72			kg
		B-300 Concrete :		0.88			m³
		B-100 Concrete :		0.196			m³

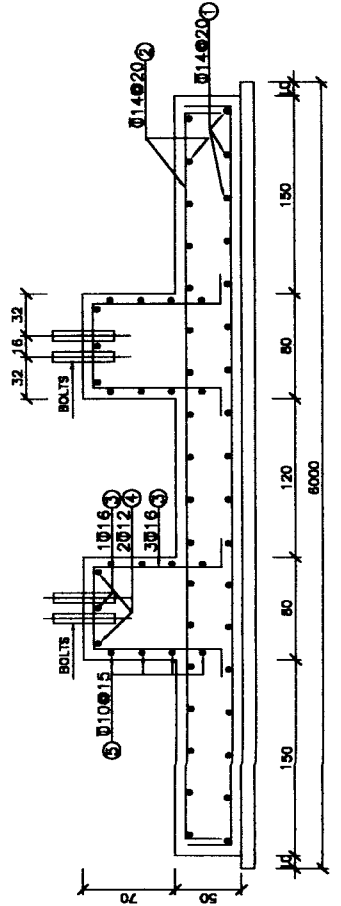
NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $f_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

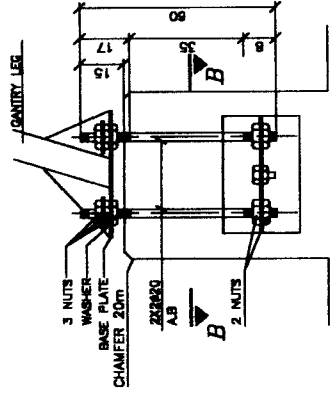


PLAN

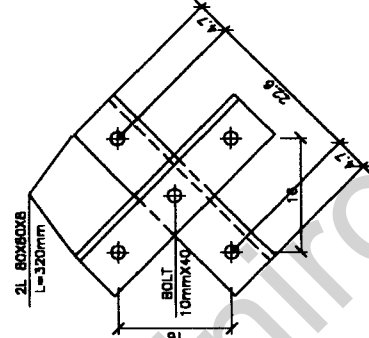
Sc=1/270



SECTION A-A



ANCHOR BOLT DETAIL



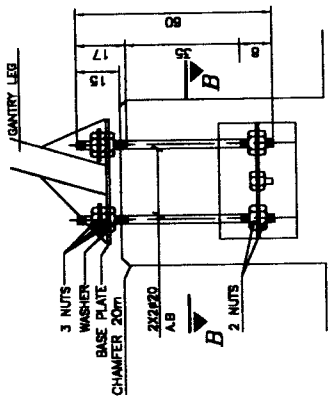
SECTION B-B

POS	FORM	NO.	LENGTH	Ø10	Ø12	Ø14
1		60	6.2			372
2		60	6.10			366
3		16	3.4			54.4
4		8	0.7		5.6	
5		16	3	48		
6						
total length				48	5.6	792.4
unit weight				0.617	0.888	1.4
total weight				29.61	4.97	1109.36
W =		1143.94 kg				
Concrete		: 18.612 m ³				
Concrete		: 3.6 m ³				

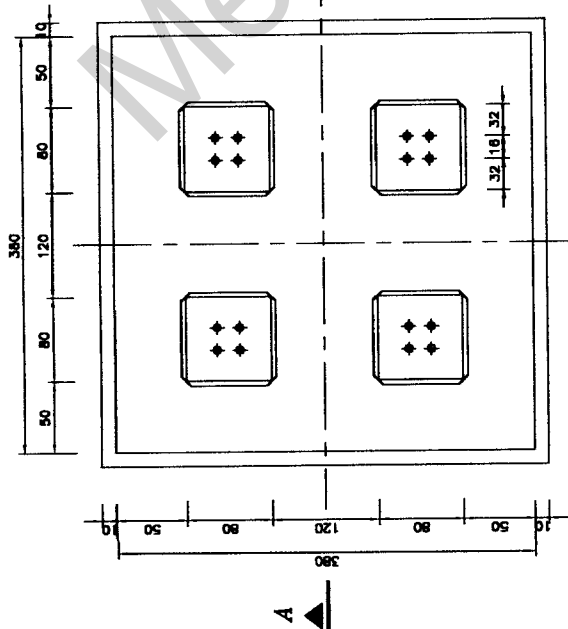
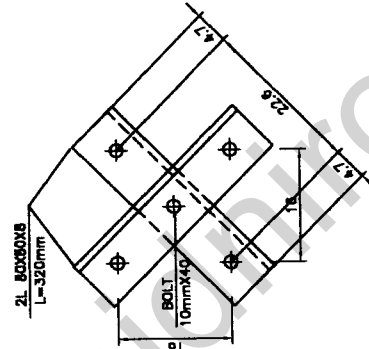
NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=30000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

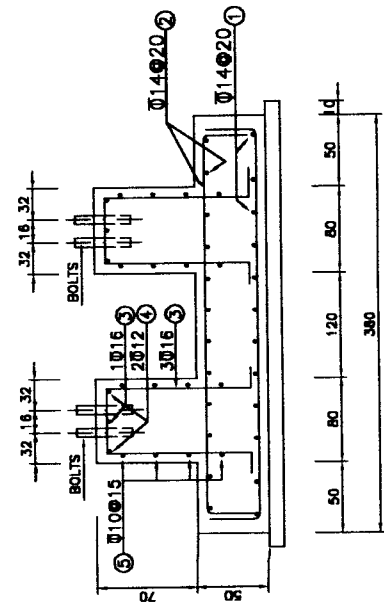
230 KV SUBSTATION
 FOUNDATION FOR GANTRY COLUMN
 $q_0 = 0.5 \text{ Kg/cm}^2$



ANCHOR BOLT DETAIL



PLAN



SECTION A-A

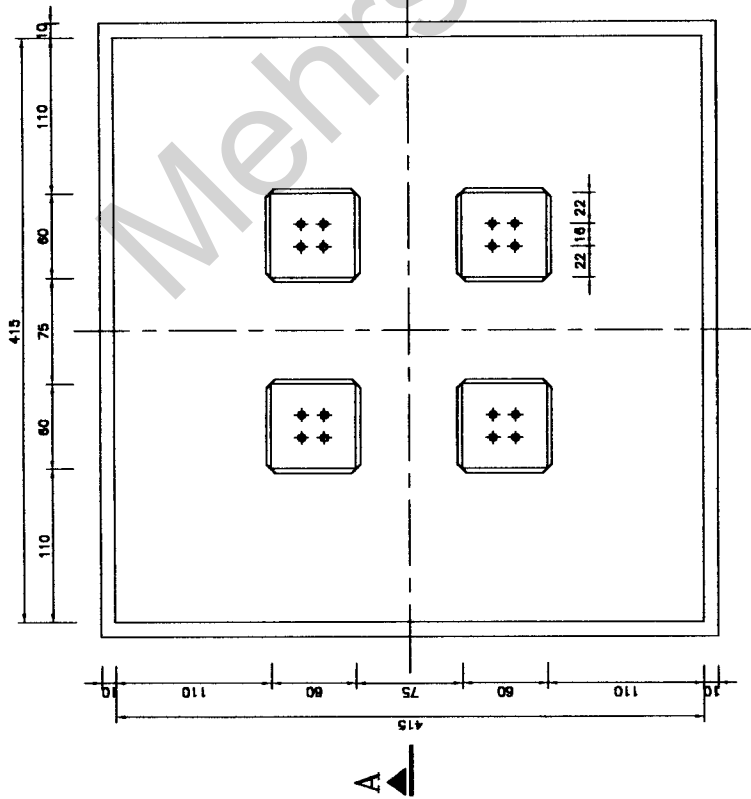
POS	FORM	NO.	LENGTH	Ø10	Ø12	Ø14
1	370 25	40	4.2			168
2	370 20	40	4.1			164
3	110 25 70 110 25	16	3.4			54.4
4	70	8	0.7		5.6	
5	70 10 70	16	3	48		
6						
total length				48	5.6	386.4
unit weight				0.617	0.888	1.4
total weight				29.61	4.973	540.96
N =			575.543 kg			
Concrete			: 9.012 m ³			
Concrete			: 1.6 m ³			

SECTION B-B

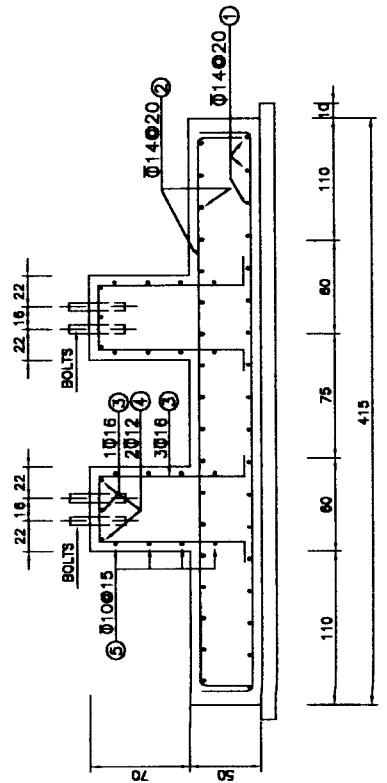
NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y = 3000 \text{ kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

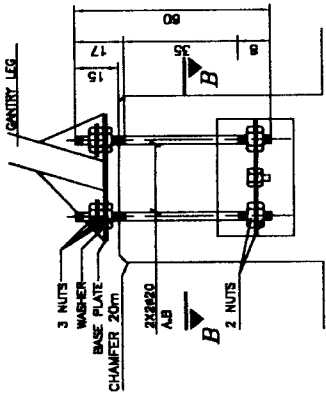
230 KV SUBSTATION
FOUNDATION FOR GANTRY COLUMN
 $q_0 = 2 \text{ Kg/cm}^2$



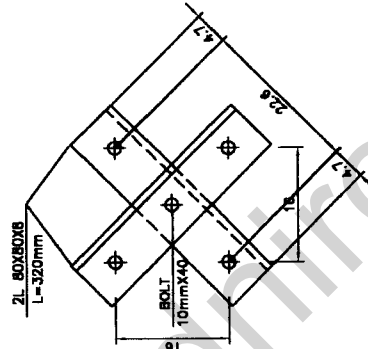
PLAN



SECTION A-A



ANCHOR BOLT DETAIL



SECTION B-B

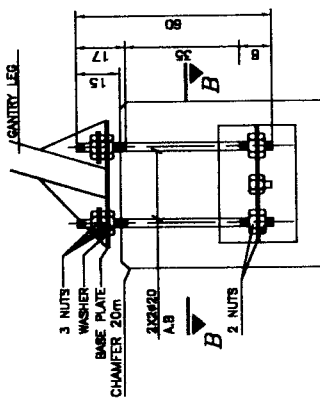
POS	FORM	NO.	LENGTH	Ø10	Ø12	Ø14
1	25 405 25	42	4.55			191.1
2	30 405 30	42	4.45			186.9
3	110 50 35 110 35	16	2.1			33.6
4	50	8	0.5		4.0	
5	50 50 50	16	2.2	35.2		
6						
		total length		35.2	4.0	411.6
		unit weight		0.617	0.888	1.4
		total weight		21.718	3.55	576.24
		$\bar{W} =$	601.51 kg			
		Concrete	: 9.619 m ³			
		Concrete	: 1.892 m ³			

NOTE:

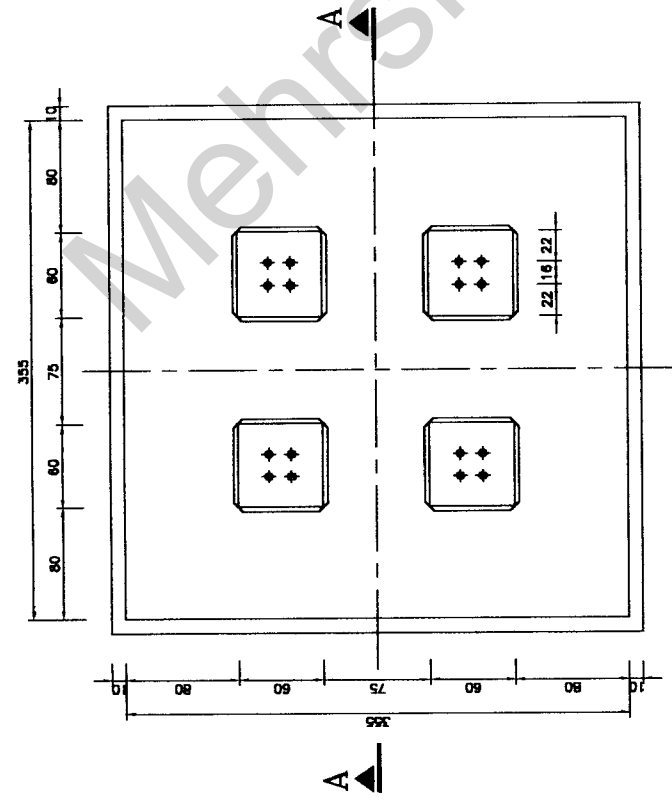
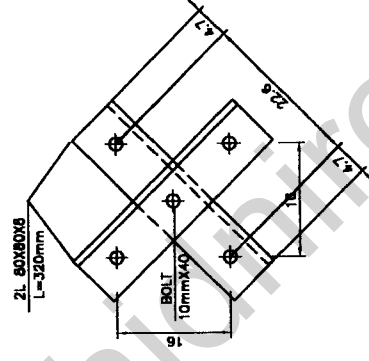
- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg}/\text{cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT

63 KV SUBSTATION
FOUNDATION FOR GANTRY COLUMN

$q_b = 0.5\text{Kg}/\text{cm}^2$

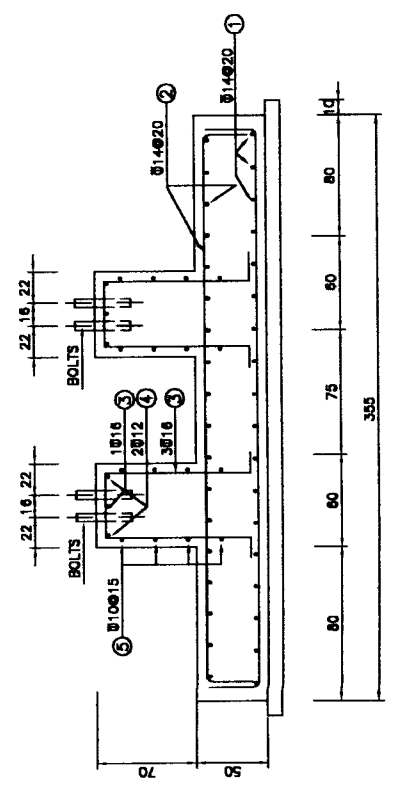


ANCHOR BOLT DETAIL



PLAN

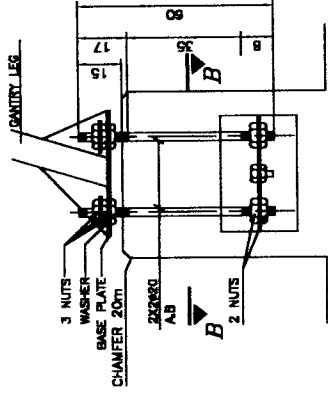
SECTION B-B



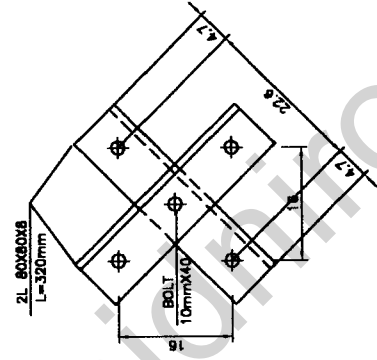
SECTION A-A

POS	FORM	NO.	LENCTE m	O10	O12	O14
1		36	3.95			142.2
2		36	3.85			138.6
3		16	2.1			33.6
4		8	0.5		4.0	
5		16	2.2	35.2		
6						
total length				35.2	4.0	314.4
unit weight				0.617	0.888	1.4
total weight				21.718	3.552	440.16
W =				465.43 kg		
Concrete				: 7.309 m ³		
Concrete				: 1.406 m ³		

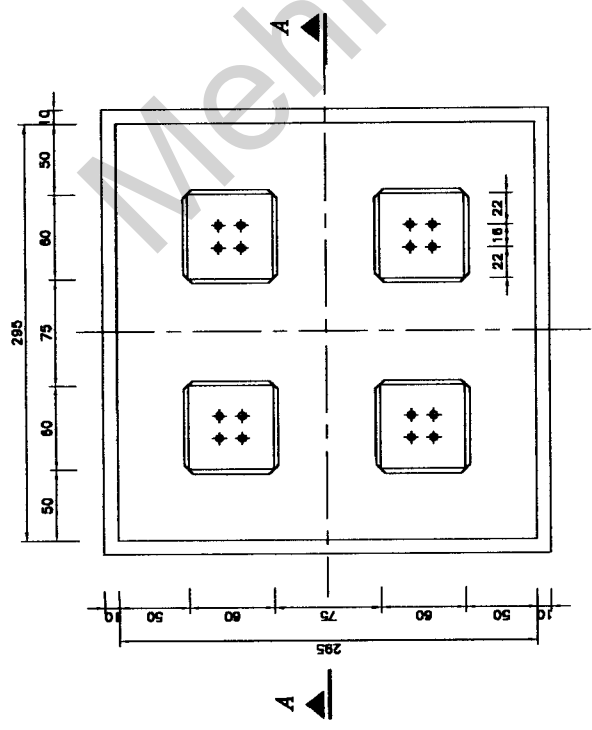
- NOTE:
- FOUNDATION CONCRETE GRADE B-300
 - LEAN CONCRETE GRADE B-100
 - BAR STRENGTH $f_y = 3000 \text{ kg/cm}^2$
 - ALL DIMENSIONS IN cm
 - ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
 - USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
 - CONCRETE COVER IS 5cm
 - FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT



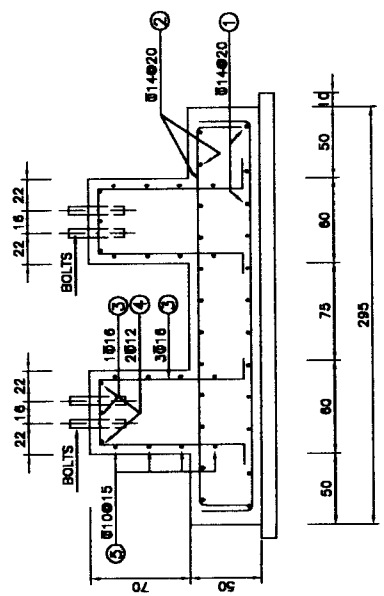
ANCHOR BOLT DETAIL



SECTION B-B



PLAN



SECTION A-A

POS	FORM	NO.	LENGTH m	Ø10	Ø12	Ø14
1	25 285 25	30	3.35			100.5
2	20 280 20	30	3.25			97.5
3	110 70 110 35 35	16				33.6
4	70	8	.5		4.0	
5	70 70 70	16		35.2		
6						
total length				35.2	4	265.2
unit weight				0.617	0.888	1.4
total weight				21.718	3.552	371.28
W =		398.55 kg				
Concrete		: 5.359 m ³				
Concrete		: 0.992 m ³				

NOTE:

- 1- FOUNDATION CONCRETE GRADE B-300
- 2- LEAN CONCRETE GRADE B-100
- 3- BAR STRENGTH $F_y=3000\text{kg/cm}^2$
- 4- ALL DIMENSIONS IN cm
- 5- ANCHOR BOLTS AND BASE PLATE TO BE USED ARE HOT-DIP GALVANIZED
- 6- USE A LAYER OF BITUMEN AROUND ALL VERTICAL SIDES AND EXPOSED SURFACE OF PAD FOUNDATION
- 7- CONCRETE COVER IS 5cm
- 8- FOR CEMENT TYPE SEE GEOTECHNICAL INVESTIGATION REPORT