

9	Running MW in 4-20 ma mode from transducer for both 33KV grid incomer	SS-9 GIS generation bus	Yes. Every MW signal shall be double .
10	Running MVAR in 4-20 ma mode from transducer for both 33KV grid incomer	SS-9 GIS generation bus	No
11	MWH /MVARH of both 33KV grid incomer	SS-9 GIS generation bus	No
12	System frequency (both line)	SS-9 GIS generation bus	yes
13	System Voltage (both line)	SS-9 GIS generation bus	Yes
15	Trip status of both 33KV grid incomer	SS-9 GIS generation bus	NO
16	Trip circuit supervision of both trip circuit for both 33KV grid incomer	SS-9 GIS generation bus	NO
19	DC & AC supply supervision of both 33KV grid incomer	SS-9 GIS generation bus	NO
20	Power factor of both 33KV grid incomer in 4-20 mA mode.	SS-9 GIS generation bus	NO
21	Monitoring of all relays of both 33KV grid incomer & LIBs (watchdog concept)	SS-9 GIS generation bus & LIB at SS-9	NO
22	Monitoring of relay healthiness (watchdog) of all LIB breakers.	LIB at SS-9	NO
23	Monitoring of healthiness of cable differential relay of both LIB	LIB at SS-9	NO
24	Monitoring of Trip circuit supervision of both LIB	LIB at SS-9	NO
25	Monitoring of DC & AC control supply of both LIB	LIB at SS-9	NO




26	Both LIB ON status	LIB at SS-9	NO
27	Both LIB OFF status	LIB at SS-9	NO
28	Both LIB ON command	LIB at SS-9	NO
29	Both LIB OFF command	LIB at SS-9	NO
30	Running MW in 4-20 ma mode from transducer for both LIB	LIB at SS-9	NO
31	Running MVAR in 4-20 ma mode from transducer for both LIB	LIB at SS-9	NO
32	Trip status of both LIB	LIB at SS-9	NO

All kind of hardware required in new LIB and existing SS-9 GIS system like contact multiplier, transducers shall be in the LSTK contractor scope including its supply, installation and commissioning

Part-3 – MB Box & control cabling -

- a- The marshalling box shall be of minimum IP-42 or better category with suitable Control TB mounting arrangement.
- b- Digital and analogue output TB shall be separate and shall be clearly identified.
- c- Cable entry in Marshalling box shall only be bottom entry . The minimum sheet thickness for non load bearing member shall be 1.6 mm while for load bearing members shall be 2.5 mm
- d- All Digital signal shall be through 1.1 Kv LV control cable of minimum size of 1.5 sqmm, multistrand type
- e- All signal cables shall be signal screened cable of size 2.5 sqmm
- f- The MB and gland plate shall be big enough to accommodate total cables of control and signal nature. For sizing purpose the number of outgoing cables to be considered same as incoming cables
- g- All the TB blocks shall be properly tagged with clear identification and shall match with MB drawings.
- h- MB box shall be floor mounted . All ~~structural work for MB installation, its earthing,~~ illumination and space heater shall be in the scope of ~~LSTK~~ contractor including supply of material.
- i- The MB can be with both side installation arrangement with provision of proper hinged type door system.
- j- Minimum 20% spare TB of both Digital and analogue type signals (of total signals) shall be provided as spare
- k- Insulating Separator plate or dual side insulated TB shall be used for all applications.

Annex-S-2/C-1/15

BASIC INFORMATION OF EXISTING PR AND PNPC FLYOVER**4 Feasibility Study of existing piperack on flyover**

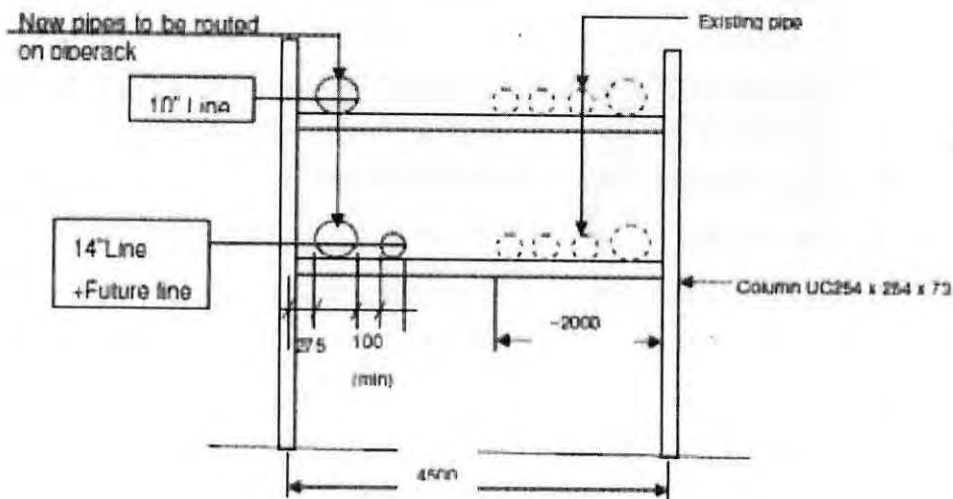
As per the document No. 6556-EPCC9-IN-FL-STR-DC-Design methodology for flyover,

Minimum vertical load on piperack considered for design = 1.25 kN/m^2

Spacing of column for each bay of piperack is @ 6 m C/C.

Hence minimum UDL considered on each transverse beam on each tier of piperack

$W = 1.25 \times 6 \times 0.9 = 6.75 \text{ kN/m}$ (considering 10% reduction due to intermediate beams)

Piperack Section over flyover

Refer Annexure-I for civil information.

Piping Load -

Existing pipes are not occupying entire width of the piperack Hence load from new pipes will be checked w. r. t. considered load on piperack.

Max. UDL due to New pipeline (due to 14" pipe line) = $2 \text{ kN} / (0.275 + 0.175 + 0.05) = 4.0 \text{ kN/m}$

Which is less than minimum UDL considered for design (= 6.75 kN/m)

Also column section provided is UC 254 x 254 x 73

Area of cross section = 9310 mm^2

Effective length of column = $1.2 \times 4 = 4.8 \text{ m}$

Slenderness ratio = $4800 / 64.8 = 74$

Permissible compressive stress = 125 N/mm^2 for buckling class d.

Hence load carrying capacity of column = $125 \times 9310 / 1000 = 1163.75 \text{ kN}$

Additional load due to new pipelines = $2 + 1.3 = 3.3 \text{ kN} \ll$ Permissible capacity (=1164 kN)

This additional load is already considered in design of existing piperack.

Percentage of additional load = $3.3 / 1164 \times 100 = 0.283$ which is negligible.

Wind Load-

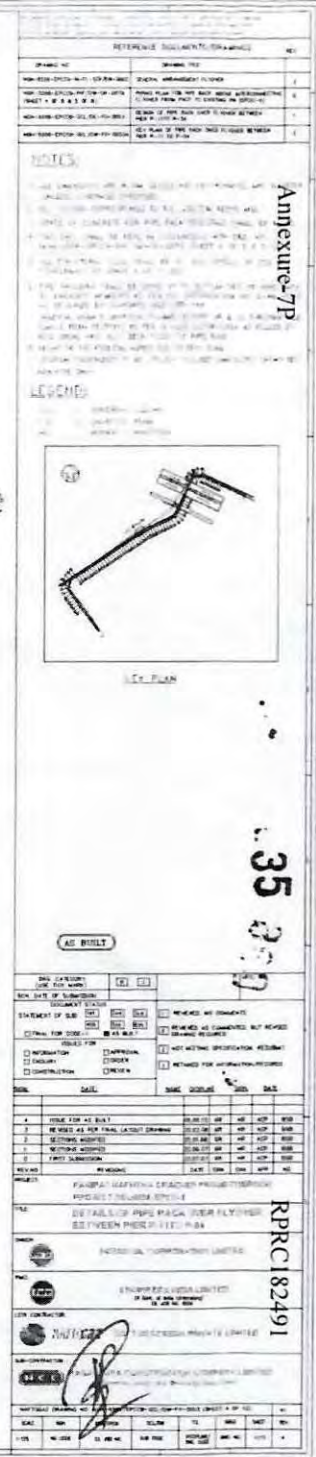
Referring to document No. 6556-EPCC9-IN-FL-STR-DC, clause 10.1.7 for transverse wind loading calculated depending on the width of the Pipe Rack as,

"To calculate wind load in transverse direction of piperack, a projected height of $1.25\text{m}/1.5\text{m}/2.0\text{m}$ shall be considered on all tiers irrespective of height between two tiers of rack widths of $4\text{m}/6\text{m}/8\text{m}$ and 10m respectively. For piperacks of widths greater than 10m , the above projected height shall be taken as $0.8[\text{diameter of largest pipe including insulation (m)}] + \tan 10^\circ[\text{width of rack (m)}]$. However, this shall not exceed the height between consecutive tiers."

This proves that wind loading on future pipes is already considered for the design of Piperack.

Hence no need to check wind load condition for the additional piping.





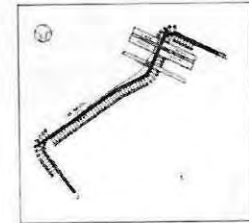
Annexure-7P

NOTES:

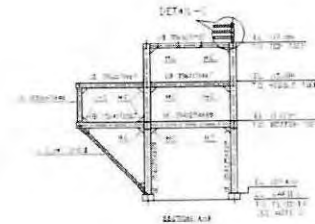
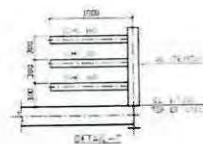
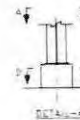
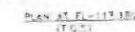
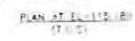
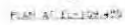
Annexure - P

LEGEND

•



Ex. Plan

AS BUILT[illegible]

Annex-S-3/C-5/6

Following testing kits shall be handed over to IOCL and shall be property of IOCL which shall be required for day-to-day maintenance and troubleshooting requirements post commissioning of the system.

S. No	Description	Quantity
1	Primary Current Injection Kit, Portable, Input: 0-230V AC, Output: 2500A continuous with 10 meter cable, Make: Megger ODEN AT/3S or equivalent	~~20~~ 0
✓ 2	Secondary Injection test Kit, 3 phase, Adjustable (voltage, current, frequency, phase angle, AC/DC output) Make: FREJA 300 equivalent	2
3	VLF AC Test kit with attachments for PD assessments and analysis system / DAC @ 50 Hz, Tandelta, Sheath Fault, Portable, 0-40KV AC as per IEC 60229 , Make: Megger TDM4540PTD or equivalent	~~20~~ 0
4	Battery Ground Fault Locator, Make: Megger BGFT or equivalent	~~20~~ 0
5	Phase sequence tester, Make: Megger PSI 410 or equivalent	~~20~~ 0
6	Power Quality Analyser, 3 Phase, with 4 Voltage and 5 Current Inputs, Make: Megger MPQ2000 or equivalent	~~20~~ 0
7	Transformer Oil Moisture Analyser, Make: Megger KF875 or equivalent	~~20~~ 0
8	Cable Route Tracer, Make: SPX RD8100 or equivalent	~~20~~ 0
9	Transformer Oil BDV Test Kit. Make: Megger OTS100 or equivalent	~~20~~ 0




Annex-S-3/C-18/1

PART-A:**EXISTING SYSTEM DATA OF PANIPAT REFINERY:**

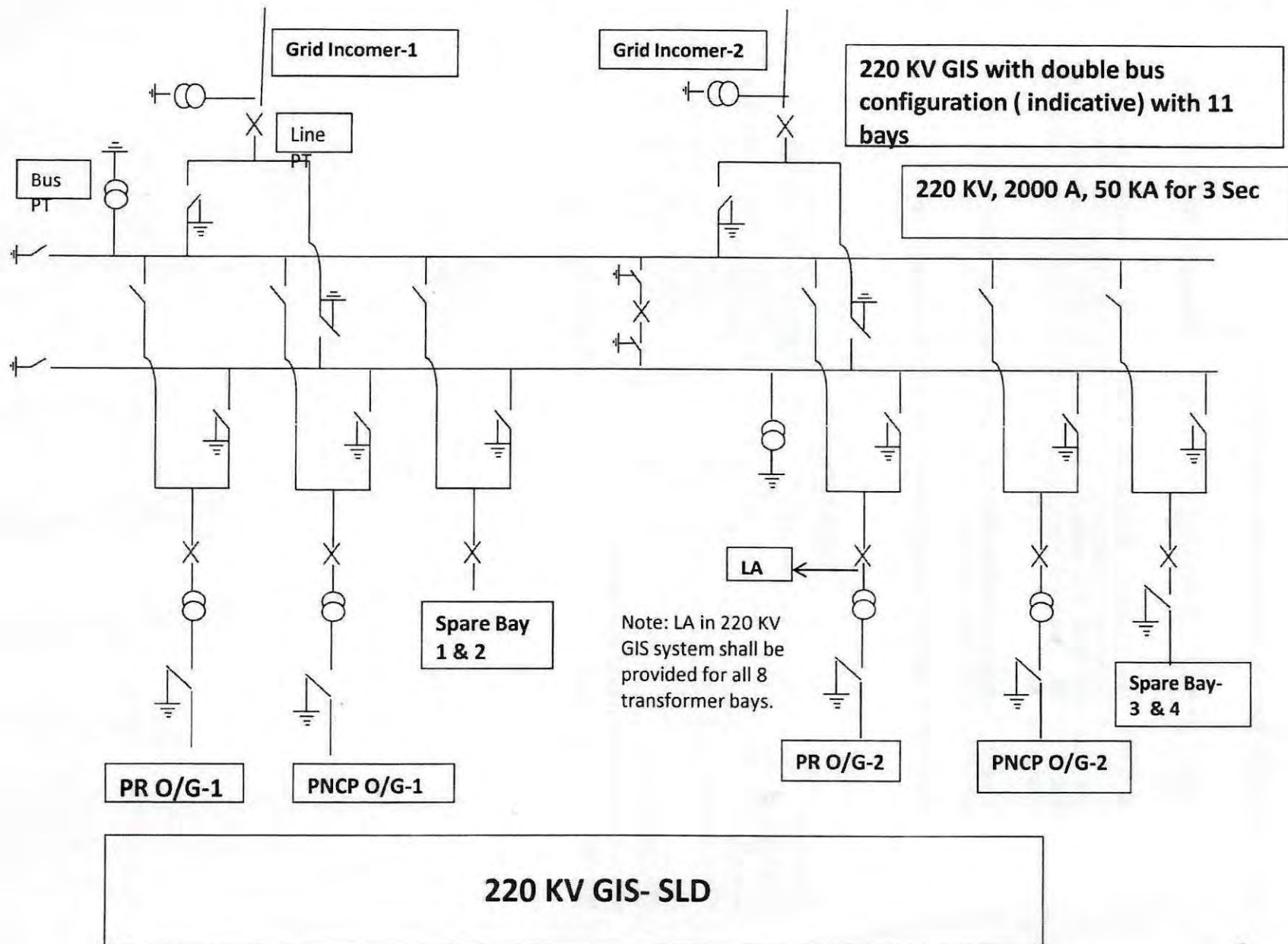
- i. Presently in PR CPP there are 3 STG units (3 X 25 MW) and 5 GTG (1 X 30.77 MW + 4 X 30.5 MW) units are installed.
- ii. STG-1 to 3 generation voltage level is 11 KV which is connected with Generation bus through Generator transformer of 11/ 11.7 KV transformer (Delta / star). STG generator grounding is High resistance grounding by use of NGT and NGR and generator transformer is also high resistance grounded by use of NGR. STG side Generation bus and distribution bus voltage is 11 KV.
- iii. GTG-1 to 5 generation voltage level is 11 KV which is connected with Generation bus through Generator transformer of 11/ 34.5 KV transformer (Delta / star). GTG generator grounding is High resistance grounding by use of NGT and NGR while 33 KV side of generator transformer is solidly grounded. GTG side Generation bus and distribution bus voltage is 33 KV.
- iv. 2 nos. of Unit ratio transformers (URT-1 & 2) are provided for fault current limit in 33 KV side. The ratio of URT is 33/33 KV.
- v. Tie transformer (Tr-111 & Tr-112) provide the required interconnection between 11 KV and 33 KV system. The details of Generator and generation system transformer is given below.

BASE DATA SHEET					
Equipment	MVA	MW	Impedance (%)		Voltage
			Xd''	Xd'	
GTG-1/2/3/4/5	38.4625	30.77	14.61	21.915	11
GT Transformer	50		11.74		11/34.5
Existing URT (old)	37.5		17.7		33/33
New URT at SS-63 related to BS-VI project	50		17.78		33/33
STG	31.25	25	16.57	24.855	11
STG Transformer	31.5		15		11/11.7
Tie transformer(Tr-111/ Tr-112)	37.5		11.18		
PNCP Tie	50		22		33/33
STG side 11 KV generation bus design fault level	750 MVA (40 KA for 3 sec)				
GTG side Generation bus design fault level	1500 MVA (25 KA for 1 sec)				

PART-B:**EXISTING SYSTEM DATA OF PANIPAT NAPHTHA CRACKER:**

- i. Presently in PNCP CPP there are 3 STG units (3 X 36.8 MW) and 5 GTG (5 X 25 MW) units are installed.
- ii. All STG & GTGs, generation voltage level is 11 KV which is connected with Generation bus through Generator transformer of 11/ 34.5 KV transformer Delta / star). GTG generator grounding is High resistance grounding by use of NGT and NGR while 33 KV side of generator transformer is solidly grounded. Generation bus and distribution bus voltage is 33 KV.
- iii. 2 nos of Unit ratio transformers (BTR-1 & 2) is provided for fault current limit in 33 KV side. The ratio of BTR is 33/33 KV.
- iv. Basic data of Generator and generation system transformer is given below.

BASE DATA SHEET				
Equipment	MVA	MW	Impedance (%)	Voltage
GTG-1/2/3/4/5	32.46		14 (Xd'')	11
STG 1/2/3	46		14.72 (Xd'')	11
GT Transformer	40		12.5	11/34.5
BST	37.5		12.5	33/33
STG Transformer	50		12.5	11/34.5
STG & GTG 33 KV generation (Bus design fault level)	40 KA for 3 sec- GIS			



PAUE2420F 341

2	Tender Section- C Sub Section-1 Chapter-3 Clause 4 - d	The line bays shall have the special dedicated CT and PT of 0.2S and 0.2 class respectively for tariff metering purpose. The separate metering panel shall be provided near to GIS switchgear complete with ABT and TOD meters (in main and check meter configuration) as per HVPNL guidelines attached as Annex-S-3/C-1/2. Multi-core CT and PT option is not acceptable.	The line bays shall have the special dedicated metering outdoor 220 KV CT and PT of 0.2S and 0.2 class respectively for tariff metering purpose. The separate metering panel in room shall be provided near to 220 KV outdoor CT and PTs complete with ABT and TOD meters (in main and check meter configuration) as per HVPNL guidelines attached as Annex-S-3/C-1/2. Only metering core to be provided in outdoor CT and PT. General purpose metering CT of 0.2s and PT of 0.2 class shall be part of GIS system. ~~The specification of outdoor 220 KV CT and PT is attached as annexure S-3/C4/8 & its approved vendor list attached as annexure section-3 chapter-17A~~
3	Tender Section- C Sub Section-2 Annexure- S-2/C-1/4	GELO as per Section -2 Chapter-1 Annex- S-2/C-1/4	Revised GELO is attached with this corrigendum and to be referred for tendering purpose.

TECHNICAL CORRIGENDUM POINT (TENDER NO.: RPRC182491)

Sl. No.	Tender Reference	DID READ	SHOULD READ
1	Section-1/Cl. no. 2 a/Pg. no.1	Construction of 11 bays, 220KV GIS Switchyard with allied switchgear and protective equipments. (Inclusive of four numbers 220 KV bays for P-25 project costing 27.01Cr.)	Construction of 11 bays, 220KV GIS Switchyard with allied switchgear and protective equipments inclusive of 4 Nos. of spare 220 KV transformer bays.
2.	Section-1/Cl. no. 2 b/Pg. no.1	Provision of 04 nos. of 220/33 KV 50 MVA grid transformers	Provision of 04 nos. of 220/34.5 KV 50/65 MVA (ONAN/ONAF) grid transformers
3	Section-1/Cl. no. 2 f/Pg. no.1	Fault current limiters for installation in parallel of URT.	Fault current limiter shall be provided in parallel with existing URTs in SS-63. The detailed scope and specification is attached as Section-3 Chapter-18.

PAGE 2490F 341

PAAE2450F 341

4	Section-2; Part-A Clause 1.0 / Pg. 93	Scope of Work: The brief scope of work include Design, Detailed Engineering, Drawing Preparation and Approvals, Electrical System Study Soil investigation, Procurement, Supply, Manufacture, Fabrication, Inspection & Expediting, Third Party Inspection, Carrying out route Surveys, Statutory Clearances, Liaisoning with HVPNL, Transportation of all equipments/Materials to the work site, Storage, Material Management, Project Management, Construction, Assembling, Installation, Testing, pre-commissioning, Commissioning and handing over of 220 KV infrastructure facilities inside battery limit area of Panipat Refinery on Single Point Responsibility (LSTK) Basis.	Scope of Work: The brief scope of work include Design, Detailed Engineering, Drawing Preparation and Approvals, Electrical System Study Soil investigation, Procurement, Supply, Manufacture, Fabrication, Inspection & Expediting, Third Party Inspection, Carrying out route Surveys, Statutory Clearances, coordination with HVPNL, Transportation of all equipments/Materials to the work site, Storage, Material Management, Project Management, Construction, Assembling, Installation, Testing, pre-commissioning, Commissioning and handing over of 220 KV infrastructure facilities inside battery limit area of Panipat Refinery on Single Point Responsibility (LSTK) Basis. The detailed scope of work is mentioned in section-2. The other sections are to be read in conjunction with Section-2.
---	--	---	---

0 163

PAGE 246 OF 341

5	Section-2 clause 4.2.1/ Page -94	Substation building, development of all required protection, metering, control and monitoring facility for new switchyard and power evacuation system with all required communication facility with supply grid system/ SLDC The ISBL (Inside Battery Limit) jobs starting from terminal point of 220KV transmission line up to Generation Board at Refinery premises includes provision of new 220KV full GIS Switchgear including Transformers and allied switchboards, protection and automation. This tender is being invited for ISBL (Inside Battery Limit) jobs of complete 220 kV GAS INSULATED SUBSTATION PACKAGE from eligible bidders with sound technical and commercial capabilities meeting the Bidder Qualification Criteria as mentioned in the relevant section of the tender. of 220KV transmission line up	Substation building, development of all required protection, metering, control and monitoring facility for new switchyard and power evacuation system with all required communication facility with supply grid system/ SLDC The ISBL (Inside Battery Limit) jobs starting from terminal point of 220KV transmission line up to Generation Board at Refinery premises includes provision of new 220KV full GIS Switchgear including Transformers and allied switchboards, protection and automation. The OSBL scope of work shall be limited to termination of overhead conductor upto gantry towers inside new 220 KV GIS switchyard including associated insulators at gantry towers. All other outdoor switchyard items like gantry tower, LA, wavetraps, CVT, CT, PT, isolator including associated conductors and accessories shall be in the scope of ISBL. Detailed scope of work shall also be referred as specified in Section-2. This tender is being invited for ISBL (Inside Battery Limit) jobs of complete 220 kV GAS INSULATED SUBSTATION PACKAGE from eligible bidders with sound technical and commercial capabilities meeting the Bidder Qualification Criteria as mentioned in the relevant section of the tender.
---	----------------------------------	---	---

0 162

6.	Section-2 /Cl. no. 4.0 /Pg. no.2	The brief description of proposed power evacuation philosophy is given in annexure-3 with SLD of existing system.	The brief description of proposed power evacuation philosophy is given in Annex- S-2/C-1/5 and S-2/C-1/6 with SLD of existing system.
7.	Section-2/Part-A/Cl. no.18	The meteorological data of the substation is indicated at Annex-S-2/C-1/8. However, for design purpose, ambient temperature should be considered as 50° C.	The meteorological data of the substation is indicated at Annex-S-2/C-1/8. Equipment design temperature shall be 45 deg C as per applicable IS and maximum ambient temperature shall be considered as 50 deg C.
8.	Section-2/Part-A/Cl. no. 9.1.2/Pg no. 3	220 KV GIS indoor switchgears with 11 bays including all its control, relay, monitoring facility inclusive of all accessories.	220 KV GIS indoor switchgears with 11 bays including all its control, relay, monitoring facility. The 11 bays are comprising of 2 line incomer bays, 1 bus-coupler bay, 8 Nos. of Transformer bays complete in all respect. Also the GIS installation shall be designed with the provision of space for extension of bays in either directions for minimum two numbers including its floor cutout arrangement. The building design, GIS system and switchgear floor designs shall be done accordingly.




PA 66 248 OF 341

9.	Section-2/Part-A/C 1. no. 9.1.7/Pg no. 3	Full facility to develop connectivity with 220 KV double circuit feeder from Point of connection (refinery premises) to new 220 KV GIS switchgear including 220 KV overhead conductors, AIS/ GIS termination bushings, gantry towers, Outdoor CVT, LA, outdoor Isolators, Wave Traps inclusive of all accessories as detailed in the tender documents	Full facility to develop connectivity with 220 KV double circuit feeder from Point of connection (refinery premises) to new 220 KV GIS switchgear including 220 KV overhead conductors, AIS/ GIS termination bushings, gantry towers, Outdoor CVT, LA, outdoor Isolators, Wave Traps inclusive of all accessories as detailed in the tender documents. For detailed specifications, please refer component wise chapters in Section-3.
10.	Annexure-S-3/C-4/3 Clause 1.2 on Pg 467	The line traps as specified shall be installed at the receiving end (IOCL Panipat end) of the transmission lines and shall be in coordination with sending end equipments. The design, selection of equipments, compatibility with the system shall be the responsibility of the LSTK contractor. All co-ordination and liasoning required with HVPNL shall be in the scope of LSTK contractor.	The line traps as specified shall be installed at the receiving end (IOCL Panipat end) of the transmission lines and also for the sending end substation of HVPNL. The supply of identical wave trap for sending end is in the scope of LSTK contractor. Due coordination for installation of the same at sending end shall be responsibility of LSTK contractor. All the device shall be identical for both sending and receiving end . The design, selection of equipments, compatibility with the system shall be the responsibility of the LSTK contractor. All co-ordination and interaction required with HVPNL shall be in the scope of LSTK contractor. The wave traps shall be required in two phases of each incoming circuit i.e. total 4 nos. of wave traps will be required.

JS

R

0 100

0 1.9

11.	Section-2/Part-A/C l. no. 10.1.1.2/Pg no. 97	220 kV SF-6 based full indoor GIS switchgears of 11 bays comprising of breakers, isolators, all type of Current Transformers & Potential transformer including 0.2 S class dedicated CT/PT for metering. In addition to above switchyard shall have Earth switches, dis-connectors switches, CVTs, LA , wave trap & PLCC equipments. The tentative SLD of switchyard system shall be attached as Annexure S-2/C-1/3 and tentative GELO of switchyard shall be attached as Annexure-S-2/C-1/4. The compliance of HVPNL guidelines, CEA guidelines and other standard requirements while preparing detailed SLD and GELOs will be in the scope of vendor.	220 kV SF-6 based full indoor GIS switchgears of 11 bays comprising of breakers, isolators, all type of Current Transformers & Potential transformer including 0.2 S class dedicated CT/PT for metering. In addition to above switchyard shall have Earth switches, dis-connectors switches, CVTs, LA , wave trap , outdoor metering CT, PT & PLCC equipments. The tentative SLD of switchyard system shall be attached as Annexure S-2/C-1/3 and tentative revised GELO of switchyard shall be attached as Annexure-S-2/C-1/4. The compliance of HVPNL guidelines, CEA guidelines and other standard requirements while preparing detailed SLD and GELOs will be in the scope of vendor. Outdoor LAs will required in 220 KV incoming line bays and LA will not be required in 220 KV Transformer bays.
12.	Section-2/Part-A/C l. no. 9.1.8/Pg no. 3	4x50/65 MVA, 220/34.5 kV Transformer & its bays along with allied switchgear and protective equipments, fire fighting facilities, online dehydration facilities including all associated accessories.	4x50/65 MVA, 220/34.5 kV Transformer & its bays along with allied switchgear and protective equipments, HVWS and NIFP based fire fighting facilities, online dehydration facilities including all associated accessories.

PAGE 250 OF 341

13.	Section-2/Part-A/C l. no. 9.1.9/Pg no. 3 & Section-2/Part-A Clause 10.1.1.7 (Pg no.: 98 & Section-2/Part-A Clause 10.1.1.8 (Pg: 98) & Section-2/Part-A Clause 10.2.1 & Section-2/Part-A Clause 10.2.1.2 & Annex-S-2/C-1/2	33/19 KV Copper Cable Sizing	33/19 KV Copper Cable minimum sizing for the complete project shall be considered as stated below: Cabling from 220 KV/34.5 KV Transformer to PR generation bus at SS-28—3Runs X 3 Core X 300 sqmm per feeder i.e. total 6 Runs for PR connectivity. Cabling from 220 KV/34.5 KV Transformer to PR side LIB at SS-63 —3Runs X 3 Core X 300 sqmm per feeder i.e. total 6 Runs for PNCP connectivity.
-----	---	------------------------------	---

0 1:8

14.	Annex-S-2/C-1/2 Clause 14.0		Cabling from PR side LIB at SS-63 to PNCP side LIB at SS-9—3Runs X 3 Core X 300 sqmm per feeder i.e. total 6 Runs for PNCP connectivity. Cabling from PNCP side LIB at SS-9 to GIS Generation Bus at SS-9—3 Runs per phase per feeder X 1 Core X 400 sqmm i.e. total 9 Runs per feeder and 18 runs for 2 feeders for PNCP connectivity. 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. All above cables are 33 KV/19 KV grade CU cables and are minimum requirements. The sizing calculation is in the scope of LSTK contractor and any increase in the size as per project requirement shall be in the scope of LSTK contractor without any extra financial implication for IOCL. The detailed specification of cables is attached as Section-3 Chapter-6. At PNCP HIS end, cable adopted/ termination system for GIS connectivity shall also be provided by LSTK contractor. In all other AIS terminations, proper end termination system shall be developed with use of heat shrinkable termination system.
-----	--------------------------------	--	--




15	Section-2/Part-A/Cl. no. 9.1.20 & 9.1.21 /Pg no. 96	The following hook up shall be done by GIS bus duct – Between incoming 220 KV D/C line and indoor GIS switchgear. & Indoor GIS switchgear to Outdoor transformers	The following hook up shall be done by GIS bus duct – Between incoming 220 KV D/C line and indoor GIS switchgears through AIS-GIS bushings. & Indoor GIS switchgear to Outdoor transformers through GAS to Oil Bushings. No EHV cables is envisaged in the project.
----	---	--	---

Am Ngai

JV

PAGE 253 OF 341

16	Section-2/Part-A/Cl. no. 10.1.1.2/Pg no. 4	220 kV SF-6 based full indoor GIS switchgears of 11 bays comprising of breakers, isolators, all type of Current Transformers & Potential transformer including 0.2 S class dedicated CT/PT for metering, In addition to above switchyard shall have Earth switches, dis-connectors switches, CVTs, LA , wave trap & PLCC equipments. The tentative SLD of switchyard system shall be attached as Annexure S-2/C-1/3 and tentative GELO of switchyard shall be attached as Annexure-S-2/C-1/4. The compliance of HVPNL guidelines, CEA guidelines and other standard requirements while preparing detailed SLD and GELOs will be in the scope of vendor.	220 kV SF-6 based full indoor GIS switchgears of 11 bays comprising of breakers, isolators, all type of Current Transformers & Potential transformer including 0.2 S class dedicated CT/PT for metering, In addition to above switchyard shall have Earth switches, dis-connectors switches, CVTs, metering CT, PT LA , wave trap & PLCC equipments. The tentative SLD of switchyard system shall be attached as Annexure S-2/C-1/3 and tentative revised GELO of switchyard shall be attached as Annexure-S-2/C-1/4. The compliance of HVPNL guidelines, CEA guidelines and other standard requirements while preparing detailed SLD and complete GELOs will be in the scope of vendor. 0.2s class metering for tariff purpose shall be through outdoor CT, PT and metering system while normal 0.5 class metering for internal purpose shall be part of GIS. The special purpose metering for line bays shall be provided only for IOCL end. Remote end metering is not the part of ISBL
----	--	---	--

Ravi Kumar

0 1:5

17	Section-3 Chapter-4 Clause 1.0 (Pg: 437)	This section of the specification covers design, fabrication, supply, installation, testing and commissioning of Gantry structures and Gantry Towers relevant ISO/IEC standard design for termination of the incoming ACSR Moose conductors and construction of bay for mounting of various outdoor switchyard components viz ACSR Moose terminations, Outdoor Lightning Arrestors, Gas Insulated Busduct, GIS to AIS bushings, CVT, PLCC components, Protection Couplers, Line Traps, Outgoing Bus-duct mounting structures, Isolators and earthing switches and any other components required for full commissioning of the system and in line with GELO approved by HVPNL.	This section of the specification covers design, fabrication, supply, installation, testing and commissioning of Gantry structures and Gantry Towers relevant ISO/IEC standard design for termination of the incoming ACSR double Moose conductors and construction of bay for mounting of various outdoor switchyard components viz ACSR Moose terminations, Outdoor Lightning Arrestors, Gas Insulated Busduct, GIS to AIS bushings, CVT, PLCC components, Protection Couplers, Line Traps, Outgoing Bus-duct mounting structures, Isolators and earthing switches and any other components required for full commissioning of the system and in line with GELO approved by HVPNL. The matching PLCC equipments including HF cable, wave trap, auxiliary supply 48V system, its cabling and any other associated cabling at remote end sub-station (Mundh) for commissioning of PLCC system shall be in the scope of LSTK contractor including its supply and installation. However supply and installation of CVTs at remote sub-station shall not be in the scope of LSTK contractor.
----	---	--	---




0 1.3

18	Section-2/Part-A/Cl. no. 10.1.1.4/Pg no. 4	Complete switchgear building for installation of GIS switchgears, relay room, SCADA/ECS cabinets, control panels, control supply and auxiliary supply system, UPS, DC Charger, batteries, Fire alarm panels, ACDB, MCC, LDB etc.	Complete switchgear building for installation of GIS switchgears, relay room, SCADA/ECS cabinets, control panels, control supply and auxiliary supply system, UPS, DC Charger, batteries, Fire alarm panels, ACDB, MCC, LDB, Lighting Transformers etc. Spare panel installation space of size 2m X 1m to be kept in new GIS building cabinet/CRP room with complete floor cut out arrangement for installation of any future owner supplied equipments. The revised floor plan shall be attached as Annex- S-3/C-3/1.
----	--	--	---

Handwritten signature

Handwritten signature

PAGE 2550F 341

PAGE 256 OF 341

19	Section-2/Part-A/C l. no. 10.1.1.7/Pg no. 5	33/19 KV Copper Cable (3 runs of 3C X 400 sqmm minimum per feeder i.e. per transformer to individual incomers in generation bus which is a total of 4 feeders.) for power evacuation from 220 KV/33 KV transformers terminals to existing generation buses in PR. In PR, 33 KV cables shall be directly terminated to spare incoming panels to Generation Buses as per tentative interconnection SLD attached as Annexure- S-2/C-1/5. Separate feeder cables will be provided from transformer to individual incomer breakers. Transformer 33 KV terminal box shall be suitable for termination of minimum 6 runs of 3C X 400 sqmm cables. All integration requirements for hook-up of grid system with the generation bus will be in the scope of vendor. Any adaptor box/panel extension for termination of cables will be in the scope of the vendor including design and supply of all required materials. Compatibility of protection system of new and existing generation system shall be in the scope of the vendor. Any additional hardware/CT/PT shall be in the scope of vendor including design and supply of all required materials.	33/19 KV Copper Cable (3 runs of 3C X 400 sqmm minimum per feeder i.e. per transformer to individual incomers in generation bus which is a total of 4 feeders.) for power evacuation from 220 KV/33 KV transformers terminals to existing generation buses in PR. In PR, 33 KV cables shall be directly terminated to spare incoming panels to Generation Buses as per tentative interconnection SLD attached as Annexure- S-2/C-1/5. Separate feeder cables will be provided from transformer to individual incomer breakers. Transformer 33 KV terminal box shall be suitable for termination of minimum 6 runs of 3C X 400 sqmm cables. All integration requirements for hook-up of grid system with the generation bus will be in the scope of vendor. Any adaptor box/panel extension for termination of cables will be in the scope of the vendor including design and supply of all required materials. Compatibility of protection system of new and existing generation system shall be in the scope of the vendor. Any additional hardware/CT/PT shall be in the scope of vendor including design and supply of all required materials. The required space for extension is available in existing switchgear rooms. The GA diagram and detailed feeder SLD of PR generation bus (Ss-63 feeder) is attached as Annex- S-2/C-1/10 and detailed feeder SLD of PNCP SS-09 generation bus feeders is attached as Annex- S-2/C-1/11. The separate cable trays shall be provided of adequate design and size shall be provided in the cable cellars of SS-28 and SS-9 for facilitating the laying of new cables as per project requirements. Structural works for new cable tray system shall also be in the scope of LSTK contractor including supply of all required materials.
----	---	--	--

0 112

20	Section-2/Part-A/CI. no. 10.1.1.8/Pg no. 98	After LIB again, 3 runs of 3C X 400 sqmm minimum per feeder cables will be laid from this LIB in 220 KV GIS switchgear room to PNCP power plant sub-station-9 and same will be terminated in the new local isolation breakers at the PNCP end. From LIB at PNCP end, 9 runs per feeders of 1C X 400 sqmm copper cables will be laid from LIB to spare incomer breaker of PCNP GIS generation bus at SS-9 as per tentative interconnection SLD attached as Annexure- S- 2/C-1/6 After LIB again, 3 runs of 3C X 400 sqmm minimum per feeder cables will be laid from this LIB in 220 KV GIS switchgear room to PNCP power plant sub-station-9 and same will be terminated in the new local isolation breakers at the PNCP end. From LIB at PNCP end, 9 runs per feeders of 1C X 400 sqmm copper cables will be laid from LIB to spare incomer breaker of PCNP GIS	After LIB again, 3 runs of 3C X 400 sqmm minimum per feeder cables will be laid from this LIB in 220 KV GIS switchgear room to PNCP power plant sub-station-9 and same will be terminated in the new local isolation breakers at the PNCP end. From LIB at PNCP end, 9 runs per feeders of 1C X 400 sqmm copper cables will be laid from LIB to spare incomer breaker of PCNP GIS generation bus at SS-9 as per tentative interconnection SLD attached as Annexure- S- 2/C-1/6 After LIB again, 3 runs of 3C X 400 sqmm minimum per feeder cables will be laid from this LIB in 220 KV GIS switchgear room to PNCP power plant sub-station-9 and same will be terminated in the new local isolation breakers at the PNCP end. From LIB at PNCP end, 9 runs per feeders of 1C X 400 sqmm copper cables will be laid from LIB to spare incomer breaker of PCNP GIS generation bus at SS-9 as per tentative interconnection SLD attached as Annexure- S- 2/C-1/6. Adequate space available in existing SS-63, SS-9 for installation of panels. Any civil floor modification and structural work required for new LIB panel installation will be in LSTK contractor scope including supply of material.
21.	Section-2/Part-A/C I. no. 10.1.1.5/Pg no. 5	The SCAP/ Remote control hardware and HMI panel to be installed in existing control room of both PR and PNCP. The existing control room shall be extended for accommodation of new hardwares in PR. Complete design supply and site work for	The SCAP/ Remote control hardware and HMI panel to be installed in existing control room of both PR and PNCP. The existing control room shall be extended for accommodation of new hardware in PR. Complete design supply and site work for extension of control shall be in the scope of vendor. Separate base foundation system to be developed from ground floor itself and same shall be connected with existing PR control room by breaking the wall in between. Extension will be required only at the control room level. So no modification in existing control room arrangement is required, except breaking the wall with proper sealing arrangement between two rooms.

PAGE 258 OF 341

22.	Section-2/Part-A/Cl. no. 10.1.1.9.1/Pg no. 5	OFC cable based connectivity will be built-up between PR and PNCP for following objectives: For cable differential protection For required data transfer for load management package. For data transfer required for load shedding through ECS at PR and PNCP end. For data transfer required from SCADA system to SCADA HMI at both PR and PNCP control	OFC based independent cable connectivity is required between PR GIS system to SS-63 for following purpose – Cable differential protection for PNCP cable from GIS to new LIB in PR – One OFC cable of minimum 6 core will be required per feeder, i.e 2 runs between GIS system to PR LIB panels in SS-63 Cable differential protection for PNCP cable from new LIB in PR to new LIB in PNCP – One OFC cable of minimum 6 core will be required per feeder, i.e 2 runs between PR LIB panels in SS-63 to PNCP LIB in SS-9 Cable Differential protection for PNCP cable from new PNCP LIB to PNCP GIS panel- One OFC cable of minimum 6 core will be required per feeder, i.e 2 runs between new PNCP LIB to PNCP GIS panel LMS system data transfer between PR – PNCP – Redundant OFC connectivity of minimum 6 core per cable is required for required data transfer for LMS system between PR new GIS substation to PR CPP and PR new GIS system to PNCP CPP . Data connectivity for HMI installation of new SAS system - Redundant OFC connectivity of minimum 6 core per cable is required for required data transfer for HMI system between PR new GIS substation to PR CPP and PR new GIS system to PNCP CPP. Each OFC cable shall be laid in independent HDPE pipe system of suitable size. For each purpose, independent OFC cabling will be required and no termination, connectivity hardware to be made common or sharing base. All FO cable connectivity shall be without any intermediate telecom equipments like SDH/PDH OFC connectivity for ECS load shedding integration will be done by IOCL. OFC cables can be laid along with 33 KV cables with spacing and dressing as required.
-----	--	--	---

0 1:0

PAPER 259 OF 341

23.	Section-2/Part-A/Cl. no. 10.1.1.13/Pg no. 6	1.1kV grade power & Armoured /Un-armoured control copper cables along with complete accessories for switchgear and protection equipment including its laying infrastructure build-up and laying. Station Auxillary at 415 V level to be taken from existing PCC system at SS-28.	1.1kV grade power & Armored /Un-armored control copper cables along with complete accessories for switchgear and protection equipment including its laying infrastructure build-up and laying. Station Auxiliary at 415 V level to be taken from existing PCC system at SS-28. Spare 415 V feeder of 800 amps capacity to be used for providing the required LT supply So no extension of existing PCC in SS-28 is envisaged while all such cabling work, including tray provision, structural support for cabling , cable termination at both end shall be in LSTK contractors scope. Existing cable tray system may be used if adequate space is available in existing trays and with due permission of EIC. Otherwise separate tray shall be provided inside SS-28 cellar room. For connectivity with between GIS building to SS-28, SS-63 shall required proper cable route and tray system which is in the scope of LSTK contractor. For control cables from GIS switchgear to PR Control room, separate tray system to be developed. For this route road crossing will also be required and structural system of surface tray type shall be provided of adequate clearances as per cable laying guidelines and as instructed by EIC. Tentative route diagram is attached as – Annex- S-2/C-1/12 LV Power and control cables will also be required for following applications in addition to requirement of GIS substation 1. LT power to LT auxiliary system of new GIS substation from SS-28 of PR 2. LT Power to AC emergency light of new GIS sub-station from SS-28 of PR. 3. IO related with SCAP. 4. IO hook up of new system with existing ECS in SS-28. ECS IO list is attached as Annexure- S-3/C-9/3. 5. DC /AC control of new LIB breakers in SS-63. Note: For LIB at PNCP ss-9, existing DC/ AC system may be used for required applications.
-----	---	--	--

0 169




PAU-2600F-341

24.	Section-2/Part-A/Cl. no. 10.1.1.17/Pg no. 6	Complete switchyard lighting including lighting transformer and complete auto control based on astronomical timers. All Lighting including tower/ high mast light shall be LED type.	Complete switchyard lighting including lighting transformer and complete auto control based on astronomical timers. All Lighting including tower/ high mast light shall be LED type. Lighting Transformer shall be 2 X 100% concept. The input supply to lighting transformer (415 V) shall be from new PMCC which will be installed in new GIS building & in the scope of ISBL.
25.	Section-2/Part-A/Cl. no. 10.1.1.18/Pg no. 6	Complete Earth mat laying and its connection to the equipment. The earth mat will be designed / quoted for soil resistivity as per site condition. Bidder to evaluate soil resistivity and earth mat will be designed for actual soil resistivity. Earthing system design calculation shall be submitted for approval.	Complete Earth mat laying and its connection to the equipment. The earth mat will be designed / quoted for soil resistivity as per site condition. Bidder to evaluate soil resistivity and earth mat will be designed for actual soil resistivity. Earthing system design calculation shall be submitted for approval. The earth mat system of new 200 KV system shall be designed independently. During execution period same shall be connected with the existing nearby earth mat system. But for design purpose same shall not be considered. Tentative value of soil resistivity of existing 132 KV switchyard area is attached as
26.	Section-2/Part-A/Cl. no. 10.1.1.20/Pg no. 6 &	220V, DC battery with Dual FCBC battery charger of capacity 80A (minimum) & Dual section DCDB along with associated accessories suitable for proposed system. Back-up time to be considered as 10 hrs for all kind of DC loads for sizing of charger and batteries.	220V, DC battery with Dual FCBC battery charger of capacity 80A (minimum) & Dual section DCDB along with associated accessories suitable for proposed system. Minimum Back-up time to be considered as 02 hrs for all kind of DC loads for sizing of charger and batteries. Minimum 20% spare outlet shall be provided in DCDB. This DC system shall be exclusively used for new loads of ISBL system including DC supply for LIB installed in SS-63, SCAP of PR control room . 20% spare capacity shall also to be considered for any future application in charger and battery sizing.

0 168

27.	Section-2/Part-A/Cl. no. 10.1.1.20/Pg no. 6	110 V AC UPS system (2X 25 KVA minimum) in parallel redundant configuration along with ACDB with dual incomer and bus coupler system and Ni-Cd batteries (2 hours backup minimum) suitable for project requirement	110 V AC UPS system (2X 25 KVA minimum) in parallel redundant configuration along with ACDB with dual incomer and bus coupler system and Ni-Cd batteries (2 hours backup minimum) suitable for project requirement. Minimum 20% spare outlet shall be provided in UPS ACDB. 20% spare capacity shall also to be considered for any future application in UPS and battery sizing.
28.	Section-1/Additional Design Guidelines/Cl. no. 23.18	All substation / MCC rooms shall be located outside the hazardous area	All proposed substation / MCC rooms is located in Non-hazardous area
29.	Section-2/Part-A/Annexure S-2/C- 1/2/ sl. no. 6 pg 125	220 kV, 10kA, station class-3 type gapless lightning arrester with corona ring, analog type leakage detector, leakage counter and other accessories including its lattice type galvanized support structure.	220 kV(nominal voltage), 10kA, station class-3 type gapless lightning arrester with corona ring, analog type leakage detector, leakage counter and other accessories including its lattice type galvanized support structure.. The detail technical data sheet is provided in Annexure S-3/C-4/7
30.	Section-2/Part-A/Annexure S-2/C- 1/2/ sl. no. 7 page 125	(220/√3)kV / (110/√3) / (110/√3) / (110/√3)V,CL. 3P, 3P and 0.2, 4400/8800 μF type Capacitive voltage transformer (CVT) including its galvanized support structure for Protection and Metering purpose with accessories required. The specification is tentative. Bidder to design and supply accordingly as per project requirements (Refer Section-3/Chapter-4.)	(220/√3)kV / (110/√3) / (110/√3) / (110/√3)V,CL. 3P, 3P and 0.2, 8800 μF type Capacitive voltage transformer (CVT) including its galvanized support structure for Protection and Metering purpose with accessories required. The specification is tentative. Bidder to design and supply accordingly as per project requirements (Refer Section- 3/Chapter-4; Annex- S-3/C-4/6)
31.	Section-2/Part-A/Annexure 1/2/ sl. no. 8 Pg -125	220kV, 1250A, 50 KA/1 sec, 1 mH bus (Tentative) with accessories required shall match with sending end system. The be design supply by bidder	220kV, 2000A, 50 KA/1 sec, 1 mH bus post mounted type (Tentative) with accessories required including its lattice type shall match with sending end system. The complete PLCC be design supply by bidder. Detail technical specification is Technical specification is given on S-3/C-4/3.

PAGE 262 OF 341

32	Section -1 /Additional Design Guidelines/Cl. no. 23	Layout of substation shall comply with OISD regulations, IE rules, TAC regulations and any other applicable statutory rules and regulations	Layout of substation shall comply with OISD regulations, IE rules, TAC regulations and any other applicable statutory rules and regulations. For reference the OISD standards such as OISD-STD-110,113,118,173, OISD-RP-146,147,148,149 & OISD-GDN-180 may be referred.
33	Section-3 /Chapter-1/Cl. no. 3.7	The 220kV GIS building shall comprise an EOT (Electric overhead travel) crane of minimum capacity 5 (Five) Ton or as per GIS OEM recommendation, whichever is higher for lifting of any components of GIS switchgear	The 220kV GIS building shall comprise an EOT (Electric overhead travel) crane of minimum capacity 5 (Five) Ton or as per GIS OEM recommendation, whichever is higher for lifting of any components of GIS switchgear. The girder system shall be double for the EOT system. One side walkway of suitable size shall be provided for maintenance purpose.
34	Section 1/ Additional Design / Guidelines clause 7.0, & Section-3 Chapter-9 Clause 1.4(e)	Power Factor Correction Equipment & Lighting control, PF control for new 220 KV GIS switchgear and switchyard area.	No capacitor bank is envisaged for 220 KV or 33 KV system. For 220 KV GIS auxiliary load, capacitor banks to be provided if new GIS auxiliary system running power factor is less than design limit or else no capacitor bank for PF correction is required. Lighting control for new 220 KV GIS switchgear and switchyard area. Lighting control must be done for lighting circuit level.
35.	Section 1/ Additional Design / Guidelines/Cl. no. 16.2	Cable trays shall be sized considering single layer of cables	Cable trays shall be sized considering single layer of cables for power cables (HT or LT). For control or instrumentation cables maximum double layer per tray is acceptable.
36	Section-3 chapter-9 part- C, Section-2 part -A clause 10.1.1.28, Annexure S-2/C-1/2 clause 34	The I/O integration of new GIS substation with existing ECS & existing ECS load shedding scheme integration at PR and PNCP	The scope of ECS work shall be followed as per attached annexure -S-3/C-9/3

0 167

37	Section-C, Page 127 of 1047 Annexure S-2/C-1/2	37.0 General - 220kV and 33kV Control & Protection System and Substation Automation System with Numerical Relays and related auxiliary tripping/ lockout relays for all bays, busbars, transformers and incoming lines.	37.0 General - 220kV and 33kV Control & Protection System and Substation Automation System with Numerical Relays and related auxiliary tripping/ lockout relays for all bays, busbars, transformers and incoming lines. Proper C&R panels will be required for 220 KV line , 220 KV GIS system, 220 KV transformer system . While 33 KV feeder protection specific to LIB may be individual switchgear mounted.
38	Annexure S-2/C-1/2 clause 33 and 42	SCADA system for new 220 KV system, associated 33 KV system including HMI in remote control room in PR and PNCP.	Substation automation system (SAS)/ SCADA for new 220 KV system, associated 33 KV system, LT auxiliaries at 415 V level including HMI in remote control room in PR and PNCP as per details specified in tender terms. No new ECS system is envisaged for new 220 KV GIS system. The hook-up and integration scope with existing ECS to be referred in annexure – S-3/C-9/3
39	Section-C, Page 128 of 1047 Annexure S-2/C-1/2 clause 38	Grid islanding facilities including islanding relays and associated system.	Grid islanding facilities including islanding relays and associated system.
40	Section-C, Page 125 & 128 of 1047 Annexure S-2/C-1/2 clause 40	Metering panel with Import and export reactive and active Energy measurement for 220kV Incomer feeder comprising of ABT meters & TOD meters as per HVPNL specification (main and check meters)	Metering panel with Import and export reactive and active Energy measurement for 220kV Incomer feeder/ line bays only comprising of ABT meters & TOD meters as per HVPNL specification (main and check meters)

41	Section-C, Page 128 of 1047 Annexure S-2/C-1/2 Clause 41	33 KV power cables Protection relays for all feeders including its auxiliary and lock out relays.	33 KV power cables Protection relays for all feeders including its auxiliary and lock out relays. Cable differential protection will be required in following each feeder – 33 PNCP O/G both feeders between transformer (at GIS substation) and 33 KV LIB panel (at SS-63) 33 PNCP O/G both feeders between LIB at SS-63 and LIB at SS-9 33 PNCP O/G both feeders between LIB at SS-09 and existing GIS generation bus incomer breaker at SS-9 Note : 33 PR O/G feeders between transformer (at GIS substation) and existing 33 KV generation bus incomer at SS-63 will be part of 220/ 34.5 KV transformer differential and may not required any additional cable differential protection
42	Section-C, Page 811 of 1047 PART-B LOAD MANAGEMENT SYSTEM (LMS):	PR & PNCP Load management	PR & PNCP power plant configuration and SLD is attached as annexure S-2/C-1/5 & S-2/C-1/6
43	clause 5.11.5 section -3 chapter 5	All relays shall have the facility of communication on IEC- 61850 communication platform with dedicated dual rear port for communication for formation of	All relays shall have the facility of communication on IEC- 61850 communication platform with dedicated dual rear port for communication for formation of daisy chain configuration and one front port for local parameterization.
44	Section-C, Page 530 of 1047	220kV Line protections.	220 KV line shall have both distance relay and line differential relay as per protection philosophy on ~~page 530 of 1047 of~~ Section- <u>2</u> .

0
1
4
4

[Signature]
[Signature]

45	clause 4.1.2 section 3 chapter 9 part A	The contractor shall provide ten (10) display units, two for operator station, two for remote station at PR, Two at remote station at PNCP, one for Engineering station, One for Historian server, two for DR server . These shall have high resolution and reflection protected picture screen. High stability of the picture geometry shall be ensured. The screen shall be at least 60" diagonally in size and capable of color graphic displays at two locations. The display shall accommodate resolution of 1280 X 1024 pixels. The HMI shall be able to switch the key board and cursor positioning device, as unit among all the	The contractor shall provide ten (10) display units, two for operator station, two for remote station at PR, Two at remote station at PNCP, one for Engineering station, One for Historian server, two for DR server . These shall have high resolution and reflection protected picture screen. High stability of the picture. The minimum size of HMI for operator station and engineering server shall be 32 inch or as instructed by EIC . In addition 2 video wall screen shall be provided . One video wall shall be in PR control room while one in PNCP control room for displaying the SAS graphics or data. The size of this video wall shall be minimum 60 inch diagonally in size and capable of color graphic displays at two locations. The display shall accommodate resolution of 1280 X 1024 pixels. The HMI shall be able to switch the key board and cursor positioning device, as unit among all the monitors at a consol vis push button or other controls
46	Section-C, Chapter-9, part -A clause 3.1.1.3.2. Page 789 of 1047	Modes of Synchronisation	Synchronization required in SCAP and BCU in line with the tender requirements. In SCAP, synchronization trolley will be required to achieve all the modes of synchronization
47	Section-C, Page 795 of 1047	3.3.2 Remote Control Centre Communication Interface	The ready to use communication hook up point with all required hardware like suitable port, media convertors, modem, network switches for all required RCC and RSCC communications for IOCL end shall be in the ~~ESC~~ contractor scope. The HVPNL end hardwares and in between cabling in not in the ~~ESC~~ contractor's scope.

PAVE 2650 F 341

48	Section-C, cl 5.5.1 of chapter-2, Page 33 of 1047 & Section-C, cl 2.2 of chapter-9, Page 785 of 1047	System architecture IEC 61850 PRP & The communication shall be made in 1+1 mode, excluding the links between individual bay IEDs to switch, such that failure of one set of fibre shall not affect the normal operation of the SAS.	System architecture IEC 61850 PRP & The communication shall be made in 1+1 mode, including the links between individual bay IEDs to switch, such that failure of one set of fibre shall not affect the normal operation of the SAS.
49	Section-C, Page 262 of 1047 Appendix-I B	The output data of ABT Compliant Special Energy Meters should be in ASCII as well as Excel format. The Base Computer software (BCS) may be got installed at Energy Centre, HVPNL, Sector-6, Panchkula, at respective sub-station & consumer PC. Suitable MRI be also procured.	The output data of ABT Compliant Special Energy Meters should be in ASCII as well as Excel format. The Base Computer software (BCS) shall be got installed at existing PC/ Laptop of Energy Centre, HVPNL, Sector-6, Panchkula, at existing PC/ laptop at source sub-station & in existing consumer PC (two numbers) . Suitable MRI/ CMRI shall be provided by ~~ESR~~ contractor (minimum 4 numbers) along with all communication hardware set (4 numbers) comprising of communication cable, patch cords, convertor as required.

[Signature]

[Signature]

0 163

PAGE 267 OF 341

50	Section-C, Page 508 of 1047 Chapter-5, clause 1.1.9	Two no.'s remotely installed (in existing user control room of PR and PNCP power plant). Synchronising, control and annunciation panel (SCAP) shall be provided in project along with its complete engineering, interconnection details, supply, erection and commissioning.	Two complete standalone Remotely installed Synchronizing, control and annunciation panel (SCAP) is required in existing user control room of PR & PNCP along with its complete engineering, interconnection details, supply, erection and commissioning. PR SCAP will handle complete 11 Bays of GIS system & transformers, 2 LIB panel of PR-PNCP connectivity of SS-63 & minimum 2 spare bays for any future extension complete in all sense and ready to use mode. SS-63 Grid incomers are already covered in existing SCAP. The SCAP at PNCP shall be for 2 nos. LIB panels of PR-PNCP connectivity at SS-09 and 2 nos. GIS incomers of GIS generation bus and 2 spare bays for any future extension complete in all sense and ready to use mode. Both the SCAP system shall be independent of existing SCAP system. For PR SCAP DC/ AC to be supplied from GIS DC and UPS system while
51	Section-C, Page 531 of 1047 Chapter-5	protection philosophy: ***BCU unit may become a part of SCAP for control requirements.	BCU unit shall be for required local control and supervision of GIS bays while all protections will be part of CRP and All remote control will be part of SCAP and SAS system.
52	Section-C, Page 550 of 1047 Chapter-5	One bus bar protection scheme shall be provided for each main bus for 220kV having double bus arrangement.	One bus bar protection scheme shall be provided for each main bus for 220kV having double bus arrangement. No common components shall be used between differential of two sections. All Relays, DC, multiplier shall be independent for each 220 KV bus section.

0 162

[Signature]

[Signature]

PAGE 268 OF 341

53	Section-C, Page 553 of 1047 Chapter-5	The separate relay shall be provided for LBB protection in every bay. The DC supply of this relay shall be separate from DC supply of the primary relay.	The separate relay shall be provided for LBB protection in every bay. The DC supply of this relay shall be separate from DC supply of the primary relay. Common differential relay based scheme shall not be used
54	Annexure- S-2/C-4/2 clause 3.1	The PLCC equipments as specified shall be installed at the receiving end of the transmission lines (at IOCL Panipat end)	The PLCC equipments along with HF cables, protection coupler, phase to phase coupling devices as specified shall be installed at the both receiving end of the transmission lines (at IOCL Panipat end) and at sending end of the transmission line (at HVPNL SS) The PLCC equipment shall be digital and in line with requirement of HVPNL & relevant technical specification is given in annexure S-3/C-4/2 All hardware required for developing the PLCC communication link at both ends shall be in the scope of LSTK contractor except CVT. For each incoming line PLCC system shall be separate & shall be suitable for voice, protection, control and other signal transfer as per detail specifications.
55	Annexure S-3/C-4/6 clause 5.1.16	A pressure relief device capable of releasing abnormal internal pressure shall be provided.	A pressure relief device capable of releasing abnormal internal pressure shall be provided. Pressure relief system is separate of system of volumetric changes. It is required to release any sudden rise of pressure in case of internal faults/short.
56	Annexure S-3/C-4/6 chapter 03G	CVT technical Parameters	CVT shall have minimum 2 secondary windings or more as per project requirement. The VA and capacity of each winding shall be selected based on project design requirement.

[Handwritten signature]

[Handwritten signature]

0 161

57.	Annexure S-3/C-4/3 clause 1.4	Type test requirement of wave trap	Type test reports as mentioned in latest IEC standards to be offered for similar or higher rating. The list provided in clause 1.4 is
58	Annexure S-3/c-4/4 clause 1.3	Line trap - Short circuit level 50 kA or as per standards	Line trap - Short circuit level shall be 31.5 kA for one second or as per HVPNL specification relevant to 220 KV system.
59	Section-3 Chapter-1 clause 3.4	Integration of 220 KV Overhead lines from point of termination to 220 KV GIS switchgear and connectivity of transformer with 220 KV switchgear Is in vendors scope including Gas insulated bus duct, gantry towers, Air to GIS termination bushings, overhead conductors, all support works and complete in all.	Integration of 220 KV Overhead lines from point of termination to 220 KV GIS switchgear and connectivity of transformer with 220 KV switchgear Is in vendors scope including Gas insulated bus duct, gantry towers, Air to GIS termination bushings, overhead conductors, gas to oil termination bushing all support works and complete in all. All the bus duct entry in GIS switchgear shall be from bottom. All The ground clearances & inter-phase clearances shall be as per applicable IS and IEC standards and as per site condition. Height of transformer shall be minimum 500 mm from FFL or as per project specific / standards requirement. A tentative layout plan is attached as Annexure S-3/ C-3/1 . Detail layout plan shall be developed by LSTK contractor was per project specific and requirement of applicable standards/ OEM guidelines.




60	Section-3 Chapter-1 clause 5 (i)	The minimum required components in each GIS bays as: iv. Voltage transformer as per project requirement vi. Online PD Monitoring devices with data acquisition and monitoring system	Voltage transformer as per project requirement shall be provided in GIS system for Both line bays for metering and protection purpose In both Bus section for metering and protection purpose AIS PT is exclusively for tariff metering purpose and shall not be used for any other application. LA of line bays are part of AIS system while LA in transformer bays are not required.
----	-------------------------------------	--	--

[Signature]

[Signature]

PAGE 291 OF 341

61	Section-3 Chapter-1 ix b pg 59	GIB lay out shall be designed as a. Only two vertical layers shall be provided. b. Outer to Outer (not center to center) vertical clearance between layers shall be minimum one meter. c. The minimum outer to outer horizontal clearance between each GIS bus ducts shall be a minimum of 0.75 meter. d. GIS bus ducts of each circuit shall be arranged in horizontal formation only and the clearance between the nearest bus ducts of two adjacent circuits shall be minimum one meter. e. Minimum vertical ground clearance of bus duct at road crossing shall be 7 meter. f. The GIB route shall not obstruct easy access to GIS and control buildings and shall not obstruct movement of cranes, equipments including HV test equipments for maintenance work. g. For the maintenance of GIB of one circuit, only that circuit shall be isolated.	GIB lay out shall be designed as a. Only two vertical layers shall be provided. b. Outer to Outer (not center to center) vertical clearance between layers shall be minimum one meter. c. The minimum outer to outer horizontal clearance between each GIS bus ducts shall be a suitable for easy maintenance and as per applicable standards/ guidelines. d. GIS bus ducts of each circuit shall be arranged in horizontal formation only and the clearance between the nearest bus ducts of two adjacent circuits shall be minimum one meter. e. Minimum vertical ground clearance of bus duct at road crossing shall be 7 meter. f. The GIB route shall not obstruct easy access to GIS and control buildings and shall not obstruct movement of cranes, equipments including HV test equipments for maintenance work. g. For the maintenance of GIB of one circuit, only that circuit shall be isolated.
62	Section-3 Chapter-1 pg 47 of 91	CT & VT details of GIS system	CT & VT details of GIS system for number of cores, VA, Ratio , accuracy shall be governed by the guidelines provided in System design basis (section-1 chapter-2) and as per project specific requirement. Its detail design is in the scope of LSTK contractor.

PAGE 292 OF 341

63	Section-3 Chapter-1 pg 48 & 49 of 91	GIS CT specifications: In each line bay, one dedicated metering CT of 0.2S class shall be provided exclusively for open access metering purpose. This CT shall not be used for any other metering purpose. This CT design shall be in line with HVPNL guidelines for open access metering as attached as annex S-3/C-1/2 GIS PT specification: In each line bay, one dedicated metering PT of 0.2 class shall be provided exclusively for open access metering purpose. This PT shall not be used for any other metering or protection purpose. This PT design shall be in line with HVPNL guidelines for open access metering as attached as annex S-3/C-1/2.	In each line bay, one dedicated metering CT & PT of 0.2S class shall be provided exclusively for open access metering purpose. This CT & PT shall be installed outdoor and part of AIS system. This CT & PT shall not be used for any other metering purpose. This CT design shall be in line with HVPNL guidelines for open access metering as attached as annex S-3/C-1/2. The GIS system shall have metering CT & PT for internal measurement purpose of 0.5 class or better in each bay & bus system (for bus voltage).
64	Section 3/chapter 16/ clause 3.1 (d)	Computer room, console room, UPS room, battery room, rack room etc of control room/ SRR shall be protected by clean agent system as per NFPA-2001. (If applicable for this project)	Clean agent system is not applicable for this project.
65	Section 3/chapter 16/ clause 3.1 (e)	Detection of fire and toxic gas.	Detection of fire.
66	Section 3/chapter 16/ clause 3.1 (j)	Landing Valve	Landing valve shall be double headed
67	Section 3/chapter 16/ clause 6	Fire Extinguishers, landing Valves, Monitors, Hoses, Hose Reel valves, Nozzles, Lock, Handles, couplings, caps, DCP, etc. shall be as per IS standards, OISD and this specification.	Fire Extinguishers, landing Valves, Monitors, Hoses, Hose Reel valves, Nozzles, Lock, Handles, couplings, caps, DCP, etc. shall be as per IS standards, OISD -std- 116 and this Specification.
68	Section 3/chapter 16/ clause 5.0	Sprinkler system for cable cellar area	Sprinkler system for cable cellar area shall be MWWS type as per applicable standards.

0 157

gr

[Signature]

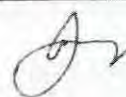
0 1.6

69	Additional design guidelines clause 23	Layout of substation shall comply with OISD regulations, IE rules, TAC regulations and any other applicable statutory rules and regulations.	Layout of substation shall comply with OISD regulations, IE rules and any other applicable statutory rules and
70	Section-3 chapter 16 clause 3.1	Fire alarm, Detector, MCP system shall be linked/ incorporated in existing Fire Alarm Panel installed at Main Fire Station (MFS) & Satellite Fire Station (SFS).	Fire alarm, Detector (smoke and heat) , MCP system shall be linked/ incorporated in existing Fire Alarm Panel installed at Main Fire Station (MFS) & Satellite Fire Station (SFS).
71	Section-3 chapter 16 clause 3.1	Fire protection facilities will be based on following: - Monitoring and Alarm by alerting, locating fire and operating advise. - Detection of fire and toxic gas. - Action by water/ foam/ CO2/ Clean agent/ Powder.	Fire protection facilities will be based on following: - Monitoring and Alarm by alerting, locating fire and operating advise. - Detection of fire and smoke & hydrocarbon. - Action by water/ portable CO2 extinguisher & DCP extinguisher
72	Point xi, Clause 1 of General Guidelines for civil work, Section"C".	The finished ground level (FGL) with a tolerance of (+/-) 100mm shall be decided by the IOCL.	The finished floor level (FFL) with a tolerance of (+/-) 100mm. shall be maintained as equal to FFL of (nearest) Substation 28 .
73	Clause 2 of General Guidelines for civil work, Section"C".	Soil test report attached with this tender as Annexure S 2/C 1/9.	Detailed Soil test report attached with this tender as Annexure S 2/C 1/9 Revised. Pl note the attached report is of nearby places and are old. This report is only for reference purpose. Detail Soil test/ resistivity test shall be in the scope of LSTK contractor for proper design of the system as specified in the tender.



PAGE 273 OF 341

74	Clause 2 of General Guidelines for civil work, Section "C".	Dismantling of existing structures, drain, piping work (above and over ground), disposal of debris, cleaning of site etc.	Dismantling of existing structures, drain, piping work (above and over ground), disposal of debris, cleaning of site at 220 KV substation area, SS-63 & Ss-28 , SS-9, Existing Control room area for the job specific to LSTK scope of work. The existing abundant oil pit within the ISBL boundary limits shall also be dismantled and filled back, if required for development of 220 KV GIS system as per tender specification requirements. Also there is an existing lighting mast in ISBL boundary limits, the dismantling of the lighting mast of modification in the same in order to utilize the same for future utilization is in the scope of LSTK contractor.
75	Clause 2 of General Guidelines for civil work, Section "C".	Dismantling of existing structures, drain, piping work (above and over ground), disposal of debris, cleaning of site etc.	The OWS, storm water channels, CRWS drawing of the 220 KV sub-station area is attached as Annex-S-2/C-1/14. For all other underground facility LSTK contractor shall ensure due Geographical survey if required for detail assessment. Otherwise dismantling, rerouting of underground facility, cables, piping, OWS drains, CRWS, oil pits, other utilities in that area shall be in the scope of LSTK contractor as directed by EIC.
76	Clause 2 of General Guidelines for civil work, Section "C".	Construction of temporary barricading around hot work location on safety point of view as per instruction of EIC.	Construction of temporary barricading around hot work location on safety point of view as per instruction of EIC. The barricading shall be done with metallic sheet and height of the barricading shall be sufficient enough to cover all hot jobs even at height.




0 154

77	General guidelines of civil work Clause 18.1	Dimension of complete GIS building is taken as 67 m X 30 m. This the minimum & indicative Requirement, however bidder may take more area as per final approved dimension of equipments.	Dimension of complete GIS building is taken as 60 m X 30 m. This the minimum & indicative Requirement, however bidder may take more area as per final approved dimension of Equipments and per applicable standards and references.
----	--	---	---

PAGE 2750F-341



PAAF 2760F 341

78	Clause 2 of General Guidelines for civil work, Section "C".	Development of walkway connectivity between existing substation (SS No.: 63) to new 220 GIS switchgear building at first floor level with required elevations for road crossings for operational requirements	Development of walkway cum cable rack for connectivity between existing substation (SS No.: 63) to new 220 GIS switchgear building at first floor level. The walkway may be build along with cable evacuation system. Bottom section may be used as walkway and top section can be used for Cable laying purpose. Walkway can be buildup of structural construction or RCC with due provision of proper roof system providing due protection from rain/ sun. The minimum walkway width shall be 1 meter & height shall be 2 meters. Height of the walkway cum cable rack at road crossing shall be minimum 7 meters. This walkway needs to be aligned and terminated at the Junction point with the existing walkway of SS-28 to SS-9. One RCC culvert of size 5 meter by 5 meter needs to be provided between walkway footing as shown in the cable route diagram for enabling heavy vehicle movement near walkway The proposed walkway tentative layout is shown in cable route diagram annex-S-2/C-1/12.
----	---	---	--

Signature

Signature

0 153

0 102

PAGE 299 OF 341

79	Clause 2 of General Guidelines for civil work, Section "C".	All kinds of modification, repair works in existing sub $\square$ station shall also be in the scope of LSKT contractors.	All kinds of modification, repair works as detailed below in existing sub$\square$ station shall also be in the scope of LSKT contractors if required – Any floor or structural modification in SS-63 for installation of LIB and Fault limiting system Any structural or civil work for development of cable route specific to new cables of ISBL scope of work The Modification in existing control room for enabling extension of control room. Any frame/ false floor work in PR and PNCP control room/ substation for installation of equipment required in LSTK scope of work. Any civil / structural work for enabling proper cable entry inside existing substations. The scope of modification/ repair in existing substations and control room is specific and linked to the work related with LSTK scope of work. Please note supply, erection, installation, testing and commissioning of all 4 nos. of LIB panel at SS-63 and PNCP SS-9 is in the scope of LSTK contractor.
----	---	---	---

80	Clause 2 of General Guidelines for civil work, Section "C".	Cable cellar fire water sprinkler system	The ground floor of GIS building will have Cable cellar, equipment room for VAM, Battery bank , Lighting transformer . MVWS type fire water sprinkler system shall be provided for cable cellar system.
----	---	--	--

81	Plot no. IOCL/PR/0001/REV□ 19/OVERALL PLOT PLAN	Boundary Wall	Boundary to be constructed through Chain link fencing around complete 220 KV switchyard area from all four sides as per applicable IS standards and CEA rules with due earthing of the same at multiple points as per IS/ CEA requirement. Due footing for fence support shall be developed as per standard design requirements. Proper structural type entry gate shall be developed at two entrance point as shown in GELO.
82	Clause 18.19 of General Guidelines for civil work, Section".	Chain link fencing□The design shall be as per drawings attached with the tender.	Chain link fencing□The design shall be as per drawings attached with the tender. The details of chain link fencing is attached as Section-3 Chapter-19.
83	Section-3 Chapter-11 Clause 4.8.3	The Switchboards shall be metal enclosed cubicle type, suitable for indoor installation, floor - mounting and free - standing. The design shall be totally enclosed, dust-tight, damp-proof and vermin proof offering degree of protection not less than IP4X.	The Switchboards shall be metal enclosed cubicle type, suitable for indoor installation, floor - mounting and free - standing. The design for the total enclosure shall be dust-tight, damp-proof, vermin proof and totally enclosed offering degree of protection not less than IP4X.
84	Section-3 Chapter-11 Clause 4.8.7	The switchgear cubicles shall be rigid and robust in design & construction. Sheet steel used for fabrication shall be cold rolled. Cubicles shall be made from rigid welded structural frames made of structural steel sections or of pressed / formed sheet steel of not less than 3 mm thickness. The frames shall be enclosed by sheet steel of at least 2 mm thickness, smoothly finished, leveled and free from flaws. Stiffeners shall be provided wherever necessary.	The switchgear cubicles shall be rigid and robust in design & construction. Panel Sheet used for fabrication shall be cold rolled steel or suitable metallurgy material. Cubicles shall be made from rigid welded structural frames made of structural steel or suitable material sections or of pressed / formed sheet of not less than 2 mm thickness. The design shall have to be type tested for full short circuit rating, internal arc resistance and ingress protection..

PAGE 295 OF 341

85	Section-1 chapter-1 clause 5.2	Clause 3.3.00 & 3.5.0.0 of the General conditions of Contract and its sub-clauses shall be modified as follows: Subject to availability, Construction water shall be provided by OWNER on chargeable basis. The cost of water supply shall be recovered by the OWNER from CONTRACTOR'S running/ final account bill at 0.25% of running account bill/ final bill value if supplied by owner. However, in case OWNER is not able to provide construction water due to any reason whatsoever, CONTRACTOR shall be responsible for making all arrangements for Construction water at his cost. Any statutory requirements/ documentation etc. to this effect shall be met by the CONTRACTOR. Nonavailability of water due to any reason shall not entitle the CONTRACTOR for any claim against OWNER on account of cost and time implications.	Clause 3.3.00 & 3.5.0.0 of the General conditions of Contract and its sub-clauses shall be modified as follows: Subject to availability, Construction water shall be provided by OWNER on chargeable basis. The cost of water supply shall be recovered by the OWNER from CONTRACTOR'S running/ final account bill at 0.25% of running account bill/ final bill value if supplied by owner. However, in case OWNER is not able to provide construction water due to any reason whatsoever, CONTRACTOR shall be responsible for making all arrangements for Construction water at his cost. Any statutory requirements/ documentation etc. to this effect shall be met by the CONTRACTOR. Non availability of water due to any reason shall not entitle the CONTRACTOR for any claim against OWNER on account of cost and time implications. Bore well for water supply is not permitted. The construction water may be arranged by LSTK contractor or construction water may be supplied from existing network.
----	--------------------------------	---	--

86	Clause 8 of General Guidelines for civil work, Section C".	Transformer foundation□ As per scope, 50/ 65 MVA Transformer is proposed to be installed. However, the plinth of the Transformer shall be designed assuming placement of 100MVA T/F for future use.	Transformer foundation□ As per scope, 50/ 65 MVA Transformer is proposed to be installed. Only foundation load bearing capacity to be calculated considering load of transformer up-to 100 MVA. The bay size shall be suitable for installation of 50/65 MVA transformer only to ensure accommodation of equipments as indicated in GELO and as per available overall plot size.
87	General guidelines for civil work clause 2.0	Extension of existing control room of PR and construction of room of approximate dimension of 8 m X 8 m with height similar to control room floor (approximate 10 M height) for installation of SCAP panel. Bidder shall develop complete room including its foundations, RCC super-structures, false floor and false ceiling.	Extension of existing control room of PR and construction of room of approximate dimension of 5 m X 4 m with height similar to control room floor (approximate 10 M height) for installation of SCAP panel. Bidder shall develop complete room including its foundations, RCC super-structures, false floor and false ceiling.
88	Chapter 8C/1 clause -D	The hook-up of steam lines, CW lines, condensate line from the nearby tap of points is also in the scope of LSTK contractor including all associated works for development of tap-off/ hook-up points, piping, and its supports.	The hook-up of steam lines, CW lines, condensate line from the nearby tap of points is also in the scope of LSTK contractor including all associated works for development of tap-off/ hook-up points, piping, and its supports. For estimation purpose a distance of 500 meters may be considered or site survey may be done by LSTK contractor. Any Hot tapping if required for hook up with existing CW or steam line shall be in the scope of LSTK contractor.

89	Section 3 chapter 9 clause 1.1.3 & clause 3.6	The PMS will be implemented for 220 KV substation, PR Generation system and PNCP generation system. PNCP power plant is around 5 KMs from the 220 KV grid sub-station. The offered PMS system will be installed in the new 220 KV sub-station. This system will acquire all required inputs from PR generation system and PNCP generation system. The tentative system architecture is attached as Annexure- S-3/C9/3. Main purpose of the PMS is to maintain stability of electrical grids, generators in plant, especially in critical situations like a generator outage. The LMS system shall be divided into three major segments a) PR loads management b) PNCP loads management c) Grid System. Load shedding feature in LMS system.	The LMS will be implemented for 220 KV substation, PR Generation system and PNCP generation system. PNCP power plant is around 5 KMs from the 220 KV grid sub-station. The offered PMS system will be installed in the new 220 KV sub-station. This system will acquire all required inputs from PR generation system and PNCP generation system. The tentative system architecture is attached as Annexure- S-3/C9/3. Main purpose of the LMS is to maintain stability of electrical grids, generators in plant, especially in critical situations like a generator outage. The LMS system shall be divided into three major segments a) PR loads management b) PNCP loads management c) Grid System. Load shedding functions are not a part of LMS system The generation SLD of both PR and PNCP is attached as S-2/C-1/5 and S-2/1/6 The Minimum IO list for both PR and PNCP is attached as annexure S-3/C-9/4
90	Section-2 part A clause 4.0	Erection of 220 KV switchyard with installed transfer capacity of 200 MVA in indoor full GIS configuration (proposed SLD is attached as annexure-(S-2/C-1/1). The basic BOM of the 220 KV switchyard and power evacuation part is given in annexure-5.	Erection of 220 KV switchyard with installed transfer capacity of 200 MVA in indoor full GIS configuration (proposed SLD is attached as annexure-(S-2/C-1/3). The basic BOM of the 220 KV switchyard and power evacuation part is given in annexure-S-2/C-1/2.

Handwritten signature

Handwritten signature