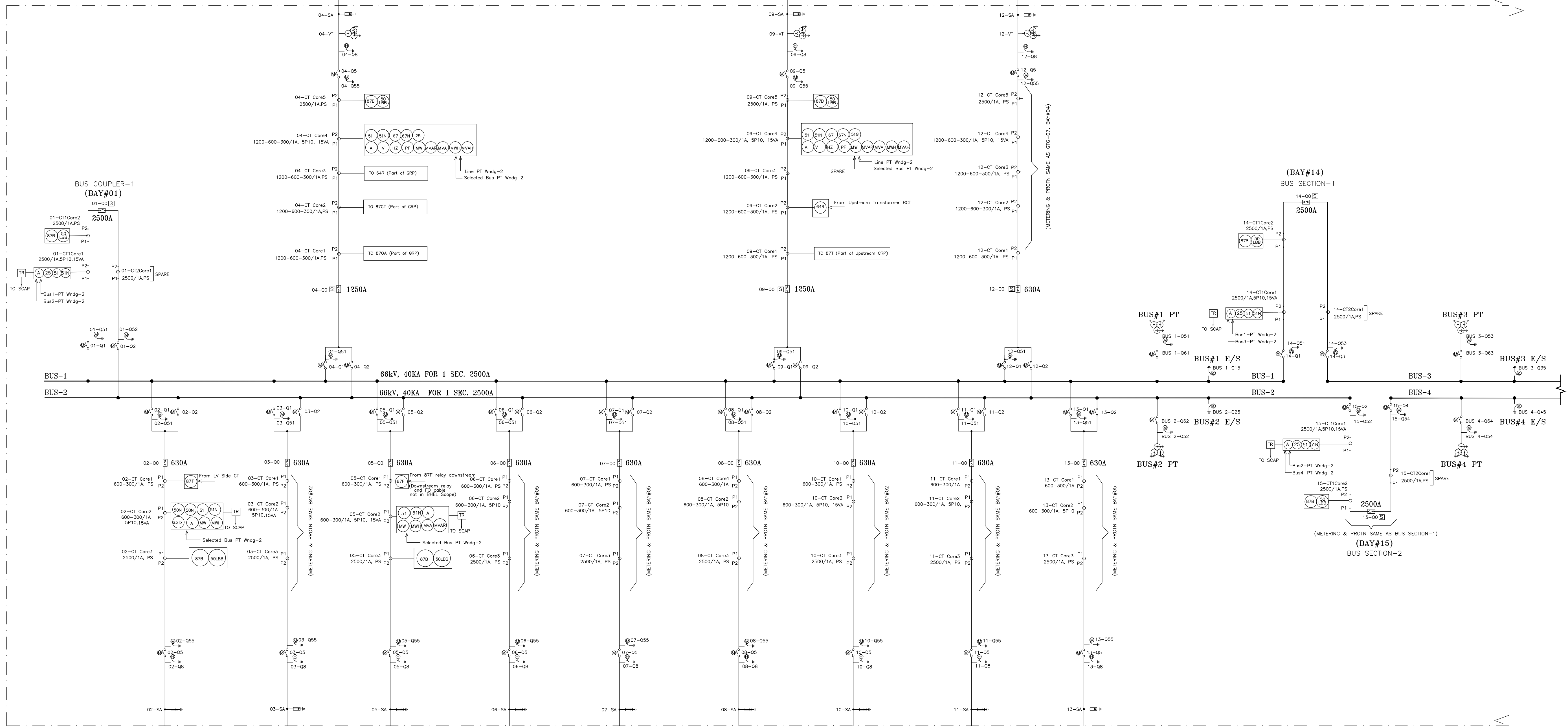


FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)

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66KV DOUBLE BUSBAR GIS SWITCHGEAR HT-9311



1Rx1Cx300Sq.mm
66KV(E), XLPE
CABLE PER PHASE
(TENTATIVE)

WITH CABLE
TERMINATION
(PROVISION)

WITH CABLE
TERMINATION
(PROVISION)

WITH CABLE
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WITH CABLE
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(PROVISION)

1Rx1Cx300Sq.mm
66KV(E), XLPE
CABLE PER PHASE
(TENTATIVE)

WITH CABLE
TERMINATION
(PROVISION)

WITH CABLE
TERMINATION
(PROVISION)

(BAY#02)
SS-94(CPP)
TR 9401, 66/11.5kV

(BAY#03)
SPARE FEEDER

(BAY#05)
SS-B3(CDU/VDU)
TR 8301

(BAY#06)
SS-84(RUF)
TR 8401

(BAY#07)
SS-84(RUF)
LARGE MOTOR

(BAY#08)
SS-B2(HCU)
TR 8201

(BAY#10)
SS-94(CPP)
TR 9403, 66/11.5kV

(BAY#11)
SS-86(CT)
TR 8601

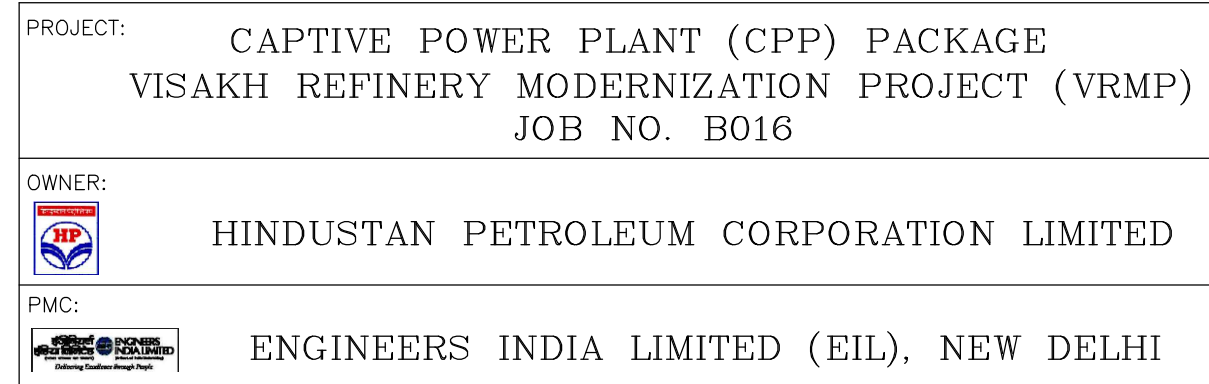
(BAY#13)
SS-90(HGU)

PROJECT: CAPTIVE POWER PLANT (CPP) PACKAGE VISAKH REFINERY MODERNIZATION PROJECT (VRMP) JOB NO. B016				
OWNER: HINDUSTAN PETROLEUM CORPORATION LIMITED				
PMC: ENGINEERS INDIA LIMITED (EIL), NEW DELHI				
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD				
NAME		SIGN.	DATE	NO.OF VAR.
DRN.	PK		19.04.18	
CHD.	DKS/AA		19.04.18	
APPD.	SKS/VK		19.04.18	
DEPT. TBG CODE: 450	UNTO. DIMS. 5/M/F	SCALE -N.A.-	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-
TITLE: SINGLE LINE DIAGRAM FOR 66KV GIS		CARD CODE N.A.	BHEL DRG NO. TB-1-402-500-001	REV. 00
SHT. No 01		NO. OF SHT. 03		

REV.	DATE	ALTERED	DATE	ALTERED	DATE	ALTERED	DATE	ALTERED	DATE	ALTERED	DATE	ALTERED	DATE	ALTERED	DATE	ALTERED	DATE	ALTERED	DATE
1		CHECKED		CHECKED		CHECKED		CHECKED		CHECKED		CHECKED		CHECKED		CHECKED		CHECKED	
2		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED	

DOCUMENT REVIEW DETAILS	
1	No Comments.
2	Proceed with manufacturing as per the commented document. Revised document required.
3	Document does not conform to basic requirements as marked. Resubmit for review.
4	Retained for Records.
5	Void.

Signature with Date: 01-MAY-2018
Name of Reviewer: SAI AJCHUTANI (A788)
Transmittal No.



		BHARAT HEAVY ELECTRICALS LTD.		NAME		SIGN.		DATE		NO.					
		HYDERABAD		DRN.		PK		19.04.18		VA					
				CHD.		DKS/AA		19.04.18							
				APPD.		SKS/VK		19.04.18							
DEPT. TBG		UNTOL. DIMS.				SCALE		WEIGHT (KG)		REF. TO ASSY. DRG.		ITEM NO.		NO. OF	
CODE 450		GR. G/W/F				-N.A.-		-N.A.-		-N.A.-		-N.A.-		-N.A.-	

TITLE	CARD CODE	BHEL DRG NO.		R/O NO.
		TB-1-402-500-001		
		CUST DRG NO.		
SINGLE LINE DIAGRAM FOR 66KV GIS	N.A.	SHT. No 02	NO. OF SHT. 03	

INVENTORY NO	SIGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
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SL.NO.	EQUIPMENT DESCRIPTION	CURRENT CAPACITY (A)	VOLTAGE LEVEL (kV)	SYMBOL	DEVICE DESIGNATION
1.	CIRCUIT BREAKER (3-PH)	2500, 1250, 630	72.5		Q0
2.	DISCONNECTOR	—	72.5		Q1, Q3 FOR BUS1&3 Q2, Q4 FOR BUS2&4 Q61, Q63 FOR BUS1&3 PT Q62, Q64 FOR BUS2&4 PT Q5 FOR LINE SIDE
3.	HIGH SPEED MAKE PROOF EARTHING SWITCH	—	72.5		Q8
4.	SAFETY EARTHING SWITCH	—	72.5		Q51, Q52, Q53, Q54, Q55 Q51, Q53 FOR BUS1&3 PT Q52, Q54 FOR BUS2&4 PT Q5 FOR LINE SIDE Q15 FOR BUS -1 Q25 FOR BUS -2 Q35 FOR BUS -3 Q45 FOR BUS -4
5.	CUURENT TRANSFORMER	—	72.5		
6.	POTENTIAL TRANSFORMER	2500, 1250, 630	72.5		
7.	SURGE ARRESTOR	—	72.5		
8.	66kV XLPE CABLE	—	72.5		

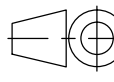
SL.NO.	NEMA DEVICE DESIGNATION	FUNCTION
1.	50	INSTANTANEOUS OVER CURRENT RELAY
2.	50N	INSTANTANEOUS EARTH FAULT RELAY
3.	51	IDMT OVER CURRENT RELAY
4.	51N	IDMT EARTH FAULT RELAY
5.	63	AUXILIARY RELAY FOR TRANSFORMER
6.	64R	TRANSFORMER RESTRICTED EARTH FAULT
7.	67	DIRECTIONAL OVER CURRENT RELAY
8.	67N	DIRECTIONAL EARTH FAULT RELAY
9.	87T	TRANSFORMER DIFFERENTIAL
10.	87F	FEEDER DIFFERENTIAL
11.	87B	BUS BAR DIFFERENTIAL
12.	50LBB	LOCAL BREAKER BACKUP PROTECTION
13.	51G	BACK UP EARTH FAULT RELAY
14.	S	CIRCUIT BREAKER WITH SYNCHRONISING FACILITY

1. FOR OWNER'S OUTGOING FEEDERS, FEEDER DIFF RELAY WILL BE PROVIDED AT 66 KV GIS END ONLY. FIBRE OPTIC CABLE AND MATCHING RELAY AT REMOTE END WILL BE PROVIDED BY CUSTOMER.
2. FOR FEEDERS(GRID IN COMERS AND BUS SECTIONALIZERS / BUS COUPLERS) PROTECTION AND METERING SHALL BE SUITABLE FOR BI-DIRECTIONAL POWER FLOW.
3. 415 AC BULK FEEDERS(2NOS.) AND EMERGENCY FEEDER SHALL BE PROVIDED BY PE&SD

SL.NO.	BAY/FEEDER DISCRPTION	BAY NO.	RATING	QTY.
1.	INCOMER GENERATOR TRANSFORMER (GTG) BAY (GTG-07 BAY)	04	1250A	01 SET
2.	INCOMER FUTURE GRID TRANSFORMER BAY (FUTURE BAY)	09	1250A	01 SET
3.	INCOMER STATION TRANSFORMER (STG) BAY (STG-01 BAY)	12	630A	01 SET
4.	INCOMER TRANSFORMER (SS-93 (220kV GIS) TR-9301 BAY, TR-9302 BAY)	18, 22	1250A	02 SET
5.	BUS COUPLER BAY (BUS COUPLER 1-2 BAY, 3-4 BAY)	01, 27	2500A	02 SET
6.	BUS SECTIONALIZER BAY (BUS SECTIONALIZER 1-3 BAY, 2-4 BAY)	14, 15	2500A	02 SET
7.	OUTGOING TRANSFORMER FEEDER (SS-94 (CPP) TR-9401 FEEDER, TR-9402 FEEDER, TR-9403 FEEDER, TR-9404 FEEDER)	02, 16 10, 19	630A	04 SET
8.	FULLY EQUIPPED SPARE FEEDER (SPARE-01 FEEDER, SPARE-02 FEEDER)	03, 24	630A	02 SET
9.	OUTGOING TRANSFORMER FEEDER (SS-83 (CD/VDU) TR-8301 FEEDER, TR-8302 FEEDER)	05, 17	630A	02 SET
10.	OUTGOING TRANSFORMER/ MOTOR FEEDER (SS-84 (RUF) TR-8401 FEEDER, TR-8302 FEEDER, LARGE MOTOR-01 FEEDER, LARGE MOTOR-02 FEEDER)	06, 25 07, 26	630A	04 SET
11.	OUTGOING TRANSFORMER FEEDER (SS-82 (HCU) TR-8201 FEEDER, TR-8202 FEEDER)	08, 20	630A	02 SET
12.	OUTGOING TRANSFORMER FEEDER (SS-86 (CT) TR-8601 FEEDER, TR-8602 FEEDER)	11, 21	630A	02 SET
13.	OUTGOING TRANSFORMER FEEDER (SS-90 (HGU) FEEDER-1, 2)	13, 23	630A	02 SET
14.	BUS PT BAY WITH DISCONNECTOR & EARTHSWITCH	BUS#1, 2, 3, 4 PT	630A	04 SET
15.	BUS EARTH SWITCH BAY	BUS EARTH SWITCH#1, 2, 3, 4	630A	04 SET

1. KEY SINGLE LINE DIAGRAM B016-606-16-50-00001 REV. B
2. EHV GIS DATA SHEET B016-606-16-50-DS-1029 REV. A
3. ENGINEERING DESIGN BASIS-ELECTRICAL A758-999-16-50-EDB-1001 REV.0
4. CT & VT SIZING CALCULATION FOR 66KV GIS , TB-402-510-024

[illegible]

PROJECT: CAPTIVE POWER PLANT (CPP) PACKAGE VISAKH REFINERY MODERNIZATION PROJECT (VRMP) JOB NO. B016												
OWNER:												
		HINDUSTAN PETROLEUM CORPORATION LIMITED										
PMC:												
		ENGINEERS INDIA LIMITED (EIL), NEW DELHI										
 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD					NAME DRN. PK CHD. DKS/AA APPD. SKS/YK		SIGN.	DATE 19.04.18 19.04.18 19.04.18	NO. OF VAR.			
DEPT. TBG CODE		UNTOL. DIMS. GR. <i>G.M.F.</i>			SCALE -N.A.-	WEIGHT (KG) -N.A.-	REF. TO ASSY. DRG. -N.A.-		ITEM NO. -N.A.-	NO. OF ITEMS -N.A.-		
TITLE					CARD CODE N.A.		BHEL DRG NO. TB-1-402-500-001 CUST DRG NO.				REV. 00	
SINGLE LINE DIAGRAM FOR 66KV GIS												
10		11		12		13		14		15		

Refer attached comment sheet



DOCUMENT REVIEW DETAILS

- ☐ 1 No Comments.
- ☒ 2 Proceed with manufacture / fabrication as per the commented document. Revised document required.
- ☐ 3 Document does not conform to basic requirements as marked. Resubmit for review.
- ☐ R Retained for Records. ☐ V Void.

Signature with Date **01-MAY-2018**

Name of Reviewer **SAI ACHUTUNI (A738)**

Transmittal No. _____

COMMENT SHEET

DOC. NO.	B016		--
	JOB NO.	TR. NO.	S.NO

PROJECT: VRMP PROJECT, VIZAG
NAME OF PACKAGE: CPP package

CLIENT: M/s HPCL-Vizag
CONTRACTOR: M/s BHEL

SL. NO.	COMMENT/ OBSERVATION	RESOLUTION / ACTION
1	DRAWING / DOCUMENT TITLE : SINGLE LINE DIAGRAM FOR 66KV GIS DOCUMENT NUMBER: TB-1-402-500-001 R 00 CATEGORY/CODE: 2	
1.	Show capacitive voltage detectors in each feeder / incomer	
2.	Include a note indicating the components mounted in CRP.	
3.	Please clarify whether transducers for SCAP and ECS will be part of CRP. Incase yes, indicate the transducers in CT circuit.	
4.	Spare CT indicated in bus coupler / bus sectionaliser shall be indicated as differential CT. The same shall be connected to differential relays in other bus section to form overlapping zone.	
5.	Indicate the current ratings of disconnecter switches.	
6.	PT symbol in the SLD and the legend are not matching. Please maintain uniformity.	
7.	Indicate knee point voltage of Class-PS CTs.	
8.	Indicate parameters of Line PTs & Bus PTs	
9.	Please check and correct the moving arm of the disconnectors (for eg 04-Q1 & 04-Q2 etc)	
10.	Please clarify whether high impedance type differential protection or low impedance type differential protection is used. Include a note in the SLD. In case of low impedance differential protection, the representation of bay units of differential relay shall be clearly indicated in each feeder along with the main relay at central location for each bus.	
11.	Each bus shall have separate differential relay.	
12.	Indicate protection elements 51V, 86 & 95 in all numerical relays.	
13.	Indicate protection element 25 in grid transformer incomers.	
14.	Spare feeder Bay#03 shall be similar to Bay#05. Update the details	
15.	Please note that all outgoing feeders for Owner's substations are plant feeders. However the downstream transformer numbers are indicated for ease of reference in the SLD. Please update the description as below Bay#07- SS-84 TR-8403 (RUF) Bay#13- SS-90 TR-9001 (HGU) Bay#26- SS-84 TR-8404 (RUF) Bay#23- SS-90 TR-9002 (HGU)	
16.	Stabilizing resistors and metrosils shall be provided for numerical relays to prevent any spurious tripping. Add a note regarding the same.	
17.	Also refer comments on CT PT sizing calculation document.	
18.	Client comments will be sent separately.	

NOTE: CONTRACTOR IS OBLIGED TO FURNISH THIS SHEET (DULY FILLED UP WITH RESOLUTION TO ALL EIL COMMENTS) ALONGWITH REVISED DRAWINGS

DOCUMENT REVIEW DETAILS	
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☒	Proceed with manufacture / fabrication as per the commented document. Revised document required.
☐	Document does not conform to basic requirements as marked. Resubmit for review.
☐	Retained for Records.
☐	Void.

Signature with Date: 01 MAY 2018 (SIGN/ DATE): 01/05/18
Name of Reviewer: SAI CHITRANI (736) Department: Electrical
Transmittal No. _____

ENGINEERS INDIA LIMITED, NEW DELHI

Name: SAI