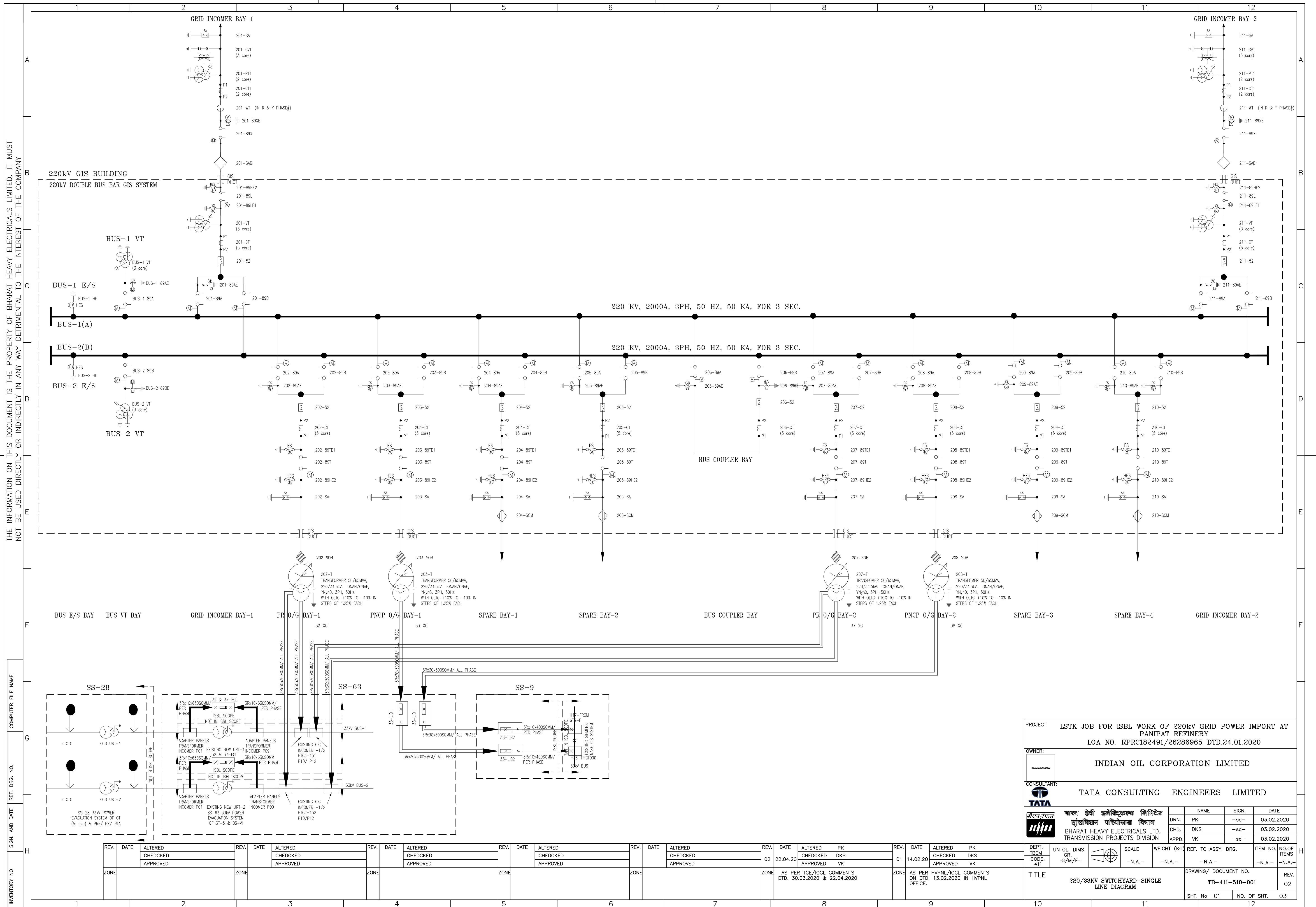


FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)



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COMPUTER FILE NAME

REF. DRG. NO.

SIGN. AND DATE

INVENTORY NO

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

1200

1200

1200

1200

1200

1200

1200

1200

1200

1200

1200

1200

A

B

C

D

E

F

G

H

A. 220kV OUTDOOR EQUIPMENT

SL.NO.	DESCRIPTION	SYMBOL	LEGEND	BAY NO/LOCATION	UNIT	QTY
1.	198kV, 10kA, CLASS-III, 1 PHASE SURGE ARRESTER (SA)/ LIGHTNING ARRESTER (LA)		SA	201, 211.	NO	06
2.	220kV, 8800pF, 1 PHASE CAPACITOR VOLTAGE TRANSFORMER (CVT), (220/ √3kV)/(110/ √3V)/(110/ √3V)/(110/ √3V)		CVT	201, 211.	NO	06
3.	220kV, 2000A, 1mH, 1 PHASE WAVE TRAP		WT	201, 211.	NO	04
4.	220kV, 1 PHASE TARIFF METERING PT		PT1	201, 211.	NO	06
5.	220kV, 1 PHASE TARIFF METERING CT		CT1	201, 211.	NO	06
6.	220kV, 2000A, 1X3 PHASE, HCB ISOLATOR (ELECTRICALLY OPERATED MECHANICALLY GANGED) WITH ONE EARTH SWITCH (ELECTRICALLY OPERATED MECHANICALLY GANGED)		89X	201, 211.	SET	02

B. 220kV INDOOR GIS

SL.NO.	DESCRIPTION	SYMBOL	LEGEND	BAY NO/LOCATION	UNIT	QTY
1.	220kV, 2000A, 1X3 PHASE CIRCUIT BREAKER		52	201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211.	SET	11
2.	220kV, 2000A, 1X3 PHASE DISCONNECTING SWITCH WITHOUT EARTH SWITCH		89B	201, 202, 203, 204, 205, 207, 208, 209, 210, 211.	SET	10
3.	220kV, 2000A, 1X3 PHASE DISCONNECTING SWITCH WITH SINGLE EARTH SWITCH		89A, 89AE, 89B, 89BE, 89L, 89LE1, 89T, 89TE1	BUS-1, BUS-2 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211.	SET	24
4.	220kV, 2000A, 1X3 PHASE HIGH SPEED/ FAST EARTHING SWITCH		89HE2	BUS-1, BUS-2 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211.	SET	12
5.	198kV, 10kA, CLASS-III, 1 PHASE SURGE ARRESTER		SA	202, 203, 204, 205, 207, 208, 209, 210.	NO	24
6.	220kV, 1 PHASE CURRENT TRANSFORMER		CT	201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211.	NO	33
7.	220kV, 1 PHASE VOLTAGE TRANSFORMER		VT	BUS-1, BUS-2, 201, 211	NO	12
8.	220kV, 1 PHASE SF6 TO AIR BUSHING		SAB	201, 211.	NO	06
9.	220kV, 1 PHASE SF6 TO OIL BUSHING		SOB	202, 203, 207, 208.	NO	12
10.	220kV, 1 PHASE SF6 TO CABLE MODULE		SCM	204, 205, 209, 210.	NO	12
11.	220kV, 1 PHASE GIS BUS DUCT		--	201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211.	LOT	01

C. 33kV OUTDOOR EQUIPMENT INCLUDING 220/33KV POWER TRANSFORMER

SL.NO.	DESCRIPTION	SYMBOL	LEGEND	BAY NO/LOCATION	UNIT	QTY
1.	220/34.5kV, 50/65MVA, ONAN/ONAF Yyn0, 3 PHASE TRANSFORMER WITH OLTC +10% TO -10% IN STEPS OF 1.25% EACH		TR	202/32, 203/33, 207/37, 208/38.	NO	04
2.	33kV AIS LUB PANEL		LUB1, LUB2	33, 38.	SET	04
3.	33kV FAULT CURRENT LIMITER PANEL		FCL	33kV BUS-1, 33kV BUS-2	SET	02
4.	33kV(E), 3CX300SQMM, CU, XLPE, ARMORED CABLE INCLUDING END TERMINATION AND STRAIGHT THROUGH JOINTS		--	32, 33, 37, 38.	LOT	01
5.	33kV(E), 1CX400SQMM, CU, XLPE, ARMORED CABLE INCLUDING END TERMINATION AND STRAIGHT THROUGH JOINTS		--	33, 38.	LOT	01
6.	33kV(E), 1CX630SQMM, CU, XLPE, ARMORED CABLE INCLUDING END TERMINATION AND STRAIGHT THROUGH JOINTS		--	33kV BUS-1, 33kV BUS-2	LOT	01

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED
		APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED
ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE		

SYSTEM PARAMETERS –

SL. NO.	DATA	220kV SYSTEM	33kV SYSTEM
01	NOMINAL VOLTAGE (kV)	220kV±10%	33kV±6%
02	FREQUENCY (Hz)	50±5%	50±3%
03	SYSTEM EARTHING	SOLIDLY EARTHED	SOLIDLY EARTHED
04	SHORT-TIME CURRENT RATING (kA/Sec)	50kA/3sec	31.5kA/1sec
05	RATED PEAK WITHSTAND CURRENT (kAp)	125	80
06	BASIC INSULATION LEVEL (kVP)	1050	170
07	RATED CURRENT AT 50°C (A)	2000	2500
08	RATED POWER FREQUENCY WITHSTAND VOLTAGE DRY/WET (kVrms)	460	70
09	LIGHTNING IMPULSE WITHSTAND VOLTAGE (KVp)	1050	170
10	CREEPAGE DISTANCE (mm/kV)	25	25
11	MINIMUM AMBIENT TEMPERATURE (°C)	-5°C	-5°C
12	MAXIMUM AMBIENT TEMPERATURE (°C)	+50.0°C	+50.0°C
13	EQUIPMENT DESIGN TEMPERATURE (°C)	+45.0°C	+45.0°C
14	AUXILIARY SUPPLY VOLTAGE (Vac)	415V,3 PHASE/ 240V,1 PHASE	415V,3 PHASE/ 240V,1 PHASE
15	PROTECTION & CONTROL SUPPLY (Vdc) 1. TRIP COIL SUPPLY 2. CLOSE COIL SUPPLY 3. SPRING CHARGING MOTOR SUPPLY	220 ±5% 220 -70% +110% 220 -80% +110% 220 -80% +110%	220 ±5% 220 -70% +110% 220 -80% +110% 220 -80% +110%

NOTES: –

1. BAY SEQUENCE FOR GIS TENTATIVE AND MAY CHANGE IN LINE WITH THE REQUIREMENTS OF SERVICE CONTINUITY AND STANDARD DESIGN OF OEM.

2. COMMON TARIFF METERING ROOM (1NO) SHALL BE PROVIDED FOR BOTH INCOMER BAYS.

3. LOCATION OF GIS CT IN BAY MAY CHANGE AS PER OEM RECOMMENDATIONS.

4. THE CABLE MODULE IN THE GIS SPARE OUTGOING BAYS, SUITABLE FOR CABLE TERMINATIONS SHALL BE PROVIDED FULLY EQUIPPED FOR CABLE TERMINATION WITH AVAILABILITY OF FEMALE CONTACT CONTACTS.

5. FOR INDIVIDUAL EQUIPMENT OF GIS & AIS SHALL BE IN LINE WITH TECHNICAL SPECIFICATION. DEVIATION IF ANY SHALL BE TAKEN UP SEPARATELY.

6. TRANSFORMER DETAILS SHALL BE UPDATED AS PER MANUFACTURE'S DRAWINGS.

7. CT/ VT PARAMETERS SHALL BE DETAILED IN SEPARATE DRAWING (DRG. NO. TB-411-510-002 220/33kV SWITCHYARD- KEY METERING & PROTECTION SINGLE LINE DIAGRAM).

8. SCHEDULE OF EQUIPMENT COVERS ONLY HV/ EHV EQUIPMENT FOR POWER FLOW. THE DETAILS OF OTHER AUXILIARY EQUIPMENT SHALL BE COVERED ON OTHER DRAWING/ DOCUMENTS, TO BE COVERED SEPARATELY.

9. THE DETAILS OF PANELS/ EQUIPMENT UNDER CUSTOMER SCOPE MAY CHANGE AS LATER STAGE.

10. 33kV GIC INCOMER PANELS/ ADAPTER PANELS IN SS-63 AND 33kV GIS PANELS IN SS-9 SHALL BE IN CUSTOMER SCOPE, HOWEVER TERMINATION OF 33kV XLPE CABLES SHALL BE DONE BY BHEL.

11. THE DETAILS OF 33kV XLPE CABLES AND ACCESSORIES ARE TENTATIVE AND ARE BASED ON SITE SURVEY, IN CASE OF ADDITIONAL REQUIREMENT, SAME SHALL SUPPLIED AND EXECUTED BY BHEL ONLY.

REFERENCE DRAWING (S)/ DOCUMENT(S) –

SL. NO.	DRAWING/ DOCUMENT NO.	DRAWING TITLE
3.	ANNEXURE-7P	220kV GIS- SLD
2.	ANNEXURE-S-2/C-1/5	INTERCONNECTION SLD FOR PR
1.	ANNEXURE-S-2/C-1/6	INTERCONNECTION SLD FOR PNCP POWER EVACUATION FACILITY

PROJECT: LSTK JOB FOR ISBL WORK OF 220kV GRID POWER IMPORT AT PANIPAT REFINERY
LOA NO. RPRC182491/26286965 DTD.24.01.2020

OWNER:

INDIAN OIL CORPORATION LIMITED

CONSULTANT:

TATA

TATA CONSULTING ENGINEERS LIMITED

DRN.	PK	SIGN.	DATE
CHD.	DKS	-sd-	03.02.2020
APPD.	VK	-sd-	03.02.2020

DEPT. TBEM CODE. 411

UNTOL. DIMS. GR. G/M/F

SCALE -N.A.-

WEIGHT (KG) -N.A.-

REF. TO ASSY. DRG. -N.A.-

ITEM NO. -N.A.-

NO.OF ITEMS -N.A.-

TITLE 220/33KV SWITCHYARD-SINGLE LINE DIAGRAM

DRAWING/ DOCUMENT NO. TB-411-510-001

REV. 02

SHT. No 02

NO. OF SHT. 03

SIZE-A1

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COMPUTER FILE NAME

REF. DRG. NO.

SIGN. AND DATE

INVENTORY NO

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)

D. 33kV XLPE CABLE AND ACCESSORIES

Sl. No.	33/19kV Cu Cable, minimum sizing for the complete project shall be considered as stated below,	Termination Details		Cable Details	Cable Length Details						Termination Details (For 3C cables, 1set= 3Phase Terminations, and 1C cables, 1no=1 phase termination)								Clamp Details		Remarks
		From	To	No. of Core (s)	Cable Size (In sqmm)	No. of Runs/ (Phase/ All Phase)	No. of Runs/ Feeder	No. of Feeder	Total No. of Runs	Route Length (In mtrs)	Total Cable Length (In meters)	No. of 220/34.5kV Power Transformer End Termination(s)	No. of 33kV LIB End Termination(s)	No. of 33kV GIC Incomer End Termination(s)	No. of 33kV Adapter Panel End Termination(s)	No. of 33kV FCL Panel End Termination(s)	No. of 33kV GIS Panel End Termination(s)	No. of 33kV Straight Through Joints @500mtrs	Trefoil Clamp	Single Clamp	
1	Cabling from 220/34.5kV Power Transformer of 220/33kV Switchyard to PR Generatin Bus (GIC Incomer- 1/2 & 3/4) at SS-63	220/34.5kV Power Transformer of 220/33kV Switchyard	PR Generatin Bus at SS-63	3C	300sqmm	1 Run/ All phase	3	4	12	250	3000	12	0	12	0	0	0	6	0	250	Bonded at one end in single core and at both ends for three core cables.
2	Cabling from 33kV Adapter Panels of Existing URT (URT-1&2) at SS-63 to 33kV FCL (202&207-FCL) for incoming & outgoing at SS-63	33kV Adapter Panels at SS-63 of Existing URT (URT- 1&2)	33kV FCL (202&207-FCL) for incoming & outgoing at SS-63	1C	630sqmm	3 Run/ Phase	9	4	36	40	1440	0	0	0	36	36	0	3	13	0	
3	Cabling from 220/34.5kV Power Transformer of 220/33kV Switchyard to PR Side 33kV LIB at SS-63	220/34.5kV Power Transformer of 220/33kV Switchyard	PR Side 33kV LIB at SS-63	3C	300sqmm	1 Run/ All phase	3	2	6	250	1500	6	6	0	0	0	0	3	0	250	
4	Cabling from PR Side 33kV LIB at SS-63 to PNCP side 33kV LIB at SS-9	PR Side 33kV LIB at SS-63	PNCP side 33kV LIB at SS-9	3C	300sqmm	1 Run/ All phase	3	2	6	4500	27000	0	12	0	0	0	0	54	0	4500	
5	Cabling from PNCP side 33kV LIB at SS-9 to PNCP side GIS Generation Bus at SS-9	PNCP side 33kV LIB at SS-9	PNCP side GIS Generation Bus at SS-9	1C	400sqmm	3	9	2	18	80	1440	0	18	0	0	0	18	3	27	0	
									3Cx300sqmm		31500	18	18	12	0	0	0	63	0	5000	
									1Cx400sqmm		1440	0	18	0	0	0	18	3	27	0	
									1Cx630sqmm		1440	0	0	0	36	36	0	3	13	0	
									Total:		34380	18	36	12	36	36	18	69	40	5000	

REFERENCE DRAWING (S)/ DOCUMENT(S) -

SL. NO.	DRAWING/ DOCUMENT NO.	DRAWING TITLE
3.	ANNEXURE-7P	220kV GIS- SLD
2.	ANNEXURE-S-2/C-1/5	INTERCONNECTION SLD FOR PR
1.	ANNEXURE-S-2/C-1/6	INTERCONNECTION SLD FOR PNCP POWER EVACUATION FACILITY

PROJECT: LSTK JOB FOR ISBL WORK OF 220kV GRID POWER IMPORT AT PANIPAT REFINERY
LOA NO. RPRC182491/26286965 DTD.24.01.2020

OWNER:

INDIAN OIL CORPORATION LIMITED

CONSULTANT:

TATATATA CONSULTING ENGINEERS LIMITED

भारत हेवी इलेक्ट्रिकल्स लिमिटेड

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BHARAT HEAVY ELECTRICALS LTD.

TRANSMISSION PROJECTS DIVISION

DRN.	PK	NAME	SIGN.	DATE
CHD.	DKS			03.02.2020
APPD.	VK			03.02.2020

DEPT. TBEM CODE. 411

UNTO L. DIMS. GR. S/M/F

SCALE -N.A.-

WEIGHT (KG) -N.A.-

REF. TO ASSY. DRG. -N.A.-

ITEM NO. -N.A.-

NO.OF ITEMS -N.A.-

TITLE 220/33KV SWITCHYARD-SINGLE LINE DIAGRAM

DRAWING/ DOCUMENT NO. TB-411-510-001

REV. 02

SHT. No 03 NO. OF SHT. 03

SIZE-A1

Comments Resolution Sheet for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 00

Sl. No.	Comment (s)/ Observation(s)	Resolution(s)
A	CONSULTANT	
1	No comments	
B	CONSULTANT	
1	Surge arrestor shall also be provided in the incomer/line bays also in line with the observation point: (f) of mail ref. no.: PR/P&U/DGM(MN-EL)/26286965/2020/3 ; Dt.28.1.20.	It is to be noted that the requirements of surge arrester, if required in line with sytem studies, shall taken care.
2	The no. of FCL is shown as 1 Set instead of the requirement of 2 Set in document no.: TB-1-411-510-001 9 Sheet 02 of 02. Please correct and submit.	Noted and complied.
3	The no. of runs of cable shown in the SLD is still incomplete. Please correct as detailed below, a. Cabling from existing URT to New Fault limiting devices both incoming and outgoing side- 3 Runs per phase per URT X 1 Core X 630 sqmm i.e. total of 18 runs per URT and 36 runs for two URT system b. From SS-9 LIB to SS-9 Generation Board (PNCP): 3 Runs per phase per feeder X 1 Core X400 sqmm i.e. total 9 Runs per feeder and 18 runs for 2 feeders	Noted and complied.

NOTE:

CONTRACTOR IS OBLIGED TO FURNISH THIS SHEET (DULY FILLED UP WITH RESOLUTION TO ALL CUSTOMER/CONSULTANT COMMENTS ALONG WITH REVISED DRAWINGS)

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
A.	CONSULTANT (dtd. 26.03.2020)		
1	General	For tariff metering "Use of only single ratio metering CT will be allowed. Multi core CT are not to be used in any case" as per Appendix-I B, HVPNL guide lines for installation of metering equipment, sr no-ix.	Noted and shall be complied in line Protection Single Line Diagram (TB-411-510-002) and hence, CT VT Parameters are deleted from this drawing/ document.
2	General	Client logo missing in title block	Noted and complied.
3	Notes	Following protections to be considered in protection scheme, same to be added in Notes a. Transformer switching Relay b. Trip circuit supervision for both trip coils (195 and 295). c. Master Trip Relay (186 and 286) d. DC supervision relays(80A and 80B). e. Over Fluxing protection f. Non-directional O/C & E/F (50/51; 50N; 51N). g. Oil Surge Relay (OSR) h. SEF relay selection shall have both IDMT and DT based settings	This requirement is not pertaining to this drawing and shall be complied in Protection Single Line Diagram (TB-411-510-002).
4	Sheet-1, Line bay	Lightning Arrester/ LA shall be mentioned instead of SA. Use same symbol in all drawings (TB-3-411-510-002)	Please note as per HVPNL guidelines, it shall be SA only. However details are revised as advised.
5	Sheet-1, Line bay	For Wave trap '#' symbol is shown. Kindly clarify. Any notes for same to be provided?	Noted and complied.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
6	Sheet-1, Line bay	ES 201-89XE shall be shown in open position	Please note that this is only symbolic representation, not functional representation.
7	Sheet-1, Line bay	Disconnecter 201-89X Motor symbol text direction to be rotated. Kindly check for equipments.	Noted and revised.
8	Sheet-1, Line bay	Equipment symbol & numbering used for SLD & Protection SLD shall be similar.	As per customer/ HVPNL guidelines, line trap shall be outdoor suspension type.
9	Sheet-1, Line bay	Kindly check 201-89HE2 shall be 89LE2 as indicated in drawing.	Please note that HE2 is used for declassified and separate equipment/ high Speed Earth Switch and hence this symbol is used.
10	Sheet-1, Line bay	201-PT2 shall be mentioned instead of 201-VT as indicated in drawing.	Please note that VT is commonly used symbol/ nomenclature and same has been used.
11	Sheet-1, Line bay	As per drawing no. TB-3-411-510-002, earth switch is provided as 89BE. Please provide in 89A for all bays	Noted.
12	Sheet-1, Line bay	Change all GIS Symbols. Indicated symbols are for not of GIS.	Please note that GIS specific symbols shall be used in OEM drawings/ documents.
13	Sheet-1, Line bay	Kindly check the sequence of equipment w.r.t Protection SLD. In protection SLD, PT2 is placed after bus duct, then High speed ES & Isolator with ES.	The sequence of equipment is in line with customer/ HVPNL guidelines.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
14	Sheet-1, Line bay	Placing Metering CT & PT between CVT & Wave Trap for communication need to be confirmed with PLCC Vendor whether it will function correctly or not	The sequence of equipment is in line with customer/ HVPNL guidelines.
15	Sheet-1, TR bay	Kindly rename Disconnecter with 2 ES as 89TE1, 89T, 89TE2	Noted and complied. Please note that HE2 is used for de-energized and separate equipment/ high Speed Earth Switch and hence this symbol is used.
16	Sheet-1, TR bay	OLTC shall be on HV side of Transformer.	Noted and revised.
17	Sheet-1, TR bay	OLTC Range & Impedance value to be mentioned	Noted and revised.
18	Sheet-1, TR bay	Spelling of Transformer to be corrected	Noted and Revised.
19	Sheet-1, TR bay	Submit separate SLD for 33kV side with Panel Number, Protection details & equipment parameters	Noted and Revised.
20	Sheet-1, TR bay	Transformer 33kV side cable shall be 3Rx1Cx630sqmm / ph shall be mentioned. Also mentioned cable is copper or Aluminium.	Noted and Revised in table of schedule of equipment.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
21	Sheet-1	1. Adapter is indicated as not in Scope, modify as applicable. 2. Check the requirement of Adapter Panel. If feasibility of connecting is not possible in existing Switchgear, Adapter Panel shall be proposed. 3. Also providing adapter panel may require cable rerouting, same shall be reflected in 33kV SLD.	Noted and Revised.
22	Sheet-1	CTs and protection (CRP) for spare bays to be provided as per future use, to be confirmed by IOCL	This requirement is not pertaining to this drawing and shall be complied in Protection Single Line Diagram (TB-411-510-002).
23	Sheet-2	GAS SLD to be submitted.	This OEM drawing shall be submitted separately.
24	Sheet-2	Lightning Arrester/ LA shall be mentioned instead of SA. Use same symbol in all drawings (TB-3-411-510-002)	Please note as per HVPNL guidelines, it shall be SA only. Please refer latest specification of HVPNL (www.hvpnl.org).
25	Sheet-2	Wave trap rating shall be 1mH	Noted and revised.
26	Sheet-2	Bay no shall be revised to 201 for sr no-4,5 & 6 in 220kV OUTDOOR EQUIPMENT	Noted and revised.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
27	Sheet-2	All equipments symbol for AIS & GIS shall be different.	OEM drawing for GIS shall be submitted separately having the different symbols for GIS.
28	Sheet-2	Why 89A is shown both rows in 220kV INDOOR EQUIPMENT	Noted and revised.
29	Sheet-2	Line VT qty is missing. Qty shall be 12 Nos.	Noted and revised.
30	Sheet-2	GAS insulated bus duct-1 Lot qty shall be added	Noted and revised.
31	Sheet-2	In 33kV OUTDOOR EQUIPMENT TABLE, 220kV Bay numbers. Not applicable for 33kV. Separate SLD for 33kV shall be submitted with Bay/ Feeder numbers. Location shall be indicated with Building/ Substation Numbers	Noted and revised.
32	Sheet-2	33kV termination Not part for 33kV Equipments. Show in separate Table as indicated in drawing	Noted and revised.
33	Sheet-2	In System Parameters frequency variation shall be + 3%	This is in line with customer technical specification.
34	Sheet-2	In System Parameters short circuit rating of 33kV system is 31.5kA/1sec as per Section-1, Chapter-11, Cl. No. 5.12	Noted and revised.
35	Sheet-2	In System Parameters rated peak withstand current of 33kV system shall be 80kA	Noted and revised.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
36	Sheet-2	In System Parameters BIL of 33kv system shall be 170kVp	Noted and revised.
37	Sheet-2	In System Parameters equipment design temperature shall be 50 deg C	This is in line with customer technical specification of Engineering Design Basis.
38	Sheet-2	Protection & control supply shall be +10% & -20%. 1. Trip Coil Operating Range: 220VDC -70% +110% 2. Close Coil Operating Range: 220VDC -80% +110%	This is in line with customer technical specification of Engineering Design Basis. Noted and revised.
39	Sheet-2	Transformer Bushing CT details to be provided	These details shall be updated in line with OEM drawings.
40	Sheet-2	For tariff metering "Use of only single ratio metering CT will be allowed. Multi core CT are not to be used in any case" as per Appendix-I B, HVPNL guide lines for installation of metering equipment, sr no-ix.	This requirement is not pertaining to this drawing and shall be complied in Protection Single Line Diagram (TB-411-510-002) and hence, CT VT Parameters are deleted from this drawing/ document.
41	Sheet-2	CT sizing calculation to be submitted.	This requirement shall be submitted in separate design document.
42	Sheet-2	Kindly make CT/VT parameters legible.	Noted and revised.
43	Sheet-2	Kindly mentioned Reference drawing details.	Noted and complied.
44	Sheet-2	Orientation/Section of the CT cores shall be in line as per IOCL comments dtd. 27.02.2020. Same to be followed in Protection SLD.	Noted.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
B	CUSTOMER (dtd. 30.03.2020 & 22.04.2020)		
1		Equipment specification wise detailed drawings to be submitted.	Noted. Individual drawing/ document from OEM shall be submitted for all the equipment.
2		Surge Arrestor in the Incomers of the GIS to be provided in line with if required in the system study.	Noted.
3		The Cable module in the GIS spare outgoing bays suitable cable terminations to be provided fully ready for cable termination with availability of female contact contacts.	Noted and revised.
4		In the Cable Schedule, the terminations have been indicated as under customer scope. Kindly modify the same and to be kept under BHEL scope of supply and execution only.	Noted and revised.
5		It is observed that the Cable quantification has been done in the drawing. Kindly mention in the drawing that, in case of variation in the quantity same has to be supplied and executed by BHEL only. Kindly mention the same as a note in the drawing.	Noted.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Single Line Diagram

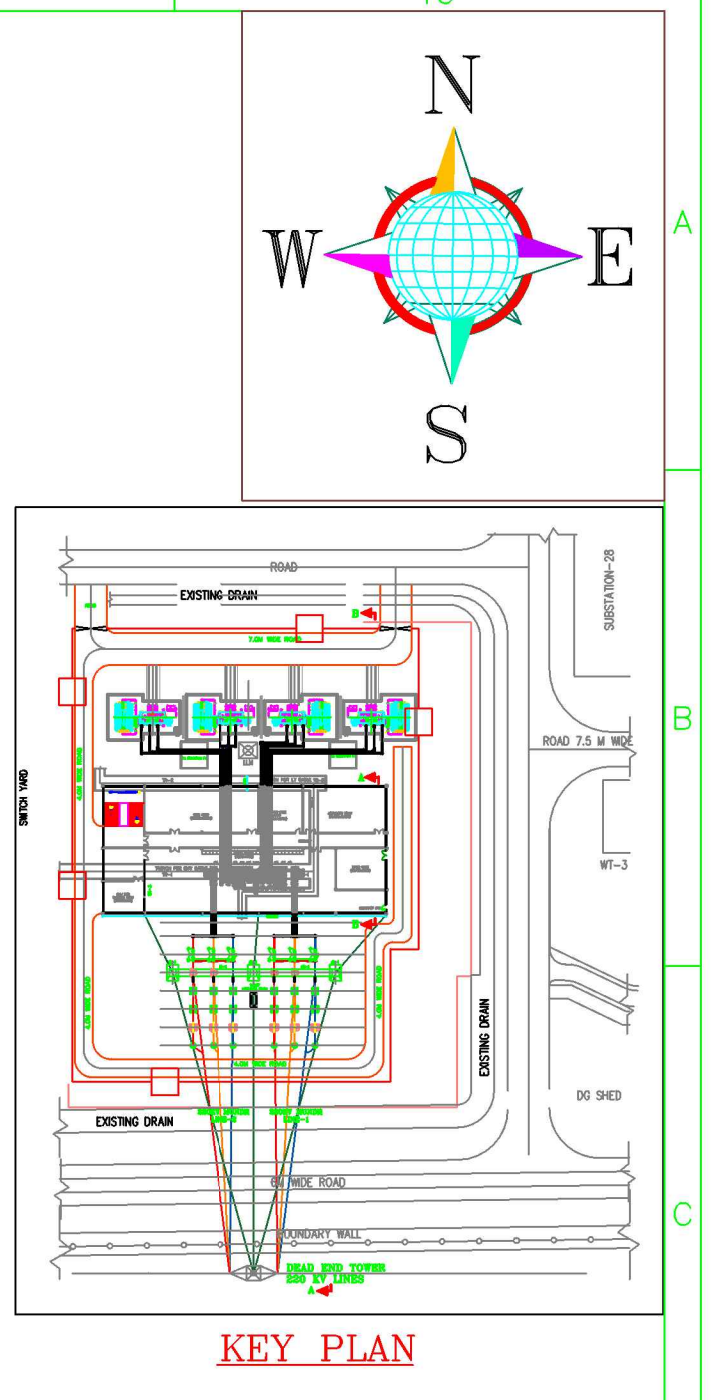
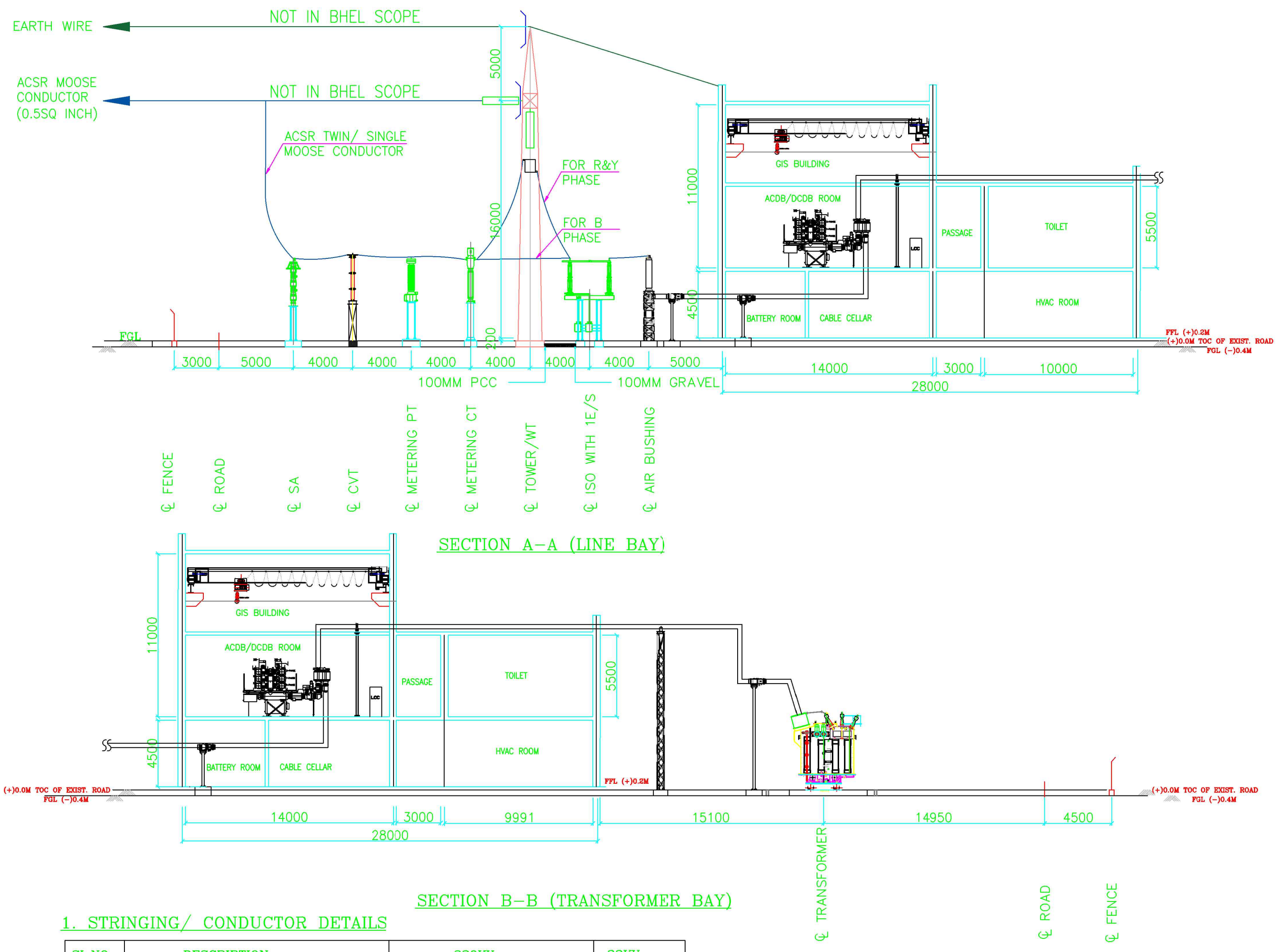
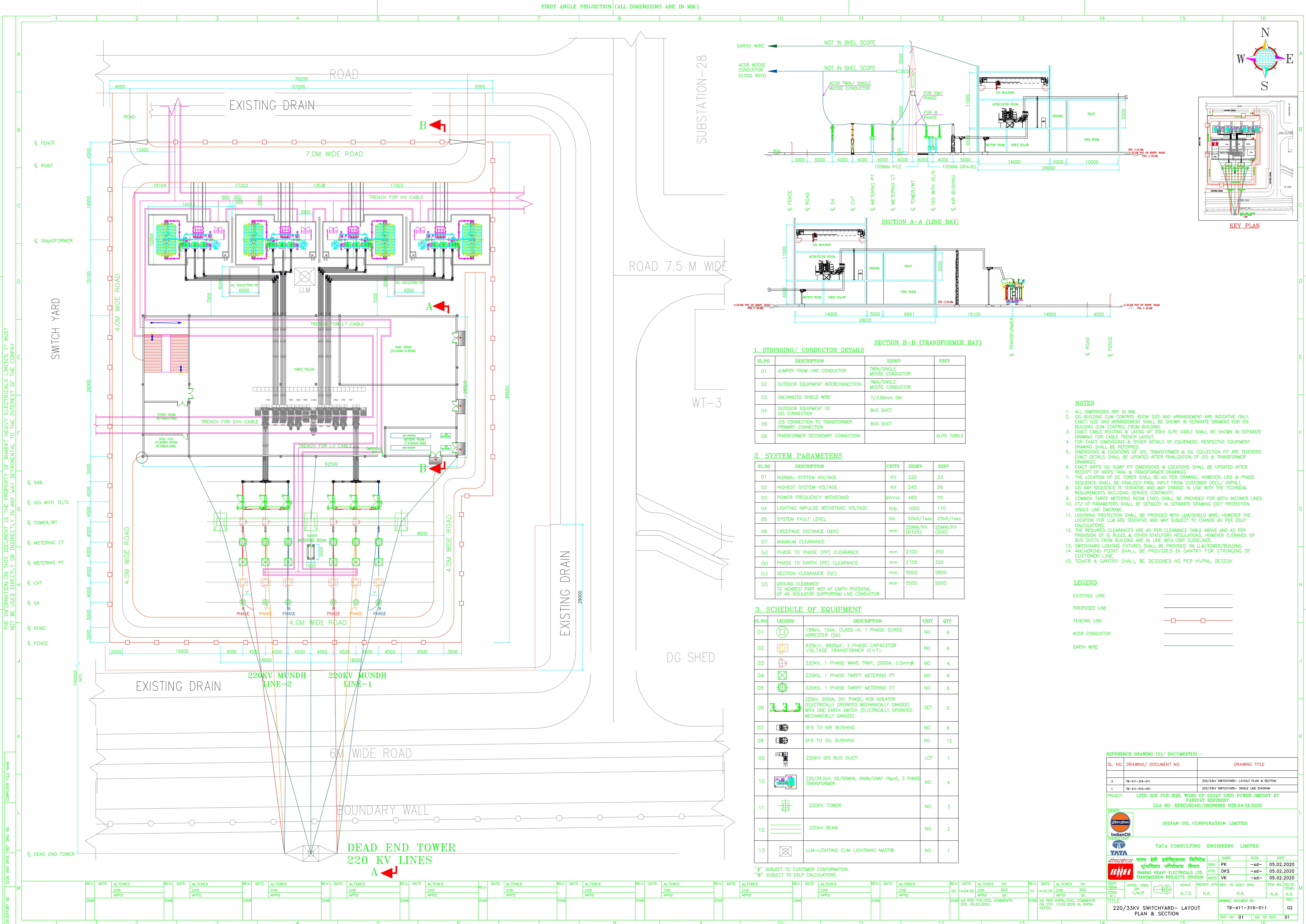
DOCUMENT NUMBER: TB-411-510-001

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
6		In line with the comment provided in the BOQ submitted for Cable procurement, please indicate in the schedule on " Provision for installation and termination of cable in line with existing cable termination coupling part of Fisterer Make in the existing GIS panel in SS-9 at PNCP end shall be in the scope of BHEL only". Kindly incorporate the same in the cable schedule submitted in this drawing also.	Noted.

NOTE:

CONTRACTOR IS OBLIGED TO FURNISH THIS SHEET (DULY FILLED UP WITH RESOLUTION TO ALL CUSTOMER/ CONSULTANT COMMENTS ALONG WITH REVISED DRAWINGS



1. STRINGING/ CONDUCTOR DETAILS

SL.NO	DESCRIPTION	220KV	33KV
01	JUMPER FROM LINE CONDUCTOR	TWIN/SINGLE MOOSE CONDUCTOR	
02	OUTDOOR EQUIPMENT INTERCONNECTION	TWIN/SINGLE MOOSE CONDUCTOR	
03	GALVANIZED SHIELD WIRE	7/3.66mm DIA	
04	OUTDOOR EQUIPMENT TO GIS CONNECTION	BUS DUCT	
05	GIS CONNECTION TO TRANSFORMER PRIMARY CONNECTION	BUS DUCT	
06	TRANSFORMER SECONDARY CONNECTION		XLPE CABLE

2. SYSTEM PARAMETERS

SL.NO	DESCRIPTION	UNITS	220KV	33KV
01	NORMAL SYSTEM VOLTAGE	KV	220	33
02	HIGHEST SYSTEM VOLTAGE	KV	245	36
03	POWER FREQUENCY WITHSTAND	kVrms	460	75
04	LIGHTING IMPULSE WITHSTAND VOLTAGE	kVp	1050	170
05	SYSTEM FAULT LEVEL	KA	50KA/1sec	25KA/1sec
06	CREEPAGE DISTANCE (MIN)	mm	25MM/KV (6125)	25MM/KV (900)
07	MINIMUM CLEARANCE			
(a)	PHASE TO PHASE (PP) CLEARANCE	mm	2100	350
(b)	PHASE TO EARTH (PE) CLEARANCE	mm	2100	320
(c)	SECTION CLEARANCE (SC)	mm	5000	2800
(d)	GROUND CLEARANCE TO NEAREST PART NOT AT EARTH POTENTIAL OF AN INSULATOR SUPPORTING LIVE CONDUCTOR	mm	5500	5500

3. SCHEDULE OF EQUIPMENT

SL.NO	LEGEND	DESCRIPTION	UNIT	QTY
01		198kV, 10kA, CLASS-III, 1 PHASE SURGE ARRESTER (SA)	NO	6
02		220kV, 8800pF, 1 PHASE CAPACITOR VOLTAGE TRANSFORMER (CVT)	NO	6
03		220kV, 1 PHASE WAVE TRAP, 2000A, 0.5mH#	NO	4
04		220kV, 1 PHASE TARIFF METERING PT	NO	6
05		220kV, 1 PHASE TARIFF METERING CT	NO	6
06		220kV, 2000A, 3X1 PHASE, HCB ISOLATOR (ELECTRICALLY OPERATED MECHANICALLY GANGED) WITH ONE EARTH SWITCH (ELECTRICALLY OPERATED MECHANICALLY GANGED)	SET	2
07		SF6 TO AIR BUSHING	NO	6
08		SF6 TO OIL BUSHING	NO	12
09		220kV GIS BUS DUCT	LOT	1
10		220/34.5kV, 50/65MVA, ONAN/ONAF Yn0n0, 3 PHASE TRANSFORMER	NO	4
11		220KV TOWER	NO	3
12		220KV BEAM	NO	2
13		LLM-LIGHTING CUM LIGHTNING MAST	NO	1

*"S" SUBJECT TO CUSTOMER CONFORMATION.
*# SUBJECT TO DLSLP CALCULATIONS.

NOTES

- ALL DIMENSIONS ARE IN MM.
- GIS BUILDING CUM CONTROL ROOM SIZE AND ARRANGEMENT ARE INDICATIVE ONLY. EXACT SIZE AND ARRANGEMENT SHALL BE SHOWN IN SEPARATE DRAWING FOR GIS BUILDING CUM CONTROL FROM BUILDING.
- EXACT CABLE ROUTING & LAYING OF 33KV XLPE CABLE SHALL BE SHOWN IN SEPARATE DRAWING FOR CABLE TRENCH LAYOUT.
- FOR EXACT DIMENSIONS & OTHER DETAILS OF EQUIPMENT, RESPECTIVE EQUIPMENT DRAWING SHALL BE REFERRED.
- DIMENSIONS & LOCATIONS OF GIS, TRANSFORMER & OIL COLLECTION PIT ARE TENTATIVE. EXACT DETAILS SHALL BE UPDATED AFTER FINALIZATION OF GIS & TRANSFORMER DRAWINGS.
- EXACT NIPPS OIL SUMP PIT DIMENSIONS & LOCATIONS SHALL BE UPDATED AFTER RECEIPT OF NIPPS TANK & TRANSFORMER DRAWINGS.
- THE LOCATION OF DG TOWER SHALL BE AS PER DRAWING, HOWEVER, LINE & PHASE SEQUENCE SHALL BE FINALIZED FINAL INPUT FROM CUSTOMER (OCL/ HYPNL).
- GIS BAY SEQUENCE IS TENTATIVE AND MAY CHANGE IN LINE WITH THE TECHNICAL REQUIREMENTS INCLUDING CONTINUITY.
- COMMON TARIFF METERING ROOM (TMO) SHALL BE PROVIDED FOR BOTH INCOMER LINES.
- CT/ VT PARAMETERS SHALL BE DETAILED IN SEPARATE DRAWING (KEY PROTECTION SINGLE LINE DIAGRAM).
- LIGHTNING PROTECTION SHALL BE PROVIDED WITH LLM/SHIELD WIRE, HOWEVER THE LOCATION FOR LLM ARE TENTATIVE AND MAY SUBJECT TO CHANGE AS PER DLSLP CALCULATIONS.
- THE REQUIRED CLEARANCES ARE AS PER CLEARANCE TABLE ABOVE AND AS PER PROVISION OF IE RULES & OTHER STATUTORY REGULATIONS, HOWEVER CLEARANCE OF BUS DUCTS FROM BUILDING ARE IN LINE WITH CBIP GUIDELINES.
- SWITCHYARD LIGHTING FIXTURES SHALL BE PROVIDED ON LLM/TOWER/BUILDING.
- ANCHORING POINT SHALL BE PROVIDED IN GANTRY FOR STRINGING OF CUSTOMER LINE.
- TOWER & GANTRY SHALL BE DESIGNED AS PER HYPNL DESIGN.

LEGEND

- EXISTING LINE _____
- PROPOSED LINE _____
- FENCING LINE _____
- ACSR CONDUCTOR _____
- EARTH WIRE _____

REFERENCE DRAWING (S)/ DOCUMENT(S) -

SL. NO.	DRAWING/ DOCUMENT NO.	DRAWING TITLE
2.	TB-411-316-011	220/33KV SWITCHYARD- LAYOUT PLAN & SECTION
1.	TB-411-510-001	220/33KV SWITCHYARD- SINGLE LINE DIAGRAM

PROJECT: LSTK JOB FOR ISBL WORK OF 220KV GRID POWER IMPORT AT PANDRAY REFINERY
LOA NO. RPRC182491/28288965 DTD.24.01.2020

OWNER: INDIAN OIL CORPORATION LIMITED

CONTRACTOR: TATA CONSULTING ENGINEERS LIMITED

NAME	SIGN.	DATE
DRN: PK	-sd-	05.02.2020
CHK: DKS	-sd-	05.02.2020
APPD: VK	-sd-	05.02.2020

DEPT. TEMA CODE: 411

SCALE: N.T.S.

WEIGHT (KG): N.A.

REF. TO ASSY. DRG.: N.A.

ITEM NO. OF ITEMS: N.A.

REV. NO. OF REV.: N.A.

TITLE: 220/33KV SWITCHYARD- LAYOUT PLAN & SECTION

DRAWING/ DOCUMENT NO.: TB-411-316-011

SHT. No 01 NO. OF SHT.: 02

Comments Resolution Sheet for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Layout Plan & Section

DOCUMENT NUMBER: TB-411-316-011

REVISION NO: 00

Sl. No.	Comment (s)/ Observation(s)	Resolution(s)
A	CONSULTANT	
1	No comments	
B	CUSTOMER	
1	Area lighting arrangement for outdoor switchyard area shall be developed during detail engineering in line with project & tender requirement	Noted.
2	Equipment specific details like layout plan/ GA drawings/ Scheme drawings & technical specifications shall be provided separately for comments and approvals.	Noted.
3	Detail layout plan of GIS indoor area/ Cellar area shall be provided during detail engineering for comments and approval	Noted.
4	GELO/ SLD to be submitted to HVPNL for review and approval accordingly.	Noted.

NOTE:

CONTRACTOR IS OBLIGED TO FURNISH THIS SHEET (DULY FILLED UP WITH RESOLUTION TO ALL CUSTOMER/ CONSULTANT COMMENTS ALONG WITH REVISED DRAWINGS)

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Layout Plan & Section

DOCUMENT NUMBER: TB-411-510-011

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
A.	CONSULTANT (dtd. 20.03.2020)		
1	General	Comments on GIS cum Control Building provided separately. Drg to be updated in line with same.	Noted. As per project requirements, concurrent approvals of other related drawings are also going on and hence such associated details shall be updated in final submisison after finalization of details from OEMs.
2	General	In upper right most corner of drawing Indicate the Overall Plot Plan & show in hatch present scope area in Over all Plot. Mark True North & Plant North.	Noted and complied.
3	General	Scale of fence shown in plan to be reduced	Noted and complied.
4	BOQ	Tower qty & description to be corrected mentioning -16.2Mtr Tower with 5Mtr peak suitable for 2 beam mounting arrangement- 1 No -16.2Mtr Tower with 5Mtr peak suitable for 1 beam mounting arrangement- 2 Nos	Standarized tower (16m) having the provision of both side beam/ gantry (18m) arrangement is made for all the three towers.
5	Section A-A	ACSR Moose Conductor single or twin to be mentioned	Provision for twin/ single ACSR moose conductor is taken, however, this is to be confirmed by customer based on the line arrangement.
6	Section A-A	Outdoor equipment interconnection to be shown either tube or conductor	Provision for twin/ single ACSR moose conductor is for outdoor equipment connection is made.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Layout Plan & Section

DOCUMENT NUMBER: TB-411-510-011

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
7	Section A-A	Distance between equipments can be reduced if required	This is finalized and frozen in line with Customer/ HVPNL guidelines.
8	Wave trap	As per IOCL specification, Annex-S-3/C-4/3, cl no-1.3, "line trap shall be suitable for outdoor suspension mounting". Whereas in BOM, Annexure S-2/C-1/2, "bus post mounted type Wave Trap" is mentioned. Mounting arrangement of Wave trap to be confirmed with HVPNL & IOCL.	As per customer/ HVPNL guidelines, line trap shall be outdoor suspension type.
9	Plan	Centre line of fence to centre line of road distance (north side) shall be 6Mtrs instead of 4.5Mtrs.	This is finalized and frozen in line with Customer requirement and consent.
10	Plan & Section B-B	Centre line of Transformer & edge of control room build is mentioned 12.1Mtrs in section whereas in plan it is mentioned as 15.1Mtrs. Please check & update.	Noted and revised.
11	Plan	Cable Trench is shown for Transformer Marshalling Box. Pipe sleeves shall be provided for TR MB.	Noted and any modification shall be done in line with OEM drawings.
12	Plan	Cable Trench shall be shifted to 33kV Cable Box of Transformer. Kindly provide details of 33kV Cable termination considering rails provided in plan layout.	Noted and any modification shall be done in line with OEM drawings.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Layout Plan & Section

DOCUMENT NUMBER: TB-411-510-011

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
13	Plan	Oil Collection Pit can be one, common for all Transformers. Relocate the pit at suitable location.	These details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
14	Plan	Show section B-B as indicated in drawing	Noted. Section B-B is indicated in drawing.
15	Plan	Numbering shall be given to Transformer. (eg- TR-1, TR-2 etc.)	Noted and any modification shall be done in line with OEM drawings.
16	Plan	Centre line of fence to centre line of road distance (south side) shall be revised.	Noted and revised.
17	Plan	Un-climbable fencing around metering CT/PT area is to be provided which will be sealed by DISCOM/HVPSNL as per Appendix-I B, HVPSNL guide lines for installation of metering equipment, sr no-viii.	This drawing is pending for approval with HVPSNL. In case of any such requirement, same shall be taken care
18	Legend	Use different line properties, there is no difference visible now.	Noted and Revised.
19	Notes	No lighting shall be provided on Tower or Gantries.	Please note that provision for fixing the lighting fixtures on the Tower is considered. This is standard practice with central/ state utilities, however this option shall be exercised on no choice basis.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Layout Plan & Section

DOCUMENT NUMBER: TB-411-510-011

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
20	General	For tariff metering "Use of only single ratio metering CT will be allowed. Multi core CT are not to be used in any case" as per Appendix-I B, HVPNL guide lines for installation of metering equipment, sr no-ix.	This shall be in line with approved Protection Single Line Diagram.
21	Section A-A	Placing Metering CT & PT between CVT & Wave Trap for communication need to be confirmed with PLCC Vendor whether it will function correctly or not.	This is in line with customer/ HVPNL guidelines, however, any specific issue, if comes shall be taken up with customer/ HVPNL, if required.
22	BOQ	Remove ratio of CVT from description	Noted and revised.
23	BOQ	Wave trap rating shall be 1mH instead of 0.5mH. Shall be checked and complied.	This shall require customer/ HVPNL confirmation.
24	Wave trap	Kindly confirm with HVPNL regarding mounting of Wave trap on which phases?	This is finalized and frozen in line with Customer requirement and consent.
25	Plan/Section	Comments regarding BUS duct routing for Transformer bay is provided in GIS cum Control Building drawing. Kindly check if GIB length can be optimised. If GIB is taken above the roof then adequate clearance from roof floor level to be maintained for roof maintenance.	Please note that these details are tentative and indicated and shall be revised based on OEM drawings, which shall be submitted separately and such requirements shall be taken care during that.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Layout Plan & Section

DOCUMENT NUMBER: TB-411-510-011

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
26	Section B-B	Conductor, earth wire & Tension insulator hardware from Takeoff tower to transmission line tower will be not in BHEL scope. Note to be mentioned in drawing after confirmation.	Noted and revised.
27	Stringing / conductor details	Transmission line conductor to be confirm by HVPNL. Do not specify in drawing. Generally 220kV Line conductor is Zebra, same to be confirmed with HVPNL/IOCL	These details still pending with customer/ HVPNL.
28	System parameters	33kV system paramter revised as per marked in drawing.	Noted and revised.
29	BOQ	Wave trap if pedestal mounting, then qty of BPI to be added in BOQ	Noted.
30	Plan	Indicate the Finished Ground Level & Coordinates of Substation area in all corners.	These details are not provided at customer end and hence these details shall be acoomodated during site work and shall be mentioned in as built drawing.
31	Plan	Show the reference points from Existing Building/ Structure and Roads.	These details are not provided at customer end and hence these details shall be acoomodated during site work and shall be mentioned in as built drawing.
32	Plan	Fence dimensions shall be marked upto Existing Road & Existing Buildings in all directions.	These details are not provided at customer end and hence these details shall be acoomodated during site work and shall be mentioned in as built drawing.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Layout Plan & Section

DOCUMENT NUMBER: TB-411-510-011

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
33	Plan	Transformer dimensions indicated (16x10m) seems to be on Higher side. 12x10m may be sufficient for the 65MVA Transformer (Please check & confirm with Transformer OEM) and rearrange the layout suitably.	Noted. These details shall be updated in line with OEM drawings.
34	Plan	GIS cum Control building dimensions are not matching between Plan & Sections. Update as applicable.	Noted and revised.
35	Plan	Cable Trench may be removed from overall Plot plan. Same can be indicated separate drawings.	These details are tentative details for understanding the complete requirements.
36	Plan	Tariff Metering room area details not provided in "Appendix-I B, HVPNL guide lines for installation of metering equipments" Tariff metering room size shall be confirmed by HVPNL & approval of same to be taken.	This is finalized and frozen in line with Customer requirement and consent.
37	Section A-A	Kindly check routing of line bays bus duct can be taken from wall instead of cutout in GIS room ground floor slab.	These details are derived from customer requirement mentioned in line with specification, however it shall be updated in line with OEM drawings.
38	Notes	Text properties shall be same for all notes (sr no-14&15)	Noted and revised.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: 220/33kV Switchyard- Layout Plan & Section

DOCUMENT NUMBER: TB-411-510-011

REVISION NO: 01

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
39	Plan	Periphery road size to be increase for transportation of GIS & other equipment. 4mtr road will not be sufficient. As per plan layout provided in 7th corrigendum, road size shown as 5mtrs. Kindly check.	Noted and revised.
40	System parameters	System fault level for 220kV system is 50kA/3sec as per 7th corrigendum, Annex-S-3/C-1/3	Noted and revised.
41	Reference	Drawing reference nos shall be provided.	This is in line with customer/ HVPNL technical specification.
42	Section A-A	Ground clearance distance shall be mentioned section drawing.	This shall be in line standard clearances mentioned in table.
43	Plan	If Building is less than 15mtrs from Transformer outer Body Control Building wall be of Fire Wall grade	Requirement shall be taken care in civil design document/ drawings.
B	CUSTOMER (dtd. 30.03.2020)		
1	No comments		

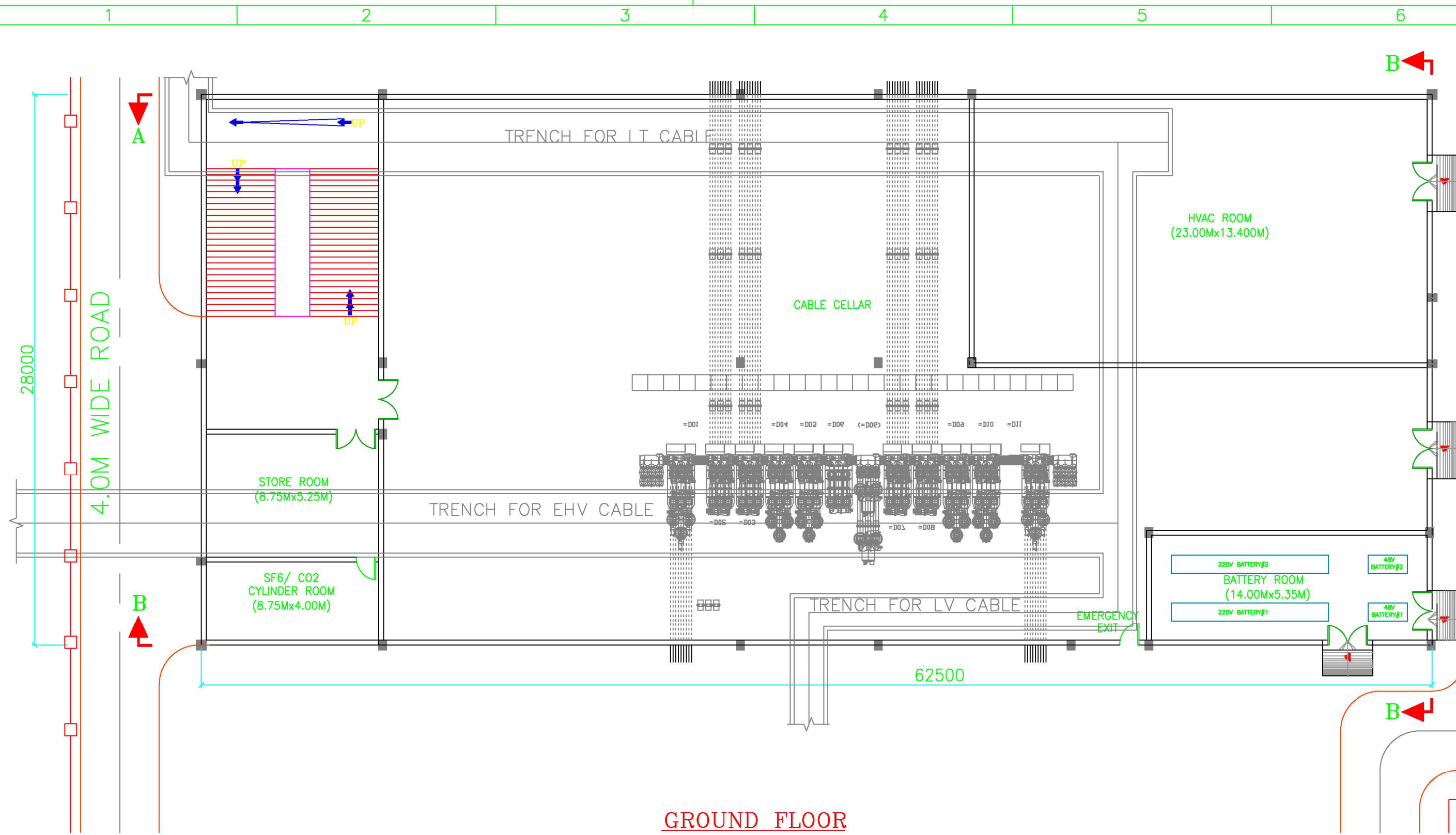
NOTE:

CONTRACTOR IS OBLIGED TO FURNISH THIS SHEET (DULY FILLED UP WITH RESOLUTION TO ALL CUSTOMER/ CONSULTANT COMMENTS ALONG WITH REVISED DRAWINGS)

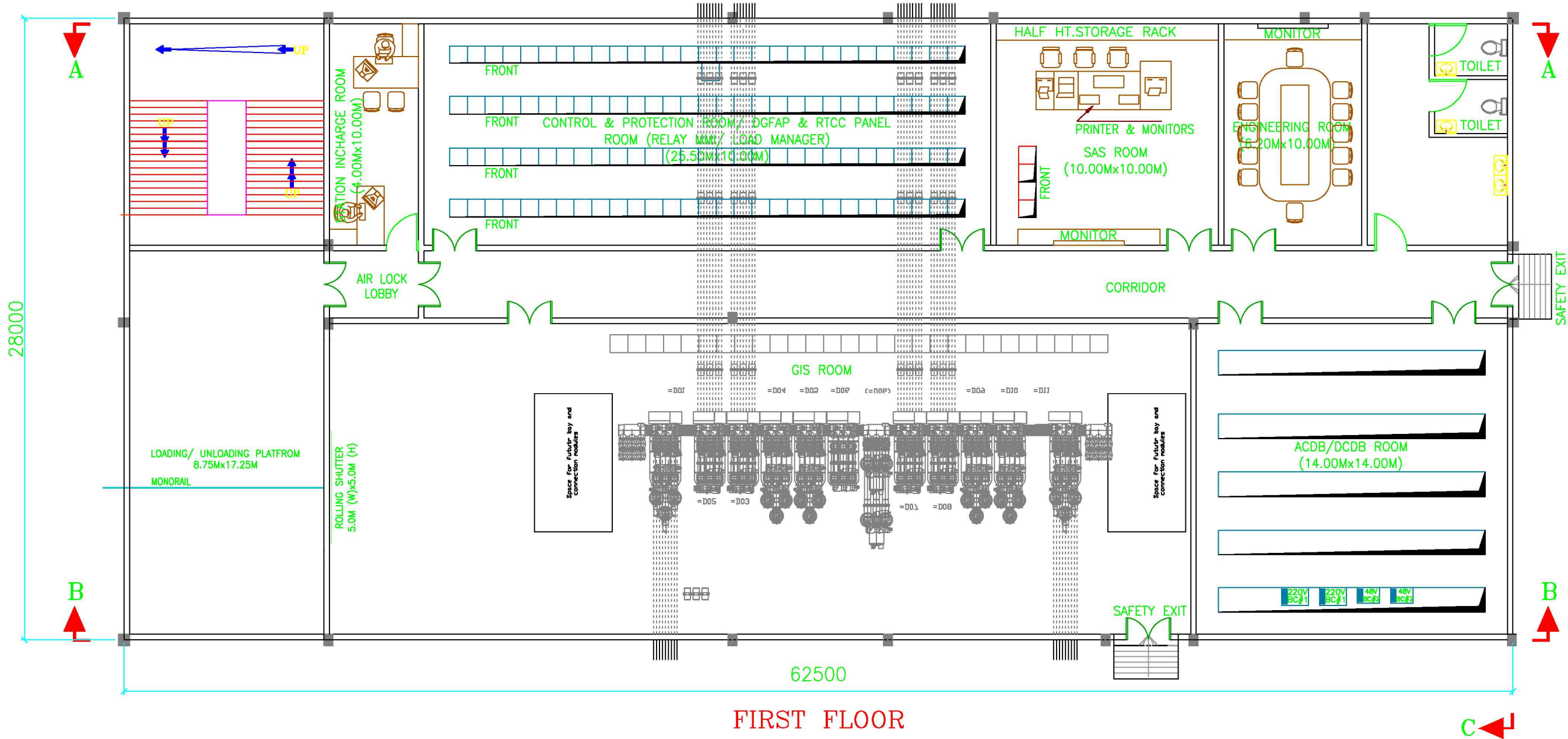
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INVENTORY NO
SIGN. AND DATE
REF. DRG. NO.
COMPUTER FILE NAME

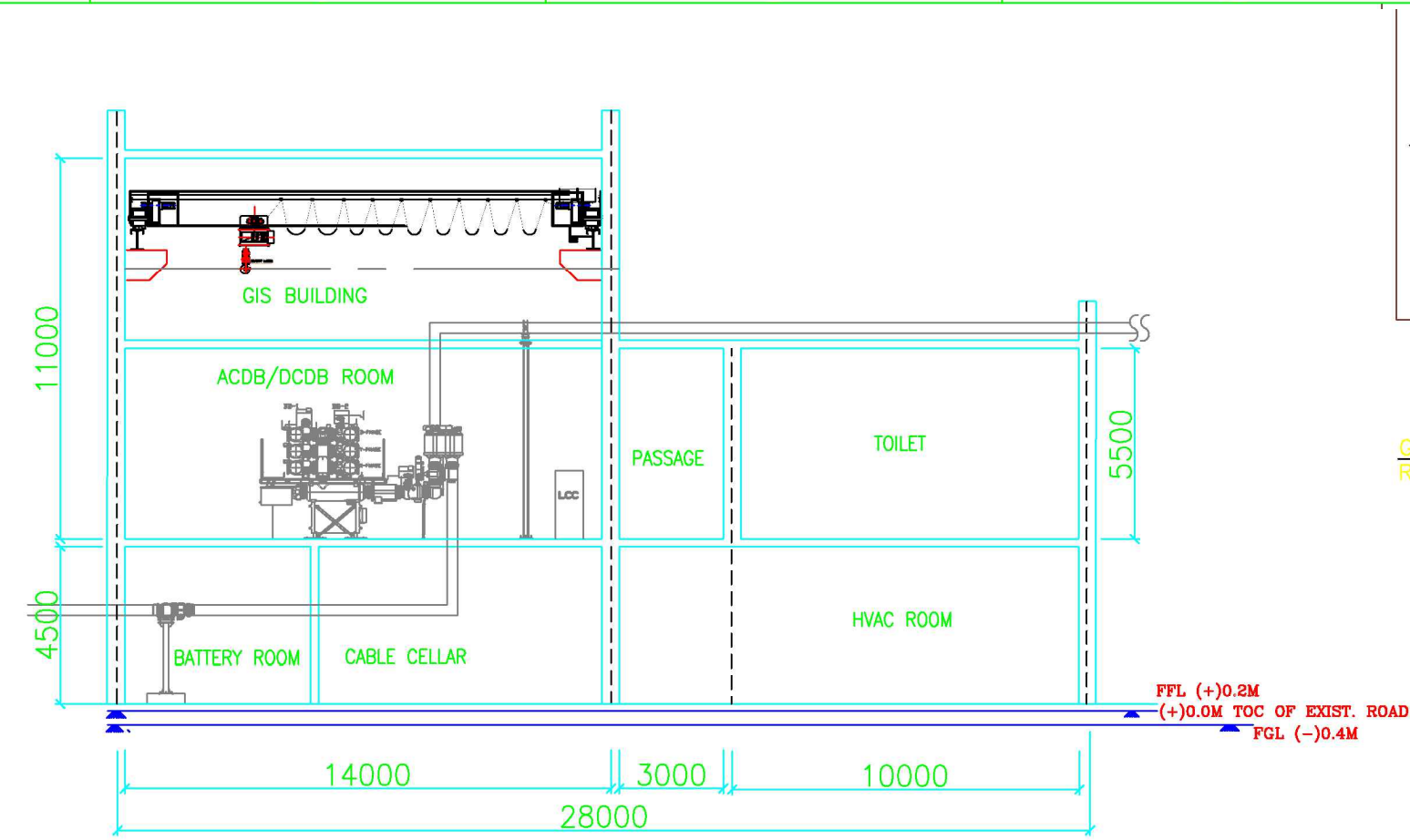
FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)



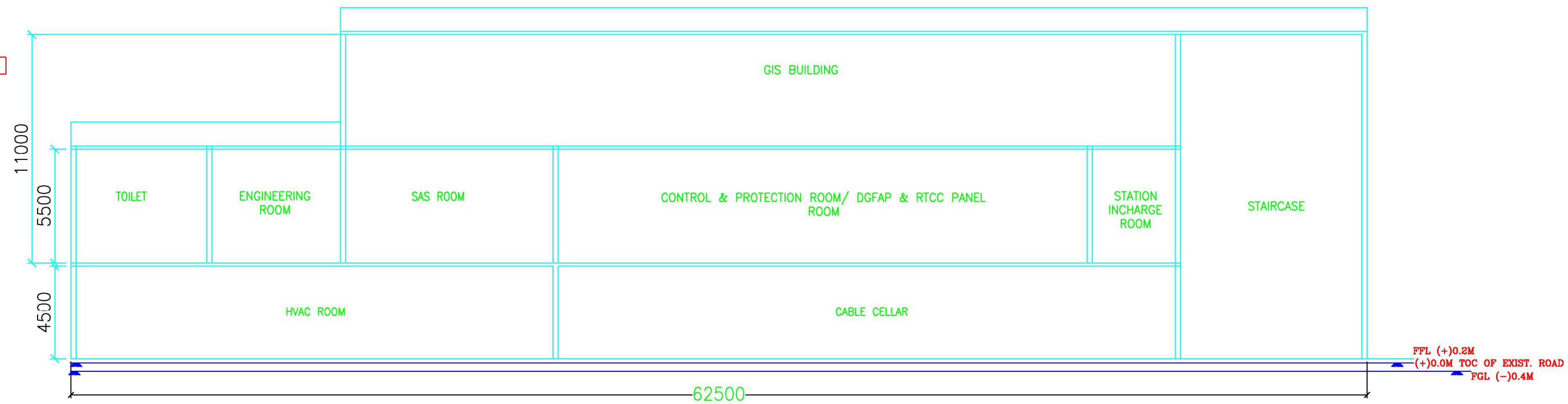
GROUND FLOOR



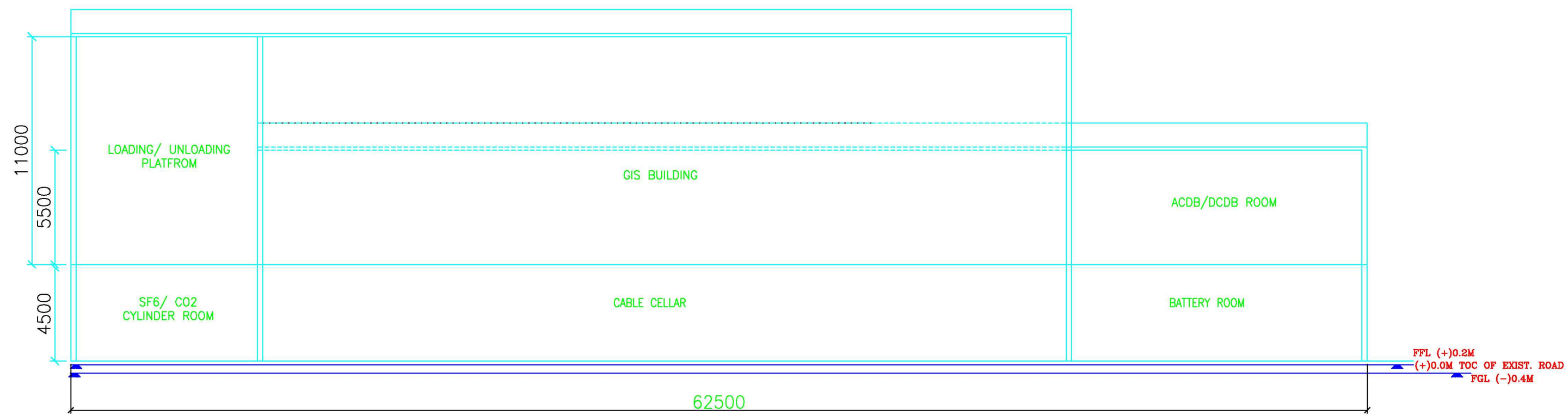
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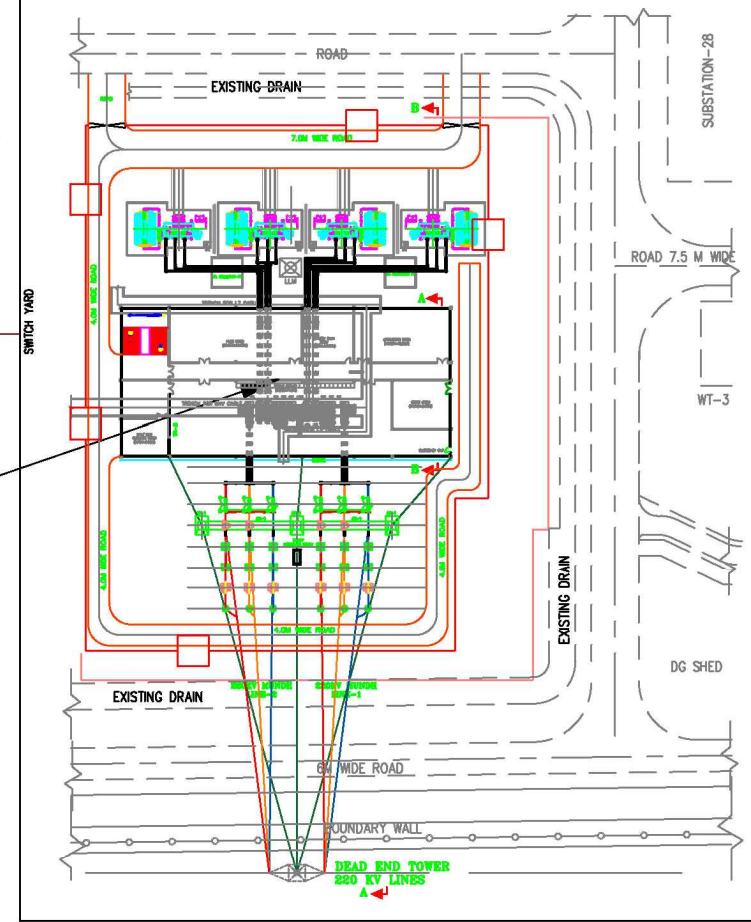
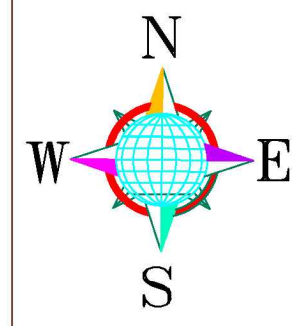
SECTION C-C



SECTION A-A



SECTION B-B



KEY PLAN

REFERENCE DRAWING (S)/ DOCUMENT(S) -

SL. NO.	DRAWING/ DOCUMENT NO.	DRAWING TITLE
2.	TB-411-316-011	220/33kV SWITCHYARD- LAYOUT PLAN & SECTION
1.	TB-411-510-001	220/33kV SWITCHYARD- SINGLE LINE DIAGRAM

PROJECT: LSTK JOB FOR ISBL WORK OF 220kV GRID POWER IMPORT AT PANIPAT REFINERY
LOA NO. RPRC182491/26286965 DTD.24.01.2020

OWNER: INDIAN OIL CORPORATION LIMITED

CONSULTANT: TATA CONSULTING ENGINEERS LIMITED

NAME	SIGN.	DATE
DRN. PK	-SD-	10.02.2020
CHD. DKS	-SD-	10.02.2020
APPD. VK	-SD-	10.02.2020

DEPT. TBEM CODE. 411	UNTOOL. DIMS. GR. G/M/F	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO. NO. OF ITEMS
		-N.A.-	-N.A.-	-N.A.-	-N.A.-
TITLE: GIS CUM CONTROL ROOM BUILDING - CONCEPTUAL LAYOUT					REV. 01
DRAWING/ DOCUMENT NO. TB-411-316-020					NO. OF SHT. 02

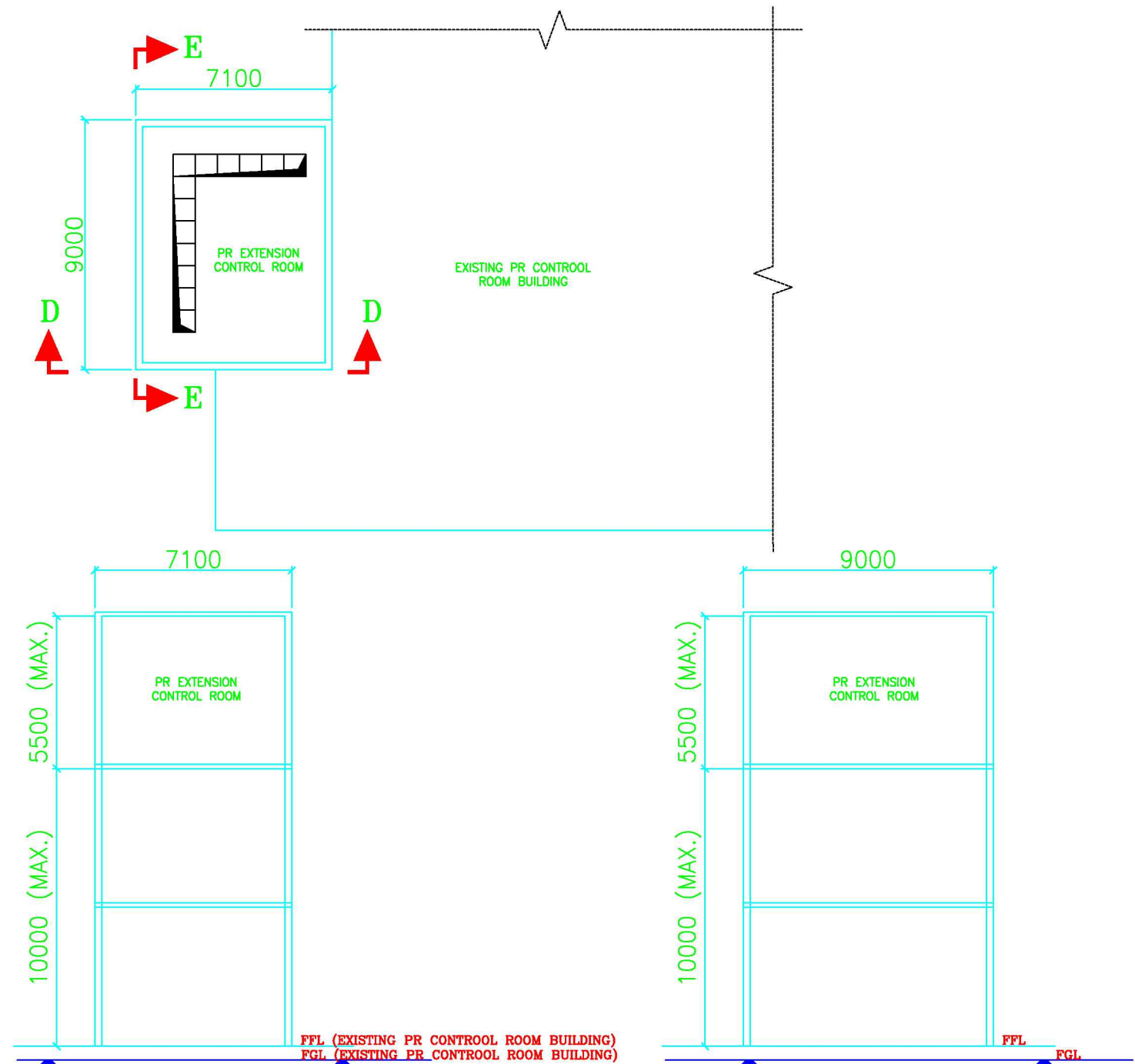
REV. DATE
01 14.04.20
PK
CHECKED
DKS
APPROVED
VK
AS PER CUSTOMER COMMENTS ON DATED 06.03.2020 DURING MEETING AT IOCL PANIPAT OFFICE

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

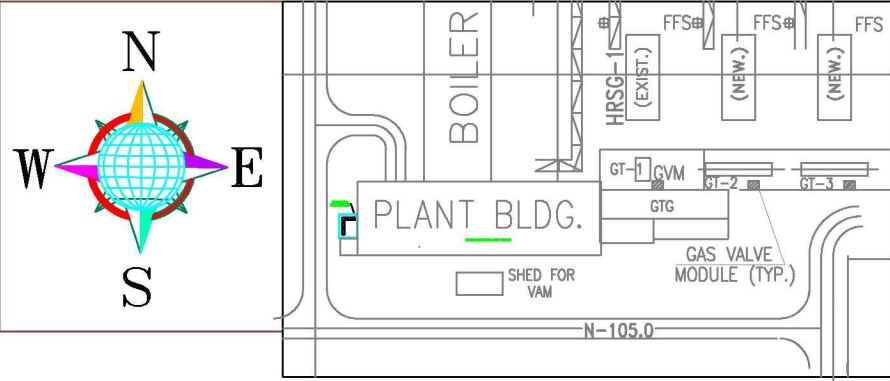
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

COMPUTER FILE NAME
REF. DRG. NO.
SIGN. AND DATE
INVENTORY NO



SECTION D-D

SECTION E-E



NOTES-

1. ALL DIMENSIONS ARE IN MM.
2. CLEARANCES SHOWN ARE MINIMUM ELECTRICAL CLEARANCES AND HENCE ANY CIVIL CONSTRUCTION SHALL BE OUTSIDE OF THIS ELECTRICAL CLEARANCES SHOWN IN THE DRAWING.
3. PR EXTENSION CONTROL ROOM SHALL BE CONSTRUCTED IN LINE WITH DIMENSIONS MATCHING WITH EXISTING CONTROL ROOM BUILDING, MEASURED AT SITE.
4. IN PR EXTENSION CONTROL ROOM BUILDING, FACILITIES FOR ILLUMINATION, AC & VENTILATION SHALL BE EXTENDED.
5. BUILDINGS LOCATIONS SHALL BE IN LINE WITH DETAILS SHOWN IN LAYOUT DRAWING.

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	PK
		CHD/APPD			CHD/APPD			CHD	DKS
								APPD	VK
ZONE			ZONE			ZONE			

AS PER CUSTOMER COMMENTS ON DATED 06.03.2020 DURING MEETING AT IOCL PANIPAT OFFICE

CUSTOMER: LSTK JOB FOR ISBL WORK OF 220kV GRID POWER IMPORT AT PANIPAT REFINERY			
LOA NO. RPRC182491/26286965 DTD.24.01.2020			
OWNER: INDIAN OIL CORPORATION LIMITED			
CONSULTANT: TATA CONSULTING ENGINEERS LIMITED			
DEPT. TBEM			
UNTOL DIMS. CR			
CODE 411			
TITLE			
GAS CUM CONTROL ROOM BUILDING - CONCEPTUAL LAYOUT			
REV. NO. 01			
SHT. No 02			
NO. OF SHT. 02			

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: GIS cum Control Room Building- Conceptual Layout

DOCUMENT NUMBER: TB-411-510-020

REVISION NO: 00

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
A.	CONSULTANT (dtd. 16.03.2020)		
	Electrical		
1	Plan	GIS LCC panel shall be shown as one per bay with dimension of 1000-1200mm as per vendor input.	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
2	Plan	Wherever column comes SF6 Duct or Cable Opening shall be rearranged to avoid fouling.	Noted. Please note that such details are tentative. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.
3	Plan	GIS bays shall be placed in between beams and not on beams.	Noted. Please note that such details are tentative. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.
4	Plan	ACDB & DCDB shall be aligned as per as per cable trench route proposed	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
5	Plan	No of staircase to be check considering building size as per relevant building standards.	Noted. Please note that such details are tentative. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.
6	Plan	More sections to be provided showing GIS room with EOT crane arrangement, loading platform etc.	Noted. Please note that such details are tentative. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.
7	Plan	No of exit to be check considering building size as per relevant building standards.	Noted and complied.
8	Plan	All inner dimension of rooms shall be provided. All dimension between panel to panel, panel to wall etc to be shown.	Noted. Please note that such details are tentative. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: GIS cum Control Room Building- Conceptual Layout

DOCUMENT NUMBER: TB-411-510-020

REVISION NO: 00

Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
9	Plan	NIFPS panel shall be shown	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
10	Plan	TR-3 (trench type) name mentioned in 1st floor GIS room to be removed	Noted and revised.
11	Plan	Exhaust fan arrangement for Toilet & Pantry to be shown	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
12	Section A-A	Cable termination arrangement in SAS/ Control room to be shown. Whether False floor to be provided or else cable entry for panel will be from top.	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
13	Plan	In ground floor GIS & LCC panel can be shown dotted as it is placed on 1st floor. Bus duct to be shown in ground floor	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
14	Plan	Bay name shall be mention for each GIS module	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
15	Plan	No. of CRP panels shown is more compared with 220kV feeders. Panel identification shall be done. CRP panel alignment to be checked.	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
16	Plan	Eye wash to be provided in battery room	Noted. Please note that such details are tentative. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: GIS cum Control Room Building- Conceptual Layout

DOCUMENT NUMBER: TB-411-510-020

REVISION NO: 00

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17	Plan	UPS not shown in drawing	Noted. Please note that such details are tentative and shall be revised, if required in line with OEM drawings/ design documents.
18	Plan	TR-2 cable trench (3Mtr wide) shown for battery room cables is too large for cables coming from battery room to DC system.	Noted and Revised.
19	Plan	Door to be provided in 1st floor staircase for entering into loading/unloading platform	In first floor, staircase shall not be covered and it shall be open. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.
20	General	Room with false ceiling & false floor shall be shown in section drawing	Noted. Please note that such details are tentative. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.
21	Plan	Steps & door shall be shown at ground floor stair case entry point	In ground floor, staircase shall not be covered and it shall be open. Civil and structure design documents shall be submitted subsequently after approval of this drawing/ document.
22	GIS room	GIS room height shown as 11mtrs in 220/33kV layout Plan & Section. Kindly confirm	Noted and revised.
23	Plan	Bus duct for transformer bay can be optimise by routing it from cable cellar. ACDB & DCDB room can be optimised in size to avoid fouling with bus duct.	This is finalized and frozen in line with Customer requirement and consent.
24	Plan	Additional door (near SAS room) to be shown for entry in GIS room	Noted and revised.

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DRAWING / DOCUMENT TITLE: GIS cum Control Room Building- Conceptual Layout

DOCUMENT NUMBER: TB-411-510-020

REVISION NO: 00

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25	Plan	Roof layout indicating busduct shall be provided	Please note that these details are tentative and indicated and shall be revised based on OEM drawings, which shall be submitted separately and such requirements shall be taken care during that.
26	Section A-A	Raised floor / power cable entry, HVAC cable entry to be shown.	Please note that these details are tentative and indicated and shall be revised based on OEM drawings, which shall be submitted separately and such requirements shall be taken care during that.
27		EHV cable trench is passing below the HVAC room. Kindly reroute the EHV cable to avoid fouling.	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.
28		Service shaft / fire hose shall be shown in drawing	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.
	Civil & General		
29	General	Layout can be optimised	Noted.
30	Section A-A	Floor level to be shown	Noted and revised.
31	Plan	Columns shall be placed at equidistant. Kindly check no. of column shown in drawings.	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.
32		GIS room clear span is 14.0 m, which may be critical during design / execution.	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: GIS cum Control Room Building- Conceptual Layout

DOCUMENT NUMBER: TB-411-510-020

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Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
33		Store Room of GIS building to have access from outside with ramp & rolling shutter	Revised details are provided.
34		Kindly review reroute busduct from cable cellar to GIS room to avoid cutout in ground floor slab. Also please review route of GIB to transformer if it can be optimised.	Please note that these details are tentative and indicated and shall be revised based on OEM drawings, which shall be submitted separately and such requirements shall be taken care during that.
35		Periphery road size to be increase for transportation of GIS & other equipment. 4mtr road will not be sufficient.	This is finalized and frozen in line with Customer requirement and consent.
36	Section A-A	Parapet wall to be shown on roof of building	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.
37	Section A-A	Staircase to be shown till the top of GIS building	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.
38		Door for 220kV GIS room shall be shifted towards west side to avoid fouling with future bays LCC panels	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.

COMMENTS RESOLUTION SHEET for

DRAWING / DOCUMENT TITLE: GIS cum Control Room Building- Conceptual Layout

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Sl. No.	Drawing Reference Details	Comment (s)/ Observation(s)	Resolution(s)
39	Plan	Wall not to be shown in 1st floor (West side) for loading/unloading platform	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.
40		All door opening shall be outside the room	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.
41	Section A-A	Beam to be shown in all rooms to verify the height of room for erection of panel & false ceiling etc.	In ground floor, staircase shall not be covered and it shall be open. Civil/ Mechanical drawing shall be submitted subsequently after approval of this drawing/ document.
42	Plan	Dimensions of building to be shown Centre to centre. Inner room dimension to be provided in civil drawing	Please note that the dimesnion shown are clear electrical dimensions, which shall be taken care in civil drawings, which shall be submitted separately.
B	CUSTOMER (dtd. 14.02.2020)		
1		The dimension of rack room shall be designed to ensure availability of spare space for additional 30% panel for future extensions.	Noted.
2		The inter-panel distances and distances between panel to building to be shown in the layout plan.	Please note that these details are tentative and indicated and shall be revised based on OEM drawings, which shall be submitted separately and such requirements shall be taken care during that.
3		The location of the SAS/Control room shall be nearby the operator's room only for ease of operation activity	Noted.
4		Battery room in the ground floor shall have entrance from outside.	Noted and revised.

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DRAWING / DOCUMENT TITLE: GIS cum Control Room Building- Conceptual Layout

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5		The location of the UPS, Battery chargers, UPS ACDB, DCDB, MLDB, ELDBs, PMCC shall be on the first floor of the building.	Noted and revised.
6		Lighting transformers can be kept in ground floor. VAM AC system MCC to be kept in HVAC room.	Noted and revised.
7		Location of AHU room shall also be shown in VAM.	Noted.
8		The space toilet and pantry to be reduced and same may be added into operator's for optimization.	Noted and revised.
9		The size of store room is observed to be small. Therefore size may be increased or different stores room may be provided of equivalent area.	Noted and revised.
10		Minimum two or more (as per CEA requirements) exit from the sub-station shall be provided at opposite ends.	Noted and revised.
11		Room/ plot plan for the MVWS may also be shown in the drawing	Please note that these details are tentative and indicated and shall be revised based on OEM drawings, which shall be submitted separately and such requirements shall be taken care during that.

NOTE:

CONTRACTOR IS OBLIGED TO FURNISH THIS SHEET (DULY FILLED UP WITH RESOLUTION TO ALL CUSTOMER/ CONSULTANT COMMENTS ALONG WITH REVISED DRAWINGS