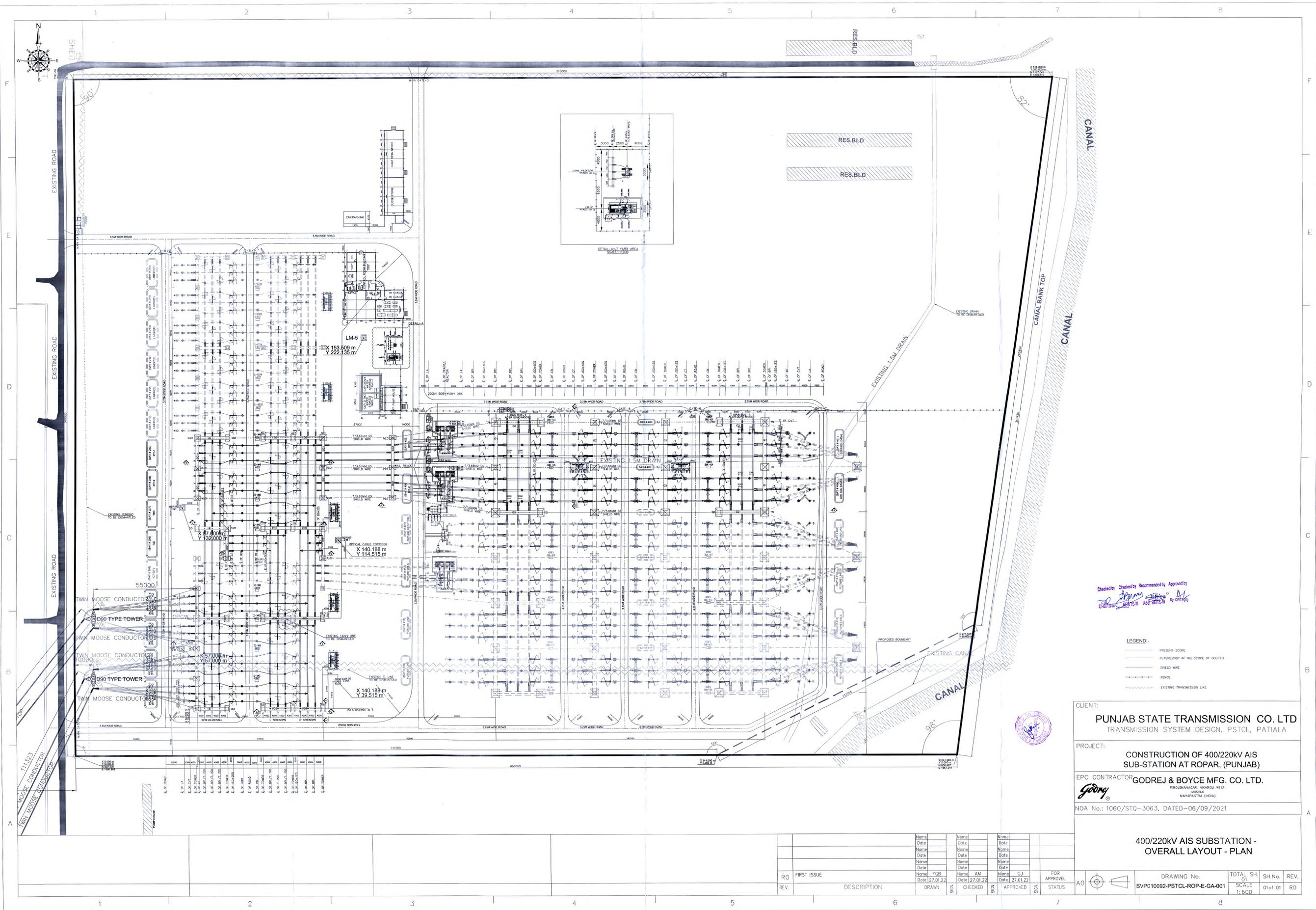


# **400kV Ropar Substation**

**400/220 kV AIS Substation  
Overall Layout - Plan**

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Checked by: [Signature] Recommended by: [Signature] Approved by: [Signature]  
 CIVILS/ST/10/10/2022 ASH SETHI (P) by Godrej

- LEGEND:-**
- PRESENT SCOPE
  - - - FUTURE/NOT IN THE SCOPE OF GODREJ
  - SHIELD WIRE
  - FENCE
  - EXISTING TRANSMISSION LINE

CLIENT: **PUNJAB STATE TRANSMISSION CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSTCL, PATIALA

PROJECT: **CONSTRUCTION OF 400/220kV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **GODREJ & BOYCE MFG. CO. LTD.**  
 PROJESHANAGAL, VADHOLI WEST, MAHARASHTRA (INDIA)

NOA No.: 1060/STQ-3063, DATED-06/09/2021

**400/220kV AIS SUBSTATION - OVERALL LAYOUT - PLAN**

REV.	DESCRIPTION	Name	Date	Name	Date	Name	Date	FOR APPROVAL STATUS
RO	FIRST ISSUE							
		Name	Date	Name	Date	Name	Date	
		YGB	27.01.22	AM	27.01.22	GJ	27.01.22	
		DRAWN	27.01.22	CHECKED	27.01.22	APPROVED	27.01.22	

DRAWING No. **SVP010092-PSTCL-ROP-E-GA-001**

TOTAL SH. 01

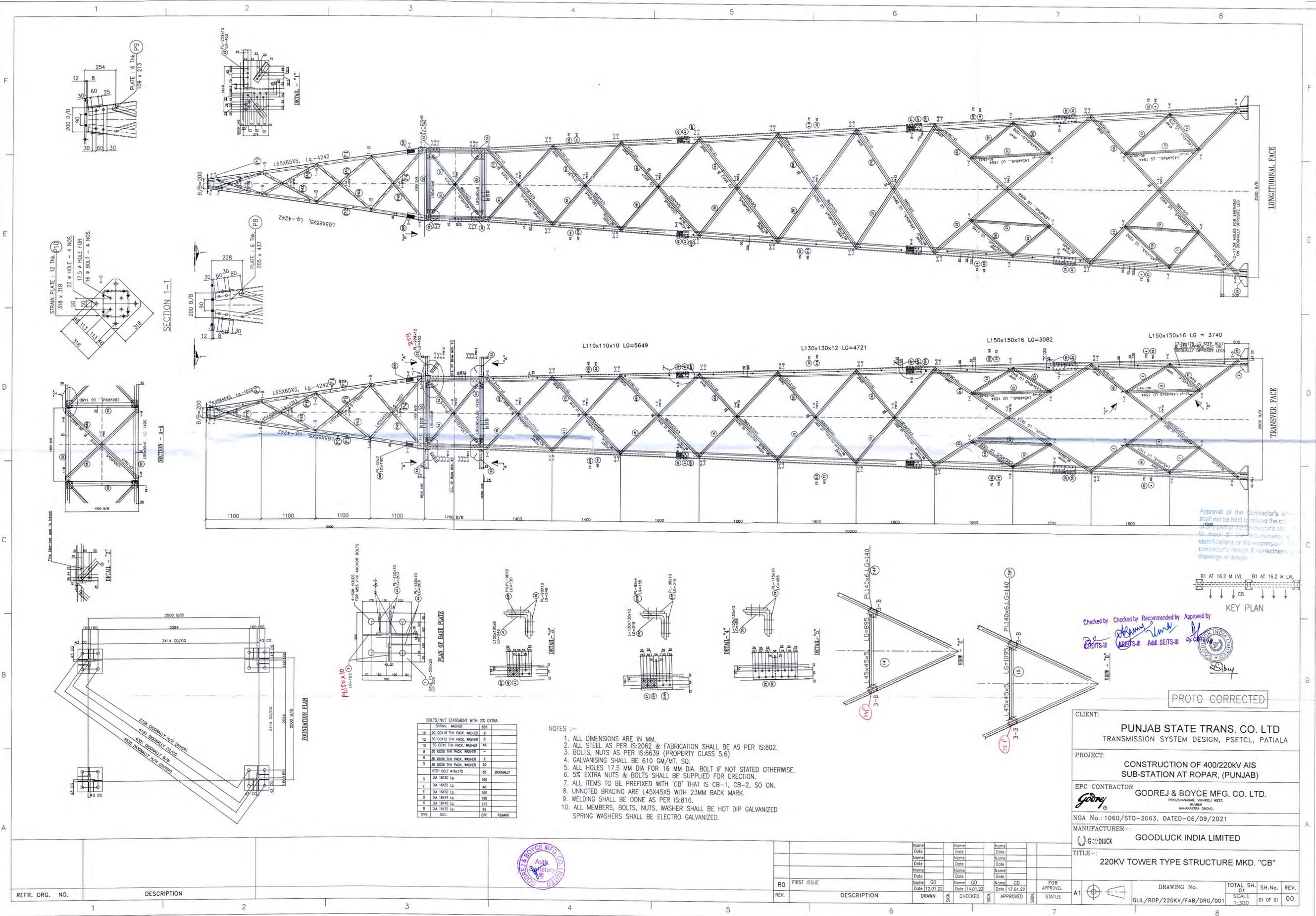
SCALE 1:500

SH.No. 01 of 01

REV. RO

# **220 kV Tower Type Structure Mkd “CB”**

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Approval of the Contractor shall not be held to relieve the contractor of his responsibility for the correctness of the specifications or the responsibility of the contractor's design & correctness of drawings of design.

Checked by *[Signature]* Checked by *[Signature]* Recommended by *[Signature]* Approved by *[Signature]*  
 P. S. CHITTS-III A. B. SETHI-III Addl. SETHI-III S. S. SETHI-III  
 MAHARASHTRA (INDIA)

PROTO-CORRECTED

CLIENT: PUNJAB STATE TRANS. CO. LTD  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)

EPC CONTRACTOR: Godrej & Boyce Mfg. Co. Ltd.  
 PRODHANAGAR, VIKHROLI WEST, MUMBAI, MAHARASHTRA (INDIA)

NOA No.: 1060/STQ-3063, DATED-06/09/2021

MANUFACTURER:- GOODLUCK INDIA LIMITED

TITLE:- 220KV TOWER TYPE STRUCTURE MKD. "CB"

- NOTES :-
1. ALL DIMENSIONS ARE IN MM.
  2. ALL STEEL AS PER IS:2062 & FABRICATION SHALL BE AS PER IS:802.
  3. BOLTS, NUTS AS PER IS:6639 (PROPERTY CLASS 5.6)
  4. GALVANISING SHALL BE 610 GM/MT. SQ.
  5. ALL HOLES 17.5 MM DIA FOR 16 MM DIA. BOLT IF NOT STATED OTHERWISE.
  6. 5% EXTRA NUTS & BOLTS SHALL BE SUPPLIED FOR ERECTION.
  7. ALL ITEMS TO BE PREFIXED WITH 'CB' THAT IS CB-1, CB-2, SO ON.
  8. UNNOTED BRACING ARE L45X45X5 WITH 23MM BACK MARK.
  9. WELDING SHALL BE DONE AS PER IS:816.
  10. ALL MEMBERS, BOLTS, NUTS, WASHER SHALL BE HOT DIP GALVANIZED. SPRING WASHERS SHALL BE ELECTRO GALVANIZED.

BOLTS/NUT STATEMENT WITH 2% EXTRA

ITEM	DESCRIPTION	QTY	REMARK
16	30 00X15 THK PACK WASHER	8	
12	30 00X12 THK PACK WASHER	8	
10	30 00X5 THK PACK WASHER	48	
8	30 00X5 THK PACK WASHER	7	
5	30 00X6 THK PACK WASHER	20	
3	30 00X6 THK PACK WASHER	20	
1	STEP BOLT #16x175	85	DIAGONALLY
G	DA 16X50 Lp	160	
F	DA 16X50 Lp	40	
E	DA 16X50 Lp	160	
D	DA 16X40 Lp	168	
C	DA 16X40 Lp	212	
B	DA 16X30 Lp	96	
A	DA 16X30 Lp	96	
TYPE	SIZ.	QTY	REMARK

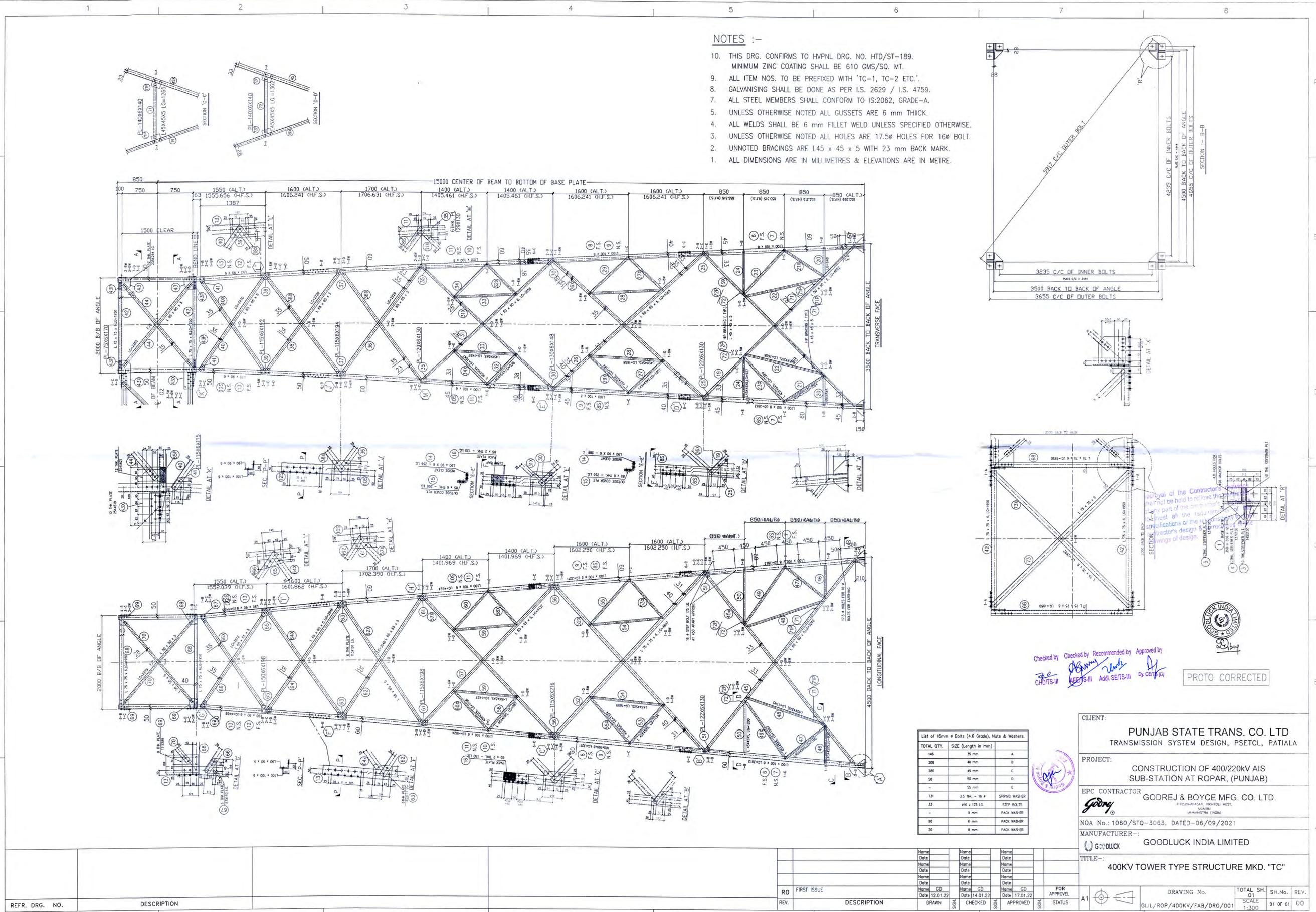
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2					
3					
4					
5					
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7					
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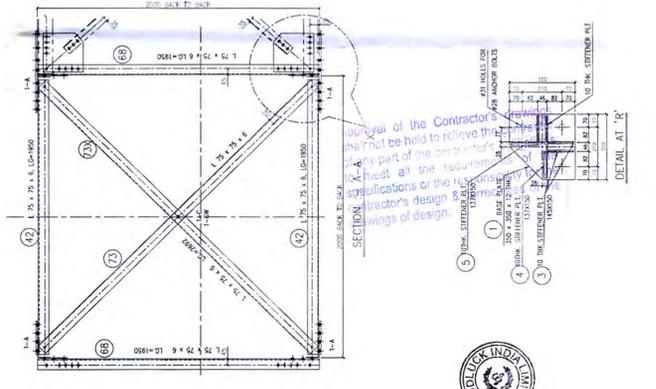
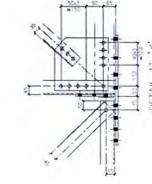
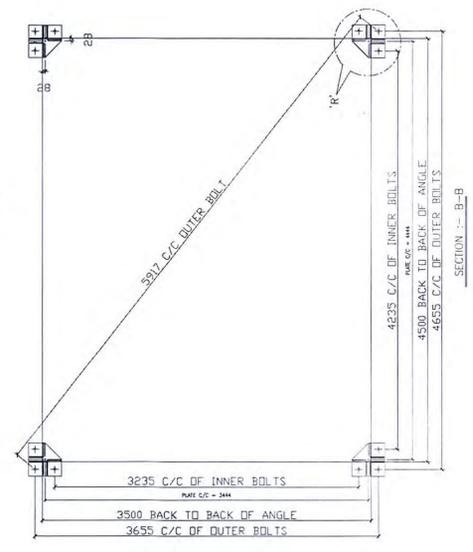
DRAWING No. GUL/ROP/220KV/FAB/DRG/001  
 TOTAL SH. 01  
 SH.No. 01 OF 01  
 SCALE 1:300

# **400 kV Tower Type Structure Mkd “TC”**

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- NOTES :-**
1. ALL DIMENSIONS ARE IN MILLIMETRES & ELEVATIONS ARE IN METRE.
  2. UNNOTED BRACINGS ARE L45 x 45 x 5 WITH 23 mm BACK MARK.
  3. UNLESS OTHERWISE NOTED ALL HOLES ARE 17.5φ HOLES FOR 16φ BOLT.
  4. ALL WELDS SHALL BE 6 mm FILLET WELD UNLESS SPECIFIED OTHERWISE.
  5. UNLESS OTHERWISE NOTED ALL GUSSETS ARE 6 mm THICK.
  7. ALL STEEL MEMBERS SHALL CONFORM TO IS:2062, GRADE-A.
  8. GALVANISING SHALL BE DONE AS PER I.S. 2629 / I.S. 4759.
  9. ALL ITEM NOS. TO BE PREFIXED WITH 'TC-1, TC-2 ETC.'
  10. THIS DRG. CONFIRMS TO HYPNL DRG. NO. HTD/ST-189. MINIMUM ZINC COATING SHALL BE 610 GMS/SQ. MT.



Checked by **CHDTS-III**  
 Checked by **ADD'S-III**  
 Recommended by **ADD'S-III**  
 Approved by **ADD'S-III**

PROTO CORRECTED

TOTAL QTY.	SIZE (Length in mm)	
146	35 mm	A
208	40 mm	B
286	45 mm	C
58	50 mm	D
-	55 mm	E
731	3.5 Thk. - 16 #	SPRING WASHER
33	416 x 175 LG.	STEP BOLTS
-	5 mm	PACK WASHER
90	6 mm	PACK WASHER
20	8 mm	PACK WASHER

CLIENT: **PUNJAB STATE TRANS. CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: **CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **GODREJ & BOYCE MFG. CO. LTD.**  
 PLOT 10, PHASE II, VIKHAROLI WEST, MUMBAI (INDIA)

NOA No.: 1060/STO-3063, DATED-06/09/2021

MANUFACTURER:- **GOODLUCK INDIA LIMITED**

TITLE:- **400KV TOWER TYPE STRUCTURE MKD. "TC"**

REFR. DRG. NO.	DESCRIPTION	REV.	DESCRIPTION	DATE	BY	CHKD	APPV	FOR APPROVAL	TOTAL SH. NO.	SH. NO.	REV.
		RO	FIRST ISSUE	12.01.22	GD	GD	GD	FOR APPROVAL	01	01	00

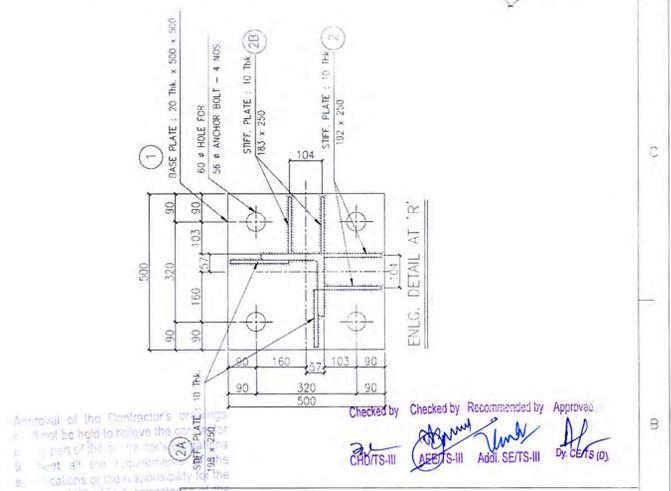
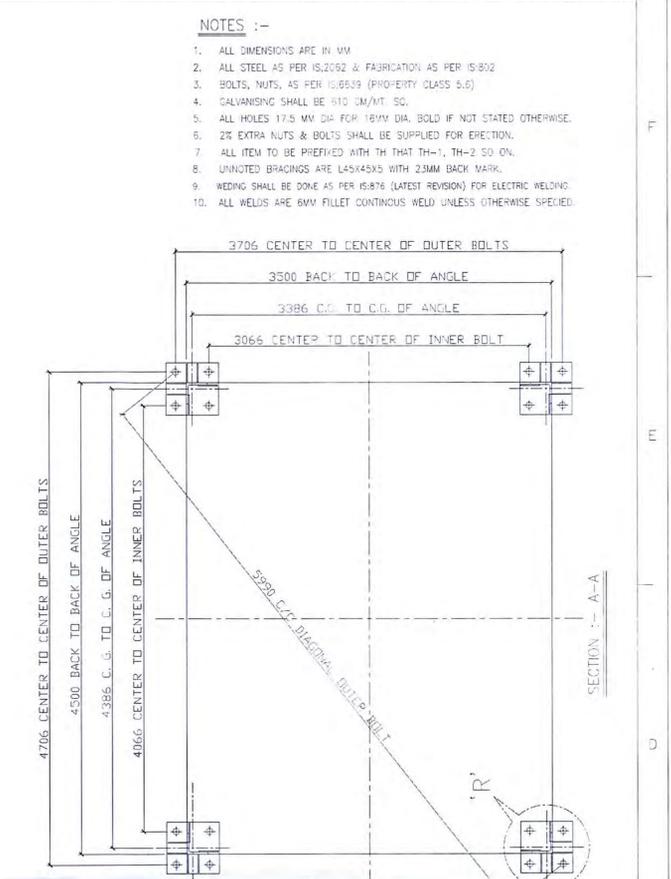
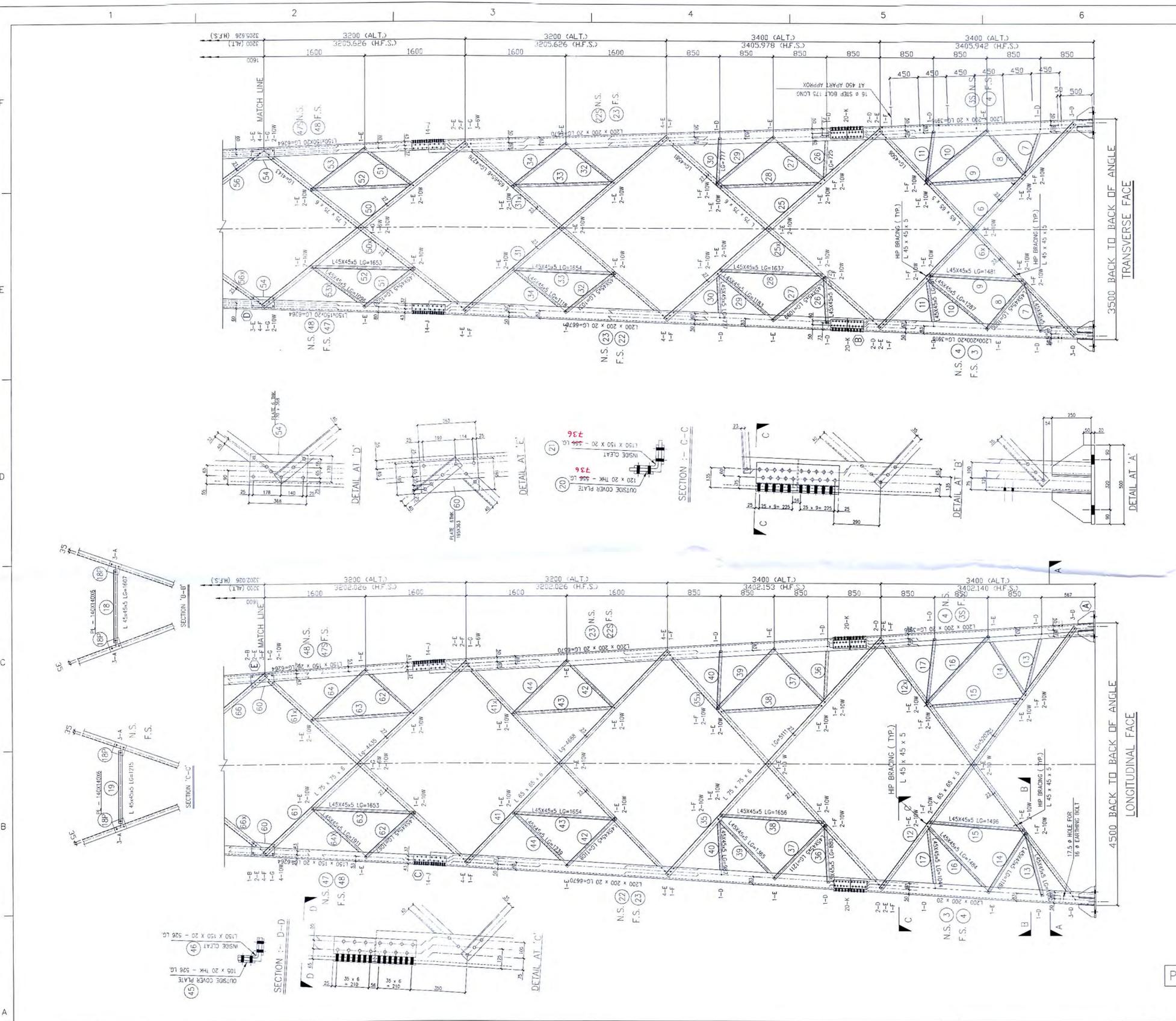
DRAWING No. **GLL/ROP/400KV/FAB/DRG/001**  
 SCALE: **1:300**

# **220 kV Tower Type Structure Mkd “CC”**



# **400 kV Tower Type Structure Mkd “TH”**

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**CLIENT:** PUNJAB STATE TRANS. CO. LTD  
TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

**PROJECT:** CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)

**EPC CONTRACTOR:** GODREJ & BOYCE MFG. CO. LTD.  
INDIA

**MANUFACTURER:-** GOODLUCK INDIA LIMITED

**TITLE:-** 400KV TOWER TYPE STRUCTURE MKD. "TH"

**NOA No.:** 1060/STO-3063, DATED-06/09/2021

**SCALE:** 1:300

**SH. No.:** 01 OF 02

**REV.:** 00

**DRAWING No.:** GUIL/ROP/400KV/FAB/DRG/002

**FOR APPROVAL:** A1

**STATUS:** REV. 00

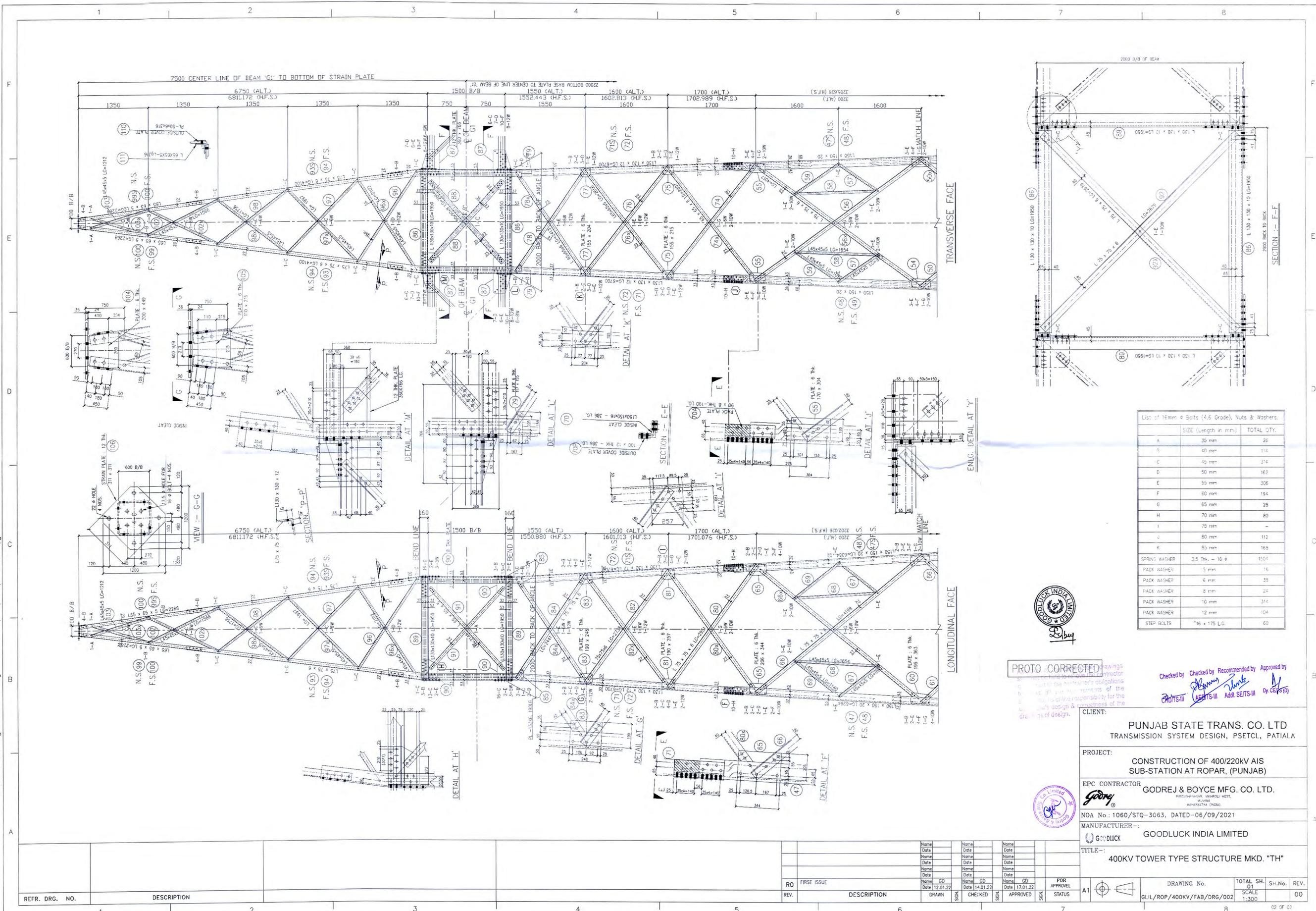
**DATE:** 12.01.22

**DATE:** 14.01.22

**DATE:** 17.01.22

REFR. DRG. NO.	DESCRIPTION	DRAWN	CHECKED	APPROVED	FOR APPROVAL
1					
2					
3					
4					
5					
6					
7					
8					

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List of 16mm ø Bolts (4.6 Grade), Nuts & Washers		
	SIZE (Length in mm)	TOTAL QTY.
A	35 mm	26
B	40 mm	114
C	45 mm	314
D	50 mm	162
E	55 mm	306
F	60 mm	194
G	65 mm	28
H	70 mm	80
I	75 mm	-
J	80 mm	112
K	85 mm	168
SPRING WASHER	3.5 THK - 16 ø	1504
PACK WASHER	5 mm	16
PACK WASHER	6 mm	38
PACK WASHER	8 mm	24
PACK WASHER	10 mm	314
PACK WASHER	12 mm	104
STEP BOLTS	*16 x 175 L.C.	60



**PROTO CORRECTED**

Checked by *[Signature]* Checked by *[Signature]* Recommended by *[Signature]* Approved by *[Signature]*  
 PROTS-III ABETS-III Addl. SETS-III Dy. CEPTD

CLIENT: **PUNJAB STATE TRANS. CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: **CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **GODREJ & BOYCE MFG. CO. LTD.**  
INDIA LIMITED, WARDHOLI WEST, VILASIM, MUMBAI (INDIA)

NOA No.: 1060/STQ-3063, DATED-06/09/2021

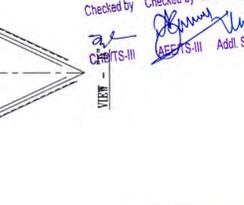
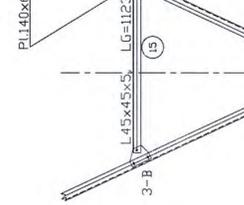
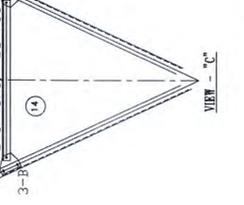
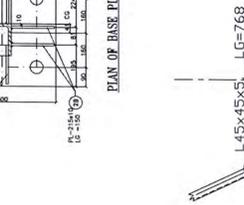
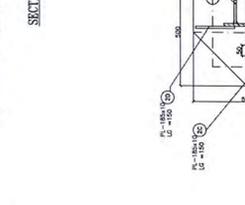
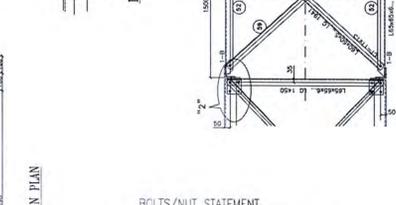
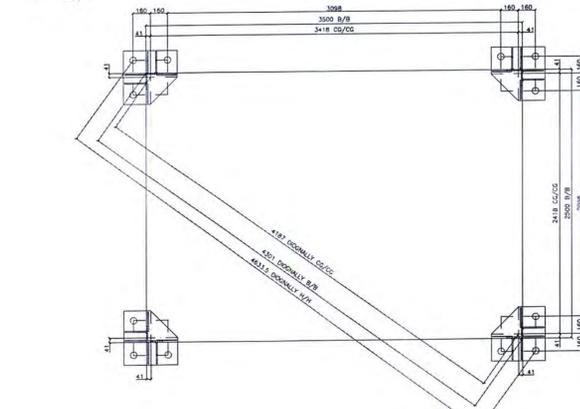
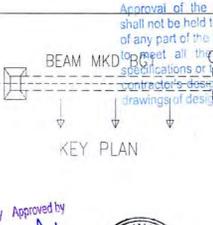
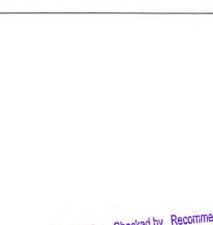
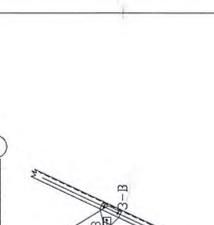
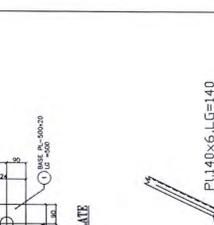
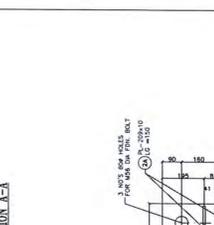
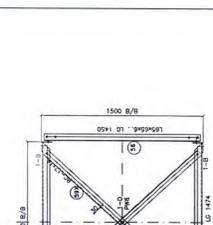
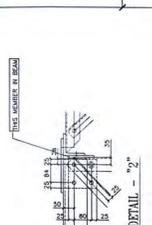
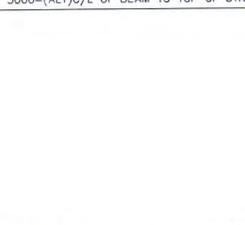
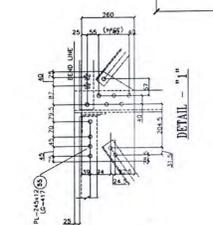
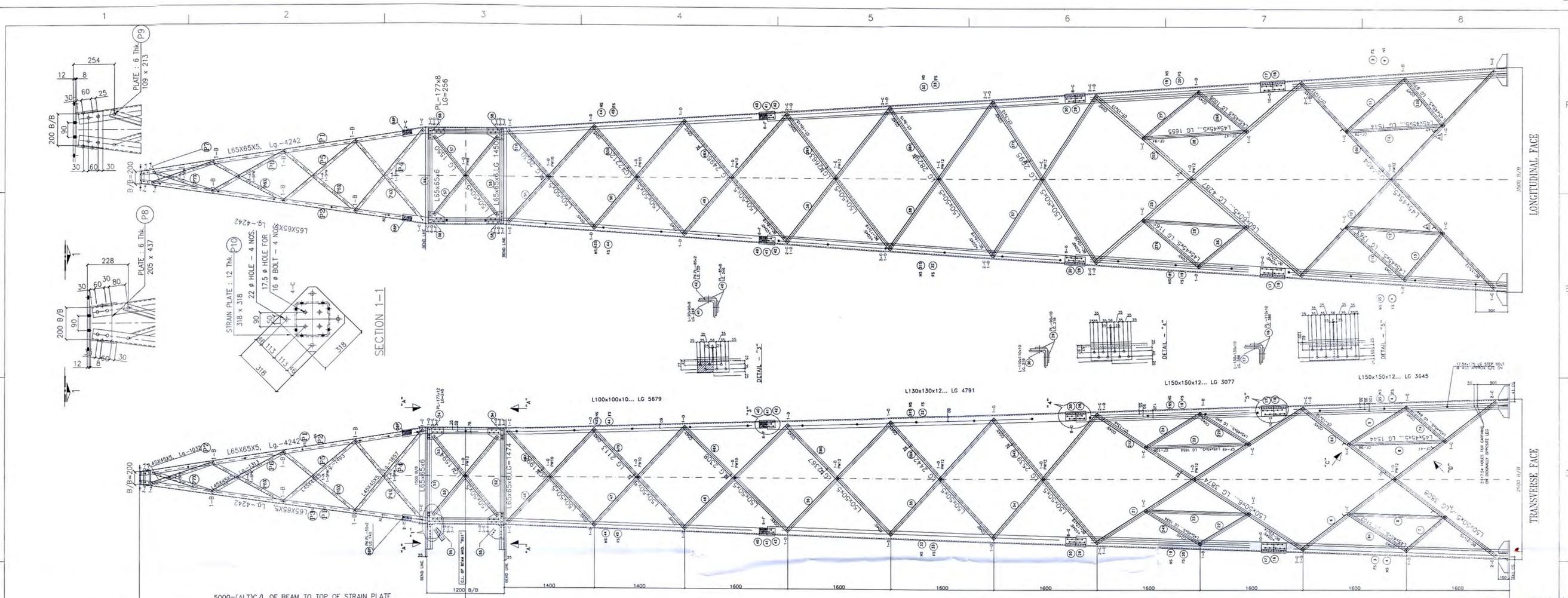
MANUFACTURER:- **GOODLUCK INDIA LIMITED**

TITLE:- **400KV TOWER TYPE STRUCTURE MKD. "TH"**

REFR. DRG. NO.	DESCRIPTION	DATE	BY	FOR APPROVAL	DATE	BY	STATUS	DRAWING No.	TOTAL SH.	SH.No.	REV.
A1	RO FIRST ISSUE	12.01.22	GD	GD	17.01.22	GD	FOR APPROVAL	GLI/ROP/400KV/FAB/DRG/002	01	01	00

# **220 kV Tower Type Structure Mkd “CTA”**

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BOLTS/NUT STATEMENT			
TYPE	SIZE	QTY.	REMARK
	SPRING WASHER	584	
12	30 ODX12 THK PACK WASHER	20	
10	30 ODX12 THK PACK WASHER	18	
6	30 ODX6 THK PACK WASHER	2	
5	30 ODX6 THK PACK WASHER	20	
	STEP BOLT #16x175	58	
G	DIA 16x60 Lg.	72	
F	DIA 16x55 Lg.	48	
E	DIA 16x50 Lg.	26	
D	DIA 16x45 Lg.	162	
C	DIA 16x40 Lg.	190	
B	DIA 16x35 Lg.	96	

1. ALL DIMENSIONS ARE IN MM.  
 2. ALL STEEL AS PER IS:2062 & FABRICATION SHALL BE AS PER IS:802.  
 3. BOLTS, NUTS AS PER IS:6639 (PROPERTY CLASS 5.6)  
 4. GALVANISING SHALL BE 610 GM/MT. SQ.  
 5. ALL HOLES 17.5 MM DIA FOR 16 MM DIA. BOLT IF NOT STATED OTHERWISE.  
 6. 5% EXTRA NUTS & BOLTS SHALL BE SUPPLIED FOR ERECTION.  
 7. ALL ITEMS TO BE PREFIXED WITH 'CTA' THAT IS CTA-1, CTA-2, SO ON.  
 8. UNNOTED BRACING ARE L45x45x5 WITH 23MM BACK MARK.  
 9. WELDING SHALL BE DONE AS PER IS:876 (LATEST REVISION) FOR ELECTRIC WELDING  
 10. ALL WELD ARE 6MM FILLET CONTIGOUS WELD UNLESS OTHERWISE SPECIFIED.

Approval of the Contractor's drawings shall not be held to relieve the contractor of any part of the contractor's obligations to meet all the requirements of the specifications or responsibility for the correctness of the drawings of design.

BEAM MKD TO BE DONE BY CONTRACTOR

KEY PLAN

Checked by: *[Signature]*  
 Checked by: *[Signature]*  
 Recommended by: *[Signature]*  
 Approved by: *[Signature]*

CTA-1, CTA-2, CTA-3, CTA-4, CTA-5, CTA-6, CTA-7, CTA-8, CTA-9, CTA-10, CTA-11, CTA-12, CTA-13, CTA-14, CTA-15, CTA-16, CTA-17, CTA-18, CTA-19, CTA-20, CTA-21, CTA-22, CTA-23, CTA-24, CTA-25, CTA-26, CTA-27, CTA-28, CTA-29, CTA-30, CTA-31, CTA-32, CTA-33, CTA-34, CTA-35, CTA-36, CTA-37, CTA-38, CTA-39, CTA-40, CTA-41, CTA-42, CTA-43, CTA-44, CTA-45, CTA-46, CTA-47, CTA-48, CTA-49, CTA-50, CTA-51, CTA-52, CTA-53, CTA-54, CTA-55, CTA-56, CTA-57, CTA-58, CTA-59, CTA-60, CTA-61, CTA-62, CTA-63, CTA-64, CTA-65, CTA-66, CTA-67, CTA-68, CTA-69, CTA-70, CTA-71, CTA-72, CTA-73, CTA-74, CTA-75, CTA-76, CTA-77, CTA-78, CTA-79, CTA-80, CTA-81, CTA-82, CTA-83, CTA-84, CTA-85, CTA-86, CTA-87, CTA-88, CTA-89, CTA-90, CTA-91, CTA-92, CTA-93, CTA-94, CTA-95, CTA-96, CTA-97, CTA-98, CTA-99, CTA-100, CTA-101, CTA-102, CTA-103, CTA-104, CTA-105, CTA-106, CTA-107, CTA-108, CTA-109, CTA-110, CTA-111, CTA-112, CTA-113, CTA-114, CTA-115, CTA-116, CTA-117, CTA-118, CTA-119, CTA-120, CTA-121, CTA-122, CTA-123, 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PROTO CORRECTED

CLIENT: PUNJAB STATE TRANS. CO. LTD  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)

EPC CONTRACTOR: **Godrej** GODREJ & BOYCE MFG. CO. LTD.  
 PRODOSHANAGAR, VISHNOLI WEST, RAJASTHAN (INDIA)

NOA No.: 1060/STO-3C63. DATE: 06/09/2021

MANUFACTURER: GOODLUCK INDIA LIMITED

TITLE: 220KV TOWER TYPE STRUCTURE MKD. "CTA"

REFR. DRG. NO.	DESCRIPTION	DATE	BY	CHECKED	DATE	BY	APPROVED	DATE	BY	FOR APPROVAL	TOTAL SH.	SH.No.	REV.
RO	FIRST ISSUE	12.01.22	SKR	SKR	14.01.22	SKR	SKR	17.01.22	SKR	SKR	01	01	00
A1													

DRAWING No. GUIL/ROP/220KV/FAB/DRG/003

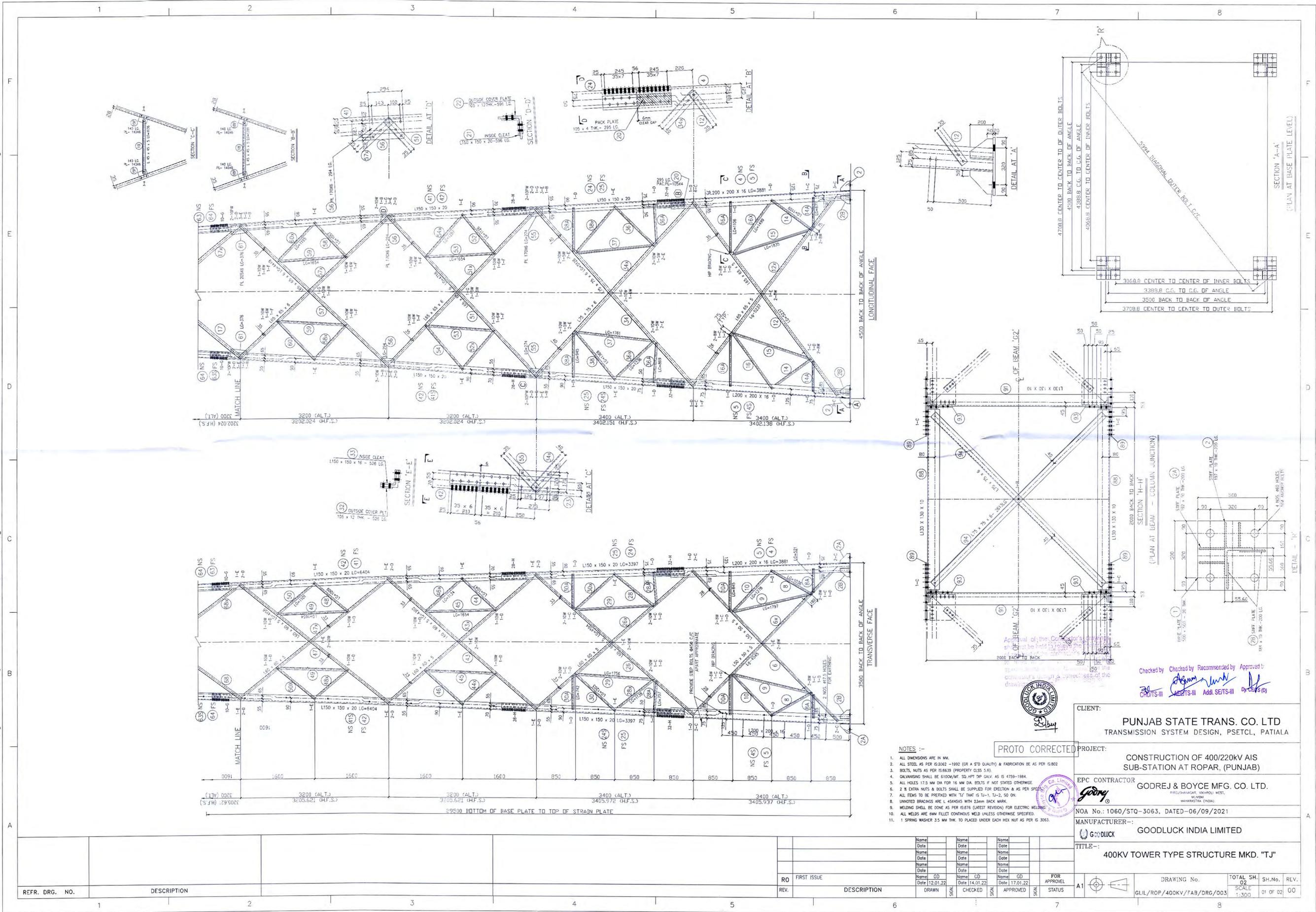
SCALE: 1:300

SH.No. 01 of 01

REV. 00

# **400 kV Tower Type Structure Mkd “TJ”**

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REFR. DRG. NO.	DESCRIPTION	REV.	DATE	BY	CHKD.	APPV.	FOR APPROVAL
		RO					FIRST ISSUE

Checked by *[Signature]* Recommended by *[Signature]* Approved by *[Signature]*  
 CRD/TS-III CRD/TS-III Addl. SE/TS-III CRD/TS-III

CLIENT: **PUNJAB STATE TRANS. CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: **CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **GODREJ & BOYCE MFG. CO. LTD.**  
 PLOT 10, INDUSTRIAL AREA, WEST, MCHINWARI, MAHARASHTRA (INDIA)

NOA No.: 1060/STQ-3063, DATED-06/09/2021

MANUFACTURER:- **GOODLUCK INDIA LIMITED**

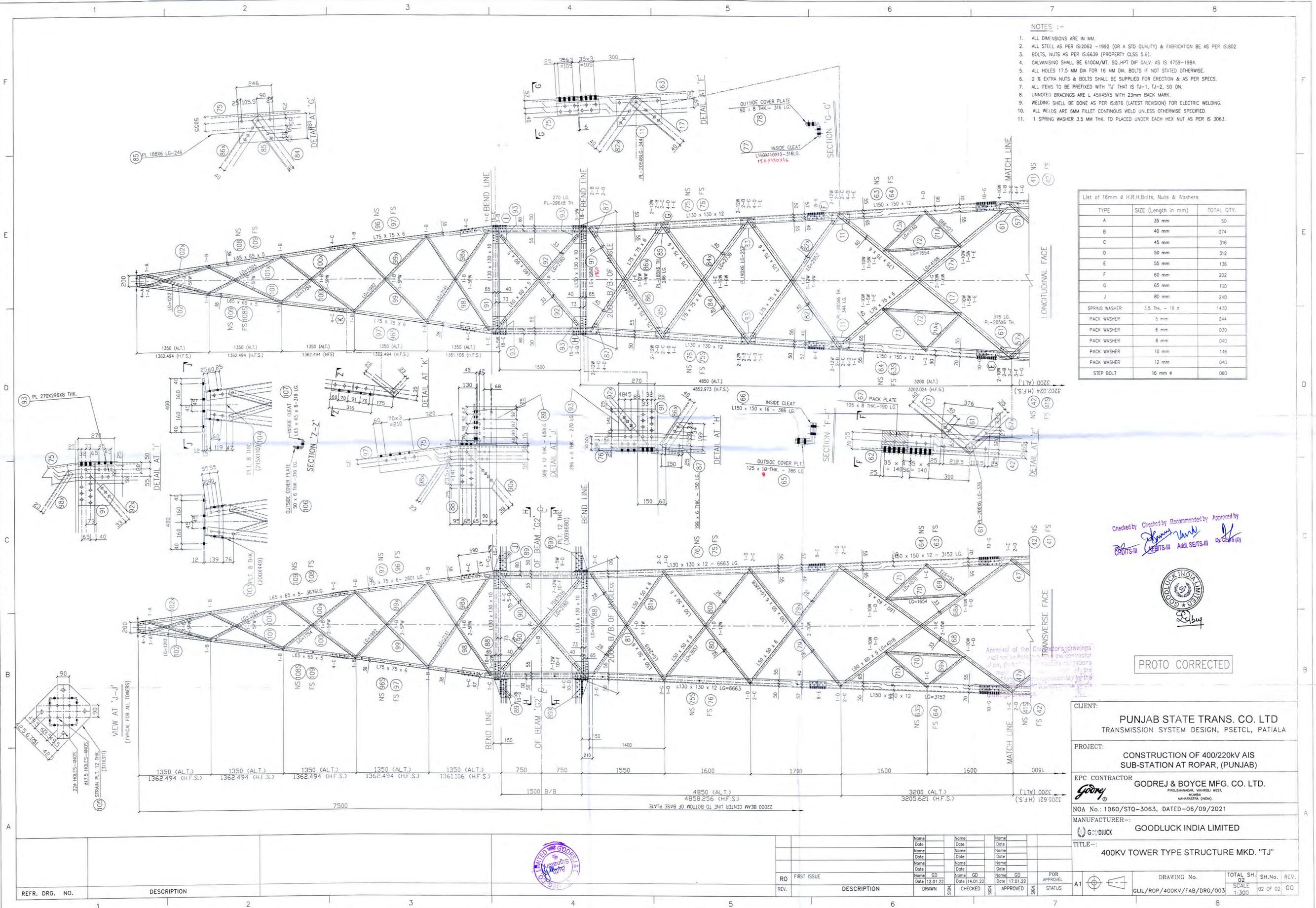
TITLE:- **400KV TOWER TYPE STRUCTURE MKD. "TJ"**

- NOTES :-
- ALL DIMENSIONS ARE IN MM.
  - ALL STEEL AS PER IS-2002 - 1992 (OR A STD QUALITY) & FABRICATION AS PER IS-8002
  - BOLTS, NUTS AS PER IS-6839 (PROPERTY CLASS 5.6)
  - GAUWANGING SHALL BE 61000/AMT. SO HPT DIP GALV AS IS 4759-1984.
  - ALL HOLES 1.5 MM DIA FOR 16 MM DIA BOLTS IF NOT STATED OTHERWISE.
  - 2 X EXTRA NUTS & BOLTS SHALL BE SUPPLIED FOR ERECTION & AS PER SPEC.
  - ALL ITEMS TO BE PREPARED WITH 'L' THAT IS T-1, T-2, SO ON.
  - UNNOTED BRACKETS ARE L 45X45X5 WITH 25mm BACK MARK.
  - WELDING SHALL BE DONE AS PER IS-8176 (LATEST REVISION) FOR ELECTRIC WELDING.
  - ALL WELDS ARE RAN FILED CONTINUOUS WELD UNLESS OTHERWISE SPECIFIED.
  - 1 SPRING WASHER 3.5 MM THK. TO PLACED UNDER EACH HEX NUT AS PER IS-3063.

NO.	DATE	BY	CHKD.	APPV.	FOR APPROVAL
1	12.01.22	GO	GO	GO	FOR APPROVAL
2	14.01.22	GO	GO	GO	FOR APPROVAL
3	17.01.22	GO	GO	GO	FOR APPROVAL

DRAWING No.	TOTAL SH.	SH.No.	REV.
GLIL/ROP/400KV/FAB/DRG/003	02	01	00

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List of 16mm $\phi$ H.R.H. Bolts, Nuts & Washers		
TYPE	SIZE (Length in mm)	TOTAL QTY.
A	35 mm	50
B	40 mm	074
C	45 mm	316
D	50 mm	312
E	55 mm	136
F	60 mm	202
G	65 mm	100
J	80 mm	240
SPRING WASHER	3.5 Thk. - 16 $\phi$	1430
PACK WASHER	5 mm	044
PACK WASHER	6 mm	030
PACK WASHER	8 mm	040
PACK WASHER	10 mm	146
PACK WASHER	12 mm	040
STEP BOLT	16 mm $\phi$	060

Checked by: *[Signature]*  
 Checked by: *[Signature]*  
 Recommended by: *[Signature]*  
 Approved by: *[Signature]*



PROTO CORRECTED

CLIENT: **PUNJAB STATE TRANS. CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: **CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **GODREJ & BOYCE MFG. CO. LTD.**  
 PROJOSHANGAR, WARDHOLI WEST, MUMBAI, MAHARASHTRA (INDIA)

NOA No.: 1060/STO-3063, DATED-06/09/2021

MANUFACTURER:- **GOODLUCK INDIA LIMITED**

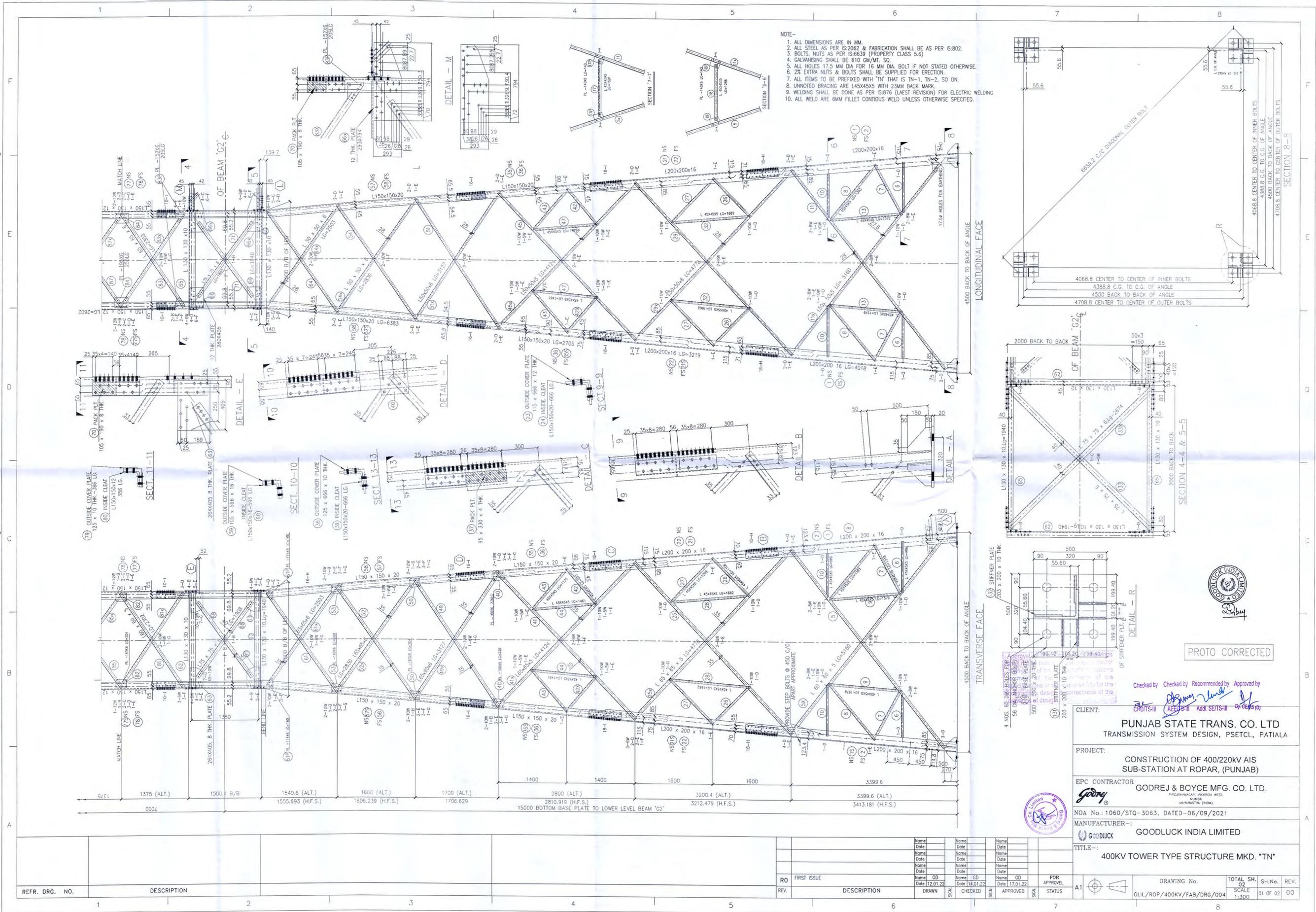
TITLE:- **400KV TOWER TYPE STRUCTURE MKD. "TJ"**

REFR. DRG. NO.	DESCRIPTION	DATE	BY	CHECKED	APPROVED	STATUS
RO	FIRST ISSUE	12.01.22	CD	CD	CD	FOR APPROVAL
REV.	DESCRIPTION	DRAWN	CHECKED	APPROVED	STATUS	

DRAWING No.	TOTAL SH.	SH.No.	REV.
GLL/ROP/400KV/FAB/DRG/003	02	02 OF 02	00

# **400 kV Tower Type Structure Mkd “TN”**

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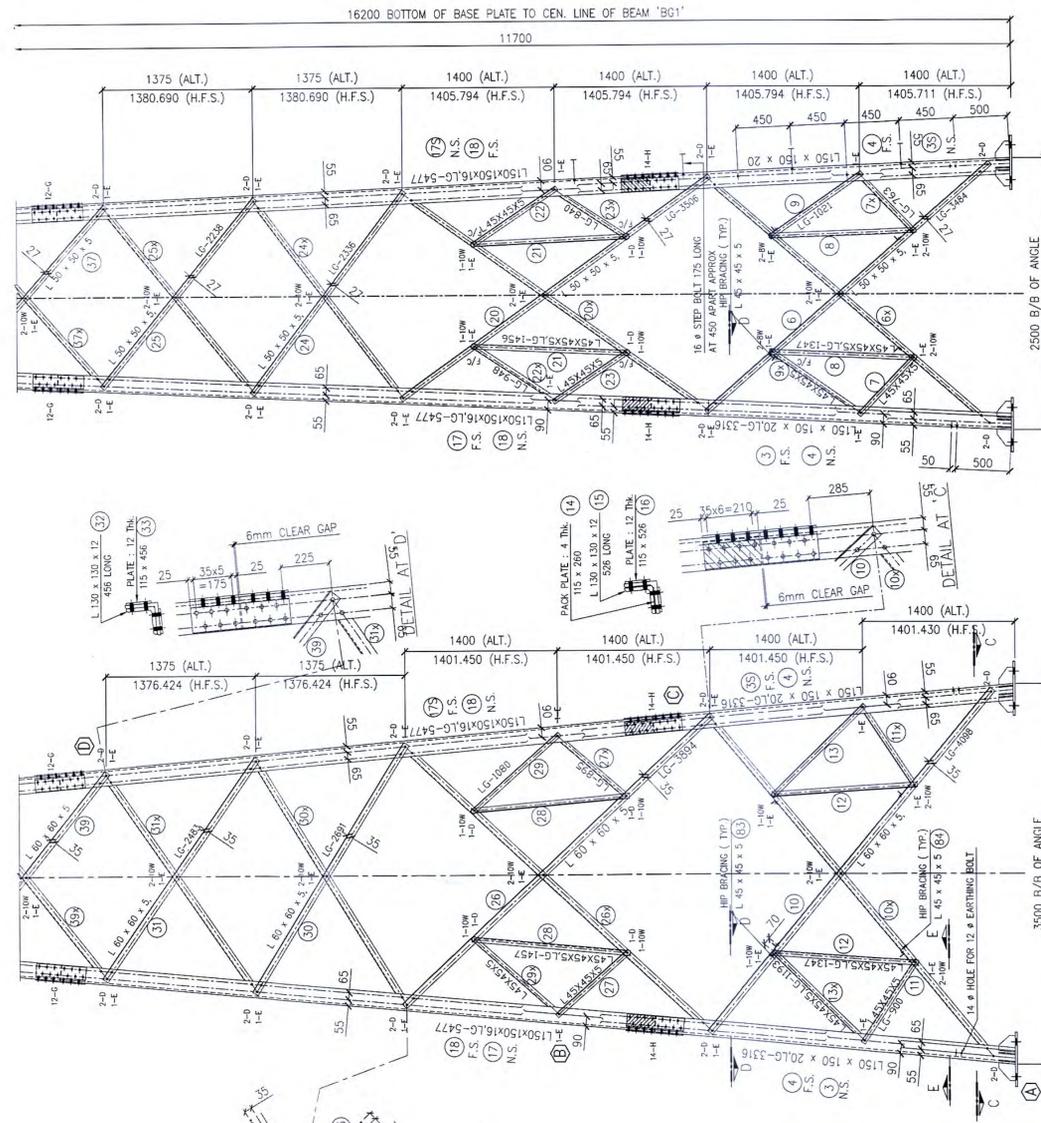




# **220 kV Tower Type Structure Mkd “CTB”**

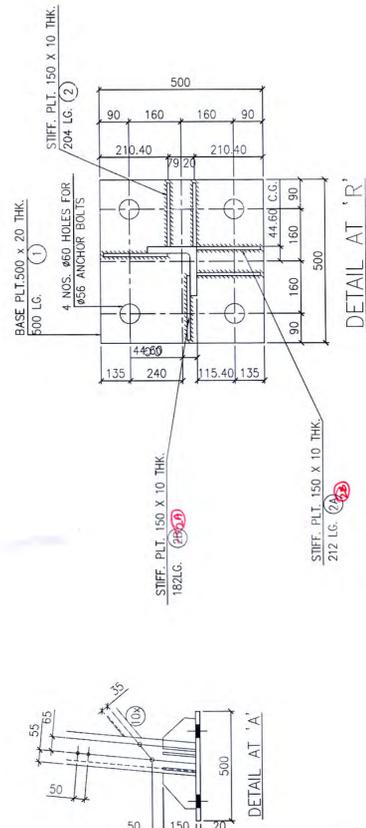
This drawing and design is the property of Godrej and must not be copied or lent without prior permission in writing.

List of 16mm φ HR Bolts, Nuts & Washers		TOTAL QTY.
TYPE	SIZE (Length in mm)	
A	35 mm	048
B	40 mm	120
C	45 mm	148
D	50 mm	294
E	55 mm	220
F	60 mm	016
G	65 mm	160
H	70 mm	112
TOTAL =		1118
SPRING WASHER 3.5 Thk. - 16 φ		1118
PACK WASHER 5 mm		028
PACK WASHER 6 mm		024
PACK WASHER 8 mm		048
PACK WASHER 10 mm		084
PACK WASHER 12 mm		028
STEP BOLT 16 mm φ		041

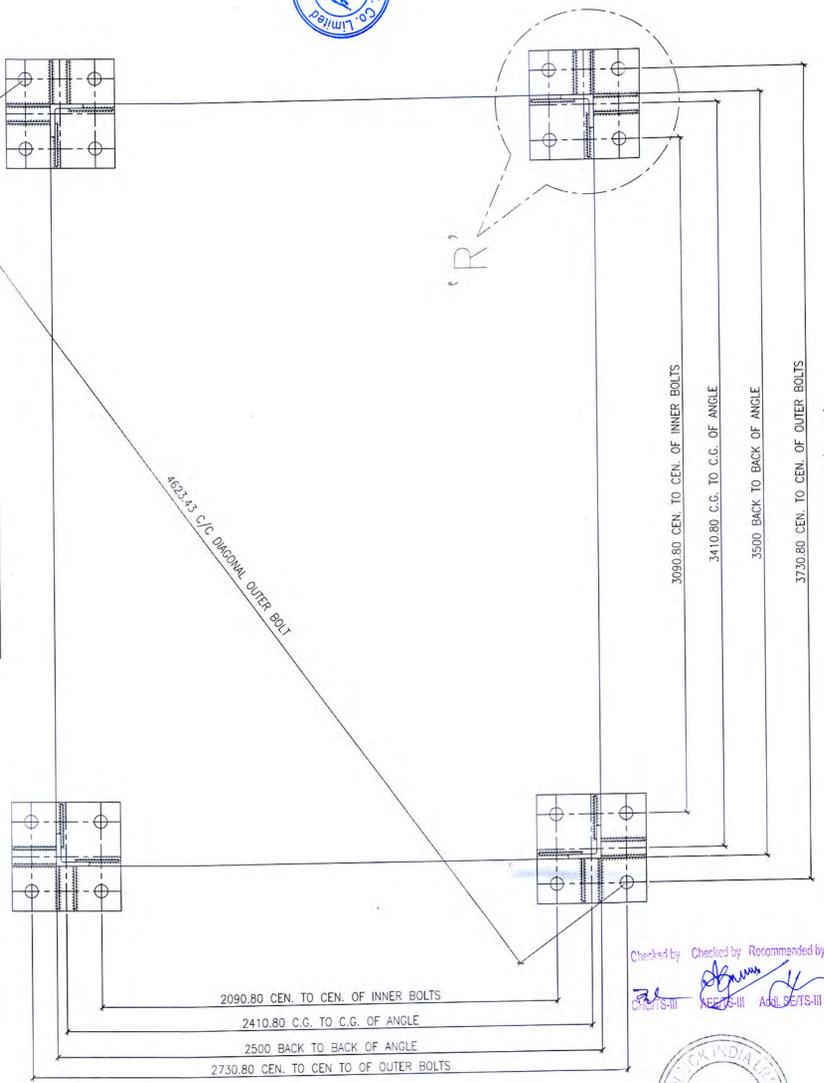


TRANSVERSE FACE

LONGITUDINAL FACE



- NOTES :-**
- ALL DIMENSIONS ARE IN MILLIMETRES & ELEVATIONS ARE IN METRE.
  - UNNOTED BRACINGS ARE L45 x 45 x 5 WITH 23 mm BACK MARK.
  - UNLESS OTHERWISE NOTED ALL HOLES ARE 17.5φ HOLES FOR 16φ BOLT.
  - ALL WELDS SHALL BE 6 mm FILLET WELD UNLESS SPECIFIED OTHERWISE.
  - UNLESS OTHERWISE NOTED ALL GUSSETS ARE 6 mm THICK.
  - a) F.C- DENOTES FLANGE CUT  
b) C.H - DENOTES CHAMFER
  - ALL STEEL MEMBERS SHALL CONFORM TO IS:2062, GRADE-A.
  - GALVANISING SHALL BE DONE AS PER I.S. 2629 / I.S. 4759. MINIMUM ZINC COATING SHALL BE 610 GMS/SQ. MT.
  - ALL ITEM NOS. TO BE PREFIXED WITH 'CTB'.



SECTION 'C-C'  
(PLAN AT BASE PLATE LEVEL)

Approval of the Contractor's drawings shall not be held to hold the contractor to meet all the requirements of the specifications or the responsibility of the contractor's design & correctness of the drawings of design.

Checked by: *[Signature]*  
Checked by: *[Signature]*  
Recommended by: *[Signature]*  
Approved by: *[Signature]*

CHITESH SHARMA  
ANIL KUMAR  
ADARSH SETHI  
DR. CERNI



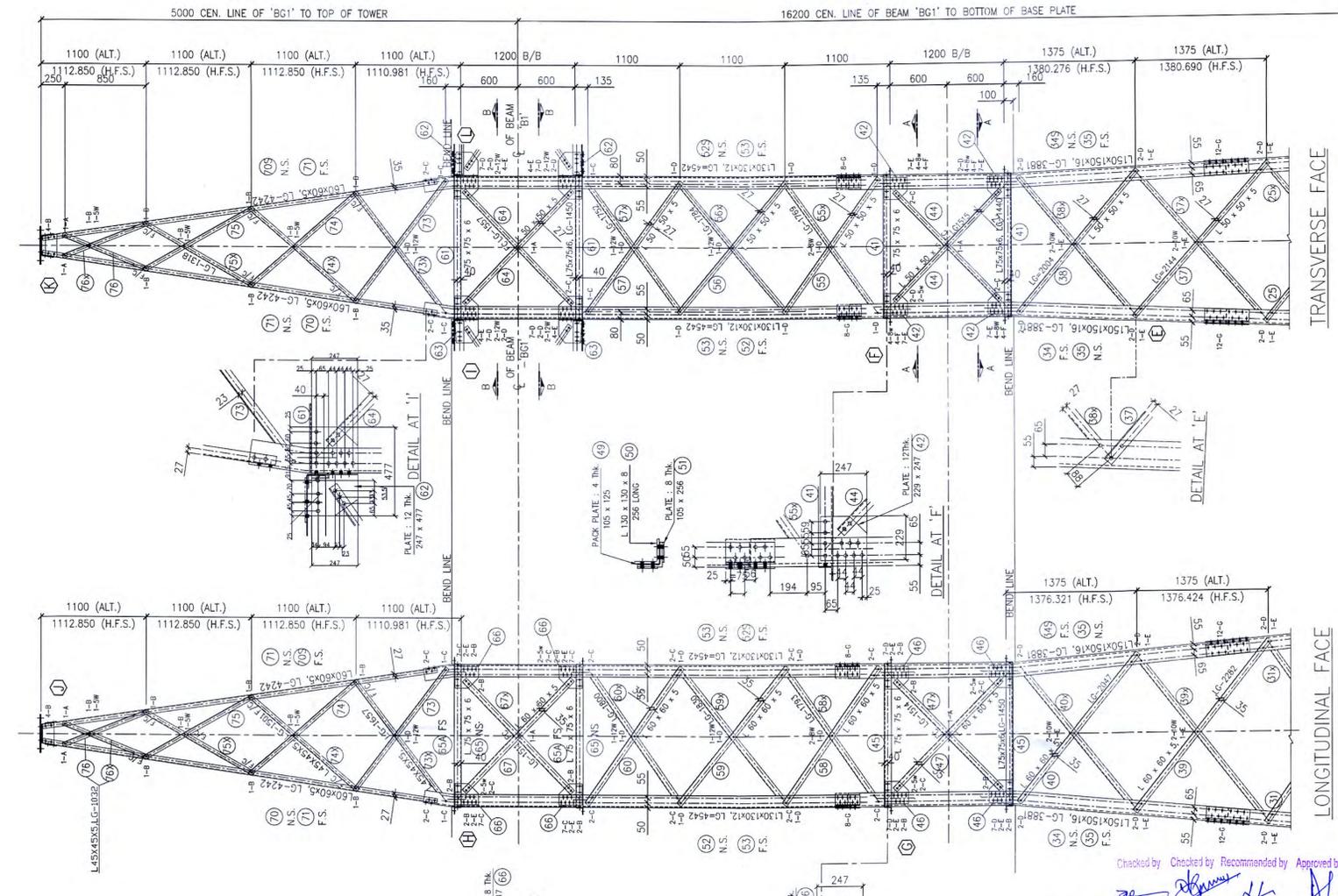
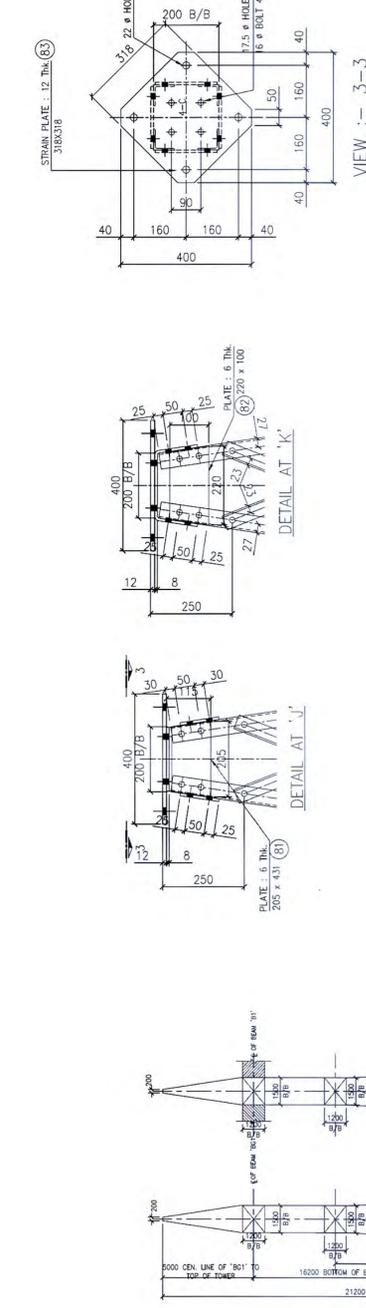
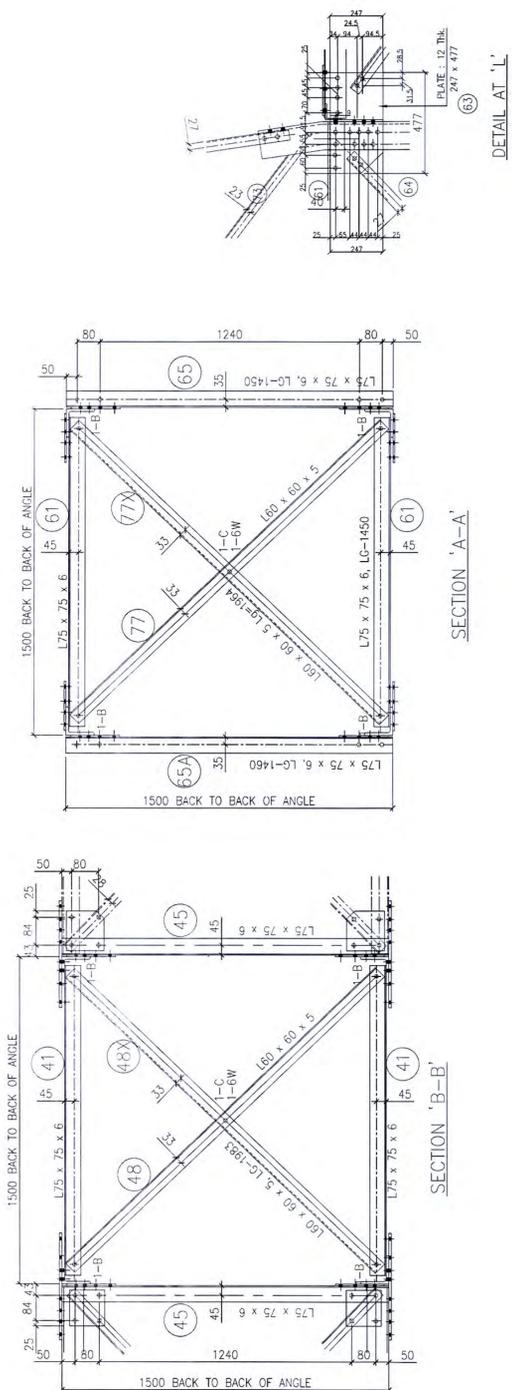
**PROTO CORRECTED**

CLIENT:	PUNJAB STATE TRANS. CO. LTD TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA		
PROJECT:	CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)		
EPC CONTRACTOR:	GODREJ & BOYCE MFG. CO. LTD. PILGUSHAHADAR, VISHNOLI WEST, MUMBAI MAHARASHTRA (INDIA)		
NOA No.:	1060/STQ-3063, DATED-06/09/2021		
MANUFACTURER:-	GOODLUCK INDIA LIMITED		
TITLE:-	220KV TOWER TYPE STRUCTURE MKD. "CTB"		

REFR. DRG. NO.	DESCRIPTION	DRAWN	CHECKED	APPROVED	FOR APPROVAL	STATUS
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REV.	DESCRIPTION	Name: <i>[Blank]</i> Date: <i>[Blank]</i>	Name: <i>[Blank]</i> Date: <i>[Blank]</i>	Name: <i>[Blank]</i> Date: <i>[Blank]</i>	FOR APPROVAL	

DRAWING No.	TOTAL SH.	SH.No.	REV.
GLIL/ROP/220KV/FAB/DRG/004	01	01	00
SCALE	DATE	DATE	DATE
1:300	01	01	00

This drawing and design is the property of Godrej & Boyce Mfg. Co. Ltd. and must not be copied or lent without prior permission in writing.



- NOTES :-**
1. ALL DIMENSIONS ARE IN MILLIMETRES & ELEVATIONS ARE IN METRE.
  2. UNNOTED BRACINGS ARE L45 x 45 x 5 WITH 23 mm BACK MARK.
  3. UNLESS OTHERWISE NOTED ALL HOLES ARE 17.5 $\phi$  HOLES FOR 16 $\phi$  BOLT.
  4. ALL WELDS SHALL BE 6 mm FILLET WELD UNLESS SPECIFIED OTHERWISE.
  5. UNLESS OTHERWISE NOTED ALL GUSSETS ARE 6 mm THICK.
  6. a) F.C - DENOTES FLANGE CUT  
b) C.H - DENOTES CHAMFER
  7. ALL STEEL MEMBERS SHALL CONFORM TO IS:2062, GRADE-A.
  8. GALVANISING SHALL BE DONE AS PER I.S. 2629 / I.S. 4759. MINIMUM ZINC COATING SHALL BE 610 GMS/SQ. MT.
  9. ALL ITEM NOS. TO BE PREFIXED WITH 'CTB'.

Checked by: *[Signature]*  
 Recommended by: *[Signature]*  
 Approved by: *[Signature]*

**PROTO CORRECTED**

Stamp: *[Circular stamp with text]*

CLIENT: PUNJAB STATE TRANS. CO. LTD  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: CONSTRUCTION OF 400/220KV AIS  
 SUB-STATION AT ROPAR, (PUNJAB)

EPC CONTRACTOR: GODREJ & BOYCE MFG. CO. LTD.  
 PRODHANAGAR, WEHOLI WEST,  
 MUMBAI  
 MAHARASHTRA (INDIA)

NOA No.: 1060/STQ-3063, DATED-05/09/2021

MANUFACTURER:- GOODLUCK INDIA LIMITED

TITLE:- 220KV TOWER TYPE STRUCTURE MKD. "CTB"

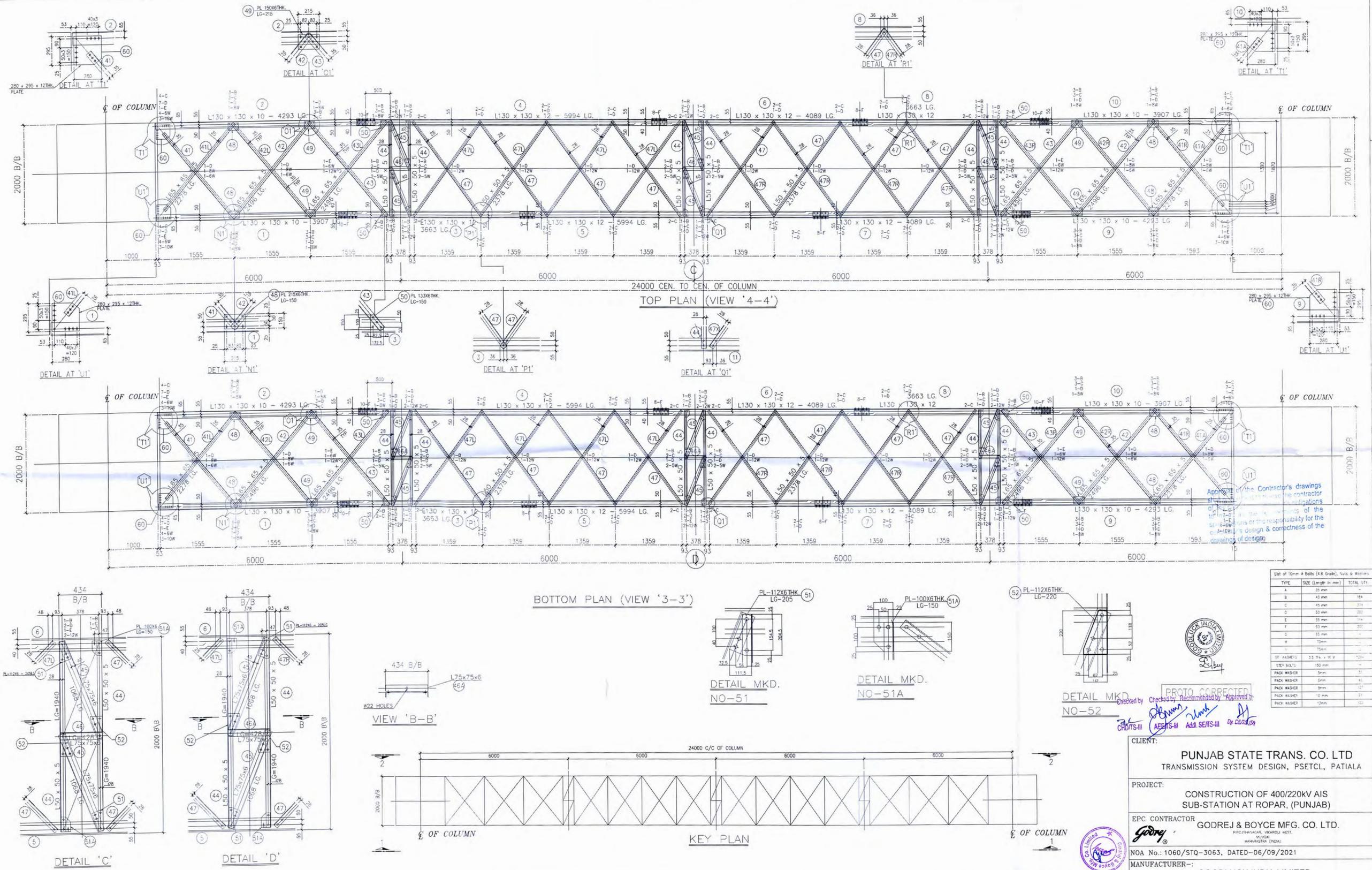
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2						1:300	02 OF 03	

# **220 kV Tower Type Structure Mkd “CTC”**



# **400 kV Beam Type Structure Mkd “G1”**

This drawing and design is the property of **Goody** and must not be copied or lent without prior permission in writing



TYPE	SIZE (Length in mm)	TOTAL QTY
A	25 mm	-
B	42 mm	184
C	45 mm	314
D	50 mm	281
E	55 mm	114
F	60 mm	200
G	65 mm	-
H	70 mm	-
I	75 mm	-
SP. WASHER	25 dia x 18 x 3	124
SP. BOLTS	150 mm	-
PACK WASHER	50 mm	21
PACK WASHER	50 mm	80
PACK WASHER	50 mm	127
PACK WASHER	50 mm	21
PACK WASHER	50 mm	100

CLIENT: **PUNJAB STATE TRANS. CO. LTD**  
TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: **CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **Goody** GODREJ & BOYCE MFG. CO. LTD.  
PUNJAB, INDIA

NOA No.: 1060/STQ-3063, DATED-06/09/2021

MANUFACTURER: **GOODLUCK INDIA LIMITED**

TITLE: **400KV BEAM TYPE STRUCTURE MKD. "G1"**

Checked by: *[Signature]*  
Checked by: *[Signature]*  
Recomm. by: *[Signature]*  
Approved by: *[Signature]*

REFR. DRG. NO.	DESCRIPTION	DRAWN	CHECKED	APPROVED	FOR APPROVAL	DRAWING No.	TOTAL SH.	SH.No.	REV.
RO	FIRST ISSUE	Name Date	Name Date	Name Date	STATUS	G11/ROP/400KV/FAB/DRG/005	02	01 OF 02	00
REV.	DESCRIPTION	Name Date	Name Date	Name Date	STATUS		SCALE 1:300		

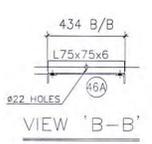
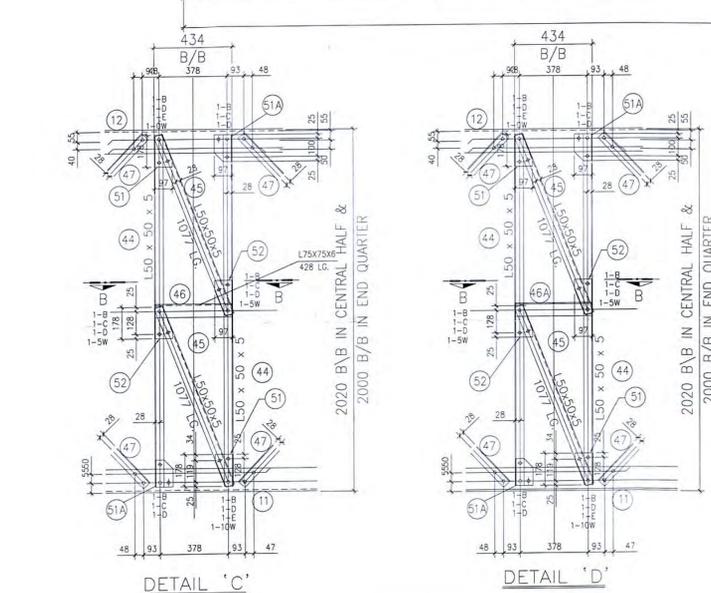
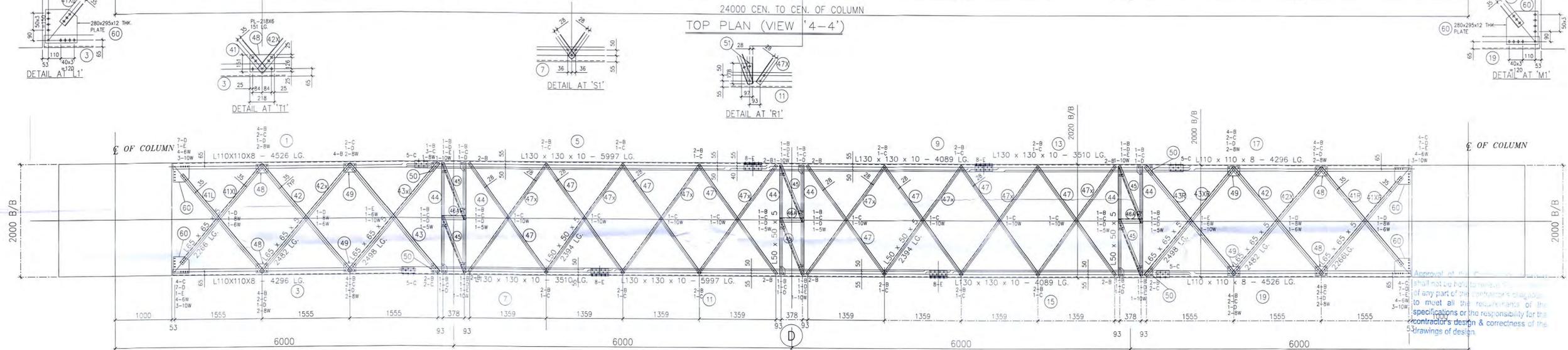
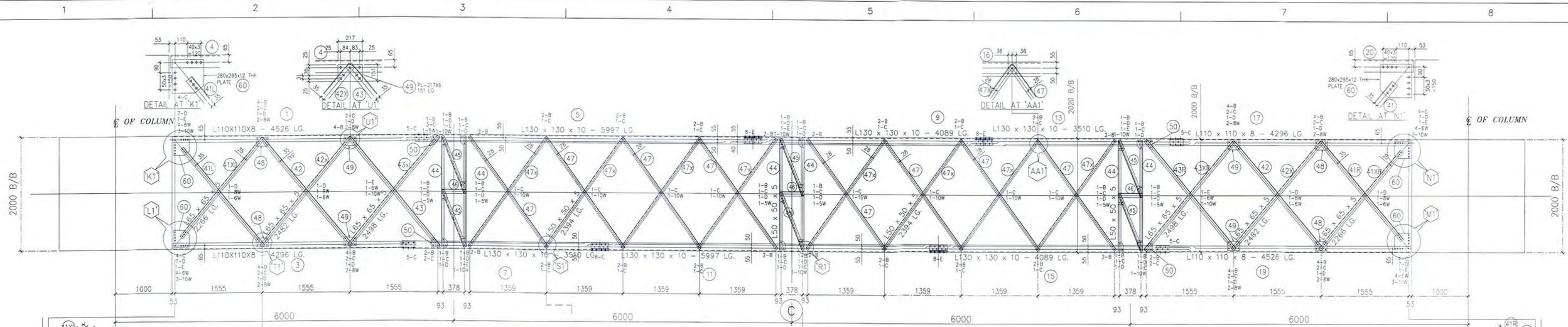


# **220 kV Tower Type Structure Mkd “CTG”**

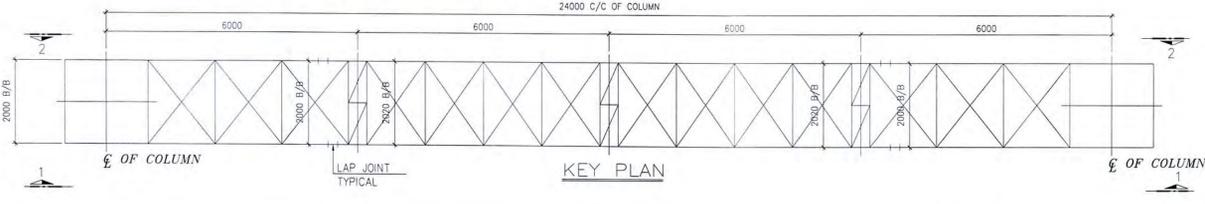


# **400 kV Beam Type Structure Mkd “G2**

This drawing and design is the property of **Godrej** and must not be copied or lent without prior permission in writing.



- NOTES:-**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL STRUCTURAL STEEL ARE AS PER IS:2062 GRADE A (E 250) & FABRICATION AS PER IS:802
  3. ALL WELDS ARE 6MM FILLET CONTINUOUS WELD UNLESS OTHERWISE SPECIFIED.
  4. WELDING SHALL BE AS PER IS:816(LATEST REVISION) OR ELECTRIC WELDING.
  5. ALL STRUCTURAL STEEL SHALL BE GALVANIZED AS PER SPECIFICATION AND IS:4759. MINIMUM COATING THICKNESS SHALL BE 610 g/m<sup>2</sup>.
  6. ALL BOLTS AND OTHER FASTENER SHALL BE GALVANIZED AS PER IS:1367 PART (13).
  7. ALL BOLTS,NUTS AND LOCK NUTS SHALL CONFORM TO REQUIREMENTS OF IS:1367(LATEST REVISION)
  8. ALL BOLT HOLES ARE 17.5φ FOR M16 BOLTS UNLESS NOTED OTHERWISE.
  9. ALL FASTENERS,SPRINGS AND WASHERS SHALL BE FULLY GALVANIZED.
  10. 2% EXTRA NUTS AND BOLTS SHALL BE PROCURED FOR ERECTION.
  11. ALL ITEMS TO BE PREFIXED WITH 'G2' THAT IS G2-1, G2-2, SO ON.



Checked by *[Signature]* Recommended by *[Signature]* Approved by *[Signature]*  
 CHDTS-III AEE/22-III Addl. SEITS-III Dy. CE/2021

PROTO CORRECTED

CLIENT: **PUNJAB STATE TRANS. CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: **CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **GODREJ & BOYCE MFG. CO. LTD.**  
 PRODHANANGAR, VIKHROLI, WEST, MUMBAI, MAHARASHTRA, (INDIA)

NOA No.: 1060/STQ-3063, DATED-06/09/2021

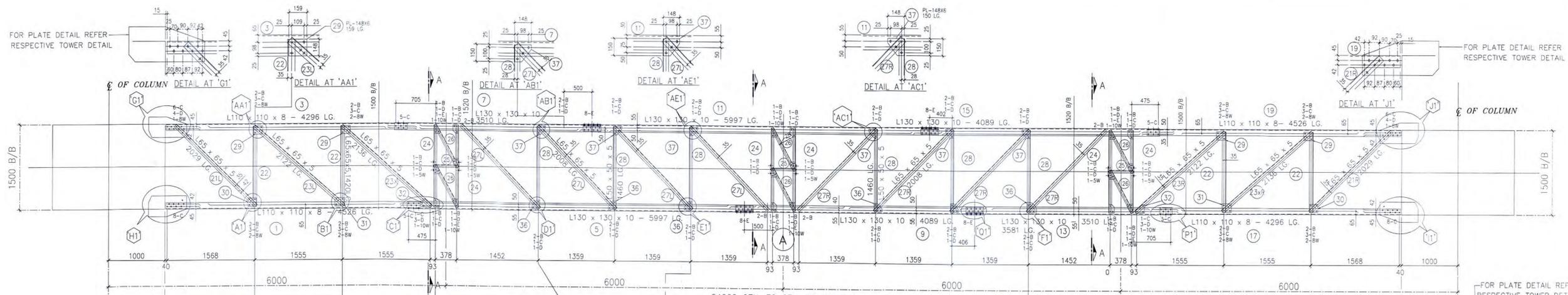
MANUFACTURER:- **GOODLUCK INDIA LIMITED**

TITLE:- **400KV BEAM TYPE STRUCTURE MKD. "G2"**

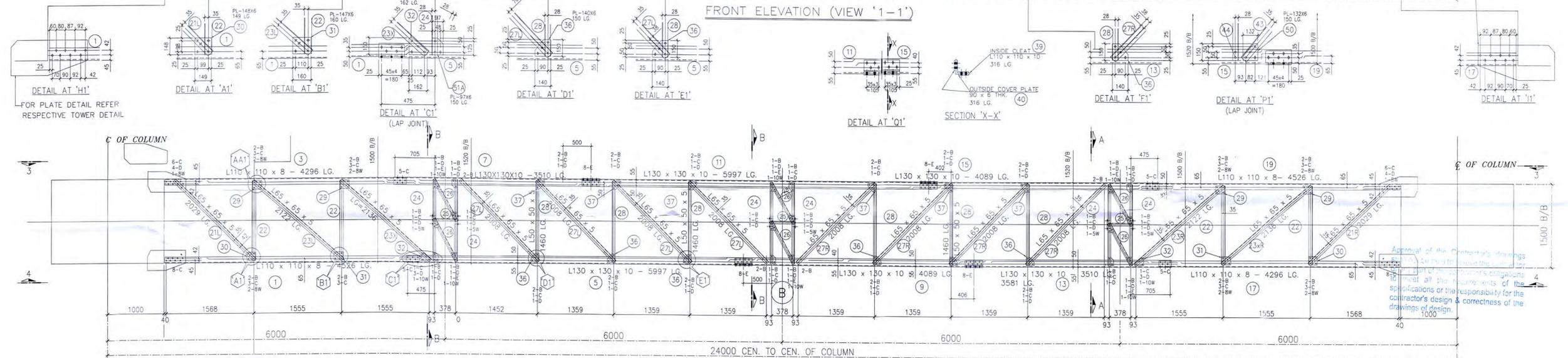
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REV.	DESCRIPTION	DATE	BY	CHECKED	DATE	BY	APPROVED	DATE	BY	FOR APPROVAL	DATE	BY	STATUS

DRAWING No.	TOTAL SH.	SH.No.	REV.
GLIL/ROP/400KV/FAB/DRG/006	02	01 OF 02	00

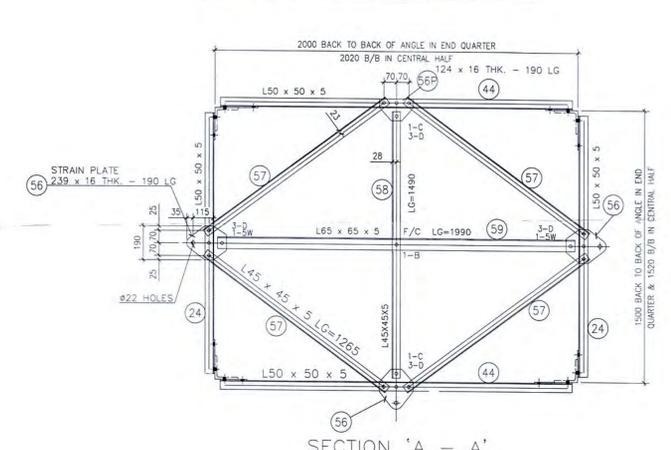
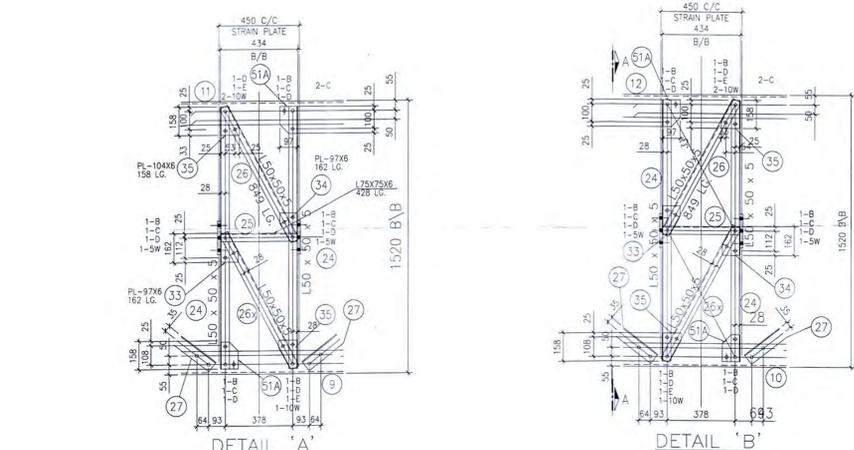
This drawing and design is the property of **Godrej** and must not be copied or lent without prior permission in writing.



FRONT ELEVATION (VIEW '1-1')



REAR ELEVATION (VIEW '2-2')



List of 16mm  $\phi$  Bolts (4.6 Grade), Nuts & Washers.

TYPE	SIZE (Length in mm)	TOTAL QTY.
A	35 mm	-
B	40 mm	260
C	45 mm	334
D	50 mm	230
E	55 mm	224
F	60 mm	12
G	65 mm	-
H	70mm	-
I	75mm	-
SP. WASHERS	3.5 Thk. x 16 $\phi$	1060
STEP BOLTS	150 mm	-
PACK WASHER	5mm	38
PACK WASHER	6mm	44
PACK WASHER	8mm	80
PACK WASHER	10 mm	116
PACK WASHER	12mm	-

Checked by: *[Signature]* Recommended by: *[Signature]* Approved by: *[Signature]*

CREDITS: III

Advt. SECTS-III

By: CENTS

PROTO CORRECTED



CLIENT: PUNJAB STATE TRANS. CO. LTD  
TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)

EPC CONTRACTOR: GODREJ & BOYCE MFG. CO. LTD.  
PLOT: MANUSAR, VIKHROU WEST, WARD: MANUSAR (INDIA)

NOA No.: 1060/STQ-3063. DATED-06/09/2021

MANUFACTURER: GOODLUCK INDIA LIMITED

TITLE: 400KV BEAM TYPE STRUCTURE MKD. "G2"

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6											
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8											



# **220 kV Tower Type Structure Mkd “CTH”**

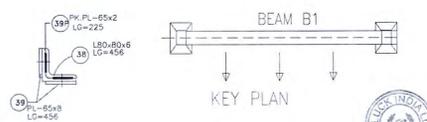
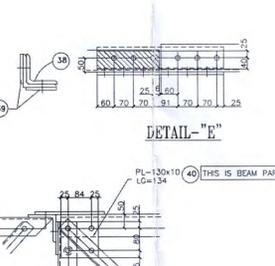
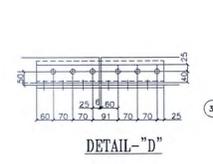
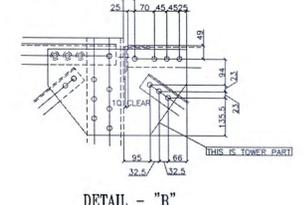
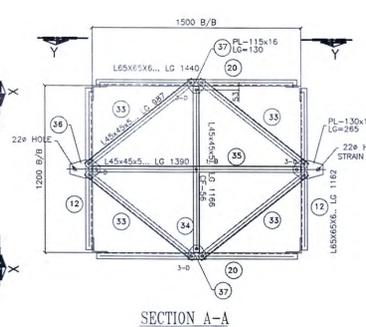
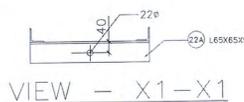
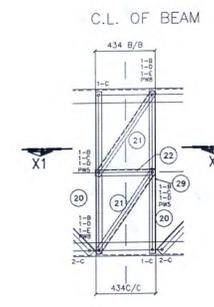
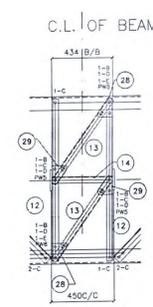
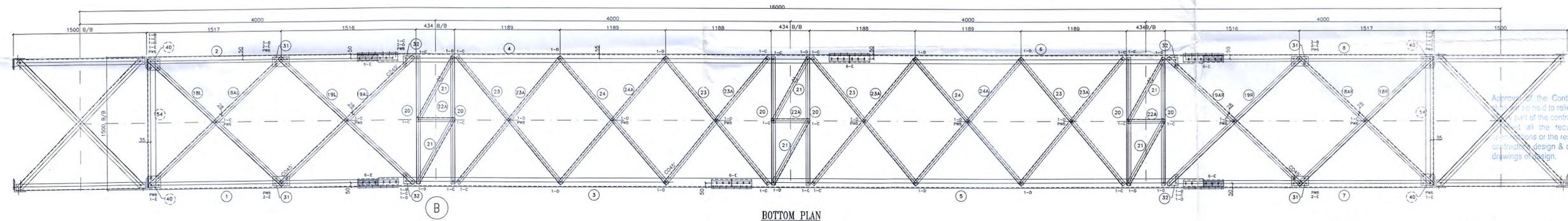
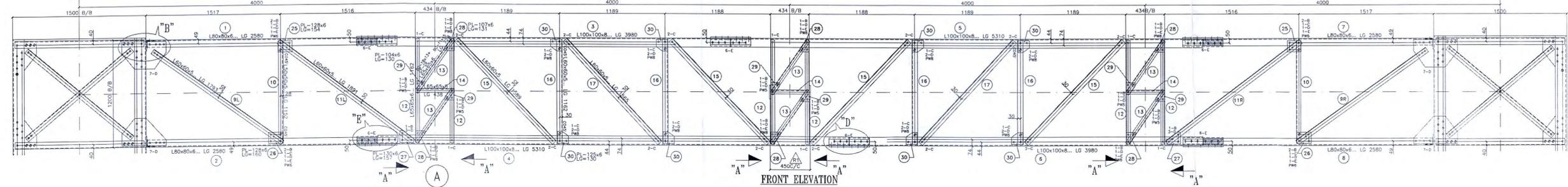
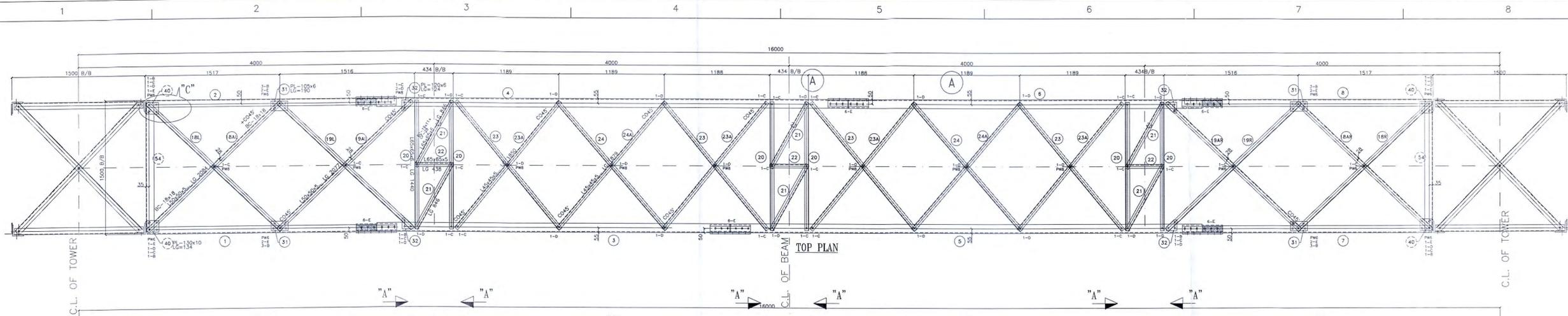


# **220 kV Beam Type Structure Mkd “CTJ”**



# **220 kV Beam Type Structure Mkd “B1”**

This drawing and design is the property of Gody and must not be copied or lent without prior permission in writing



BO LTS/NUT STATEMENT WITH 5% EXTRA

TYPE	SIZE	QTY.	REMARKS
	SPRING, WASHER	680	
B	30 00X8 THK PACK, WASHER	40	
G	30 00X6 THK PACK, WASHER	44	
	STEP BOLT #18x175	-	
F	DIA 16X55 Lg.	-	
E	DIA 16X50 Lg.	176	
D	DIA 16X45 Lg.	262	
C	DIA 16X40 Lg.	156	
B	DIA 16X35 Lg.	86	

- NOTES :-
1. ALL DIMENSIONS ARE IN MM.
  2. ALL STEEL AS PER IS:2062 & FABRICATION SHALL BE AS PER IS:802.
  3. BOLTS, NUTS AS PER IS:6639 (PROPERTY CLASS 5.6)
  4. GALVANISING SHALL BE 610 GM/MT. SQ.
  5. ALL HOLES 17.5 MM DIA FOR 16 MM DIA. BOLT IF NOT STATED OTHERWISE.
  6. 5% EXTRA NUTS & BOLTS SHALL BE SUPPLIED FOR ERECTION.
  7. ALL ITEMS TO BE PREFIXED WITH 'B1' THAT IS B1-1, B1-2, SO ON.
  8. UNNOTED BRACING ARE L45X45X5 WITH 23MM BACK MARK.
  9. WELDING SHALL BE DONE AS PER IS:816.
  10. ALL MEMBERS, BOLTS, NUTS, WASHER SHALL BE HOT DIP GALVANIZED SPRING WASHERS SHALL BE ELECTRO GALVANIZED.

Checked by *[Signature]*  
 Checked by *[Signature]*  
 Recommended by *[Signature]*  
 Approved by *[Signature]*

PROTO CORRECTED

CLIENT: PUNJAB STATE TRANS. CO. LTD  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: CONSTRUCTION OF 400/220KV AIS  
 SUB-STATION AT ROPAR, (PUNJAB)

EPC CONTRACTOR: GODY & BOYCE MFG. CO. LTD.  
 PICHGHANAGAR, VIKHROU WEST,  
 MUMBAI  
 MAHARASHTRA, (INDIA)

NOA No.: 1060/STQ-3063, DATED-06/09/2021

MANUFACTURER:- GOODLUCK INDIA LIMITED

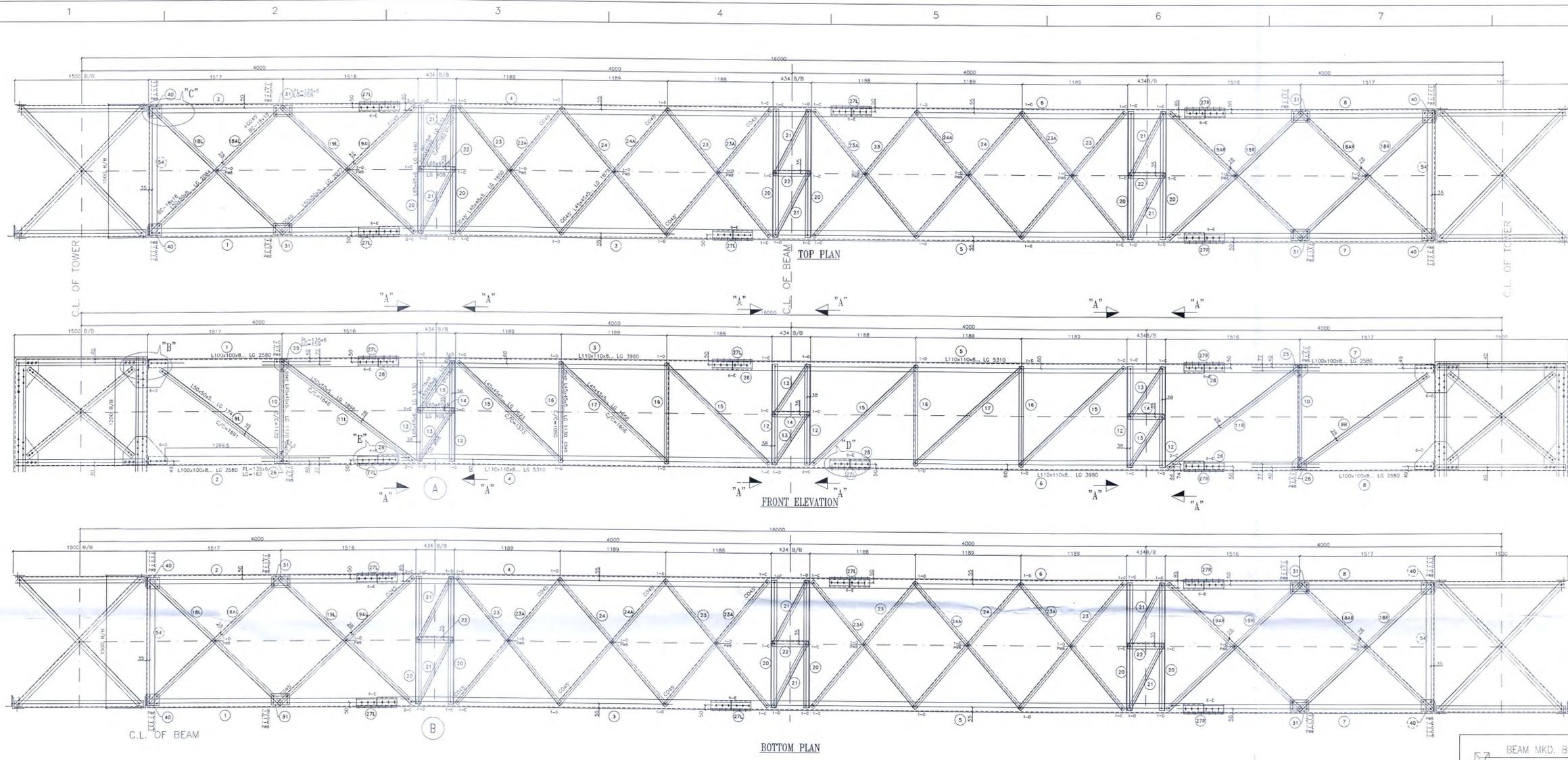
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REFR. DRG. NO.	DESCRIPTION	DATE	BY	FOR APPROVAL	DATE	BY	STATUS
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					17.01.22		REV.

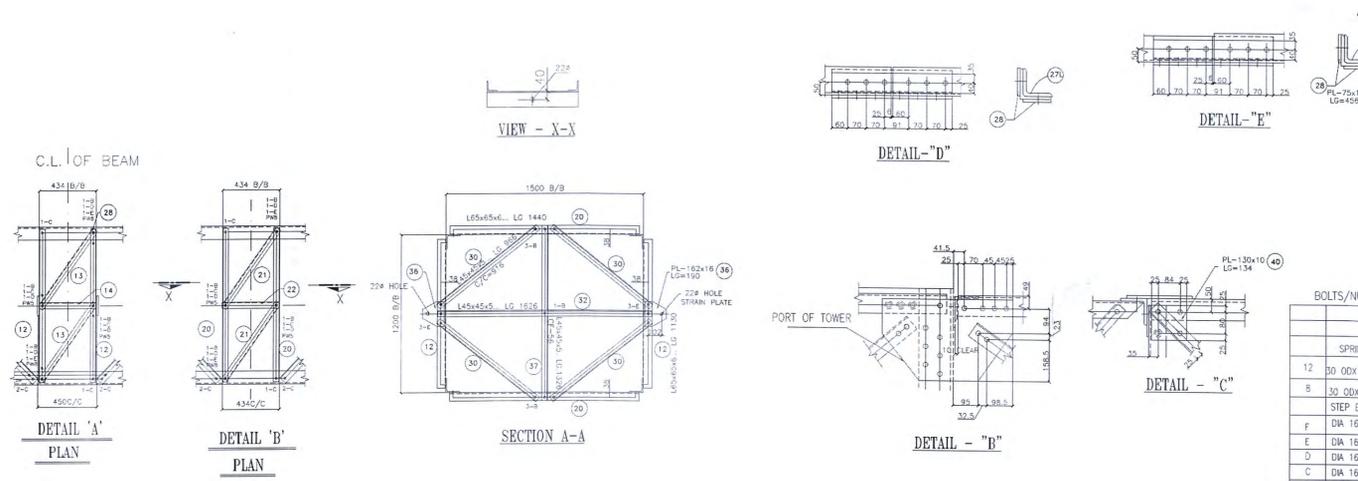
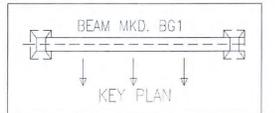
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 TOTAL SH. 01  
 SCALE 1:300  
 SH.No. 01 OF 01  
 REV. 00

# **220 kV Beam Type Structure Mkd “BG1”**

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Approval of the Contractor's design shall not be held to relieve the contractor of any part of the contractor's liability to meet all the requirements, specifications or the responsibility for contractor's design & correctness of the drawings of design.



**BOLTS/NUT STATEMENT WITH 2% EXTRA**

TYPE	SIZE	QTY.	REMARK
		562	SPRING WASHER
12	30 ODDX12 THK PACK WASHER	-	
B	30 ODDX8 THK PACK WASHER	44	STEP BOLT Ø16x175
F	DA 16X35 Lg.	-	
E	DA 16X50 Lg.	192	
D	DA 16X45 Lg.	158	
C	DA 16X40 Lg.	126	
B	DA 16X35 Lg.	86	

- NOTES:-**
1. ALL DIMENSIONS ARE IN MM.
  2. ALL STEEL AS PER IS-2062 & FABRICATION SHALL BE AS PER IS-802.
  3. BOLTS, NUTS AS PER IS-6639 (PROPERTY CLASS 5.6)
  4. GALVANISING SHALL BE 610 GM/MT. 50.
  5. ALL HOLES 17.5 MM DIA FOR 16 MM DIA. BOLT IF NOT STATED OTHERWISE.
  6. 2% EXTRA NUTS & BOLTS SHALL BE SUPPLIED FOR ERECTION.
  7. ALL ITEMS TO BE PREFIXED WITH 'BG1' THAT IS BG1-1, BG1-2, SO ON.

Checked by: *[Signature]*  
 Checked by: *[Signature]*  
 Recommended by: *[Signature]*  
 Approved by: *[Signature]*



PROTO CORRECTED

CLIENT: **PUNJAB STATE TRANS. CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSETCL, PATIALA

PROJECT: **CONSTRUCTION OF 400/220KV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **GODREJ & BOYCE MFG. CO. LTD.**  
 PLOT 20, PHASE II, INDUSTRIAL AREA, WEST, GURGAON, HARYANA (INDIA)

NOA No.: 1060/STQ-3063, DATED-06/09/2021

MANUFACTURER:- **GOODLUCK INDIA LIMITED**

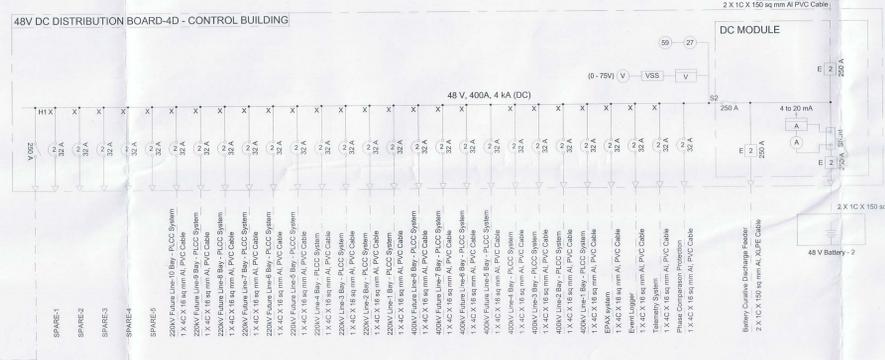
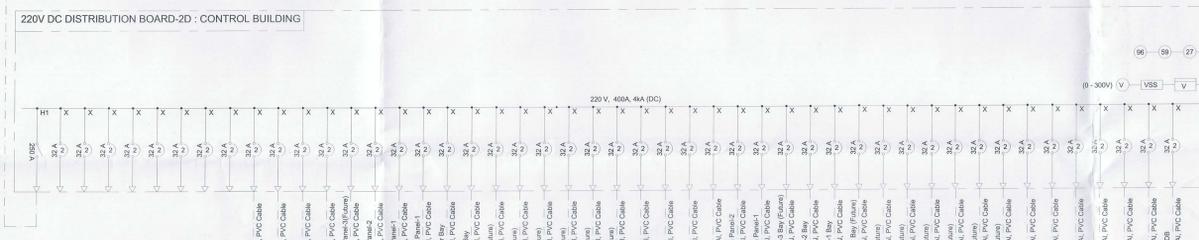
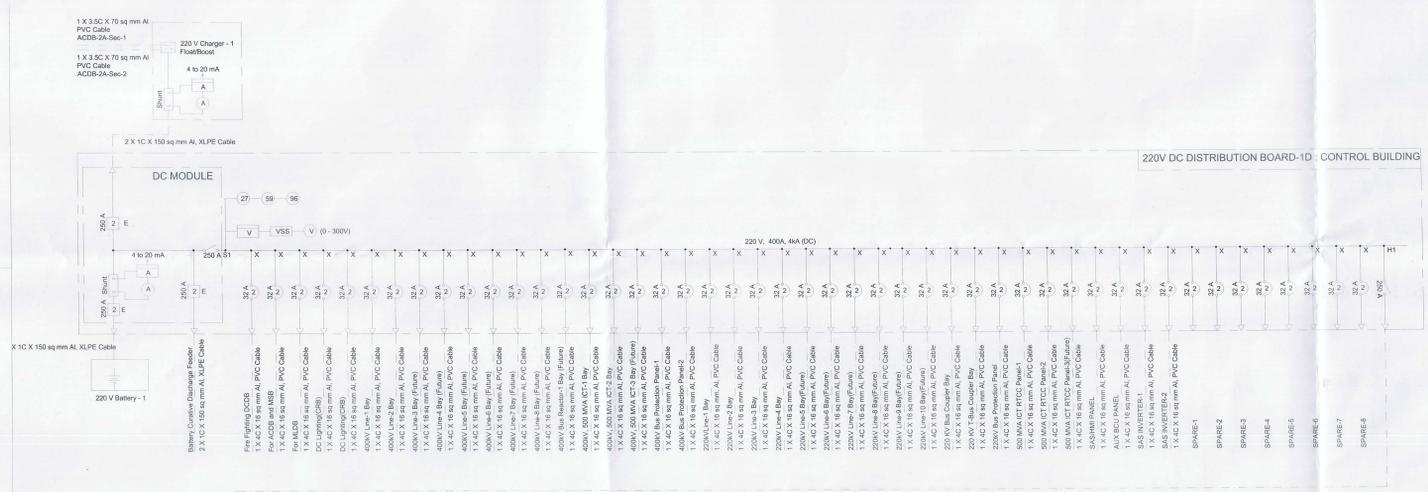
TITLE:- **220KV BEAM TYPE STRUCTURE MKD. "BG1"**

REFR. DRG. NO.	DESCRIPTION	DATE	BY	FOR APPROVAL	STATUS
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DRAWING No. **GLIL/ROP/220KV/FA3/DRG/011**  
 TOTAL SH. **01** SH.No. **01** REV. **00**  
 SCALE **1:300**

**400/220 kV AIS Substation –  
Single Line Diagram for AC/DC  
Switchgear**

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**LEGENDS :**

Legend	Description
	Air Circuit Breaker
	4 Pole MCCB
	2 Pole MCCB
	2 Pole MCB
	Contactor
	Air Break Switch
	Ampsere Transducer
	Voltage Transducer
	Indication Lamp
	Ammeter Selector Switch
	Voltmeter Selector Switch
	Ammeter
	Voltmeter
	Kilowatt Meter
	Kilowatt Hour Meter
	Frequency Meter
	Timer
	Under Voltage Relay
	Instantaneous Over-current Relay/Releases
	Instantaneous Earth Fault Relay/Releases
	IDMT Earth Fault Relay/Releases
	IDMT Earth Fault Relay/Releases
	Voltage Controlled Definite Time Over-current Relay
	Over-Voltage Relay
	Differential Relay
	High Speed Tripping Relay
	HRC Fuse
	Fuse
	Voltage Monitoring Relay

- NOTES :**
- NO TWO AC SOURCES SHALL BE PARALLELED AT ANY STAGE.
  - DG SET SHALL BE OF AUTO START TYPE.
  - THE BOARD SHALL BE DOUBLE FRONT, FIXED TYPE DESIGN FOR ALL MODULES EXCEPT AIR CIRCUIT BREAKER MODULE, WHICH SHALL BE DRAW OUT TYPE.
  - ALL BOARDS SHALL BE OF METAL ENCLOSED, INDOOR FLOOR MOUNTED COMPARTMENTALISED CONSTRUCTION AND FREE STANDING TYPE.
  - ALL BOARDS SHALL BE OF DUST & VERMIN PROOF CONSTRUCTION & SHALL BE PROVIDED WITH DEGREE OF PROTECTION OF IP20. BUS BAR CHAMBERS SHALL HAVE DEGREE OF PROTECTION OF IP42. LIGHTING TRANSFORMER SHALL BE INSTALLED IN SEPARATE MODULE IN RESPECTIVE LIGHTING DISTRIBUTION BOARDS. DEGREE OF PROTECTION FOR THIS MODULE SHALL BE AT LEAST IP31.
  - ALL BOARD FRAMES SHALL BE FABRICATED USING SUITABLE MILD STEEL STRUCTURE SECTIONS OR PRESSED AND SHAPED COLD-ROLLED SHEET STEEL OF THICKNESS NOT LESS THAN 2.0 MM. FRAMES SHALL BE ENCLOSED IN COLD-ROLLED SHEET STEEL OF THICKNESS NOT LESS THAN 1.8 MM.
  - INTERLOCKING OF BREAKER SHALL BE PROVIDED TO PREVENT PARALLELED OPERATION OF DG SET WITH NORMAL STATION SUPPLY.

- REFERENCE :**
- PGCIL TENDER STAGE DRAWINGS / DOCUMENTS -
  - TECHNICAL SPECIFICATION, SECTION: LT SWITCHGEAR
  - TECHNICAL SPECIFICATION, SECTION: POWER AND CONTROL CABLE
  - STANDARD SLD FOR AC/DC SYSTEM: PSTCL/TS/DH-060/R0

**CLIENT:**  
**PUNJAB STATE TRANSMISSION CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSTCL, PATIALA

**PROJECT:**  
**CONSTRUCTION OF 400/220kV AIS SUB-STATION AT ROPAR, (PUNJAB)**

**EPC CONTRACTOR:**  
**GODREJ & BOYCE MFG. CO. LTD.**  
 (INDIA) PRIVATE LIMITED  
 100, MARKET STREET,  
 MADRAS 600 002 (INDIA)

**NDA No.:** 1060/5/10-3063, DATED-06/09/2021

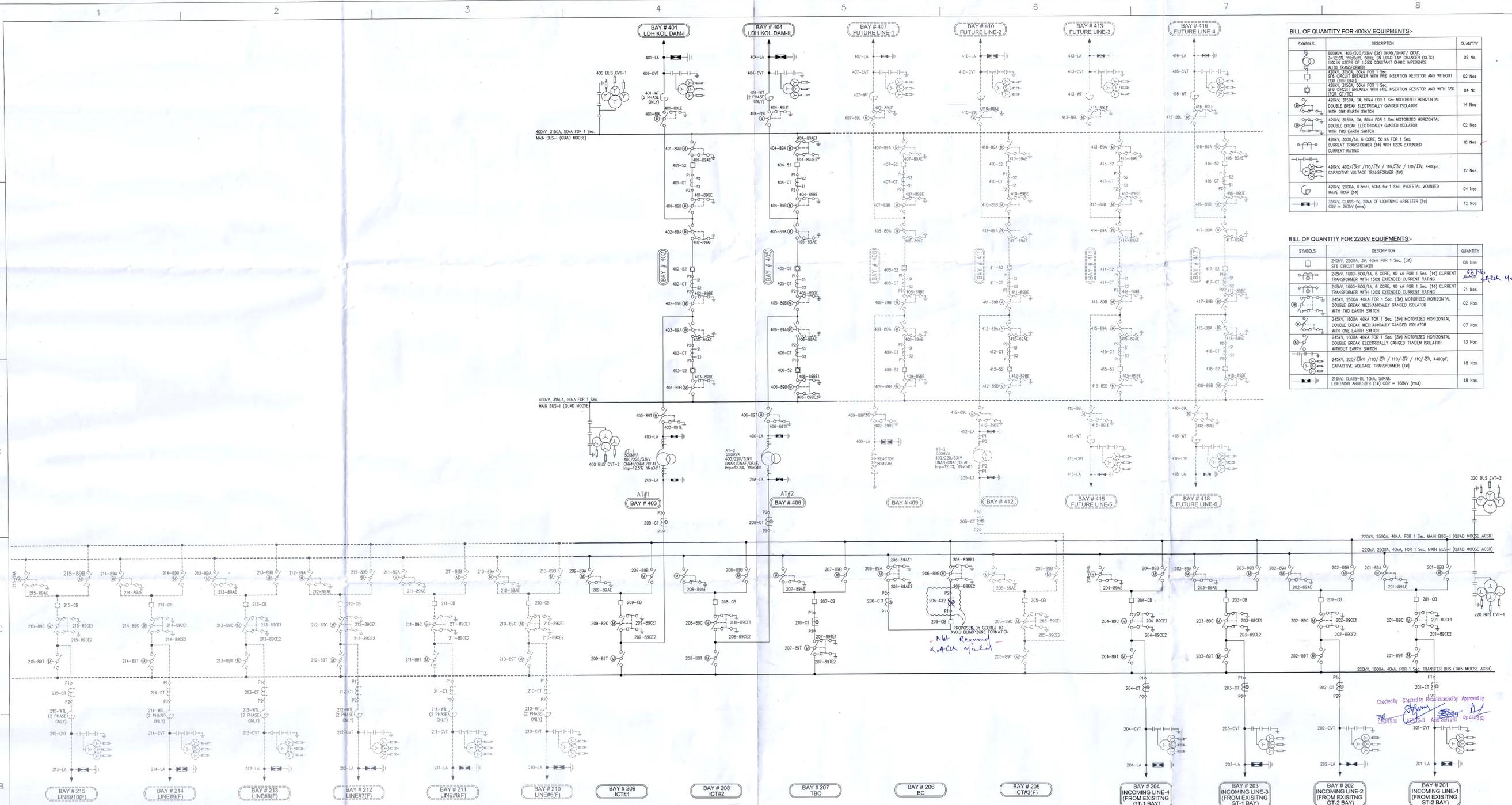
**400/220kV AIS SUBSTATION - SINGLE LINE DIAGRAM FOR AC/DC SWITCHGEAR**

REV	DESCRIPTION	DATE	BY	CHECKED	APPROVED	STATUS
01	FIRST ISSUE	09/09/2021	AM	AM	AM	FOR APPROVAL
02						APPROVED

DRAWING No.	TOTAL SHEETS	SH No.	REV
SVP010092-PSTCL-ROP-E-SLD-002	02	02	02

# **400/220kV AIS Substation – Single Line Diagram**

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**BILL OF QUANTITY FOR 400kV EQUIPMENTS:-**

SYMBOLS	DESCRIPTION	QUANTITY
	500MVA, 400/220/132kV (3) TRANSFORMER / BEAR 10% IN STEPS OF 1.25% CONSTANT OHMIC IMPEDANCE WITH TRANSFORMER	02 Nos
	420kV, 3150A, 34, 50kA FOR 1 Sec. 25% CIRCUIT BREAKER WITH PRE INSERTION RESISTOR AND WITHOUT DOUBLE BREAK ELECTRICALLY GANGED ISOLATOR	02 Nos
	420kV, 3150A, 34, 50kA FOR 1 Sec. MOTORIZED HORIZONTAL DOUBLE BREAK ELECTRICALLY GANGED ISOLATOR WITH ONE EARTH SWITCH	14 Nos
	420kV, 3150A, 34, 50kA FOR 1 Sec. MOTORIZED HORIZONTAL DOUBLE BREAK ELECTRICALLY GANGED ISOLATOR WITH TWO EARTH SWITCH	02 Nos
	420kV, 3000/1A, 6 CORE, 50 KA FOR 1 Sec. CURRENT TRANSFORMER (1A) WITH 120% EXTENDED CURRENT RATING	18 Nos
	420kV, 400/132kV / 110/132kV / 110/132kV, 4400pF, CAPACITIVE VOLTAGE TRANSFORMER (1A)	12 Nos
	420kV, 2000A, 0.5mH, 50kA FOR 1 Sec. PEDESTAL MOUNTED WAVE TRAP (1A)	04 Nos
	220kV, CLASS-II, 10kA, SURGE LIGHTNING ARRESTER (1A) (CVV = 28kV (rms))	12 Nos

**BILL OF QUANTITY FOR 220kV EQUIPMENTS:-**

SYMBOLS	DESCRIPTION	QUANTITY
	245kV, 2500A, 34, 40kA FOR 1 Sec. (34) SF6 CIRCUIT BREAKER	08 Nos
	245kV, 1600-800/1A, 6 CORE, 40 KA FOR 1 Sec. (14) CURRENT TRANSFORMER WITH 150% EXTENDED CURRENT RATING	21 Nos
	245kV, 1600-800/1A, 6 CORE, 40 KA FOR 1 Sec. (14) CURRENT TRANSFORMER WITH 120% EXTENDED CURRENT RATING	02 Nos
	245kV, 2500A, 40kA FOR 1 Sec. (34) MOTORIZED HORIZONTAL DOUBLE BREAK MECHANICALLY GANGED ISOLATOR WITH TWO EARTH SWITCH	07 Nos
	245kV, 1600A, 40kA FOR 1 Sec. (14) MOTORIZED HORIZONTAL DOUBLE BREAK MECHANICALLY GANGED ISOLATOR WITH ONE EARTH SWITCH	13 Nos
	245kV, 1600A, 40kA FOR 1 Sec. (14) MOTORIZED HORIZONTAL DOUBLE BREAK ELECTRICALLY GANGED TANDEM ISOLATOR WITHOUT EARTH SWITCH	18 Nos
	21kV, CLASS-II, 10kA, SURGE LIGHTNING ARRESTER (1A) (CVV = 16kV (rms))	18 Nos

**420kV CURRENT TRANSFORMER DETAILS**

CORE NO.	APPLICATION	RATIO	ACCURACY CLASS	MAX. CT SECONDARY WIND. RESIST. (mΩ) CORRECTED TO 75°C (OHMS)	EXCITATION CURRENT (mA) AT 1A	MINIMUM KNEE POINT VOLTAGE (kV) - VOLTS	OUTPUT BURDEN (VA)	ISF
1	BUS DIFFERENTIAL PROTECTION - BACKUP	3000-2000-500/1A	PX	15/10/2.5	20/30/120	3000/2000/500	-	-
2	BUS DIFFERENTIAL PROTECTION - MAIN	3000-2000-500/1A	PX	15/10/2.5	20/30/120	3000/2000/500	-	-
3	METERING	3000-2000-500/1A	0.2S	-	-	-	20	≤ 5
4	METERING	3000-2000-500/1A	0.2S	-	-	-	20	≤ 5
5	LINE PROTECTION/ TRANS. BACKUP	3000-2000-500/1A	PX	15/10/2.5	20/30/120	3000/2000/500	-	-
6	LINE PROTECTION/ TRANS. DIFF.	3000-2000-500/1A	PX	15/10/2.5	20/30/120	3000/2000/500	-	-

**400/220/132kV, 500MVA TRAF. BUSHING CT DETAILS**

S. NO.	PARTICULARS	REQUIREMENTS			
		CORE-1	CORE-2	CORE-1 + CORE-2	NEUTRAL
1	CT RATIO	1600/1A	1000/1A	1600/1A	1600/1A
2	MAX. KNEE PT. VOLTAGE (kV)	1600V	-	1600V	-
3	ACCURACY CLASS	PX	0.2S	PX	0.2S
4	VA BURDEN	-	20VA 1F/5S	-	20VA 1F/5S
5	MAX CT RESISTANCE	4 Ohms	-	4 Ohms	-
6	Impedance @ 1k	75mΩ	-	75mΩ	-
7	APPLICATION	REF. PROTIN	METERING	REF. PROTIN	METERING

**420kV CVT DETAILS**

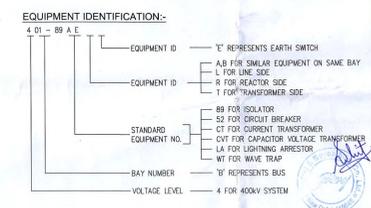
CORE NO.	APPLICATION	PRIMARY VOLTAGE (kV)	SECONDARY VOLTAGE (V)	OUTPUT BURDEN (VA)	ACCURACY CLASS
1	PROTECTION	420	110	50	0.5k3P
2	PROTECTION	420	110	50	0.5k3P
3	METERING	420	110	50	0.2

**220kV CT DETAILS**

CORE NO.	APPLICATION	RATIO	ACCURACY CLASS	MAX. CT SECONDARY WIND. RESIST. (mΩ) CORRECTED TO 75°C (OHMS)	EXCITATION CURRENT (mA) AT 1A	MINIMUM KNEE POINT VOLTAGE BURDEN (kV) - VOLTS	OUTPUT BURDEN (VA)	ISF
1	BUS DIFFERENTIAL CHECK	1600-800/1A	PX	8/4	25/50	1600/800	-	-
2	BUS DIFFERENTIAL MAIN	1600-800/1A	PX	8/4	25/50	1600/800	-	-
3	METERING	1600-800/1A	0.2S	-	-	-	20	≤ 5
4	METERING	1600-800/1A	0.2S	-	-	-	20	≤ 5
5	TRANSFORMER BACKUP/ LINE PROTECTION	1600-800/1A	PX	8/4	25/50	1600/800	-	-
6	TRANSFORMER DIFFERENTIAL/ LINE PROTECTION	1600-800/1A	PX	8/4	25/50	1600/800	-	-

**220kV CVT DETAILS**

CORE NO.	APPLICATION	PRIMARY VOLTAGE (kV)	SECONDARY VOLTAGE (V)	OUTPUT BURDEN (VA)	ACCURACY CLASS
1	PROTECTION	220	110	50	3P
2	PROTECTION	220	110	50	3P
3	METERING	220	110	50	0.2



CLIENT:  
**PUNJAB STATE TRANSMISSION CO. LTD**  
TRANSMISSION SYSTEM DESIGN, PSTCL, PATIALA

PROJECT:  
**CONSTRUCTION OF 400/220kV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR:  
**GODREJ & BOYCE MFG. CO. LTD.**  
PRODHANAGAR, BHARUJI WEST, MAHARASHTRA (INDIA)

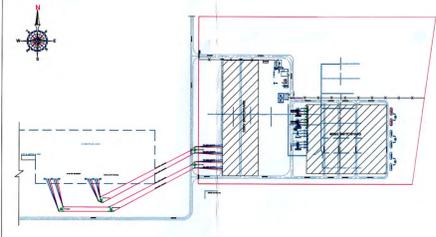
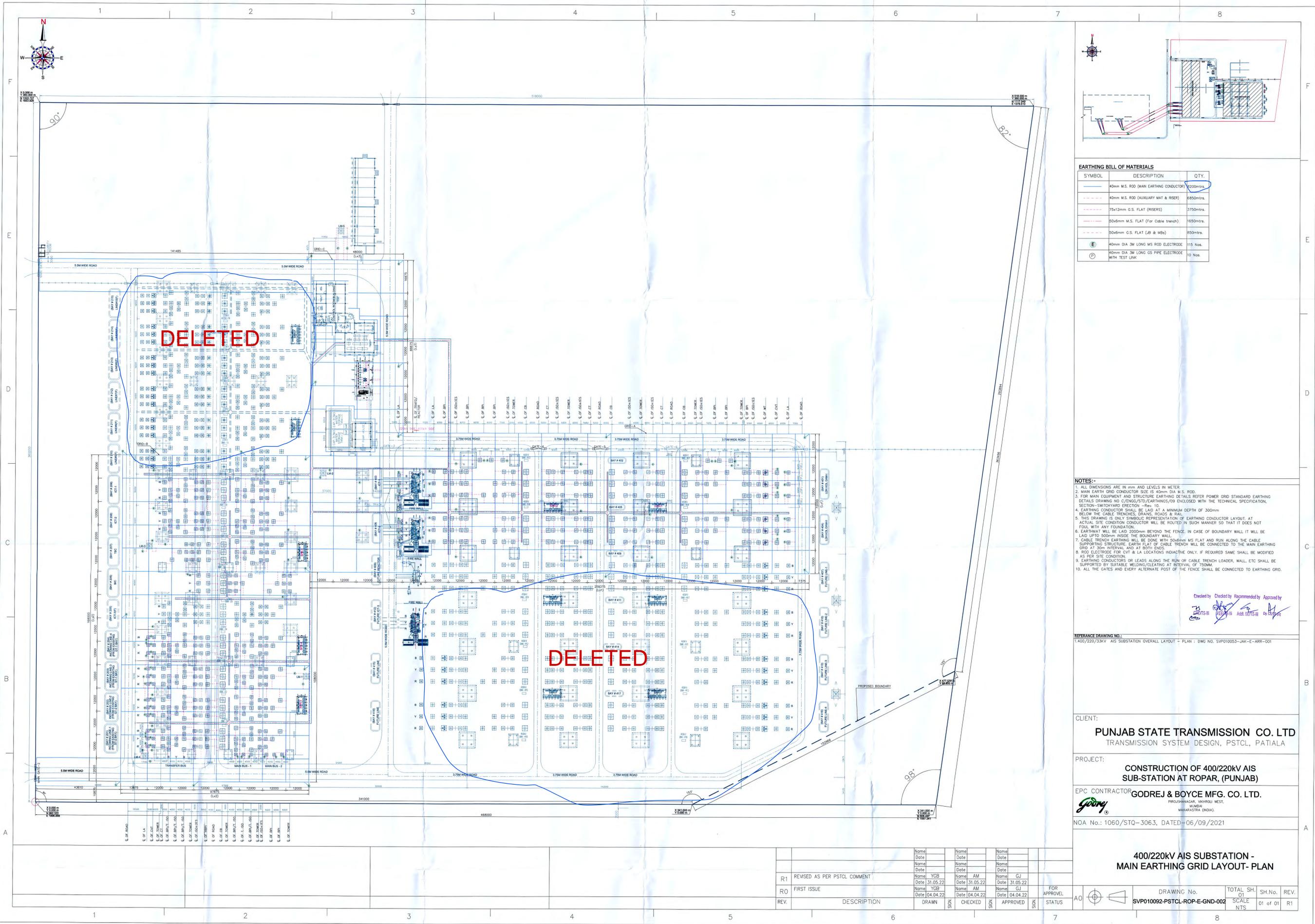
NOA No.: 1069/STQ-3063, DATED-06/09/2021

**400/220kV AIS SUBSTATION - SINGLE LINE DIAGRAM**

REFR. DRG. NO.	DESCRIPTION	DATE	BY	CHECKED	DATE	BY	FOR APPROVAL	TOTAL SH. OF	SH.No.	REV.
								01	01	RO

RR:5  
27.12.21

# **400/220 KV, AIS Substation Main Earthing Grid Layout Plan**



**EARTHING BILL OF MATERIALS**

SYMBOL	DESCRIPTION	QTY.
—	40mm M.S. ROD (MAIN EARTHING CONDUCTOR)	200mtrs.
- - - -	40mm M.S. ROD (AUXILIARY MAT & RISER)	850mtrs.
- - - - -	75x12mm G.S. FLAT (RISERS)	3750mtrs.
- - - - -	50x6mm M.S. FLAT (For Cable trench)	1650mtrs.
- - - - -	50x6mm G.S. FLAT (JB & MBs)	850mtrs.
(E)	40mm DIA 3M LONG MS ROD ELECTRODE	115 Nos.
(D)	40mm DIA 3M LONG GS PIPE ELECTRODE WITH TEST LINK	10 Nos.

- NOTES:-**
- ALL DIMENSIONS ARE IN mm AND LEVELS IN METER.
  - MAIN EARTH GRID CONDUCTOR SIZE IS 40mm DIA M.S. ROD.
  - FOR MAIN EQUIPMENT AND STRUCTURE EARTHING DETAILS REFER POWER GRID STANDARD EARTHING DETAILS DRAWING NO C/ENG/STD/EARTHING/09 ENCLOSED WITH THE TECHNICAL SPECIFICATION, SECTION-SWITCHYARD SECTION -row. 10.
  - EARTHING CONDUCTOR SHALL BE LAID AT A MINIMUM DEPTH OF 300mm BELOW THE CABLE TRENCH, GRAVING ROADS & RAIL.
  - THIS DRAWING IS ONLY SYMBOLIC REPRESENTATION OF EARTHING CONDUCTOR LAYOUT. AT ACTUAL SITE CONDITION CONDUCTOR WILL BE ROUTED IN SUCH MANNER SO THAT IT DOES NOT FOUL WITH ANY FOUNDATION.
  - EARTH MAT WILL BE LAID 2000mm BEYOND THE FENCE. IN CASE OF BOUNDARY WALL IT WILL BE LAID UP TO 500mm INSIDE THE BOUNDARY WALL.
  - CABLE TRENCH EARTHING WILL BE DONE WITH 50x6mm MS FLAT AND RUN ALONG THE CABLE SUPPORTING STRUCTURE. EARTH FLAT OF CABLE TRENCH WILL BE CONNECTED TO THE MAIN EARTHING GRID AT 30m INTERVAL AND AT BOTH ENDS.
  - ROD ELECTRODE FOR CVT & LA LOCATIONS INDUCTIVE ONLY. IF REQUIRED SAME SHALL BE MODIFIED AS PER SITE CONDITION.
  - EARTHING CONDUCTORS OR LEADS ALONG THE RUN OR CABLE TRENCH LOADER, WALL, ETC SHALL BE SUPPORTED BY SUITABLE WELDING/CLIPPING AT INTERVAL OF 750MM.
  - ALL THE GATES AND EVERY ALTERNATE POST OF THE FENCE SHALL BE CONNECTED TO EARTHING GRID.

Checked by: [Signature]  
 Recommended by: [Signature]  
 Approved by: [Signature]

REFERENCE DRAWING NO.:  
 1:400/220/33kV AIS SUBSTATION OVERALL LAYOUT - PLAN : DWG No. SVP010053-JAK-E-ARR-001

CLIENT:  
**PUNJAB STATE TRANSMISSION CO. LTD**  
 TRANSMISSION SYSTEM DESIGN, PSTCL, PATIALA

PROJECT:  
**CONSTRUCTION OF 400/220kV AIS SUB-STATION AT ROPAR, (PUNJAB)**

EPC CONTRACTOR: **GODREJ & BOYCE MFG. CO. LTD.**  
 PROZSHANAGAR, VIKROU WEST, MUMBAI (INDIA), MAHARASHTRA (INDIA).

NOA No.: 1060/STQ-3063, DATED-06/09/2021

**400/220kV AIS SUBSTATION - MAIN EARTHING GRID LAYOUT- PLAN**

REV.	DESCRIPTION	DRAWN	CHECKED	APPROVED	FOR APPROVAL	STATUS
R1	REVISED AS PER PSTCL COMMENT	Name: YGB Date: 31.05.22	Name: AM Date: 31.05.22	Name: CJ Date: 31.05.22		
R0	FIRST ISSUE	Name: YGB Date: 04.04.22	Name: AM Date: 04.04.22	Name: CJ Date: 04.04.22		

DRAWING No.	TOTAL SH.	SH.No.	REV.
SVP010092-PSTCL-ROP-E-ENG-002	01	01 of 01	R1