SPECIFICATION

FOR

ENGINEERING SERVICES

OF

20 MW SIMPLE CYCLE GAS TURBINE BASED POWER PLANT AT DULIAJAN, ASSAM

FOR

OIL INDIA LIMITED

CONTENTS

INTRODUCTION

BHEL is setting up a 20 MW (1XFR-5 GTG) Simple Cycle Power Plant for Oil India Limited (OIL), in their existing refinery complex at Duliajan, Assam. M/s DCL, Kolkata is appointed by M/s OIL as their project management consultant(PMC) for this project.

Project Zero date. - 01.09.2009
Schedule for Commissioning - 26 months

SCOPE OF SUPPLY OF BHEL IN THE PROJECT

Following is the broad scope of supply of BHEL:

Gas Turbine Package:
1 no. gas turbine generator (Fr. 5FA) unit along with auxiliaries.

For Balance of Plant, detail scope is listed under respective sections – Civil, Mechanical & Electrical.

To execute this project, BHEL intends to engage an Engineering Subcontractor (ESC) for Civil, Mechanical and Electrical work. The scope of ESC and General requirements are defined in various annexure enclosed. Qualification criteria and bid requirements are as per document PED/ESC/PQC enclosed for Sl no-1 of the tender.

ANNEXURE 'C1'

SCOPE OF ENGINEERING SERVICES FOR CIVIL WORKS

The ESC shall furnish complete design, drawings and Engg. Documentation work related to total scope of the Civil, Structural & Architectural areas. The following services are envisaged in the scope of the ESC.

1. Preparation of list of drawings and drawing submission schedule.

2. A consolidated Design Basis is already prepared by BHEL to give a detailed idea for the total engineering work involved in the project.

3. Design basis for the individual structures has to be prepared by EC and submitted to BHEL/ DCL / OIL and get approved before taking up the complete analysis & design of the respective structures.

4. Preparation of Analysis & Design documents and drawings for various buildings, equipment foundations, structures and services listed in the scope of Civil Works (Ref-Notes below).

5. Preparation of advance bill of materials for procurement of cement, reinforcement steel and structural steel.

6. Preparation of detailed fabrication drawings including member names & bill of materials for all the structural steel works.

7. Preparation of detailed BOQ for all structures to include all items of construction based on RFC drawings and to be updated based on As Built Drg. However all relevant construction drawings shall contain a table indicating BOQ's for PCC, RCC and Reinforcement Steel.

8. The scope of this work includes complete Architectural, Civil and structural design and drawing services as per 'Scope of Civil Works" (Annexure-C2). The list is only indicative for the Engineering Subcontractor. It is not intended to limit the Engineering work to these equipment/building/facilities. Engineering Subcontractor to carry out Civil Engineering as necessary.

9. Soil investigation report indicating relevant recommendations for design of foundations will be furnished by BHEL before taking up the design work. However, soil report furnished by customer shall be made available during the tendering. ESC to decide the type of foundation to be used for the different structures. Design of piles (capacity of piles, structural design, etc.), if piles are required, shall be in scope of ESC

10. Seismic analysis shall be as per IS 1893. Design response spectra given in the code or site-specific seismic data as applicable shall be used.

11. Provide Technical advice/ recommendations regarding site related construction problems, as and when they crop up.

12. Incorporation of civil interface details in respective civil drawings using vendor drawings. BHEL shall furnish vendor drawings to ESC for their review in this regard.

13. Preparation of As built drawings.

EXCLUSIONS:

(a) Preparation of schedule of quantities and Technical specification for Sub-Contracting of Civil works.
(b) Evaluation and award of Sub-Contract for Civil Works.
(c) Site management and field quality assurance.

NOTES:-

1. Design calculations, Architectural, R.C.C and structural drawings for each structure should be submitted in one lot for approval by customer/customer Subcontractor.

2. ESC shall submit detailed working sheets along with abstract of quantities for structure wise BOQ.

3. ESC is expected to give a most economical design for the civil structures, however, without compromising on customer specifications, code and statutory requirements etc.

4. BHEL will furnish ESC the structure wise BOQ prepared by BHEL at bidding stage. ESC is expected to carry out the engineering based on the customer specifications, code and statutory requirements and BHEL standard practices for the project. ESC shall monitor the actual BOQ for various structures as per RFC drawings and compare the same with BHEL's BOQ and inform BHEL whenever the actual quantities exceed preliminary estimated quantities or where it becomes necessary to operate additional items. For the purpose ESC shall submit a comparative statement every time engineering for a particular structure is completed.

5. ESC shall take care that the items, specifications and details shown in the drawings are strictly in accordance with customer specifications and BHEL schedule of items. If there is any variation between the two the same must be referred to BHEL for opinion.

6. ESC is expected to bring to the notice of BHEL any aspect of customer specification, which is at variance with code provisions and standard practice, for BHEL to consider the same and give a decision before ESC precede with engineering.

ANNEXURE 'C2'

SCOPE OF CIVIL WORKS

Scope of work includes, but not limited to the following:

1. Design of following Plant Buildings

a) GTG hall
b) Gas Booster Compressor Hall
c) DG building & DG Foundation
d) Clarifier water & fire water water pump house
e) DM water treatment plant building including Control Room
f) IA/PA Shed

2. Design of Foundations for following Equipments

a) Generator Transformer - 1 No.
b) Station Transformers - 2 Nos.
c) Auxiliary Transformers - 2 Nos.
d) Gas Booster Compressor Foundation - 1 No
e) Misc. foundations / skid foundations:
LP dosing skids, main & aux cooling water pumps, DM water tanks, DM water pumps, FRP cooling tower with fans, chlorination booster pumps, flash tank, unloading pumps, jockey pumps and other various skid foundations required to complete the project.

3. Design of foundation and super-structure for the following

a) Pipe Rack, Pipe Sleepers & Cable Rack
b) Cable trench

4. Design of following Reservoirs/Storage Tanks/Pits/Underground Structures

a) Cooling Tower Forebay
b) Miscellaneous pits like Neutralization pits, transformer oil soak pits etc.
c) Fire Water & Clarifier water reservoir
d) Potable & Service water tanks

5. Design of the following services:

a) Roads & Culverts
b) Storm water drains
c) Oily Water system drains / Contaminated rain water system drains
d) Sanitary Sewer Drains
e) RCC cable trenches & pipe trenches including inserts & pre-cast cover slabs.
f) Service Water system including OH tanks, pipelines etc.
g) Concrete paving
h) Miscellaneous structural platforms, monorail beams, walkways, crossovers, handrails, panel base frames in control Room, platforms for lube oil tanks etc.

Notes:-

1. All Buildings will be RCC framed structure with RCC slab & brick wall, except for GTG Hall . which will be framed steel structure with steel trusses and galvalume sheet cladding. Gas Booster Compressor Building will be RCC structure with steel truss and galvalume sheet cladding. Gas Booster Compressor building will have 10 m high barricading around the building for sound insulation using sand witched Llyod's Insulation panels. Cooling water pump house shall be RCC framed structure with steel roof truss and galvalume sheet cladding.

2. Foundation for transformers shall include the transformer yard consisting of, (besides the Foundations), blast wall, removable gate/fencing, oil collection trough, sump etc.

3. The dimensions / Quantities furnished above are only tentative to give an idea to the ESC. Actual dimensions/Quantities will be finalized at detailed engineering stage.

4. General arrangement Drawings including plans, sections, elevations & the Design Basis Documents for the Buildings, Structures etc. shall be submitted & got approved by BHEL / DCL/ Customer, before taking-up the Analysis and detailed Design activities.

5. Design of fire barricading to segregate existing facilities from the new construction activities will be in the scope of ESC.

6. Design Calculation & Auto-CAD drawings along with soft copies of STAAD analysis files, in house design sheets etc. has to be furnished by ESC to BHEL for its review and record. This is applicable to any Building or Structural design undertaken by ESC as per the scope.

7. ESC to prepare Bar Bending Schedule for GTG foundations.

8. **Foundation for Gas Turbine Generator, Bypass Stack, Inlet Air filter, etc. & Control Room cum SWGR Bldg. will be designed by BHEL. Hence EC need not include these in their scope.**

ANNEXURE 'C3'

MAJOR DRAWING SUBMISSION SCHEDULE

Sl. No	TITLE OF DRAWING	DURATION FOR ISSUE OF DRAWINGS IN Days	From
1.0	**General**		
	Already Prepared by BHEL		
2.0	**GTG Hall**		
2.1	GTG Hall Layout and details of Foundation	21	Issue of approved GA drawings
2.2	GTG Hall Architectural plan	14	Issue of input data
2.3	GTG Building - North Elevation	14	Issue of input data
2.4	GTG Building - South Elevation	14	Issue of input data
2.5	GTG Building - East side Elevation	14	Issue of input data
2.6	GTG Building - Sections	14	Issue of input data
2.7	GTG Building - Roof Plan	14	Issue of input data
2.8	GTG Building - Doors, windows & Finish schedule	14	Issue of input data
2.9	GTG Hall Layout and RCC details of Grade beams.	10	Issue of input data
2.10	GTG Hall Base Plate detail	7	Issue of data
2.11	GT Hall layout of column	14	Issue of approved GA drawings
2.12	GT Hall Framing Elevations	21	- do -
2.13	GTG Hall layout & details of purlin tie bracing & roof trusses	28	- do -
2.14	GTG Hall- Layout and RCC Detail of grade slab with Misc. equipment foundation details	28	- do -
2.15	GTG Hall -Detail of Crane Girders	35	- do -
2.16	GTG Hall-Fabrication drawings	45	- do -
3.0	**Control Room Cum SWGR Building**		
	Will be designed by BHEL		
4.0	**Clarifier water /Fire water pump house**		
4.1	Clarifier water /Fire water pump house Architectural Plans, sections, Elevations & Finish Schedule	14	Issue of input data
4.2	Clarifier water /Fire water pump house Layout and details of columns, foundation and plinth beam	14	- do -
4.3	Clarifier water /Fire water pump house Layout & RCC Det. of roof slab & beams	21	- do -
4.4	Clarifier water /Fire water pump house Layout & det. Of pump fdns, cable trenches & grade slab	21	- do -
5.0	**Gas Booster Compressor House**		Issue of input data

5.1	Layout Det. of Footings columns & Plinth beams	14	- do -
5.2	Layout & RC det. Of Gas Booster Compr. foundation.	21	- do -
5.3	Layout Det. of grade slabe & trenches.	21	- do -
5.4	Architectural Plans, Elevation, Sections, Doors Windows & Finish Schedule.	14	- do -
5.5	Layout & RCC det of Tie beams	14	- do -
5.6	Layout & det of roof truss, purlins side runners etc.	14	- do -
5.7	RCC Det of Misc. Equipment fdns.	30	- do -
5.8	Layout & det. of Gantry Girder	21	- do -
5.9	Layout & RCC det. of Stair case.	21	- do -
5.10	Layout & det. of insert plates	14	- do -
5.11	Gas condensate drain tank pit, layout & RCC Det.	21	- do -
5.12	Fabrication drawings	30	-do-
6.0	**Cable Trench**		Issue of input data
6.1	Overall Cable Trench Layout	14	- do -
6.2	RCC det of Cable trench, Duct Bank & Pull pit etc	14	- do -
6.3	Layout and RCC details of pipe trenches.	21	-do-
7.0	**IA/PA Compressor Building**		Issue of input data
7.1	Arch Plan, elevations and Sections	14	- do -
7.2	Layout & RCC details of footings, plinth beams & columns	14	- do -
7.3	Layout and RCC Details of Roof beams & Slabs	14	- do -
7.4	Layout and RCC Details of – Misc. eqpt fdns and grade slab	21	- do -
7.5	Layout & RCC det. of cable trenches, grade slabs& eqpt. foundations.	21	- do -
7.6	Layout & RCC details of Lintel and Sunshades	14	- do -
7.7	Layout & RCC det. of Stair case.	21	- do -
8.0	**DG Building**		Issue of input data
8.1	Layout Det. of Footings columns & Plinth beams	14	- do -
8.2	Layout Det. of grade slabe & trenches.	21	- do -
8.3	Architectural Plans, Elevation, Sections, Doors Windows & Finish Schedule.	14	- do -
8.4	Layout & RCC det of Lintel beams & Sunshades	14	- do -
8.5	Layout and RCC Details of grade slab & misc. eqpt. foundations	21	- do -
8.6	Layout & RCC details of Lintel beam & chajjas	14	- do -
8.7	Layout & RCC det. of roof beams & slab	21	- do –
8.8	Layout & RC details of Staircase	21	-do-

9.0	**Pipe & Cable rack str.**		Issue of input data
9.1	Pipe & Cable Rack Layout & RCC Detail of Foundation	21	- do -
9.2	GA details of Pipe & cable Rack	14	- do -
9.3	fabrication drawings of pipe rack	14	- do -
10.0	**Road, Drains & Paving.**		Issue of input data
10.1	Layout & details of OWS drains, Storm drains	30	- do -
10.2	Cross section & Details of Roads	30	- do -
10.3	Layout of Roads	30	- do -
10.4	Layout & RCC details of Pavement	30	- do -
10.5	Tank farm area & Details of outdoor Paving	30	- do -
11.0	**TRANSFORMERS**		Issue of input data
11.1	Generator /Station Transformer yard Layout & RCC framed fire wall	14	- do -
11.2	Transformer Foundations - Layout & RC details	14	- do -
11.3	GA & RC details of oil soak pit	14	- do -
11.4	Removable type Transformer gate & Fencing Detail	14	- do -

The above drawing schedule is for major structures/ foundations only.

APPENDIX – M1

SCOPE OF ENGG SERVICES FOR MECHANICAL

FoI. is the list of major items in the scope of BHEL as part of B.O.P.(Mechanical):

(i) Gas Conditioning Skid, Gas Condensate Drain Tank
(ii) Water sys including DM Plant, DM Tanks, Pumps for GT NOx abatement
(iii) Effluent Disposal System
(iv) Fire Detection & Protection Sys, Fire water reservoir & pumps
(v) Cooling Water sys including FRP Cooling Tower, C.W. pumps
(vi) Air conditioning
(vii) Ventilation system
(viii) Gas Booster Compressors
(ix) Air compressor sys for Instrument air, service air, inert gas piping
(x) EOT Crane for GTG, GBC Halls, Hoists for all the pumps
(xi) DG Set
(xii) Piping : Gas piping, DM water piping from DM Plant to GT, Cooling water piping between coolers and cooling tower, Cooling water make-up piping to cooling tower, chemical dosing skids, Potable water piping, Service water piping, and all other piping not mentioned above in between one mechanical package and other mechanical package

FoI. is the list of major deliverables in the scope of ESC for Mechanical portion:

1. Layout Engineering:

All layouts are to be made as per scales suggested by BHEL using latest version of AutoCAD. Title Block and drawing / Document formats shall be as furnished by BHEL after award of contract

A. Equipment Layouts:

ESC shall develop equipment layouts based on the Plot Plan, for different areas like GTG Hall, Cooling water system area, Air Compressor Hall etc. However Equipment Layouts and Plot Plan itself need to be revised in case of any changes in the equipment dimensions, locations, comments received from BHEL's Customer & Consultant to Customer during the execution of the project.

Based on these equipment layouts and P&IDs, ESC shall carry out Balance of Plant piping engineering in association with BHEL engineers.

B. Piping Layouts

Complete piping layouts for fuel, steam, feed water, utilities the entire scope of BHEL contract with Customer shall be prepared by ESC based on Plot plan and P&IDs. Layout of "integral piping" related to BHEL's equipment / Bought out packages are respectively in the scope of package vendors. ESC shall integrate all the BOP packages and BHEL supply equipment from their respective termination points and also up to the "Battery limits" of the respective equipment/packages. ESC should therefore familiarize themselves clearly with the termination points of BHEL manufactured equipment and various bought out packages, so that piping of all services are correctly interfaced in all aspects. ESC to note that piping layout shall cover all process line, irrespective of their size i.e**. lines of less than 2" shall also be shown in piping layout.** Since the Plot plan, P&IDs, piping etc. may undergo several revisions during the progress of the Engineering work, necessary changes as applicable in the piping layout etc. shall also be taken care by ESC without any commercial or any other implications.

2. Material Take Off

ESC shall prepare system wise "Material Take Off" list (MTO) for piping system in two phases. In the first phase, ESC shall furnish the MTO within SIX weeks of placement of order based on the PLOT PLAN and P & IDs. In the second phase, ESC shall furnish additional MTO / Revised MTO within two weeks after finalization of piping layouts. This MTO shall include pipes, pipe fittings, valves, flanges, fasteners (stud nuts), gaskets etc., structural steel for pipe supports, hangers etc.
After finalization of isometrics, ESC shall once again reconcile the MTO with the First MTO to identify and intimate any shortages or surplus.

BHEL shall provide the list of rationalized sizes of plates, channels, beams, angles, pipe, flanges, reducers, gaskets, stud nuts, line specifications, philosophy of mounting of local instruments etc and ESC shall use the same while developing MTO.

3. Isometrics

Isometrics are to be prepared for all pipes of diameter 2" & above. Bill of material in the Drgs. & also in specified format of BHEL (showing "PART No" of all Items, Tag-No. of valves and instrumentations, etc.) shall be prepared by ESC. Isometrics shall also indicate the design data and erection notes (e.g. references to standard edge preparations, Hydraulic testing, Radiography requirement etc) & along with the terminal point hook-up details.
For lines less than 2" size, even though Isometrics are not prepared, fairly accurate B.O.M. to be furnished based on piping layouts.

4. Spool Drawings

ESC shall prepare spool drawings meant for edge preparation of pipes at BHEL workshop, for all pipes in pipelines with rating 600# and above.

5. Stress Analysis should be carried out wherever it is required for various piping systems to ensure safe working of various interconnected systems & equipment.
Following lines shall be considered critical and for these formal analysis is mandatory. Other lines may also need analysis, if required:
- All process lines to and from fired heaters and steam generators
- **All process lines to and from centrifugal compressor** and blower
- All lines to and from turbines
- All pump lines (6" & above and analysis temp > 120°C & less than -60°C) & air cooler lines.
- Re boiler piping, Flare header/sub headers
- All other lines as below:

4" to 6" analysis temp above 300°C & less than -100°C
8" to 14" analysis temp above 150°C & less than -80°C
16"& above analysis temp above 100°C & less than -80°C

- Lines requiring composite stress analysis (Piping along with Structure and Equipments), Dynamic/Wind/Seismic analysis
- Lines requiring Flange leakage check, i.e.26" & above except air & water lines (upto 600 rating)

8" & above, other lines (900 rating and above)

- All other critical lines (connecting to sensitive equipments). Such as Platefin exchangers,Cold boxes (sizes 6" and above and analysis temp. > 120°C & less than -60°C)

Only CAESAR-II / CAEPIPE software packages shall be used. All the input & output files to of stress analysis to be submitted to BHEL

7. Hangers and Support Documents

ESC shall prepare the "Hanger and support schedule", detailed erection documents for hangers and supports and the BOM for all types of materials for hangers and support systems of piping.

Preliminary MTO and final MTO shall be given by ESC in time so that BHEL can procure and supply the items as per project schedule.

8. As-built drawings / documents

ESC shall prepare the "As-Built" Drgs. for all the Drawings / Documents generated by them on the basis of the "As Built" comments furnished by BHEL Hyderabad.

Annexure- M2

Table-1 : List of Inputs

S.No.	TITLE	Dwg. No.	Rev	Enclosed with Spec
I	Plot Plan	0-381-01-01039	03	Yes
II	**P&I Diagrams**			
1	P&ID for Off-base Fuel Gas System	1-38101-03622 (3 shts)	00	Yes
2	P&ID for Cooling Water System	1-38101-03727	00	Yes
3	P&ID for Utilities distribution	1-38101-03737	00	Yes
4	P&ID for Filtered Water System	2-38101-01908	00	Yes

Annexure- M3

Table-2 : Schedule of Drawing submission by ESC & Billing weightage

	I. Engg Offloading	*Schedule (in weeks from LOI)*	Weightage in Total Contract Value (%)
1	Revision of Plot Plan	2 (Note-2)	0.50
2	Preparation of Equipment Layouts	7 (Note-3)	2.00
3	Terminal Point Diagram	4	0.25
5	GA of Pipe Rack & Pipe Sleepers	5	0.75
6	Pipe Rack / Pipe Sleeper Loading Data	6	0.75
7	First MTO for Piping	6	0.50
8	Piping Layouts	8	4.00
9	Stress Analysis	14	1.00
10	Hanger schedule	16	0.50
11	Piping Isometrics	12 (Note-4)	5.00
12	Reconciled MTO for piping	20	1.00
13	Revision Piping Layouts based on comments	10	1.00
14	Revision Piping Isometrics based on comments	22	1.00
16	Support Drawings	24	1.00
17	Support Schedule	26	0.50
19	Insulation Schedule	12	0.25
20	As Built Documents	4 (Note-5)	2.00
	TOTAL		**22.00**

Note-1: The above is indicative list of deliverables only. ESC shall prepare any other document / dwg. other than mentioned above, but required for project completion / required by Customer (APGCL /DCPL)

Note-2: Shall be apportioned in 5 revisions of Plot Plan

Note-3: Shall be apportioned in 3 revisions of Equipment Layouts

Note-4: Isometrics of Simple Cycle & Cold lines not requiring Stress analysis shall be issued first

Note-5: 4 weeks from the date BHEL forwards the As-Built comments after receipt from site

Note-6: Payment for a milestone can be claimed on pro-rata completion of a deliverable on obtaining prior approval from BHEL

Note-7: Payments shall be made on full completion / reasonably quantifiable completion of milestone basis only and not on regular interval basis like monthly bills.

Annexure-E1

Scope of Works for EC for BOP-Electrical

INCLUDING SCOPE OF CONTRACT BHEL CUSTOMER	DRAWINGS : DOCUMENTS	COLLECTING INPUTS	DOCUMENT	ERECTION BOM	SUBMISSION TO CUSTOMER FOR COMMENTS/APPROVAL	REVISING AS PER CUSTOMER COMMENTS AND OTHER INTERFACES	AS BUILT DRAWING	SITE SUPPORT	REMARKS
AA) EQUIPMENT LAYOUTS:									To meet total project requirements.
Y	SW.GR. ROOM EQUIPMENTS LAYOUT.	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	SW.GR. ROOM FLOOR CUTOUT DETAILS.	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	BATTERY ROOM EQUIPMENT LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	May be part of Switch Gear Room.
Y	GTG TRANSFORMER YARD LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	STATION SERVICE TRANSFORMER YARD LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	LT STATION AUX. TRANSFORMER YARD LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	May be part of Station Service Transformer Yard Layout
Y	LT BUSDUCT LAYOUT.	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	DG BUILDING EQUIPMENT LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
BB) EARTHING AND LIGHTNING LAYOUTS:									To meet total project requirements.
Y	OVER ALL PLANT EARTHING LAYOUT & SIZING CALCULATIONS	B/ EC	EC	EC	B	EC	EC	EC /B	Above Ground and Underground Earthing for total BHEL Package.
Y	TRANSFORMER YARD EARTHING LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	DM PLANT /COOLING TOWER AREA EARTHING LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	GTG EARTHING LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	

INCLUDING SCOPE OF CONTRACT BHEL CUSTOMER	DRAWINGS : DOCUMENTS	COLLECTING INPUTS	DOCUMENT	ERECTION BOM	SUBMISSION TO CUSTOMER FOR COMMENTS/APPROVAL	REVISING AS PER CUSTOMER COMMENTS AND OTHER INTERFACES	AS BUILT DRAWING	SITE SUPPORT	REMARKS
Y	SUBSTATION CUM DG BUILDING EARTHING LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	GBC AREA EARTHING LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	OVER ALL PLANT LIGHTNING PROTECTION LAYOUT & SIZING CALCULATIONS	B/ EC	EC	EC	B	EC	EC	EC /B	Also as applicable for various buildings/skids/areas under BHEL scope.
Y	GT HALL LIGHTNING LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	GBC AREA LIGHTNING LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	SUBSTATION CUM DG BUILDING LIGHTNING LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	NOTES & DETAILS FOR PLANT EARTHING & LIGHTNING PROTECTION SYSTEM.	B/ EC	EC	EC	B	EC	EC	EC /B	
CC) PLANT CABLE TRAY/TRENCH LAYOUT & ROUTINGS:									To meet total project requirements.
Y	OVER ALL CABLE TRAY/TRENCH LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CABLE TRAY LAYOUT IN CABLE CELLAR	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	TRANSFORMER YARD CUM DG BUILDING TRAY/ TRENCH LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CABLE TRAY / TRENCH LAYOUT IN GT HALL	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CABLE TRAY LAYOUT IN GBC AREA,AIR COMPRESSOR BUILDING.	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CABLE TRAY LAYOUT FOR CONTROL ROOM & ANALYSER ROOM.	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CABLE TRAY LAYOUT FOR FIRE WATER PUMP HOUSE	B/ EC	EC	EC	B	EC	EC	EC /B	

INCLUDING SCOPE OF CONTRACT BHEL CUSTOMER	DRAWINGS : DOCUMENTS	COLLECTING INPUTS	DOCUMENT	ERECTION BOM	SUBMISSION TO CUSTOMER FOR COMMENTS/APPROVAL	REVISING AS PER CUSTOMER COMMENTS AND OTHER INTERFACES	AS BUILT DRAWING	SITE SUPPORT	REMARKS
Y	NOTES AND DETAILS FOR PLANT CABLE LAYING SYSTEM.	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CABLE LINK DIAGRAM	B/ EC	EC	EC	B	EC	EC	EC /B	
DD) PLANT ILLUMINATION LAYOUTS:									To meet total project requirements.
Y	SIZING OF ILLUMINATION SYSTEM FOR ALL AREA WITH IN BATTERY LIMIT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	OUTDOOR AREA ILLUMINATION LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	GT HALL AREA ILLUMINATION LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	SWITCH GEAR ROOM ILLUMINATION LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CABLE CELLAR ILLUMINATION LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CENTRAL CONTROL ROOM & ANALYSER ROOM ILLUMINATION LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	GBC AREA ILLUMINATION LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	DM PLANT & COOLING TOWER AREA,AIR COMPRESSOR BUILDING ILLUMINATION LAYOUT	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	NOTES & DETAILS FOR ILLUNMINATION SYSYTEM	B/ EC	EC	EC	B	EC	EC	EC /B	
EE) CABLE SCHEDULES AND INTERCONNECTION CHARTS:									To meet total project requirements.

INCLUDING SCOPE OF CONTRACT BHEL CUSTOMER	DRAWINGS : DOCUMENTS	COLLECTING INPUTS	DOCUMENT	ERECTION BOM	SUBMISSION TO CUSTOMER FOR COMMENTS/APPROVAL	REVISING AS PER CUSTOMER COMMENTS AND OTHER INTERFACES	AS BUILT DRAWING	SITE SUPPORT	REMARKS
Y	1.HT POWER CABLE 2.LT POWER CABLE 3.CONTROL CABLE	B/ EC	EC	EC	B	EC	EC	EC /B	
Y	CONTROL CABLE INTERCONNECTION CHARTS FOR ALL ELECTRICAL SCOPE.	B/ EC	EC	EC	B	EC	EC	EC /B	
FF) RELAY SETINGS & COORDINATION									To meet total project requirements.
Y	1.FAULT CALCULATIONS 2.RELAY SETINGS CAL. 3.COORDINATION CHARTS & CURVES	B/ EC	EC	EC	B	EC	EC	EC /B	
GG) AS BUILT DRAWINGS:									
Y	1. LAYOUTS, OTHER ENGG DOCUMENTS AS MENTIONED ABOVE. 2. DRAWINGS AND DOCUMENTS OF EACP AS INDICATED ABOVE.	B/ EC	EC	EC	B	EC	EC	EC /B	

B-BHEL, EC-Engineering Consultant

Notes:

1. Engineering for any other packages required to meet overall system requirement is also included in the scope of Engineering Consultant (EC).
2. EC shall refer to the Scope/Terminal Points/Exclusions Documents of BOP (Elect.) Submitted to Customer as part of Tender Documents, for the scope details.

3. Any Assumptions, Deviations, Exclusions taken by EC shall be subjected to BHEL's Approval.
4. Plant Illumination Package includes: Flame proof & weather proof:
   (i) Lighting Fixtures/lamps
   (ii) Lighting Panels & JBs
   (iii) Light Poles suitable for outdoor/skid areas.
   (iv) Armoured and Flexible wires along with conduits
   (v) All required accessories for completion of package
5. EC shall prepare Consolidated Cable Schedules (HT/LT Power, Control & Signal) for the entire BHEL scope of supply i.e. Gas Turbine & Generator, BOP (Elec.) & BOP(C&I).
   - For this BHEL shall furnish the cable details (type, no of. runs, starting from, ending at) pertaining to GT, Generator, PED(C&I) scope to Engineering Consultant for EC to furnish cable routings to these cables.
   - Similarly EC shall prepare consolidated Control/Signal Cable Interconnection Charts.
   - However EC need not prepare Control Cable IC for other packages/cables except BOP (Electrical) scope of supply.
6. Cable trays/trench layouts shall be prepared considering all the BHEL packages i.e. GT, Generator, BOP (Elect, C&I).
   - Also all the trenches/overhead cable arrangements shall be designed considering 20% spare capacity for future use of Customer.
   - EC shall consider separate trays for HT, LT power, Control, Signal, Communication Cables as per customer cabling philosophy.
7. Relay setting documents shall be prepared for the total BHEL scope/package.
   - Generator relay settings shall be forwarded to EC by BHEL for compiling the same with BOP (Elect) scope, so that consolidated relay setting document is made.
8. EC shall prepare all the Plant Control Philosophy, logic/block diagrams, Synchronization Schemes, Incomer & Bus-coupler logics, Auto-Change over and momentary paralleling Schemes within 2 weeks of LOI/P.O.
9. EC shall include site/official visits in their scope for collecting inputs for Areas where in hook up activities are involved, meetings at site/other venues and for site/engineering support.

Annexure-E2

SCOPE OF SUPPLY FOR BHEL UNITS/ GROUPS

Scope of supply by others (exclusions for PED electrical): The following are presumed to be included by other BHEL groups:-

Transformers Package Details:

- GT Generator transformer-Qty 1 Set
  11/11.5kV, 25/31.5MVA rating, ONAN/ONAF Gas turbine generator transformer & auxiliaries.

Switch Gear Package Details:

HT Switchgear- 1 set(BHEL Bhopal)

- Modification of existing 11kV GT switchgear
- New 11kV WHRP Switchgear: 2500A, 3Ph, 3 W, 31.5kA/1 sec
- New 6.6kV board: 1000A, 3Ph, 3 W, 25kA/1 sec

Generator Package Details:

- GT Generator and auxiliaries inclusive of GTG bus duct/cable termination (as per layout feasibility), GT generator transformer protections, etc-Qty 1 set

SCOPE OF SUPPLY FOR BOP ELECTRICALS

LV Bus duct: Qty -2 sets

- 0.415kV 2500A Aluminium Bus duct for interconnection between Station Auxiliary transformers & LV Switchgear.

415V BOP LT Switchgear: Qty -1 set

PMCC&MCCs of 415V, 50Hz, with fault rating 50kA for 1 sec, Al bus bars, with auto/manual changeover facility for incomers and bus couplers, microprocessor based protection relays for incomers, panels in double front modular execution with IP 52 protection

- 2500Amps, PMCC-1No
- 630Amps, BOP MCC-1No
- 630Amps ,GT MCC-1NO

LT distribution boards with Al bus bars, panels in double front fixed type non-modular execution with IP 52 protection, with 1 no. switch fuse incomers and SFU outgoing feeders

- 110V, 50Amps, 10kA for 1 sec DC DB-1No
- 240V, 150Amps, 10kA for 1 sec AC UPS DB-1No
- 415V, ACDB for feeding AC Vent loads, other receptacle loads.-1No
- 415V, MLDB for main lighting loads
- 415V AC ELDB for emergency lighting .

110V DC System-1 set

- 1x100% DC system consisting of 110V, 55cells, lead acid VRLA battery, sized for 60 minutes back up and 15% margin for battery & charger, and standard battery accessories.
- 2x100% Float cum Boost Charger in full controlled thyristorised bridge rectifier configuration with off line boost charging.

HT Power cable and accessories-1 set

HT cables as below

- 11(UE) kV, Cu conductor, XLPE insulated, PVC inner sheath, FRLS PVS outer sheath type ST-2, with Al/steel round wire armour inclusive of HT cable kits, jointing kits and accessories for the following:-

- From the Gen terminals to the 11kV switchboard located at new switchgear room.
- From the 11kV new switchboard to Station power transformers.
- For interconnection b/w existing 11kV switch board and new 11kV switch board

- 6.6(UE) kV, Cu conductor, XLPE insulated, PVC inner sheath, FRLS PVS outer sheath type ST-2, with Al/steel round wire armour inclusive of HT cable kits, jointing kits and accessories for the following :-

- Station power transformer to 6.6kV switchboard
- 6.6kV switchboard to station auxiliary transformers.

BOP LT power cables-1 set

- LT Power cables 1.1kV HRPVC insulated, FRLS PVC outer sheath type ST-2, Cu conductor with Al/steel round wire armour for power plant BOP scope

BOP control cables-1 set

- LT Control & Signal cables 1.1kV, PVC insulated type ST-1, FRLS PVC outer sheath, steel round wire armour and Cu conductor for power plant BOP scope.

Station Service Power Transformer (SST)-Qty 2 Nos

- 11/6.9kV, 3.5MVA ONAN, Dyn11, OFTC +/-5% @ 2.5% Station Service power transformer with accessories

LT Station Service transformers-Qty 2 Nos

- LT Aux transformer 6.6/0.433kV 1.6MVA Dyn11 ONAN, OFTC +/- 5%@2.5%, z=6.25% +/-IEC tolerance and accessories

BOP local control push button stations-1 set

- Weather Proof sheet steel Local control push button stations without ammeters for all BOP motors in IP 55 as per the requirement (LCS With ammeters for motors > 30kW)
- Ex Proof sheet steel Local control push button stations without ammeters for all BOP motors in IP 55 as per the area classification requirement (LCS With ammeters for motors > 30kW)

Cable support system and accessories-1 set

- Cable support system & accessories inclusive GI ladder type cable trays for HT/LT power cables and GI perforated cable trays for control & signal cables, GI & PVC conduits, steel support structures, and accessories for HT power, LT power & LT control/signal cables routing within power plant battery limits.

Plant earthing System-1 set

Below ground Earthing and lightning protection materials as below:

- 10 mm dia Copper conductor for main underground earth mat for the plant
- 20 mm dia ground Copper clad steel electrode for electronic & electrical equipments body & neutral earthing.
- 10 mm dia phosphor bronze Air termination rod for GT stack lightening protection
- 50 Sqmm & 120 Sq mm Copper conductors for risers.

Above ground earthing materials inclusive of following:

- 25x6mm Copper flat for above ground bus, 20x3 mm Copper flat for down conductors.
- 120Sq mm Copper conductor for cable trays earthing & 50 Sq mm conductor for motors & equipment/panel earthing for the plant.

Plant Illumination system -1 set

- Illumination system consisting of lighting transformers, lighting fixtures for indoor areas (inclusive of plant substation room, control room, etc), outdoor areas (inclusive of street lighting, tank farm area, Transformer Bay, etc.) and Aviation obstruction lighting; flexible lighting cables; cable raceways/conduits; lighting power panels and distribution boards; small power system inclusive of 1 phase & 3 Phase Convenience & Welding Receptacles for power plant for power plant GT BOP area.

Station Auxiliary Control and Annunciation panel-1 set

- Stand alone, hard wired, mosaic based unit auxiliary control cum annunciation panel for the control and monitoring of 6.6kV Switchgear.

Unit Auxiliary Control and Annunciation panel- 1 set

- Stand alone, hard wired, mosaic based unit auxiliary control cum annunciation panel for the control and monitoring of 11kV WHRP switchgear to be located in the existing control room.

Emergency black start DG with AMF panel-1 set

- 415V, 1500RPM, 500kVA, 50Hz DG set complete with all standard accessories, day tank for 8.0 hour full load operation fuel storage, Stand alone hard wired AMF panel for control and protection of DG. The DG set is sized only for the black start operation of one GT.

Lab equipments-1 set The following calibration & testing instruments as listed in general Technical spec GO Pg 12, Cl 3.06.00 F & Sl No 14 of Addendum-2 are included in scope:

- Digital Multimeters (2 Nos), signal simulator (1 No), digital earth megger (1 No), insulation tester (HT & LT) (1 No), current injector (1 No), AC/DC clip-on meter (Ammeter (1 No)), digital lux meter (1 No) and thermal imager.

Safety equipments-1 set

- Safety equipments like rubber mats, danger boards, etc. as required for the power plant.

Fire proof sealing materials-1 set

- Fire proof sealing materials (dough type for 30 min fire rating) for Cable entry into switchgear/control building, fire coating for cables and fire alarm cables for cable trays.

Annexure-E3

Enclosures for BOP-Electrical Packages.

Sl No	Title of Document/Drawing	Drawing/Document No
1.	Key SLD-CPP (As part of Contract Specifications)	K5212-DWG-E-001 Rev D
2.	Preliminary Key SLD as prepared by BHEL	0-381-21-02034 Rev-00
3.	Contract Specification Pertaining to BOP Electrical Scope (DCPL Specification)	Hard Copy will be enclosed separately.
4.	Other relevant specification required for complying to Customer's system requirements.	Hard Copy will be enclosed separately.

ANNEXURE G1

DOCUMENTATION REQUIREMENTS

Documentation requirements for this project are as follows.

- Initial submission as check print for BHEL (Rev-A,B etc) : 3 nos
- Submission for customer/BHEL : 15 nos. (each revision)
- (Rev.0 & Subsequent revisions till finalization)
- Additional copies for marking As-Built corrections. : 3 nos
- As built drawings in suitable bound form -Full size : Six sets
  - A3 size. : Two sets
- Soft copy of final documentation on CD's : Two sets
- Design Calculations : Six sets
- Structure wise BOQ : Two sets

Notes:

1. Engineering charges includes charges for the above documents and unit rate for additional prints shall be indicated as per "Price Format".

2. During engineering stage, BHEL may like to exchange technical documents and drawings through electronic media (Internet), E-mail. Bidder should ensure that he has compatible workstation at his engineering office for this purpose.

3. ESC may have to be furnish the files of the drawings of the project by E-Mail or in the form of a floppy/CD, as and when requested by BHEL during the engineering work.

4. Full size 'AS BUILT' drawings shall be supplied in deluxe quality box files with plastic pouches for each drawing.

5. A3 size 'AS BUILT' drawings shall be supplied in spiral bound form, with transparent plastic sheet covers.

ANNEXURE-G2

BILLING WEIGHTAGE SCHEDULE

Sl. No.	DESCRIPTION	PERCENTAGE
A	**CIVIL**	
1	GTG hall	9
2	DG room including DG foundation	6
3	Pipe Rack & Cable Rack-Super Structure and foundation	4
4	Cable Trenches	2
5	Paving, Road & Drainage Layout & Details	2
6	Transformer Foundation & Yard Details	4
7	Pipe Trenches & Sleeper Details	1.5
8	Miscellaneous buildings	5
9	GBC Hall including GBC foundation	7
10	IA/PA Compressor Building	5
11	Clarifier water cum fire water pump house	5
12	Miscellaneous Equipment foundations	4
13	Structurewise As-built BOQ	3
	Sub-Total (Civil)	**57.5**
B	**MECHANICAL**	
1	Revision of Plot Plan	0.5
2	Preparation of Equipment Layouts	2
3	Terminal Point Diagram	0.25
5	GA of Pipe Rack & Pipe Sleepers	0.75
6	Pipe Rack / Pipe Sleeper Loading Data	0.50
7	First MTO for Piping	0.5
8	Piping Layouts	4
9	Stress Analysis	1
10	Hanger schedule	0.5
11	Piping Isometrics	5
12	Reconciled MTO for piping	1
13	Revision Piping Layouts based on comments	1
14	Revision Piping Isometrics based on comments	1
16	Support Drawings	1
17	Support Schedule	0.5
19	Insulation Schedule	0.25
20	As Built Documents	2
	Sub-Total (Mechanical)	**22**
C	**ELECTRICAL**	
1	Equipment layouts	4
2	Earthing and lightning layouts	4
3	Plant cable tray/trench layout & routings	4

4	Plant illumination layouts	4
5	Cable schedules and interconnection charts.	2.5
6	Relay setings documents.	3
	Sub-Total (Electrical)	**21.5**
	Grand Total (Including table 2 of annx M3)	**100**

NOTES:

1. The above mentioned list is major identifiable categories for payment milestones only and is not the full documentation list for the project.

2. Weightages for all equipment foundations and other miscellaneous structures not listed above are included under the relevant structures in the above list.

3. Payment in each of above category is to be paid pro-rata based on the no. of documents/drawings in each category which will be frozen after award of contract.

4. The above Billing Schedule is liable for revision (Additions/Deletions/Modification) during course of project execution, in consultation with ESC.

5. If, for any reason, ESC does not prepare drawings & designs for any of the above listed structures payment will not be made for such structures.

6. Site support (answering site queries, clarifications, modifications, visits to site) even though not appearing in above milestones, is to be extended as and when necessary till the end of contract.

7. The above break up is for 100% of the lump sum engineering fee. Against the total fee quoted for detailed engineering. 50% will become payable on release of requisite no. of prints for submission to customer / consultant (after incorporating BHEL's comments, if any, on the preliminary drawings made by ESC). Next 30% will be payable on release of requisite prints of drawings after obtaining Code-2 approval from Customer / Consultant and 10 % will be payable on obtaining Code-1 approval from Customer / Consultant. Last 10% will be payable only after submission of As-built documents.

8. The payment for the visits will be made on pro-rata basis as and when they are made and only for the no. of visits actually completed.

9. Security deposit will also be released only after the completion of As-built drawings, As-built BOQ and other project closing documents.

ANNEXURE-G3

GENERAL INSTRUCTIONS TO ESC

1. ESC shall fully familiarize himself on the scope of work and may seek clarifications if required before submitting the bid. Incomplete and vague bids are liable for rejection.

2. Since time is the essence of the contract, ESC shall offer a schedule/minimum time for engineering and also indicate the time schedule of inputs required to complete the engineering work. This engineering schedule should match the overall project schedule.

3. Immediately after the receipt of the LOI from BHEL, ESC shall form a dedicated Engg. Group & accordingly submit the list of engineers who would be assigned with total activities of Engg. work i.e. from beginning till completion of the engineering activities for this project. The engineers designated thus shall be made available full time for the completion of the project.

4. ESC shall ensure optimal & economic design while executing the Engg. work, but without sacrificing the customer Specification requirements / statutory regulations / code provisions / safety aspects etc.

5. Analysis and design carried out using computers shall be accompanied with a commentary defining all notations, description of method/formula used, units and defining the formats of the computer print out along with all input data. “STAAD-PRO” software shall be used for analysis of structures. Software used for analysis etc. has to be validated with a standard sample problem before using the same on this project.

6. All specification, drawings and documents and bill of materials (BOM) shall be prepared in the formats as directed by BHEL.

7. Since speedy delivery of documents is essential for such a time schedule, it shall be the responsibility of ESC to ensure timely delivery of all documents. To ensure this courier/Hand delivery will have to be accounted for by ESC.

8. **M/s DCPL, Kolkata, is Customer’s Consultant for this project. All civil drawings are likely to reviewed by Customer and their Consultant. ESC shall extend all assistance to BHEL to get the drawings & documents approved by Customer/ Customer’s Consultant at the earliest.**

9. If in the opinion of BHEL, discussion / clarifications across the table with the BHEL’s/Customer’s/Consultant’s engineers are felt necessary, ESC shall comply for deputing their designer(s) concerned to BHEL- Hyderabad / Duliajan site /Kolkata. Travel expenses, incidentals, transport, pocket money, hotel charges are included in lump sum fees quoted for visits.(However engg. hours spent is included in the lump sum charges quoted for engg.). Each man visit shall comprise for an average of 3 days stay at the station excluding travel time.

10. ESC shall provide adequate and decent office arrangements to BHEL/ vendors/ Customer/Customer’s Consultant visiting their offices for any meeting / discussion.

11. For support engineering services at site, BHEL will not provide any accommodation at site. ESC engineers visiting the project site shall come fully prepared for the assignment given by BHEL.

12. BHEL shall have the right to remove from work (in the engineering work) or at project site any of the employees of the ESC who in the opinion of BHEL is not suitable to perform work assigned to him or on account of improper conduct or negligence in duty.

13. a) ESC shall estimate engg-hours for revision/modification of drawings/documents that can be anticipated for completion of the project of such a nature based on his experience. No extra payment shall be made for any engineering modifications/ revisions which may be necessary by BHEL/ Customer. No extra payment shall also be made for the duplication/preparation of the required no of copies to be submitted to BHEL /Customer or due to ESC's errors or omissions. No extra payment shall be made for the revision/rectification/re-preparation of drawings/documents/manuals demanded by BHEL/Customer on quality grounds.

(b) However if the drawings are revised due to change/s in inputs after receipt of code-1/A approval from Customer additional payment for rework may be considered by BHEL .

c) Engg. for any additional structure/s which is outside the agreed scope shall also be payable extra.

d) ESC shall inform BHEL about their intention to claim extra payment for such Reworks/Additional Works and obtain in-principle approval before proceeding with engineering.

e) Such Reworks/Additional Works shall be carried out by ESC expeditiously to meet the Project Schedule. Engg. hours required for such rework/additional scope shall be estimated and mutually agreed on completion of total engineering of the project, and shall be paid as per the contract rates for additional work.

14. ESC shall familiarize fully with the specifications / standard / procedures / practice / quality requirements of BHEL / Customer and also the site conditions, to avoid any dispute at later date and after order placement.

15. BHEL shall not pay any amount, other than the fee specifically agreed, towards any cost incurred by ESC by way of salaries to his employees (income and taxes), insurance of any nature, benefits/bonus to the employees, etc. BHEL's liability is limited to the amount contracted for the services to be rendered under the scope of work defined.

16. Progress reporting formats, guidelines for payment invoices etc shall be collected by the ESC from BHEL wherever applicable. BHEL shall provide only one set and duplication shall be the responsibility of ESC.

17. ESC shall not commit any expenditure on behalf of BHEL without BHEL'S consent in writing, during the execution of the work defined in the scope.

18. ESC shall bear all expenses/fee penalties if it infringes on patents/licenses of any persons/ organizations or in case of suits, court proceedings, damage claims etc., due to any reason whatsoever.

19. ESC shall ensure that it possesses the latest revisions of various national and international standards, codes of practices, statutory & environmental regulations etc. - as applicable, for execution of the engineering work. BHEL shall not provide any such documents to ESC. Engineers of ESC assigned for this project shall have familiarity on relevant documents as mentioned above for their use and applications.

20.ESC shall maintain at their own cost the personal accidents policy, life insurance and / or any such insurance required in respect of their personnel deputed to outstation visits for the given contract.

21. BHEL reserves the right to terminate or suspend the contract or withdraw part of the scope of the work at any stage of its execution, if it found that the ESC has not met its obligation for the performance / progress is not up to the expected standards and overall work is likely to suffer. In such an event, BHEL shall give one-month notice in writing. In such case all costs incurred accordingly by BHEL to complete any work forming part of the contract shall be recovered from the ESC. In case of such premature termination of contract, BHEL reserves the right to claim damages from the bidder including the initiation of judicial proceedings.

22. ESC shall keep all information/data/drawings etc. related to the work as "confidential information" and shall not divulge or use the information indirectly or directly in any way detrimental to the interest of BHEL. All drawings, documents, manuals, design calculations including all originals prepared or obtained during the work shall remain the property of BHEL and shall be handed over to BHEL on demand.

23.ESC shall comply with the laws and regulations of the country, the state and territories concerned, during the progress of the work.

24. In the event of any dispute or difference at any time arising between the parties relating to construction, meaning or effect of this agreement or any other clause or any content of the rights and liabilities of the parties or other matters specified herein or with reference to anything arising out of or incidental to this agreement or otherwise in relation to the terms, whether during the continuance of this agreement or thereafter, such disputes or differences shall be endeavoured to be solved by mutual negotiations. If, however, such negotiations are infractuous, they shall be decided by arbitration of two Arbitrators, one to be appointed by each party to the dispute or difference and to an Umpire to be appointed by the Arbitrators in writing before taking upon themselves the burden of arbitration. Such a reference shall be deemed to be a submission to arbitration under The Indian Arbitration & Reconciliation Act, 1996 and or any modification or re-enactment thereof. The venue of arbitration shall be Hyderabad only and subject to the above, the Civil Courts in Hyderabad & Sangareddy have exclusive jurisdiction in this matter.

25.ESC shall ensure that all engineering services required for the completeness of the project be carried out to the ultimate satisfaction of BHEL and customer. Any activity, which has not been spelt out in this specification, but is required for completeness of the job and for safe & satisfactory performance of the systems, shall be deemed to be included in engineering work of ESC for the given scope.

26.ESC shall submit progress report on the status of the work entrusted to him periodically and as mutually agreed upon.

27. ESC shall be fully responsible for the accuracy and adequacy of engineering services rendered by him. Any modifications / rectification, if required in engineering and design shall be carried out expeditiously by ESC at his own cost. Losses / damages if any due to wrong engineering shall be compensated by ESC and a maximum of 10% of the lump sum engineering fee shall be deducted from the bills of ESC arising out of such errors.

28. If due to some unforeseen circumstances or at the request of BHEL's customer, it becomes necessary to suspend / terminate the project engineering work, ESC shall be asked to stop work. ESC shall be paid only for the work portion completed till the date of such notification

and as per rules asserted by BHEL. No other damages/cancellations charges whatsoever, arising out of such suspensions/cancellation, shall be payable by BHEL.

29. BHEL cannot consider offers received from bidders who are Customer's consultants for this project in any capacity. Hence, if the bidder happens to be Customer's Consultant for this project in any capacity, the same should be highlighted in bidder's technical offer. The bidder should submit a declaration in the format given in Annexure G-4 along with their Technical Bid.

30. ESC shall ensure compliance to all statutory rules and regulations, especially with regard to Industrial & Labour laws, with respect to the work force employed by them.

31. Bidder should sign all the pages of this technical specification and return to the owner as a token of acceptance of all the clauses. Deviation, if any may be brought out in an exclusive deviation format.

32. Submission of bids shall in two parts ie Technical cum commercial bid and priced bid in separate sealed covers as per Cl –B of PQC document PED/ESC/PQC.

ANNEXURE – G4

COMMERCIAL TERMS & CONDITIONS

1. **Earnest Money Deposit:**

Bidder to pay 'Earnest Money Deposit' (EMD) of Rs. 1,50,000 in the form of Pay Order or Demand Draft along with their technical offer. EMD given by all unsuccessful bidders shall be refunded normally within fifteen days of acceptance of award of work by the successful tenderer. EMD shall not carry any interest. EMD of successful bidder shall be converted and adjusted against security deposit. Technical offers received without EMD are liable for rejection.

2. Security Deposit:

Successful bidder to pay Security Deposit (SD) before start of the job. SD shall not carry any interest. SD shall be Rs.4 lakh+5% of the amount exceeding Rs.50 lakhs. SD may be furnished by successful bidder in the form of

- Pay Order /Demand Draft in favour of BHEL
- Local cheques of Scheduled Banks subject to realisation,
- NSC certificates, Kisan Vikas Patras(Certificates should be in the name of ESC and duly pledged in favour of BHEL and discharged on the back)
- Bank guarantee from scheduled banks/ Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.
- Fixed Deposit Receipts issued by Scheduled Banks /Public Financial Institutions as defined in the Companies Act. The FDR shall be in the name of the ESC, A/C BHEL, duly discharged on the back.
- SD can also be recovered at the rate of 10% from running bills. However in such cases at least 50% of the SD should be furnished before start of the work and the balance 50% will be recovered from the running bills.

Security Deposit will be released on commissioning of the total plant, submission of 'As Built' drawings and submission of detailed structure wise BOQs.

3. Payments:

Payments will be made against ESC's invoices. All payments will be made within 90 days after submission of original documents to BHEL for processing. Payment for engineering will be controlled based on weightages and percentages indicated in Annexure C-4.Payment for the visits will be made on pro-rata basis as and when they are made and only for the number of visits made.

4. Penalties:

i) In the event of delay in completion of the job, a penalty @0.5% per week up to a max. of 10% of the order value will be levied on ESC. Drawing submissions by ESC shall be strictly monitored as per schedule indicated in Annexure C-3 and penalties for delays, if any, will will be recovered from the respective bills.

ii) For penalty on account of wrong engineering refer cl.27 of Annexure- G3. These penalties are applicable separately.

However, total penalties on account of "Wrong engineering" and "Delay" shall be limited to 10% of the total contract value, even though each one is applied separately.

Validity of the offer.

i. The offer by the bidder shall be kept valid for 60 days from opening of Price Bids.

5. Firm Prices:

If the job is awarded, the successful bidder's price shall be kept firm in all respects for 32 months from LOI date. In the event of the project extending beyond that period, for reasons not attributable to ESC, the charges payable to ESC for the left out portion of work will be mutually discussed and settled, subject to a maximum of 5% of the total contract value.

6. Reverse Auction

As a company initiative, BHEL may decide to finalize the order on Reverse Auction basis. Bidders are requested to quote their most competitive price keeping the option open for BHEL to either go for reverse auction or normal tendering procedure. BHEL reserves its right to go for reverse auction or normal tendering procedure. However, bidders will be intimated in advance before proceeding with any of the tendering procedure.

Ref. Doc

ANNEXURE –G5

DECLARATION BY ENGINEERING SUB-CONTRACTOR

We M/s----------
declare that we will not engage ourselves as consultants/contractors to OIL-Duliajan, for this project in case of award of contract for Engineering Sub-contractor to us by BHEL .

Signature & Seal of Authorized Signatory
(on behalf of Engineering Sub-contractor)

ANNEXURE-P1

PRICE FORMAT

A. MAIN SCOPE

Sl. No.	Item	Basic Price Rs.	Service Tax Rs.	Other Taxes Rs.	Total Rs.
1	Lump sum price for Detailed Engineering as per **BHEL specification PECC/Duliajan/004 , Rev-00**				
2	Lump sum price for 25 man visits to BHEL,Hyd./ DCL Kolkata / Oil –Duliajan site, Assam				
	Total				

PRICE BREAK UP OF 'A' ABOVE

1. Man hours considered ….
2. Man hour charges considered Rs.
3. Documentation charges and other charges considered Rs.

B. ADDITIONAL SCOPE

1. **Man hour rates for additional work beyond the scope of contract**

Engineering Man-hours Rs. per Man hour

Drafting man-hours Rs. per man hour

2. **Rates for additional Man visits to**

Duliajan site Rs. per visit

BHEL, Hyderabad	Rs.	per visit
DCL, Kolkata	Rs.	per visit

3. **Unit rates for additional documentation**

a) Hard Copies

Sl. No.	Size	Cost for additional AMMONIA PRINT Rs. (Per Print)	Cost for additional WHITE PRINT Rs.(Per Print)
1	A0		
2	A1		
3	A2		
4	A3		
5	A4		

Notes:

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1. Charges for visits to include cost of traveling, boarding & lodging, local expenses etc. Engineering hours to be spent during such visits are considered as part of total man-hours for the identified scope and shall be included in price quoted for A above.

2. Charges for detailed engineering should also include for miscellaneous expenses like Telephone, Email, Fax, postal, Courier, Ammonia prints, Documentation etc.

3. No other charges other than specified above will be payable to ESC against this work.

4. For evaluation purpose prices quoted for '**Part-A Main Scope'** above only will be considered.

5. Separate prices should be indicated for each item.

6. Prices must be quoted for 'Part**–B additional scope**' in price format above. Offers which are incomplete or where separate prices are not indicated are liable for rejection.

7. Prices quoted shall be inclusive of all taxes & duties with break-up as indicated above. Percentage of taxes & duties considered may also be indicated.

RECORD OF REVISIONS

Rev. No.	Date	Revision Details	Revised By	Approved By
Rev 00	15.03.10	First Issue	First Issue	First Issue

Ref