



NLC INDIA LTD
‘Navratna’ - Government of India Enterprise
Block-1, NEYVELI - 607 801, Cuddalore District, Tamil Nadu, INDIA.

OFFICE OF THE CHIEF GENERAL MANAGER/CONTRACTS
CORPORATE OFFICE

DOMESTIC COMPETITIVE BIDDING

THROUGH e-TENDER & e- REVERSE AUCTION
TENDER DOCUMENT

FOR
BOS WORKS FOR SETTING UP OF 600 (6X100MW) MW GRID CONNECTED
SOLAR POWER PROJECT AT KHAVDA, GUJARAT UNDER ENGINEERING,
PROCUREMENT (EXCLUDING SUPPLY OF PV MODULES, IDT, CENTRAL
INVERTER, HT CABLES & HT SWITCH GEARS) & CONSTRUCTIONS
WITH O&M FOR 03 YEARS

VOLUME – IA
INVITATION FOR BID

Tender No. CO CONTS/0024P/600 MW Solar/BOS/e-Conts/2023, Dt.30.08.2023

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GRID CONNECTED SOLAR POWER PROJECT AT
KHAVDA, GUJARAT.**

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TENDER SPECIFICATION - ALL VOLUMES

OVERALL CONTENTS

Sl. No	Volume	Description
1.	I A	Invitation for Bid
2.	I B	Commercial – Draft Contract
3.	II	Technical Specification



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COMMERCIAL**

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LIST OF ACRONYMS

APG	:	Advance Payment Bank Guarantee
BG	:	Bank Guarantee
BOS		Balance of System
C&I	:	Control & Instrumentation
Cl.	:	Clause
CIF	:	Cost, Insurance & Freight (Incoterms 2010)
CPG	:	Contract Performance Bank Guarantee
CTU	:	Central Transmission Utility
DD	:	Demand Draft
DJU	:	Deed of Joint Undertaking
EOI	:	Expression of Interest
EPC	:	Engineering, Procurement & Construction
FOB	:	Free on Board (Incoterms 2010)
FTP	:	Foreign Trade Policy
GST	:	Goods and Services Tax
IDT	:	Inverter Duty Transformer
IFB	:	Invitation for Bid
IST	:	Indian Standard Time
ISTS	:	Inter State Transmission System
INR	:	Indian Rupees
JV	:	Joint Venture
kW	:	Kilo Watt (Power)
LOA	:	Letter of Award
LTA	:	Long Term Access
MW	:	Mega Watts (Power)
NLCIL/NLC	:	NLC India Limited
OTGT	:	O&M Target Generation Test
SCOD	:	Scheduled Commercial Operation Date
SPP	:	Solar PV Power Project
PERT	:	Project Evaluation and Review Technique
PSU	:	Public Sector Undertaking
PTO	:	Provisional Take Over
PAT		Performance Assessment Test
PG	:	Performance Guarantee
RBI	:	Reserve Bank of India

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SCHEDULE OF TENDER (SOT)

Sl. No.	Description	Details
i.	Tender No.	CO CONTS/0024P/600 MW Solar/ BOS /e-contrs/2023, Dt.30.08.2023
ii.	Name of the work	BOS works for Setting up of 600 MW (6X100MW) Grid Connected Solar Power Project at Khavda, Gujarat Under Engineering, Procurement (Excluding Supply of PV Modules, IDT, Central Inverter, HT Cables & HT Switch Gears) & Constructions with O&M for 03 Years.
iii.	Mode of Tender	e-Tendering (Two cover system)
iv.	Cost of Tender Document	Rs. 20,000/- (Rupees Twenty Thousand only) Non-refundable
v.	Bid Guarantee	Rs. 4,35,50,000/- (Rupees Four Crore Thirty Five Lakh and Fifty Thousand Only)
vi.	Date of Pre-Bid Meeting	13.09.2023 at 11.00 Hrs. (IST) through Video Conference (VC)
vii.	Last Date & Time of submission of on line Bids (Part-I, Part-II) and Physical cover	29.09.2023 at 14.30 hrs. (IST)
viii.	Date & Time of opening of Part-I and Physical Cover	29.09.2023 at 15.00 hrs. (IST)
ix.	Date & time of opening of Price Bids (Part-II)	To be informed later
x.	Date of e-Reverse Auction	To be informed later

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SECTION – 1
NOTICE INVITING BID
DOMESTIC COMPETITIVE BIDDING

Tender No. CO CONTS/0024P/600 MW Solar/ BOS /e-contrs/2023, Dt.30.08.2023

1.0 Invitation for Bid

Online Bids in English are invited by NLC India Limited, Neyveli for “BOS works for Setting up of 600 MW (6X100MW) Grid Connected Solar Power Project at Khavda, Gujarat Under Engineering, Procurement (Excluding Supply of PV Modules, IDT, Central Inverter, HT Cables & HT Switch Gears) & Constructions with O&M for 03 Years ” in Two Part system (Part-I and Part-II) followed by Reverse Bidding.

This 600 MW Solar Power Project is intended to be developed by NLCIL through its wholly owned subsidiary M/s.NLC India Green Energy Limited as details given below.

i).	Cost of tender document	:	Rs 20,000/- (Rupees Twenty Thousand only) Non-refundable
ii).	Bid Guarantee	:	Rs.4,35,50,000/-(Rupees Four Crore Thirty Five Lakh and Fifty Thousand Only)
iii).	Date of Pre-Bid Meeting	:	13.09.2023 at 11.00 Hrs. (IST) through Video Conference (VC)
iv).	Last Date & Time of submission of online Bids (Part-I, Part-II) and Physical cover	:	29.09.2023 at 14.30 hrs. (IST)
v).	Date & Time of opening of Part-I and Physical Cover	:	29.09.2023 at 15.00 hrs. (IST)
<u>Note:</u> 1. The points for discussion shall be furnished in advance to pre-bid meeting to the e-mail ID: corporate.contrs@nlcindia.in 2. Bidders who are interested to participate in the Pre-bid Meeting may send their request to corporate.contrs@nlcindia.in furnishing Company name and address, Name of the authorized person to attend pre-bid meeting, contact number and e-Mail ID to enable us to send the link for participating in the Pre-bid meeting. 3. For further details, please visit our website: www.nlcindia.in, NeAT portal: https://procure.nlcindia.in or Central Public Procurement Portal (CPPP) of Government of India website: www.eprocure.gov.in or contact:			

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	The Chief General Manager/Contracts, Corporate Office, NLC India Ltd., Block-1, Neyveli– 607 801., Tamil Nadu. Phone: 04142 – 212308/ 218588. E-Mail : corporate.conts@nlcindia.in

1.1. **Brief Scope of Work**

The scope of work includes the Design, Engineering, Site development, Manufacture, Inspection at supplier's works, Supply, Insurance, Transport, Storage, Erection, Installation, Testing & Commissioning of the total capacity of 600 (6X100) MW SPP and the Evacuation System up to the Point of connection (ie., 33KV side of 33/400KV Pooling Sub Station) Except Supply of Solar PV Modules, IDT, Central Inverter, HT cables & HT Switch Gears.

The scope also includes necessary arrangements/supports to enable SPD to Declare Scheduled Commercial Operation Date (SCOD) after Entire Commissioning of SPP With DC overloading and conducting O&M Target Generation Test (OTGT). The scope also includes Operation & Maintenance (O&M) of entire SPP upto Point of connection. Standard 3 years O&M shall start from the date of SCOD. In addition, Scope also includes, Annual Maintenance Contract (AMC) of SCADA & Tracker for Six (6) years starting from 4th year to 9th year (ie. on completion of 03 years O&M of 600 (6X100) MW SPP).

This Scope of Work is indicative only. Detailed Scope of Work is contained in Volume-II (Technical Specification).

2.0 **Pre-Qualifying Requirements (PQR) for the Bidders:**

TECHNICAL CRITERIA:

Bidder shall meet the technical requirements either in clause 2.1 or 2.2 or 2.3 or 2.4 below:

2.1. Route-I:

The Bidder should have designed, supplied, erected/ supervised erection and commissioned/ supervised commissioning of Balance of System Package/ Solar power project for Solar Photo Voltaic (SPV) based grid connected power plant(s) of cumulative installed capacity of 40 MWp or higher in maximum of 4 agreements/orders, out of which at least one plant should have been of 10 MWp or higher capacity. The reference plant of 10 MWp or higher capacity must have been in successful operation for at least six (6) months prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening).

2.2. Route-II:

The Bidder should be a developer of Solar Photo Voltaic (SPV) based grid connected power plant(s) of cumulative installed capacity of 40 MWp or higher in maximum of 4



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agreements/orders, out of which at least one plant should have been of 10 MWp or higher capacity. The reference plant of 10 MWp or higher capacity must have been in successful operation for at least six (6) months prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening).

2.3. Route-III:

2.3.1. The Bidder should have executed in the last ten (10) years an industrial project either as developer or as EPC Contractor in the area of Power/ Solar Power/ Steel/ Oil/ Gas/ Petro chemicals/ Fertilizer/ Cement/ Coal mining including coal handling plant/ Rail/ Ports/ Bridges/ Any other Infrastructural projects, for a value of Rs. 168 Crores in a single project or single work and the same should be in successful operation for at least one (1) year prior to the date of techno- commercial bid opening (i.e., Part-I Bid Opening).

(AND)

2.3.2. The Bidder should have executed at least one (1) Electrical Sub-station of 33 kV or above voltage level, consisting of equipment such as 33kV or above voltage level circuit breakers and Power transformer, either as developer or as EPC Contractor which should be in successful operation for at least one (1) year prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening).

Note: The works referred at clause 2.3.1 (as applicable) & 2.3.2 can be in same or different projects.

2.4. Route-IV:

The bidder should be an Indian company registered in India and should be a Group Company/Holding Company/ Subsidiary Company of a firm meeting the requirement stipulated in clause 2.1 (Route-I) or 2.2 (Route-II) or 2.3 (Route-III). In such a case, Bidder shall furnish a Joint Deed of Undertaking (JDU) jointly executed by the firm qualified as per the clause 2.1 (Route-I) or 2.2 (Route-II) or 2.3 (Route-III) and the Bidder along with its bid for complete performance of the contract jointly or severally as per format enclosed (Annexure-F) shall only be furnished without financial backup BG in the bid document failing which the Bidder's bid is liable to be rejected.

2.5. FINANCIAL CRITERIA:

2.5.1. The Bidder shall have Positive Net Worth as per the latest audited financial statements individually.

2.5.2. Average Annual Turn Over of the Bidder shall not be less than Rs. 168 Crores for the last three (3) consecutive financial years as on the original scheduled date of tender opening.

2.5.3. In case the bidder is Group Company/Holding Company/Subsidiary Company of a firm meeting the requirement stipulated in clause 2.1 (Route-I) or 2.2 (Route-II) or 2.3 (Route-III) then the combined annual average turnover of the bidder and the firm meeting the QR shall not be less than Rs. 168 Crores for the last three (3) consecutive financial years as on the original scheduled date of tender opening.



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- 2.5.4. In case a Bidder does not satisfy the annual turnover criteria, stipulated above on its own, its Holding Company would be required to meet the stipulated turnover requirements as above, provided that the Net Worth of such Holding Company as on the last day of the preceding financial year is at least equal to or more than the paid-up share capital of the Holding Company. In such an event, the Bidder would be required to furnish along with its techno-commercial bid, a Letter of Undertaking from the Holding Company, supported by the Holding Company's Board Resolution, as per the format enclosed (Annexure-G) in the bid documents.
- 2.5.5. In case the Bidder is not able to furnish its audited financial statements on standalone entity basis, the unaudited unconsolidated financial statements of the Bidder can be considered acceptable provided the Bidder further furnishes the following documents on substantiation of its qualification:
- (a) Copies of the unaudited unconsolidated financial statements of the Bidder along with copies of the audited consolidated financial statements of its Holding Company.
 - (b) Certificate from the CEO/ CFO of the Holding Company, as per the format enclosed in the bidding documents, stating that the unaudited unconsolidated financial statements form part of the consolidated financial statement of the Holding Company.
- In case where audited results for the last financial year as on date of techno commercial bid opening are not available, the financial results certified by a practicing Chartered Accountant shall be considered acceptable. In case the Bidder is not able to submit the Certificate from a practicing Chartered Accountant certifying its financial parameters, the audited result of three financial years preceding the last financial year shall be considered for evaluating financial parameters. Further, a certificate would be required from the CEO/CFO as per the format enclosed (Annexure-H) in the bidding documents stating that the financial results of the company are under audit as on techno-commercial bid opening and the Certificate from a practicing Chartered Accountant certifying the financial parameters is not available.

3.0 DOCUMENTARY EVIDENCE:

- 3.1 The bidder shall attach documentary evidence to prove that the qualifying requirements mentioned in the clause 2.1 or 2.2 or 2.4 are met by him, along with the bid in the form of user certificate along with copy LOA/Work order/Contract agreement together with full contact details for verification.
- 3.2 For QR clause No.(2.3), the bidder shall attach documentary evidence to prove that the qualifying requirements mentioned in the clause 2.3.1 & 2.3.2 are met by him, along with the bid in the form of user certificate along with copy LOA/Work order / Contract agreement together with full contact details for verification.
- 3.3 For Financial QR, clause No.(2.5) Bidder shall furnish his audited profit and loss accounts and balance sheets for the last three (3) consecutive financial years as on the original scheduled date of tender opening. Wherever the bidder participates with Group Company/Holding Company/Subsidiary Company, profit and loss accounts and balance



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sheet for the last three (3) years consecutive financial years as on the original scheduled date of tender opening of their Group Company/Holding Company/Subsidiary Company shall also be furnished by the Bidder.

4.0 NOTES:

- 4.1 The Bidder or Group Company or Holding Company or Subsidiary Company as the case may be, shall attach documentary evidence to prove that the qualifying requirements mentioned in Clause no: 2.1 or 2.2 or 2.3 above are met by him / them, along with the bid in the form of user certificate along with copy LOA/Work order / Contract agreement together with full contact details for verification.
- 4.2 The bidder or the bidder with Group Company or Holding Company or Subsidiary Company, as the case may be, shall furnish their audited profit and loss accounts and balance sheets for the last three (3) consecutive financial years.
- 4.3 The Bidder shall submit End User Certificate which is subject to verification for qualification. In case the bidder furnishes the end user certificates showing the experiences of their subsidiary or group companies or companies under the same Management, a confirmation from the firm which is having the experience in this regard is to be enclosed along with end user certificate. In case of end user certificates are furnished by the Bidder from the subsidiary or group companies or companies under the same Management, in addition to End User Confirmation, NLCIL reserves the right to inspect such installations where such certificates are obtained by the Bidder, only if the Bidder facilitates necessary inspection of such installation by the purchaser. The subsidiaries/group companies will submit an undertaking for extending necessary support/expertise to the bidder for execution of the project. NLCIL reserves the right to verify the credentials submitted by the bidders. However, cost pertaining to the purchaser's personnel for such inspection shall be borne by the purchaser.
- 4.4 NLCIL reserves the right to inspect the plant(s) referred to by the bidders as well as the original documents submitted in support of their claim to assess its veracity.
- 4.5 The bidder shall furnish major legal cases and their statutory liabilities if any.
- 4.6 The bidder shall also possess a valid certificate of registration under GST and the same should be furnished along with tender documents.
- 4.7 The bidder should have (obtained / holder of) the Permanent Account Number (PAN) under the Income Tax Act and production of the documents relating to same are mandatory. To ensure that the bidder is not a defaulter in payment of income tax as evidenced by income tax assessment records for four consecutive years prior to bidding, it is mandatory for the bidder to provide the self-attested printout of the online IT Statement indicating zero tax liabilities for four consecutive years prior to bidding along with the tender documents. NLCIL reserves the right to send the same to the income tax department for verification. (In this regard, the bidder can seek the help of the auditor in case of any doubt or otherwise.).



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- 4.8 In case of participation by the Bidder with Group Company or Holding Company or Subsidiary Company as the case may be, the above clauses (4.5), (4.6) and (4.7) shall be applicable to the partners also.
- 4.9 The Project Consultant for this tender shall not be a Bidder for same tender. If a bidder from a Group of Company /Subsidiary company /Holding Company is the Project Consultant for this tender, any bidder from the same group of company cannot be a bidder for the same tender.
- 4.10 If the Bids submitted by both the Main contractor and Sub contractor claiming the same experience, then the bid submitted by the Main Contractor alone shall be considered for further evaluation and the bid submitted by the Sub-Contractor shall be rejected.
- 4.11 In case, if a bidder meets the technical QR but could not furnish his / their audited financial statement of three consecutive financial years preceding the last financial year for evaluating the average Annual turnover, due to the incorporation / formation of the bidder, with in a period of less than 3 years from the original scheduled date of tender opening, then, such bidder shall also be considered and the Average annual turnover of such bidder shall be arrived at as below:
- 4.11.1 If the bidder furnished audited financial statement (Profit & Loss Account and Balance Sheet) for the last financial year only, then such bidder's average Annual turnover shall be arrived at by dividing the Turnover of the last financial year by three.
- 4.11.2 If the bidder furnished audited financial statement (Profit & Loss Account and Balance Sheet) for the last two financial years only, then the bidder's average Annual turnover shall be arrived at by dividing the sum of Turnover of last two financial years by three.
- 4.11.3 In cases, where audited financial statement (Profit & Loss Account and Balance Sheet) for the last financial year immediately preceding the original schedule date of Tender opening is not available, a certificate would be required from the bidder stating that the Financial statement of the bidder are under audit as on the date of tender opening. In such case, the audited financial statement of three consecutive financial years preceding the last financial year shall be considered for evaluating the financial parameters.

5.0 OTHER CONDITIONS:

- (a) The bidder shall furnish the following details also along with documents.
- (i) Contracts in hand / pending jobs and their status along with value.
 - (ii) Major Legal Cases and their Statutory Liabilities.
 - (iii) Recent Orders completed for Solar project with value.
- (b) The bidder shall be solely responsible and liable for all technical management and all other services required for completing the entire scope of work detailed in the tender specification.
- (c) In case, certificate(s) submitted by the bidders is found to be a forged one/bogus one; the bidder will not only be disqualified for the tender but also would be Suspended/Banned by NLCIL.



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- (d) Notwithstanding anything stated above, the Purchaser reserves the right to verify all statements/information submitted to confirm the bidder's claim on experience and to assess the capabilities and capacity of the bidder, to perform the contract, should the circumstances warrant such verification/ assessment in the overall interest of NLCIL.
- (e) NLCIL reserves the right to reject any or all bids or cancel/withdraw the Invitation for bids without assigning any reason whatsoever and in such case no bidder/intending bidder shall have any claim arising out of such action.

6.0 PUBLIC PROCUREMENT POLICY (MAKE IN INDIA):

- 6.1. The bidder shall take note of the following as per Department for Promotion of Industry and Internal Trade (formerly, Department of Industry Policy and Promotion), Ministry of Commerce and Industry, Government of India, Public Procurement (Preference to Make in India) Order 2017 – Revision: Dt: 16.09.2020 and further revisions, if any and confirm compliance to the requirements in this regard.

6.2. DEFINITIONS:

- (i) Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.
- (ii) 'Class -I local supplier', means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I local supplier' under order dt. 16.09.2020.
- (iii) 'Class-II local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II local supplier' but less than that prescribed for 'Class-I local supplier' under order dt. 16.09.2020.
- (iv) Non-Local Supplier' means a supplier or service provider whose goods, services or works offered for procurement has local content less than that prescribed for 'Class-II local supplier' under order dt. 16.09.2020.
- (v) Minimum local content: The 'Local Content' requirement to categorize a supplier as 'Class-I Local Supplier' is equal or more than 50%. For 'Class – II Local Supplier', the 'Local Content' requirement is equal or more than 20%. For the items, for which Nodal Ministry Department has not prescribed higher minimum local content notification under the Order, it shall be 50% and 20% for Class – I local supplier / Class – II local supplier respectively.
- (vi) 'RL1' means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjusted in the evaluation process as per the tender or other procurement solicitation.
- (vii) 'Margin of purchase preference' means the maximum extent to which the price quoted by a 'Class-I local supplier' may be above the RL1 for the purpose of purchase preference.



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- (viii) ‘Nodal Ministry’ means the Ministry of Department identified pursuant to this order in respect of a particular item of goods or services or works.
- (ix) ‘Procuring entity’ means a Ministry or department or attached or subordinate office of, or autonomous body controlled by the Government of India and includes Government companies as defined in the Companies Act.
- (x) ‘Works’ means all works as per Rule 130 of GFR-2017, and will also include ‘turnkey works’

6.3. **ELIGIBILITY CLASS:** Only Class-I local suppliers are eligible to participate in this Tender.

6.4. **MARGIN OF PURCHASE PREFERENCE: Not Applicable**

6.5. **Verification of local content:**

- a. The ‘Class-I local supplier’ at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for ‘Class-I local supplier’, as the case may be. They shall also give details of the location(s) at which the local value addition is made.
- b. In cases of procurement for a value in excess of Rs.10 crores, the ‘Class-I local supplier’ shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
- c. False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per the Rule 151(iii) of the General Financial Rules along with such other actions as may be permissible under law.
- d. A supplier who has been debarred by any procuring entity for violation of this order shall not be eligible for preference under this Order for procurement by any other procuring entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities.

6.6. **RECIPROCITY CLAUSE:**

- i. Entities of Countries which have been identified by the nodal Ministry / Department as not allowing Indian companies to participate in their Government procurement for any item related to that nodal Ministry shall not be allowed to participate in Government procurement in India for all items related to that nodal Ministry / Department, except for the list of items published by the Ministry / Department permitting their participation.
- ii. The term ‘entity’ of a country shall have the same meaning as under the FDI policy of DPIIT as amended from time to time.



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**6.7. Department of Expenditure Order (Public Procurement No.: 1) Order
No.6/18/2019-PPD, Dt: 23.07.2020.**

6.7.1

- I. Department of Expenditure, Ministry of Finance have issued Public Procurement No.: 4, Order No.: F.7/10/2021-PPD (1), Dt: 23.02.2023 in supersession to all of the above-mentioned Orders/clarifications, in which, the requirement of registration is stated as follows:
- i) *“Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the specified Competent Authority.*
 - ii) *Any bidder (including an Indian bidder) who has a Specified Transfer of Technology (ToT) arrangement with an entity from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the specified Competent Authority.*
 - iii) *The requirement of registration for cases covered by paragraph (i) above has been applicable since 23.07.2020. The requirement of registration for bidders covered by paragraph (ii) above will be applicable for all procurements where tenders are issued/published after 01.04.2023.*
 - iv) *In tenders issued after 23.07.2020 or 01.04.2023, as the case may be, the provisions of requirement of registration of bidders and of other relevant provisions of this Order shall be incorporated in the tender conditions”.*

II. Definitions:

1. “Bidder” (including the term ‘tenderer’, ‘consultant’ or ‘vendor’ or ‘service provider’ in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
2. "Tender" for the purpose of the Order will include other forms of procurement, except where the context requires otherwise.
3. "Transfer of Technology" means dissemination and transfer of all forms of commercially usable knowledge such as transfer of know-how, skills, technical expertise, designs, processes and procedures, trade secrets, which enables the acquirer of such technology to perform activities using the transferred technology independently. (Matters of interpretation of this term shall be referred to the



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Registration Committee constituted by the Department for Promotion of Industry and Internal Trade, and the interpretation of the Committee shall be final.)

4. "Specified Transfer of Technology" means a transfer of technology in the sectors and/ or technologies, specified in paragraph 15, occurring on or after 23.07.2020.

III. “Bidder (or entity) from a country which shares a land border with India” for the purpose of this Order means:

- a. An entity incorporated, established or registered in such a country; or
- b. A subsidiary of an entity incorporated, established or registered in such a country; or
- c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
- d. An entity whose beneficial owner is situated in such a country; or
- e. An Indian (or other) agent of such an entity; or
- f. A natural person who is a citizen of such a country; or
- g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

IV. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person(s), has a controlling ownership interest or who exercises control through other-means

Explanation –

- a. “Controlling ownership interest” means ownership of, or entitlement to, more than twenty-five per cent of shares or capital or profits of the company.
 - b. “Control” shall include the right to appoint majority of the directors or to control the management or policy decisions, including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.
2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.
 3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together; or through one or more juridical person, has ownership of or entitlement to more than fifteen



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percent of the property or capital or profits of such association or body of individuals.

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official.
5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third persons.

Note:

- i. A person who procures and supplies finished goods from an entity from a country which shares a land border with India will, regardless of the nature of his legal or commercial relationship with the producer of the goods, be deemed to be an Agent for the purpose of this Order.
- ii. However, a bidder who only procures raw material, components etc. from an entity from a country which shares a land border with India and then manufactures or converts them into other goods will not be treated as an Agent.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

- VII.
- i. Bidder is permitted to procure raw material, components, sub-assemblies etc. from the vendors from countries which shares a land border with India. Such vendors will not be required to be registered with the Competent Authority, as it is not regarded as "sub-contracting".
 - ii. However, in case a bidder has proposed to supply finished goods procured directly/indirectly from the vendors from the countries sharing land border with India, such vendor will be required to be registered with the Competent Authority.

VIII. Procurement of spare parts and other essential service support like Annual Maintenance Contract (AMC)/Comprehensive Maintenance Contract (CMC), including consumables for closed systems, from Original Equipment Manufacturers (OEMs) or their authorized agents, shall be exempted from the requirement of registration as mandated under Rule 144(xi) of GFRs 2017 and Public Procurement Orders issued in this regard.

6.7.2 Model Certificate

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a



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country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by Competent Authority shall be attached].

6.7.3 Model Certificate for Works involving possibility of sub-contracting

“I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached].

The above said order will not apply to bidders from those countries (even if sharing a land border with India) to which, Govt. of India has extended lines of credit or in which, and the Govt. of India is engaged in development projects (Order Public Procurement No.2).

Any bidder (including its Collaborator/Associate/JDU Partner/JV partner /Consortium Member / Assignee, wherever applicable) from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. Such registration should be valid for the entire period of bid validity or any extension thereof. However, in case the validity period of registration is less than bid validity period, the Bidder shall be required to submit the extension of the validity period of registration before the opening of price bids, failing which the bid is liable for rejection.

6.8. Certification for testing:

Ministry of Power issued following directions vide Order 25-11/6/2018-PG, dt.02.07.2020, Order 12/34/2020-T&R, dt.08.06.2021 and its amendments to protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network in the country and the bidder has to comply with the same:

- (1) All equipment, components, and parts imported for use in the power Supply System and Network shall be tested in the country to check for any kind of embedded malware/trojans/cyber threat and for adherence to Indian Standards.
- (2) All such testing shall be done in certified laboratories as designated by the Ministry of Power (MoP).
- (3) Any import of equipment components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India.



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(4) Where the equipment/ components/ parts are imported from "prior reference" countries, with special permission, the protocol for testing in certified and designated laboratories shall be approved by the Ministry of Power (MoP). This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.

6.9. MOP vide Order Dt. 16.11.2021, based on DPIIT Order Dt. 16.09.2020, issued circular for Purchase Preference (linked with local content) in respect of Power Sector, which is in supersession to all the earlier Orders issued by MOP in this regard and bidder is requested to confirm compliance of the same.

6.10. Bidder is also requested to confirm the compliance of MNRE vide order No F. No. 283/22/2019-GRID SOLAR Dt 23.09.2020 with regard to the Class-I local supplier.

Note:

The Bidders are requested to note that the bids will be evaluated taking into consideration of compliance to the orders mentioned in the above Clauses.

7.0 Time Schedule:

The Time Schedule for Scheduled Commercial Operation Date (SCOD) of the entire capacity of the Project is 12 months from the date of LOA. Scheduled Commercial Operation Date (SCOD) shall be the date on which the commissioning certificate is issued by the purchaser upon successful commissioning of the full capacity of the Project (600MW SPP) including DC overloading.

8.0 Bid Guarantee:

- i. Bidder is required to submit Bid guarantee for a value Rs.4,35,50,000/- (Rupees Four Crore Thirty Five Lakh Fifty Thousand Only) along with the Bid (Part-I) in the form and manner as described in the instructions to Bidders.
- ii. The Bid Guarantee shall be either in the form of (a) Bank Guarantee valid for 210 days from the date of opening of Part-I bids **or** (b) demand draft for an equivalent amount drawn in favour of NLC India Limited, payable at Neyveli **or** (c) NEFT/RTGS mode to NLCIL's Account No. 3062 3095 200 Beneficiary Name: NLC India Ltd., in State Bank of India, Branch: Neyveli Main (IFS Code No. SBIN0000958, SWIFT code: SBININBB457) and the remittance details with UTR No./DD shall be enclosed with the bid in Part I failing which the offer is liable for rejection.

The bidder is to note that the Banks commission charges will be to the account of the bidder and the net amount transferred to NLCIL's account shall be equal to the Bid Guarantee value as stipulated in the Tender. No other mode of payment will be accepted.



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- iii. Structured Financial Messaging System (SFMS): Bank Guarantee submitted in Physical mode, including EMD/ Bid Guarantee which cannot be verifiable through Structured Financial Messaging System (SFMS) SFMS will be rejected summarily. Hence, the bidder is requested to attach the proof for the issuance of bid guarantee through SFMS given by banker.
- iv. The bid shall be treated as non-responsive offer and will not be considered for further evaluation, in case -
 - the bid is submitted without Bid Guarantee and Cost of Tender document
 - the bid is submitted with Xerox copy of the Bid Guarantee
 - the bid guarantee and Tender Cost is of lesser value or any adjustment sought for.

9.0 Bid Submission & Opening:

- (i) All bids, including all attachments/enclosures shall be prepared in English Language only and submit the same. The bidder shall submit the offer for full scope of work indicated in the Tender Specification.

Part - I & Part – II of the Bids are to be submitted through online. Physical cover containing the documents in physical form as listed in S.No.3 of the table below shall be submitted within the last date and time of receipt of Bids.

- (ii) The Offers/Bids are to be obtained in two Part system as detailed below: -

1.	Part I	:	PART – I (through online) Covering Letter, Proof for remittance of Cost of tender document, Bid Guarantee (As per Annexure - A), Form of Bid (Part-I) (As per Annexure - B), Affidavit (as per Annexure-D), Power of Attorney, Techno-Commercial details, Integrity Pact (As per Annexure-E), Joint Deed of Undertaking (JDU) (as per Annexure-F), if applicable, Letter of Undertaking from the Holding Company (as per Annexure-G) if applicable, Proforma of certificate from the CEO/CFO (as per Annexure-H) if applicable, Minimum local content Certificates from the bidder and auditor and all other details as given in this Volume.
2.	Part II	:	Part-II (Price) (through online) (i) Duly filled in Form of bid (Part-II) as per Annexure – C. (ii) Price Bid with completely filled in Schedule of Prices (Schedule of Prices–F1 Table 1) along with annexures for Volume – IA.
3.	Physical Cover	:	Bidders are requested to furnish the following documents in Original in a sealed Physical cover within the last date and time of receipt of Bids: 1. Proof of remittance of cost of tender documents 2. Bid Guarantee (As per Annexure-A). 3. Power of Attorney / Authorization with the seal of the company in favour of the person signing the Bid.

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		4. Integrity Pact duly filled up and signed in all pages(as per Annexure-E). 5. Joint Deed of Undertaking, if applicable (as per Annexure-F). 6. Letter of Undertaking from the Holding Company (as per Annexure-G) if applicable, 7. Proforma of certificate from the CEO/CFO (as per Annexure-H) if applicable 8. Duly filled up Checklist as in Specimen Format.

- (iii) Bidders are requested to submit their Physical Cover containing the documents in physical form as listed in S.No.3 of the table above within the last date and time of receipt of Bids at the Office of the Chief General Manager / Contracts, Corporate Office, Block-1, NLC India Limited, Neyveli-607801, Tamil Nadu, India.
- (iv) Any Bid submitted without Cost of tender document and Bid Guarantee or submitted with part amount, or any request to adjust it in any other bills etc., or seeking exemption shall be treated as non-responsive offer and their offer will not be considered for further evaluation.
- (v) Part-I and Physical cover shall be opened on the scheduled date of tender opening. The offers/bids of the bidders who satisfy the conditions of Bid Guarantee and Cost of tender document shall be considered for further evaluation on QR aspects.

10.0 Special Note and Information Regarding the Tender

- (i) For downloading tender document, please visit our website: www.nlcindia.in or Central Public Procurement Portal (CPPP) of Government of India, Website: www.eprocure.gov.in or NeAT Portal: <https://procure.nlcindia.in>
- (ii) The Cost of tender document may be remitted through RTGS / NEFT mode or e-payment and the UTR No. may be indicated in the Part-I Bid.

Beneficiary Name : NLC India Limited, Neyveli
Account No. : 30623095200
Nature of Account : Current A/c
Bank : State Bank of India
Branch : Neyveli Main
IFSC Code : SBIN0000958
SWIFT Code : SBININBB457
E-mail : sbi.00958@sbi.co.in

The bidder is to note that the Bank commission charges will be to the account of the bidder and the net amount transferred to NLCIL's account shall be equal to the cost of the tender document. The qualification of bidder is subject to receipt of cost of the tender document stipulated in the tender. No other mode of payment will be accepted.



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- (iii) Amendments/ Errata/ Clarifications if any, shall be issued as Corrigendum for the tender and shall form part and parcel of the tender documents. Corrigendum will be displayed in NLCIL's Website www.nlcindia.in / <https://procure.nlcindia.in> of NLCIL NeAT Portal/Central Public Procurement Portal (CPPP) of Government of India, (www.eprocure.gov.in). Bidders are requested to visit NLCIL's website or Central Public Procurement Portal. NLCIL will not be responsible if any bidder omits to notice any Corrigendum. Corrigendum will be numbered consecutively. All the corrigendum issued are forming part and parcel of the tender documents.
- (iv) All other terms and conditions along with the technical specifications, time schedule, validity of bid and Instructions to bidders, etc., are contained in the tender specification.
- (v) NLCIL reserves the right to accept/reject any bid or all bids received at its discretion without assigning any reason whatsoever thereof. No further correspondence shall be entertained in this regard.
- (vi) The Bid shall be made in Indian Rupees only and all payments for the entire scope will be made in Indian Rupees.
- (vii) Bids submitted by fax or E-Mail or other than the prescribed mode of submission as per the tender shall be rejected.
- (viii) NLCIL takes no responsibility for delay, loss of receiving the Bid documents or any letter sent by the Bidder.
- (ix) The Tender specifications are meant for the exclusive purpose of bidding against the subject package and shall not be transferred, reproduced or otherwise used for purposes other than for which these are specifically issued.
- (x) Any bidder, who is placed under Suspension/Banning/Debarment by NLCIL will not be allowed to participate in any tender issued on or after the date of suspension/banning order and also if that bidder has already participated in any tender which is under process, their bid will not be considered for further processing.
- (xi) Bidders are advised to quote the most competitive price in the initial bid as well as in the Reverse Auction (RA), wherever applicable, since there will not be post tendering negotiations with the lowest bidder.
- (xii) Bidders are permitted to furnish clarification/ deviation, if any during pre-bid stage only. Deviation requests of the bidders, only upto the pre-bid stage which are acceptable to NLCIL will be communicated to the bidders for consideration.
- (xiii) Bidders are not allowed to take any deviations in their bid. Deviations listed elsewhere in the Bid shall not be considered.



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- (xiv) Bids without cost of tender document and Bid Guarantee will be summarily rejected.
- (xv) Performance certificate/Work Completion Certificate issued by Consultant will not be considered.



CHIEF GENERAL MANAGER/ CONTRACTS
NLC INDIA LIMITED

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SECTION – 2

GENERAL PROJECT INFORMATION

2.0 GENERAL PROJECT INFORMATION:

Sl.No	Description	Details
1	Owner/Purchaser	NLC India Limited, Neyveli, Cuddalore Dist., Tamilnadu, India
2	Project Title	BOS works for Setting up of 600 MW (6X100MW) Grid Connected Solar Power Project at Khavda, Gujarat Under Engineering, Procurement (Excluding Supply of PV Modules, IDT, Central Inverter, HT Cables & HT Switch Gears) & Constructions with O&M for 03 Years.
3	Location	Khavda, Gujarat
4	Capacity of the Project	Active Power of 600 MW (6X100MW) (AC) measured at delivery point.
5	Land requirement	Provided by NLCIL
6	Delivery Point & Voltage	400 KV sides of 400/765 KV Khavda PS-II pooling Sub-Stations of CTU.
7	Annual Estimated Net Energy Export	Refer Technical Volume-II.



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SECTION – 3

INSTRUCTIONS TO BIDDERS

3.1 Introduction

NLC INDIA LIMITED (formerly Neyveli Lignite Corporation Limited) (NLCIL) is a Navratna, Government of India Enterprise registered under the Indian Companies Act 1956, engaged in mining of lignite and power generation in Neyveli, Tamil Nadu State and Barsingsar, Rajasthan State in India. NLCIL views its business as an opportunity to set up the mechanisms for sustainable socio-economic development of its operating regions and also for contributing to the Nation Building Efforts.

A pioneer among the public sector undertakings in energy sector, NLCIL operates:

- Three highly mechanized opencast Lignite Mines (28.5 Million Tonnes per Annum) at Neyveli and one Lignite Mine (2.1 Million Tonnes per Annum) at Barsingsar, Rajasthan with a total capacity of 30.6 MTPA.
- Talabira II & III Coal Block (20 MTPA), Odisha, allotted to NLCIL as linked mine to proposed Odisha Thermal Power Project and operating Thermal Power Plant of NTPL at Tuticorin.
- Four Lignite based Thermal Power Stations (3,390 Mega Watt) in Neyveli and one Lignite based Thermal Power Plant in Barsingsar, Rajasthan (250 Mega Watt) with a total capacity of 3,640 MW.
- On green energy front it operates a Solar Power Plant of 141.06 MW (130MW+10 MW+1.06 MW) capacity at Neyveli.
- Solar Power Plant of 500 MW commissioned in 2018-19 and 709 MW commissioned in 2019-20 in various districts of Tamil Nadu.
- 20 MW capacity Solar Power Project was commissioned May 2020 at Andaman & Nicobar Islands.
- Wind Power Plant of 51 MW at Kazhuneerkulam, Tirunelveli, Tamil Nadu.
- A coal based Thermal Power Station of 1000 MW - NTPL at Tuticorin, Tamil Nadu as a joint venture between NLC India Limited and TANGEDCO (89:11).

ON GOING PROJECTS:

- Expansion of Mine-IA (From 3.0 MTPA to 7.0 MTPA) at Neyveli.
- Pachwara South Coal Block (11 MTPA), Jharkhand, allotted by GOI as a linked mine to NUPPL – A JV between NLCIL & UPRVUNL (51:49)
- NLC India Limited has also formed a Joint Venture (JV) company with Uttar Pradesh Rajya Vidut Utpadan Nigam Limited (UPRVUNL) in the name of Neyveli Uttar Pradesh Power Limited (NUPPL) to set up a coal based supercritical power plant with a capacity of 1980 MW (3 x 660 MW) in the state of Uttar Pradesh at Ghatampur Tehsil, Kanpur Nagar.



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- NLC India Limited also formed a Joint Venture Company with Coal India Ltd (CIL), in the name of 'Coal Lignite Urja Vikas Private Limited, (CLUVPL)', incorporated on 10.11.2020 to venture into various Solar and Thermal Power projects across India around 5000 MW.

NLCIL has envisaged to enhance the Renewable Energy installed capacity to 6031 MW by 2030.

NLCIL has participated in GUVNL Tender for development of 300 MW at Solar Park of GSECL at Khavda (GSECL Phase-II). NLCIL has received LOI from GUVNL for development of 600 MW Solar Power Project in GSECL's Solar Park at Khavda (GSECL Phase-II).

For more details on the activities of NLCIL, please refer to www.nlcindia.in.

3.2 Language of the Bid

The Bid, prepared by the Bidder and all correspondence and documents relating to the Bid, exchanged by the Bidder and the Purchaser shall be written in the English language. Any printed literature/material furnished by the Bidder in any other language shall be accompanied by an authentic English translation of all pertinent points. For purposes of interpretation of Bid, the English translation shall govern.

3.3 Brief Scope of Work

The scope of work includes the Design, Engineering, Site development, Manufacture, Inspection at supplier's works, Supply, Insurance, Transport, Storage, Erection, Installation, Testing & Commissioning of the total capacity of 600 (6X100) MW SPP and the Evacuation System up to the Point of connection (ie., 33KV side of 33/400KV Pooling Sub Station) Except Supply of Solar PV Modules, IDT, Central Inverter, HT cables & HT Switch Gears.

The scope also includes necessary arrangements/supports to enable SPD to Declare Scheduled Commercial Operation Date (SCOD) after Entire Commissioning of SPP With DC overloading and conducting O&M Target Generation Test (OTGT). The scope also includes Operation & Maintenance (O&M) of entire SPP upto Point of connection. Standard 3 years O&M shall start from the date of SCOD. In addition, Scope also includes, Annual Maintenance Contract (AMC) of SCADA & Tracker for Six (6) years starting from 4th year to 9th year (ie. on completion of 03 years O&M of 600 (6X100) MW SPP).

This Scope of Work is indicative only. Detailed Scope of Work is contained in Volume-II (Technical Specification).



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3.4 Time Schedule

The Time Schedule for Scheduled Commercial Operation Date (SCOD) of the entire capacity of the Project is 12 months from the date of LOA. Scheduled Commercial Operation Date (SCOD) shall be the date on which the commissioning certificate is issued by the purchaser upon successful commissioning of the full capacity of the Project (600MW SPP) including DC overloading.

3.5 Tender Specifications

The scope of contract, bidding procedures and contract terms are prescribed in the Tender Specifications. The Tender Specifications comprise, inter alia, the following volumes:

Volume – IA	:	Invitation for Bid
Volume – IB	:	Commercial – Draft Contract
Volume – II	:	Technical Specification

The Bidder is expected to examine all instructions, forms, terms and specifications in the Tender Specifications including clarifications/corrigendum/amendments for completeness and obtain clarifications, if any, from Purchaser.

3.6 Instruction to bidders for submission of Online bids through E-Tender

Bidders/Firms are requested to read the terms & conditions of this tender before submitting their online bids. In this document the terms “bidders” and “Bidders/firms” mean the one and same.

3.6.1 Pre-requisites for accessing NLCIL Website:

A. Software Requirements:

Operating system: Windows 7 & above.

- *Web browser: Google Chrome or Firefox or Edge or Internet Explorer 11 or above.*
- *Java JRE: JRE 1.8 or above.*
- *PDF reader: Adobe Acrobat Reader 8 or above.*

B. Digital Certificate:

- Bidder should have a legally valid **CLASS III Digital Certificates (i) Digital Signature, non-repudiation certificate (used for Signing) and (ii) Key Encipherment Certificate (used for encrypting Bid Document) with Organization name** from any of the licensed Certifying Authorities (CA) operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India.

Ensure that all necessary trust certificates and drivers are installed as per CA's instruction and working properly. For detailed guidance about browser and Java

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configuration the bidders are advised to go through the guide available in the NeAT portal <https://procure.nlcindia.in>.

3.6.2 Enrollment:

Bidders interested to participate in the tender require to complete the enrollment process at NeAT <https://procure.nlcindia.in> to create their account / user id and password, if not done already.

Bidder(s) having a valid NeAT account with user id and password can only submit his/their bids online electronically. Bidders are required to make their own arrangement for bidding from a computer connected with Internet. NLCIL shall not be responsible for making such arrangements.

3.6.3 Payment of Tender Fee/ Cost of Tender document: Rs.20,000/- (Rupees Twenty Thousand only).

3.6.4 Bidding Process:

A. Preparation of Bid

- (i) The Bidder will be able to prepare his TECHNICAL AND COMMERCIAL BID and PRICE BID through online using the respective forms in the system. For Guidelines, please refer to the help in the Portal.
- (ii) Before submission of bid, the Bidder can edit and save his bid any number of times till closing time for submission of the bid.
- (iii) After submission of bid, if Bidder wants to edit his submitted bid, then he has to first delete his submitted bid and then edit his bid and resubmit before closing time for submission of the bid. Only submitted bids will be considered for evaluation. Any saved bids that are not submitted will be deleted by the system after the due date of opening.
- (iv) Bidder can attach files containing company profile details, scanned copies of dealership certificate, scanned copies of technical drawings, etc., which are required for the enquiry. The documents attached should be in PDF format.
- (v) File Size: 10 MB is the maximum size of a single file that can be attached.

B. e-Bid Submission and Signing

- (i) Submission of e-bids online is a two-step process. In the first step, the Techno Commercial bid and Price bid (Schedule of Price-F1) have to be filled and submitted. In the second step, these bids have to be digitally signed using Bidder's Digital Signature Certificate.

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- (ii) Bidder cannot submit any offer after the due date and time stipulated in the e-Tender.
- (iii) All bids submitted by Bidder can be viewed by clicking on the link “Submitted bids” provided in the left menu of the corresponding Bidder's home page.
- (iv) All notices and correspondence to the bidder(s) shall be sent by email message only during the process till finalization of tender. Hence the bidders are required to ensure that their email address provided at the time of registration is valid and updated. Non-receipt of email will not entitle any bidder to lodge any claim and no complaint in this regard shall be entertained. Bidders are also requested to ensure validity of their DSC (Digital Signature Certificate).
- (v) Bidders are advised to see the website regularly to remain updated with latest information to ensure that they do not miss out any corrigendum / Amendments/errata uploaded against the said e-tender after downloading the e-tender document. The responsibility of downloading the related corrigendum, if any, will be that of the bidders.
- (vi) Submitted bids will be returned to the Bidder screen in Saved bid, if any Corrigendum/Amendments/errata issued before the last date and time of bid submission and intimation mail will be sent to the bidder's registered email id. Bidder shall ensure the resubmission of their bid after noting of the Corrigendum/Amendments/errata.

3.6.5 Process of e-Tender:

- (i) On the scheduled date and time of tender opening, Tender Opening Committee shall open online bids (Part-I) and Physical Cover (Part-1) Tender Opening Committee shall confirm Compliance of Important Tender Conditions.
- (ii) If a bidder desires to be present at the time of Tender Opening, he shall depute his representative(s) (not more than two persons) in time with due authorization for participating in the Tender Opening.

3.6.6 Bidding in e-Tender:

- a. In all cases, bidder should use their own ID and Password along with Digital Signature at the time of submission of their bid.
- b. The e-tender floor shall remain open from the pre-announced date & time and for as much duration as mentioned above.
- c. All electronic bids submitted during the e-tender process shall be legally binding on the bidder. Any bid will be considered as the valid bid offered by that bidder and



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- acceptance of the same by the Purchaser will form a binding contract between Purchaser and the Bidder for execution of work.
- d. It is mandatory that all the bids are submitted with digital signature certificate otherwise the same will not be accepted by the system.
 - e. NLCIL reserves the right to cancel or reject or accept or withdraw or extend this bidding process without assigning any reason thereof.
 - f. The server time shall be treated as final and binding. Bids recorded in the server before the bid closing time will only be treated as valid bid. Bidders are, therefore, advised to submit their bids well before the closing time of e-tender. If any bid reaches the server after the bid closing time as per server time, the same will not be recorded and no complaint in this regard shall be entertained.
 - g. Bidders are advised to exercise caution in quoting their bids in e-tender to avoid any mistake. Bids once submitted cannot be recalled.
 - h. Any order resulting from this bidding process shall be governed by the terms and conditions mentioned in the NIB.

3.6.7 Cost of tender document:

- (1) The Cost of tender document may be remitted through RTGS / NEFT mode or e-payment and the UTR No. may be indicated in the tender document. The Bank commission charges will be to the account of the bidder.

Beneficiary name : NLC India Ltd
Beneficiary Bank : State Bank of India
Address of the bank : Block 02 Neyveli
A/C No. : 30623095200
Nature of A/C : Current
IFSC code : SBIN0000958

The bidder is to note that the Bank's commission charges will be to the account of the bidder and the net amount transferred to NLCIL's account shall be equal to the cost of the tender document. The qualification of bidder is subject to receipt of cost of the tender document stipulated in the tender. No other mode of payment will be accepted.

- (2) While making payment through NEFT / RTGS / e-payment, the Bidders are requested to furnish Tender Number and Bidder's name in the Remarks Column.
- (3) Tender fee/Cost of Tender document will be deemed to have been submitted by the bidder if and only if the same is received (credited) in the above bank account within the stipulated time.
- (4) Tender fee/Cost of Tender document is non-refundable.

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3.7 Bid Submission and Opening:

- (i) All Bids, including all attachments/enclosures shall be prepared in English language only, by typing or printing and shall be submitted in two parts.
- (ii) The bidder shall submit the offer for full scope of work indicated in the Tender Specification. In the following manner:
 - (a) Part-I & Part-II in **online** and Physical Cover in **offline**.
 - (b) The bidder shall also furnish the following in **physical form** in a separate sealed cover.
 - i) (i) Proof of remittance of Cost of Tender (ii) Bid Guarantee (iii) Power of Attorney / Authorization with the seal of the company in favour of the person signing the Bid (iv) Integrity Pact (as per Annexure-E) (v) Joint Deed of Undertaking as applicable (as per Annexure-F). (vi) Letter of Undertaking from the Holding Company (as per Annexure-G) if applicable, (vii) Proforma of certificate from the CEO/CFO (as per Annexure-H) if applicable (viii) Duly filled up Checklist as in Specimen Format.
- (ii) The Physical cover shall be super scribed as under:

Name of the Bidder :	
Tender No :	Part No.:
Last date & time of submission of : on line Bids (Part-I, Part-II) and Physical cover	
Bid opening date and time (Part-I) :	
Bid for	: BOS works for Setting up of 600 MW (6X100MW) Grid Connected Solar Power Project at Khavda, Gujarat Under Engineering, Procurement (Excluding Supply of PV Modules, IDT, Central Inverter, HT Cables & HT Switch Gears) & Constructions with O&M for 03 Years.
Submitted to	: Office of the Chief General Manager / Contracts, Corporate Office, NLC India Limited, Neyveli– 607 801, Cuddalore District Tamil Nadu, India.

- (iii) Online / Electronic Bid shall be submitted through NLCIL website through NeAT (NLCIL e-Auctioning & Tendering) portal (<https://procure.nlcindia.in>)
- (iv) Physical sealed cover as brought out in clause 3.7 (ii) (b) must be deposited / delivered to any one of the officers at the office mentioned below, not later than

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14.30 Hrs. IST on the date fixed for tender opening. The sealed cover deposited / delivered after the time & date fixed for the receipt of the bids shall be rejected.

- a) Shri. C. Venkatraman, Additional Chief Manager / Contracts
- b) Shri. Sunil Kumar, Deputy Executive Engineer / Contracts
- c) Smt. D. Packia Jeeva, Asst. Executive Manager / Contracts

O/o The Chief General Manager / Contracts,
Corporate Office, Block-1,
NLC India Limited
Neyveli – 607 801, Cuddalore District.
Tamil Nadu, India.

- (v) The Physical cover shall be sealed and superscribed as above. Bid submitted in any other office of NLC India Limited shall not be considered.
- (vi) The Bidder's Bid and the documents attached thereto shall be considered as forming part of the Contract documents.
- (vii) Bids submitted by E-mail or any other mode of submission will not be accepted.
- (viii) NLCIL will receive Bids in online in respect of all the equipment/systems to be supplied and erected for the above power plant as set forth in the accompanying specifications. All bids shall be prepared and submitted in accordance with the Tender Specification.
- (ix) Failure to furnish all information required in the Tender Specifications or submission of a Bid not substantially responsive to the Tender Specifications in every respect or bids received in incomplete shape shall be liable for rejection. A bid shall be determined as substantially responsive in every respect, if it confirms to all the terms, conditions and specifications of the Tender Specifications without material deviations, objections, conditionality or reservations.
- (x) A material deviation, objection, conditionality or reservation is one:
 - (a) That affects in any substantial way the scope, quality or performance of the contract;
 - (b) That limits in any substantial way, inconsistent with the Tender Specifications, the Purchaser's rights or the successful Bidder's obligations under the contract.
 - (c) Bidders are not allowed to take any deviations in their bid. Deviations listed elsewhere in the Bid shall not be considered.

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3.8 Part-I Bid Guarantee, Pre Qualifying Requirements and Technical & Commercial Aspects (without prices)

3.8.1 Bid Guarantee:

- i) The Bid shall be accompanied by Bid Guarantee either in the form of (a) Bank Guarantee valid for 210 days from the date of opening of the Bids (Part-I) or (b) Demand Draft of equivalent amount drawn in favor of “NLC INDIA LIMITED” payable at Neyveli, without any exception or (c) NEFT/RTGS mode to NLCIL’s Account No. 30623095200, Beneficiary Name: NLC India Ltd., in State Bank of India, Branch: Neyveli Main (IFS Code No. SBIN0000958, SWIFT Code: SBININBB457) and the remittance details with UTR No./DD shall be enclosed with the bid in Part-I failing which the offer is liable for rejection. The bidder is to note that the Bank’s commission charges will be to the account of the bidder and the net amount transferred to NLCIL’s account shall be equal to the Bid Guarantee value as stipulated in the Tender. No other mode of payment will be accepted.
- ii) The Bank Guarantee shall be from any scheduled commercial Bank in India authorized by Reserve Bank of India other than Bank of China, to issue such bank guarantee on a non-judicial stamp paper of value not less than Rs. 80/-. The stamp paper shall be purchased in the name of the Bank/Name of the bidder. The date of purchase of stamp paper shall be on or before the date of execution of Bank Guarantee.
- iii) Unless otherwise expressly stated,
 - (a) The Bid Guarantee shall be executed only on behalf of the Bidder on whose name the bid is submitted.
 - (b) The Bid and other documents shall be submitted only by the Bidder on whose name the bid is submitted.
 - (c) The Bid Guarantee shall be executed only as per the format prescribed by Purchaser (at ‘Annexure-A’ of this Volume). In the event of any deviation in this regard, the decision of Purchaser as to whether the same could be accepted or not, is final and binding on the Bidder.
- iv) The Bidder shall arrange for extension of validity of Bid and that of the Bid Guarantee upon request from the Purchaser. If the bidder is extending the validity of the bid based on the request from the purchaser, he should correspondingly extend the validity of the Bid guarantee also.
- v) The Bid Guarantee submitted in any manner shall not bear any interest.
- vi) Any Bid submitted without Bid Guarantee or submitted with part amount, or any request to adjust it in any other bills etc., or seeking exemption shall be summarily rejected.
- vii) The Bid Guarantee shall be forfeited and the bidder will be banned for 2 years for breach of the following condition(s):



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- a) The bid has been unilaterally revoked/ revised / modified/withdrawn before expiry of bid validity period, by the Bidder(s) (or)
 - b) The price(s) have been unilaterally increased or altered after the bid opening and during validity of offer by the bidder, (or)
 - c) On issue of LOA by NLCIL to the bidder, the bidder has omitted or refused to accept the said LOA within the stated period and/or execute the Contract Agreement, (or)
 - d) The Successful bidder, after issue of LOA, omitted or failed to submit Contract Performance Guarantee within the period specified (or)
 - e) The bidder furnished Forged /Bogus certificates.
- viii) In addition to banning the bidder for 2 years for breach of the above condition(s), NLCIL may resort to the following actions without prejudice to any other remedies available at law,
- 1. In the event of any of the contingencies mentioned in Clause 3.8.1 vii) (a) and (b), NLCIL shall have the right at their discretion, to reject the Bid without notice to the Bidder(s).
 - 2. In the event of the contingency mentioned in Clause 3.8.1 vii) (c) and (d), NLCIL shall have the right to cancel the LOA/Contract, without notice to the Bidder(s).
 - 3. In the event of the contingency mentioned in Clause 3.8.1 vii) (e), the Bidder will be disqualified for the tender.
 - 4. In addition to (1) to (3) above, NLCIL shall also have the right to Ban the defaulting Bidder(s) for a period of two years from participating in any of their tenders at the discretion of NLCIL and the decision of NLCIL in this regard shall be final and binding on the Bidder(s) and NLCIL would also inform the matter to other PSUs / Statutory Bodies.
- ix) Return of Bid Guarantee:
- a) If any Bidder does not agree to extend the validity of Bid and requests for the return of the Bid Guarantee, then it can be returned.
 - b) The Bid guarantee of the bidders not shortlisted on PQR and techno-commercial aspects will be returned within 15 days from the date of receipt of approval for shortlisting of the firms on PQR and techno-commercial aspects.
 - c) The Bid Guarantee of all unsuccessful Bidders shall be returned within fifteen days from the date of approval for placement of order on the successful bidder.
 - d) The bid guarantee of the successful Bidder shall be returned after furnishing of the Contract Performance Bank Guarantee and Additional BG if applicable to the Purchaser and acceptance thereof.

In all the above transactions the documents shall be sent by Speed Post.



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x) Confirmation of Bank Guarantee:

Confirmation of Bank Guarantee through Structured Financial Messaging System (SFMS) will be done as follows:

The bank guarantee issued by the issuing Bank on behalf of Bidder in favour of “NLCIL” shall be in paper form as well as issued under the “Structured Financial Messaging System”. The details of beneficiary for issue of BG under SFMS platform is furnished below:

Name of Beneficiary	NLC India Limited
Unit/Area/Division	Corporate Office/Contracts Division
Beneficiary Bank, Branch & Address	State Bank of India Block-2, Neyveli-607801
IFSC Code	SBIN0000958
Swift Code	SBININBB457
Email	sbi.00958@sbi.co.in

Bid Guarantee submitted in the form of BG Physical mode, which cannot be verifiable through Structured Financial Messaging System (SFMS) will be rejected summarily.

3.8.2 Pre-Qualifying Requirements (PQR) of the Bidder (Technical & Financial Criteria): Bidder to refer Clause: 2.0 of Section-1 of Volume IA.

3.8.3 **Public Procurement (Make in India):** Bidder to refer Clause: 6.0 of Section-1 of Volume IA.

3.8.4 Price Bid (Part-II)-Bidder to refer Clause 3.8.7.

3.8.5 Integrity Pact Programme:

1. NLCIL is committed to have most ethical business dealing with the Vendors, Bidders and Contractors of goods and services and deal with them in a transparent manner with equity and fairness.
2. NLCIL being a signatory in implementing the Integrity Pact Programme with Transparency International India, all the bidders / contractors required to sign the ‘Integrity Pact’ during the submission of the Techno-Commercial bids / offers (as per Annexure – E of this Volume).
3. In order to achieve these goals, NLCIL is implementing the Integrity Pact Programme in co-operation with Central Vigilance Commission (CVC) and renowned International Non-Governmental Organization, Transparency International India (TII).
4. The Integrity Pact Programme will cover Tenders/Contracts valued at Rs. 1 (one) Crore or above.



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5. The Integrity Pact Programme covers the following aspects.
 - i) Commitments and Obligations of NLCIL (Principal).
 - ii) Commitments and Obligations of Vendors / Bidders / Contractors (Counterparties).
 - iii) Violations and Consequences.
 - iv) Independent External Monitors.
6. As per the Integrity Pact Programme, an “Integrity Pact”, which envisages an agreement between the prospective Vendors, Bidders & Contractors and NLCIL, committing the persons / officials of both parties, not to exercise any influence on any aspect of the contract. Only those Vendors / Bidders / Contractors, who have entered into such an “Integrity Pact” with NLCIL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.
7. Hence the bidder shall submit the Integrity Pact agreement duly filled and signed in his offer enclosed in Part-I cover.
8. The format of “Integrity Pact”, which should form a part of the tender is attached as Annexure – E of this volume.
9. The details of the Independent External Monitors of NLCIL are given below:

Sl. No.	Name and Address	Phone No. and e-mail
1	Shri. Lov Verma, IAS (Retd.), Secretary, Dept. of Empowerment of persons with Disabilities, GOI, K-41, Fourth floor, Louisville – II, New Delhi – 110 049.	Email: lov_56@yahoo.com
2	Shri. Ramabhadran Ramanujam, IAS (Retd.) 44/24, Third Trust Cross Street, Mandavelipakkam, Chennai – 600 028.	Email: raamaanuj@gmail.com
3	Shri. Rakesh Jain, IA & AS (Retd.), Dy. Comptroller & Auditor General Flat No. 701, Platinum Tower, Chandrakala Colony, Durgapura, Jaipur – 302 018.	Email: rakeshjain18@hotmail.com

10. The main role and responsibility of IEM is to resolve issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or indicates bias towards some bidders. IEMs are expected to examine process integrity and not expected to concern themselves with fixing of responsibility on officers.

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11. However, Bidders are requested to visit NLCIL's website: www.nlcindia.in for changes, if any of the Independent External Monitors of NLCIL.

3.8.6 Technical & Commercial Bid (Part-I)

This part shall, inter alia, include the following in the same order as listed below.

- i) Covering letter clearly indicating the PQR clauses under which the bid is submitted for BOS works for setting up of 600MW Solar Power Project at Khavda, Gujarat.
- ii) Proof of remittance of cost of tender document and Bid guarantee as per Annexure-A of this Volume.
- iii) Duly filled in "Form of Bid Part-I" (As per Annexure-B of this Volume).
- iv) Power of Attorney/Authorization with the seal of the company in favour of the person signing the Bid.
- v) Documentary Evidence for meeting Minimum local content as per Cl 3.1.4(a) & 3.1.4 (b) of Section 1 of Volume 1A.
- vi) Joint Deed of Undertaking (JDU) as per Annexure-F of this Volume, if applicable.
- vii) Documentary Evidence for meeting PQR.
- viii) Integrity Pact Programme as per Annexure-E of this Volume
- ix) Schedule of Prices as per Schedule – F1 along with annexures. Bidder is required to furnish all the details called for in Notes indicated in the Tables of Schedule – F1 in the form of separate Annexures.
- x) Overall time schedule as per Schedule – F2
- xi) Schedule F-3 to F-5 – NOT APPLICABLE
- xii) Resource deployment schedule as per Schedule – F6
- xiii) Schedule of weights and dimensions as per Schedule – F7
- xiv) Checklist for Bid submission
- xv) Details of Sub-Contractors/Sub-Suppliers/Sub-Vendors
- xvi) Quality Assurance Programme.
- xvii) Technical Details to be furnished with the Bid as called for in the Technical Specification. Bidder shall furnish the above separately in the same order as in the relevant section of Technical Specification Volume(s).
- xviii) Bar chart/PERT Network schedule to achieve the time schedule, as per clause 3.4 of this Volume-IA and details as called for in Section-4 of Volume-IB (Draft Contract).

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- xix) All other details as called for in Schedule F1 to F7 to this Volume 1A.
- xx) Technical parameter, Sub Vendors to be proposed by the bidder for the Project.
- xxi) Any other information the Bidder wishes to furnish.

3.8.7 Price Bid (Part-II)

- i) The Bidders are requested to quote the Prices through online only in the format as per Schedule of Price F1. Price given in Part-II should cover the entire scope of work as given in Part-I of the offer.
- ii) The Price Bid shall contain the following:
 - (a) Duly filled in Form of bid (Part-II) as per Annexure – C of Notice inviting Bid (NIB).
 - (b) Completely filled in Schedule of Prices (Schedule – F1) of Volume – IA.

Note:

- i) The Bidder shall quote his price through online against each item of the schedules as per the Schedule of Prices format. The Bidder shall quote the prices only once after considering all the pros and cons, risks and contingencies. Rebate percentage etc., if any, should be spelt out by the Bidder in the first bid itself. Price quoted in any other format/place other than the Schedule of Price shall be summarily rejected.
- ii) The Bid shall be made in Indian Rupees only and all payments for the entire scope will be made in Indian Rupees only.

3.9 General

- i) Bidders shall submit bids as per clause “Bid submission and opening” detailed in Section-3, Cl. 3.7 of this Volume. Unsolicited Bids shall not be taken into cognizance and Purchaser shall not bear any responsibility or liability in this regard.
- ii) This is a two-part tender. On the date and time of opening, Online Bid and Physical Cover (Part– I) containing Bid Guarantee, Joint Deed of Undertaking (JDU) if applicable, Documentary evidences for PQR, Power of Attorney, technical and commercial aspects will be opened.
Opening of the Part – II (Price Bid) will be intimated separately to those Bidders whose Part-I Bid would be determined to be substantially responsive in all respects.
- iii) If the Bidder desires to be present at the time of opening of Part-I of bids, it shall depute its representatives (not more than two persons) in time with due authorization for participating in the Bid opening.
- iv) Purchaser takes no responsibility for delays, loss or non-receipt of Bid documents or any letters sent by post/courier either way and also reserve the right to reject any Bid in part or full without assigning any reasons thereof.
- v) Notwithstanding any information and data, which may be contained in these Tender Specifications, the Bidder has to make independent inquiries and generally obtain

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his own information on all matters that may in any way affect prices, risks and obligations of the bidder under the Contract.

3.10 Signature of Bids

- i) The Bid must contain the name and place of business of the person or persons making the Bid and each page of the Bid must be signed and stamped by the Bidder with his usual signature. The names of all persons signing should also be typed or printed below the signature.
- ii) Bids by a Corporation / Company must be signed with the legal name of the Corporation / Company by the President, Managing Director or by the Secretary or such other person or persons authorized to Bid on behalf of such Corporation / Company in the matter with the official seal of the company.
- iii) Bid by a partnership must be furnished with full names of all partners be signed with the partnership name, followed by the signature(s) and designation(s) of the authorized partner(s) or other authorized representative(s).
- iv) Satisfactory evidences of authority of a person signing on behalf of the Bidder shall be furnished with the Bid.
- v) The Bidder's name stated on the Bid shall be the exact legal name of the Bidder.
- vi) Corrections in the Bid documents if any shall be countersigned by the person signing the Bid.
- vii) Printed literature, if enclosed need not be signed.
- viii) Bids not conforming to the above requirements are liable to be treated as non-responsive.

3.11 Clarifications/Corrigendum/ Amendment of Tender Specifications

- i) At any time prior to the deadline for submission of Bids, the Purchaser may, for any reason, whether at his own initiative or in response to clarification(s) requested by a prospective Bidder, modify the Tender Specifications by amendment.
- ii) Clarifications/Corrigendum/Amendment shall be construed to be an integral part of the Tender Specifications, which will be notified in writing or by e-mail to all the prospective bidders.
- iii) Corrigendum shall be numbered serially.

3.12 Modification of Bids

The Bidder is not permitted to modify his Bid Suo-moto after the Bid submission.

3.13 Information to be furnished with the Bid

- i) The Bidder may indicate in Part-I the name of the manufacturer, the type or model of each principal item of equipment proposed to be supplied and erected. The Bid



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should also contain drawings and descriptive materials indicating general dimensions, material from which the parts are manufactured, principles of operation and the extent of pre-assembly involved, major erection equipment required to be deployed, method of erection and the proposed erection Organization structure.

- ii) The above information shall be provided by the Bidder in the form of separate sheets, drawings, catalogues, etc.
- iii) Any Bid not containing sufficient descriptive material to describe accurately the system / equipment proposed may be treated as incomplete. Such descriptive materials and drawings submitted by the Bidder will be retained by the Purchaser. Any major departure from these 'drawings and descriptive material submitted will not be permitted during the execution of the Contract' without specific written permission of the Purchaser.
- iv) Oral statements made by the Bidder at any time regarding quality, quantity or arrangement of the equipment or any other matter will not be considered.
- v) Standard catalogue pages and other documents of the Bidder may be used in the Bid to provide additional information and data as deemed necessary by the Bidder.

3.14 Policy for Bids under Consideration

Bids shall be deemed to be under consideration immediately after they are opened. While the Bids are under consideration, Bidder's and/or their representatives or other interested parties are advised to refrain from contacting by any means, the Purchaser and/or his employees/ representatives on matters related to the Bids under consideration. The Purchaser, if necessary will obtain clarifications on the Bids by requesting for such information from any or all the Bidders, in writing as may be necessary.

3.15 Validity of Bid

- i) The Bid shall be kept valid for acceptance for 150 days from the date of opening of the Bid.
- ii) The Bidder will not be permitted to change the substance of the Bid suo-moto, after Bid has been opened.
- iii) Unilateral revision or withdrawal of offer by the Bidder within the subsistence of the validity period of offer shall not be permitted. Violation of this condition shall result in rejection of the Bid without notice, besides the Bidder shall also be banned either permanently or for a fixed period, at the discretion of Purchaser from participating in any of the Purchaser's tenders.

3.16 Understanding & Clarification on Documents & Specifications

- i) The Bidder is required to carefully examine the specifications and documents and fully informs himself as to all the conditions and matters which may in any way affect the 'Works' or the cost thereof.



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- ii) Bidders may seek clarifications to the prescribed clauses and / or different part of the Tender Specifications. Such a request for clarifications, if any, should reach the Purchaser two days before the date stipulated for pre-bid meeting. The Purchaser then will issue interpretations and clarifications as it may think fit in during the pre-bid meeting. After receipt of such clarifications, the Bidder may submit its Bid but within the time and date as specified in the Invitation for Bid or as amended by the Purchaser. All such clarifications and the relevant exchange of correspondence between the parties shall be construed to form part of the tender specifications.
- iii) Pre-Bid Conference will be organized and outcome of the pre-bid conference is binding on all the Bidders. Outcome of the Pre-Bid Conference will be intimated by the Purchaser to all the Bidders.
- iv) In case any queries remain un-replied, it shall be construed that in respect of those queries, the respective stipulations of the Tender Specifications shall continue to apply and/or no new stipulations are made with respect to those queries.
- v) No extension of time for submission of Bid will be granted on account of Bidders' request for interpretation/clarifications.

3.17 Latest Hour for Receipt of Bids

Bids must reach the designated NLC India Limited Office not later than 14:30 Hrs, Indian Standard Time (IST) on the date fixed for receipt of the Bid as indicated in the Invitation for Bid. Bids delivered / received after the time and date fixed for the receipt of the bids shall be liable for rejection.

3.18 Single Bidder Responsibility

- i) The scope of supply and services shall be under single Bidder responsibility.
- ii) The successful Bidder should not sub contract the entire work on back to back basis or otherwise.

3.19 No Claim for Compensation for Submission of Bid

- i) The submission of any Bid connected with these documents and specifications shall constitute an agreement that the Bidder shall have no cause of action or claim against the Purchaser for rejection of his Bid.
- ii) Regardless of the conduct or outcome of the bidding process, Bidder shall not be entitled to claim any costs, charges and expenses incidental to or incurred by him through or in connection with his submission of Bid or its consideration by the Purchaser, even though the Purchaser may elect to modify/withdraw the Invitation for Bid or does not accept the Bid(s).



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3.20 Purchaser's Right to Accept Bid

- i) Purchaser shall always be at liberty to reject or accept any bid or bids at his sole discretion and any such action will not be called into question and the Bidder shall have no claim in that regard against the Purchaser.
- ii) The Purchaser does not pledge himself to accept the lowest of Bid.

3.21 Deputation of Representatives for Discussion

After opening of the Bid, if the Purchaser desires to have techno-commercial discussion on the Bid, the Bidder shall be in a position to depute his competent representatives of various disciplines at short notice with full authority for finalising technical parameters as well as Commercial Terms and Conditions of the Tender.

3.22 Price Basis

Bidder shall quote as lumpsum firm price basis.

Bidder to refer Section-3, Contract Price of Volume-IB (Draft Contract).

3.23 Evaluation of Bid

The Bids received will be evaluated by the Purchaser to ascertain the lowest evaluated substantially responsive Bid vis-à-vis the Tender Specifications. The Bidder has to satisfy himself that full information is furnished as required in the specifications. Lack of particulars or incomplete information furnished will run the risk of rejection of the Bid.

The following major procedures would be followed for evaluation of Bids.

- i) The bidders who satisfy the eligibility criteria as Class-I local supplier shall alone be considered for evaluation of their bids.
- ii) The eligible bidders who qualify in PQR conditions alone shall be considered for further evaluations for techno-commercial aspects.
- iii) All the Bidders would be brought on par with reference to technical specification, Draft Contract, Instructions to Bidders and subsequent techno-commercial discussions/ clarifications.
- iv) The Bidders who qualify on techno-commercial aspects alone will be considered for price cover opening (Part-II).
- v) For evaluation and comparison of price Bid, Total project cost including O&M price with taxes & duties will be considered as Total evaluated bid price (CE).
- vi) All the Sl. Nos. and columns in the 'Schedules of Prices' shall be quoted. If no prices are envisaged for any of the entries, 'Numeric Zero (0)' shall be mentioned. In this context "Zero (0)" mentioned against any item shall construe that the Bidder shall not charge any amount separately for that item from the Purchaser but cover it in the scope of work. If the Bidders have not quoted for Taxes & Duties, it is construed that the Taxes & Duties will be borne by the Bidder.



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- vii) In case of any Arithmetical errors between the prices quoted (i.e., Schedule of Prices: F1) and the Final price in the calculation sheet (i.e., Spread sheet) attached along with the Schedule of Prices, the prices quoted (Schedule of Prices: F1-Table -1) will only be considered for Evaluation. This price shall be binding on the Contractor.
- viii) The Bidders will be ranked starting from the lowest total evaluated bid price (i.e., Total EPC cost plus O&M price with taxes and duties) (L1) for the entire scope of the Contract and increasing in the ascending order (L1, L2, L3.....).
- ix) From the ranking the bidders starting from Highest total evaluated bid price, H1 shall be eliminated subject to ensuring minimum 4 bidders participation in Reverse Auction.
- x) All the shortlisted bidders for Reverse Auction will be intimated about their eligibility for participation in Reverse Auction. The Rules and terms & conditions of reverse auction is given in Clause 3.40.
- xi) After Reverse Auction, bidders would be ranked in ascending order as RL-1, RL-2, RL-3, RL-4 and so on with RL-1 being the bidder with lowest total evaluated Bid Price. After the Reverse Auction is closed, the bidder with the lowest evaluated bid price will be considered for award of contract.
- xii) Final Price after RA: The contract shall be awarded to successful bidder who has quoted the lowest evaluated bid price in Reverse Auction.
- xiii) Based on the price ranking, the end user verification/confirmation of the PQR documents submitted by the bidders shall be carried out.
- xiv) In case the documents of the bidder who offered lowest price (RL1) are found to be false/incorrect, the next lowest bidder's offer in their order of price ranking including the eliminated bidders, if any, will be evaluated for obtaining end user verification till a successful bidder is identified.
- xv) During the above said evaluation process, in case, the documents of the bidder(s) are found to be false / incorrect, then the bid(s) of such bidder(s) shall be rejected and action of banning / suspension / debarment of such bidder(s) for a specific period shall be taken by the Purchaser.
- xvi) After completion of the Reverse Auction event, successful bidder shall submit item wise price break up for Final Price after RA (INR) for all the items (i.e., For Sl. No. 1.0 to 5.0 of Schedule of Prices- F1 Table-1) to Purchaser, within 24 hours of conclusion of the RA as per the ratio quoted in original Evaluated bid price.
- xvii) Bidder to note that the Final Total Price as per item wise detailed break-up (including taxes and duties) shall not exceed the Award Price to be calculated after completion of RA.



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xviii) Bidder for the BOS tender has to design the plant with reference module as 540Wp and quoted accordingly. However, the actual module will be supplied from 540Wp to 600Wp based on the availability. Hence Suitable adjustment in the award price in Total EPC Cost shall be carried out during detailed engineering as per the relevant clause 3.26. The Award price for 3 years O&M remains the same.

3.24 **Technical Loading/Adjustments:** Not applicable

3.25 **Total Capital Expenditure (CE):**

Total Capital Expenditure inclusive of taxes and duties (CE) in Rs. = EPC cost (Schedule-1 + Schedule-2 + Schedule-3 + Schedule-4) + O&M cost for 3 years (Schedule-5).

Where,

Schedule-1: Site preparation works

Schedule-2: Supply of Plant and Equipment

Schedule-3: Installation and Commissioning

Schedule-4: Civil and Structural Works

Schedule-5: Operation and Maintenance

3.26 **Evaluation Methodology (Post award Adjustment):**

a. Basic Design Parameters like DC/AC ratio, minimum pitch, mounting technology etc for BOS package has been stipulated in Technical Specifications Volume-II. Bids shall be evaluated based on the Total EPC Cost (in Crores) without guaranteed generation as the Modules, IDT, Central Inverter, HT cables & HT Switchgears would be issued as Free Issue item to BOS vendor and design parameters are predetermined by NLCIL.

b. The actual wattage(s) of the PV Modules offered to BOS vendor can vary depending on the outcome of the PV Modules tender. Suitable adjustment in Total EPC cost for BOS vendor shall be carried out during detailed engineering.

c. The post award price variation Adjustment shall be based on the actual wattage of the module supplied as detailed below:

Awarded Total EPC Cost based on 540Wp for 600MW (AC) = Rs. X.

Contract Price Variation for each unit increment in Wp for 600MW (AC) = Rs.15490906.09

$Wp\_new = (\Sigma (MWp \text{ offered for a particular Nominal } Wp \times \text{Nominal } Wp)) / 780MWp.$

Total Price Reduction (ΔX) = $15490906.09 \times (Wp\_new - 540).$

Final Price after Correction = $(X - \Delta X).$

All values for calculation purpose would be rounded off to second decimal place only.

The percentage change in the total contract price shall be limited to 10% during the execution of contract for change in quantities variation at the quoted rates.

Example:

Awarded Total EPC Cost based on 540Wp (X) for 600MW (AC) = 1970 Crores.

If 540Wp of 300MWp and 545Wp of 480MWp is supplied by NLCIL.



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$$Wp_{\text{new}} = (540 \times 300 \text{ MWp}) + (545 \times 480 \text{ MWp}) / 780 \text{ MWp} = 543.1$$

$$\text{Total Price Reduction } (\Delta X) = 15490906.09 \times (543.1 - 540) = 48021808.88$$

$$\text{Final Price after Correction for 600MW (AC)} = (X - \Delta X)$$

$$= 1970,00,00,000 - 48021808.88 = 19651978191.12$$

Note: The Total Quoted Bid Price inclusive of taxes and duties (Q) in Total EPC for comparison of bids shall be calculated up to two places of decimals.

3.27 Local Conditions

Wages not less than Minimum wages for Contract labor shall be paid as applicable in this region from time to time. Claims and objections due to ignorance of site conditions will not be considered after submission of Bid.

- (a) The Bidder is required to carefully examine the Technical & General Specification, Terms and Conditions of Draft Contract and other details relating to work given in the Tender Specification and fully acquaint himself as to all conditions and matters which may in any way affect the work or the cost thereof. The Bidder shall be deemed to have on his own and independently obtained all necessary information for the purpose of preparing the Bid and his Bid as accepted shall be deemed to have taken into account all contingencies as may arise due to such information or lack of the same.
- (b) The Bidder shall be deemed to have exhaustively examined the Tender Specifications including the Draft Contract, to have obtained all information and clarifications on all matters whatsoever that might affect the carrying out of the work and to have satisfied himself as to the adequacy of his Bid. He is deemed to have known the scope, nature and magnitude of the work and the requirements of materials and labor involved etc. and as to all work he has to complete in accordance with the Contract for the adequacy of his Bid. Whatever be the defects, omissions or errors that may be found in the tender/ Bid Documents after submission of Bid, it shall be to the account of the Bidder.
- (c) The Bidder shall be deemed to have visited and carefully examined the site and surroundings, to have satisfied himself about the nature and details of all existing structures, if any, and also as to the nature and conditions of the railways, roads, bridges and culverts, means of transport and communications, whether by land, water or air and as to possible interruptions thereto and the access to and from the site, to have made independent enquiries, examined and satisfied himself as to the sources for obtaining earth, gravel, sand, stones, bricks and all other construction materials, the site for disposal of surplus earth and debris, the available accommodation, underground existing services, sub-soil water conditions, storms, prevailing winds, climatic conditions and all other similar matters which may affect the work.
- (d) The Bidder shall be deemed to have acquainted himself with the Indian Income tax



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Act, 1961, Indian Companies Act, 1956, Indian Customs Act, 1962, Indian Central Excise Act, GST Act, Indian Electricity Act, Interstate Migrant Workmen Act 1979, Factories Act, Pollution Control Regulations and other related Acts & Laws prevalent in India and as amended from time to time. The Purchaser shall not entertain any request for clarifications from the Bidders regarding such local conditions.

- (e) Any neglect or omission or failure on the part of the bidder in obtaining necessary and reliable information as stated above or on any other matter affecting the Bidder shall not relieve him from any risk or liabilities or the entire responsibility for completion of the work in accordance with the Tender Specifications.

3.28 Deviations

- i) Bidders will not be allowed to take any deviations in the Tender conditions. Bidders are permitted to furnish clarification / deviation, if any, during pre-bid stage only. Deviations listed elsewhere in the Bid shall not be considered and will be summarily rejected. Separate printed standard terms and conditions of the Bidder shall not be taken into cognizance and shall be totally rejected.
- ii) No alterations or disfigurement, other than filling in particulars wherever called for in the formats of the Tender Specifications shall be made in the Bid. Any changes/modifications made by the Bidder in Bid documents itself shall not be taken into consideration.
- iii) If at any later date, it is found that documents, information, averments and data submitted by the bidder in the Bid, based on which the Bidder has been considered eligible or successful or has been awarded the Contract is incorrect or false to the extent that had the correct or true information been made available to the Purchaser at time of tender evaluation, the Bid would have been declared ineligible or unsuccessful, the Bidder shall be forthwith disqualified or, as the case may be, the Contract awarded based on such incorrect or false information shall be cancelled and the CPG /Back up Guarantee for compliance to JDU, if applicable / any other Guarantees deposited shall be appropriated by the Purchaser towards Purchaser's cost, loss and damage to Purchaser.

3.29 Suspension/Banning/Debarment

The Bidder will be disqualified for this tender and also would be banned for (2) Two years for the following acts:

- i. Formation of Cartel with other Contractors with a view to artificially hike the prices.
- ii. Wilful suppression of facts or furnishing of wrong information or manipulated/forged documents or using other illegal/unfair means.
- iii. If the bidder withdraws/modifies/impairs/derogates his offer on his own after tenders are opened or fails to accept the LOA/fails to submit CPG.



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Purchaser would also be at liberty to inform the matter to other PSUs of the Government of India / Statutory Bodies.

Any firm which is placed under Suspension/Banning/Debarment by NLCIL will not be allowed to participate in any tender issued on or after the date of suspension/banning/debarment order and also if that firm has already participated in any tender, which is under process their bid will not be considered for further processing.

3.30 Signing of Contract

- i) The enclosed Draft Contract of Volume-IB shall form the basis of the Contract to be entered into with the successful Bidder. The Bidder shall carefully go through the terms and conditions given in the draft contract and his offer (Bid) should be in line with the terms and conditions specified therein.
- ii) Contract will be signed and executed by and between the Purchaser and the successful Bidder, at the earliest but not later than three (3) months from the Purchaser's Letter of Award, which shall be valid till completion of all the obligations on the part of the Contractor under this Contract. The successful bidder shall present himself for signing of the Contract with proper power of attorney and other requisite materials. The Purchaser shall prepare two (2) originals of Contract as described for signing the Contract. One (1) original will be given to the Contractor for his record and other original will be retained by the Purchaser. Within one (1) month after signing the Contract, the Contractor shall make and submit 15 (fifteen) photocopies of the Contract documents complete with all enclosures, neatly bound, to the Purchaser, along with a scanned copy in Pen drive of entire document free of charge.
- iii) Single Contract or Separate Contracts for Supplies, Services, Maintenance during warranty period etc., may be entered with suitable interlinking clauses. Separate contracts will be entered in to for three years Operation and Maintenance. The contract price for O&M shall be firm till completion of the contract period.

3.31 Agency Commission

No Agency commission shall be payable under the Contract.

3.32 Priority of Documents

Subject to the conditions enumerated in the Draft Contract, the tender will be governed by "Technical Specification and Conditions of Contract" as detailed in the document. The Technical Conditions of Contract shall prevail over the other conditions elsewhere specified in the Tender Specification in case they differ from other conditions to the extent they differ from other conditions.

3.33 CONTRACT PERFORMANCE BANK GUARANTEE (CPG)

As a Contract security, the successful Bidder, to whom the work is awarded, shall be required to furnish a Contract Performance Guarantee (CPG) as per Format in Volume –



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IB (Draft Contract), in favour of the Purchaser within 30 days from the date of issue of Letter of Award (LOA). The guarantee amount shall be equal to ten percent (10%) of the 'Contract value excluding O&M Price for 3 years' and it shall guarantee the faithful performance of the 'Contract' in accordance with the terms and conditions specified in these documents and specifications. The Contract Performance Bank Guarantee shall be valid for 27 months (i.e., 12 months from date of LOA + Warranty period of 12 months + 3 months grace period).

The Contract Performance guarantee ten percent (10%) of the Contract Price excluding O&M Price for 3 years will be released on receipt and acceptance of O&M BGs.

3.33.1 CONTRACT PERFORMANCE GUARANTEE FOR O&M (CPG for O&M)

a) CPG for O&M Compensation: 5% of revenue generated out of Expected net energy export (as per Technical Schedule-2) at a tariff of Rs. 2.705 per kwhr. The CPG shall be valid till completion of contractual O&M period plus 3 months.

b) CPG for O&M (i.e., Defects Liability period): 1% of the total EPC Cost excluding O&M charges. The CPG shall be valid till completion of contractual O&M period plus 3 months.

3.34 Contract Quality Assurance

- i) The Bidder shall include in his Bid a detailed Quality Assurance Programme containing the overall quality, management and procedures which he proposes to follow in the performance of the 'Works' during various phases.
- ii) After Letter of Award (LOA) the detailed Quality Assurance Programme to be followed for the execution of the 'Contract' will be mutually discussed and agreed to and such agreed Programme shall form a part of the 'Contract'.

3.35 Codes & Standards

Specifications give reference to Indian or Internationally accepted Standards. However, equipment or materials meeting other recognized National or International Standards, which ensure an equal or superior quality than Standards specified, will also be accepted. For details of codes and standards refer Technical specification.

3.36 Drawing List

The Successful bidder on issue of Letter of Award (LOA) shall submit the list of engineering drawings to be submitted by him for the complete package to the Purchaser for review, approval and information clearly indicating date of submission within the time schedule furnished in the Bar Chart/PERT Network indicated in Section-4 of Volume-IB. On receipt of list of drawings, NLCIL shall review and finalize the drawing list for easy monitoring of status of the drawings.



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3.37 Standardization & Variety Reduction

- i) With a view to standardize maintenance procedures, reduce spares inventory and achieve interchangeability, the Purchaser desires to have, as far as practicable, dimensionally and otherwise identical components and parts of equipment which are common within the package.
- ii) This will apply to items like, Electric Motors, Gear Boxes, Couplings, Rollers, Switchgear, Relays, Panels and Desks, SCADA Instruments, etc. In respect of bought out items, the Contractor shall therefore arrange to Standardize and offer specifically identified Manufacturer's equipment in consultation, at the appropriate time with the Purchaser.
- iii) It shall be responsibility of the Bidder to interact with the Purchaser well in advance and in any case ahead of supply schedule so as to obtain whatever details of specifications / parameters of components, as are necessary in this regard. The successful bidder shall not be entitled to any increase in the Contract Price or to any extension of time, on account of this clause, nor shall the warranty period / conditions be altered as a result. No request for extension of time or increase in price on this account shall be entertained by the Purchaser.

3.38 Vital Clauses

The following clauses in the "Instructions to Bidders" and "Draft Contract" are vital. Bidder is advised not to take deviations to these clauses. If deviations are taken from the stipulations of these clauses, such Bids would be liable for rejection:

- i) Scope of Work
- ii) Time Schedule
- iii) Price Basis
- iv) Contract Performance Guarantee (CPG)
- v) Joint Deed of Undertaking (JDU), if applicable
- vi) Warranty
- vii) (a) Price Reduction & (b) Penalty
- viii) Force Majeure
- ix) Arbitration
- x) Taxes & Duties
- xi) Bid Guarantee
- xii) Patents, Indemnity
- xiii) Validity of Bids
- xiv) Governing Laws
- xv) Termination



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3.39 Pre-Bid meeting:

Pre-bid meeting will be held on the date and time indicated in the Tender Documents through video conference. The points for discussion / clarification shall be furnished in advance of Scheduled Date of Pre-bid meeting, both in hard and editable soft copy (like word document) to the Chief General Manager/Contracts /Corporate Office, NLC India Limited, Neyveli - 607 801 and also to the following E-mail ID: corporate.conts@nlcindia.in

3.40 RULES FOR REVERSE BIDDING/AUCTION

1. **Rules of Reverse Bidding/Auction:** The price bids of all the bidders who were techno-commercially qualified will be opened online with due intimation to the concerned bidders.
2. **Schedule for Reverse Bidding:** After Price e-Bids are opened online, date and time of start of Reverse Auction shall be intimated to all the eligible bidders. Scheduled duration of Reverse Auction shall be normally two hours.
3. **Auction extension time:** If a valid bid is placed within Ten (10) minutes of End Time of the Reverse auction (RA), then RA duration shall get automatically extended for another Ten (10) minutes from the existing end time. It may be noted that the auto-extension will take place only if a valid bid comes in those last Ten (10) minutes. If a bid does not get accepted as the lowest bid, the auto-extension will not take place even if that bid might have come in the last Ten (10) minutes. The above process will continue till no bid is received in last Ten (10) minutes which shall mark the completion of Reverse Auction. However, bidders are advised not to wait till the last moment to enter their bid to avoid complications related to internet connectivity, their network problems, system crash down, power failure etc.
4. **Procedure of Reverse Auctioning:**
 - I. The Reverse Auction will be conducted based on lowest evaluated bid price emerged as per Clause 3.23 in Section-3 of Volume 1A of Tender Specifications.
 - II. The 'Opening Price' i.e. Start Price for RA (Reverse Auction) shall be the lowest Evaluated bid price (L1 price).
 - III. Bid Decrement shall be Rs.10,00,000/- and its multiples.
 - IV. "RL1" Bid is the last offered price i.e. further no bidder responds within the time limit.
 - V. After completion of the online Reverse Auction, the Closing Price (i.e. RL1 price) shall be available for further processing.
 - VI. After Reverse Auction, the price break-up for all components shall be arrived at the same ratio as quoted in their initial price bid such that the total price shall be equal to the lowest quoted Bid Price during Reverse Auction.



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3.40.1 NLCIL shall conduct the Online Reverse Auction and the terms and conditions shall be as below:

- i. Once NLCIL decides to conduct reverse auction for a tender, an e-mail containing the terms and conditions, date and time of reverse auction (RA), the start price and the decrement amount will be sent to all the eligible bidders to their Email ID enrolled with NLCIL NeAT portal (<https://procure.nlcindia.in>). The same will also be available in the home page of NLCIL. e-contracts site after logging in under Reverse auction menu. It shall be the sole responsibility of the bidders to view such emails and participate in the Reverse Auction. NLCIL shall not be responsible for any failure on the part of the bidders to notice the emails.
- ii. In case of any change in the bidders Email ID, it is the responsibility of the bidder to update his Email ID then and there (available under “Update Profile” menu using secure login). NLCIL does not hold any responsibility for the lapses on the bidders’ side in this regard.
- iii. The bidders are also requested to login to NLCIL NeAT portal (<https://procure.nlcindia.in>) regularly and view the details of Reverse Auction (RA).
- iv. The duration indicated in the auction screen, will be the minimum duration for the Reverse Auction process.
- v. If a bid is received in the last 10 minutes of closing of the auction, the auction gets extended automatically for 10 minutes (rounding off to the nearest minute) from the time of last bid. If no bid is received in the last 10 minutes the auction will get closed. However, bidders are advised not to wait till the last minute or last few seconds to enter their bid to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc.
- vi. During the course of Reverse Auction if any problem arises in NLCIL’s Server that interrupts the participation of the bidder in RA and resulting in closure of RA, NLCIL reserves the right to reconduct RA with the last bid price offered in the RA. The rescheduled date and time of RA will be intimated to the qualified bidders by e-mail / SMS.
- vii. RA screens are activated 10 minutes before the start of the Reverse Auction.
- viii. In all cases, bidder should use their own ID and Password along with Digital Signature at the time of submission of their bid.
- ix. During the entire e-reverse auction process, the bidders will remain completely anonymous to one another and also to everybody else.
- x. The e-reverse auction floor shall remain open from the pre-announced date & time and for as much duration as mentioned above.
- xi. All electronic bids submitted during the e-reverse auction process shall be legally binding on the bidder. Any bid will be considered as the valid bid



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offered by that bidder and acceptance of the same by the NLCIL will form a binding contract between NLCIL and the Bidder for execution of work.

- xii. It is mandatory that all the bids are submitted with digital signature certificate otherwise the same will not be accepted by the system.
- xiii. The Start Price and the minimum Bid decrement value shall be displayed to the Bidders at the start of the Reverse Auction. The bidder can bid lower than the current bid amount however such bid should be single or multiple of decrement value.
- xiv. Bidders shall be required to start bidding from this Start price, reducing their price by minimum one decrement value or multiple of decrement value by clicking the calculator button under the column 'Action'.
- xv. A single Bid cannot have more than 5 times the decrement value from the current lowest bid. In case the bidder wants to give more than 5 times the decrement value, he can give multiple bids.
- xvi. At the end of Reverse Auction, the lowest closing bid will be considered for further processing.
- xvii. NLCIL's decision on award of the order shall be final and binding on all the bidders.
- xviii. The lowest bidder's price shall be final.
- xix. Bids once made by the bidder cannot be revoked / withdrawn by them and the bidder shall be bound to accept the price indicated in the auction as per their final bid price. Should the bidder fail to accept the prices quoted and in conformity with the terms and conditions of enquiry, their offer will be rejected without any notice besides debarring the firm for a fixed period from participating in any of the NLCIL tenders and encashing the Bid guarantee if any.
- xx. NLCIL reserves the right to reschedule or cancel the Reverse Auction Process / Tender at any time without any notice or assigning any reason thereof.
- xxi. The time of NLCIL Server, hosting the reverse auction will be the basis for all time related activities i.e., start of auction, closing of auction, acceptance of bid, etc. The server time shall be treated as final and binding. Bids recorded in the server before the bid closing time will only be treated as valid bid. Bidders are, therefore, advised to submit their bids well before the closing time of e-reverse auction. If any bid reaches the server after the bid closing time as per server time, the same will not be recorded and no complaint in this regard shall be entertained.
- xxii. NLCIL is not liable for any interruption or delay in accessing NLCIL's Website irrespective of the cause and for any system problems or inability to use the system by the Bidders. Bidders are requested to make all the necessary arrangements / alternatives whatever required so that



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they are able to circumvent such situation and be able to participate in the reverse auction successfully.

- xxiii. The Bidder shall not involve himself or any of his representatives in Price manipulation of any kind directly or indirectly by communicating with other suppliers / bidders.
- xxiv. The Bidder shall not divulge either his Bids or any other exclusive details of NLCIL to any other party.
- xxv. The prevailing / current lowest bid will be displayed on the bidding screen during the course of e-reverse auction and all subsequent bids shall have to be quoted lower than the prevailing / current lowest bid.
- xxvi. Bidders are advised to exercise caution in quoting their bids in e-reverse auction to avoid any mistake. Bids once submitted can't be recalled.
- xxvii Any order resulting from this bidding process shall be governed by the terms and conditions mentioned in the NIB. No deviation to the technical and commercial terms & conditions are allowed. NLCIL reserves the right to cancel this bidding process (e-reverse auction) or extend the due date of receipt of bid(s) without assigning any reason thereof.



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SECTION-3

ANNEXURES



**BOS WORKS FOR SETTING UP OF 600(6X100MW) MW
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ANNEXURE-A

FORMAT OF BID GUARANTEE

- 1) This guarantee should be furnished by a Scheduled Commercial Bank in India, authorized by RBI, other than Bank of China in the same format as given below. NLCIL reserves its rights to reject the Bank Guarantee if the same is not in the specified format.
- 2) The bank guarantee should be furnished on stamp paper of value not less than Rs.80/-.
- 3) The bid guarantee amount shall be in Indian rupees only.
- 4) The bid guarantee shall be executed only as per the format prescribed by NLCIL. In the event of any deviation the decision of NLCIL as to whether the same could be accepted or not is final and binding on the bidder.
- 5) The stamp paper should be purchased in the Name of the Bank executing the Guarantee/Name of the bidder. The date of purchase of stamp paper shall be on or before the date of execution of Bank Guarantee.
- 6) NLCIL reserves its right to reject the offer of the bidder, if any of the above conditions are not adhered to while furnishing the bids.
- 7) The bank guarantee issued by the issuing Bank on behalf of Bidder in favour of "Name of Company" shall also be confirmed through Structural Financial Messaging System (SFMS).
- 8) Bank Guarantee submitted in physical mode, including EMD/Bid Guarantee, which cannot be verifiable through SFMS will be rejected summarily.

REF: Tender No.....

DATE:

BANK GUARANTEE No:

To

The Chief General Manager/Contracts,
The NLC India Limited, Corporate Office, Block-1,
Neyveli - 607 801, Cuddalore Dist., Tamil Nadu, India.

Dear Sirs,

In accordance with your "Invitation to Bid" under your Tender No. M/s
.....herein after called the Bidder, having its registered office/head office at
..... with the following Directors on their Board of Directors / partners of the firm:

1.	2.....
3.....	4.....
5.....	6.....
7.....	8.....
9.....	10.....

wish to participate in the said bid for

As an irrevocable Bank Guarantee against Bid Guarantee for a sum of
INR/FC.....(in words and figures) valid for 150 days



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from..... (the date of bid opening) is required to be submitted by the Bidder as a condition precedent for participation in the said bid, which amount is liable to be forfeited on the happening of any contingencies mentioned in the Bid documents.

We, the Bank at having our Head Office at (local address) guarantee and undertake to pay immediately on demand by NLC India Limited.

The guarantee shall be irrevocable and shall remain valid up to If any further extension of this guarantee is required the same shall be extended to such required period (not exceeding one year) on receiving instruction from M/s..... on whose behalf this guarantee is issued.

Notwithstanding anything contained herein:

- a. our liability under this bank guarantee shall not exceed.....(in words)
- b. this bank guarantee shall be valid upto; and
- c. we are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if you serve upon us a written claim or demand on or before

In witness whereof the Bank, through its authorised officer has set its hand and stamp on this day of at

Signature :

Name :

Designation :

Staff Code No.:

Banker's Seal :

Date :

WITNESS

1. Signature.....

Full Name in (Block Letters)

Designation

Address

2. Signature.....

Full Name in (Block Letters)

Designation

Address

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ANNEXURE –B

FORM OF BID

To be submitted by the Bidder in
Part-I [Techno-commercial]

From:

To:

The Chief General Manager / Contracts,
NLC India Limited,
Corporate Office, Block-1,
Neyveli - 607801,
Cuddalore Dist.,
Tamil Nadu, India

Sub :

Ref : Tender No.CO CONTS//....., Dt.

Dear Sirs,

1. Having carefully examined the Tender Documents attached to your Invitation to Bid No _____ dated _____, and its Amendments / Errata / Corrigendum / clarifications issued till the date of tender opening, we agree to complete the 'works' in conformity with all the terms and conditions stated in Tender Documents and its Amendments / Errata / Corrigendum / Clarifications issued till the date of tender opening and as per time schedule given in Tender Documents. The plant, equipment and systems offered are of the best and latest technology and of international standards.
2. I/We declare and certify that I/We fully satisfy the eligibility criteria and the documentary proof as called for, have been annexed.
3. We undertake, in case our Bid is accepted, to commence the work from the date of Letter of Award and to complete and deliver the whole of the work and responsibilities comprised in the Contract as per Time Schedule given in Tender Documents.
4. We are submitting the Bid Guarantee for a sum of (Rupees..... only) as instructed by you. This Bid Guarantee shall be governed as per the stipulations provided in the "Instructions to Bidders".
5. We agree to abide by and keep our Bid valid initially for a period of 150 (One Hundred and Fifty) days from the date of opening of bid (Part-I) by NLC India Limited and it shall remain binding on us and may be accepted at any time before the expiry of that period.
6. Should our Bid be accepted, we hereby agree to abide by and fulfill all terms and conditions of Tender Documents as accepted by us and in default thereof, to forfeit and pay to NLC India Ltd or NLC India Ltd.'s successors, assignees or authorized nominees such sums of money as are stipulated in conditions contained in Tender Documents and agree to furnish Bank Guarantee for Contract Performance as per the proforma prescribed by NLC India Ltd and acceptable to NLC India Ltd and for the sum equal to 10% of the "Contract Price excluding O&M price for 3 years", for the entire scope of work within 30 days from the date of Letter of Award.

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7. We understand that NLC India Ltd. is not bound to accept the lowest or any Bids received and NLC India Ltd. has the right to reject any Bid, without assigning any reason whatsoever.
8. This Bid together with written acceptance thereof, shall constitute a binding Contract between NLC India Ltd. and ourselves till a formal Contract is executed.
9. We have noted the contents of clause 6.0 of Section-1 of Volume-IA in line with DIPP order and its subsequent Amendments and confirm compliance to the requirements.

Signed this -----day of ----- 2023

Signature :
Name :
Designation :
Company :
Company Seal
Date :

XXXXX

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**ANNEXURE - C
FORM OF BID**

To be submitted by the Bidder in
Part-II– [Price Bid]

NLCIL's Tender No. : Dated :

Our Bid No :

From:

To:

The Chief General Manager / Contracts
NLC India Limited.
Corporate Office, Block-1
Neyveli – 607 801, Cuddalore Dist.,
Tamil Nadu, India.

Dear Sirs

1. I/We, the undersigned have carefully examined and understood the Tender Documents including the Amendments/Errata/Corrigendum/Clarifications issued till the date of Tender Opening. I/We hereby agree to carry out the entire works as described in the specifications in conformity with the specifications and Tender Documents, as per prices quoted by us in the Schedule of Prices (Schedule F1 – Table 1) enclosed herewith.
2. In the event of our offer being accepted, we agree to furnish a Bank Guarantee for Contract Performance as per the proforma prescribed by NLC India Limited and acceptable to NLC India Limited and for the sum equal to 10% (Ten percent) of “Total Contract Price excluding O&M price for 3 years” within 30 days from the date of Letter of Award.

Signed this -----day of ----- 2023.

Signature :
Name :
Designation :
Company :

Company Seal
Date :

XXXXXX

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ANNEXURE-D

AFFIDAVIT (to be furnished by all bidders)

From:
(Name & Address of Bidder)
.....

.....
We do hereby declare that the contents of the offer submitted vide No. _____ against this tender (i.e Tender No. CO CONTS/, Dt.) have been submitted after fully understanding that the information contained in the offer and the documents enclosed/provided along with the bid are true, correct and complete in every aspect and that if any information contained therein is found to be false/incorrect/fabricated, offer shall be considered as null and void and we shall be liable for any penal action as per the provisions of Law for the time being in force.

- i) I/We Partner / Legal Attorney / Proprietor/ Accredited Representative of M/s..... declare that, we are submitting our offer/bid for the supply of equipment/material/works/services vide our offer..... dated
- ii) The contents/enclosures/documents of the offer are submitted after fully understanding that all the information furnished by me / us are correct and true and complete in every respect and all documents/credentials submitted along with the offer/bid are genuine, authentic, true and valid.
- iii) During the verification of offer or even at a later date, if any information or document submitted by me/us is found to be false /fabricated/ incorrect, the said offer shall be considered absolutely null and void and action as deemed fit shall be taken against me / us including forfeiture of EMD/Bid Guarantee/Security Deposit/Contract Performance Guarantee and action of suspension/banning/debarring/black-listing of my / our firm (including all partners of the firm)/company as per the tender conditions and law.

Authorized Signatory
(Name & Designation)

Place:
Date :

Seal:

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ANNEXURE – E

FORMAT FOR INTEGRITY PACT

(To be executed on plain paper and applicable for all tenders of value above Rs 1 crore)

Integrity Pact Between NLC India Limited (NLCIL) hereinafter referred to as "The Principal" and..... hereinafter referred to as "The Bidder/ Contractor"

Preamble:

The Principal intends to award, under laid down organizational procedures, contract/s for The Principal values full compliance with all relevant laws and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder/s and Contractor/s.

In order to achieve these goals, the Principal cooperates with the renowned international Non-Governmental Organization "Transparency International" (TI). Following TI's national and international experience, the Principal will appoint an Independent External Monitor who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Definitions:

In pursuance of the above Pact, for the purposes of this provision, the Principal defines the relevant terms set forth therein as under:

- 1) "Contract" means the contract entered into between the Principal and Bidder (or Tenderer) / Contractor for the execution of work mentioned in the preamble above.
- 2) "Contractor" means the bidder or tenderer whose tender (bid) has been accepted by the principal or Company whose tender (bid) has been accepted and shall be deemed to include his/its/their successors, representatives, heirs, executors and administrators unless excluded by the Contract.
- 3) "Coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the procurement process or affect the execution of a contract; In order to achieve these goals, the Principal proposes to appoint one or more Independent External Monitor/s who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.
- 4) "Collusive practice" means a scheme or arrangement between two or more bidders, with or without the knowledge of the Principal designed to establish bid prices at artificial, noncompetitive levels; and
- 5) "Corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution;
- 6) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Principal and

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includes collusive practices among Bidders (Prior to or after bid submission) designed to establish bid prices at artificial, non-competitive levels and to deprive the Principal of the benefits of free and open competition;

- 7) “Independent External Monitor” means a person, hereinafter referred to as IEM appointed, in accordance with Section 8 below, to verify compliance with this agreement.
- 8) “Party” means a signatory to this agreement.
- 9) “Purchaser” means NLC INDIA LTD, Neyveli, incorporated under the Companies Act 1956, having their registered Office at Chennai-600 010 and includes their successors.
- 10) “Bidder or Tenderer” means the person, firm or company submitting a tender (bid) against the invitation to Tender (bid) and includes his/its/their staff, consultants, parent and associate and subsidiary companies, agents, consortium and joint venture partners, sub- contractors and suppliers, heirs, executors, administrators, representatives, successors.

Section 1 - Commitments of the Principal

- (1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:
 - 1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for him/herself or third person, any material or immaterial benefit which he/she is not legally entitled to.
 - 2 The Principal will, during the tender process treat all Bidders with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidders the same information and will not provide to any Bidder confidential/additional information through which the Bidder could obtain an advantage in relation to the tender process or the contract execution.
 - 3 The Principal will exclude from the process all known prejudiced persons.
- (2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-Corruption Laws of India, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder/Contractor

- (1) The Bidder / Contractor commits itself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
 1. The Bidder / Contractor will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or immaterial benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2. The Bidder / Contractor will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non- submission of bids or any other actions to restrict competitiveness or to form cartels in the bidding process.
 3. The Bidder /Contractor will not commit any offence under the relevant Anticorruption Laws of India: further the Bidder /Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
 4. The Bidder / Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
 5. The Bidder / Contractor of foreign origin shall disclose the name and address of the Agents / representatives in India, if any. Similarly, the Bidder / Contractor of Indian Nationality shall furnish the name and address of the foreign principals, if any.
 6. In Case of subcontracting, the principal contractor shall take the responsibility of the adoption of IP by the sub-contractor.
- (2) The Bidder / Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder, before contract award has committed a transgression through a violation of Section 2 or in any other form such as to put his reliability or credibility as Bidder into question, the Principal is entitled to disqualify the Bidder from the tender process or to terminate the contract, if already signed, for such reason.

- (1) If the Bidder / Contractor has committed a transgression through a violation of Section 2 such as to put his reliability or credibility into question, the Principal is entitled also to exclude the Bidder /Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressors within the company hierarchy of the Bidder and the amount of the damage. The exclusion will be imposed for a minimum of 6 months and maximum of 3 years.
- (2) A transgression is considered to have occurred if the Principal after due consideration of the available evidence, concludes that no reasonable doubt is possible.
- (3) The Bidder accepts and undertakes to respect and uphold the Principal's absolute right to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.
- (4) If the Bidder / Contractor can prove that he has restored / recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal may

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revoke the exclusion prematurely, provided such systems has been audited by an independent agency.

Section 4 - Compensation for Damages

- (1) If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover from the Bidder liquidated damages equivalent to Earnest Money Deposit / Bid Security.
- (2) If the Principal has terminated the contract according to Section 3 or if the Principal is entitled to terminate the contract according to Section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to Security Deposit / Performance Bank Guarantee.

Section 5 - Previous transgression

- (1) The Bidder declares that no previous transgressions occurred in the last 3 years with any other Company in any country conforming to the TI approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- (2) If the Bidder makes incorrect statement on this subject he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 - Equal treatment of all Bidders / Contractors/ Subcontractors

- (1) The Bidder / Contractor undertakes to demand from all subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.
- (2) The Principal will enter into agreements with identical conditions as this one with all Bidders, Contractors and Subcontractors.
- (3) The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 - Criminal charges against violating Bidders/Contractor/ Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor, which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 – Independent External Monitor (IEM)

- (1) The IEMs have been appointed by the Central Vigilance Commission. The task of the IEMs is to review independently, whether and to what extent the parties comply with the obligations under this agreement.
- (2) The IEM is not subject to instructions by the representatives of the parties and performs his functions, neutrally and independently. He reports to the Chairperson of the Board of the Principal.
- (3) The Contractor accepts that the IEM has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the IEMs, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation.

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The same is applicable to Subcontractors. The IEM is under contractual obligation to treat the information and documents of the Bidder / Contractor / Subcontractor with confidentiality.

- (4) The Principal will provide to the IEMs sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the IEMs the option to participate in such meetings.
- (5) As soon as the IEM notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or heal the violation, or to take other relevant action. The IEMs can in this regard submit non-binding recommendations. Beyond this, the IEM has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
- (6) After award of work, the IEMs shall look into any issue related to execution of contract if specifically raised before them. However, the IEMs may suggest systemic improvements to the Principal if considered necessary to bring about transparency, equity and fairness in the system of procurement.
- (7) The IEMs would examine all complaints received by them and give their recommendations/views to the Chief Executive of the Principal, at the earliest. They may also send their report directly to the CVO in case of suspicion of serious irregularities requiring legal/administrative action. Only in case of very serious issue having a specific, verifiable Vigilance angle, the matter should be reported directly to the Commission. IEMs are expected to tender their advice on the complaints, within 30 days.
- (8) For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process or during execution of contract, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an investigation and submit their joint recommendations to Principal.
- (9) IEMs should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers.
- (10) In the event of any dispute between the Principal and the Contractor/Bidder, in case, both the parties are agreeable, they may try to settle the dispute through mediation before the IEMs in a time bound manner, not more than five meetings for a particular dispute resolution. The sitting fees and expenses towards travel and stay arrangements for such meetings for the IEMs shall be equally shared by both the parties.
- (11) If required, the Principal may adopt any mediation rules for this purpose. In case, the dispute remains unresolved even after mediation by the panel of IEMs, the Principal may take further action as per the terms and conditions of the contract.
- (12) The advisory role of IEMs is envisaged as that of a friend, philosopher and guide. The advice of IEMs would not be legally binding and it is restricted to resolving issues raised by a bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood

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that IEMs are not consultants to Principal. Their role is independent in nature and the advice once tendered would not be subject to review at the request of Principal.

- (13) Issues like warranty/guarantee etc. shall be outside the purview of IEMs.
- (14) The reference to 'IEM' would include both Singular and Plural.
- (15) The IEM can be removed from his office, before the expiry of his tenure only with the approval of the Board of the Principal.

Section 9 - Pact Duration

Integrity Pact, in respect of a particular contract, shall be operative from the date IP is signed by both the parties till the final completion of the contract. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings. For all other bidders it shall be operative upto 6 months after the contract has been awarded.

If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged / determined by Chairperson of the Principal.

Section 10 – Other provisions

- (1) This agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. Chennai / Neyveli. The Arbitration clause provided in the main tender document / contract shall not be applicable for any issue / dispute arising under Integrity Pact.
- (2) Changes and supplements as well as termination notices need to be made in writing.
- (3) If the Contractor is a partnership or a consortium this agreement must be signed by all partners or consortium members.
- (4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- (5) "A person signing IP shall not approach the Courts while representing the matters to IEMs and he / she will await their decision in the matter".

For the Principal

For the Bidder / Contractor

Place

Date

Witness 1.....

Witness1

Witness 2.....

Witness 2.....

Annexure-F

JOINT DEED OF UNDERTAKING

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IN CASE OF BIDDER PARTICIPATION IN THE BID BASED ON THE CREDENTIALS OF HOLDING /SUBSIDIARY/GROUP COMPANY

(TO BE ENCLOSED WITH THE BID)

This Deed of undertaking executed this day of by Collaborator (Holding/Subsidiary/Group Company) (Name)..... a Company incorporated under and having its Registered Office at herein after called or Collaborator (Holding/Subsidiary/Group Company) which expression shall include its successors, executors and permitted assigns and (Bidder/Contractor Name) a Company incorporated under the Companies Act 1956 having its registered office at hereinafter called (Bidder/Contractor Name) or 'Contractor' which expression shall include its successors, executors and permitted assigns) in favour of NLC INDIA LIMITED (formerly Neyveli Lignite Corporation Limited), a company incorporated under the Companies Act 1956 having its Registered Office at Chennai-600 031 (hereinafter called the 'PURCHASER'), which expression shall include its successors, executors and assigns.

Whereas the Purchaser is desirous of getting work of the design, manufacture, supply, transport and insurance, Port handling, Customs clearance, forwarding, storage, erection, testing and commissioning of (herein after called as equipment) at done as per its specification No dated whereas (Bidder/Contractor Name) submitted its technical proposal vide its Letter No. dated based on the association of M/s (Collaborator (Holding/Subsidiary/Group Company)) and whereas it is a condition for the award of contract to (Bidder/Contractor Name) that (Bidder/Contractor Name) and its Collaborator (Holding/Subsidiary/Group Company) M/s would be jointly and severally bound and shall be responsible to the Purchaser for the successful performance of the equipment fully meeting the parameters guaranteed as per the Purchaser's specifications in terms of the Contract. Now, Therefore, this Undertaking witnesses as under:

1. That consideration of the award of Contract by the Purchaser (herein after referred to as the 'Contract') we, the Collaborator (Holding/Subsidiary/Group Company) and Bidder/Contractor do hereby declare and guarantee that we shall be jointly and severally bound unto to NLC INDIA LIMITED (Purchaser) for the successful performance of equipment fully meeting the guaranteed parameters as per the contract and further shall be fully responsible for the correctness of design, manufacture, supply, transport, insurance, erection supervision, testing and commissioning of the equipment in accordance with the Contract specifications. Further, we, the Collaborator (Holding/Subsidiary/Group Company) and the Bidder/Contractor hold ourselves jointly responsible for the timely execution of all activities in accordance with the contract.

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2. Without prejudice to the generality of the undertaking in para - 1 above, the methods of achieving the objectives set forth above shall be as follows:
 - a. The Collaborator (Holding/Subsidiary/Group Company) shall be responsible for the preparation of all design, design calculation and manufacturing drawings for the equipment and shall provide all additional necessary technical assistance to (Bidder/Contractor Name) for the portion of the work to be performed by (Bidder/Contractor Name) in India. Further, the Collaborator (Holding/Subsidiary/Group Company) shall extend their quality surveillance to (Bidder/Contractor Name) during manufacture at Bidder/Contractor work and/or at the Purchaser's project site. Without prejudice to the overall responsibility of the Collaborator (Holding/Subsidiary/Group Company) as to the successful commissioning and performance of the equipment, the Collaborator (Holding/Subsidiary/Group Company) shall in addition despatch his technical experts from time to time to the Bidder/Contractor works/ Purchaser and the Bidder/Contractor in accordance with the stipulation in the Contract.
 - b. The Collaborator (Holding/Subsidiary/Group Company) will be fully responsible for the quality of manufacture and the timely delivery of all the major equipment/ main assembly /components manufactured at his works or at his Contractor's work for incorporation in the equipment as per the Contract Schedule.
 - c. The Contractor shall be responsible to manufacture that portion of the equipment to be manufactured at his works or at the sub-Contractor's works as per the Collaborator (Holding/Subsidiary/Group Company) design and the Collaborator (Holding/Subsidiary/Group Company) quality acceptance level. Further the Contractor shall supervise the erection, commissioning and carry out the work as per the contract in accordance with the Collaborator's advice, procedure and guidance.
3. In the event of any breach in the performance of the obligations set forth above, we the Collaborator (Holding/Subsidiary/Group Company) and the Contractor, shall jointly and severally pay the loss or damage to the Purchaser on his demand. Further we the Collaborator (Holding/Subsidiary/Group Company) and the Contractor, jointly and severally undertake to pay to the Purchaser to effect price reduction arrived at in accordance with the provisions of the Contract, in the event of any delay in supply or in completion of functional test including weighing of the equipment or in commissioning of the equipment without any demur, reservations, protest and recourse. Further, any extension of time, relaxation or indulgence by the Purchaser to the Contractor/ Collaborator (Holding/Subsidiary/Group Company) shall not prejudice the rights of the Purchaser under this undertaking against the Collaborator (Holding/Subsidiary/Group Company) of the Contractor.

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4. We, the Collaborator (Holding/Subsidiary/Group Company) and the Contractor agree that this undertaking shall be irrevocable and further agree that this undertaking shall continue to be enforceable till the end of warranty period under the Contract. We further agree that this undertaking shall without prejudice to the various liabilities of the Contractor including his Contract Performance Guarantee as well as his other obligations in terms of the Contract.
5. The Performance, rights and responsibility of the party shall be in accordance with the Contract and further the liability of the Contractor/ Collaborator (Holding/Subsidiary/Group Company) under this Undertaking shall not in any case exceed the limits as stipulated in the Contract.

In witness whereof the Collaborator (Holding/Subsidiary/Group Company) and the Contractor have through their authorized representatives executed this Undertaking and affixed common seals of their respective companies, on the day, month and year first above mentioned.

..... (Signature) (Name in Block Letters) (Official address)	For Collaborator (Holding/Subsidiary/Group Company) Name: Designation: Common seal of the company.
..... (Signature) (Name in Block Letters) (Official address)	For Contractor. Name: Designation: Common seal of the Company.

NOTE:

- i) Power of Attorney of each of the person signing the Deed of Joint Undertaking and Board resolution in regard of POA of Authorized signatory, shall be furnished along with this Deed of Joint Undertaking.
- ii) * Bidder to strike out, whichever is not applicable

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Annexure-G

PROFORMA OF LETTER OF UNDERTAKING FROM THE HOLDING COMPANY

(TO BE FURNISHED ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

(To be executed by the Holding Company Supported by Board Resolution and submitted by the Bidder along with the Techno-Commercial Bid, Applicable to the Bidder for meeting the stipulated Financial Qualifying Requirement)

Ref. :

Date :

To
The Chief General Manager / Contracts
NLC India Limited,
Corporate Office, Block-1,
Neyveli- 607 801, Cuddalore District,
Tamil Nadu, INDIA.

Dear Sirs,

1.0 We, M/s..... declare that we are the holding company of M/s..... (Name of the Bidder) and have controlling interest therein. M/s..... (Name of the Bidder) proposes to submit the bid for the package..... (Name of the package) for.....(Name of the Project) under bid reference no. dated and have sought financial strength and support from us for meeting the stipulated Financial Qualifying Requirement as per Clause No. -- -----of Bid Data Sheet.

2.0 We hereby undertake that we hereby pledge our unconditional & irrevocable financial support for the execution of the said package to M/s..... (Name of the Bidder), in case they are awarded the Contract for the said package, at the end of the bidding process. We further agree that this undertaking shall be without prejudice to the various liabilities that M/s..... (Name of Bidder) would be required to undertake in terms of the Contract including the Performance Security as well as other obligations of the Bidder/Contractor.

3.0 This undertaking is irrevocable and unconditional, and shall remain in force till the successful execution and performance of the entire contract and/or till it is discharged by Employer.

4.0 We are herewith enclosing a copy of the Board Resolution in support of this undertaking.

Yours faithfully

(Signature of Authorised Signatory on behalf
of the Holding Company)

Witness : (1)

(Name & Designation)

(2)

(Name of the Holding Company)

(Seal of the Holding Company)

Date:

Place:

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Annexure-H

*** PROFORMA OF CERTIFICATE FROM THE CEO/CFO (To be submitted by Bidder along with the Techno-Commercial Bid)**

Ref.:

Date:

To

CGM/Contracts

Corporate Contracts Division

NLC India Limited

Madam/Sir,

I, ... (CEO/ CFO of the Company) of (Name of the Company) declare that the financial results of M/s. (Name of the Bidder) are under audit as on (as on original scheduled date of Tender opening) and the Certificate from the practicing Chartered Accountant certifying the financial parameters is also not available.

Yours faithfully

(Signature)

Date : (Name & Designation)

Place : (Name of the Company)

(Seal of Company)

Note: *Strike off if not applicable.

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ANNEXURE – I

FORM OF UNDERTAKING BY BOS EPC CONTRACTOR FOR SPARES

(To submit the declaration form duly signed by the BOS EPC contractor in their Letter Head before starting of the O&M contract period)

We, M/s a Company incorporated under the having its Registered Office at (The bidder) undertake the following on day of.....for the work of “.....” to NLCIL, a company incorporated under the laws of India and having its Registered Office at No.135, EVR Periyar High Road, Kilpauk, Chennai-600 010, Tamil Nadu, India and Corporate Office at Block - 1, Neyveli - 607 801, Cuddalore District, Tamilnadu. NLC India Limited (Employer) has invited bids for “.....” vide its Tender ID No.

The bidder / BOS EPC Contractor shall be ensured that there are no commercial issues, technical issues or any other major issues pending with the sub-contractor/ supplier/ OEM which may affects the solar project spares procurement.

The bidder shall submit the vendor/supplier details and address along with the contact person name and contact numbers for material used in the proposed 600MW Solar Power Project before starting of the O&M contract period.

Signature of the applicant
Full name of applicant
Stamp & Date

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ANNEXURE – J

Proforma for Joint Undertaking for AMC of Tracker & SCADA for Stipulated Duration Beyond O&M Period between BOS EPC Contractor and OEM/OEM service provider.

(On non-judicial stamp paper of appropriate value)

(To submit the declaration form duly signed by the BOS EPC contractor before 30 days of completion of the O&M contract period)

In consideration of the NLC India Limited, (hereinafter referred to as the 'Employer', which expression shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s..... with its Registered/Head Office at..... (Hereinafter referred to as the 'Contractor', which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a Contract by issue of Employer's Notification of Award No. Dated and the same having been unequivocally accepted by the Contractor resulting in a 'Contract' bearing No. Dated..... Valued at..... for..... (Scope of Contract) and the Contractor for providing Annual Maintenance Contract (AMC) of Tracker and SCADA for Stipulated Duration beyond O&M Period as specified in the Bidding Documents.

Contractor further agrees to the bidding document that the **AMC of SCADA and Tracker** shall be carried out through its vendor M/s.....with its Registered/Head Office at.....(Hereinafter referred to as the 'OEM'/OEM service provider , which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns). Contractor and OEM / OEM service provider shall be jointly and severally liable to undertake the responsibility outlined in bidding document.

IN WITNESS WHEREOF, the 'Contractor' and the 'OEM/OEM service provider' through their authorized representative, have executed these presents on the Day, Month and Year first mentioned above at..... (Name of the Place)

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For and on behalf of

.....

(Contractor's Name)

Signature

Name

Designation of

Authorized representative

WITNESS:

--

1. Signature

2. Name

3. Address

For and on behalf of

(OEM's name)

Signature

Name

Designation of

Authorized representative

WITNESS:

1. Signature

2. Name

3. Address

* Please strike off whichever not applicable. Separate Joint undertaking is required to be furnished for aforesaid equipment's

	BOS WORKS FOR SETTING UP OF 600(6X100MW) MW GRID CONNECTED SOLAR POWER PROJECT AT KHAVDA, GUJARAT.	VOLUME – IA

SECTION -4

LIST OF FORMS

	BOS WORKS FOR SETTING UP OF 600(6X100MW) MW GRID CONNECTED SOLAR POWER PROJECT AT KHAVDA, GUJARAT.	VOLUME – IA

I. PRE-QUALIFYING REQUIREMENTS FORMS

1. PRE-QUALIFYING REQUIREMENTS (PQR)

Sl.No.	Pre-Qualifying Requirement	Bidder Response
1.0	TECHNICAL CRITERIA: Bidder to specify the Route viz. Route-I or Route-II or Route-III or Route-IV under which bid is submitted.	Text entry
1.1	2.1 Route-I Whether the Bidder have designed, supplied, erected/ supervised erection and commissioned/ supervised commissioning of Balance of System Package/ Solar power project for Solar Photo Voltaic (SPV) based grid connected power plant(s) of cumulative installed capacity of 40 MWp or higher in maximum of 4 agreements/orders, out of which at least one plant should have been of 10 MWp or higher capacity. The reference plant of 10 MWp or higher capacity must have been in successful operation for at least six (6) months prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening) (OR)	Yes/No
1.2	2.2 Route-II Whether the Bidder is a developer of Solar Photo Voltaic (SPV) based grid connected power plant(s) of cumulative installed capacity of 40 MWp or higher in maximum of 4 agreements/orders, out of which at least one plant should have been of 10 MWp or higher capacity. The reference plant of 10 MWp or higher capacity must have been in successful operation for at least six (6) months prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening) (OR)	Yes/No
1.3	2.3 Route-III	
1.3.1	2.3.1 Whether the Bidder have executed in the last ten (10) years an industrial project either as developer or as EPC Contractor in the area of Power/ Solar Power/ Steel/ Oil/ Gas/ Petro chemicals/ Fertilizer/ Cement/ Coal mining including coal handling plant/ Rail/ Ports/ Bridges/ Any other Infrastructural projects, for a value of Rs. 168 Crores in a single project or single work and the same should be in successful operation for at least one (1) year prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening). (AND)	Yes/No
1.3.2	2.3.2 Whether the Bidder have executed at least one (1) Electrical Substation of 33 kV or above voltage level, consisting of equipment such as 33kV or above voltage level circuit breakers and Power transformer, either as developer or as EPC Contractor which should be in successful operation for at least one (1) year prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening) (OR)	

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1.4	2.4 Route-IV Whether the bidder is an Indian company registered in India and should be a Group Company/Holding Company/ Subsidiary Company of a firm meeting the requirement stipulated in clause 2.1 (Route-I) or 2.2 (Route-II) or 2.3 (Route-III). In such a case, Bidder shall furnish a Joint Deed of Undertaking (JDU) jointly executed by the firm qualified as per the clause 2.1 (Route-I) or 2.2 (Route-II) or 2.3 (Route-III) and the Bidder along with its bid for complete performance of the contract jointly or severally as per format enclosed (Annexure-F) shall only be furnished without financial backup BG in the bid document failing which the Bidder's bid is liable to be rejected.	
1.5	Whether the bidder has attach documentary evidence to prove that the qualifying requirements mentioned in the clause 2.1 or 2.2 or 2.4 are met by him.	Yes/No
1.5.1	If yes, Upload relevant Documentary Evidence in the form of user certificate along with copy LOA/Work order/Contract agreement together with full contact details for verification.	Upload Files
1.6	Whether the bidder has attached documentary evidence to prove that the qualifying requirements mentioned in the clause 2.3.1 & 2.3.2 are met by him.	Yes/No
1.6.1	If yes, Upload relevant Documentary Evidence in the form of user certificate along with copy LOA/Work order / Contract agreement together with full contact details for verification.	Upload Files
1.7	In case of bidding by Group Company/Holding Company/Subsidiary Company, the bidder to specify the name of the firm meeting the Qualifying Requirement i.e., on whose strength the bidder is participating.	Text entry
1.8	Upload the Deed of Joint Undertaking, as per Annexure-F (If applicable)	Upload Files
2.0	2.5 FINANCIAL CRITERIA	
2.1	2.5.1 Whether the bidder has Positive Net Worth as per the latest audited financial statements individually.	Yes/No
2.2	2.5.2 Whether the Average Annual Turn Over of the Bidder is not be less than Rs. 168 Crores for the last three (3) consecutive financial years as on the original scheduled date of tender opening.	Yes/No
2.3	2.5.3 Whether the bidder is Group Company/Holding Company/Subsidiary Company of a firm meeting the requirement stipulated in clause 2.1 (Route-I) or 2.2 (Route-II) or 2.3 (Route-III) then the combined annual average turnover of the bidder and the firm meeting the QR shall not be less than Rs. 168 Crores for the last three (3) consecutive financial years as on the original scheduled date of tender opening.	Yes/No
2.3.1	Have you Uploaded relevant Documentary Evidence (Financial Criteria) for meeting QR in Sl.No.2.5.1, 2.5.2, 2.5.3 & 2.5.4 above in support of Bidder as per details stated in 2.5 under Section -1 of Volume IA.	Yes/No
2.4	Whether the annual turnover criteria, stipulated above is on your own or your	Text

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	Holding Company?	Entry
2.4.1	If Holding Company, please attach the Net Worth of such Holding Company as on the last day of the preceding financial year is at least equal to or more than the paid- up share capital of the Holding Company.	Upload Files
2.4.2	Upload Letter of Undertaking from the Holding Company, supported by the Holding Company's Board Resolution, as per the format Annexure-G enclosed in the bid documents.	Upload Files
2.5	Whether the Bidder is able to furnish its audited financial statements on standalone entity basis.	Yes/No
2.5.1	If no, whether the bidder has furnished the unaudited unconsolidated financial statements.	Yes/No
2.5.2	If yes, the Bidder has to upload the following documents on substantiation of its qualification: (a) Copies of the unaudited unconsolidated financial statements of the Bidder along with copies of the audited consolidated financial statements of its Holding Company.	Upload Files
	(b) Certificate from the CEO/ CFO of the Holding Company as per the format enclosed in the bidding documents, stating that the unaudited unconsolidated financial statements form part of the consolidated financial statement of the Holding Company.	Upload Files
2.5.3	In case audited results for the last financial year as on date of techno commercial bid opening are not available, please upload the financial results certified by a practicing Chartered Accountant.	Upload Files
2.5.3.1	In case the Bidder is not able to submit the Certificate from a practicing Chartered Accountant certifying its financial parameters, please upload the audited result of any three consecutive financial years preceding the last financial year.	Upload Files
2.5.3.2	Upload certificate obtained from the CEO/CFO as per Annexure-H in the bidding documents stating that the financial results of the company are under audit as on techno-commercial bid opening and the Certificate from a practicing Chartered Accountant certifying the financial parameters is not available.	Upload Files
4.0	Upload Power of Attorney/Authorization in favour of the person signing the Bid.	Upload Files
5.0	Upload Major legal cases, if any	Upload Files
6.0	Bidder to upload copy of Integrity Pact duly signed as per Annexure-E of Section 3 of Volume 1A.	Upload Files
7.0	Bidder accepted the points mentioned in Clause No. 4.0 [4.1 to 4.11] of Section-1 of Volume I A.	Yes/No
8.0	Any other details/Information, Bidder wishes to furnish. Kindly upload.	Upload Files

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2. GROUP COMPANY/HOLDING COMPANY/SUBSIDIARY COMPANY DETAILS

Sl.No	Description	Bidder Response
1	Group Company/Holding Company/Subsidiary Company	Text Entry
2	Name of the Company	Text Entry
3	Address	Text Entry
4	Telephone Number	Text Entry
5	Fax No.	Text Entry
6	Email address	Text Entry
7	Name of contact person	Text Entry
8	Upload any relevant documents	Upload files

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3. BIDDER'S EXPERIENCE

(Checklist for breakup details for each project/work furnished towards QR)

Sl. No.	Description	Bidder Response
1.0	Bidder to Provide the following details of Owner/ End user/Client such as Name of the Company, Contact Person name, address, phone/ Mobile No, email id etc.	Text Entry
2.0	Bidder to indicate the reference No. of Work Order(s) / Contract(s) / Agreement(s).	Text entry
3.0	Whether copy of work order/Agreement/Contract is enclosed	Yes/No
4.0	Bidder to mention the brief Scope of work	Text Entry
5.0	Bidder confirms having designed, supplied, erected/ supervised erection and commissioned/ supervised commissioning of Balance of System Package/ Solar power project for Solar Photo Voltaic (SPV) based grid connected power plant(s) of cumulative installed capacity of 40 MWp or higher in maximum of 4 agreements/orders, out of which at least one plant should have been of 10 MWp or higher capacity. The reference plant of 10 MWp or higher capacity must have been in successful operation for at least six (6) months prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening).	Text Entry
	Upload supporting documents	Upload Files
6.0	Bidder confirms to be a developer of Solar Photo Voltaic (SPV) based grid connected power plant(s) of cumulative installed capacity of 40 MWp or higher in maximum of 4 agreements/orders, out of which at least one plant should have been of 10 MWp or higher capacity. The reference plant of 10 MWp or higher capacity must have been in successful operation for at least six (6) months prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening).	Text Entry
	Upload supporting documents	Upload Files
7.0	Bidder confirms to have executed in the last ten (10) years an industrial project either as developer or as EPC Contractor in the area of Power/ Solar Power/ Steel/ Oil/ Gas/ Petro chemicals/ Fertilizer/ Cement/ Coal mining including coal handling plant/ Rail/ Ports/ Bridges/ Any other Infrastructural projects, for a value of Rs. 168 Crores in a single project or single work and the same should be in successful operation for at least one (1) year prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening). (AND)	Text Entry

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7.1	Bidder confirms to have executed at least one (1) Electrical Sub-station of 33 kV or above voltage level, consisting of equipment such as 33kV or above voltage level circuit breakers and Power transformer, either as developer or as EPC Contractor which should be in successful operation for at least one (1) year prior to the date of techno-commercial bid opening (i.e., Part-I Bid Opening). Note: The works referred at QR clause 2.3.1 (as applicable) & 2.3.2 can be in same or different projects.	Text Entry
	Upload supporting documents	Upload Files
8.0	The Bidder Group Company/Holding Company/Subsidiary Company fulfils the PQR criteria as per Route I or II or III	Text Entry
	Upload supporting documents	Upload Files
9.0	Bidder to indicate the Date/ Ref No. of user / Performance certificate issued by the end user	Text Entry
	Upload supporting documents	Upload Files
10.0	Period of Satisfactory operation of Solar Power Project or Industrial projects or any other Infrastructural projects	Text Entry
	Upload supporting documents	Upload Files



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4. BID GUARANTEE

Note: Bidder is requested to attach the proof for the issuance of bid guarantee through SFMS given by banker in the provision given below for attachment.

Sl.No	Description	Bidder's Response
	Bid Guarantee Type	
BG	Bank Guarantee	
1	Bank Guarantee No.	
2	Bank Guarantee Date	
3	Details of Stamp paper	
3.1	Stamp Paper Amount	
3.2	Whether stamp paper purchased in the Name of the issuing Bank/Bidder	
3.3	Stamp paper purchased address	
3.4	Date of Purchase	
3.5	Whether Bank Guarantee Date is on or after the Date of Purchase of Stamp Paper	
4	Bank details	
4.1	Banker's Name	
4.2	Banker's Address	
4.3	Bank email-id	
4.4	Bank Phone No.	
4.5	Bank IFSC code	
4.6	Banker's Seal	
5	Manager's Name & No.	
6	Whether signed by two Witness	
7	Whether overwriting/cutting if any on the BG authenticated under signature & seal of executants	
8	Whether the BG has been issued by a Nationalized/Scheduled Bank in India	
9	If the bank guarantee issued by a foreign bank. Whether it is in the approved list of RBI.	Not applicable
10	Details of value and validity	
10.1	Currency of BG	
10.2	Value of BG	
10.3	Validity upto	
11	Whether Bank Guarantee is as per NLCIL Format	
SFMS	Structural Financial Messaging System (SFMS)	
	Whether the Bid Guarantee submitted in physical form can be verifiable through SFMS.	YES
RTGS/NEFT	RTGS/NEFT details	
1	UTR No for RTGS/NEFT.	
2	UTR Date	
DD	Demand Draft	
1	Demand Draft No	
2	Date of DD	
3	DD in favour of	
4	Payable at	
5	Amount	

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5. COST OF TENDER DOCUMENT

Sl.No	Description	Bidder Response
	COST OF TENDER DOCUMENT	
1	e-Payment Details RTGS/NEFT UTR No.	
2	UTR Date	
3	Remitted Bank	
4	Amount	
5	Upload the Supporting Document	FILE Attachment

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II TECHNICAL FORM

1. ACCEPTANCE FOR TECHNICAL SPECIFICATION & SPECIAL CONDITIONS

Sl.No	Description	Bidder's Response
1.0	Please confirm acceptance of the Technical Specification & Special Conditions including Scope of Work stipulated in the tender document including Corrigendum/ Amendments/ Clarification/ Errata issued, if any without deviation.	YES
2.0	Please confirm acceptance of the time schedule stipulated in the tender document.	YES

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2. SUB VENDORS TO BE PROPOSED BY THE BIDDER FOR THE PROJECT

List of Sub Vendors for Bought out Items

A. Class I items:

Sl. No	Equipment list for Class I items	Category I / MAKE	Bidder to Specify Sub Vendor Name(s)
1	Solar PV modules	NA	
2	Central Inverter	NA	
3	String Combiner & Monitoring Unit	HENSEL, JACKSON, AEG, CAPE Electric, L&T, SMA, Statcon Power Controls, Adarsh Control & Automation, Solaris, Jakson, AEG, StatconEnergiaa Pvt Ltd, Raychem RPG Pvt. Ltd, Trinity Touch Pvt Ltd, ABB India Ltd	
4	Inverter Duty Transformer	NA	
5	Grid Tie Power Transformer	NA	
6	HT Auxiliary Transformer	IPL Products, Automatic Electric Ltd, Voltech	
7	LT Panel	----	
8	HT Switchgear/Panel	NA	
9	Instrument Transformers	Pragati, Kappa, Prayog, AE, BHEL, CGL, JYOTILTD, PRECISE, Schneider, Southern Electric, EMCO, Controls & Systems, Vishal Transformers & Switch gears Pvt Ltd, Mehru Electrical & Mechanical Engineers (P) Ltd, Precise, Emmess Control Pvt Ltd, ABB India Ltd, Megawin Switchgear Pvt Ltd, Pragati Electricals Pvt Ltd	
10	HT Power Cables	NA	

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11	LT power cables	Asian cables, KEI, RPG, CCI, Incab, Nicco, UNIVERSAL, FortGloster, Hinudthan Vidyut Products, Torrent Cables, GemsCab, KEC, Cords, GuptaPower, RAVIN CABLES, Cable Corporation of India, Finolex, Torrent Power, Havells India Ltd, KEC International Limited, Polycab India Limited, Apar Industries Limited	
12	DC Cables	Lapp, Bizlink, KEI, Polycab, Universal, HAVELLS, Finolex, NICCOCABLES, RAVINCABLES, RPG, TORRENT CABLES, Siechem Technologies Pvt Ltd, Torrent Power Limited, Apar Industries Limited, Polycab India Limited, Ravin Cables Ltd, KEC International Limited	
13	HT OH Line Conductors	NA	
14	HT OH Line	NA	
15	Battery Charger	NA	
16	UPS	Emerson, NUMERIC, Hitachi, Dubas, HIREL, HITACHI-HIREL, ConsulNeowatt, Numeric, PowerOne Micro systems Pvt Ltd	
17	Batteries	Exide, HBL, Amco, HBL Nife, Consul Neowatt, Voltech, HBL Power Systems Ltd, Exide Industries Ltd, Amara Raja Power Systems Ltd	
18	SCADA	Honeywell, GE, Schneider, Rockwell, Allan Bradley ALSTHOM, BHEL, Emerson, GE Fanuc, Hitachi, L&T, Siemens, Rockwell Automation India Pvt Ltd, Trinity Touch Pvt Ltd, ABB India Ltd, GE Intelligent Platforms Pvt. Ltd	
19	C&R Panel	----	
20	Numerical Relays	Schneider, Alstom, L&T, ABB, Siemens, AREVA, GE, C&S Electric Ltd, Ashida Electronics	
21	Transformer Fire protection system / NIFPS	TYCO, AGNI, HONEYWELL, KIDDE, Mather & Platt, Notifier, Agni Easun -MR, CTR Manufacturing Industries Ltd, Vendere, Tectonicus Services (India) Pvt. Ltd	

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22	Fire detection alarm panel	AGNI, Honeywell, KIDDE, Mather & Platt, Notifier, TYCO, Ravel electronics Pvt Ltd, MX Systems International Pvt Ltd	
23	ABT Energy Meter	ABB, Elster, Secure, L&T, Electrical Controls & Systems	
24	WMS (Class A meteorological Sensors and data loggers)	Pyranometer: Kipp & Zonen. Wind Sensor: Davis Instruments, Firstrate sensor Products, Lufft, Jambhekar, Equinox. Ambient temperature: Mas Technologies, Rotronic, IMT, Campbell Scientific, Jambhekar. Data Logger: Aeron, Trinity Touch, Jambhekar	
25	Tracker system	----	

B. Class II items:

Sl. No	Equipment list for Class II items	Category II / Make	Bidder to Specify Sub Vendor Name(s)
1	Cable termination kits	Raychem, 3M, Denson	
2	LED Lamp fixtures for indoor	Bajaj, CGL, Havells, Philips, Wipro	
3	LED Flood light fittings for outdoor	Bajaj, CGL, Havells, Philips, Wipro	

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III. COMMERCIAL FORM

1. FORM OF BID - Part-I (Techno-Commercial)

Sl.No	Description	Bidder Acceptance
1.0	Having carefully examined the Tender Documents attached to your Invitation to Bid No Tender No. CO CONTS/0024P/600 MW Solar/ BOS /e-contrs/2023, Dt.30.08.2023 and its Amendments / errata / Corrigendum / Clarifications issued till the date of tender opening, we agree to Complete the WORKS in conformity with all the terms and conditions stated in Tender Documents and its Amendments / Errata / Corrigendum / Clarifications issued till the date of tender opening and as per time schedule given in Tender Document. The Plant, Equipment and System offered are of best and of latest technology and of international standards.	Yes
2.0	I / We declare and certify that I / We fully satisfy the eligibility criteria and the documentary proof as called for, have been attached.	Yes
3.0	We undertake, in case our bid is accepted, to commence the work from the date of Letter of Award and to complete and deliver the whole of the work and responsibilities comprised in the contract as per time schedule given in Tender document.	Yes
4.0	We are submitting the Bid Guarantee as per the format as instructed by you. This Bid Guarantee shall be governed as per the stipulations provided in the "Instructions to Bidders".	Yes
5.0	We agree to abide by and keep our Bid valid initially for a period of 150 days from the date of opening of Bid (Part-I) by NLC India Ltd. (NLCIL) and it shall remain binding on us and may be accepted at any time before the expiry of that period.	Yes
6.0	Should our Bid be accepted, we hereby agree to abide by and fulfill all terms and conditions of Tender Documents as accepted by us and in default thereof, to forfeit and pay to NLC India Ltd or NLC India Ltd.'s successors, assignees or authorized nominees such sums of money as are stipulated in conditions contained in Tender Documents and agree to furnish Bank Guarantee for Contract Performance as per the proforma prescribed by NLC India Ltd and acceptable to NLC India Ltd and for the sum equal to 10% of the "Contract Price excluding O&M price for 3 years", for the entire scope of work within 30 days from the date of Letter of Award.	Yes
7.0	We understand that NLC India limited is not bound to accept the lowest or any bids received and NLCIL has the right to reject any bid without assigning any reason whatsoever.	Yes

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8.0	This Bid together with written acceptance thereof shall constitute a binding ‘CONTRACT’ between NLCIL and CONTRACTOR till a formal contract is executed.	Yes
9.0	We have noted the contents of clause 6.0 in Section-1 of Volume 1A in line with DPIIT order and its subsequent Amendments and confirm compliance to the requirements	Yes

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2. AFFIDAVIT

Sl.No	Description	Bidder Response
1	FROM: (NAME & ADDRESS OF BIDDER)	Header
2	BIDDER/FIRM NAME:	Text Area Entry (Mandatory)
3	Address Line-1:	Text Area Entry (Mandatory)
4	Address Line-2:	Text Area Entry (Mandatory)
5	City:	Text Entry (Mandatory)
6	State:	Text Entry (Mandatory)
7	Pincode:	Number Entry (Mandatory)
8	Name of the Authorized Signatory	Text Area Entry (Mandatory)
9	Bidder's Offer Number and Date:	Text Area Entry (Mandatory)
10	Whether the authorized signatory is Partner / Legal Attorney / Proprietor / Accredited Representative of the bidder? (Please mention the applicable one i.e "Partner or Legal Attorney or Proprietor or Accredited Representative")	Text Area Entry (Mandatory)
11	We do hereby declare that the contents of the offer submitted against this tender CO CONTS/0024P/600 MW Solar/ BOS /e-contrs/2023, Dt.30.08.2023 have been submitted after fully understanding that the information contained in the offer and the documents enclosed/ provided along with the bid are true, correct and complete in every aspect and that if any information contained therein found to be false/incorrect/fabricated, offer shall be considered as null and void and we shall be liable for any penal action as per the provisions of Law for the time being in force. i). I/We (as mentioned above) declare that; we are submitting our offer/bid for the supply of equipments / materials/works/services vide our offer mentioned above. ii). The contents/enclosures/documents of the offer are submitted after fully understanding that all the information furnished by me / us are correct and true and complete in every respect and all documents/credentials	I Agree

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	submitted along with the offer/bid are genuine, authentic, true and valid. iii). During the verification of offer or even at a later date, if any information or document submitted by me/us found to be false /fabricated/ incorrect, the said offer shall be considered absolutely null and void and action as deemed fit shall be taken against me / us including forfeiture of EMD/Bid Guarantee/ Security Deposit /Contract Performance Guarantee and action of suspension/banning/ debarring/ blacklisting of my / our firm (including all partners of the firm)/company as per the tender conditions and law.	
12	We do hereby submit the above declaration as per the format of the Affidavit given in the Tender Document, duly accepted and digitally signed.	YES

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3. PUBLIC PROCUREMENT POLICY (MAKE IN INDIA) FORM

Sl.No.	Public procurement policy (Make in India)	Bidder's Response
1.	Do you certify that you have read conditions as specified in the Order applicable for this Tender in the Department for Promotion of Industry and Internal Trade (DPIIT), revised Public Procurement (Preference to Make in India) Order 2017 - Revision Dt 16.09.2020 and its amendments as in Clause 6.0 as per Section-1 of Volume 1A. and MoP vide Order No.: A-1/2021-FSC-Part(5), Dt: 16.11.2021	Yes
2.	The Bidder to confirm compliance to the requirements of Public Procurement Policy (Preference to Make in India) as in Clause 6.0 as per Section-1 of Volume 1A.	Yes
3.	The bidder to confirm that they are Class-I local supplier as per Cl.6.3 as per Section-1 of Volume 1A.	Yes/No
4.	The Bidder to attach self-certification that the item offered meets the local content requirement for 'Class-I local supplier' as per Clause 6.5(a) as per Section-1 of Volume 1A.	Upload Files
5.	The Bidder to attach a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content as per Clause 6.5(b) as per Section-1 of Volume 1A	Upload Files
6.	Bidder hereby certify that I have read the "Reciprocity Clause" and I am not a bidder from the Entities of countries which have been identified by the Nodal Ministry/ Department as not allowing Indian companies to participate in their Government procurement for any item as per Clause 6.6 as per Section-1 of Volume 1A.	Yes
7.	Upload certification for not being a bidder from the Entities of countries which have been identified by the Nodal Ministry/ Department as not allowing Indian companies to participate in their Government procurement for any item.	Upload Files
8.	The Bidder to attach confirmation certificate (refer model certificate as in 6.7.1 & 6.7.2) regarding restrictions on procurement from a country which shares a land border with India as per Clause 6.7 of Section 1 of Volume 1A	Upload Files
9.	Bidder to certify that I have read and complied to "Protect the security, integrity and reliability of the strategically important and critical power supply system & Network in the Country" as per Cl 6.8 of Section-1 of Volume - IA of tender Specification.	Yes

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4. ACCEPTANCE FOR COMMERCIAL CONDITIONS

Sl.No.	Description	Bidder Response
1.0	Please confirm acceptance of all commercial terms and conditions stipulated in the tender document including Corrigendum/ Amendments/ Clarification/ Errata issued, if any without deviation.	YES
2.0	Any other information, the bidder wants to furnish	Upload Files

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5. BIDDER'S DETAILS

Sl. No.	Description	Bidder's Response
1.0	Particulars of the firm	Header
1.1	Bidder's Name and Address	Text Area Entry (Mandatory)
1.2	Telephone No.	Text Entry (Mandatory)
1.3	Fax No.	Text Entry (Optional)
1.4	E – Mail address	Text Entry (Mandatory)
1.5	Name of Contact Person	Text Area Entry (Mandatory)
1.6	Mobile Number of Contact Person	Text Area Entry (Mandatory)
1.7	PAN No. of the Bidder	Text Area Entry (Mandatory)
1.8	GST Registration No.	Text Area Entry (Mandatory)
1.9	MSME Details, if applicable	Text Area Entry (Mandatory)
1.10	Other Statutory Registration No., if any	Text Area Entry (Optional)
1.11	Name and full address of Chief executives	Text Area Entry (Mandatory)
1.12	Upload copies of PAN, GST Registration certificate, any other statutory documents	Upload Files
2.0	Bank Details	Header
2.1	Name of the beneficiary	Text Area Entry (Mandatory)
2.2	Bank A/c No.	Text Area Entry (Mandatory)
2.3	Name of the Bank	Text Area Entry (Mandatory)
2.4	Name of the Branch	Text Area Entry (Mandatory)
2.5	IFS Code (For NEFT/RTGS Payment)	Text Area Entry (Mandatory)
2.6	BANK ADDRESS	Text Area Entry (Mandatory)
2.7	BANK FAX NO.	Text Entry (Optional)
2.8	BANK EMAIL-ID	Text Area Entry (Mandatory)
2.9	Bank Phone No.	Text Area Entry (Mandatory)
2.10	Upload Supporting Documents for the applicable items	Upload Files



BOS WORKS FOR SETTING UP OF 600(6X100MW) MW GRID CONNECTED SOLAR POWER PROJECT AT KHAVDA, GUJARAT.

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6. CHECK LIST FOR BID SUBMISSION

Sl. No	Description	Bidder's Response
1.0	Whether the bidder has enclosed the following documents in Original in Physical Cover of Part-I? • Details of Payment made towards Cost of Tender document. • Bid Guarantee as per Annexure –A • Power of Attorney / Authorization with the seal of the company in favour of the person signing the Bid. • Integrity Pact duly signed as per Annexure-E • Joint Deed of Undertaking, if applicable, as per Annexure-F • Form of undertaking by Holding Company, if applicable (as per Annexure-G) • Proforma of certificate from the CEO/CFO, if applicable (as per Annexure-H) • Checklist for Bid Submission	Yes
2.0	Bidder to submit their Physical Cover within the stipulated time to the Office of the Chief General Manager / Contracts, Corporate Office, Block-1, NLC India Limited, Nevyeli-607801, Tamil Nadu, India.	Agreed
3.0	Bidder has filled and digitally signed online Affidavit submitted	Yes
4.0	Bidder has attached Details of Documentary evidence for meeting eligibility Criteria by the bidder (i.e., Class I Local Supplier)	Yes
5.0	Bidder has duly filled in Schedule of Prices	Yes
6.0	Bidder has attached Details of sub-contractors /sub-suppliers/sub-vendors	Yes/No
7.0	Bidder has attached documents to confirm compliance to the requirements of Public Procurement Policy (Preference to Make in India) as in Clause 6.0 in Section -1 of Volume 1A	Yes
8.0	Bidder has confirmed that they are Class-I local supplier as per Cl.6.3 in Section -1 of Volume 1A	Yes
9.0	Bidder has attached self-certification that the item offered meets the local content requirement for 'Class-I local supplier' as per Cl.6.5(a) in Section -1 of Volume 1A	Yes
10.0	Bidder has attached a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content as per Cl.6.5 (b) in Section -1 of Volume 1A	Yes
11.0	Bidder has attached Integrity Pact duly signed as per Annexure-E	Yes
12.0	Bidder has confirmed that they have filled and submitted all the Commercial and Technical forms as per tender.	Yes
13.0	Bidder accepted the points mentioned in other requirement as in Clause No. 4.0 (4.1 to 4.11) in Section -3 of Volume 1A	Yes
14.0	Bidder to provide the self-attested print out of the online IT statement indicating zero tax liabilities for four consecutive years prior to the original schedule date of tender opening.	Upload Files

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7. FORM OF BID - Part-II (Price)

Sl.No.	Description	Bidder's Acceptance
1.0	I/We, the undersigned have carefully examined and understood the Tender Documents including the Amendments/ Errata/ Corrigendum/Clarifications issued till the date of Tender Opening. I/We hereby agree to carry out the entire works as described in the specifications in conformity with the specifications and Tender Documents, as per prices quoted by us in the Schedule of Prices (Schedule F1 – Table 1) enclosed herewith.	Yes
2.0	In the event of our offer being accepted, we agree to furnish a Bank Guarantee for Contract Performance as per the proforma prescribed by NLC India Limited and acceptable to NLC India Limited and for the sum equal to 10% (Ten percent) of “Total Contract Price excluding O&M price for 3 years” within 30 days from the date of Letter of Award.	Yes



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SECTION -5

SCHEDULES

 NLC INDIA CREATING WEALTH FOR WELLBEING	BOS WORKS FOR SETTING UP OF 600(6X100MW) MW GRID CONNECTED SOLAR POWER PROJECT AT KHAVDA, GUJARAT.	VOLUME – IA

**SCHEDULE OF PRICES-F1
TABLE 1**

Sl. No.	Description	Price	GST	Total Price
1.0	Schedule-1 Site Preparation Works			
1.1	Lumpsum and firm price for Site preparation Works			
2.0	Schedule-2 Plant and Equipment			
2.1	Lumpsum and firm price for supply (excluding Solar PV Modules, IDT, Central Inverter, HT cables & HT Switch Gears) & delivery of items including Design, Engineering Manufacturing, Shop Testing, packing, forwarding, loading into container, all Transport charges including Transit Insurance, Unloading at Site, Stacking & Storage inclusive of all taxes and duties. (Also, the price shall include Receipt, Unloading, storage, of PV Modules, IDT, Central Inverter, HT cables & HT Switch gears)			
3.0	Schedule -3 Installation and Commissioning			
3.1	Lumpsum and firm Price for erection, testing and commissioning of 600 MW Solar Power plant including Solar PV Modules, IDT, Central Inverter, HT cables & HT Switch gears & all items as per scope, Storage & Erection Insurance inclusive of all taxes and duties.			
4.0	Schedule -4 Civil and Structural Works			
4.1	Lumpsum and firm price for complete civil and structural engineering works including design and engineering. This shall be the total price for complete civil and structural engineering works at site as per the technical specification inclusive of all taxes and duties.			
5.0	Total EPC Cost including all taxes and duties (Sum of 1.1, 2.1, 3.1 and 4.1)			

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Sl. No.	Description	Price	GST	Total Price
6.0	Schedule-5 Operation and Maintenance (O&M) for 3 years			
6.1	Lumpsum and firm price for O&M of Solar Power Plant of 600 MW capacity for 3 years as per technical specification inclusive of all taxes and duties. Note: O&M price for 3 years shall be minimum 2% of EPC cost.			
7.0	Total price for BOS works for setting up of 600 MW Solar power project including O&M for 3 years [i.e., Total Capital Expenditure (CE)] (Sum of 5.0 and 6.1)			
8.0	Upload the supporting documents for Schedule-5 - Mandatory			

Note:

- Bidders shall quote the prices in the above format only. The price quoted in this format alone shall be considered for Evaluation and comparison as per clause No.3.23 of Section 3 of Volume-1A.
- Any item of work not mentioned in the above particulars but written elsewhere in the scope of work (or) in Technical Specification (or) essentially required for completion of works (or) proper operation and maintenance of Solar power plant (or) safety of equipment and operating personnel shall be deemed to have been included in the above particulars.
- O&M price quoted for 3 years shall not be less than 2% of Total EPC cost quoted by the bidder. Further the bidder shall furnish price Breakup for O&M price for 3 years quoted in Schedule-5 in Sl. No 6.1 and the price breakup shall have minimum escalation of 3.5% per year.
- Download Spread sheet for calculating the O&M Charges (Schedule of Prices F1 -Table-2) (Sl. No 6.1)
- The bidder shall upload the signed copy of the Spread sheet for calculating the O&M Charges (Schedule of Prices F1 -Table-2) (Sl. No 6.1)
- In case of any Arithmetical errors between the prices quoted in the system (i.e., Schedule of Prices: F1 table-1) and the Final price in the calculation sheet (i.e., Spread sheet) attached along with the Schedule of Prices, the prices quoted in the system (Schedule of Prices: F1-Table -1) will only be considered by the system for Evaluation. This price shall be binding on the Contractor.
- Bidder shall note that Total price of 600 MW Solar Power Project including O&M for 3 years in Sl. No.7.0 is equal to Total Capital Expenditure (CE) in Rs. = {EPC cost (Schedule-1 + Schedule-2 + Schedule-3 + Schedule-4) + O&M price for 3 years (Schedule-5)}
- Bidder to quote GST on ceiling basis wherever applicable in the column provided.
- Bidder shall attach Form of Bid, Part II, as per Annexure – C of Section 3 of Volume 1A.

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Schedule of Prices -F1
Price Break up of O&M for 3 years
Table -2

Lumpsum and firm price for O&M of Solar Power Plant of 600 (6X100) MW capacity for 3 years as per technical specification inclusive of all taxes and duties				
S.No	For the year	Quoted Price in Rupees	Quoted GST in Rupees	Total Quoted Price in Rupees including GST
		(a)	(b)	c = (a+b)
1	1 st Year after SCOD			0
2	2 nd Year after SCOD			0
3	3 rd Year after SCOD			0
Schedule-5 (Total O&M Charges in Rupees including GST).				0

Note:

O&M price quoted for 3 years shall not be less than 2% of Total EPC cost quoted by the bidder. Further the bidder shall furnish price Breakup for O&M price for 3 years quoted in Schedule-5 in Sl. No.6.1 and the price breakup shall have minimum escalation of 3.5% per year.



**BOS WORKS FOR SETTING UP OF 600(6X100MW) MW
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**SCHEDULE-F2
OVERALL TIME SCHEDULE
FOR BOS PACKAGE OF 600 MW SOLAR POWER PROJECT
(Bidder to fill-in and submit with its Bid)**

S. No	Activities/Milestone	Period in Months from LOA	
		Start	Finish
1	Engineering for the Project		
	Submission of Master Drawing List from the date of LOA		
	Submission, Review and approval of drawings		
2	Supplies		
	Supply of Tracker & Structure and DC cables		
	Supply of Balance of System		
	Supplies of PCSS & MCR		
3	Civil Works		
	Site Preparation Works		
	MMS, PCSS and Main Control Room		
	Approach Road, drainage system & internal roads		
4	Erection & Installation Works		
	Erection and Installation of Electrical & Associated Equipment's.		
	Testing of Equipment and Readiness of SCADA		
5	Evacuation Works		
	Erection, Testing and Commissioning of 600MW SPP upto point of connection (33KV Side of 33/400KV Solar Park PSS).		
6	Commissioning Activities		
	CEA inspection and Commissioning of Solar PV Plant.		
	Commercial Operation as per GEDA/ DISCOM/ GETCO/CTU Commissioning Committee of Solar PV Plant		
	Completion of SCOD		
7	O&M Target Generation Test (OTGT) (i.e., 03 months from SCOD)		
8	O&M Start time (After completion of SCOD)		

Signature :
Name :
Designation :
Company :

Company Seal

Date :

	BOS WORKS FOR SETTING UP OF 600(6X100MW) MW GRID CONNECTED SOLAR POWER PROJECT AT KHAVDA,GUJARAT.	VOLUME – IA

SCHEDULE F3

DEVIATION SCHEDULE TO DRAFT CONTRACT

NOT APPLICABLE

	BOS WORKS FOR SETTING UP OF 600(6X100MW) MW GRID CONNECTED SOLAR POWER PROJECT AT KHAVDA, GUJARAT.	VOLUME – IA

SCHEDULE F4

DEVIATION SCHEDULE TO TECHNICAL SPECIFICATION

NOT APPLICABLE

	BOS WORKS FOR SETTING UP OF 600(6X100MW) MW GRID CONNECTED SOLAR POWER PROJECT AT KHAVDA, GUJARAT.	VOLUME – IA

SCHEDULE F5

REQUIREMENTS OF CONTRACTOR AT SITE

NOT APPLICABLE

	BOS WORKS FOR SETTING UP OF 600(6X100MW) MW GRID CONNECTED SOLAR POWER PROJECT AT KHAVDA, GUJARAT.	VOLUME – IA

SCHEDULE F6

CONTRACTOR RESOURCE DEPLOYMENT SCHEDULE

The Bidder shall indicate the schedule of manpower resources proposed to be deployed at the site for executing the BOS works for 600MW Solar Power Project (Bidder to fill-in and submit with its Bid)

S. No.	Type of Resource	Months							
		1	2	3					

Signature:

Name:

Designation:

Company:

Date:

Company Seal

SCHEDULE F7

Schedules of Weights & Dimensions

The bidder shall state below the weights and dimensions of various packages for shipment, comprising the complete scope.

(Bidder to fill-in and submit with its Bid)

Description	Dimensions (in metres) l x b x h	Weight (in tonnes)

Total for the complete scope of works Tonnes.

Signature:

Name:

Designation:

Company:

Date:

Company Seal



NLC INDIA LTD
‘Navratna’ - Government of India Enterprise
Block-1, NEYVELI - 607 801, Cuddalore District, Tamil Nadu, INDIA.

OFFICE OF THE CHIEF GENERAL MANAGER/CONTRACTS
CORPORATE OFFICE

DOMESTIC COMPETITIVE BIDDING
Through e-Tender & e-Reverse Auction

TENDER DOCUMENT
FOR
BOS WORKS FOR SETTING UP OF 600 (6X100MW) MW GRID
CONNECTED SOLAR POWER PROJECT AT KHAVDA, GUJARAT
UNDER ENGINEERING, PROCUREMENT (EXCLUDING SUPPLY OF PV
MODULES, IDT, CENTRAL INVERTER, HT CABLES & HT SWITCH
GEARS) & CONSTRUCTIONS WITH O&M FOR 03 YEARS

VOLUME – IB
COMMERCIAL – DRAFT CONTRACT

Tender No. CO CONTS/0024P/600 MW Solar/BOS/e-contrs/2023, Dt.30.08.2023

Phone: 04142-212308 / 218588

Web site: www.nlcindia.in

E-Mail: corporate.conts@nlcindia.in

Registered Office: 135, E.V.R. Periyar High Road, Kilpauk, Chennai- 600 010.



**BOS WORKS FOR DEVELOPMENT OF 600 MW SOLAR
PROJECT IN GSECL'S SOLAR PARK AT KHAVDA (GSECL
STAGE-2) WITH THREE YEARS OF O&M**

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**DRAFT CONTRACT
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**BOS WORKS FOR DEVELOPMENT OF 600 MW SOLAR
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STAGE-2) WITH THREE YEARS OF O&M**

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SECTION-1 DEFINITIONS

1. DEFINITIONS

The following words and expressions are used in this Contract (as herein defined and in the Invitation for Bid) shall have the meanings hereof assigned to them, except where the context requires otherwise:

- 1.1. 'Acceptance' shall mean the manifestations by the owner of his assent to the mutually agreed terms of the offer by the bidder.
- 1.2. 'Agreement' shall mean mutual understanding between the parties which creates obligations between each other.
- 1.3. 'Approval of the Purchaser' shall mean the written approval by the 'Purchaser' or 'Consultant' with respect to matters delegated to the consultant by the purchaser of a document or drawing or other particulars or matters in relation to the Contract.
- 1.4. 'Base date' shall mean the first working day of the calendar month, one month prior to the actual date of opening of Bids (Part-I).
- 1.5. 'Bid' shall mean a valid offer made against this tender enquiry, indicating terms, conditions and prices.
- 1.6. Bidder / Tenderer / SDO (Solar Developer and Operator) shall mean a person/party/ firm/ company /consortium who submits an offer/ bid against a tender enquiry.
- 1.7. 'Billing Schedule' shall mean the item, description and Quantities arrived at after detailed design and engineering are prepared. It generally occurs in lump sum Price contracts, where rates are fixed up for such items, based on the Break up prices indicated in the offer.
- 1.8. 'Commercial use' shall mean that use of the equipment for works, which the 'Contract' contemplates.
- 1.9. 'Commissioning' – The Solar Power Project will be considered as commissioned if all equipment as per rated project capacity has been installed and energy has gone into the grid.
- 1.10. 'Compensation' shall mean anything as an equivalent as to make assessment for loss or damage.
 - a) The consideration for services rendered by contract agreed or implied.
 - b) Remuneration for injury suffered, especially when it has resulted in measurable loss or in expenditure.
 - c) Money paid for damage caused by any wrong or breach of contract, to the person defrauded or injured.
- 1.11. 'Completion of erection' shall be defined as to be completion of erection of all the materials and items of the equipment covered under the scope of Contract, successful completion of functional tests.
- 1.12. 'Completion of Handing Over' shall mean that completion certificate as indicated in the technical specifications and conditions of contract.
- 1.13. Completion time for scheduled commercial operation date (SCOD) shall be 12 months from the date of LOA.
- 1.14. 'Condition' shall mean the conditions agreed between the parties and stipulated in the Contract agreement.

- 1.15. 'Consequential damages' mean the damages, claimed in a tort or breach of contract which do not normally follow from the tort or breach.
- 1.16. 'Consultant' shall mean the Consultants appointed by the Purchaser for the 'Project' or their duly authorized representatives.
- 1.17. 'Contractor' shall mean the successful Bidder whose bid has been accepted by the Purchaser and on whom the 'Contract' or 'Purchase order' is placed by the Purchaser and shall include his heirs, legal representatives, successors and permitted assignees.
- 1.18. 'Contract' shall mean and include this contract between the owner and Contractor for the execution of the works as per agreed terms, conditions, specifications prices and enforceable as per law.
- 1.19. 'Contract period' shall mean the period / time schedule agreed in the contract during which period the Contracted work shall be performed / executed, inclusive of any period covered by extension(s), duly issued. '**Contractual Delivery Period**' for the purpose of statutory variations in taxes & duties shall be 12 months from the date of LOA.
- 1.20. 'Contract Price' in relation to particular contract shall mean the total consideration to be paid by the Purchaser to the Contractor. It includes all taxes and duties.
- 1.21. "Contractor's works" or "Manufacturer's works" shall mean the places which are used by the Contractor/Sub-Contractor for the manufacture of equipment.
- 1.22. 'Day' shall mean the period between midnight to next midnight.
- 1.23. Defects liability: For latent defects, the liability period shall be up to 3 (Three) years from the Expiry of Guarantee / Warranty period of equipment or completion of O&M Period.
- 1.24. 'Delivery' shall mean delivery of only such equipment, materials and supplies specified in the Contract and manufactured and/or supplied by the Contractor in accordance with the sequence of delivery schedule of the Contract and in case of construction and erection work, delivery shall mean the approval of the owner to the said construction and erection work.
- 1.25. 'Dimensions' shall mean length, area, volume etc. all expressed in metric system.
- 1.26. 'Drawing' shall mean such drawings provided along with bid documents / furnished during the progress of work by the Contractor and approved by the Purchaser.
- 1.27. 'Date of Contract' shall mean the calendar date on which Purchaser and the Contractor have signed the 'Contract'.
- 1.28. 'Design Charges' shall mean the charges payable for design and engineering of the equipment.
- 1.29. 'Effective date of Contract' shall mean the date of Letter of Award.
- 1.30. 'Engineer' / 'Project Manager' shall mean the Officer nominated by the Purchaser for the performance of the Contract.
- 1.31. 'Equipment Portion of the Contract Price' shall mean the F.O.R. SITE. Price of the equipment components and goods including charges for design, manufacture, shop-testing, packing and forwarding and loading into containers / carriers, Transit Insurance, Transportation and Unloading to the Site.
- 1.32. 'Erection' shall mean the putting up of structures and/or installation of plant and equipment under the Contract by the Contractor and/or under the supervision of the Contractor and will include any service which the Contractor is required to perform at the site with his own

and/or other staff and/or labour and/or Sub-Contractor for the due fulfilment of the Contract.

- 1.33. 'Erection Portion of the 'Contract Price' shall mean the value of field activities of the 'Works' including unloading, handling, storage till erection, erection, commissioning and testing including supervision to be performed at "site" by the Contractor.
- 1.34. Final take over will occur when the following are achieved:
 - i. All supplies and services have been completed as per Contract.
 - ii. The Contractor has met any and all obligations under this Contract
 - iii. Final balance documentation, if any, incorporating latest modifications in 'as built' drawings has been submitted by the Contractor in requisite copies.
 - iv. The Contractor has rectified in a definite manner all objections / observations mentioned in the "Commissioning Certificate" and 'Final Project Punch List'.
 - v. Completion of OTG Test for the plant and submission of Test Reports.
- 1.35. 'Functional tests' shall mean all activities undertaken after completion of erection and shall include mechanical and electrical check outs, safety checks, calibration of instruments and protection devices and such other tests carried out to ensure functional reliability of various sub-supporting systems.
- 1.36. 'Guarantee/ Warranty period of the equipment' shall mean the period of 12 (twelve) months from the date of SCOD.
- 1.37. 'Inspector'/ 'Inspecting Engineer' shall mean any person or persons, or any firm nominated by or on behalf of the Purchaser or his duly authorized agent or Consultant to inspect equipment, supplies, materials or any type of work under the contract.
- 1.38. 'Instructions' shall mean any drawings and/or instructions, oral and/or in writing details, direction and explanations issued by the Consultant or the Purchaser from time to time during the 'Contract Period'.
- 1.39. 'Initial Operation' shall mean all operations undertaken as part of "Commissioning" after completion of "Preliminary Operation" It shall be the first integral operation of the complete plant/system/ equipment covered under this "Contract" and shall include first start-up on no-load and/or partial load and/or full load runs of PV arrays, Inverters and electrical equipment and gathering of operational data, calibration, setting and commissioning of control systems and shut-down inspection and adjustment after running of the plant/system/equipment covered under the Contract.
- 1.40. 'Letter of Award' (LOA) shall mean the official communication issued by the owner notifying legally to the bidder that his bid has been accepted on mutually agreed terms, conditions and prices.
- 1.41. Part Commissioning of the Project shall be accepted subjected to the condition that the minimum capacity for acceptance of first and subsequent part(s) commissioning shall be in blocks of minimum 50MW.
- 1.42. Price Reduction, not as a Penalty, is agreed upon between parties in the Contract towards time delay.
- 1.43. Compensation is agreed upon between parties in the Contract towards shortfall in performance parameters agreed in a Contract.

- 1.44. 'Manufacturer' shall mean a person firm/company who manufactures and/or produces Plant, Equipment, Component Spare Parts etc.
- 1.45. 'Mechanical Completion' shall be defined to be a state of readiness for "Preliminary Operation" after due erection of all the materials and items of equipment covered under the scope of the contract.
- 1.46. 'Mobilisation' shall mean establishment as per contract of sufficiently adequate infrastructure by the Contractor at site inclusive of construction equipment, aides, tools & tackles, setting up site offices with facilities such as power, water, communication etc. establishing man power organisation consisting of Resident Engineers, Supervisory personnel and an adequate strength of skilled, semi-skilled and unskilled workers, who, with the so established infrastructure shall be in a position to commence execution of work at site(s), in accordance with the agreed time schedule of completion of works. 'Mobilisation' shall be considered to have been achieved if the Contractor is able to establish infrastructure as indicated above to begin work at site in accordance with agreed schedule of work to the satisfaction of the Purchaser.
- 1.47. 'Month' shall mean English Calendar month. The month or months unless herein otherwise expressly defined shall mean Calendar month or months.
- 1.48. 'Notice' shall mean any written Notice issued by the owner / Bidder / Contractor.
- 1.49. 'Notice inviting Tender' (NIT)/Notice inviting Bid (NIB) shall mean a Notice published by the owner with the intention to invite offer/ bid for his requirements.
- 1.50. 'Particulars' shall mean the following:
- a) Specification
 - b) Drawing
 - c) Sealed pattern denoting a pattern sealed and signed by the Inspector.
 - d) Proprietary make denoting the product of an individual firm.
 - e) Any other details governing the construction, manufacture, supply and / or erection as per the Contract.
- 1.51. 'O&M Target Generation Test (OTGT)' shall mean such tests as are prescribed in the Technical Specification to be done by the Contractor.
- 1.52. 'Preliminary Operation' shall mean all activities undertaken, as part of "Commissioning" after "Mechanical Completion" upto commencement of "Initial Operation" and include mechanical and electrical checkouts, calibration of instrument and protection devices, commissioning of sub/supporting system of the plant/system/equipment covered under the Contract.
- 1.53. 'Plant, Equipment, Stores, Item or Material' shall mean and include plant, equipment, material, machinery or any part thereof to be provided for and the erection work to be done by the Contractor under the Contract.
- 1.54. 'Price' shall mean the price agreed in the contract between the parties towards the scope of work.
- 1.55. 'Project' shall mean the project specified in the tender documents and specification.

- 1.56. 'Purchaser/Owner' shall mean and include NLC India Limited (NLCIL) and its different functionaries entrusted with the responsibilities in relation to this contract in respect of the area of responsibilities of such functionaries.
- 1.57. 'Provisional take over' shall mean acceptance of prima facie and in principle subject to completion of / fulfilment of certain conditions and entire plant is exporting power to grid. This is not a complete acceptance of work entitling the Contractor to get full payment or to assume that all the obligations and terms and conditions of the contract have been fulfilled to the satisfaction of the Owner / Purchaser.
- 1.58. 'Scheduled Commercial Operation Date (SCOD)' shall be the date on which the commissioning certificate is issued by the purchaser upon successful commissioning of the full capacity of the Project (600MW SPP) including DC overloading.
- 1.59. 'Site' shall mean the land set for the location of the project / work.
- 1.60. 'Specification' shall mean the Technical – Commercial specification including modification set in the tender / contract documents.
- 1.61. "Sub-Contractor/ Sub-Vendor/Sub-Supplier" shall mean the contractor undertaking a part of the work/supply or any person to whom a part of the Contract has been sublet with the consent in writing of the Purchaser and shall include its heirs, legal representatives, successors and permitted assignees.
- 1.62. 'Sublet' shall mean to let out the work to another.
- 1.63. 'Supervision' shall mean the successive control and directions given by the Contractor in relation to Contract work during execution of the Contractor's and/or his sub-Contractor's work.
- 1.64. 'Successful Bidder' / 'Tenderer' shall mean the bidder whose bid is considered for acceptance.
- 1.65. 'Supply' shall mean the goods to be supplied by the Contractor under the 'Contract'.
- 1.66. 'Tender' shall mean the bidder's offer with his terms, conditions, Specifications and prices to perform the scope of work.
- 1.67. 'Test' shall mean such test / tests stipulated or considered necessary by the Inspecting Officers.
- 1.68. 'Time' shall be reckoned by months, weeks, days and hours, month being equivalent to the Calendar month according to the Gregorian calendar. The day or days unless herein otherwise expressly defined shall mean Calendar Day or days of 24 hours each.
- 1.69. 'Time of completion' shall mean the time / period stated / agreed for completing the scope of work specified in the contract.
- 1.70. 'Transport Portion of the Contract Price' shall mean charges on all the mode of transport envisaged under Contractor's scope including inter-carting storage at any intermediate point.
- 1.71. 'Warranty' shall mean Contractor's assurance to the Purchaser that the goods or property is or shall be as represented and if not, it will be repaired and reconditioned or replaced by the Contractor at his cost or expenses.
- 1.72. 'Warranty Period of the equipment' shall mean 12 months from the date of SCOD.



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- 1.73. 'Weight' shall mean the calculation of a load. It is to be stated in ton (1 ton = 1000 kilogram) and / or kilogram (1 Kilogram = 1000 gram).
- 1.74. 'Works' shall mean plant, non-plant, buildings, Structures, Foundations and all plants, Equipment, Components to be provided and other construction/erection services that the contract requires the Contractor to provide.
- 1.75. Terms and expressions not herein defined shall have the same meaning as are assigned to them in the Indian Sales of Goods Act (1930), failing that in the Indian Contract Act (1872) and failing that in the General Clauses Act (1897) and such others as mentioned from time to time.
- 1.76. 'Writing' shall include any manuscript, typewritten or printed statement, under or over signature and/or seal as the case may be.
- 1.77. When the words 'Approved', 'Subject to Approval' 'Satisfactory', 'Equal to', 'Proper', 'Requested', 'As requested', 'Where directed', 'When directed', 'Determined by', 'Accepted', 'permitted', or words and phrases of like import are used the approval, Judgement, direction, etc. is understood to be function of the Purchaser or the Consultant.
- 1.78. Words imparting person shall include firms, Companies, Corporation, associations or body of individuals whether incorporated or not. Words imparting masculine gender or singular number shall also include the feminine gender and plural number and vice-versa where the context so required or permits.
- 1.79. The various Acts and Regulations are normally available for sale from the following address:
 'Deputy Controller -Publication Department,
 Government of India,
 Civil Lines, Delhi - 110 006.
and with leading authorised Government of India book sellers.

SECTION-2

Brief Scope of Work

2. Brief Scope of Work:

2.1. Introduction

The scope of work includes the Design, Engineering, Site development, Manufacture, Inspection at supplier's works, Supply, Insurance, Transport, Storage, Erection, Installation, Testing & Commissioning of the total capacity of 600 (6X100) MW SPP and the Evacuation System up to the Point of connection (i.e., 33KV side of 33/400KV Pooling Sub Station) Except Supply of Solar PV Modules, IDT, Central Inverter, HT cables & HT Switch Gears.

The scope also includes necessary arrangements/supports to enable SPD to Declare Scheduled Commercial Operation Date (SCOD) after entire commissioning of SPP with DC overloading and conducting O&M Target Generation Test (OTGT). The scope also includes Operation & Maintenance (O&M) of entire SPP up to Point of connection. Standard 3 years O&M shall start from the date of SCOD. In addition, Scope also includes Annual Maintenance Contract (AMC) of SCADA & Tracker for Six (6) years starting from 4th year to 9th year (i.e., on completion of 03 years O&M of 600 (6X100) MW SPP).

This Scope of Work is indicative only. Detailed Scope of Work is contained in Volume-II (Technical Specification).

2.2. SCOPE OF SUPPLY

2.2.1. Plant & Equipment

The scope of supplies and services of the Contractor for setting up of 600 MW Solar Power Project is described in Technical Specification and the relevant Annexures subject to General Terms and Conditions of Contract in Section-10 of this Volume.

2.2.2. Spares

The Contractor shall maintain Spares and consumables as defined in the Technical Specification.

2.3. SCOPE OF SERVICES

2.3.1. Technical Services

The Contractor shall be responsible for the following services including those Services stipulated elsewhere in the Tender Specification:

2.3.1.1. Detailed design and engineering

2.3.1.2. Technical services relating to planning, procurement, manufacturing, inspection, expediting, packing, shipping, storing, etc.

2.3.1.3. Project management services and complete feedback of data and information to Purchaser regarding Contractor's scope of supply and services.

2.3.1.4. Time bound project co-ordination relating to transportation, insurance, claim settlement, inspection, construction planning and scheduling, erection planning, field construction engineering, testing, start up, trial run, commissioning and OTG tests. The

Contractor shall bring his own or Sub-Contractor(s) Specialists for the performance of the above-mentioned works.

- 2.3.1.5. Total day to day supervision of construction including erection and specialized services, if any.
- 2.3.1.6. Technical consultation/liaison/guidance relating to detail design and plant engineering by its sub-Contractors.
- 2.3.1.7. Quality control and adherence to the time schedule control of site work and other works.
- 2.3.1.8. Start-up trial runs and commissioning services.
- 2.3.1.9. Demonstration of OTG tests by deputing commissioning engineers/specialists.
- 2.3.1.10. Clearance for installations including power evacuation system from the statutory and other concerned authorities on behalf of Purchaser. The Contractor shall also assist in preparing application forms, providing necessary drawings, documents, test certificates etc., including necessary co-ordination with statutory and other concerned authorities.
- 2.3.1.11. All applications will be filed on the name of purchaser. Statutory fee if any will be paid by Purchaser for approval.
- 2.3.1.12. Submission of complete as built drawings/documents, O&M Manuals etc., as instructed by the Purchaser.
- 2.3.1.13. The Contractor shall be responsible for supply of all the drawings and technical documents & information in respect of the plant & equipment. The Contractor shall deliver the drawings, technical documents and information to the Purchaser and their authorized agency.
- 2.3.1.14. Detailed Scope of Work:** The detailed scope of work covers the following activities and services in respect of all the equipment & works specified and covered under the specifications. All equipment, materials and services whether explicitly stated or otherwise and that are necessary for the satisfactory operation of the Solar PV System and its integration as described in the specification shall be deemed to be included in the scope of work of the Contractor and shall not be limited to the following:
 1. Site preparation like vegetation removal, soil grading and levelling of the Project area.
 2. Conducting Topographical survey, Geo-Technical investigation and Soil Resistivity test in all the site locations.
 3. Detailed Design and Engineering of all the equipment and equipment system(s) including civil works.
 4. Submitting the engineering drawings, data sheets, process calculations, test certificates and reports, structural design calculations, Equipment layout, Civil structural/architectural Drawings for Review and approval by SPD/SPDs Engineering consultant.
 5. Finalization of sub-vendors, manufacturing quality plans and Field quality plans.
 6. Purchase, testing, packing and transportation from the manufacturer's works to the site including customs clearance & port clearance, port charges, (if any) of all the equipment of SPP (excluding supply of Solar PV Modules, IDT, Central Inverter, HT cables & HT Switch gears), Evacuation System i.e., all the equipment, system, sub-

- system etc. and receipt, storage, preservation and conservation of equipment at the site and protecting the material from theft, fire including Free Issue items by SPD.
7. Receipt, Unloading, storage, erection, installation, testing and commissioning of Modules, IDT, Central Inverter, HT cables & HT Switch gears supplied by SPD.
 8. Fabrication, pre-assembly, (if any), erection, testing, pre-commissioning and commissioning and putting into satisfactory operation of all the equipment, system, sub-system etc. as mentioned above, Starting from the solar PV modules sections to Point of connection.
 9. Approval from CEA/statutory authorities of Central/State, before charging of the plant.
 10. Contractor shall obtain project insurance for 600 (6X100) MW SPP for the entire period of Contract excluding O&M.
 11. Submitting the O&M Target Generation (OTG) Test procedure, Operation & Maintenance/ instruction manuals, As-built drawings and other information for SPD/ SPDs Engineering Consultant Review and acceptance.
 12. Warranty for the Works and Equipment of SPP complying to the conditions stipulated below:
 - a) The mechanical structures, electrical works and overall workmanship of the grid solar power plant must be warranted for a period of 12 months from the date of SCOD.
 - b) Transfer of Warranty by OEM for the Equipment after Contract Period to SPD as applicable.
 13. Solar O&M - Entire SPP up to Point of connection for 3 years from the date of SCOD.
 14. The Contractor shall furnish all the relevant documents and provide all necessary support to SPD in the Works related to connectivity approval and other statutory approvals.
 15. The Contractor shall furnish all the relevant documents and provide all necessary support to SPD in the Works related to filing of petitions (if any) and appearing for the petitions before Hon'ble Regulatory Commission/Court pertaining to the Project.
 16. Settlement of any disputes related to BOS works with public/statutory bodies / local authorities state authorities etc. shall rest with Contractor.

2.3.2. **Supervision**

The Contractor shall depute Technical personnel/ Specialists from various disciplines for the supervision of construction work under his scope of work. The above-mentioned Technical personnel/Specialists shall supervise the construction and commissioning of the Project so as to establish to the Purchaser that the guarantees as agreed by the Contractor are fully met.

2.3.3. **Construction & Erection Works**

- 2.3.3.1. The Contractor shall mobilize all necessary construction and erection tools & tackles, small hand tools, instruments, all commissioning instruments, bolts, nuts, washers, jigs and fixtures, winches, alignment tools etc. and the material handling equipment such as cranes, hoists etc., welding equipment and accessories, measuring instruments,

temporary supports and staging, consumables (e.g. welding gas, electrodes etc.), erection packs etc. for erection of steel structures, and other equipment which may be required for carrying out the construction and erection work efficiently within the time schedule provided herein in the Contract. The Contractor shall ensure that proper documentation is followed at entry gate of Purchaser's premises for such items which shall be carried back by Contractor after completion of work.

- 2.3.3.2. The Contractor shall carry out any and all such works, as may be required, to build the project complete in all aspects as per the Contract Specification.
- 2.3.3.3. The Contractor shall make all necessary arrangements to deliver the equipment at the project site by wagons/trucks/trailers, build his own stores (covered, uncovered, air-conditioned, if necessary) for the proper storage of equipment, maintain the stores and all related documents and records, transport the equipment to site for erection purpose. Necessary security arrangements also shall be made by the Contractor. Area required for construction of stores and construction site office, labour colony, etc. shall be made available by the Contractor.
- 2.3.3.4. The Contractor shall unpack and do visual checking against physical damages to the equipment/cases, clean equipment before start of erection. Damage/ shortage, if any, will be reported to the Purchaser and shall be rectified/replaced expeditiously, so as not to upset the erection and commissioning schedule. Delay on account of settlement of insurance claims by the Contractor shall not be considered as an excuse for delay in completion of erection and commissioning.
- 2.3.3.5. The Contractor shall erect and maintain his own site offices and stores, as required for the work and arrange for proper housekeeping and up-keep of the area.
- 2.3.3.6. The Contractor shall provide sufficient fencing/barricade, notice boards, signage and lighting to protect and warn others as may be considered necessary by the Purchaser. All materials used for providing these facilities shall be the property of the Contractor.
- 2.3.3.7. The Contractor shall mobilize adequate material handling equipment such as mobile cranes, forklifts, trailers, dozers, winches etc. in addition to other erection tools & consumables keeping in view the erection schedule. The Contractor shall provide within two weeks from the date of Letter of Award, his scheme for mobilization with Bar Chart indicating clearly the resources, manpower and machinery proposed to be deployed to ensure timely completion of work and quality of workmanship.
- 2.3.3.8. Underground services, if any to be diverted / protected shall be the responsibility of the Contractor and shall be informed to the Purchaser. Approval from authorities required for such works shall be obtained by the Contractor. The compensation / statutory payments if any for such works shall be borne by the Contractor.
- 2.3.3.9. The Contractor shall organize the work in such a manner that work being carried out simultaneously at site is not impeded and the workmen not endangered and shall arrange all temporary access as required for the erection work.
- 2.3.3.10. The Contractor shall carry out base/primer and final painting of all Plant & Equipment, Structures, Pipelines, etc. supplied. The painting including its process shall be carried out as specified in the detailed technical specification. Where not specified, the same

shall be as per the standard codes & practices normally applicable and adopted internationally for the type of Plant & Equipment offered.

2.3.3.11. Grouting of the equipment and steel structures on the foundations with approved non-shrink-grouting compound shall be the responsibility of the Contractor. The grouting materials shall be supplied by the Contractor.

2.3.3.12. All safety, health and pollution control measures as required to be adopted as per the statutory regulations and the safety codes for projects issued along with the tender or otherwise required or implied by local statutory regulations or practices shall be strictly followed by the Contractor during the entire duration of execution of the Contract. The Contractor shall set up a suitable safety organization of its own at site, in this regard.

2.3.3.13. The Contractor shall not dispose of, transport or withdraw any tools, tackles, equipment, and material provided by him for the "contract" without taking prior written approval from the Purchaser.

2.3.4. Demonstration of O&M Target Generation Test (OTGT):

O&M Target Generation Test has to be carried out to monitor and assess the overall plant performance after SCOD and also the other parameters as in Technical specification.

2.3.5. Construction Power:

The Contractor needs to arrange the Construction Power Supply at the project location for construction purpose. Control, protection, distribution inside the solar power plant area shall be made by the Contractor at his own cost.

2.3.6. Water during Construction & O&M:

- i. Water supply need to be arranged by the Contractor at his own cost during construction period. During O&M period of Solar Power Plant, water will be provided at one point of each plot (i.e., 100 MW Block). The Contractor shall arrange for Metering, storage sumps, pumps and distribution piping to various locations within the solar power plant. Water charges will be recovered based on actual usage during O&M phase if Applicable.
- ii. Water supply to a maximum of 6 KL/MW/Cycle is envisaged to complete three cleaning cycle every month. However, the supply of water shall be depending upon the availability of water. In view of special geographical conditions of the Park, contractor shall preferably provide Dry Cleaning System for the solar module cleaning.
- iii. It is the responsibility of the Contractor to make his own arrangements for the uninterrupted supply of construction water for the construction activities & labour colony at their own cost. Extra Claim on any account by the Contractor due to non-supply of water by the Purchaser shall not be considered both for cost & time.

2.3.7. Codes and Standards

All works to be executed and/or engineering services and technical services to be rendered under this Contract, shall be completed in the manner set out in this Contract

and in accordance with the specified codes, Standards and best trade/ engineering practices. Wherever the codes are not mentioned or in case of code discrepancies, relevant Indian Standards / International Standards approved by Purchaser shall be followed.

2.3.8. Total Responsibility

The Contractor shall be solely responsible for the entire supplies, engineering services and technical services, irrespective of whether supplies and services have been made/ rendered by him directly or by his Sub-Contractor.

2.3.9. Local Conditions

Minimum wages for contract labour shall be paid as applicable in that region from time to time. Claims and objections due to ignorance of site conditions will not be considered after submission of Bid.

2.3.10. General

- 2.3.10.1. The Contractor is required to carefully examine the Technical & General Specification, Terms and Conditions of Draft Contract, drawings and other details relating to work as given in the Tender Document and fully acquaint himself as to all conditions and matters which may in any way affect the work or the cost thereof. The Contractor shall be deemed to have on his own and independently obtained all necessary information for the purpose of preparing the Bid and his bid as accepted shall be deemed to have considered all contingencies as may arise due to such information or lack of the same.
- 2.3.10.2. The Contractor shall be deemed to have exhaustively examined the Tender documents including the Draft Contract, to have obtained all information and clarifications on all matters whatsoever that might affect the carrying out of the work and to have satisfied himself as to the adequacy of his Bid. He is deemed to have known the scope, nature and magnitude of the work and the requirements of materials and labour involved etc. and as to all work he has to complete in accordance with the Contract whatever be the defects, omissions or errors that may be found in the Tender/Bid Documents.
- 2.3.10.3. The Contractor shall be deemed to have acquainted himself with the Indian Income Tax Act, 1961, Indian Companies Act, 1956, Indian Customs Act, 1962, Indian Electrical Act, State Electricity rules and regulations & State Renewable Energy rules and regulations of State Government, Factories Act, Pollution Control Regulation and other related Acts & Laws prevalent in India and as amended from time to time. The Purchaser shall not entertain any request for clarifications from the Contractors regarding such local conditions.
- 2.3.10.4. Any neglect or omission or failure on the part of the Contractor in obtaining necessary and reliable information as stated above or on any other matter affecting the Contractor shall not relieve him from any risks or liabilities or the entire responsibility of completion of the work in accordance with the Contract.
- 2.3.10.5. The Contractor shall make all efforts to maximise the supplies and services from Indian Sources.



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STAGE-2) WITH THREE YEARS OF O&M**

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2.3.11. Surplus materials and Scrap

- 2.3.11.1. Surplus materials/ defective materials available after commissioning of the project shall be taken back free of cost by the Contractor with prior approval of the Purchaser. The cost of removal shall be borne by the Contractor.
- 2.3.11.2. Contractor shall take back all crates, packing cases, all packing materials including steel packing materials and other scrap materials then and there to keep the site free from scraps.
- 2.3.11.3. No imported material shall be allowed to be taken out other than imported tools and tackles and instruments brought by the Contractor on draw back basis, provided he has carried out necessary documentation at the time of bringing such items inside the Plant.

SECTION-3

3. CONTRACT PRICE

1. The total lumpsum prices quoted by the Contractor in his bid with additions and deletions as may be agreed to before award of Letter of Award/ Contract, for the entire scope of work, viz., design, manufacture, supply, transportation, insurance, storage, erection, commissioning and testing of the equipment etc. covered by detailed scope of work of contract and in accordance with all terms, conditions, stipulations, specifications, requirements and other conditions of the Contract and incorporated in the Price Schedule and documents shall be treated as the Contract Price.
2. The Contract Price shall be paid in Indian currency only. The contract price (inclusive of GST) shall be firm till completion of contract period.
3. The Contract Price shall be deemed inter-alia to include and cover the cost of deployment of construction equipment, temporary works, establishment of labour camp, all materials and supplies, labour, insurance, fuel, stores, appliances, security arrangements, safety and fire-fighting arrangements (including those required during construction, storage and erection) to be supplied/used by the Contractor and all such other materials and services and actions that may be necessary or derived or statutorily required in connection with the execution of the works as per the Contract or any portion thereof complete in every respect and maintained as detailed in the contract documents or as may be required in terms of the Contract.
4. The Contract Price shall be deemed to include and cover the cost of all royalty and fees for all articles, and processes, protected by letters patent or otherwise incorporated in or used in connection with the work, also all royalties, rents and other payments in connection with obtaining all materials for the work and the Contractor shall indemnify and keep indemnified the Purchaser, which indemnity, the Contractor hereby gives against all actions, proceedings, claims, damages, costs and expenses arising from the incorporation in or use of work of any such articles, processes or supplies.

3.1 Contract Price Break-up

- i) The Contract Price indicated in the Price Schedule shall be for the scope of work and services detailed under scope covered under technical specification and for all the contractual obligations of the Contractor if any, under the Contract.
(After issue of Letter of Award, the agreed Contract Price as per Schedule of Prices F-1 will be detailed here while signing the Contract with the successful bidder.)
- ii) The Contractor shall furnish the detailed billing break-up for each item for the approval of Purchaser, which after the approval only, will be the basis for submission of invoices for progress of payments.

3.2 Price Basis

- i) In respect of equipment and steel structures, and other supplies supplied by the Contractor from Indian sources, the prices mentioned hereinabove are for delivery on F.O.R. at Site.
- ii) The Contract price stated above shall include supply of instruments, appliances for erection, operation and maintenance, consumables including oils, lubricants till the completion of OTG Tests.
- iii) The Contract price shall include the cost of all foundation bolts, anchoring parts, floor plates, hand railings, cross overs, safety guards etc.
- iv) The Contract price shall also include cost of painting, packing, forwarding, loading, freight, insurance, unloading, handling, clearing, port charges, storing, conservation and re-conservation, fees and all expenses in connection with the execution of the Contract.
- v) The Contract Price indicated above shall be inclusive of mandatory spares for operations & maintenance, Tools & Tackles, instruments, appliances for erection, operation and maintenance, consumables including oils, lubricants till the completion of OTG Tests.
- vi) The Contract price indicated above shall be inclusive of all taxes and duties as indicated in Section-5 hereto.

3.3 Firm Price

The prices for supply, services, civil works, mandatory spares, tools and tackles, O&M charges etc. shall be firm and shall not be subject to any escalation whatsoever.

Contract shall be awarded to the successful bidder as 'Single Contract or Separate Contracts for Supplies, Services, Maintenance during warranty period etc. with suitable interlinking clauses. However, the Separate Contracts shall have necessary provisions to take care of Single Bidder responsibility, Price Reduction, Purchaser's right to recover dues including price reduction from payment due under any of the contracts, warranty and Performance Guarantee etc., any liabilities arising out of such Separate Contracts shall be borne by the bidder/Contractors. Separate contracts will be entered in to for three years Operation and Maintenance. The contract price for O&M shall be firm till completion of the contract period'.

SECTION-4
TIME SCHEDULE (Firm and Binding)

4. TIME SCHEDULE

Time schedule for design and engineering including submission of drawings and documents, delivery of plant and equipment and spares, delivery of steel structures, civil work, erection, start up, testing, commissioning shall be as per Clause 4.1 and shall be binding on the Contractor.

The basic considerations and the essence of the 'Contract' shall be the strict adherence to the time schedule for performing the works in the contract.

The time and the date of completion of the project activities as stipulated in the Time Schedule of Tender specification and accepted by the Purchaser shall be deemed to be the essence of the Contract. The Contractor shall so organise his resources and perform this work as to complete it not later than the date agreed to. The time to complete the 'Works' contracted for, shall be reckoned from the date of "Letter of Award".

4.1. Completion Time:

The Time Schedule for Scheduled Commercial Operation Date (SCOD) of the entire capacity of the Project is 12 months from the date of LOA. Scheduled Commercial Operation Date (SCOD) shall be the date on which the commissioning certificate is issued by the purchaser upon successful commissioning of the full capacity of the Project (600MW SPP) including DC overloading.

4.2. Time Schedule for Feed Back Data, Drawings and Documents

4.2.1. The Contractor shall submit the various drawings and documents listed in Technical Specification. The number of copies is indicative only. Additional copies, if any, required by Purchaser shall be furnished by the Contractor, without any extra cost. The Contractor shall supply all drawings/documents and will be the property of Purchaser. In addition to hard copies, soft copy of all drawing/ documents shall be uploaded by the Contractor in NLCIL's portal, details of which will be furnished after issue of LOA.

Within 15 days from the date of Letter of Award, the Contractor shall submit to the Purchaser the list of all drawings and documents by title, using the approved numbering system and indicating the schedule of submission of drawings in conformity with the time schedule.

4.2.2. All the drawings and documents shall be prepared in accordance with contractual requirements and also as per the best engineering practices. Approval in respect of drawings shall be accorded by the Purchaser within two weeks of receipt of the same. In case drawing is not complete and/or is not approved, the comments shall be furnished to the Contractor within two weeks of receipt of drawing in hard copy. Any submission with gross omissions and/or errors will not be considered as a valid submission. If any document/drawing were commented by Purchaser, the Contractor has to incorporate the

comments and resubmit the document within one week for approval by the Purchaser. This review and / or approval of the drawings by the Purchaser will not relieve the Contractor of any of his responsibilities under this contract.

- i) The Contractor shall submit the various drawings and documents as per technical Volume of tender document. The number of copies is indicative only. Additional copies, if any required by Purchaser shall be furnished by the Contractor, without any extra cost. The Contractor shall supply all drawings/documents, which will be the property of Purchaser.
- ii) The process flow sheets, materials balance sheet utilities balance sheet, energy balance sheet, single line electrical diagram, electrical equipment arrangement plans, process C&I diagrams, automation diagrams, general layout of the works within the battery limits, shop layouts equipment arrangement drawings, structural design drawings and other basic design drawings documentation as indicated in above point no.(i), shall be submitted by the Contractor, for approval by the Purchaser/Consultant, as per approved schedule.

Approval, or comments (if drawings/documents are incomplete or not approved) in respect of drawings/documents, shall be accorded by the Purchaser within 7 (Seven) working days of receipt of the same. Any submission with gross omissions and/or errors will not be considered as a valid submission. If any document/drawing is commented by Purchaser, the Contractor shall incorporate all comments and resubmit the drawing/document within 7 (Seven) working days, clearly marking such changes/revision.

- 4.2.3. The sequence of submission of feedback data, delivery of structural, mechanical equipment and electrical equipment, instrumentation, submission of erection instruction and erection drawings and other supplies and services by the Contractor shall be as per the approved (by Purchaser/Consultant) Level -1 (L-1) PERT network schedule.

4.3. PERT NETWORK

- 4.3.1. Level-I PERT network of the project (submitted along with the bid) shall be resubmitted by the Contractor and finalized within two weeks from the date of Letter of Award.
- 4.3.2. Detailed Level-2 PERT network of all systems/sub systems/ discipline/ equipment etc. incorporating activity-wise quantity shall be submitted and finalized within one month from the date of Letter of Award. These-detailed networks shall be prepared based on the milestones reflected in Level-I network, which shall be the basis for performance of the Contract. The list of activities that shall appear in the PERT Network is as follows:

S. No	Activities/Milestone	Period in Months from LOA	
		Start	Finish
1	Engineering for the Project		
	Submission of Master Drawing List from the date of LOA	0	15 days

S. No	Activities/Milestone	Period in Months from LOA	
		Start	Finish
	Submission, Review, and approval of drawings.	15 days	3
2	Supplies		
	Supply of Tracker & Structure and DC cables.	3	5
	Supply of Balance of System.	5	7
	Supplies of PCSS & MCR.	3	5
3	Civil Works		
	Site Preparation Works.	1	9
	MMS, PCSS and Main Control Room.	4	6
	Approach Road, drainage system & internal roads.	1	3
4	Erection & Installation Works		
	Erection and Installation of Electrical & Associated Equipment's.	7	10
	Testing of Equipment and Readiness of SCADA.	9	10
5	Evacuation Works		
	Erection, Testing and Commissioning of 600MW SPP up to point of connection (33KV Side of 33/400KV Solar Park PSS).	7	10
6	Commissioning Activities		
	CEA inspection and Commissioning of Solar PV Plant.	10	11
	Commercial Operation as per GEDA/ DISCOM/ GETCO/CTU Commissioning Committee of Solar PV Plant.	10	11
	Completion of SCOD	11	12
7	O&M Target Generation Test (OTGT) (i.e., 03 months from SCOD)	13	15
8	O&M Start time (After completion of SCOD)	13	For 3 Years

Note: The L-1 PERT to be submitted by the bidder and finalized with the successful bidder will be annexed to at the end of this schedule to the contract document. **(Approved L-1 PERT to be attached at the end of this Section).**

- 4.3.3. The Contractor shall submit detailed construction resource planning along with Level-2 networks.
- 4.3.4. The Contractor shall submit estimates of quantities/volume of work sub-system wise, discipline wise, list and weights of equipment mechanical/electrical/ instrumentation etc. during execution stage as per requirement.

- 4.3.5. All PERT Network shall be furnished in MS Projects both in Hard copies and Soft copies.
- 4.3.6. Detailed assignment schedules of foreign specialists Experts for rendering technical services shall be submitted by the Contractor for the approval of the Purchaser within one month from the date of Letter of Award. The bio-data of key personnel shall be submitted within one month of the date of Letter of Award (LOA) and for others two months before their deputation.
- 4.3.7. Drawings of equipment shall be supplied at least one month before the shipment of the equipment.
- 4.3.8. All “as built drawings” shall be submitted by the Contractor before Final Take Over.
- 4.3.9. Erection Instructions for the Plant and Equipment shall be submitted by the Contractor at least one month before the shipment of the respective Plant & Equipment.
- 4.3.10. The delivery of equipment shall be deemed to be completed when all equipment and drawings/documentations have been supplied by the Contractor. Spares shall be delivered along with the last consignment of the respective equipment. The Spares shall be maintained at stores after SCOD.
- 4.3.11. Erection of the system / equipment shall be deemed to be completed when all equipment for the normal functioning of the plant / system are erected at site.
- 4.3.12. Completion of successful commissioning of the system/ equipment shall be deemed to have taken place when the system/ equipment has been successfully commissioned as per relevant Clauses of Section-10 of this volume and as per Technical specification.
- 4.3.13. Demonstration of OTG tests shall be deemed to have completed when the Contractor has demonstrated as per Technical Specification.
- 4.3.14. The Contractor shall render timely and adequate technical services through his Specialists to ensure completion of civil work, erection, commissioning and demonstration of OTG tests as per relevant Clauses of Section -10.
- 4.3.15. The Contractor shall prepare and submit in a time bound manner necessary drawing of proper standard with best engineering practices. The Contractor shall be responsible for obtaining timely approval of the drawings from the Purchaser to ensure completion of work within the time schedule. Any delay due to incomplete submission and consequent delay in approval shall be to the account of the Contractor. The Contractor shall not claim any time extension on this ground.
- 4.3.16. The Contractor shall ensure to send all letters with authentication through E-mail and a confirmation copy of the same through courier/Speed Post. All drawings and documents shall be sent through Courier/ Speed Post.

4.4. DELIVERY OF EQUIPMENT, SUBSTATION EQUIPMENTS ETC.

The delivery periods shall be reckoned from the date of Letter of Award.

- 4.4.1. The delivery of imported equipment and components including the foundation bolts and inserts in respect of the plant and equipment shall be completed as given in the Overall time schedule.
- 4.4.2. Delivery of all indigenous equipment, steel structures including foundation bolts and inserts shall be completed on F.O.R. site basis as given in the Overall Time schedule.

- 4.4.3. Delivery of all supplies shall be made strictly in sequence of erection at site unless otherwise differently agreed to by Purchaser.
- 4.5. MAINTAINING SPARES**
The required spares shall be maintained and shall be dispatched along with the last consignment of the respective equipment. The required Spares shall be maintained by the Contractor at the stores after the Final Takeover.
- 4.6. DELIVERY OF ENGINEERING SERVICES**
The delivery of the engineering services, drawings and documents will be completed as per the time schedule mentioned herein before and will be delivered to the Purchaser.
- 4.7. RESPECT FOR TIME SCHEDULE AND PRICE REDUCTION FOR NON – FULFILLMENT OF TIME SCHEDULE:**
- a) The time schedule stipulated in the Contract shall be adhered to on the clear understanding that the Contract Price has been fixed with reference to the said Time Schedule.
- b) If any delay is anticipated by the Contractor beyond the stipulated time schedule, the Contractor shall forthwith inform PURCHASER in writing of such anticipated delay and of the steps being taken by the Contractor to remove or reduce the anticipated delay, and shall promptly keep PURCHASER informed of all subsequent developments.
- 4.7.1. PRICE REDUCTION CLAUSE (PRC) FOR DELAY:**
The time stipulated in the Contract shall be deemed to be the essence of the Contract. In case the Contractor fails to adhere to the time specified in the Contract Clause 4.1, then Price reduction will be levied by the Purchaser as follows.
- “In case the CONTRACTOR fails to complete the Works within the stipulated period, then, unless such failure is due to Force Majeure or due to PURCHASER’S defaults, the Total Contract price shall be reduced by ½% (Half percent) of the Total Contract Price excluding O&M price per week of delay or part thereof on pro rata basis of the non-commissioned capacity subject to a maximum of 5% of the Total Contract Price excluding O&M price by way of reduction in price for delay and not as penalty.”
- 4.7.2. PRICE REDUCTION CLAUSE:**
1. In case of delay on the part of CONTRACTOR, the invoice value shall be reduced proportionately for the delay and payment shall be released accordingly. In the event the invoice value is not reduced proportionately for the delay, the Purchaser may, without prejudice to any method of recovery, deduct the amount for such Price reduction from any amount due or which becomes due to the Contractor either under this or any other Contract or by recovery from the Contract Performance Guarantee. Effecting of Price reduction shall in no way relieve the Contractor from its contractual obligations to complete the works or from any of the obligations under the contract. Any delay in effecting Price reduction shall not constitute waiver of the right of the Purchaser under the contract towards Price reduction.

2. Both CONTRACTOR and PURCHASER agree that this is a genuine pre-estimate of the loss/damage which the PURCHASER would have suffered on account of delay/breach on the part of the CONTRACTOR and the said amount shall be payable by the CONTRACTOR by reduction in Invoice value or said amount shall be adjusted from the amount payable to the CONTRACTOR or by recovery from the Contract Performance Guarantee, without there being any proof of the actual loss/or damages having been caused by such delay/breach.
3. The decision of the PURCHASER with respect to applicability of price reduction shall be final and binding.
4. The Price Reduction will be calculated on the basis of total Value of Contract excluding taxes and duties where such taxes and duties have been shown separately in the Contract.
5. In case of delay in execution of contract, contractor will raise invoice for reduced value as per Price Reduction Clause. If Contractor has raised the invoice for full value, then Contractor will issue Credit Note towards the applicable Price Reduction amount.
6. In case, Contractor fails to submit the invoice for reduced value or does not issue credit note as mentioned above, Purchaser will release the payment to contractor after effecting the Price Reduction.
7. In the event any financial implication arises on PURCHASER due to issuance of invoice without reduction in price or non-issuance of Credit Note, the same shall be to the account of CONTRACTOR.
8. Price Reduction (PR) for delay shall be effected when the scheduled date of completion of the activity as specified in Clause No. 4.1 is not achieved.
9. If the reason for the delay is solely attributable to the Purchaser and/or Force Majeure, adequate time extension shall be given to the Contractor to that extent of delay without Price reduction.
10. If the reason for the delay is purely attributable to the Contractor, PR will be effected and extension of time may be granted.
11. The Purchaser, for this clause, shall include Purchaser and other entities/ agencies engaged by the Purchaser for fulfilling its obligations for this project.

4.8. Compensation for shortfall in generation during O&M Period:

The Tariff of Rs.2.705 for every unit (kWh) may be considered for calculation of shortfall in generation during O&M Period.

Note: Compensation against shortfall during O&M period shall be subject to the Maximum of 5% of Guaranteed revenue during 1st year of O&M.

4.9. Deleted.

4.10. Compensation for overstay shall not be applicable.

4.11. Implementation Strategy

4.11.1. Time Schedule

The heads to be covered in the L1 PERT network schedules broadly are:

Submission of basic engineering and approval, issue of ordering specifications, placement of orders of equipment, submission and approval of drawings for Mechanical/Electrical/Instrumentation equipment, etc. manufacture and supply of equipment, civil and structural works, submission of erection drawings and manuals, erection of mechanical/electrical equipment, testing and trial power export and SCOD etc. The major milestones for the principal items are to be highlighted in the schedule.

4.11.2. The Contractor shall submit:

- i) Level- 2 PERT network schedule (with activity duration generally not exceeding one month) including details of pre-construction activities and execution work. L-2 PERT network shall be finalised and submitted to the Purchaser/Consultant within one month from the date of LOA.
- ii) Estimates of quantities/volume of work and other details such as list of specifications, list of drawings, quantum of work discipline wise, list of equipment (mechanical/electrical/instrumentation) etc. within one month from the date of LOA.
- iii) Updated L-2 networks [Tracking Gantt] along with progress reports (formats to be mutually finalized) shall be furnished as and when required.

4.12. Construction/Erection Plan

4.12.1. General

The Contractor shall submit a write-up for construction/erection plan for the plant & equipment under his scope of supply. The plan will indicate a broad outline:

- i. The construction/erection techniques to be employed.
- ii. Resource planning for deployment of construction / erection of equipment/ machineries.
- iii. List of various construction equipment such as cranes, dumpers, etc. planned to be mobilized with quantity & rated capacity/specification.
- iv. List of machinery, tools, and tackles such as welding transformers, welding generators/sets, gas cutting sets, drilling machines, chain pulley blocks, survey instruments, etc. and indicate specification and quantity of each item.

4.12.2. Deployment of Manpower

The Contractor shall submit a list showing deployment of manpower of the following categories indicating number of personnel, schedule and duration of their posting at site, educational background, and experience.

- i) Engineers to be engaged for design and engineering coordination, follow up and expediting.
- ii) Engineers and supervisors are to be directly attached to site work i.e., civil construction (as applicable), erection, testing, commissioning and demonstration of OTG Test.
- iii) Engineers / Supervisors for O&M services upto the date of completion of O&M period.
- iv) Organization (proposed) for implementation of the package.

4.13. Progress Monitoring

- 4.13.1. It is proposed to have an effective system of progress monitoring to ensure timely completion of all project activities. The guidelines laid down herein shall ensure progress monitoring by the Purchaser.
- 4.13.2. The intention is to dwell upon the progress of the activities related to Engineering Procurement, Manufacturing, Dispatch, Site activity and OTG Test.
- 4.13.3. In the interest of the timely completion of the project, the area of monitoring can be altered in consultation by the Purchaser with the Contractor. The Contractor shall furnish adequate information in the monthly progress reports on the formats to be mutually agreed upon.
- 4.13.4. The Purchaser will invite the Contractor for monthly/fortnightly meetings to review the progress of each activity and depute Purchaser's authorized representatives for ascertaining/ expediting progress at Contractor's works and suggest remedial actions to bridge-up time gap if any between planned progress and observed progress.

4.13.5. Progress Report

Project Progress Reports shall be submitted by the Contractor as follows:

- a) A monthly progress report with exception report showing current status of various activities including status of ordered/yet to be ordered items shall be submitted to the Purchaser by the Contractor, referring to the schedule of order, reasons for not achieving it and remedial measures / Catch-up plans proposed.
- b) The Contractor shall submit Programme of execution both in the form of activities in 'PERT Network' as well as quantitative Programme in terms of month wise physical targets for various disciplines of work.
- c) The Contractor shall submit computerized updated time analysis reports every month along with progress report. The updated PERT network drawing (both Level I and Level II) are to be submitted in requisite no. of copies at least once in every month. The format of the submission is to be mutually discussed and agreed.
- d) The monthly progress report shall indicate progress of activities against targeted dates and targeted quantities in Proforma as per the requirement of the Contract for maintaining consistency of reporting and for maintaining database by the Purchaser. Reasons for shortfalls, if any, shall be clearly brought out and proposed remedial measures to arrest the delays shall be indicated by the Contractor in the progress report, wherever applicable.
- e) Quantitative programme which is termed as "Work Plan" shall be updated regularly at a mutually agreed interval of time and Principal Contractor shall submit the same for Purchaser's approval keeping in view the balance time available to execute the balance of activities. Once if approved, subsequent progress report shall indicate the revised targets.
- f) The Contractor shall furnish information on site activities viz. daily progress report, weekly receipt of equipment, monthly erection plan, etc. The Contractor has also to

indicate resource deployment at site, highlights of critical areas and constraints in the daily progress report once in a week.

- g) Other information related to site activities as may be required by the Purchaser, shall also be submitted by the Contractor.
- h) The Contractor shall submit progress photographs in through official E-mail every month relating to the progress in sequence of work of all major site activities. The Purchaser will arrange necessary permission for the same.
- i) The progress report will also highlight inspection status. The Contractor shall submit one copy of the inspection certificate duly signed by representatives/authorized agencies after inspection.

4.14. Overall Time Schedule

Time Schedule (L-1 PERT network) furnished by the Contractor will form part of the Contract.

(Approved L-1 PERT to be attached at the end of this Section)

4.15. Extension of Time

4.15.1. The Contractor shall not be allowed for any extension of time for completion except in the following cases:

- i) Force Majeure – As per details stated in the Contract.
- ii) Major changes or substantial addition to work ordered by the Purchaser adversely affecting the completion time.
- iii) Any other circumstance of any kind whatsoever which may occur making the Contractor entitled to an extension of time which, however, shall be in the absolute discretion of the Purchaser.

4.15.2. The Contractor, upon the happening of any such event as stated above shall immediately inform the Purchaser but nevertheless use constantly his best endeavours to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Purchaser to proceed with the work.

4.15.3. Request for extension of time shall be submitted by the Contractor in writing and the Purchaser, based on the merit, shall consider the request and convey his decision to the Contractor in writing within a reasonable time.

4.15.4. The Contractor shall not be eligible for any extension of time on account of any delay in procurement of materials.

4.15.5. Joint Monitoring Group: Joint Monitoring Group comprising representatives of Purchaser as well as the Contractors as Members for this Contract shall be constituted to deliberate all issues affecting execution of the Contract periodically and a Record Note of Discussion shall be signed by the parties.

SECTION-5

TAXES AND DUTIES

5.1. General

- 5.1.1. All other taxes, duties or other charges, except those specifically mentioned in the Contract, legally levied on the CONTRACTOR in connection with the contract work, shall be borne and paid by the CONTRACTOR.
- 5.1.2. All bank charges in connection with payment to be made to the Contractor. In connection with Bank Guarantee (BG), all bank charges shall be borne and paid by the Contractor.
- 5.1.3. The Contractor shall comply with all the necessary tax related statutory compliances including but not limited to providing GST invoices or other documentation as per GST law relating to the Supply of Goods and Services or both to the Purchaser, uploading, the details of the invoice, payment of taxes, timely filing of valid statutory returns for the tax period on the Goods and Service Tax Portal.
- 5.1.4. In case any demand is recovered from Purchaser on account of any act of the Contractor, including but not limited to non-payment of GST charged and recovered, non-filing of Returns, non-uploading of valid invoices raised on Purchaser in the Returns etc. the Contractor shall indemnify the Purchaser in respect of all claims of tax, penalty and/or interest, loss, damages, costs, expenses and liability that may arise due to such non-compliance.

5.2. Goods and Service Tax

- 5.2.1. The Supplier / Contractor has to provide a copy of the GST Registration Certificate and also mention their GST Registration No. and Date in each of their invoices / bills without fail. No invoice or bill will be paid unless the GST Registration No. is mentioned therein.
- 5.2.2. While claiming the GST payment, the Contractor should furnish the requisite details in the invoice as per statutory requirements.
- 5.2.3. GST wherever applicable, shall be paid restricting to ceiling indicated in the schedule of prices. GST will also be paid for the items that are directly consigned to site by the approved sub suppliers/sub vendors/Associate.
- 5.2.4. The ownership of all materials to be supplied by Contractor, dispatched directly from sub supplier's/sub-contractor's works to the project site, shall rest with NLCIL on endorsement of dispatch document while the materials are in transit. Sales-in-transit is acceptable by the Purchaser.
- 5.2.5. Details of item tariff no. with break up values for dispatches from Tamil Nadu, and other States attracting IGST, CGST & SGST shall be indicated separately in the Billing Schedule with rate of GST in percentage and total amount of GST.
- 5.2.6. The billing schedule should contain details of tariff head, tariff rate and amount in respect of GST. The respective total amount shall tally with the respective ceiling quoted for the GST. Payment for GST shall be paid based on the value mentioned in the billing schedule. Statutory variations during contractual delivery period shall also be payable only for those items for which basic GST has been indicated in the billing schedule.

- 5.2.7. Final claim will be settled only after certification by practicing firm of Chartered Accountants that all benefits out of GST availed by the Contractor have been passed on to the Purchaser.
- 5.2.8. The Contractor shall comply with the Anti-profiteering measures at all times as prescribed under Sec 171 of CGST Act, 2017 and corresponding provisions of SGST / UTGST Act, 2017 and Anti-profiteering rules released there under.
- 5.2.9. The Contract Price is inclusive of all applicable GST, levies and duties. The ceiling for Taxes & Duties shall correspond to the Base Price. Additional liabilities of Taxes & Duties shall be paid over and above the respective ceiling amounts quoted in the Price Bid. Obligations of the Purchaser/Contractor towards payment of statutory variations in taxes and duties are as follows:
- 5.2.9.1. In respect of items directly consigned to Site by approved sub suppliers/ sub vendors/Associate the GST and statutory variation on GST after the base date shall be payable within contractual delivery period.
- 5.2.9.2. Additional amount of GST arising out of statutory variations within the contractual delivery period after the base date will be made by the Purchaser. Such payment shall be restricted only to finished goods supplied by the Contractor and its sub suppliers/ sub vendors/Associate directly to the Purchaser.
- 5.2.9.3. Statutory variations due to imposition of new taxes, duties and levies or increase/reduction/withdrawal of existing GST, duties and levies by the Central or State Government as may be applicable on the supply of plant & equipment, erection, etc. shall be to Purchaser's account to the extent applicable as direct liability of the Contractor in execution of this contract with the Purchaser. In the case of any upward revision the same shall be paid by the Purchaser and in the case of any downward revision the same shall be passed on to the Purchaser in full. However, the same will be limited within the contractual delivery period.
- 5.2.9.4. If contractual delivery period is extended for reasons not directly attributable to the Contractor, variations in taxes & duties, if any, shall be paid.
- 5.2.9.5. The Contractor shall bear and pay all liabilities in respect of: (a) non-observance of all legal formalities as per various statutory provisions and (b) statutory variations in all taxes, duties and levies and imposition of new taxes, duties and levies that may be imposed after the contractual delivery period, in case the contractual delivery period is extended due to reasons attributable to the Contractor.

5.3. Tax Deduction at Source (TDS) towards Income Tax/Other Taxes

Deduction of Tax at source at prevailing rate shall be effected by the Purchaser before payment as a statutory obligation wherever applicable.

TDS on Income Tax, GST (CGST, SGST & IGST) and all other taxes as applicable as per statutory obligations/ enactments shall be progressively deducted from the payments released to Contractor, by the Purchaser, for depositing with the Income tax, GST and other Tax authorities as per Income Tax Act, GST Act, etc., as applicable.

5.4. Personal Income Tax and Cess:

Income Tax and Cess, if any payable by the Contractor's / Sub-Contractor's employees shall be paid by the said employees directly and the purchaser shall not be liable to pay the Income Tax and Cess payable by the employees of the Contractor/ Sub-Contractor and the purchaser is not responsible for filing the tax return of the Contractor's employees/experts. The Purchaser is not responsible for any tax arrears of Contractors employees who have been associating their service, towards this scope of work on any circumstances whether they are in service or otherwise.

5.5 Building & Other Construction Workers' Welfare (BOCW) Cass, if applicable:

BOCW will be the responsibility of the Contractor wherever applicable. The Contractor has to submit challans as a proof deposit, if not, NLCIL reserves all the rights to deduct the same from the running bills of the Contractor.

The contract price is inclusive of all applicable taxes, levies, duties and Building & Other Construction Workers' Welfare (BOCW) Cess.

5.6 Royalty:

5.6.1 Royalty for Excavation:

The contract price is inclusive of all applicable taxes, levies and duties excluding Royalty for excavation, if any. The Bidder need not quote for Royalty for excavation which will be reimbursed by NLCIL based on documentary evidence submitted by the Contractor for making such payments as per statutory provisions and this reimbursement shall be over and above the Contract Price. However, if there is a demand by statutory bodies at a later date from the Contractor for payment of royalty for Excavation, the same will be reimbursed to the Contractor at actual against submission of documentary evidence and any penalty levied by the Statutory bodies in this regard will be to Contractor's account.

5.6.2 Royalty for Construction materials:

Royalties for construction materials where applicable shall be deducted by the Purchaser from Contractor's bills progressively for depositing with the concerned State Government authorities, unless receipt, in support of payment made to the concerned State Government authorities, is provided by the Contractor.

5.7 Billing Schedule

The billing schedule should contain details of tariff head, tariff rate and amount in respect of all taxes & duties. The respective total amount shall tally with the respective ceiling quoted for the taxes & duties. Payment for taxes & duties shall be paid based on the value mentioned in the billing schedule. Statutory variation shall also be payable only for those item for which basic taxes & duties has been indicated in the billing schedule.

SECTION-6 PAYMENT TERMS

6. Payment Terms

6.1. General procedure:

The payment to the Contractor for the supply, services & works under the Contract will be made by the Purchaser as per the guidelines and conditions specified herein. All payments made during the Contract shall be on account payment only and Purchaser shall have full rights against the Contractor even though payment has been made and the Contractor shall not be relieved of his obligations towards the due performance of the Contract. The final payment will be made on completion of all the works and on fulfillment by the Contractor of all his liabilities under the Contract to the satisfaction of the Purchaser.

6.1.1 Mode of Payment: All payments shall be made direct to the Contractor by Purchaser through E-payments. For effecting E-payment, Contractor shall furnish necessary details to the Purchaser. All bank charges for effecting E-Payment shall be to the account of the Purchaser.

Payment, will become due and payable by the Purchaser within a reasonable period which will not exceed one month from the date of receipt of Contractor's bill / invoice / debit note by the Purchaser provided the documents submitted are complete and correct in all respects. If it is not payable the invoice will be returned to the Contractor stating the reasons for rejection within 30 days from the date of receipt by the Purchaser.

6.2. Due dates for Payment:

6.2.1. The Purchaser will make progressive payment as and when the payment is due as per the terms of payment set forth herein. Payment will become due and payable by the Purchaser within 30 days from the date of receipt of Contractor's bill/invoice/debit note by the Purchaser provided the documents submitted are complete and correct in all respects, and is accompanied with a checklist substantiating the pay ability of the bill/invoice.

6.2.2. The Contractor shall certify the following in all the bills:

"Certified that no payment has been claimed and received before, for the components for which payment has been claimed in this invoice".

6.2.3. Purchaser reserves the right to deduct any un-payable claims admitted inadvertently from any amount due to the Contractor.

6.2.4. Notwithstanding any amount becoming due and payable to the Contractor by the Purchaser, the Contractor shall not be entitled to any interest on delayed / overdue payments.

6.3. Payment Schedule:

6.3.1. The Contractor shall prepare and submit to the Purchaser for approval, a detailed Billing Breakup (BBU) of the Contract Price component wise. This Contract Price BBU shall be interlinked with the agreed detailed PERT Network of the Contractor setting forth his starting and completion dates for the various key phases of works prepared. Any payment except the advance payment under the Contract shall be made only after the BBU is

approved by the Purchaser. The aggregate sum of the BBU shall be equal to the Lumpsum Contract Price. BBU shall be reviewed, updated and submitted to the Purchaser, by the Contractor as and when required.

- 6.3.2.** The Contractor shall submit to the Purchaser his Sequential delivery schedule for all the equipment correlated to the sequence of erection within 1 month from the date of Letter of Award (LOA). Such schedules shall be in line with the agreed detailed PERT for all phases of the works of the Contractor. If required such schedules shall be reviewed, updated and submitted to the Purchaser, by the Contractor as and when required.
- 6.3.3.** Dispatches shall be as per such approved time schedule and payment shall be regulated accordingly. No early payment shall be made for the 65% (if advance availed) /75 % (if 10% advance not availed) stage payment and subsequent payment further indicated in the case of early dispatches effected.
- 6.3.4.** All demurrages and wharfage if any arising out of any dispatches shall be to the account of the Contractor only.

6.4. Advance Payment:

- a) The Contractor shall claim mobilization advance within a time period of

- First instalment within 2 months from the date of LOA.
- Second instalment within 3 months from the date of LOA.

along with requisite APGs for the same and compliance of conditions specified in 6.5.1.

Confirmation of BG documents towards APG will be done in SFMS mode which shall also fall within the above period of time. Any such request for mobilization advance payment after the time period stipulated as above will not be considered by the Purchaser.

- b) Mobilization advance shall be paid separately for Schedule-1,2,3&4 i.e., site preparation, Plant & Equipment, Installation Services and Civil & allied Works respectively.
- c) The Amount advanced to Contractor shall be adjusted on pro-rata basis while making progressive payment for supplies /services/ Civil work as the case may be. If Contractor fails to adhere to the Contractual Delivery period of the Contract, then interest at SBI MCLR plus 0.5% applicable for one year tenor will be levied by the purchaser for the un-adjusted advance in the respective scope of work.

- 6.4.1.** Except Advance, all other payments shall be made only after signing the contract and shall be based on approved Billing Break-up details.
- 6.4.2.** The advances stipulated in the payment terms shall be made to the Contractor by the Purchaser subject to the Contractor providing **a bank guarantee for 110% of the advance amount** as per the stipulations and Purchaser's guarantee. The bank guarantee shall be valid till the completion of respective scope of work with a grace period of 2 (two) months thereafter. The Bank Guarantee value shall be reduced on the basis of actual recovery of advances from the bills of respective scope of works on quarterly basis. After

contractual delivery period, if the amount from the running bills is not sufficient to recover the unadjusted advance, the contractor shall remit the unadjusted advance amount with interest at SBI MCLR plus 0.5% applicable for one year tenor will be levied by the purchaser for the un-adjusted advance in the respective scope of work. In case the Contractor fails to remit the same, purchaser reserves the right to encash the APGs to that extent.

6.5. Terms of payment:

The terms of payment for the various price components of the Contract price are detailed herein:

6.5.1. Terms of Payment for Advance Payment:

If the bidder wishes to claim advance payment for mobilization of work, equipment, materials etc., then Advance shall be paid limited to a maximum of 10% in the following manner.

(i) Conditions to be fulfilled for first installment (5%):

(A) For Site Preparation Work

1. Acceptance of Letter of Award (LOA)
2. Submission of an unconditional Advance Payment Bank Guarantee (APG) for 110% of advance amount in the prescribed form and acceptance of the same by the Purchaser.
3. Submission of Contract Performance Bank Guarantee (CPG), and acceptance of the same by the Purchaser.
4. Submission of detailed L-1 PERT chart and acceptance thereof by Purchaser.

(B) For Plant & Equipment

1. Acceptance of Letter of Award (LOA)
2. Submission of an unconditional Advance Payment Bank Guarantee (APG) for 110% of advance amount in the prescribed form and acceptance of the same by the Purchaser.
3. Submission of Contract Performance Bank Guarantee (CPG) and acceptance of the same by the Purchaser.
4. Submission of detailed L-1 PERT chart and acceptance thereof by Purchaser.

(C) For Installation & Commissioning and Civil & Structural Works:

1. Establishment of project Site Office (preparations for mobilization of erection establishment) and on making ready the storage area for receipt of first consignment (before dispatch of first instalment) of supply, in addition to fulfilling the conditions stipulated in Clause 6.5.1 (i) A (1), (3) & (4) and 6.5.1 (i) B (1), (3) & (4)
2. Submission of an unconditional Advance Payment Bank Guarantee (APG) for 110% of advance amount in the prescribed form and acceptance of the same by the Purchaser.

(ii) Conditions to be fulfilled for Second instalment (5%)

(A) for Plant & Equipment, Site Preparation Work, Installation & Commissioning and Civil & Structural Works:

- i. Signing of the Contract Agreement.

- ii. Submission of an unconditional Bank Guarantee covering 110% of the of the advance amount claimed in the prescribed form and acceptance of the same by the PURCHASER.
- iii. Utilization certificate for first advance.

6.6 Terms of Payment for Supply, Erection, Civil Works, Testing & Commissioning of Solar Power Project:

The payment of contract price shall be regulated and paid as per price quoted in various schedules i.e., Schedule - 1 to Schedule - 4 of Volume – IA and also as per break up details furnished in their BBU.

6.6.1 Schedule-1: Site Preparation Works

- 6.6.1.1. Of the total 10% Advance Payment, First 5% Advance Payment shall be paid as per clause 6.5.1.i) A
- 6.6.1.2. Of the total 10% Advance Payment, second 5 % Advance Payment shall be paid as per clause 6.5.1.ii)
- 6.6.1.3. 90% (if 10% advance availed) / 100 % (if 10% advance not availed) of price quoted in Schedule - 1 shall be paid after completion of each item and certification of the same by the Project Manager.

6.6.2. Schedule-2: Plant and Equipment:

- 6.6.2.1. Of the total 10% Advance Payment, First 5% Advance Payment shall be paid as per clause 6.5.1.i) B.
- 6.6.2.2. Of the total 10% Advance Payment, second 5 % Advance Payment shall be paid as per clause 6.5.1.ii)
- 6.6.2.3. 65% (if advance availed) /75 % (if 10% advance not availed) pro-rata value of Contract price of supplies (as per agreed billing schedule) against receipt of materials at site subject to production of:
 - i. Material Dispatch Clearance Certificate (MDCC)
 - ii. Original Lorry/Rail Receipt.
 - iii. In case of import Receipt of goods at Indian Customs House (ICDS) and submission of all documents for confirmation of receipt at ICDS.
 - iv. Submission of valid transport Insurance /Project insurance.
- 6.6.2.4. Ten percent (10%) price of each item quoted in Schedule -2 shall be paid after installation of each item on pro-rata basis and certification of the same by the Project Manager.
- 6.6.2.5. Five percent (5%) price of Schedule-2 of the Plant and Equipment shall be paid after Successful Commissioning of Solar Project in part capacity (i.e. in Blocks of Minimum 50 MW) and certification of the same by the Project Manager.
- 6.6.2.6. Five percent (5%) price of Schedule-2 of the plant and Equipment shall be payable on completion of OTG tests and certification of the same by the Project Manager.
- 6.6.2.7. The final five percent (5%) price of Schedule- 2 of the plant and equipment against shall be payable after Final take over and certification of the same by the Project Manager.

6.6.3. Schedule-3: Installation and Commissioning

- 6.6.3.1. Of the total 10% Advance Payment, first 5% Advance Payment shall be paid as per clause 6.5.1.i) C.
- 6.6.3.2. Of the total 10% Advance Payment, second 5 % Advance Payment shall be paid as per clause 6.5.1.ii)
- 6.6.3.3. 75% (if advance availed)/85% (if advance not availed) of the price of the installation services quoted in Schedule-3 shall be payable on pro-rata basis after completion of installation of equipment of the Solar Power Plant and certification of the same by the Project Manager.
- 6.6.3.4. Five percent (5%) price of the installation services quoted in Schedule-3 shall be paid after Successful Commissioning of Solar Project in part capacity (i.e. in Blocks of Minimum 50 MW) and certification of the same by the Project Manager.
- 6.6.3.5. Five percent (5%) price of the installation services quoted in Schedule-3 shall be payable on completion of OTG tests as specified and certification of the same by the Project Manager.
- 6.6.3.6. The final five percent (5%) price of the installation services quoted in Schedule-3 Shall be payable after Final take over and certification of the same by the Project Manager.

6.6.4. Schedule-4: Civil and Structural Works

- 6.6.4.1. Of the total 10% Advance Payment, first 5% Advance Payment shall be paid as per clause 6.5.1.i) C.
- 6.6.4.2. Of the total 10% Advance Payment, second 5% Advance Payment shall be paid as per clause 6.5.1.ii).
- 6.6.4.3. 75% (if advance availed)/85% (if advance not availed) of the price of the Civil and Structural works quoted in Schedule-5 shall be payable on pro-rata basis after completion of installation of equipment of the Solar Power Plant and certification of the same by the Project Manager.
- 6.6.4.4. Five percent (5%) price of the Civil and Structural works quoted in Schedule-4 shall be payable after Commissioning of Solar project in part capacity (i.e. in Blocks of Minimum 50 MW)and certification of the same by the Project Manager.
- 6.6.4.5. Five percent (5%) price of the Civil and Structural works quoted in Schedule-4 shall be payable on completion of OTG tests as specified and certification of the same by the Project Manager.
- 6.6.4.6. The final five percent (5%) price of the Civil and Structural works quoted in Schedule-4 Shall be payable after Final take over and certification of the same by the Project Manager.

Note: If the OTGT (O&M Target Generation Test) and the Final Takeover is delayed beyond six months from the schedule due to reasons not attributable to Contractor, final 10% (two instalments, 5% and 5 % respectively) for Schedule 2,3 & 4 shall be released against production and acceptance of Retention Money Bank Guarantee (as per the format enclosed in this volume) for an equal amount valid for one year or the revised schedule

date of OTG tests and /or Final takeover whichever is earlier. If the OTG tests and/or Final Takeover get delayed further, the validity of the bank guarantee is to be extended till the actual date of OTG tests and/or Final take over.

6.6.5. Schedule-5: Operation and Maintenance charges of Solar Power Plant for 3 years after SCOD:

- 6.6.5.1. No payment shall be made during OTG Test period of 90 days (i.e., The bidder shall include the same in EPC cost).
- 6.6.5.2. After completion OTG Test period, the Operation and Maintenance charges for 3 years quoted in Schedule-5 will be payable on quarterly basis on the certification of work by the Project Manager after completion of each quarter.

6.7. Terms of Payment for Taxes & Duties:

For GST:

The Contractor has to produce a copy of the GST Registration Certificate before claiming GST payment.

1.	Advance	GST as applicable on Advance Payment shall be paid to the Contractor along with the Advance sanctioned except Schedule-2. The GST paid along with advance shall be adjusted pro rata against the Tax due upon Schedule-1, 3 & 4, based on the value.
2.	100%	GST for Schedule-2 shall be paid restricting to the respective ceiling quoted against production of invoices along with 65% (if advance availed)/75% (if advance not availed) stage payment for Schedule-2. Statutory variation within the contractual delivery period over and above the percentage of taxes and duties will be paid by the Purchaser.
3.	100%	GST for Schedule-1, 3 & 4 shall be paid restricting to the respective ceiling quoted against production of invoices along with 90%/75%/75% (if advance availed)/100%/85%/85% (if advance not availed) stage payment for Schedule-1, 3 & 4 respectively. Statutory variation within the contractual delivery period over and above the percentage of taxes and duties will be paid by the Purchaser.

For Custom Duty: Not Applicable.

6.8. General:

- 6.8.1.** Bank Guarantees (BGs) against mobilization advance shall be furnished for each of Site Preparation, Supply, Erection and Civil portion of contract for each instalment. The contractor shall furnish each BG for value equal to 110% of the respective advance amount.
- 6.8.2.** All payments shall be paid only against submission of complete and correct invoices and documents by the Contractor duly certified by the Purchaser except as otherwise specified in the Contract. Payment shall be due and payable by the Purchaser within a reasonable period, which will not normally exceed one month from the date of receipt of complete

and correct invoices. If it is not payable the invoice will be returned to the Contractor stating the reasons for rejection within a month from the date of receipt by the Purchaser.

6.8.3. All payments shall be released directly by the Purchaser to the Contractor except as otherwise provided in the contract. If as per provisions of Contract any payments are made directly by the Purchaser to the Sub-contractor, such payments shall constitute a proper discharge of Purchaser's obligations for such payments to the Contractor.

6.8.4. All the progressive payments mentioned above shall be made by the Purchaser based on the satisfactory progress of work as agreed.

6.8.5. All interim/progressive payments shall be regarded as payments by way of advance against the final payment only and not as payment for work actually completed and shall not preclude defective/imperfect/ incomplete work to be removed. It will not be considered as an admission by the Purchaser of the due performance of the Contract, or any part thereof by the Contractor nor shall it preclude, determine or affect in any way the powers of the Purchaser under these conditions or in any other way vary or affect the Contract.

6.8.6. The Purchaser reserves the right to encash Bank Guarantees if sufficiently convinced of negligence and lack of dedication to work on the part of the Contractor.

6.8.7. The Contractor shall prepare and submit every six months, a statement covering payments claimed and the payments received vis-à-vis the works executed, for reconciliation of accounts with the Purchaser.

6.9. Payment Procedure:

6.9.1. The successful Bidder shall submit the bills for claim in four copies. The payment shall be made after the verification of the bill by concerned Accounts Centre of NLC India Ltd.

6.9.2. It is expressly understood that the release of payment to the successful Bidder in the manner specified will not be construed as the fulfillment of the Bidder's obligations either in part or whole under the contract and that the Bidder shall continue to remain responsible to NLCIL until all the obligations under the agreement have been fulfilled.

6.10. Payment of Contractors Bills through National Electronic Fund Transfer (NEFT):

The Bidder should submit the consent in a mandate form for receipt of payment through NEFT and provide the details of bank A/c in line with RBI guidelines for the same. These details will include bank name, branch name & address, A/c type, bank A/c no., bank and branch code as appearing on MICR cheque issued by bank. Further, the Bidder should also submit certificate from their bank certifying the correctness of all above mentioned information in the mandate form.

6.11. Documents for Payment

6.11.1. Invoice for Supplies:

6.11.1.1. The following documents in original shall be sent by Registered Post/Speed Post to the Head of the Execution /Project Manager/PBD as applicable within 10 days from the date of dispatch to enable the Purchaser to make progressive payment to the supplier after receipt of material at site.

6.11.2. For 65% (if advance availed) /75 % (if advance not availed) Material Receipt payment:

- 6.11.2.1. Material Dispatch Clearance Certificate (MDCC) issue by the NLCIL.
- 6.11.2.2. Original Lorry/Rail Receipt+ 2 copies.
- 6.11.2.3. Supply invoice -1 original + 2 copies.
- 6.11.2.4. Packing list (dispatch note) - 2 copies.
- 6.11.2.5. Material receipt Certificate (MRC) issued by Project Manger- 1 original + 2 copies.
- 6.11.2.6. Insurance documents - 2 copies.
- 6.11.2.7. Test certificate if applicable and/or inspection certificate of the Contractor- 1 original + 2 copies.
- 6.11.2.8. Certificate for Brought out item by equipment Manufacturer if required-1 original + 2 copies.
- 6.11.2.9. In case of import Receipt of goods at Indian Customs House (ICDS) and submission of all documents for confirmation of receipt at ICDS.
- 6.11.2.10. Soundness certificate -1 original + 2 copies
- 6.11.2.11. The Certificate of soundness referred to above will be furnished in the following form:
"Certified that the materials Receipt through in RR dated for the value of Rs. against Contract No. were in sound condition at the time of Receipt and storage as per approved Quality Plan".
- 6.11.2.12. Indemnity Bond if required 2 copies.
- 6.11.2.13. Running Account for the items specified in the Bill with respect to BBU.
- 6.11.2.14. In respect of last consignment in addition to the above documents the following certificate and document shall also be furnished:
 - i. Certificate by the Contractor that no further supplies will be made and supplies are complete in all respects.
 - ii. Summary of all invoices for the equipment also showing the amount due and amount claimed / received.

6.11.3. For 10% Installation stage payment:

- 6.11.3.1. Invoices – 1 Original + 3 Copies
- 6.11.3.2. Installation completion certificate 1 original + 2 Copies

6.11.4. For 5% Commissioning stage payment:

- 6.11.4.1. Invoices 1 Original + 3 Copies.
- 6.11.4.2. Purchaser's Certificate of completion of commissioning.

6.11.5. For 5% OTG test completion stage payment:

- 6.11.5.1. Invoices 1 Original + 3 Copies.
- 6.11.5.2. Purchaser's Certificate of successful completion of OTG test.

6.11.6. For Final 5 % payment on completion of all facilities:

- 6.11.6.1. Invoices 1 Original + 3 Copies.
- 6.11.6.2. Purchaser's certificate for final take over and certification of the same by the Project Manager.



**BOS WORKS FOR DEVELOPMENT OF 600 MW SOLAR
PROJECT IN GSECL'S SOLAR PARK AT KHAVDA (GSECL
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SECTION-7

FACILITIES TO BE PROVIDED BY THE PURCHASER

-NOT APPLICABLE-



**BOS WORKS FOR DEVELOPMENT OF 600 MW SOLAR
PROJECT IN GSECL'S SOLAR PARK AT KHAVDA (GSECL
STAGE-2) WITH THREE YEARS OF O&M**

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**SECTION-8
CONTRACT TECHNICAL SPECIFICATIONS**

8. CONTRACT TECHNICAL SPECIFICATIONS

- 8.1. The Technical Specifications (Volume-II) issued along with the Tender Specifications duly modified and up-dated based on the changes/modifications agreed between the Purchaser and the successful Bidder shall constitute Section-8 "Contract Specifications" of this Contract and shall form an integral part of the Contract for all purposes.



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SECTION-9

O&M TARGET GENERATION TEST (OTGT)

Please refer Clause 24.4 /Section-24 of Technical Specification of Volume-II.

SECTION-10

GENERAL TERMS AND CONDITIONS OF THE CONTRACT

10.1 BANK GUARANTEES

10.1.1 GENERAL

- i) All the Bank Guarantees shall be irrevocable. The Bank Guarantee shall be from any Nationalized Bank or any Scheduled bank in India other than Bank of China authorized by Reserve Bank of India to issue such Bank Guarantee drawn in favour of NLC India Limited, Neyveli.
- ii) Except bid guarantee, all bank guarantees are to be furnished directly by the banker to NLCIL by Speed Post/Courier to the following address:
The Chief General Manager/Contracts
Corporate Office, NLCIL India Ltd., Block-1,
Neyveli - 607 801.
- iii) The Bank Guarantee shall be furnished as per respective format prescribed by the Purchaser and shall be submitted on Non-judicial stamp paper of value Rs.80/- and the stamp paper shall be in the name of the Bank/Name of the Contractor.
- iv) All the Bank Guarantees shall be payable on first demand, without demur, irrespective of any dispute between the Bank and the Contractor to the Purchaser without any condition or dispute whatsoever.
- v) The Contractor shall arrange to keep the several bank guarantees referred to herein valid for the requisite duration by making timely request to the Bank or Banks concerned. All the extension for Bank Guarantees also shall be on non-judicial stamp paper of value Rs.80/- obtained in the name of Bank/Contractor. All charges connected with the bank guarantees shall be to the account of the Contractor.
- vi) No interest or any bank charges shall be payable by the Purchaser in respect of any Bank Guarantee furnished by the contractor in respect of this contract with respect to the period up to completion of all obligations under the Contract by the Contractor.
- vii) The Purchaser shall have the right to encash the Bank Guarantees for non-compliance of any or all the terms and conditions of the contract and also in terms of the Joint Deed of Undertaking, if any, which the Contractor may enter into along with other parties with the purchaser.

viii) Confirmation of Bank Guarantee :

Confirmation of Bank Guarantee through Structural Financial Messaging System (SFMS) will be done as follows:

The bank guarantee issued by the issuing Bank on behalf of Contractor in favour of “Name of Company” shall be in paper form as well as issued under the “Structured Financial Messaging System”. The details of beneficiary for issue of BG under SFMS platform is furnished below:-

Name of Beneficiary	NLC India Limited
Unit/Area/Division	Corporate Office/Contracts Division
Beneficiary Bank, Branch & Address	State Bank of India Block-2, Neyveli-607801
IFSC Code	SBIN0000958
Swift Code	SBININBB457
email	sbi.00958@sbi.co.in

Bank Guarantee submitted in Physical mode, which cannot be verifiable through SFMS will be rejected summarily.

10.1.2 BANK GUARANTEE FOR ADVANCE PAYMENT (APG):

The advance amount including GST stipulated in the payment terms shall be made to the Contractor by the Purchaser subject to the Contractor providing a bank guarantee for 110% of the advance amount as per the stipulations and on acceptance of the said bank guarantee.

If the Contract is terminated due to default of the Contractor, the ‘Mobilization Advance’ pay would be deemed as interest bearing advance at the rate applicable to cash credit facility prevailing at the time of issue of Invitation for Bid to be compounded quarterly.

10.1.3 CONTRACT PERFORMANCE BANK GUARANTEE (CPG)

- i. The Contractor shall submit an irrevocable Contract Performance Bank Guarantee within 30 days from the date of Letter of Award.
- ii. The Contractor shall furnish to the Purchaser, Bank Guarantee in the prescribed pro-forma towards Contract Performance for a value of Ten (10%) per cent of the Contract price excluding O&M price, in favour of the Purchaser. The Bank Guarantee shall be for the time bound, due and faithful performance of the contract and shall remain binding notwithstanding such variations, alterations or extensions of time as may be made, given, conceded or agreed to between the Contractor and the Purchaser under these General Terms & Conditions or otherwise. The Bank Guarantee shall be as per Annexure–XIII of this volume. The Bank Guarantee towards Contract Performance shall be subject to approval of the Purchaser thereafter. The Contractor shall ensure that

the Contract Performance Bank Guarantee shall be valid for 27 months (i.e., 12 months from date of LOA + Warranty period of 12 months + 3 months grace period).

- iii. The Contract Performance Bank Guarantee furnished by the Contractor will be subject to the terms and conditions of the Contract. The Purchaser will not be liable for payment of any interest on the Contract OTG.
- iv. The Contract Performance Bank Guarantee shall be released on application by the Contractor within ninety (90) days after the expiry of the warranty period and after the Contractor has discharged all his obligations under the Contract.
- v. The performance guarantee shall cover additionally the following guarantees to the purchaser:
 - a) The Contractor guarantees the successful and satisfactory operation of the equipment furnished under the contract as per the specification and documents.
 - b) The contractor further guarantees that the equipment provided and installed shall be new and free from all defects in design, material and workmanship. The Contractor shall upon written notice from the purchaser, fully remedy free of expenses to the purchaser such defects as may develop under normal use of the said equipment within the period specified in the contract.
 - c) The Contractor also guarantees the proper performance of the steel structures, for a period of twelve (12) months from the date of final takeover of the plant and equipment. Any defect found during this period will be made good by the contractor at his own cost failing which the purchaser reserves the right to take remedial measures at the contractors' risk and cost.
- vi. The Purchaser shall have the fullest liberty to lodge their claim for encashment of the guaranteed sum either in full or part, in the manner suitable to them. However, payment made for a sum lesser than the guaranteed amount shall not relieve or discharge the bank from their obligations guaranteed under the bank guarantee, till the contractual obligations are fully performed by the Contractor or the Bank Guarantee is discharged by the Purchaser, as the case may be and the Bank Guarantee shall continue to be in force till such time.

vii. BANK GUARANTEES FOR O&M:

The Contractor shall furnish the following O&M BGs:

1. BG for shortfall in generation during O&M Period of 3 years:
 CPG for O&M Compensation: 5% of revenue generated out of Expected net energy export (as per technical schedule 2 of Technical Specification Volume-II). The CPG shall be valid till completion of contractual O&M period plus 3 months.
 The O&M BGs shall be initially valid for 12 months and shall be extended suitably by the Contractor every year to be valid till the expiry of 90 days beyond the actual date of successful completion of operation and maintenance contract period.

In case BG is forfeited for the first and subsequent years on pro-rata basis for shortfall in generation, the contractor shall maintain the original value of the BG (i.e., 5% out of

Expected net energy export (as per technical schedule 2 of Technical Specification Volume-II)) within 30 days of encashment of the BG.

2. BG for O&M period of 3 Years (i.e. Defects Liability period)

Contractor shall submit a Bank Guarantee for a value of 1% of the total Contract Price excluding O&M price with a validity of 90 days beyond O&M period of 3 Years. The Contractor shall submit this bank guarantee as a Performance security against equipment during the complete Defect Liability Period (i.e. for O&M period).

The Contractor shall submit both the Bank Guarantees within 30 days after completion of SCOD.

- viii. The Contract Performance Bank Guarantee for EPC Contract will be returned to the Contractor without any interest after 90 (ninety) days from the expiry of warranty period or after date of final take over whichever is later and on receipt and acceptance of BG for O&M period and BG for shortfall in generation during O&M period for period of 3 Years.

10.1.4 RETENTION MONEY BANK GUARANTEE (RMBG)

If the OTG tests and the Final Takeover is delayed beyond six (6) months from the schedule due to reason not attributable to Contractor, final 10% (i.e., 5% for OTGT and 5% for Final take over) of price indicated in Schedule-2,3&4 as stated in the terms of payment shall be released against production and acceptance of Retention Money bank guarantee (as per the format enclosed at Annexure-XVII of this volume) for an equal amount initially valid for six months and shall be extended suitably in such a way that the Bank Guarantee is valid up to the actual date of completion of OTG test.

10.2 Licenses

10.2.1 Import License

For any portion of the supplies to be imported by the Contractor for incorporation in manufacture of the equipment, the Contractor shall arrange the necessary import including arrangements of licenses and Foreign Exchanges as may be required, on his own.

10.2.2 Export License

In case of foreign Contractor, he shall obtain and maintain the necessary Export licence from the competent authorities and shall pay at his cost any fee connected therewith. Failure to obtain and maintain export Licences shall not be considered as Force Majeure. In case the Contractor fails to obtain or maintain the Licences, or if the licences are withdrawn, he shall restore them within two months from the date of cancellation/withdrawal. However, the delay due to restore of Licence is attributable to the Contractor, the Purchaser has the right to cancel the Contract and the Contractor shall forthwith return the Purchaser all the amounts paid by the Purchaser to the Contractor.

10.3 Insurance

The Bidder shall at his own expense take out necessary insurance to-the supplies, transit, personnel and all other related to the satisfaction of the NLCIL including all third party

risks as detailed below and the same shall be submitted to the Purchaser for approval failing which the progressive payment of 65% /75% as per Section – 6 of this Volume, will not be effected.

Contractor shall obtain project insurance for 600 (6X100) MW SPP for the entire period of Contract excluding O&M.

10.3.1 Marine cum Erection (MCE) Insurance

- i) The Contractor shall take Marine-cum-Erection insurance policy against all risks of Physical loss or damage to the equipment /materials during handling, transit (marine and inland), storage, erection, testing and commissioning for the total contract price. The period of policy shall commence from the despatch of first consignment of equipment/materials for the work and continue during transit, storage, erection at site till completion of testing commissioning and upto Provisional Takeover of the equipment/system as per Contract.

Alternatively, the Contractor may take a Transit / Marine Insurance policy and a Storage-cum-Erection Insurance policy against all risks to cover the loss or damage during Transit and Storage & Erection respectively. The sum insured under the policy shall represent the cost of equipment / materials supplied by the Contractor for the work. The sum insured under the Storage-cum-Erection policy shall represent the complete erected value of Plant & Equipment including freight, insurance, taxes and duties and erection cost.

If the Contractor is already having an open Transit /Marine Insurance policy, the copy of the same shall be furnished.

- ii) The Contractor shall also take additional covers (Add-On covers) given under MCE insurance like Third Party Liability, Surrounding properties, Flood Risk Clearance and Removal of debris, Cross liability, Additional Customs Duty, Express Freight, Extended Maintenance Cover upto Final Takeover, etc. The sum insured for such Add-On covers shall be decided by the Contractor based on its assessment and risk involved in the contract.
- iii) Risks to be covered by insurance shall not be limited merely to the items mentioned above. The Contractor shall arrange for insurance of any other risks he may deem prudent, but the expenses thereof shall be to the account of the contractor only.
- iv) If necessary, Transit and storage (all risks) insurance coverage for additional transit involved for sending equipment/material to Sub-Contractor/Fabricator's shop for fabrication/ reprocessing and receiving back at site shall be taken.
- v) The form and the limit of such insurance as defined shall be acceptable to the Purchaser. However, irrespective of such acceptance, the responsibility to maintain insurance at all times during the required period and for the required value shall be that of the Contractor alone. The Contractor's failure in this regard shall not relieve him of any of his contractual responsibilities and obligations.
- vi) The transfer of title shall not in any way relieve the Contractor of the above responsibilities during the period of the contract. Any loss or damage to the equipment during handling, transporting, storage and erection, till such time the plant is provisionally taken over (Provisional Takeover) by the Purchaser, shall be to the account of the

Contractor. The Contractor shall be responsible for preferring of all claims as applicable and make good at the Contractor's own cost for the damage or loss by way of repairs and/or replacement of the portion of the works damaged or lost for the timely commissioning of the equipment/ completion of the works. Licenses, clearance etc., if any required for the purpose of replacement of equipment lost/damaged in transit and/or during storage, erection, shall be made available by the Contractor.

- vii) The Contractor shall provide the Purchaser with a copy of all insurance policies and documents taken out by him in pursuance of the contract. All copies of such documents shall be submitted to the Purchaser immediately after such insurance coverage for approval.
- viii) The Contractor shall also inform the Purchaser in writing at least sixty (60) days in advance regarding the expiry cancellation and/or change in any of such documents and ensure revalidation/renewal etc, as may be necessary well in time.
- ix) The Contractor shall take insurance policy from an Insurance Company regulated by IRDA. The Insurance policy shall provide for payment of claim in Indian Rupees.
- x) The Purchaser shall be the principal holder of the policy along with the Contractor the Purchaser reserves the exclusive right to assign the Policy.
- xi) All costs on account of Insurance charges / premium on lumpsum and firm price basis shall be indicated in the price schedule. The premium receipt issued by the Insurance Company shall have to be produced for claiming the payment. However, the total premium to be reimbursed shall be restricted to the lumpsum agreed to in the price schedule in the contract. However, the Contractor's responsibility to maintain the insurance cover as per the terms of contract at his cost will not cease after reaching the lumpsum quoted.
- xii) If the Contractor fails to produce the Insurance Policy in time or fails to keep it in force, further payments will not be made, without prejudice to other terms and conditions of the Contract. Recovery from Contractor's bills may also be effected.

10.3.2 Workmen's Compensation Insurance

The Contractor shall take Workmen's Compensation Insurance for this project work. This insurance shall protect the Contractor against all claims applicable under the Workmen's Compensation Act, 1948 (Government of India) as amended from time to time. This policy shall also cover the Contractor against all claims for injury, disability, disease or death of his or his Sub Contractor's employees which for any reason are not covered under the Workman's Compensation Act, 1948. The liabilities shall not be less than:

- i) Workmen's compensation: As per statutory provisions.
- ii) Towards Employees Liability: As per statutory provisions.

The Contractor shall provide the Purchaser with a copy of Workmen Compensation insurance policies taken out by him in pursuance of the Contract.

10.4 Customs Clearance

The Contractor shall be responsible for the expeditious clearance of imported materials consigned to Indian port. In the event, the materials are unloaded at ports other than specified by the Contractor, the Contractor shall be responsible to clear the consignments from that port and transport the same to Purchaser's store/site. All costs and expenses including port rent, port handling, demurrage, wharf age, customs clearance and forwarding etc. are deemed to be included in the Contract Price under Port Charges.

10.5 Liquidation, Death, Bankruptcy etc.

If the Contractor shall die, dissolve or become bankrupt or insolvent or cause or suffer any receiver to be appointed on its business or any assets thereof with its Creditors, or being a corporation commence to be wound up, not being a member's voluntary winding up for the purpose of amalgamation or reconstruction, or carry on its business under a Receiver for the benefits of its Creditors or any of them, the Purchaser shall be at liberty:

- i) to terminate the Contract forthwith upon coming to know of the happening of any such event as aforesaid by notice in writing to the Contractor or to the Receiver or Liquidator or to any person in whom the Contract may become vested to, or
- ii) to give such Receiver, Liquidator or other person the option of carrying out the Contract subject to his providing a guarantee upto an amount to be agreed for the due and faithful performance of the Contract.

10.6 Responsibility for Performance of Contract

- i) The Contractor shall be responsible for the due and faithful performance of the Contract in all respects according to the drawings, specifications and all other documents referred to in this Contract. Any approval which the Purchaser/Consultant may have given in respect of the drawings/documents, specifications, stores, materials, supplies or other particulars and the work or the workmanship involved in the Contract (whether with or without test carried out by the Contractor or the Purchaser) shall not relieve the Contractor from its obligations and notwithstanding any approval or acceptance given by the Purchaser/Consultant, it shall be lawful for the Purchaser to reject the material on arrival at site, if it is found that the materials supplied and/or erection and/or construction work carried out by the Contractor are not in conformity with the terms and conditions of the Contract in all respects.
- ii) The Contractor shall co-operate with the Purchaser's other contractors, if any, for any associated plant and freely exchange all relevant technical information with them to obtain the most efficient and economical design and to avoid unnecessary duplication of equipment. The Contractor shall also coordinate with other contractors for any interface activity at his battery limits. No remuneration shall be claimed from the Purchaser for such technical cooperation.

10.7 Responsibility for Completeness

- i) Any supplies and services which might not have been specifically mentioned in the Contract but are necessary for the design & engineering, supply, erection, commissioning, performance and/ or completeness of the Works, shall be supplied/provided by the Contractor without any extra cost to the Purchaser within the time schedule for efficient

and smooth operation and maintenance of the works under Indian conditions, unless expressly excluded from the scope of supplies and services in this Contract.

- ii) The approval by the Purchaser/Consultant at any stage for any supplies and services by the Contractor shall not relieve the Contractor of its obligations.

10.8 Dispatch and Billing Schedule

- i) The Contractor shall prepare a detailed Billing-cum-Dispatch Schedule and a detailed Shipping Schedule for supplies of the plant, machinery and equipment in the logical sequence required for erection within the overall delivery schedule of the Contract. Billing-cum-Dispatch schedule for the Plant and Equipment shall be submitted within thirty (30) days from the date of Letter of Award of the Contract. Detailed shipping schedule shall be submitted within 3 months from the Letter of Award of Contract indicating the breakdown of the complete Plant into shipment units with approximate weights and dimensions and the respective dates upon which such units will be dispatched from the Contractor's and/or his Sub-Contractor(s) works.
- ii) The Billing-cum-Dispatch Schedule and the Shipping Schedule is subject to approval of the Purchaser/Consultant. Six (6) copies of the approved Billing-cum-Dispatch Schedule and Shipping Schedule shall be submitted to the Purchaser within fifteen (15) days from the date of approval. The Contractor shall arrange for supplies of the Plant, Machinery and Equipment in the sequence as approved in the Billing-cum-Dispatch Schedule and Shipping Schedule. The Contractor shall promptly give written notice to the Purchaser of any anticipated delay in maintaining such schedule stating reasons and remedial measures, therefore. This shall not however in any way absolve the Contractor from his responsibility of timely delivery of plant and equipment as per contractual time schedule.
- iii) No early payment shall be made for non-sequential or early delivery of any Plant & Equipment which will be required for erection at a later date. Further, the early delivery of such equipment will occupy storage space, which will be the responsibility of Contractor.
- iv) The lapse of guarantee due to delay in OTG Test of any such equipment, if it is supplied by any associate/sub-vendors, is the responsibility of the Contractor.

10.9 Shipping Notes and Documents

i. General

The consignee for both rail and road dispatches shall be clearly marked as NLCIL, BOS Works for setting up of BOS works for 600 MW Solar power project in Solar Park of Khavda, Gujarat.

The Contractor shall arrange to despatch the following documents to:

PROJECT MANAGER (BOS works for 600 MW Solar Power Project in Solar Park of Khavda, Gujarat).

- (a). One (1) original and five (5) copies of the clean rail/lorry receipt.
- (b). One (1) original and five (5) copies of Contractor's signed invoice.
- (c). 6 (six) copies of Challan and Packing List.
- (d). 6 (six) copies of inspection certificate, if any issued by the Purchaser.
- (e). 6 (six) copies of Purchaser's dispatch clearance
- (f). 6 (six) copies of Approved Test Certificates if any.

The RR/Challans duly endorsed by the Purchaser will be handed over to the Contractor for taking delivery of materials from Railway/Trucks unloading the same from wagons/ trucks and subsequent handling, transportation, and storage at site after submission of custody-cum-indemnity bond in Purchaser's approved proforma. The demurrage charges, if any, will be payable by the Contractor.

ii. By Wagons

In case of despatch of materials in railway wagons, the Contractor shall ensure that the following are observed by them and their Sub-Contractors.

- (a). Identify, place necessary indents on the railways and obtain at the appropriate time the correct type of wagons required, keeping in view the consignments to be despatched.
- (b). In case of over dimensioned consignments, the Contractor shall obtain the sanction for movement of the O.D. Consignment from the railways.
- (c). Non-availability of special wagon or handling equipment shall not be an excuse for payment of demurrage and if so it shall be to the Contractor's account.
- (d). Care being taken to avoid all possible chances of damages during transit and to ensure that all packages are firmly secured.
- (e). The destination shall be clearly marked.

iii. By Road

In case of the consignments despatched by road, the Contractor shall ensure that the following are observed by himself and the Sub-Contractors:

- (a). Identify and obtain the correct type of trucks/trailors, keeping in view the nature of consignments to be despatched.
- (b). Care being taken to avoid all possible chances of damages during transit to ensure that all packages are firmly secured.
- (c). In case of over dimensioned consignments, the Contractor shall obtain necessary approval from concerned authority of State / Centre for movement of the O.D. Consignment.
- (d). Non-availability of special trucks or handling equipment shall not be an excuse for payment of demurrage and if so shall be to the Contractor's account.
- (e). All consignment despatched by road shall be on "door delivery" and freight paid basis.
- (f). The destination shall be clearly marked.

10.10 Packing, Identification and Markings

- i) The Contractor shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during handling & transport by air, sea, rail and road.
- ii) All packing shall allow for easy removal and checking at site. Special precaution shall be taken to prevent rusting of steel and iron parts during transit by sea. Gas seals or other materials shall be adopted by the Contractor for protection against moisture during transit.
- iii) The number of each package in a shipment shall be shown in fraction, numerator showing number of the package and the denominator showing total number of packages in a lot / consignment. The packages number shall be generally prepared in the sequence in which they will be required for erection.

- iv) Each package delivered under the Contract shall be marked by and at the expense of the Contractor and such marking must be distinct and in English language (all previous irrelevant markings being carefully obliterated). Such marking shall show the description and quantity of contents, the name and address of consignee, the gross weight and net weight of the package, the name of the Contractor with a distinctive number of mark sufficient for purposes of identification. All markings shall be carried out with such materials as to ensure quickness of drying, fastness and indelibility. Each equipment or parts of equipment shall, when shipped or railed or otherwise despatched be tagged with reference to the assembly drawings and corresponding part numbers. Each bale or package shall contain a packing note quoting specifically the name of the Contractor, the number and date of contract and the name of the office placing the contract, nomenclature of the stores and include a schedule of parts for each complete equipment giving the part numbers with reference to the assembly drawing and the quantity of each part, drawings nos. and tag numbers.
- v) Rotor bearings should not be used as a support while packing.
- vi) Besides wherever necessary, packing shall bear a special marking "TOP", "BOTTOM", "DO NOT TURN OVER", "KEEP DRY", "HANDLE WITH CARE", etc.
- vii) All packing cases, containers (excluding marine container), packing and other similar materials shall be new.
- viii) Notwithstanding anything stated in this clause, the Contractor shall be entirely responsible for loss, damage or depreciation or deterioration to the materials & supplies due to faulty and/or insecure packing.
- ix) One copy of respective standard manufacturer's erection instruction/operation instruction manual shall be kept in each package/container for immediate reference.
- x) Each and every package box shall be marked with the following, as a minimum:
 - (a) Name and address of Consignee :
 - (b) Project reference :
 - (c) Contract No.:
 - (d) Packing No.: (1/10, 2/10, 3/10 when there are 10 packages for one consignment)
 - (e) Net Weight/Gross Weight :
 - (f) Port of Loading :
 - (g) Destination Port :
 - (h) Packing Mark : [symbols indicating "TOP" and other special markings as per clause 10.10.(iv) & 10.10.(vi) above]
 - (i) Type of Equipment :
 - 1. "E" (for Equipment supply)
 - 2. "T" (for Tools & Tackles)
 - 3. "S" (for Mandatory Spares)

10.11 Type, Quality of Materials and Workmanship

- i) The Contractor shall be deemed to have carefully examined and to have knowledge of the equipment, the general and other conditions, specifications, schedules, drawings, etc. forming part of the Contract and also to have satisfied himself as to the nature and character of the work to be executed and the type of the equipment and duties required including wherever necessary of the site conditions and relevant matters and details. Any

information thus procured or otherwise obtained from Purchaser/Consultants shall not in any way relieve the Contractor from his responsibility and contractual obligations for designing, manufacturing and supplying the Plant and Equipment at site and executing the work in terms of the Contract. If the Contractor shall have any doubt as to the meaning of any portion of the Contract, he shall before signing it set forth the particulars thereof and submit to Purchaser in writing in order that such doubt may be removed.

- ii) The Equipment under scope of supply shall be of the best quality and workmanship according to the latest engineering practice and shall be manufactured from materials of best quality considering strength and durability for their best performance. All material shall be new. Substitution of specified material or variation from the method of fabrication may be permitted with the prior written approval of the Purchaser.
- iii) The Contractor shall procure and/or fabricate all materials and equipment in accordance with all requirements of Central and State enactments, rules and regulations governing such work in India and at site. This shall not be construed as relieving the Contractor from complying with any requirement of Purchaser as enumerated in the Contract Specifications which may be more rigid than and not contrary to the above-mentioned rules, nor providing such construction as may be required by the above-mentioned rules and regulations. In case of variance of the Contract Specification from the laws, ordinance, rules and regulations governing the work, the Contractor shall immediately notify the same to the Purchaser. It is the sole responsibility of the Contractor, however, to determine that such variance exists. Wherever required by rules and regulations, the Contractor shall also obtain the Central Electrical Authorities / Statutory Authorities' approval for the plant, machinery and equipment to be supplied by the Contractor.
- iv) Codes and standards referred in Contract documents shall be followed. Codes and standards of other countries can be followed with the prior written approval of Purchaser, provided materials, supplies & equipment according to the standard are equal to or better than the corresponding standards specified in the Contract.
- v) All meters, gauges, recorders and other types of indicating, integrating or recording devices shall be calibrated in metric system and degree Celsius. Where vernier attachments are related, English system gearing must be changed to produce result on a true decimal (metric basis). Functional and instruction plate shall be in English language.
- vi) Brand names mentioned in the Contract documents are for the purpose of establishing the type and quality of products to be used. The Contractor shall not change the brand name and qualities of the bought-out-items without the prior written approval of the Purchaser. All such products and equipment shall be used or installed in strict accordance with original manufacturer's recommendations, unless otherwise directed by the Purchaser.

10.12 Drawings and Documents

The Contractor shall supply all drawings and documents to the Purchaser/Consultants as per respective volumes of Technical Specifications.

10.13 Errors and Omissions

- i) The Contractor shall be responsible for any discrepancies, errors and omissions in the drawings, documents or other information submitted by him, irrespective of whether these have been approved, reviewed or otherwise accepted by the Purchaser or not.

- ii) The Contractor shall take all corrective measures arising out of discrepancies, errors and omissions in drawings and other information referred in above para within the time schedule and without extra cost to the Purchaser.
- iii) The Contractor shall also be responsible any extra cost and the cost due to delay, if any, in carrying out engineering and site works by other agencies arising out of discrepancies, errors and omissions stated above as well as of any late revision/s of drawings and information submitted by the Contractor.

10.14 Acceptance of the System

10.14.1 Mechanical Completion

1. On completion of erection of all the materials / items of equipment covered under the scope of the Contract, a joint inspection shall be carried out by the Purchaser and the Contractor to verify physically that all materials /items / equipment have been placed and erected properly and the system is ready for commissioning. A defects list shall be prepared jointly.
2. On liquidation of the defects (except minor defects which shall be mutually discussed and agreed between the Purchaser and Contractor and which shall not affect the commissioning of the system), Mechanical Completion Certificates shall be issued by the Purchaser.

10.14.2 Commissioning & OTG Testing:

Commissioning and OTG test shall be carried out as per technical Specification (Volume-II).

On successful completion of commissioning, the Solar Power Plant along with Power Evacuation system shall be Provisionally Taken over with a list of major and minor defects and non-conformities prepared jointly by the Purchaser and the Contractor. Differentiation of defects as major and minor shall be jointly discussed and agreed by the Purchaser and Contractor and recorded. Upon the completion of commissioning, as soon as practicable, or at such time as may be otherwise agreed to by the parties concerned, the Contractor Shall notify in writing to the Purchaser /Consultant that the plant is ready for OTG Test only after liquidating all the major defects.

1. Readiness for "OTG Test" shall be intimated to the Purchaser in writing at least 15 days before commencement of "OTG Test". However, Contractor shall be allowed to conduct "OTG Test" only after liquidating all the major defects.
2. All test instrumentation for the OTG Tests as required shall be supplied by the Contractor. Data loggers shall be used for performance test. All costs associated with the supply, calibration, installation of the test instrumentation / data loggers / computers etc. are deemed to have been included in the contract price. The test shall be in accordance with those specified in the Technical specification.
3. Any special equipment, tools and tackles required for successful completion of the OTG Test shall be provided by the Contractor.
4. It is the Contractor's responsibility to co-ordinate for suitably carrying out the OTG Test.
5. The OTG Test results shall be reported as computed from the OTG Test observations.

6. Within ten days after the conclusion of the OTG Test the Contractor shall submit the documents as stated in Clause 24.5.1/Section-24 of Volume II (Technical Specification)
7. Within two weeks of receipt such test report, the Purchaser /Consultant shall either:
 - (i). Concur with the information provided in the Contractor's test report, or
 - (ii). Disputes some or all of the information provided in the Contractor's test report, the areas being disputed, and the levels of performance being disputed.
8. If the tests could be carried out but are being unduly delayed by the Contractor the Purchaser may, by notice require the Contractor to make the tests within 14 days after the receipt of such notice. The Contractor shall make the tests on such days within that period as the Contractor may fix and of which he shall give notice to the Purchaser.
9. Should the test fail, the repeat OTG Test shall be carried out as per Procedure given in Technical specification.

The above shall be read in conjunction as detailed in technical specification.

10.14.3 Final Take Over

Certificate for "Final Take Over" shall be issued by the Purchaser when

- i. All supplies and services have been completed as per Contract.
- ii. The Contractor has met any and all obligations under this Contract
- iii. Final balance documentation, if any, incorporating latest modifications in 'as built' drawings has been submitted by the Contractor in requisite copies.
- iv. The Contractor has rectified in a definite manner all objections / observations mentioned in the "Commissioning Certificate" and 'Final Project Punch List'.
- v. Completion of OTG Test for the plant and OTG Test Report submitted.

10.15 Mandatory Spares, Tools & Tackles, Initial Fill, Oil, Lubricants and Consumables

10.15.1 Mandatory Spares

- i) The Contractor shall supply mandatory spares as listed in the Technical Specification (Volume- II).
- ii) The list of mandatory spares shall include such details as:
 - (a) Item number of equipment in Contract
 - (b) Description
 - (c) Number per Item
 - (d) Material specification.
 - (e) Manufacturing drawing number/ordering specification number.
- iii) The Contractor shall supply complete ordering specification including the list of supplies to enable the Purchaser to procure operating and maintenance spares for replacement beyond the period of life considered for spares. Complete manufacturing drawings (except for the proprietary items) with bill of materials and material specification and catalogues with reference details shall also form part of such ordering specification.
- iv) The identification of mandatory spares for operation and maintenance shall be indelibly engraved on the parts within or on a label securely fixed to the part.
- v) The Contractor shall agree to submit the Declaration form duly signed by the EPC contractor in the format as per Annexure-I.

10.15.2 Tools and Tackles

- i) The Contractor shall supply new set of tools and tackles, instruments and appliances for operation and maintenance of the plant & equipment as per schedule in the Technical Specification. (Volume II)
- ii) While preparing the list of special tools and tackles, the Contractor shall include such number of sets as he may recommend necessary from his own experience.
- iii) The Contractor shall provide ordering specification including the names of suppliers giving sufficient details to enable the Purchaser to procure at a later date when necessary such special tools and tackles instruments and appliances.

10.15.3 Oil, Lubricants & Consumables

- i) The Contractor shall within the Contract price of the equipment as per Section-3 supply all consumables including oils, lubricants, lining materials, usual stores and small materials and other consumables required.
- ii) Quantities to be supplied shall be adequate to cover also the wastage/ breakage during transportation, storage, handling, construction, erection and commissioning. Should it be found that the quantities supplied are not adequate till the completion of warranty period, the Contractor shall supply further quantities within the time schedule and without any extra cost to the Purchaser.
- iii) The Contractor shall also furnish Indian equivalent of imported oils, lubricants, and other consumables along with necessary specifications, drawings, literature etc.

10.16 Approval by the Purchaser

- i) Documents and drawings as mentioned in Section-4 shall be subject to the approval of the Purchaser/ Consultant.
- ii) Other drawings and documents as per Section-4 shall be subject to the review and reference of the Purchaser/ Consultant.
- iii) All changes from the approved drawings/documents shall be subject to the prior approval of the Purchaser / Consultant.
- iv) All sub-contractors and sub-suppliers for raw materials testing, design and engineering, manufacture, supplies, construction and erection work and any other work/services covered under the Contract shall be subject to the written approval of the Purchaser / Consultant.
- v) While the Contractor shall make/execute/perform supplies, work and services in terms of the Contract, the Purchaser shall have the right to check and approve design, type, quality, quantity, materials and workmanship of any or all items of supplies, work and services where considered necessary by the Purchaser to ensure that supplies, work and services made/executed/ performed by the Contractor are in accordance with the provisions of this Contract.
- vi) The Chief Project Manager of Contractor who shall be in overall charge of the Project at site shall be appointed in consultation with the Purchaser.
- vii) To enable the Purchaser to accord approval and to review documents and drawings the Contractor shall submit back-up data/ drawings/basic calculations/assumptions as may be required by the Purchaser/ Consultant.

- viii) Where approval of the Purchaser/Consultant is required or implied but is not specifically provided for elsewhere in this Contract, such approval shall also come within the purview of this Section.
- ix) Approval by the Purchaser/Consultant in terms of this Section shall not relieve the Contractor of any of his obligations under the Contract. The Purchaser/ Consultant shall approve or refuse approval within seven (7) working days from the date of receipt of request with supporting documents.
- x) The approval requested by the Contractor shall not be withheld unreasonably by the purchaser. All requests for approval shall be accompanied by fully supporting documents, otherwise it shall not be considered as a request.

10.17 Sub-Contract

- i) The Contractor shall not sub-contract the Contract Work in whole to third parties for the performance of this Contract.
- ii) The Contractor may propose a panel of Sub- Contractors for the part of scope of works. The Contractor shall thereafter select any sub-Contractor out of this panel subject to the approval of the Purchaser. Any such assignment shall not relieve the Contractor from any obligation, duty or responsibility under the contract. Any assignment as above without the prior concurrence of the Purchaser shall be void.
- iii) The Contractor shall be responsible for transmitting all the pertinent data of all Contract terms and conditions with his Sub-Contractors. The Contractor shall also furnish the specification, place of manufacture, delivery schedule and adequate copies of un-priced supply order/contract in the case of indigenous items.
- iv) The Purchaser shall give approval or shall refuse approval in writing within seven (7) working days of receipt of request along with all supporting details.
- v) Bought-out items, critical components, proprietary items and equipment manufactured and supplied by specialized manufacturers which the Contractor intends to incorporate in the Contract Work shall also be subject to the written approval of Purchaser.
- vi) The approval extended by the Purchaser in selecting Sub-Contractors recommended by the Contractor shall not discharge the later from his Contract obligations. The Contractor shall remain solely liable for any action, deficiency, and/or negligence on the part of his Sub-Contractors/sub-suppliers.
- vii) In the event certain obligations extended by a Sub-Contractor to the Contractor should extend beyond the guarantee period specified in the Contract, the Purchaser shall automatically be entitled to the benefit thereof.
- viii) In no event shall the Purchaser be deemed to have any Contractual obligations whatsoever in respect of Contractor's/ Sub-Contractors and/or title-holders of any sub-orders placed by the Contractor.

10.18 Inspection and Tests at Contractor's/ Manufacturer's Premises

- i) The Purchaser or his authorised agent shall have the right of inspecting and testing the contract work or any part thereof at any stage during the manufacture and the Contractor on demand from the Purchaser shall carry out such tests in appropriate manner in the presence and free of charge to Purchaser. The tests required as per

relevant codes and the tests specifically agreed in the contract specifications and agreed QAP only will be done. Should the Contractor himself not be in a position to carry out the tests, he shall, on the Purchaser's demand prepare specimen and samples and send them at his own cost to such testing stations as the Purchaser may specify and the cost of the test so effected shall be to the Contractor's account. However, cost pertaining to the Purchaser's inspection personnel shall be borne by the Purchaser.

- (a) Should a part of the plant be manufactured not on Contractor's own premises but on other premises, the Contractor shall likewise obtain permission for the Purchaser/his authorised representative to inspect and test the work as if the said plant were being manufactured on the Contractor's premises.
- (b) The inspection, examination or testing carried out by the Purchaser shall not relieve the Contractor from any of his obligations under this Contract. The inspection procedure shall be discussed and finalised.
- ii) The inspection and tests shall be so conducted as not to unreasonably impede the progress of manufacture.
- iii) The Purchaser shall have the right to be present during all tests carried out by the Contractor. The Contractor on being requested so to act, shall present sufficient documentary evidence that the material used shall meet the specified requirement. If called for, samples and specimen shall become the Purchaser's property. The Contractor shall notify the contract work, particularly before any assembly, in order that the inspection or tests can be carried out as may be required to ascertain without prejudice to the Contractor's liability, whether the materials and/or services are in conformity with the requirement of the contract. All inspection and tests shall be carried out as per the approved procedure unless otherwise specified.
- iv) The Contractor shall bear all costs of any and all agreed inspections and tests. If special tests are necessary based on the results of the agreed test, then cost of all such special tests also shall be to the account of the Contractor in all cases.
- v) The Purchaser upon giving fifteen (15) days notice in writing and stating any grounds of objection, shall have the right to reject any or all equipment or demand rectification or replacement thereof.
- vi) The Contractor shall submit to the Purchaser quarterly programme of inspection and tests one month in advance of the commencement of the quarter. The Contractor shall give the Purchaser a minimum of fifteen (15) days clear notice for inspection within India and thirty (30) days clear notice for inspection at places other than India, of any work being ready for inspection and tests specifying the period likely to be required for such inspection and tests. Thereafter, the Purchaser or his inspector shall, unless inspection or test is voluntarily waived, attend at the contractor's or his Sub-supplier(s)/Sub-contractor(s) premises, such inspection and tests within seven (7) days of the date on which the equipment is notified as being ready for inspection and test. Should the Purchaser fail to attend such inspection and test, the Contractor may proceed with the inspection and test at his option which shall be deemed to have been made in the Purchaser's presence and shall forthwith forward to the Purchaser copies of inspection/test certificates for acceptance by the Purchaser. The pro-forma and number of copies for

inspection/test certificates shall be mutually agreed. However, if the Purchaser request the Contractor for a revised date of inspection but within fifteen(15) days of the date of inspection as communicated by the Contractor, the Contractor shall arrange the inspection on the revised date as requested by the Purchaser.

- vii) In all cases whether at the premises or works of the Contractor or of any sub-contractor, the Contractor shall, provide free of charge to the Purchaser such labour, materials, electricity, fuel, water, stores, apparatus and instrument and/or facilities as may reasonably be deemed required to carry out efficiently such tests of the plant in accordance with the contract and shall give all such facilities to the Purchaser or his authorised representative to accomplish such tests.
- viii) When the inspection/tests have been satisfactorily completed at the Contractor's or his Sub- Contractor's premises, the Purchaser shall issue a certificate to that effect. If a final certificate cannot be issued, a provisional certificate shall be issued. If the tests were not witnessed by the Purchaser or his representative the certificate shall be issued on receipt of the inspection and tests report from the contractor but not later than fifteen (15) days after the receipt of the said report by the Purchaser. In the event a certificate is not issued by the Purchaser during 15 (fifteen) days, the Contractor, if considered necessary, can arrange despatch along with the certificate as stated in 10.18.(vi) with the clear understanding that if the Purchaser reject such equipment at a later date, the contractor shall rectify the same at his own cost to the Purchaser's satisfaction. No Plant shall be shipped or left or otherwise despatched before such certificate has been issued. The satisfactory completion of these inspection and tests or the issue of the certificate shall not bind the Purchaser to accept the work, should it on further tests during or after erection be found not to comply with the Contract.
- ix) In case any equipment fails in inspection/tests, re-inspection/retest shall be carried out only after necessary rectification work/replacement by the Contractor.
- x) Subject to Clause-10.18 (viii) above, no plant, equipment and material shall be shipped before inspection certificate and despatch instructions have been issued by the Purchaser.
- xi) The contractor shall furnish to the Purchaser/his authorised Inspector five (5) copies of un-priced purchase orders including detailed technical specification and drawings placed on his Sub- Contractors as soon as such orders are placed by the Contractor, but, in any case not later than two (2) months before the expected date of the equipment getting ready for inspection.
- xii) In the case of such equipment, structural etc. where tests set forth above cannot be conducted either partially or fully in Contractor's/Sub-supplier(s) premises but have to be conducted at site only after erection, the provisions under this Section shall also apply. However, in such cases prior approval of the Purchaser shall be obtained by the Contractor prior to despatch.
- xiii) The Inspection by the Purchaser and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of agreed QAP forming part of the Contract.

- xiv) In the case of mandatory spares, the same shall be offered for inspection along with the main equipment or after the main equipment has been satisfactorily inspected and tested.

10.19 Participation of Indian Engineers

- i) For basic design and detail engineering of Plant & Equipment, if carried out by the Contractor in his office abroad, Purchaser reserves the right to depute his/Consultants' or engineers hereafter called Indian Engineers to participate in this work.
- ii) The participation assignment, number of Indian engineers, their technical disciplines and the period of participation shall be mutually agreed.
- iii) The Contractor shall provide all opportunities and information to Indian engineers to get acquainted with the technical know-how and the methods and practices adopted by the Contractor in basic and detail engineering. The Contractor shall provide documents, drawings, calculations etc. as may be required by Indian engineers.
- iv) The Contractor shall provide free of charge office accommodation, office facilities, secretarial services, communication facilities, general and drawing office stationery, etc. as may be reasonably required by the Indian engineers. Similarly, facilities shall also be provided by Contractor's /Sub-Contractors/ Associates if such basic and detail engineering activities are carried out in the design offices of Sub-Contractors/Associates.
- v) At all times the Indian engineers shall remain employees of the Purchaser or Consultant as the case may be.
- vi) The Purchaser shall bear all costs relating to air fares, local travel, residential accommodation and subsistence in respect of Indian engineers.
- vii) In the absence of designation as Purchaser's or Consultants' representative, no such Indian engineer shall have any authority under the Contract.

10.20 Standards, Codes and Compliance with Laws & Regulations

- i) The design, engineering, manufacturing, supplying, assembling, erection, testing and construction work shall be carried out in accordance with latest appropriate Indian Standards and Codes unless otherwise specified in the Contract specification. Where appropriate Indian Standards and Codes are not available, appropriate latest standards and codes of Country of Origin shall be used. Contractor shall however, obtain purchaser's prior approval before using such standards and codes of country of origin.
- ii) The Contract Work shall be designed to suit the climatic, geological, hydrological, hydro-geological, and seismological and soil conditions of the site. Measures shall be taken against corrosion/erosion by ground water, storm surge, floods, cyclones, wind speeds etc.
- iii) The Contractor shall, throughout the performance of this Contract comply with all laws, rules, regulations and statutory requirements of Government of India and other statutory bodies as far as such bodies have jurisdiction over the Contract work or any part of the site.

- iv) If any new statutory regulation or law or modification of the existing regulation or law comes into force subsequent to the Base Date, the Contractor shall comply with the same. However, if it calls for any modification of the design/equipment with financial implication, the same shall be discussed between the Contractor and Purchaser and mutually agreed.

10.21 Protective Painting

The General Specification for painting and colour code etc. shall be followed by the Contractor for painting of equipment, steel structures etc. as per the technical specification.

10.22 Weights & Measures

- i) All weights, dimensions and measures shall be in metric system.
- ii) All weights, instruments, measures used in the contracted equipment shall be properly calibrated.

10.23 Secrecy & Titles

- i) All technical information, maps, plans, drawings, specifications, schemes and the subject matter contained therein and all other information given to the Contractor by the Purchaser in connection with the performance of the Contract Work shall be held confidential by the Contractor and shall remain the property of the Purchaser and shall not be used or disclosed to third parties by the Contractor for any purpose other than for which they have been supplied or prepared. The Contractor may disclose to third parties, upon execution of secrecy agreements, such part of the drawings, Specifications or information if such disclosure is necessary for the performance of the Work.
- ii) Maps, layouts and photographs of this Solar Power Plant including its surrounding regions showing vital installation for national security of Purchaser's country shall not be published or disclosed to the third parties or taken out of the country without prior written approval of the Purchaser.
- iii) Title to secret processes if any developed by the Contractor on an exclusive basis and employed in the design of the equipment shall remain with the Contractor. The purchaser shall hold in confidence such processes and shall not disclose such processes to the third parties without prior approval of the Contractor.
- iv) Subject to above Clause, title to technical specifications, drawings, flow sheets, norms, calculations, diagrams, interpretations of test results, schematics, lay-outs and such other information which the Contractor has supplied to the Purchaser under the Contract shall be passed on to the Purchaser. The Purchaser shall have the right to use these for construction, erection, start-up, commissioning, operation, maintenance, modifications and/or expansion of the works including for the manufacture of spare parts (other than those of proprietary in nature to the contractor) in connection with the project.
- v) The provision of above Clauses shall not apply to information:
- (a) Which at the time of disclosure are in the public domain or which later on become part of public domain through no fault of the party concerned, or

- (b) Which were in the possession of the party concerned prior to disclosure to him by the other party, or
- (c) Which were received by the party concerned after the time of disclosure without restriction on disclosure or use, from a third party.

10.24 Rejection of Defective Plant & Works or Other Installation

- i) If the completed plant, or any portion thereof, before it is finally accepted be found to be defective or fails to fulfill the requirements of the Contract, the Purchaser shall give the Contractor notice setting forth particular of such defects or failure and the Contractor shall forthwith make the defective plant good or alter the same to make it comply with the requirements of the Contract. Should he fail to do so within a period of time as deemed reasonable by the Purchaser and stated in the said notice, the Purchaser may reject and replace at the risk and cost of the Contractor, the whole or any portion of the plant, as the case may be, which is defective or fails to fulfill the requirements of the Contract. However, such rejection/replacement by the Purchaser shall not absolve the Contractor of any of his responsibilities under this Contract.
- ii) Without prejudice to the above, the Purchaser shall be entitled at his discretion to the use of the rejected plant in a reasonable and proper manner for a time reasonably sufficient to enable him to obtain other replacement plant. However, such usage shall not be deemed as waiver or acceptance of such defective plant by the Purchaser.

10.25 Negligence

- i) If the Contractor shall neglect to execute work with due diligence or expedition or shall refuse or neglect to comply with any reasonable order given to him in writing by the Purchaser in connection with the work or shall contravene the provisions of Contract, the Purchaser may give notice in writing to the Contractor calling upon him to make good the failure, neglect or contravention complained of within such time as may be deemed reasonable by the Purchaser and in default of compliance with the said notice, the Purchaser without prejudice to its rights under clauses 10.25.(ii) hereto and Cl. 6.8.8, may rescind or cancel the Contract as provided in Cl.10.30 holding the Contractor fully liable for the damages that the Purchaser may sustain. In addition, the Contractor shall refund all amounts paid to him by the Purchaser for all such work which, may become in fructuous due to such cancellation.
- ii) Should the Contractor fail to comply with such notice within the period as mentioned in the notice or any other period considered reasonable by the Purchaser for such compliance, from the date of serving thereof, then and in such case, without prejudice to the Purchaser's right under clause 10.25.(i) hereto, the Purchaser shall have at his option the right to take the affected work wholly or in part out of the Contractor's hands and may complete the work, as envisaged in the Contract either departmentally or by awarding fresh Contract(s) at a reasonable price to any other persons or firm or company to execute the same, at the cost of the Contractor.
- iii) In such event the Purchaser shall, without being responsible to the Contractor for fair wear and tear to the same, be entitled to seize and take possession of all

materials, construction equipment tools, tackles and other things belonging to the Contractor and also to have free use of all materials, construction equipment, tools, tackles and other things of the Contractor / its sub-contractors which may be on the site for use at anytime in connection with the work to the exclusion of any right of the Contractor over the same and the Purchaser shall be entitled to retain and apply any sum which may otherwise be then due as per the Contract or any other contract from him to the Contractor as may be necessary for the payment of the cost of execution of such work as aforesaid.

- iv) If the cost of executing the work as aforesaid shall exceed the sum due to the Contractor and the Contractor fails to make good the deficit, the said materials, tools, tackles, construction plant or other things and properties belonging to the Contractor as may not have been used up in the completion of the work, may be sold by the Purchaser and proceeds applied towards the payment of such difference and the cost of and incidental to such sale. Any outstanding balance existing after crediting the proceeds of such sale shall be paid by the Contractor on the demand of the Purchaser, but when all expenses, cost and charges incurred in the completion of the work are paid by the Contractor, all such materials, tools, tackle, construction plant or other things not used in the completion of the work and remaining unsold shall be removed by the Contractor with the written permission of the Purchaser only.
- v) In addition, such action by the purchaser as aforesaid shall not relieve the contractor of his liability to pay Price Reduction for delay in completion of work as defined in Section-4.

10.26 Progress Report

- i) The Contractor shall prepare and regularly update his detailed PERT/CPM Networks and submit the same with computerized time analysis reports showing starting and completion dates of all activities of engineering, purchasing, procurement of materials, manufacture, supply, inspection and despatch, construction, erection etc. in his scope of work and those of his sub-contractor(s).
- ii) The Contractor shall submit the progress report in such pro-forma and details as may be required by the Purchaser showing the agreed detailed programme of various activities as per above clauses and actual progress achieved to monitor the progress of the work.
- iii) The Contractor shall submit the progress report every month and in 10 (Ten) copies. Purchaser shall have the right to depute his/Consultant's representatives at the premises of works of the Contractor or any of his sub-contractors to ascertain the progress of work.
- iv) The Contractor shall submit the progress photographs in 5 (five) copies every month relating to the progress in sequence of work of all major activities.

10.27 Training – Not applicable.

10.28 Patents

- i) If the performance of the Contract involves the use of a patent, trade mark, registered design, copy rights and/or industrial property rights of which the Contractor holds the title, the Contractor shall not be entitled to any licence fee,

royalty and/or compensation from the Purchaser outside of the Contract Price which shall be deemed to include such licence fee, royalty and/or compensation.

- ii) Where the title holder of a patent, trade mark, registered design, copy rights and/or industrial property rights used is a third party, the Contractor shall be liable for settling with such party and paying any licence fee, royalty and/or compensation thereon.
- iii) The Contractor shall submit to the Purchaser a certificate from the licensor attesting technology of the licence granted.
- iv) In the event of any third party raising claim or bringing action against the Purchaser including but not limited to action for injunction in connection with third party's alleged rights affecting the equipment covered under the Contract or the use thereof, the Contractor agrees and undertakes:
 - (a) To defend and assist the Purchaser in defending at the Contractor's cost against such third party's claim and/or actions and against any law suits of any kind initiated against the Purchaser.
 - (b) To indemnify, keep indemnified and hold harmless the Purchaser against all actions, claims, demands, costs, charges and expenses raised by third parties and arising from or incurred by reason of any infringement of patent, trade mark, registered design, copy rights and/or industrial property rights by manufacture, sale or use of the equipment supplied by the Contractor whether or not the Purchaser is held liable for by any court judgement. Provided, however, that:
 1. The Purchaser shall, as soon as reasonably possible notify the Contractor in writing of such third party's claim and/or action and:
 - The Contractor shall at his own cost defend or assist the Purchaser in defending his rights against any such claims and/or actions;
 - If the Contractor defends the case, the Purchaser shall assist the Contractor free of charge by providing all such information and documents as are available with the Purchaser, save and except that in case of production of any witness at the request or insistence of the Contractor shall bear the costs and expenses required in this regard.
 2. The Purchaser shall not without the Contractor's consent (which shall not be unreasonably withheld) enter into any commitment or admit any fact capable of supporting third party's claims, unless the Purchaser shall release the Contractor of his liabilities and obligations.
 3. The Contractor shall at his own cost, without prejudice to the provisions of this Section, may either carry out such alterations or modifications of the equipment which are necessary to avoid the infringement without affecting the efficient operation of the equipment to the satisfaction of the Purchaser or to procure a right to the unrestricted use of the infringing equipment by the Purchaser.
- v) Nothing in this article shall abrogate or abridge the Contractor's own liability for infringement or violation of patent, trade mark, registered design, copy rights and/or

industrial property right of a third party, if such infringement or violation is proved before and sustained in court of law and the Contractor fails to take action in terms of provision of Clause 10.28.(iv)

- vi) If required and mutually agreed, the Purchaser shall enter into Process Licence Contract(s) as per clause 10.28.(ii).
- vii) The rights and liabilities of the parties under this Clause shall survive this Contract.

10.29 Indemnity

- i) The Contractor shall at all times indemnify and keep indemnified the Purchaser against all claims which may be made against the Purchaser in respect of any infringement of any rights protected by patent registration of design of trade mark. In this connection, the Purchaser shall pass on all claims made against him to the Contractor for settlement.
- ii) The Contractor assumes responsibility for and shall indemnify and save harmless the Purchaser from all liability, claims, costs, expenses, taxes and assessments including penalties, punitive damages, attorney's fees and court costs which are or may be required to be paid by the Purchaser arising from any breach of the Contractor's obligations under the Contract or for which the Contractor has assumed responsibilities under the Contract including those imposed under any Contract local or national law or laws, or in respect to all salaries, wages or other compensation or all persons employed by the Contractor or his Sub-Contractors or suppliers in connection with the performance of any work covered by the Contract. The Contractor shall execute, deliver and shall cause his Sub-contractor and suppliers to execute and deliver, such other further instruments and to comply with all the requirements of such laws and regulation as may be necessary there under to conform and effectuate the Contract and to protect the Purchaser.
- iii) The Purchaser shall not be held responsible for any accident or damages incurred or claims arising there from during the period of construction and erection under the responsibility of the Contractor/sub-contractors/associates and putting into operation of the plant under the supervision of the Contractor in so far as the latter is responsible. However, the Contractor shall be liable for such accidents as may be due to negligence on his part to carry out work in accordance with Indian laws and regulations.
- iv) The Contractor shall be responsible for proper fencing, lighting, guarding and watching of all works at site until they are taken over and further arrange proper provisions for like period of temporary drainage, roadways, footways, guards and fences as far as may be rendered necessary by reason of works for accommodation and protection of the Purchaser's adjacent property and that of, the public and others. No naked light shall be used by the Contractor on the site otherwise than in the open air without the special permission in writing from the Purchaser. The purchaser shall not be responsible for any theft or misuse of material/plant, equipment.
- v) The contractor shall furnish the Custody-cum-Indemnity Bond for the materials supplied by the Purchaser on receipt at site as per the format in Annexure-XVI.

10.30 Termination, Suspension and Foreclosure

- i) The Purchaser may at any time on breach of this Contract by the Contractor give him a written notice of such breach. If the Contractor does not take appropriate measure to the satisfaction of the Purchaser within a period of 30 days after issuance of such notice to remedy that breach, then the Purchaser may terminate this Contract at any time thereafter stating therein the date of termination. The Contractor shall then be liable to the Purchaser in accordance with the Clause-10.25 hereinabove.
- ii) The Purchaser reserves the right to terminate this Contract at any time either in part or in full due to reasons such as the Contractor failed to commence work, abandoned the work during progress, neglected to proceed and progress, failed to perform his obligations, by giving a notice of not less than fifteen (15) days. The Contractor upon receipt of such notice shall discontinue the work on the date and to the extent specified in the notice, make all reasonable efforts to obtain cancellation of all orders and Contracts to the extent they are related to the work terminated and terms satisfactory to the Purchaser, stop all further sub contracting or purchasing activity related to the work terminated and assist the Purchaser in maintenance, protection and disposition of the works acquired under the Contract by the Purchaser. The Contractor shall hand over all the drawings, documents, plant, equipment, supplies, material etc. including all the rights of work to the Purchaser. The Purchaser shall pay to the Contractor the cost incurred in accordance with the Contract terms and rates as decided by the Purchaser till the date of termination as compensation. No consequential damages shall be payable by the Purchaser to the Contractor in the event of termination.

In the event that the Associate is not performing the contractual obligation or the main Contractor intends to change the Associate on whose strength the Contract was bagged by the Contractor, the Contract will be terminated at the Cost & Risk on Contractor.

- iii) The Purchaser reserves the right to suspend and reinstate execution of the whole or any part of the works without invalidating the provisions of the contract by giving Contractor notice in writing to such effect stating the nature, the date and the anticipated duration of such suspension.
- iv) On receiving the notice of suspension as per above clause, the Contractor shall stop all such work which the Purchaser has directed to be suspended with immediate effect. The Contractor shall continue to perform other work in terms of the Contract which the Purchaser has not suspended.
- v) The Purchaser may at anytime cancel the suspension notice for all or any part of suspended work by giving written notice to the Contractor specifying the part of work to be resumed and the effective date of suspension withdrawal. The Contractor shall resume the suspended work as expeditiously as possible after receipt of such withdrawal of suspension notice.
- vi) In the event of suspension of work, the Purchaser shall not be liable to the Contractor for any damage or loss or idle labor caused by such period of suspension of work. The Purchaser shall not be liable to Contractor for any payment towards watch & ward and any other expenditure. However, the

compensation for the suspension period beyond 30 days for the reason attributable to the purchaser shall be mutually discussed and agreed. Further for the actual suspension period for the reason attributable to the purchaser, which will affect the progress of Contractor's work and scheduled completion time, the extension time shall be granted on request from the contractor.

- vii) The contract shall be terminated if due to any unforeseen circumstances which may lead to the foreclosure of the project for reasons such as resource crunch, non-availability of funds, and for other administrative resource etc. Purchaser shall however, give 60 days prior written notice to the contractor of the effective date of termination.
- viii) Contractor shall be compensated only for the quantum of work/services he has rendered till effective date of foreclosure. The costs mutually agreed by the Contractor and purchaser in the removal of the Contractor's Equipment from the Site and in the repatriation of the Contractor's and its Sub contractors' personnel and costs mutually agreed by the Contractor and purchaser in protecting the Facilities and leaving the Site in a clean and safe condition. Any other claims like compensation for loss in profit, compensation for loss of reputation etc. or any other consequential damages if any claimed by the Contractor shall not be given by the Purchaser.

10.30.1 Suspension of the Contractor:

If the performance of the Contractor is found to be unsatisfactory or if the conduct is under suspicion or in the event of any breach of the conditions committed by the contractor will lead to suspension of the Contractor for six (6) months.

10.30.2 Banning of the Contractor:

Supplying defective / poor quality materials or performing substandard works and failure to rectify /replace the same even after reasonable extension is given to the contractor will lead to banning of the Contractor for one (1) year.

10.31 Termination of Services of Contractor's Personnel

In the event any of the Contractor or his Sub- Contractors, personnel, agents, sub-agents, assistants, or other employees shall be guilty of any misconduct or be incompetent or insufficiently qualified or negligent in the performance of their duties or it is undesirable for any administrative reasons for such person to be employed, the Contractor, if so directed, shall immediately remove such person or persons from employment thereon. Any person or persons so removed shall not again be employed in connection with this Contract without the written permission of the Purchaser. Any person so removed shall immediately be replaced by a qualified and competent substitute at the Contractor's cost and expenses. Should the Contractor be requested to repatriate any person he shall do so and shall bear all costs and charges in connection there with.

10.32 Force Majeure

The following shall constitute Force Majeure:

- i) Natural phenomena, including but not limited to floods, droughts, earthquake and epidemics.

- (a) Acts of any Government, domestic or foreign including but not limited to war, declared or undeclared priorities, quarantines, embargoes.
 - (b) Strikes, lock outs and sabotage.
 - (c) Riots and civil commotions.
 - (d) Piracy
- Provided either party shall within 15 days from the occurrence of such a cause notify the other in writing of such cause.
- ii) If the Contractor suffers delay in the due execution of the contractual obligations due to delays caused by Force Majeure as defined above, the agreed time of completion of the work covered by this contract and of the obligations of the Contractor shall be extended by a period of force majeure, provided, that on the occurrence of any such contingency, the Contractor immediately reports to the Purchaser in writing, the cause of delay with requisite documentary evidence and also the remedial steps being taken and the expected period of interruption.
- However, as regards to the Sub-Contractors of the contractor, the events or occurrences enumerated above in Clause 10.32.(i) which are site-specific shall constitute force majeure events but excluding strikes, Lockouts or other concerted action of workmen of such subjects.
- iii) The decision of the Purchaser whether there is a Force Majeure condition or not and whether extension of time shall be granted or not shall be final.
- iv) Force Majeure conditions prevailing at the works of the collaborator/Associate/ Suppliers / Sub-Suppliers / major Sub-Contractors other than a maximum of 10 (Ten) major collaborator / Associate / major Suppliers / major Sub-Contractors (the names of which have to be indicated by the contractor and got approved by the Purchaser: however, the decision of the Purchaser shall be final) shall not be recognized by the Purchaser on any account and it shall be upto the Contractor to make necessary alternative arrangement to execute the Contract within the agreed time schedule. The Contractor shall furnish the list of Sub-Suppliers / Sub-contractors to be considered under Force Majeure conditions before signing of the contract.
- vi) The contractor or the Purchaser shall not be liable for delays in performing his obligations resulting from any Force Majeure cause as referred to and/or defined above. The date of completion shall subject to hereinafter provided, be extended by a reasonable time even though such cause may occur after the contractor's performance of his obligations has been delayed for other causes.
- vii) No increase in price shall be payable due to force majeure condition. However any benefit of price fall shall be passed on to the purchaser.

10.33 Jurisdiction & Resolution of Disputes

10.33.1 Jurisdiction

The laws applicable to this Contract shall be the laws in force in India. The civil courts having ordinary original jurisdiction over places where site is located shall alone have exclusive jurisdiction over all matters concerning this Contract including the arbitration proceedings if any arising under the Contract.

10.33.2 Resolution of Disputes

Any dispute/disputes or difference / differences arising out of or in connection with the contract shall, to the extent possible be settled amicably between the parties.

In the event of any dispute, Clause No.10 & 11 under Sec.8 of Integrity Pact may also be referred.

10.33.2.1 Informal Dispute Resolution

The parties agree to use reasonable efforts to resolve all disputes equitably and in good faith. If any dispute between the Contractor and the PURCHASER arises it shall in the first instance be referred in writing to the PURCHASER, who shall endeavour to resolve the dispute amicably and render a decision within 30 days. The period of 30 days shall be reckoned from the date of intimation of the dispute is received by the PURCHASER.

10.33.2.2 Save as hereinafter provided, in respect of a dispute so referred, the decision of the PURCHASER shall be final and binding upon the Parties until the completion of the Contract and shall forthwith be given effect to by the Contractor who shall proceed with the Contract with all due diligence, whether or not either Party has sought has sought conciliation / arbitration (as applicable) of the dispute as hereinafter provided.

10.33.3 Conciliation (for other Contractors and not for PSUs):

10.33.3.1 If the party is dissatisfied with the decision rendered by the Purchaser, or if the Purchaser omits or declines to render a decision within the said period of 30 days, then within a further period of 30 days, the dissatisfied Party shall require by a notification that the dispute be referred to Conciliation in the manner as per the 'NLC Conciliation Rules', copy of which is available with the NLCIL offices and the Bidders/ Contractors shall abide by the NLC Conciliation Rules' for resolving any dispute arising out of this contract. Such a notification shall be in writing and it shall be duly served on the other party. Failure to invoke the Conciliation within the time stipulated shall debar the party from seeking reference to Conciliation.

10.33.3.2 Except as otherwise provided in this clause, any dispute arising out of or relating to this agreement, or the breach, termination or validity thereof, shall be settled by Conciliation in accordance with 'NLC Conciliation Rules'. The Conciliation shall be held at Neyveli / Chennai. The Conciliation proceedings shall be conducted, and the award shall be rendered in English. The award shall state the reasons upon which it is based.

10.33.3.3 There shall be three Conciliators, who will be appointed as per Section-5 of the 'NLC Conciliation Rules', which is available in NLCIL's Web site.

10.33.3.4 The Work Order conditions and the rights and obligations of the Parties, shall remain in full force and effect during the Conciliation proceedings. Supplies and / or services under the Contract shall, if reasonably possible, continue during the Conciliation proceedings.

10.33.3.5 For the purpose of this clause, the term 'dispute' shall include a demand or difference of any kind whatsoever, arising out of the Contract and respecting the performance of the Contract, whether during the Contract period including extensions if any, or after completion, and whether before or after termination, abandonment or breach of the

Contract. (except as to any matter, the decision of which is specifically otherwise provided for in any of these conditions).

- 10.33.3.6 Only in case of failure to resolve the dispute through Conciliation, Arbitration can be resorted to.
- 10.33.3.7 Once the settlement agreement is signed with respect to a dispute, the same dispute is not subject to further appeal through Arbitration or Judicial Proceedings.
- 10.33.3.8 Anything not found included in the 'NLC Conciliation Rules', but necessary to conduct the conciliation proceedings will be dealt with as per the provisions of the 'Arbitration and Conciliation Act 1996 - Part-III' or as per the statutory provisions modified from time to time.

10.33.4 Arbitration:

10.33.4.1 Between NLCIL & another Central PSE

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial purchases and contract(s) between Central Public Sector Enterprises (CPSEs) / Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes relating to Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for its resolution through AMRCD as mentioned in DPE OM No. 05/0003/2019-FTS-10937 Dated 14th December 2022 and the decision of AMRCD on the said dispute will be binding on both the parties. The inter-se disputes of various Ministries/Departments/CPSEs etc., other than those related to taxation, are to be resolved through the existing AMRCD/AMRD Mechanism."

10.33.4.2 For other Contractors

Arbitration shall be applicable only for the dispute(s) involving claims from Rs.25 Lakhs to Rs.20 Crores.

For the dispute(s) involving claims below Rs.25 Lakhs and above Rs.20 Crores:

The parties mutually agree that dispute(s)/issues(s) involving claims below Rs.25 Lakhs and above Rs.20 Crores shall not be subject matter of Arbitration.

The claims below Rs.25 Lakhs are subject to the jurisdiction of the respective Civil Court having jurisdiction over the place of works/supply/service.

The claims above Rs.20 Crores are subject to the exclusive jurisdiction of the Court situated at Chennai.

The above provisions shall supersede provisions relating to the Arbitration, governing Law & Jurisdiction mentioned elsewhere in the tender documents.

- a) In case of failure to resolve the dispute through Conciliation, then within a further period of 30 days, the dissatisfied Party may require by a notification that the dispute be referred to arbitration in the manner hereinafter provided. Such a notification shall be in writing and it shall be duly served on the other party. Failure to invoke the arbitration within the time schedule shall debar the party from seeking reference to arbitration.
- b) Except as otherwise provided in this clause, any dispute arising out of or relating to this agreement, or the breach, termination or validity thereof, shall be finally settled by Arbitration in accordance with the Arbitration and Conciliation Act 1996 (the "Act"). The arbitration shall be held at Chennai, Tamil Nadu. The arbitration

proceedings shall be conducted, and the award shall be rendered in English. The award shall state the reasons upon which it is based.

- c) There shall be three arbitrators of whom each Party shall appoint one. The Party requesting that the dispute be referred to arbitration shall, within 30 days of the notification in terms of Clause 10.32 (ii) (a), appoint an arbitrator as also call upon the other Party to appoint an arbitrator within 30 days. The two arbitrators so appointed shall, within 30 days of the date on which the second of them is appointed, agree on the third arbitrator who shall act as the presiding arbitrator of the tribunal.
- d) The agreement and the rights and obligations of the Parties, shall remain in full force and effect pending the award in any arbitration proceedings. Supplies and/ or services under the Contract shall, if reasonably possible, continue during arbitration proceedings.
- e) For the purposes of this clause, the term 'dispute' shall include a demand or difference of any kind whatsoever, arising out of the Contract and respecting the performance of the Contract, whether during the Contract period including extensions if any, or after completion, and whether before or after termination, abandonment or breach of the Contract (except as to any matter, the decision of which is specifically provided for in any of these conditions).
- f) The party, in whose favour the award is passed, shall be entitled to recover the entire cost of Arbitration from the other party. The Arbitrator shall indicate the above in their award clearly.

10.34 Warranty

1. The Contractor shall guarantee that the equipment shall be new and in accordance with the Contract documents and be free from defects in design, material, and workmanship. The warranty period shall be 12 (twelve) months from the date of SCOD. The Contractor's liabilities shall be limited to the replacement of any defective parts in the equipment of his own manufacture or those of his Sub-Contractors, under the normal use and arising from faulty design, materials and/or workmanship. The Plant shall be operated as per the operating instructions and all records, logbooks and other information about the operation shall be kept. Such replaced defective parts shall be taken back by the Contractor.
2. The Contractor shall carry out complete maintenance of the plant till completion of warranty period. All repairs and / or replacement other than maintenance works until the end of the warranty period shall be carried out by the Contractor to fulfill the warranty obligation.
This, however, shall not dilute the Contractor's liability during the guarantee period.
3. The warranty for the equipment supplied by the BOS Contractor and workmanship during the execution/Construction period will be 12 months after SCOD.
4. In case of failure in the NLCIL supplied equipment (i.e., PV Modules, IDT, Central Inverter, HT cables & HT Switchgears), the BOS EPC contractor shall need to intimate to the NLCIL within 24 Hours from the failure occurred. If BOS EPC contractor is not informed to NLCIL within the stipulated time period, the BOS EPC Contractor is soul responsible for restore the failure.
5. In the event of any emergency where, in the judgment of the Purchaser or the Consultant, delay would cause serious loss or damage, repairs, replacements or

adjustments may be made by the Purchaser or the Consultant or a third party chosen by the Purchaser or the Consultant without advance notice to the Contractor and the cost of such work shall be paid by the Contractor, or by the Surety. In the event of such action being taken by the Purchaser or the Consultant, the Contractor shall be notified promptly, and he shall assist wherever possible in making the necessary corrections. This shall not dilute the Contractor's liability under the terms and conditions of the Contract.

6. If it becomes necessary for the Contractor to replace or renew any defective portions of the plant under this clause, the provisions of this clause shall apply to the portion of the plant so replaced or renewed until the expiry of twelve (12) months from the date of such replacement or renewal. If any defects be not remedied within a reasonable time, the Purchaser or the Consultant may proceed to do the work at the Contractor's risk and costs, but without prejudice to any other rights which the Purchaser may have against the Contractor in respect of such defects.
7. The repaired or new parts shall be furnished and erected free of cost at site by the Contractor. If any repair is carried out on his behalf at the site, the Contractor shall bear the cost of such repair.
8. The cost of any special or general overhaul rendered necessary during the Warranty period due to defects in the plant or defective work carried out by the Contractor, shall be borne by the Contractor.
9. The acceptance of the equipment by the Purchaser or the Consultant shall not in any way relieve the Contractor of his obligations under this clause.
10. In case of these defective parts which are not repairable at site but are essential for the commercial use of the equipment, the Contractor and the Purchaser or the Consultant shall mutually agree to a programme of replacement or renewal which shall minimise interruption to the maximum extent, in the operation of the equipment.
11. At the end of the Warranty period, the Contractor's liability ceases except for latent defects.

“Latent Defect” means any repeated defect or repeated adjustment in the equipment / system which was not revealed in the normal standard inspection checklist of manufacture, erection and operation, but exhibits as observation or as deviation in operation parameters or as repetitive failure of certain components after guarantee Period and when variations in operating conditions are experienced and ultimately could be solved only by replacement or repair / correction of equipment or parts of equipment.”

For latent defects, the liability period shall be upto three (3) years after the expiry of the guarantee period. In respect of goods supplied by the Sub-Contractors to the Contractor where a longer guarantee (more than 12 months) is provided by such Sub-Contractors, the Purchaser shall be entitled to the benefit of such longer guarantee.

The equipment shall be operated as per the Contractor's O&M Manual.

12. The provisions contained in Clause 10.34(i) shall not be applicable:

- (a) If the Purchaser has not operated the equipment according to the generally approved industrial practices and in accordance with the conditions of operation specified and in accordance with operating manuals, if any.
 - (b) In case of normal wear and tear of the parts.
13. All costs on account of these warranty obligations shall be to the account of the Contractor.
14. The Contractor should furnish an Indemnity Bond in the prescribed format as per Annexure- XVI for the equipment to be taken away from Project site for repair/rectification.

15. Defect Liability for Civil Works

- (a) The Contractor guarantees that within one (1) year from the date of work completion certificate or in the event more than one certificate having been issued by the Purchaser from the respective date so certified, the contract work shall not show any sign of defects, cracks, settlements, disfiguration, shrinkage, leakage, dampness, or any other faults.
- (b) The Contractor shall maintain and satisfactorily execute at his own cost all such works of repair, amendment, reconstruction, rectification, replacement and any other work to make good any faulty work during the defect liability period.
- (c) The Contractor shall, if required by the Purchaser, search for the causes of any defects, imperfection, or fault under the direction of the Purchaser. The cost of such work shall be borne by the Contractor.
- (d) At intervals specified by the Purchaser, the Contractor along with the Purchaser shall inspect the contract work to satisfy himself that no defects have cropped up in the contract work. Should there be any signs of defects, the Contractor shall take immediate steps to rectify the same.
- (e) At the end of the defect liability period, the Contractor along with the Purchaser shall carryout final inspection of the contract work to prove that no defects had appeared in the contract work or that all defects which appeared in the contract work have been rectified to the satisfaction of the Purchaser. If during the final inspection it is found that the defects still remain in the contract work, the period of defect liability shall be extended for further period which will be mutually discussed and agreed for rectifying the defect and the Contractor shall be liable to make good the defects and be responsible for the maintenance of the work till the defect have been fully removed.
- (f) Until the end of the defect liability period, the Contractor shall have right of entry at his own risk and expense, by himself or his duly authorised representative whose name shall previously have been communicated in writing to the Purchaser at all reasonable working hours, upon all necessary parts of the works for the purpose of inspection and taking notes there from and, if he desires, at his own expense, making any tests subject to the approval of the Purchaser, which shall not be unreasonably withheld.
- (g) The issue of the Purchaser's certificate shall in no way exempt the Contractor from the provisions of this clause.

- (h) To the intent that the works shall or as soon as practicable after the expiration of defect liability period be handed over to the Purchaser in perfect condition to the satisfaction of the Purchaser, all such repair works as stated herein above, shall be carried out by the Contractor at his own expense if the necessity thereof shall in the opinion of the Purchaser be due to the use of materials or workmanship not in accordance with the contract or failure on the part of the Contractor to comply with any obligation expressed or implied on Contractor's part under contract.
- (i) If the Contractor fails to commence rectification of such defects within fourteen (14) days from the date of Notice by the Purchaser or does not complete the said rectification with diligence and within mutually agreed time period, the Purchaser shall be entitled to carryout such work by his own workmen or by other Contractors and if such work is the work which the Contractor should have carried out at his own cost, the Purchaser shall be entitled to recover from the cost thereof or may deduct the same from any money due or that become due to the Contractor.
- (j) Upon the successful completion of defect liability period, the Purchaser shall issue final acceptance certificate to the Contractor.

10.35 Tests on Completion

The final OTG tests shall be carried out by the Contractor in the presence of Purchaser/Consultant as specified in Technical Specification, Volume-II.

10.36 Access to and Possession of Site

Not applicable.

10.37 Due Dates of Payment

Payment shall be due and payable by the Purchaser within a reasonable period which shall not normally exceed one month from the date of the receipt of each complete and correct invoice by him supported by requisite certificate issued by the purchaser/his authorised agency and proper documentation. If it is not payable the invoice shall be returned to the Contractor stating the reasons for rejection within 15 (fifteen) days from the date of receipt by the Purchaser.

10.38 Deductions from Contract Price

The Contractor shall reimburse the Purchaser all costs, charges, damage or expenses which the Purchaser may have paid or incurred, if and to the extent to which the Contractor is liable under this Contract to pay within thirty (30) days upon written request of the Purchaser, failing which such costs, charges, damages or expenses shall be deducted by the Purchaser from any money due or becoming due by him to the Contractor under this Contract or any other Contract failing which such amounts shall be considered as debt due from the Contractor to the Purchaser and shall be recoverable accordingly.

10.39 Construction of Contract

The Sections and terms and conditions herein contained including Annexures shall construe the entire contract and understanding between the parties and shall be binding

on both the parties. All other communications which were made prior to the signature of the Contract between the parties hereto with respect to the subject matter hereof shall form the schedule of references and form part of the Contract.

10.40 Rights of Purchaser to Vary Scope

- i) The Purchaser shall have the right, during the performance of the Contract, to change the scope and/or technical character of the Project and/or of the supplies and services stipulated in the Contract.
- ii) If any changes are required for completeness of the work as per Clause-10.7 the Contractor shall not be entitled to extra price or time.
- iii) In the event, the Purchaser requests a change as per above Clause-10.40 (i) the Contract price and time shall be adjusted upwards or downwards, as the case may be and as shall be mutually agreed. The Contractor shall not be entitled to any extension of time unless such changes adversely affect the time schedule.
- iv) The Contractor shall not change any work to be made pursuant to this Contract except as may become necessary to enable him to meet his technical obligations under this Contract, provided however that such changes shall be subject to prior written approval of the Purchaser.
- v) If any changes are required for completeness of the works as per Clause 10.40(ii), or the Contractor himself makes changes as per Clause 10.40 (iv), the Contractor shall not be entitled to extra price or time.
- vi) The Contractor shall proceed with the changes as requested as per Clause 10.40(i) pending adjustment of Contract price and time schedule where so applicable in terms of Clause-10.40(iii).
- vii) In the event that a request for changes by the Purchaser should affect the guarantees of the plant/process, a readjustment of such guarantees shall be agreed upon jointly, before the Contractor proceeds with the change.
- viii) Changes occasioned due to non-observance by the Contractor of the provisions of this Contract or arising out of detection by the Purchaser of errors in the documents or in works not in compliance with the design, specifications & drawings or with the best engineering practice, shall neither give rise to price adjustment nor extension of time. The Contractor shall take immediate steps to restore the contractual position.

10.41 Waiver

- i) Non-enforcement by either party of any of the provisions of this Contract shall not operate or constitute as a waiver of the provision itself or any subsequent breach thereof.
- ii) The validity of the Contract shall not be affected, should one or more of its stipulations be or become legally invalid and such stipulation is severable from and not fundamental to the obligations of either party to this Contract. In such a case, the parties shall negotiate in good faith to replace the invalid clause by an agreed stipulation which is in accordance with the applicable law and which shall be as close as possible to the parties original intent.

10.42 Assignment

- i) The Contractor shall not assign its rights and obligations under the terms of this Contract to any party other than its legal successor without the written consent of the Purchaser.
- ii) Should loan/financial agreement(s) require the Contractor to assign, by way of charge, any money due or to become due to it, to a bank/credit agency for the benefit of receiving payment by the Contractor under this Contract from such bank/credit agency, or if any partial assignment is necessary to be made to any insurer in terms of Insurance Policy approved by the Purchaser, the Purchaser shall not refuse consent in such cases.

10.43 Contract Amendments

- i) Any amendment to the terms of this Contract (including Sections & Annexures) shall be made in writing by both parties hereto and shall specifically state that it is an amendment to the Contract.
- ii) Contractor shall not suspend the performance of this Contract during review and negotiation of any amendment to the contract except as may be directed by the Purchaser.
- iii) No amendment shall have any effect until the Purchaser and Contractor have agreed to the amendment in writing.

10.44 Applicable Law

This Contract shall be governed by prevailing Indian Laws.

10.45 Notices

- i) All notices under this Contract shall be given in writing and shall be deemed sufficiently given when delivered either in person or by e-mail or by registered mail addressed to the other party at its address set forth in the contract agreement with a copy to the nominated representative at site.
- ii) If any such notice is delivered by hand, it shall be duly acknowledged and if given, by fax it shall be confirmed by Registered Letter within seven days of the date of such notice. Either party shall by notice in writing inform the other party of any change of its address as stated under Clause 10.45 (i) for receiving such notices.
- iii) Date of notices under Clause-10.45 (i) shall be the date of receipt of such notice by the receiving party.

10.46 Language

- i) All documents, instructions, catalogues, brochures, pamphlets, design data, norms and calculations, drawings, operation, maintenance and safety manuals, reports, labels, on deliveries and any other data shall be in the English Language.
- ii) The Contract documents and all correspondence between the Purchaser/consultants and the Contractor shall be in the English language.
- iii) However, all signboards required to indicate "Danger" and/or security at site and other statutory signage shall be in English, Tamil & Hindi. Other Indian languages shall also be considered depending upon the workforce deployed at site.

10.47 Statutory and Other Regulations

- i) The Contractor shall comply with all the statutory obligations of Government of India/State Government of Tamil Nadu applicable at site and the Purchaser shall not be liable for any action of the statutes applicable due to non-fulfillment of statutory obligations by the Contractor.
- ii) Explosives shall not be used at the site by the Contractor without the permission in writing of the Purchaser and then only in the manner and to the extent to which he has prescribed. Where explosives are used, the same shall be stored in a special magazine to be provided by and at the cost of the Contractor, who shall be liable for all damages loss or injury to any person or property and shall be responsible for complying with all statutory obligations in these respects.
- iii) The Contractor shall give all notices and pay all fees required to be given or paid under any Central or State statute, ordinance or other law or any regulation or by-law of any local or other duly constituted authority in relation to the execution of the Contract Work.
- iv) The Contractor shall conform in all respects with the provisions of any statute, ordinance or laws as aforesaid and the rules, regulations or by-laws of any local or other duly constituted authority which may be applicable to the works or to any temporary works and with such rules and regulations of public bodies as aforesaid and shall keep the Purchaser indemnified against all penalties and liabilities of every kind for breach of any such statute, ordinance, law, rule, regulation or by-law.
- v) All fossils, coins, articles of value of antiquity and structures and other remains or things of geological or archaeological interest discovered on the site shall as between the Purchaser and the Contractor be deemed to be the absolute property of the Purchaser and the Contractor shall take reasonable precaution to prevent its workmen or any other person from removing or damaging any such article or thing and shall immediately upon discovery thereof and before removal acquaint the Purchaser of such discovery and carry out at the expense of the Purchaser as to the disposal, removal or otherwise of the same.
- vi) Except where otherwise specified, the Contractor shall pay all tollage and other royalties, rent and other payments or compensation, if any, for getting stone, gravel, clay, or other materials required for the work or in connection therewith.
- vii) All operations necessary for the execution of the works and for the construction of any temporary works shall so far as compliance with the requirements of the Contract permits be carried on so as not to interfere unnecessarily or improperly with the public convenience or the access to use and occupation of public or private roads and footpaths or of properties whether in the possession of the Purchaser or any other person and the Contractor shall save harmless and indemnify the Purchaser in respect of all claims demands, proceedings, damages, costs, charges and expenses, whatsoever arising out of or in relation to any such matters.
- viii) The Contractor shall use every reasonable means to prevent any of the highways and bridges communicated with or on the routes to the site from being damaged or injured by any of his or any of his Sub-Contractor's traffic and in particular shall

select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as shall inevitably arise for moving of plant and materials from and to the site shall be limited as far as reasonably possible so that no unnecessary damage or injury may be occasioned to such highways and bridges. For any damage caused by the breach hereof, the Contractor shall be solely responsible.

- ix) Where the nature of the work is such as to require the use by the Contractor of water borne transport, the foregoing provisions of this clause shall be construed as though "high sea" including a lock, dock, seawall or other structure related to waterway and "vehicles" including craft and shall effect accordingly.
- x) On completion of the work, all rubbish, kilns, VATs, tanks, materials and temporary structure of any sort or kind used for the purpose or connected with the construction/erection work are to be removed by the Contractor and all pits and excavations filled up and the site handed over in a tidy and workmanlike condition and no final payment in settlement of the account for the said work shall be held to be due or shall be made to the Contractor till such site clearance shall have been effected by him and such clearance may be made by the Purchaser at the expenses of the Contractor in the event of his failure to comply with this provision within 15 (fifteen) days after receiving notice in writing from the Purchaser to that effect. If it becomes necessary for the Purchaser to have the site cleared as indicated above at the expense of the Contractor, the Purchaser shall under no circumstances be held liable for any losses or damages to such of Contractor's property as may be on such site due to such removal there from, which removal may be effected by means of public sale of such materials and property or in such a way as seems fit and most convenient to the Purchaser.
- xi) The Contractor must take sufficient care in moving its construction plants and equipment from one place to another so that they may not cause any damage to the property of the Purchaser, particularly to the existing structures and overhead and underground services and in the event of Contractor's failure to do so, the cost of such damages shall be borne by the Contractor.

10.48 Labour

10.48.1 Labour rules

In respect of all labour directly or indirectly employed on the works by the Contractor, the Contractor shall comply with and implement all the provisions of the Contract Labour (Regulation and Abolition) Act 1970, or any amendment thereof, and all legislations and rules of the State and/or Central Government or other local authority formed from time to time governing the protection of health, sanitary arrangements, wages, welfare and safety of labour employed on the works and the Contractor shall be deemed to be the Principal employer for this purpose. The rules and other statutory obligations with regard to fair wages, welfare and safety measures, maintenance of register etc. shall be deemed to be part of the Contract. The Contractor shall get himself registered with the concerned statutory authorities as provided in the Act and shall be directly responsible to the authorities there under for compliance with the provisions thereof.

10.48.2 Provision of Minimum Wages Act and Payment of Wages

- i) The Contractor shall comply with the provisions of the Minimum Wages Act 1948. The minimum wages Central Rules 1950, the Payment of Wages Act 1936 or any other rules made thereunder by the Government in respect of all employees employed by him or his Sub-Contractor directly or indirectly for the purpose of carrying out the works. In the event of retrenchment of workers by the Contractor or Sub-Contractors employed by the Contractor during or after the completion of the work, the retrenchment compensation and other benefits shall be paid by the Contractor to the workers as per the Industrial Dispute Act.
- ii) If any money shall, as a result of any claim or application made under the said acts, be directed to be paid by the Purchaser, such money shall be deemed to be money payable to the Purchaser by the Contractor and/or failure by the Contractor to repay the Purchaser, any money paid by the Purchaser as aforesaid, latest within thirty (30) days after the same shall have been demanded from the Contractor, the Purchaser shall be entitled to recover the same from any money due or accruing to the Contractor under this or any other contract with the Purchaser, failing which such amount shall be considered as debt due from the Contractor to the Purchaser.
- iii) The Contractor shall comply with the provisions of bi-partite and tripartite agreement entered into by the Purchaser from time to time with the Labor Unions and/or the circulars issued by the Purchaser regarding payment of minimum wages and benefits applicable.

10.48.3 Reporting of accidents to labour

The Contractor shall be responsible for the safety of his and his Sub-contractor(s)/Workmen and employees. All accidents at site are to be immediately reported to the required authorities. The Contractor shall be responsible for all such accidents.

10.48.4 Provision of Workmen's Compensation Act

The Contractor shall be liable for in respect of any damages or compensation payable by law in respect of or in consequence of any accident or injury to any workmen or other person in the employment of the Contractor or any of his Sub-Contractors and the Contractor shall save harmless and shall indemnify and keep indemnified the Purchaser against all such damages and compensation and against all claims, demands, proceedings, costs, charges and expenses, whatsoever, in respect thereof or in relation thereto. The Contractor shall at all times indemnify and keep indemnified the Purchaser against all claims for compensation under the provisions of the Workmen's Compensation Act 1948 or any other law for the time being in force by or in respect of any workmen employed by the Contractor or his Sub-Contractors / agencies in carrying out the Contract and against all costs and expenses of penalties incurred by the Purchaser in connection therewith. In every case in which by virtue of the provisions of Section-12, Sub-Section(l) of the Workmen's Compensation Act 1923, the Purchaser is obliged to pay compensation to a workmen employed by the Contractor or his Sub-Contractor/ agencies, the amount of compensation so paid and without prejudice to the

rights of the Purchaser under Section-12, Sub-Section (2) of the said Act, the Purchaser shall be at liberty to recover such amount or any part thereof from the security deposit or from the sums due or to become due to the Contractor (whether under this Contract or any other Contract).

10.48.5 Provisions of Apprentices Act

The Contractor shall comply with the provisions of the Apprentices Act 1961, and the rules and orders issued there under from time to time. If he fails to do so, his failure may be treated as breach of the Contract and the Purchaser may, in his discretion, terminate the Contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.

10.48.6 Labour Returns

The Contractor shall submit daily statements of labor employed by him/Sub-contractor(s) in the proforma prescribed by the Purchaser.

10.48.7 Labour Camps

The Contractor shall, at its own expense, make adequate arrangements for housing, electricity, road, supply of drinking water and provision of latrines and urinals for its staff and labor, disposal of sewerage and sullage and for temporary creche (balmandir) where 50 or more women are employed at a time.

10.48.8 Preservation of Peace

The Contractor shall take requisite precautions and use his best endeavor to prevent any riotous or unlawful behaviour by, or amongst its workmen and/or others employed on the works by him or his Sub-contractor(s) and for the preservation of peace and protection of the inhabitants and security of the property in the neighbourhood of the works/site. In the event of the Purchaser requiring the maintenance of a special police force at or in the vicinity of the site during the tenure of the Contract in consequence of the riotous or unlawful behaviour by, or amongst the Contractor's or his Sub-contractor(s)/Workmen and/or others staff employed by him/them, all expenses thereof and costs of all damages due to such riotous or unlawful behaviour shall be borne by the Contractor and if paid by the Purchaser, shall be recoverable from the Contractor from any money due or that may become due to the Contractor by the Purchaser.

10.48.9 Payment of Wages

- i) The Contractor shall make regular and prompt payment of wages to its workmen engaged in the work and in no case shall the payment be delayed more than seven days following the period for which the wages are due. The Contractor shall send a certificate to the Purchaser to this effect every month. If it is found that workers are not paid regularly, the Contract is liable to be terminated.

- ii) The Purchaser shall have the right to enquire into and decide against any complaint alleging that the wages paid by the Contractor to any labourer for the work done by such labourer is less than the wages paid for similar work in the neighbourhood.
- iii) As number of Contractors may be working at the same time in the erection of different parts at the Project site, there is need for pursuance of a coordinated policy with regard to employment, wages and other conditions of work. The Contractor shall consult the Purchaser on all such matters to arrive at mutually agreed settlements.

10.48.10 Sanitary arrangements

The Contractor shall comply with all local sanitary rules in force and carry out all sanitary measures and permit inspection of all sanitary arrangements at all reasonable times by the Purchaser/local bodies.

10.48.11 Infectious diseases

The Contractor shall employ such persons as are found to be free of contagious diseases and shall produce, if required by the Purchaser, certificate of fitness of all its employees working at site. The Contractor shall, if required by the Purchaser, subject all its employees to regular medical check up and produce satisfactory evidence of their being free from any contagious disease.

- 10.48.12** The Contractor shall remove from its labour camp such labour and their families who refuse protective inoculations and vaccination when called upon to do so by any competent authority.

10.48.13 Medical Facilities at Site

The Contractor shall provide reasonable medical facilities at the site as per rules in force in relation to the strength of the Contractor's staff and workmen deployed at site.

10.48.14 Use of intoxicants

The use or sale of ardent spirits or other intoxicating beverages, within the works or in any of the buildings, boarding houses, encampments or other tenements owned, occupied by or within the control of the Contractor or any of its employees or his Sub-contractor is strictly forbidden and the Contractor shall ensure strict compliance.

10.48.15 Age limits of labour

The Contractor shall not employ, for the purpose of the work, any person below the age of eighteen (18) years as it is statutorily forbidden. The Purchaser reserves the right to dis-allow any labourer, whom he considers to be underage, to be employed by the Contractor. The Contractor shall submit periodical statements to the Purchaser, of labor employed by him.

10.48.16 Provident Fund

- i) The Contractor shall be solely responsible for deduction and contributions under the Employees' Provident Fund Act 1952 and Family Pension Act 1971 and the scheme made there under as amended from time to time. He shall be solely responsible for the maintenance of records for payment of contributions and submission of returns in accordance with the said act and scheme.
- ii) In case the Contractor fails to make payments under the above act and the scheme made there under and as amended from time to time, the Purchaser reserves the right to make such payment on behalf of the Contractor on demand from the authorities under the act and recover the same from the payments due to the Contractor. Further, the Contractor shall indemnify and keep indemnified the Purchaser against any loss or damage whatsoever that may be suffered by the Purchaser as a results of any claims, damages, penalties for any failure, non-compliance on his part with the provisions of the aforesaid act and the scheme framed there under.

10.48.17 Observance by Sub-Contractor(s)

The Contractor shall also be responsible for the observation of all the above clauses by his Sub contractor(s).

10.49 Care of Works

From the commencement to the completion of provisional takeover, the Contractor shall take full responsibility for the care of works and for all temporary works and in case any damage or loss shall happen to the works or to any part thereof or to any temporary works from any cause whatsoever, the Contractor shall at his own cost replace or repair and make good the same.

10.50 Restriction of Visitors

The Contractor shall not allow any visitors on the works except with the prior written approval of the Purchaser.

10.51 Possession Prior to Completion

The Purchaser shall have the right to take possession or use any completed or partially completed work. Such possession or use shall not be deemed to be an acceptance of any work done not in accordance with the Contract. However, any damage to such work solely due to such provision or use shall be to the Purchaser's account.

10.52 Work Permit, Passport, Etc.

The Contractor shall be responsible for arranging and obtaining at his own cost, the necessary work permits, passports, visas, police permits and expenses and for other effects of any personnel employed or engaged by him for work, which are non- residence of India.

10.53 General

No Director or Official or Employee of the Purchaser shall in any way be personally bound or liable for the acts or obligations of the purchaser under the contract or answerable for any default or omission in the observance or performance of any of the acts, matters or things or conditions which are herein contained.

10.54 General Liability Provision

The rights and obligations of the parties are finally and conclusively defined in this Contract.

10.54.1 Limitation of Liability

Except in case of Criminal Negligence or Wilful Misconduct,

- i) The Contractor shall not be liable to the Purchaser, whether in Contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages to the Purchaser, and,
- ii) The aggregate liability of the Contractor to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to any obligation of the Contractor to indemnify the Purchaser with respect to Patent infringement.

10.55 Transfer of Titles

10.55.1 Imported Items – Not Applicable

10.55.2 Self Manufactured Indigenous Items

Ownership of equipment supplied under the supply portion of the contract shall vest with Purchaser as soon as they are despatched ex-works/place of despatch, in respect of indigenous items. However, for executing the erection portion of the contract, Contractor shall take over, all such equipment from purchaser and further shall take full responsibility for safe custody, transportation to site, handling at all intermediate points and at site, storage, erection, testing and commissioning of equipment and for their exclusive use for purposes specified in this contract. Contractor's liability under the contract shall not be over till the plant is successfully commissioned and taken over by purchaser. The despatch document consigned in the name of the Purchaser, shall be endorsed by the Purchaser, in favour of the Contractor for receipt of goods and then for storage, erection testing and commissioning. Purchaser's responsibility shall be limited to endorsement of despatch documents in Contractor's favour to enable the contractor to carry out services under the erection portion of the contract.

10.55.3 Bought out items

The procedure described in the above clause covers the self manufactured items of the Contractor. For bought out items directly consigned to purchaser's site, from approved sub-supplier, the consignee shall be the Purchaser. The dispatches shall be made as

performance relevant provisions of GST Act. However, the contractor shall ensure that no additional liability towards sales tax arises to the Purchaser.

10.56 Indemnity Bond

For the equipment handed over to Contractor, for performing the work under this contract, Contractor shall execute a custody cum indemnity bond in favour of Purchaser as per Annexure- XVI. The endorsement and handing over of despatch documents by purchaser to contractor shall be construed as having handed over and entrusted to the Contractor all the equipment covered in such despatch documents. The Contractor shall hold the equipment handed over to him by Purchaser, as trustee on behalf of the Purchaser without having any lien or charge against the equipment at any stage. For any loss or damage to the equipment and material till these are finally taken over by Purchaser, the contractor shall immediately replace/repair the loss or damaged equipment entirely at his cost irrespective of the extent and/or time of realisation of claims by him from the insurer/underwriters.

The title of ownership and property to all goods materials equipment etc. originating in India shall pass to the purchaser as per the terms and conditions of this contract after the Contractor has effected the despatch of the same to Project Site and the Contractor has prepared necessary documentation for handing over the same to Purchaser's authorised representative provided however, such passing of titles of ownership and property to the Purchaser shall not in any way absolved, dilute or diminish the responsibility and obligations of the Contractor under this Contract including loss or damage and all risks which shall vest with the Contractor till the successful commissioning as per this Contract.

10.57 Safety

The Contractor shall abide by the Safety Code for Contractors which is annexed as Annexure-XIX.

10.58 General Conditions for Erection & Civil works

The Contractor shall abide by the General Conditions for Erection & Civil Works, which is annexed to this Volume as Annexure-XX.

10.59 Emission Test Certificate

The vehicles being used by the Contractors must have valid Emission Test Certificate issued by the authorized agency.

10.60 Public Procurement (Preference to Make in India):

The Order/Contract is placed based on the declaration submitted in the offer by the Contractor in compliance with Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Govt. of India, Public Procurement (Preference to Make in India) Order 2017 dated 16.09.2020 and its subsequent amendments. Accordingly, the Contractor shall ensure that the supplies made and services rendered have been complied with the local content indicated in their offer.



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10.61 Contract Closure

The Contractor shall execute the work as per the Terms and Conditions of the tender. Successful bidder/Contractor shall furnish required documents/Clearance Certificate(s) – No Claim Certificate immediately on completion of all the contractual obligations under the contract for the closure of contract.



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SECTION-11

QUALITY ASSURANCE

Quality System for Inspection & Testing of Plant & Equipment at Manufacturer's Premises

11.1 General

- i) Inspection & testing of plant & equipment shall be carried out by NLCIL at the works of successful bidder (Contractor/Sub-contractor) during manufacturing and on final product to ensure conformity of the same with acceptable criteria of technical specifications, approved drawings, authenticated manufacturing drawings and reference national / international standards.
- ii) This specification is in addition to provisions laid-down elsewhere in Purchaser's Draft Contract and special instructions to tenderers, if any.
- iii) Contractor must recognize the importance of quality and follow defined quality programme in all manufacturing and quality control activities of the product. Contractor must define and implement the tasks and controls that shall provide needed assurance in case manufacturing of product is sub contracted either partly or fully and/or for the procured components of the product.
- iv) Purchaser/ Consultant reserve the right to verify the quality programme and entire product characteristics to assure the intended and specified quality of the product.
- v) The inspection, examination or testing carried out by the purchaser shall not relieve the contractor from any of his obligation under this contract. The inspection procedure shall be discussed and finalised.

11.2 Quality Assurance Plan (QAP)

- i) Inspection and test requirements shall be decided with due consideration of factors like safety, duty cycle, operating conditions, equipment life, environmental conditions, place of installation and statutory regulations, as applicable, for a particular equipment.
- ii) Detailed QAP shall be prepared by Contractor in consultation with Sub-contractors / Manufacturers to avoid any complication later.
- iii) QAP shall clearly indicate the followings:
 - (a) Range of inspection & tests to be done by Manufacturers and cross checked by Contractor during manufacture of equipment from raw materials to finishing stage.
 - (b) Suggestive check/ hold points for Purchaser's Inspection and witnessing of tests during the manufacturing and final product inspection.
 - (c) Inspection documents to be furnished by Contractor/ Manufacturers to Purchaser for reference during inspection.

11.3 Internal Inspection by Contractor / Manufacturer

- i) Inspection and tests shall be carried out by Contractor/ Manufacturer in accordance with approved drawings, Tender Specification, Purchase Order, and approved QAP. Contractor/ Manufacturer shall maintain record of each inspection and test carried out and signed documents shall be submitted to purchaser for verification.
- ii) Contractor shall carry out their internal inspection & obtain clearance from statutory bodies e.g., IBR, CCE, TAC, Weights & Measures, safety, IE rules etc., if applicable prior to offering any equipment for purchaser's inspection in accordance with approved QAP.
- iii) All the measuring & test instruments shall be calibrated by manufacturers and record of the same shall be maintained for purchaser's scrutiny. Contractor shall ensure use of appropriate calibrated measuring & test instruments during their internal inspection, as well as, make available the same for purchaser's inspection and tests. Calibration standard shall be national standard, if existing. Otherwise, manufacturers' own standard & calibration procedure shall be accepted. Valid calibration certificates traceable to national/ international standards shall be submitted to purchaser during / prior to inspection.
- iv) Contractor / Manufacturers shall identify all the inspected equipment/ component/raw materials & shall maintain the record of status of inspection viz. inspected & found acceptable, require rectification/rework, rejected etc.
- v) The Contractor shall establish and maintain procedures to ensure that product that does not conform to specified requirements, is prevented from inadvertent use or installation. The description of non-conformity that has been accepted subsequently by Designer / Purchaser by concession and/or of repairs, shall be recorded and forms part of the subsequent drawings / schedules relevant to the products.
- vi) Repaired and reworked product shall be offered for re- inspection to purchaser along with records of corrective action taken.
- vii) Contractor / Manufacturer shall not despatch any equipment till receipt of despatch clearance from purchaser.

11.4 Method of Undertaking Inspection & Testing by Purchaser

11.4.1 Agency Responsible

Inspection/Waiver of inspection of equipment shall be undertaken by purchaser.

11.4.2 Method of Issuing Inspection Call to Purchaser

Inspection call shall be given only on readiness of the equipment/ assembly/ sub-assembly and approval of all relevant drawings and QAP. In case, equipment/ assembly/ sub-assembly offered for inspection are found not ready, all the cost of visit of purchaser's engineer shall have to be borne by the Contractor.

11.4.3 Obligations of Contractor

- i) Contractor shall provide all facilities and ensure full and free access of the Inspection Engineer of purchaser to the Contractor's or their Sub-Contractor's premises at any



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time during contract period, to facilitate him to carry out inspection & testing of the product during or after manufacture of the same.

- ii) The Contractor shall delegate a Representative / Co-ordinator to deal with purchaser on all inspection matters. Also, Contractor's Representative shall be present during all inspection at Sub-Contractor's works.
- iii) The Contractor shall comply with instructions of the Inspection Engineer fully and promptly.
- iv) The Contractor / Sub-Contractor shall provide all instruments, tools, necessary testing & other inspection facilities to Inspection Engineer free of cost for carrying out inspection.
- v) The cost of testing welds by ultrasonic, radiographic and dye penetration tests etc. in the fabrication workshop shall be borne by the Contractor.
- vi) The Contractor shall ensure that the equipment / assembly /component of the plant and equipment required to be inspected, are not dismantled or despatched before inspection.
- vii) The Contractor shall not offer equipment for inspection in painted condition unless otherwise agreed in writing by purchaser.
- viii) The Contractor shall ensure that the equipment and materials once rejected by the Inspection Engineer, are not re-used in the manufacture of the plant and equipment. Where parts rejected by the Inspection Engineer have been rectified as per agreed procedures laid down in advance, such parts shall be segregated for separate inspection and approval, before being used in the work.

11.4.4 Stamping and issue of inspection documents

i) Inspection Memo

For stage inspection and for rejected items/items which do not conform to Technical specification in one or more quality characteristics requiring rectification/rework, Inspection memo shall be issued in standard form indicating therein the details of observation and remarks. All the non-conformities with respect to specification of the product shall be indicated in the inspection memo for further control by manufacturer.

ii) Inspection Certificate

On satisfactory completion of final inspection and testing, an inspection Certificate in standard form shall be issued by the Inspection engineer for the accepted items.

iii) Inspection Waiver Certificate

For the inspection waiver category of items identified in the approved QAP, Purchaser shall issue Inspection Waiver Certificate.



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11.5 General Clauses

- i) Inspection & tests carried out by purchaser shall not absolve the responsibility of the Contractor/ Manufacturer to provide acceptable product nor shall it preclude subsequent rejection.
- ii) Purchaser reserve the right to inspect any product at any stage of manufacturing without prior notice to Contractor/Manufacturer beyond pre-identified stages & hold points of approved QAP. The inspection mentioned in this clause is meant for Purchaser getting apprised of status of manufacturing and not to obstruct the manufacturing program of the Contractor.



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SECTION-12

SPECIAL CONDITIONS FOR SHARED TRANSMISSION SYSTEM- Deleted



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SECTION-13

**COMMERCIAL TERMS AND CONDITIONS FOR
OPERATION AND MAINTENANCE CONTRACT FOR 3 YEARS**

1.0 DEFINITION:

- 1.1 'Codes and Standards' shall mean all the applicable codes & standards as indicated in the specification.
- 1.2 'Contractor' shall mean the successful Bidder whose bid has been accepted by the Purchaser and on whom the 'Contract' or 'Purchase order' is placed by the Purchaser and shall include his heirs, legal representatives, successors and permitted assignees.
- 1.3 'Contract' shall mean and include this contract between the owner and Contractor for the execution of the works as per agreed terms, conditions, specifications, prices and enforceable as per law.
- 1.4 'Contract period' shall mean the period / time schedule agreed in the contract during which period the Contract work shall be performed / executed, inclusive of any period covered by extension(s), duly issued.
- 1.5 'Contract Price' in relation to particular contract shall mean the total consideration to be paid by NLCIL to the Contractor.
- 1.6 'Date of Contract' shall mean the calendar date on which NLCIL and the Contractor have signed the 'Contract'.
- 1.7 'Effective date of Contract for O&M' shall mean the next date of completion of SCOD.
- 1.8 'Notice in Writing', 'Written Notice' shall mean any notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received) by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post, it would have been delivered.
- 1.9 'Purchaser' / 'Owner' shall mean and include NLC India Limited (NLCIL) and its different functionaries entrusted with the responsibilities in relation to this contract in respect of the area of responsibilities of such functionaries.
- 1.10 'Site' shall mean the place or places envisaged by NLCIL at which the services are to be performed, as also such other places as may be specifically provided by NLCIL for the stated purposes.
- 1.11 'Work' shall mean the services to be provided by the Contractor under the scope of the 'Contract'.
- 1.12 'Writing' shall include any manuscript, typewritten or printed statement, under or over signature and/or seal as the case may be.



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- 1.13 The various Acts and Regulations are normally available for sale from the following address:

Deputy Controller,
Publication Department,
Government of India,
Civil Lines, Delhi - 110 006.

and with leading authorised Government of India book sellers.

2.0 SCOPE OF WORK

The Scope of work includes Operation & Maintenance of Entire Plant including all Equipment, PCSS, Main Control Room, Evacuation systems upto the point of connection, using the contractor's own spares & Manpower including engineering personnel as per the detailed System Operating Procedures (SOP) for O&M activity, indicating work details and schedule of maintenance.

The detailed Scope of Work is indicated in Technical Specification of the Contract.

3.0 PRICE BASIS FOR OPERATION & MAINTENANCE INCLUDING USAGE CHARGES FOR POWER EVACUATION FACILITIES:

- 3.1 The Bidder shall quote "Lumpsum & Firm" price inclusive of all Taxes & Duties, in Indian rupee for the entire contract period of three (3) years after completion of warranty period. The O&M price breakup for every year shall have minimum escalation of 3.5% per year. The O&M Price quoted shall be at least 2% of the EPC cost.
- 3.2 Price quoted shall include cost of all spares and consumable, inclusive of all Taxes & Duties, to meet NLCIL's requirement as specified in the tender specification.

4.0 TIME SCHEDULE:

The Time Schedule for operation and maintenance shall be for a period of Three (3) years after completion of SCOD.

5.0 CONTRACT PERFORMANCE BANK GUARANTEE

- 5.1. The Contractor shall furnish the following O&M BGs:

5.1.1 BG for shortfall in generation during O&M Period of 3 years:

CPG for O&M Compensation: 5% of revenue generated out of Expected net energy export (as per technical schedule 2 of Technical Specification Volume-II). The CPG shall be valid till completion of contractual O&M period plus 3 months.

The O&M BGs shall be initially valid for 12 months and shall be extended suitably by the Contractor every year to be valid till the expiry of 90 days beyond the actual date of successful completion of operation and maintenance contract period.

In case BG is forfeited for the first and subsequent years on pro-rata basis for shortfall in generation, the contractor shall maintain the original value of the BG (i.e., 5% out of



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Expected net energy export (as per technical schedule 2 of Technical Specification Volume-II)) within 30 days of encashment of the BG.

5.1.2. BG for O&M period of 3 Years (i.e., Defect Liability period):

Contractor shall submit a Bank Guarantee for a value of 1% of the total Contract Price excluding O&M price with a validity of 90 days beyond O&M period of 3 Years.

The Contractor shall submit this bank guarantee as a Performance security against equipment during the complete Defect Liability Period (i.e. for O&M period).

The Contractor shall submit both the Bank Guarantees within 30 days after completion of SCOD.

The above two BGs shall be initially valid for 12 months and shall be extended suitably by the Contractor every year to be valid till the expiry of 90 days beyond the actual date of successful completion of operation and maintenance contract period.

5.2. NLCIL shall have the right to encash the above BGs for non-compliance of any or all the terms and conditions of the contract and non-performance with respect to availability, discontinues to do the work before the completion of period mentioned in Cl. 4.0 above and for failure to comply with any of the obligations as enumerated in the Contract.

5.3. 100% Contract Performance Bank Guarantee for EPC Contract will be returned to the Contractor without any interest after 90 (ninety) days from the expiry of warranty period or after date of final take over whichever is later and on receipt and acceptance of BG for O&M period and BG for shortfall in generation during O&M period for period of 3 Years.

5.4 ADDITIONAL BG FOR AMC FOR SCADA & TRACKER

1. Contractor has to take Comprehensive Annual Maintenance Contract (AMC) from Original Equipment Manufacturer (OEM) or OEM authorized service provider for a period of 06 years for the Tracker based MMS structure and SCADA after completion of O&M Period of 3 years.

2. Comprehensive AMC shall include all preventive maintenance and breakdown maintenance including replacement of any component to ensure that equipment working satisfactorily as per design/system requirement.

3. Considering the above AMC, the Contractor shall submit Additional BG for AMC for SCADA & Tracker.

(i) SCADA AMC BG:

The Contractor shall submit the additional security in the form of BG for a value of Rs. 45 Lakhs (Rs 15,000/MWac as per the market practice) initially for a period of 03 years which will be further extended to another 03 years.

(ii) Tracker AMC BG: (In case bidder supplied Tracker MMS)

The contractor shall submit the additional security in the form of BG amount of Rs. 20,000/ MWp as per the market practice (For Tracker portion Only) initially for a period of 03 years which will be further extended to another 03 years.



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4. Above said BGs shall be submitted by the Contractor before 30 days of completion of the O&M period and before release of O&M BG.
5. The above BG securities will be returned to the contractor without any interest on expiry of the security at the end of 06 years of successful completion of the AMC for the above said equipments.
6. Failure from the OEM to adhere the activity and the time schedule may lead to BG encashment.

6.0 TERMS OF PAYMENT

- 6.1. The O & M charges quoted in Price Schedule-5 shall be paid on quarterly basis to the annually quoted O&M Charges on certification of work by the Project Manager at the end of every quarter.
- 6.2. Payment towards O&M charges shall be made only after submission and acceptance of proof of having valid insurance.

7.0 OPERATION & MAINTENANCE CHARGES

- i. The O&M charges shall be inclusive of all Taxes & Duties. The O&M charges should be quoted for a period of 3 years after completion of SCOD.
- ii. Payment will be made after all statutory deductions as applicable to such type of contracts. The rate quoted shall deem to be inclusive of all salaries and other cost, expenses of employees, cost of spares, cost of repair/replacement/ modification of any equipment or system for the entire quoted period of 3 years so as to give maximum machine availability. The rates are also inclusive of tools & tackles, etc. and liabilities of every description and all risk of every kind to be taken in operation, maintenance and handing over the plant to NLCIL by the Contractor.
- iii. **O&M Compensation Rate**

The Contractor shall compensate Rs.2.705 (Multiplication Factor) for every unit (kWh) of shortfall in energy generation to Employer as compensation during O&M period. Shortfall in generation shall be calculated annually in line with the procedure detailed in the technical specification. Compensation towards shortfall in generation shall be first adjusted against the bills due for payment to the contractor and then the BG for O&M compensation shall be encashed for the balance amount.

In case BG is forfeited for the first and subsequent years on pro-rata basis for shortfall in generation, the contractor shall maintain the original value of the BG (i.e., 5% of revenue from Expected Net Energy Export) within 30 days of encashment of the BG.

- iv. **O&M Compensation Limit**

Compensation against shortfall during O&M period shall be subject to the Maximum of 5% of Guaranteed revenue during 1st year of O&M.



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8.0 Mode of Payment

All Payments in Indian Rupees shall be made direct to the Contractor through E-payment. For effecting E-Payment, Contractor shall furnish necessary details to the Purchaser. All bank charges shall be to the account of the Purchaser.

9.0 Taxes & Duties:

Appropriate clause of Section 5 of this Volume is applicable for O&M contract.

9.1. GST:

- i. The Supplier / Contractor has to provide a copy of the GST Registration Certificate and also mention their GST Registration No. and Date in each of their invoices / bills without fail. No invoice or bill will be paid unless the GST Registration No. is mentioned therein.
- ii. While claiming the GST payment, the Contractor should furnish the requisite details in the invoice as per statutory requirements.
- iii. GST wherever applicable, shall be paid restricting to ceiling indicated in the schedule of prices.
- iv. Rules & Regulations, Notifications circulars issued under GST Law has to be complied from time to time the Contractor.

9.2. Personnel Income Tax & Cess:

Income Tax and Cess, if any payable by the Contractors/ Sub-Contractor's employees shall be paid by the said employees directly, and the Purchaser shall not be liable to pay the Income Tax & Cess payable by the employee of the Contractor/Sub-Contractor and the purchaser is not responsible for filing the tax returns of contracts employees/experts.

- 9.3. Deduction of Tax at source at prevailing rate shall be effected by the Purchaser before payment as a statutory obligation wherever applicable.

10.0 DEPLOYMENT OF QUALIFIED TECHNICAL STAFF IN EXECUTION:

Sufficient nos. of qualified and experienced engineers / supervisors including leave reserve shall be engaged for carrying out all the operation& maintenance works. Any requirement of additional engineers/supervisors shall be met by the contractor without any additional cost to NLCIL.

- 10.1. Sufficient Manpower (workmen) deployment shall be ensured by the Contractor for the successful and trouble-free O&M of the system. Manpower should be increased as per the need as and when required to ensure continuous running of the system without production stoppage of the main plant.
- 10.2. In respect of the O&M manpower deployment, the attendance details of the Contractor's personnel will be maintained with the signature of the supervisors, countersigned by the contractor as well as NLC official concerned.
- 10.3. The contractor has to arrange equivalent substitute for leave and absenteeism.

11.0 SUSPENSION OF WORK:

- 11.1. NLCIL may suspend the work in whole or in part at any time by giving Contractor notice in writing to such effect stating the nature, the date and the anticipated duration of such suspension.
- 11.2. On receiving the notice of suspension as above, the Contractor shall stop all such work which NLCIL has directed to be suspended with immediate effect.
- 11.3. NLCIL may at anytime revoke the suspension notice for the whole or any part of suspended work, by giving written notice to the Contractor specifying the part of work to be resumed and the effective date of revocation of suspension. The Contractor shall resume the suspended work as expeditiously as possible after receipt of such notice of revocation of suspension.
- 11.4. Where such suspension of work is due to reasons attributable to (i) the Contractor or (ii) Force Majeure Conditions NLCIL will not be liable to the Contractor for any cost-direct or indirect damage or loss or idle labour caused by such period of suspension of work. NLCIL shall not be liable to Contractor for any payment towards watch & ward and any other expenditure, in such circumstances. If the suspension is for reason attributable to the NLCIL, NLCIL shall pay to the Contractor, the cost as reimbursement, as may be agreed mutually.

12.0 INSPECTION OF WORKS:

The Purchaser or his duly authorized person shall have at all times, full power to inspect the Solar Power Plant where the Contractor is carrying out the Operation and Maintenance. The Contractor shall properly carry out the works as per the written instruction issued by the NLCIL.

13.0 TOOLS & TACKLES, SPARES AND CONSUMABLES:

The Contractor shall arrange all necessary tools and tackles, spares, and consumables required for the Operation & Maintenance of the Solar Power Plant.

14.0 ASSIGNMENT AND SUBLETTING OF CONTRACT:

The Contractor shall not sublet, transfer or assign the contract or any part thereof without the written permission of NLCIL. In the event of the Contractor contravening this condition, Owner shall be entitled to entrust the work to other agencies at the Contractor's risk and cost. The Contractor shall be liable for any loss or damage which the Corporation may sustain in consequence of or arising out of such replacing the contract notwithstanding any such permission to sublet, the Contractor shall always be held responsible for the due fulfillment of the terms and conditions of contract.

15.0 REGULATION OF LOCAL AUTHORITIES & STATUTES:

- 15.1. Please refer Clause 10.48 of Section 10 of this Volume.
- 15.2. The Contractor shall arrange to give all notices required by the said Acts, Regulations or Bye-laws to be given to any authority or to any Public Officer and pay all fees that may be properly chargeable in respect of the 'works' and lodge the receipts with NLCIL, obtaining



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all permits and licenses required thereupon is the responsibility of the Contractor.

- 15.3. All registration and statutory inspection fees, if any, in respect of his work pursuant to this 'Contract' shall be to the account of the Contractor.

16.0 NLCIL'S LIEN ON EQUIPMENT:

No material brought to the "site" shall be removed from the "site" by the Contractor and/or his Sub-Contractor without the prior written approval of NLCIL.

17.0 CO-OPERATION WITH OTHER CONTRACTORS

The Contractor shall co-operate with all other Contractor's or tradesmen of NLCIL who may be performing other works on behalf of the NLCIL and the workmen who may be employed by NLCIL and doing work in the vicinity of the works under their respective contracts. The Contractor shall also so arrange to perform his work as to minimize, to the maximum extent possible interference with the work of other Contractor's and his workmen. NLCIL shall determine the resolution of any difference of conflict that may arise between the Contractor and other Contractor or between the Contractor and the workmen of NLCIL in regard of their work. If the works of this Contractor is delayed because of any acts or omissions of another Contractor, the Contractor shall have no claim against NLCIL on that account other than an extension of time for a completing his works.'

18.0 DISCIPLINE OF WORKMEN:

The Contractor shall adhere to the disciplinary procedure set by NLCIL in respect of his employees and workmen at 'Site'. NLCIL shall be at liberty to object to the presence of any representative or employee of the Contractor at the 'Site' if in the opinion of NLCIL such employee has misconducted himself or be incompetent or negligent or otherwise undesirable and then the Contractor shall promptly remove such a person objected to, and provide in his place a competent replacement at his own expenses.

19.0 MANPOWER REPORT:

- 19.1. The Contractor shall submit to NLCIL on the last week of every month, a man-hour schedule for the next month, detailing the man hours scheduled for the month, skill wise and area wise.
- 19.2. The Contractor shall also submit to NLCIL on the 7th day of every month, a manpower report of the previous month detailing the number of persons scheduled to have been employed and actually employed, skill-wise and the areas of employment of such labour.
- 19.3. The Contractor shall also submit periodically such of the reports as NLCIL may call for from time to time.

20.0 FIRE PROTECTION:

- 20.1. The work procedures that are to be used during the maintenance shall be those, which



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minimize fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the 'Site' at least once a day.

- 20.2. The Contractor shall provide enough fire protection equipment of the types and number for the warehouses, office, temporary structures etc. Access to such fire protection equipment shall be easy and kept open at all times.

21.0 SECURITY:

The Contractor shall have total responsibility for all equipment and materials in his custody. The Contractor shall make suitable Security arrangements including employment of Security personnel to ensure the protection of all materials, equipment and 'Works' from theft, fire, pilferage, any other damages and loss. All materials of the Contractor shall enter and leave the Project 'Site' only with the written permission of NLCIL in the prescribed manner.

22.0 CONTRACTOR'S MATERIALS BROUGHT ON TO SITE:

- 22.1. The Contractor shall bring to 'Site' all the equipment, components, parts, materials, including equipment, tools and tackles for the purpose of the 'Works' under intimation to NLCIL. All such goods shall from the time of their being brought may be used for the purpose of the 'Works' only and shall not on any account be removed or taken away by the Contractor without the written permission of NLCIL. But, the Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.
- 22.2. NLCIL shall have lien on such goods for any sum or sums which may at any time be due or owing to him by the Contractor, under in respect of or by reasons of the 'Contract'. After giving a fifteen (15) days' notice in writing of his intention to do so, NLCIL shall be at liberty to sell and dispose of any such goods, in such manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.
- 22.3. After the completion of the 'works' the Contractor shall remove from the 'Site' under the direction of NLCIL his own materials such as equipment, tools and tackles, scaffolding, etc. which were brought by him with the written permission of NLCIL. If the Contractor fails to remove such materials, within 15 (fifteen) days of issue of a notice by NLCIL to do so, then NLCIL shall have the liberty to dispose of such materials and credit the proceeds thereto the account of the Contractor.
- 22.4. On completion of the work, all rubbish, kilns, vats, tanks, materials and temporary structure of any sort or kind used for the purpose or connected with the work are to be removed by the Contractor and all pits and excavations filled up and the site handed over in a tidy and workmanlike condition and no final payment in settlement of the account for the said work shall be held to be due or shall be made to the Contractor till such site clearance shall have been effected by him and such clearance may be made by NLCIL at the expenses of the Contractor in the event of his failure to comply with this provision within 7 days after receiving notice in writing from NLCIL to that effect. If it becomes



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necessary for NLCIL to have the site cleared as indicated above at the expense of the Contractor, NLCIL shall under no circumstances be held liable for any losses or damages to such of Contractor's property as may be on such site due to such removal there from, which removal may be effected by means of public sale of such materials and property or in such a way as seems fit and most convenient to NLCIL.

- 22.5. The Contractor must take sufficient care in moving his equipment from one place to another so that they may not cause any damage to the property of NLCIL, particularly to the existing structures and overhead and underground services and in the event of Contractor's failure to do so, the cost of such damages shall be borne by the Contractor.

23.0 MODIFICATION AND UPGRADATION

- 23.1. The Contractor shall carryout any modifications or upgrades of the Solar Power Plant for increasing safety and reliability and to meet the production performance at his own cost.
- 23.2. If Contractor on his own initiative wishes to upgrade or modify the Solar Power Plant then, the Contractor may carry out the upgrade at his own cost with the prior written consent of NLCIL.
- 23.3. If any alteration or modification is required to be made in the Solar Power Plant to comply with all provision of law for the time being in force on the Commencement Date of this agreements the Contractor shall take necessary step to make Solar Power Plant comply with the provisions of such law at his own cost.

24.0 ACCIDENT / DAMAGE

- 24.1. If there is any damage to Solar Power Plant due to accident or otherwise and it is established that the said accident and/or damage has been occurred due to the operators faults or negligence, Contractor shall be responsible for payment towards rectification of such damage of Solar Power Plant.
- 24.2. If any damage is caused to Solar Power Plant and / or accident occurred at the site of the said Solar Power Plant, due to improper maintenance of the Solar Power Plant by the Contractor, the Contractor shall be responsible and liable against all such damage and compensation and indemnify Purchaser against such loss or damage incurred or be incurred by NLCIL.
- 24.3. The parties hereto are independent to each other, where in NLCIL is a principal, Contractor is a Contractor and all the relationships between NLCIL and Contractor under this agreement are contractual in nature but none else.
- 24.4. Nothing in this agreement shall be deemed to constitute of form an employment, partnership, agency or any other form of business relationship between the parties except as stated above.
- 24.5. The actual amount paid to the Engineers/Supervisors or the amount indicated by the bidder in his bid, whichever is lower only will be reimbursed.
- 24.6. The contractor shall comply with all laws, statutory rules, safety rules and regulations,



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payment of wages etc.,

- Minimum wages act and all other relevant acts of state / central Government for employment of labours,
- EPF Act, 1952 and other labour welfare rules etc.

24.7. Contractor should have separate EPF number and ESI number for his firm and remittance of EPF and ESI should be paid only in the name of the firm. Third Party payment by out sourcing the activity to any third party will not be accepted.

24.8. The contractor shall furnish a copy of INCOME TAX RETURN filed and duly acknowledged by the INCOME TAX department before signing of contract and shall also furnish the correct declaration of his status [whether individual, HUF, the firm or Company].

25.0 GENERAL:

25.1. Contractor shall meet the NLCIL authorised representative and receive instructions regarding the works to be carried out. The Contractor or his representative shall be available at all times in the site in order to execute any urgent work.

25.2. Contractor must have registered under GST Act and the same should be valid for the entire period of this contract.

25.3. Decision of the NLCIL shall be final and binding in all matters regarding Contract.

26.0 SAFETY:

26.1. The Contractor shall ensure the safety of his workmen against accidents and injuries while at work as required by the relevant rules. It shall be the obligations of the Contractor to pay compensation as per workmen compensation Act and to extend co-operation to the officers in any enquiry conducted there on. No responsibility shall rest with the NLCIL in this regard. The Contractor shall work in co-ordination and close co-operation with the staff working in the area.

26.2. While doing works, all the safety precautions and safety rules should be followed and failure to adhere to the same shall be viewed seriously and the contract shall be terminated if required."

26.3. The Contractor shall arrange all safety gadgets for workmen engaged by him.

26.4. Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or NLCIL, he shall.

(a) Satisfy NLCIL that the appliance is in good working condition.

(b) Inform NLCIL of the maximum current rating, voltage and phases of the appliances.

(c) Obtain permission of NLCIL detailing the sockets to which the appliances may be connected

26.5. NLCIL will not grant permission to plug-in until he is satisfied that the appliance is in good conditions and is fitted with a suitable plug. The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.



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26.6. No electric cable in use by NLCIL will be disturbed without prior permission. No weight of any description will be imposed on any such cable and no ladder or similar equipment will rest against or be attached to it.

26.7. No work shall be carried out on any live equipment. The Equipment must be made safe and a permit to work should be issued before any work is carried out.

27.0 WORKS:

27.1. The site of work shall be kept clean, free from rubbish and dismantled materials. All rejected and unwanted materials, debris etc., shall be removed from the site then and there. If the Contractor fails to do such clearance work, NLCIL have the right to execute the work, two days after the issue of a single written notice to the Contractor and the expenditure incurred therefore shall be recovered from the Contractor's bills.

27.2. Any faulty work noticed and pointed out by NLCIL shall be rectified by the Contractor.

27.3. The Contractor shall Work in co-ordination and close co-operation with other Contractor's staff working in the area.

28.0 MATERIALS:

The material used shall comply with the relevant standard specification and shall be approved by NLCIL.

29.0 LABOUR:

29.1. Under the provisions of the Contract Labour (Regulation and Abolition) Act 1970 the Contract Labour (Regulation and abolition) Rules 1971 any Contractor who employs or employed 20 or more men on any day of the preceding 12 months shall obtain a licence. The licence so obtained shall be renewed every year.

29.2. The Contractor shall maintain the following registers.
Register of workmen in Form XIII as per rule 75 of the Contract Labour
(R & A Rule) central 1971.)

- i. Muster Roll.
- ii. Register of wages
- iii. Register of deduction.
- iv. Register of over time.
- v. Register of fines.
- vi. Register of Advances.
- vii. Wages slip.

29.3. The Contractor shall issue an employment card in Form XIV as per rule 76 of the Contract Labour (Regulation and Abolition) Rules 1971.

29.4. As per the provisions under Chapter IV of the Central Contract Labour (Regulation and Abolition) Rules 1971 the Contractor should observe the rules strictly regarding the payment of wages to the contract workmen.



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- 29.5. Failure to comply with the statutory provisions will entail prosecution by the statutory authorities beside black listing the Contractor.
- 29.6. The Contractor should produce the following declaration along with their application for issue of identity cards to the workmen. "Certified that the following contract workers engaged by me bear good conduct, that their antecedents have been verified and found satisfactory".

Sl. No.	Name of the Contract Worker	Address	Identification Marks

30.0 INSURANCE:

- 30.1. The Contractor shall arrange for Workmen's Compensation Insurance, Comprehensive Automobile Insurance and Comprehensive General Liability Insurance and till completion of Operation & Maintenance period which shall also be the responsibility of the Contractor.
- 30.2. The Contractor should take group insurance scheme for the workers under his contract, which may or may not result in partial or permanent disablement. The first bill will be passed after producing group insurance policy.
- 30.3. The above are only illustrative list of insurance covers normally required and it will be the responsibility of the Contractor to maintain at his cost all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect in pursuance of the 'Contract'.
- 30.4. Insurance of common facilities shared with other Solar Power Developers should be taken by contractor and shall be renewed from time to time till completion of contractual O&M Period. Payment towards O&M charges shall be made only after submission and acceptance of proof of having valid insurance.

31.0 JURISDICTION, RESOLUTION OF DISPUTES

Refer clause no: 10.33 of Section 10 of this volume.

32.0 FORCE MAJEURE:

Please refer to Section 10, Clause no 10.32 of this volume.

33.0 CONTRACTOR'S DEFAULT:

- 33.1. If the Contractor omits or neglects to execute the 'Works' with due diligence and expedition, or shall refuse or neglect to comply with any reasonable orders given to him, in writing by the NLCIL in connection with the 'Works' or shall contravene any provisions of the 'Contract' the NLCIL may give notice in writing to the Contractor to make good such omission, failure, neglect or contravention complained of, should the Contractor fail to comply with the notice within thirty (30) days from the date of service thereof, then and in



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such case the Purchaser shall be at liberty to employ other person/ persons and forthwith execute such part of the 'works' as the Contractor may have neglected to do or if the Purchaser shall think fit it shall be lawful for him without prejudice to any other right he may have under the 'Contract' to take the 'Works' wholly or in part out of the Contractor's hands and re-contract with any other person or persons, complete the 'works' or any part thereof and in that event the Purchaser shall be free to use without hire charges, of all Contractor's equipment that may have been at the time on the 'Site' in connection with the 'Works' without being responsible to the Contractor for fair wear and tear thereof and to the exclusion of any right of the Contractor, over the same and the Purchaser shall be entitled to retain and apply any balance of money which may otherwise be due in the 'Contract' by him to the Contractor or such part thereof as may be necessary to the payment of the cost of executing the said part of the 'Works' or of completing the works as the case may be. If the cost of completing the 'works' or executing a part thereof as aforesaid shall exceed the balance due to the Contractor, the Contractor shall pay such excess. Such payment of excess amount shall be independent of the Compensation for delay which the Contractor shall have to pay if the completion of 'Works' is delayed.

- 33.2. In addition, such action by the Purchaser as aforesaid shall not relieve the Contractor of his liability to pay Compensation for delay in completion of 'Works'.
- 33.3. In the event the NLCIL takes recourse to clause 37.1 above, it shall not entitle the Contractor to reduce the value of the Performance Guarantee nor the period of validity of such guarantee. The Performance Guarantee shall be valid for the full value and full period as originally stipulated in the 'Contract'.
- 33.4. In case the Contractor defaults in timely furnishing of engineering data specified in the Contract and this delays the performance by the Purchaser his part of the Contract and as a consequence the Contract execution schedule is delayed the responsibility for such delay will be that of the Contractor and he will become liable for all damages as per Contract.

34.0 TERMINATION OF CONTRACT:

- 34.1. NLCIL reserves the right to terminate the Contract either in part or in full due to reason other than those mentioned under clause entitled Contractor's Default. NLCIL shall, in such an event, give 30 (thirty) days notice in writing to the Contractor of his decision to do so.
- 34.2. The Contractor upon receipt of such notice shall discontinue the work on the date and to the extent specified in the notice, make all reasonable efforts to obtain cancellation of all order and Contracts to the extent they are related to the work terminated and upon terms satisfactory to NLCIL, stop all further sub-Contracting or purchasing activity related to the work terminated and assist NLCIL in maintenance, protection and disposition of the works acquired under the Contract by NLCIL.



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- 34.3. In the event of such a termination, the Contractor shall be paid compensation, equitable and reasonable dictated by the circumstances prevalent at the time of termination. No consequential damages shall be payable by the NLCIL to the Contractor in the event of termination.
- 34.4. If the Contractor is an individual or a Proprietor concern and the individuals or the proprietor dies and if the Contractor is a partnership concern and one of the partners dies, then unless the NLCIL is satisfied that the legal representatives of the individual Contractor or the Proprietor of the proprietary concern and in the case of partnership, surviving partners, are capable of carrying out and completing the Contract NLCIL shall be entitled to cancel the Contract as to its incomplete part without being in any way liable to payment of any compensation to the estate of deceased Contractor and/ or to the surviving partners of the Contractor's firm on account of the cancellation of the Contract. The decision of NLCIL that the legal representatives of the deceased Contractor or surviving partners of the Contractor's firm cannot carry out and complete the Contract shall be final and binding on the parties. In the event of such cancellation NLCIL shall not hold the estate of the deceased Contractor and/ or the surviving partners of the estate of the deceased Contractor and/ or the surviving partners of the Contractor's firm liable to damages for not completing the Contract.

35.0 HANDING OVER OF THE EQUIPMENT AFTER COMPLETION OF CONTRACT PERIOD:

The entire plant shall be handed over to NLCIL in good working condition after completion of Three years of O&M Contract. The Contractor shall attend the defects if any or replacement of any worn-out parts before handing over of the plant to NLCIL. If the Contractor fails to attend the defects or to replace the worn-out parts, NLCIL shall recover the relevant cost from the payment due to the Contractor.

36.0 MAINTENANCE OF HISTORY CARD:

- 36.1. The Contractor shall maintain a history register and submit to the NLCIL at the end of each calendar year for review.
- 36.2. The history card shall contain all the works carried out including replacement of spares & consumables etc.

37.0 COMPLETION OF CONTRACT PERIOD:

- 37.1. The contract period shall automatically cease to exist after three years from the effective date of O&M contract and the Contractor shall have no right to ask for any extension. However, NLCIL at its discretion can extend this Contract, for further period at the mutually agreed price and terms & conditions.

38.0 GOVERNING LAWS AND REGULATIONS:

This Contract shall be governed and construed according to the Indian Laws and Regulations.

39.0 ANNUAL MAINTENANCE CONTRACT (AMC) FOR TRACKER AND SCADA FOR 06 YEARS

- A.** The Contractor (EPC Contractor) is permitted to install maximum of 100% Tracker based MMS structure and SCADA. It is also proposed to have Annual Maintenance Contract (AMC) for tracker and SCADA for 06 years between EPC contractor and Original Equipment Manufacturer (OEM) in line with market practice.
1. Contractor has to take Comprehensive Annual Maintenance Contract (AMC) from Original Equipment Manufacturer (OEM) or OEM authorized service provider for a period of 06 years for the Tracker based MMS structure and SCADA after completion of O&M Period of 3 years.
 2. Comprehensive AMC shall include all preventive maintenance and breakdown maintenance including replacement of any component to ensure that equipment working satisfactorily as per design/system requirement.
 3. During AMC period, the OEM or its representative is required to visit the plant at least once a year or as per OEM recommendation cycle for periodic maintenance.
 4. During AMC period, the OEM is required to respond within one working day through telecom or any electronic mean. In case of breakdown of the system, OEM has to send their representative within 72 hours.
 5. For the minor faults not hampering the generation eg. communication, display etc., the OEM has to get the fault rectified within 07 working days.
- B.** Considering the above AMC between EPC contractor and OEM, the EPC Contractor shall submit AMC BG's for SCADA and Tracker to purchaser as detailed below:
- a) **SCADA AMC BG:**
The contractor shall submit the additional security in the form of BG for a value of **Rs. 45 Lakhs (Rs 15,000/MWac** as per the market practice) initially for a period of 03 years which will be further extended to another 03 years.
 - b) **Tracker AMC BG: (In case bidder supplied Tracker MMS)**
The contractor shall submit the additional security in the form of BG **amount of Rs. 20,000/ MWp** as per the market practice (For Tracker portion Only) initially for a period of 03 years which will be further extended to another 03 years.
 - c) Above said BGs shall be submitted by the Contractor before 30 days of completion of the O&M period of 3 years and before release of O&M BG
 - d) The above BG securities will be returned to the contractor without any interest on expiry of the security at the end of 06 years of successful completion of the AMC for the above said equipments.
 - e) The Annual Maintenance Contract (AMC) document between the OEM & EPC contractor has to be submitted before starting of 3 years O&M Contract.
 - f) The EPC contractor has to submit the Joint Undertaking between EPC contractor and OEM for AMC of Tracker based MMS structure and SCADA for Stipulated Duration



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beyond O&M Period. (Proforma for the joint undertaking is attached as Annexure-J of Volume-IA).

- g) Failure from the OEM to adhere the activity and the time schedule may lead to BG encashment.

Replacement of equipment/spare parts/ updating of software are being phased out or not being supported by OEM's is also included in bidder's scope.



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ANNEXURE – XIII

Pro-Forma for Contract Performance Bank Guarantee format

Note:-

- 1) This guarantee has to be furnished by a Scheduled Commercial Bank, authorized by RBI, except Bank of China.
- 2) The Bank Guarantee should be furnished on stamp paper of value of not less than Rs.80/-
- 3) The stamp papers should be purchased in the name of Bank executing the guarantee/Name of the Contractor. The date of purchase of stamp paper shall be on or before the date of execution of Bank Guarantee.
- 4) The BGs must be sent to the organization directly by the issuing bank Speed Post.
- 5) In exceptional cases, where BGs are received through CONTRACTOR etc. the issuing branch shall immediately send by Speed Post an unstamped duplicate copy of the guarantee directly to the organization with the covering letter.
- 6) The bank guarantee issued by the issuing Bank on behalf of Bidder/Contractor/Supplier in favour of "Name of Company" shall also be confirmed through Structural Financial Messaging System (SFMS).
- 7) In case, B.G is issued by a Foreign Bank, the issuing Bank should be authorised by RBI.

Bank Guarantee No.....

Date:

To
The Chief General Manager / Contracts
NLC India Limited,
Corporate Office, Block-1, Neyveli- 607 801,
Cuddalore District,
Tamil Nadu, INDIA.

Dear Sirs,

1.0 In consideration of the NLC India Limited, Neyveli hereinafter referred to as the 'PURCHASER', which expression shall, unless repugnant to the context or meaning thereof include its successors, administrators, representatives and assignees, having awarded in favour of M/s...having registered office at..... hereinafter referred to as the 'CONTRACTOR', which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, representatives and assignees, a Contract, hereinafter referred as the "CONTRACT" for the on terms and conditions set out interalia, in the PURCHASER's Contract /Letter of Award No..... dated as well as "CONTRACT" documents, valued at (In words) and the same having been unequivocally accepted by the CONTRACTOR and the CONTRACTOR having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire "Contract" including the warranty obligations / liabilities under the contract equivalent to



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10% of the Contract value excluding O&M price for 3 years after SCOD to the PURCHASER amounting to (In words) as Contract Security in the form of a Bank Guarantee.

- 2.0 We, ...(Name).....(Address) hereinafter referred to as the 'BANK' which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees do hereby irrevocably guarantee and undertake to pay the PURCHASER merely on demand without any previous notice and without any demur and without referring to any other source, any and all monies payable by the CONTRACTOR by reason of any breach by the said CONTRACTOR of any of the terms and conditions of the said CONTRACT including non-execution of the "CONTRACT AGREEMENT" to the extent of 10% of the Contract price and adherence to Time Schedule stipulated at any time upto (day /month/ year). Any such demand made by the PURCHASER on the bank shall be conclusive and binding, absolute and unequivocal notwithstanding any disputes raised/pending before any court, tribunal, arbitration or any other authority. The Bank agrees that the guarantee herein contained shall continue to be enforceable till this sum due to the PURCHASER is fully paid and claims satisfied or till the PURCHASER discharges this Guarantee.
- 3.0 The Bank further irrevocably guarantees and undertakes to pay on mere demand, without any demur, reservation, contest, recourse or protest, any and all monies due and payable by the CONTRACTOR by reasons of non- fulfilment of any of the following obligations.
- 3.1 For the successful and satisfactory operation of the equipment furnished and erected under the said Contract as per the specifications and documents.
- 3.2 That the equipment installed under the said Contract shall be new and in accordance with Contract Documents and be free from all defects in design, material workmanship and performance including modifications, improvements and replacements for a period of calendar months, from successful completion of commissioning of the equipment / OTG Test and that immediately upon intimation / written notice from the PURCHASER, the CONTRACTOR shall remedy free of expenses to the PURCHASER such defects as noticed and developed under the normal use of the said equipment, within the said guarantee period.
- 4.0 The PURCHASER shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time, to extend the time of performance by the CONTRACTOR. The Bank shall not be released from its liabilities under these presents by any exercise of the PURCHASER of the liberty with reference to the matter aforesaid.
- 5.0 The PURCHASER shall have the fullest liberty, without affecting this guarantee to postpone from time to time the exercise of any Powers vested in them or of any right which they might have against the CONTRACTOR and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants contained or implied in the CONTRACT between the PURCHASER and the CONTRACTOR or any other course or remedy or security available to the PURCHASER and the BANK shall not be released of its obligations/ liabilities under these presents by any exercise by the PURCHASER of his liberty with reference to the matters aforesaid or any of them or by reasons of any other act or



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forbearance or other acts of omission or commission on part of the PURCHASER or any other indulgence shown by the PURCHASER or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank Guarantee. The Bank further undertakes not to revoke this guarantee during its currency without the previous consent of the PURCHASER.

- 6.0 The Purchaser shall have the fullest liberty to lodge their claims for encashments of the guaranteed sum in full or in part, in the manner suitable to them. However, payment made for a sum lesser than the guaranteed amount shall not relieve or discharge the bank from their obligations guaranteed hereunder till the contractual obligations are fully performed by the Contractor or the Bank guarantee is discharged by the Purchaser as the case may be and the Bank Guarantee shall continue to be in force till such time.
- 6.1 The Bank further agrees that the decision of the PURCHASER as to the failure on the part of the CONTRACTOR to fulfil their obligations as aforesaid and/or as to the amount payable by the BANK to the PURCHASER hereunder shall be final, conclusive and binding on the BANK.
- 7.0 The Bank also agrees that the PURCHASER shall be entitled at his option to enforce this guarantee against the BANK as a principal debtor, in the first instance notwithstanding any other Security or guarantee that it may have in relation to the CONTRACTOR's liabilities.
- 8.0 This guarantee will not be discharged due to the change in the constitution of the BANK or the CONTRACTOR(S).
- 9.0 Notwithstanding anything contained herein:
- our liability under this bank guarantee shall not exceed (in words)
 - this bank guarantee shall be valid upto; and
 - we are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if you serve upon us a written claim or demand on or before

Dated at this.....day of 20...

Witnesses:

1. Signature
(Name in Block Letters).....
Occupation
Address

Signature.....
Name in block letters.....
Designation
Staff Code No.....
Bank's Seal

2. Signature
Name in Block Letters
Occupation
Address



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ANNEXURE – XIV

Pro-Forma for Financial Back Up Guarantee format

NOT APPLICABLE



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ANNEXURE- XV

Pro-Forma for Advance Payment Bank Guarantee format

NOTE.

1. This guarantee has to be furnished by a Scheduled Commercial Bank, authorized by RBI, except Bank of China.
2. The Bank Guarantee should be furnished on stamp paper of value of not less than Rs.80/-
3. The stamp papers should be purchased in the name of Bank executing the guarantee or name of Contractor. The date of purchase of stamp paper shall be on or before the date of execution of Bank Guarantee.
4. The BGs must be sent to the organization directly by the issuing bank under Speed Post.
5. In exceptional cases, where BGs are received through Contractor etc. the issuing branch shall immediately send by Speed Post an unstamped duplicate copy of the guarantee directly to the organization with the covering letter.
6. The bank guarantee issued by the issuing Bank on behalf of Bidder/Contractor/Supplier in favour of "Name of Company" shall also be confirmed through Structural Financial Messaging System (SFMS).
7. In case, B.G is issued by a Foreign Bank, the issuing Bank should be authorised by RBI.

Advance Payment Guarantee No :

Date :

To
The Chief General Manager / Contracts
NLC INDIA LIMITED,
Corporate Office, Block-1, Neyveli- 607 801,
Cuddalore District,
Tamil Nadu, INDIA.

Dear Sirs,

- 1.0 Pursuant to the Contract, herein after referred to as "The Contract" which M/s. herein after referred to as the "Contractor" (which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees), have concluded with NLC India Limited, Neyveli, herein after referred to as the "Purchaser" (which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees), on 2023..... vide. Letter of Award No: Dated : The Contractor have undertaken to (scope of work) for (Contract price) on F.O.R. Site.
- 2.0 According to the said Contract, the Purchaser, has undertaken to make an advance payment of Rs (Rupees only) being the payment of % of the Contract value for against issuance of an advance payment guarantee by a Bank for 110% of the Advance amount.



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- 3.0 For this advance payment, We, the undersigned (Name) (Address), herein after referred to as the bank, which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, representatives and assignees, hereby guarantee to the effect that we irrevocably under-take to pay the Purchaser merely on demand without any previous notice and without any demur, reservation, contest, protest and without recourse to the Contractor and without referring to any other source, any and all monies payable by the Contractor towards the advance or part thereof paid by the Purchaser, but not exceeding Rs..... (Rupees only) provided the Purchaser advice us that the Contractor has failed to fulfil his contractual obligations stipulated in the said Contract. Any such demand made by Purchaser on the bank shall be conclusive and binding, absolute and unequivocal notwithstanding any difference between the Purchaser and the Contractor or any dispute or disputes raised /pending before any court, Tribunal Arbitrator or any other authority.
- 3.1 The value of this Advance payment bank guarantee shall stand progressively diminished based on the supplies/ erection made on quarterly basis on the advice of the Purchaser.
- 4.0 This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).
- 5.0 This guarantee will become invalid after months from the date of LOA or as soon as this Letter of Guarantee has been returned to us at the latest, however, on unless a claim has been lodged with us under this guarantee before that date.
- 6.0 The Purchaser shall have the fullest liberty without affecting in any way the liability of the bank under this guarantee from time to time to extend the time of performance by the Contractor. The Bank shall not be released from its liability under these presents by any exercise of the Purchaser of the liberty with reference to the matter aforesaid.
- 7.0 The Bank also agrees that the Purchaser shall be entitled at his option to enforce this guarantee against the Bank as a Principal Debtor, in the first instance notwithstanding any other Security or Guarantee that it may have in relation to the Contractor's liabilities.
- 8.0 This guarantee shall remain in force upto and including..... and shall be extended from time to time for such period as may be desired by M/s. on whose behalf this guarantee has been given.
- 9.0 The Bank further agrees that the decision of the Purchaser as to the failure on the part of the Contractor to fulfil the Contractual obligations stipulated in the said Contract and/or to the amount payable by the Bank to the Purchaser shall be final conclusive and binding.
- 10.0 This guarantee is revocable only with the written consent of the Purchaser.



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11.0 Notwithstanding anything contained herein:

- a. our liability under this bank guarantee shall not exceed (in words)
- b. this bank guarantee shall be valid upto; and
- c. we are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if you serve upon us a written claim or demand on or before
.....

In witness whereof the Bank, through its authorised Officer has set its hand and stamp on this
.....day of ...2023 at

WITNESS

1. Signature.....
(Name in Block Letters).....
Occupation
Address

Signature.....
Name in block letters.....
Designation
Staff Code No.....
Bank's Seal

2. Signature.....
(Name in Block Letters)

Occupation
Address.

Attorney as per power
of Attorney No..... dt.



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ANNEXURE-XVI

Pro-Forma for Custody Cum Indemnity Bond

(On Non-judicial stamp paper of appropriate value)

This CUSTODY CUM INDEMNITY BOND is made this..... day of 2023 by (Contractor's name) a Company registered under the Companies Act 1956/Partnership firm/proprietary concern having its registered office at (hereinafter called as the "Contractor" or "Obligor" which expression shall include its successors and permitted assignees) in favour of the NLCIL, a company incorporated under the Companies Act, 1956 having its registered office at Chennai.

WHEREAS NLC India Limited has awarded to the Contractor a Contract for vide its Letter of Award/Contract No..... date and its Amendment(Applicable when amendments have been issued) (hereinafter called the "Contract") in terms of which NLCIL is required to hand over various equipment to the Contractor for execution of the Contract.

AND WHEREAS by virtue of Clause No..... of the said Contract, the Contractor is required to execute the Custody cum Indemnity Bond in favour of NLCIL for the Equipment to be handed over to it by NLCIL for the purpose of performance of the Contract/Erection Portion of the Contract (hereinafter called "Equipment").

NOW, THEREFORE, this Custody cum Indemnity Bond witnesseth as follows:

- 1 That in consideration of various Equipment as mentioned in the Contract, valued at Rs..... (Rupees) to be handed over to the Contractor in instalments from time to time for the purpose of performance of the Contract, the Contractor hereby undertakes to indemnify and shall keep NLCIL indemnified, for the full value of the Equipment. The Contractor hereby acknowledges receipt of the initial instalment of the Equipment as per details in the schedule appended hereto. Further, the Contractor agrees to acknowledge receipt of the subsequent instalments of the Equipment as required by NLCIL in the form of schedules consecutively numbered which shall be attached to this Custody cum Indemnity Bond so as to form integral part of this Bond. It is expressly understood by the Contractor that handing over the despatch title document in respect of the said equipment duly endorsed by NLCIL in favour of the Contractor shall be construed as handing over of the equipment purported to be covered by such title documents and the Contractor shall hold such equipment in trust as a Trustee for and on behalf of NLCIL.



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- 2 That the Contractor is obliged and shall remain absolutely responsible for the safe transit/protection and custody of the Equipment at NLCIL Project site against all risks whatsoever till the Equipment are duly used/erected in accordance with the terms of the Contract and the plant/package duly erected and commissioned in accordance with the terms of the Contract is taken over by NLCIL.
- 3 The Contractor undertakes to keep NLCIL harmless against any loss or damage that may be caused to the Equipment.
- 4 The Contractor undertakes that the Equipment shall be used exclusively for the performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the Equipment shall be utilised for any other work or purpose whatsoever. It is clearly understood by the Contractor that non-observance of the obligations under this, Custody cum Indemnity Bond by the Contractor shall interalia constitute a criminal breach of trust on the part of the Contractor for all intents and purposes including legal/penal consequences.
- 5 That NLCIL is and shall remain the exclusive, Purchaser of the Equipment free from all encumbrances, charges, or liens of any kind, whatsoever. The Equipment shall at all times be open to inspection and checking by Engineer-in-charge/Engineer or other employees/agents authorised by him in this regard. Further, NLCIL shall always be free at all times to take possession of the Equipment in whatever form the Equipment may be, if in its opinion, the Equipment are likely to be endangered, mis utilised or converted to uses other than those specified in the Contract, by any acts of omission or commission on the part of the Contractor or any other person or on account of any reason whatsoever and the Contractor binds itself and undertakes to comply with the directions or demand of NLCIL to return the equipment without any demur or reservation.
- 6 That this Custody cum Indemnity Bond is irrevocable. If at any time any Loss or damage occurs to the Equipment or the same or any part thereof is mis utilised in any manner whatsoever then the Contractor hereby agrees that the decision of the Engineer-in-charge/Engineer of NLCIL as to assessment of loss or damage to the Equipment shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Equipment at its own cost and/or shall pay the amount of Loss to NLCIL without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to NLCIL against the Contractor under the Contract and under this Custody cum Indemnity Bond.
- 7 Now the condition of this Bond is that if the Contractor shall duly and punctually comply with the terms and conditions of this bond to the satisfaction of NLCIL then, the above shall be void, but otherwise it shall remain in full force and virtue.
- 8 IN WITNESS, WHEREOF, the Contractor has hereunto set its authorised representative under the common seal of the company, the day, month and year first above mentioned.



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SCHEDULE NO. 1

Particulars of the Equipment handed over	Qty.	Particulars of despatch: Title Documents & Value			Signature of Attorney in token of receipt
		RR/GR Carrier Bill of lading	No. Date,	Value of the Equipment	
-- Please number subsequent Schedule (s) --					

Signature :

Name :

Designation :

Company :

Company Seal

Date :

Witness:

For and behalf of:

M/s.....

1. Signature : Name
Full name in block letters : Signature
Occupation : Designation
Address :

2. Signature : Authorized Representative*
Full name in block letters :
Occupation : (Company Seal – in case of Company)
Address :

*Indemnity Bonds are to be executed by the authorised persons and (i) in case of Contracting company, under company seal of the company or (ii) having the power of attorney issued under company seal of the company with authority to execute Indemnity Bonds, (iii) in case (ii), the original Power of Attorney if it is specifically for this Contract or a Photostat copy of the power of attorney if it is a General Power of Attorney and such documents should be attached to Indemnity Bond.



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ANNEXURE –XVII

PROFORMA FOR RETENTION MONEY BANK GUARANTEE

Note:

This Guarantee should be furnished by a Scheduled Commercial Bank authorized by Reserve Bank of India other than Bank of China.

- i). The Bank Guarantee should be furnished on Stamp Paper of value of not less than Rs.80/-.
- ii). The Stamp papers should be purchased in the name of Bank executing the Guarantee / name of the Contractor. The date of purchase of stamp paper shall be on or before the date of execution of Bank Guarantee.
- iii). The bank guarantee issued by the issuing Bank on behalf of Contractor in favour of “NLC India Limited (NLCIL)” shall also be confirmed through Structured Financial Messaging System (SFMS).
- iv). Bank Guarantee submitted in physical mode, which cannot be verifiable through (SFMS) will be rejected summarily.

Place:

Bank Guarantee No:

Date:

To

The Chief General Manager / Contracts
NLC INDIA LIMITED,
Corporate Office, Block-1, Neyveli- 607 801,
Cuddalore District,
Tamil Nadu, INDIA.

Dear Sirs,

- 1 Pursuant to the Contract, hereinafter referred to as “The Contract” which M/s _____ hereinafter referred to as the “CONTRACTOR”, which expression shall, unless repugnant to the context or meaning, thereof, include its successors, administrators, representatives and assignees, have concluded with the NLCIL, hereinafter referred to as the “PURCHASER”, which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees, on ____ 2023 vide Letter of Award/Contract No. _____ dated _____, the CONTRACTOR have undertaken to _____ for the _____ as per the prices indicated hereunder _____
- 2 According to the said contract, the PURCHASER has undertaken to make the final payment of Rs. _____ (Rupees _____) being the



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- _____% of the supply portion/erection portion/contract value (delete whichever is not applicable) against issuance of Retention Money Guarantee by a Bank for Rs..... the value of the supply portion/erection portion/contract value (Delete whichever is not applicable).
- 3 For this Retention Money payment, we, the undersigned _____ (Name) _____ (Address), hereinafter referred to as the BANK which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees, hereby guarantee to the effect that we irrevocably undertake to pay the PURCHASER merely on demand without any previous notice and without any demur reservation, protest, contest and without recourse to the CONTRACTOR and without referring to any other source, any and all monies paid by the PURCHASER, but not exceeding Rs. _____ (Rupees _____ only) provided the PURCHASER advises us that the CONTRACTOR has failed to fulfill his contractual obligations stipulated in the said contract, any such demand made by the PURCHASER on the BANK shall be conclusive and binding, absolute and unequivocal notwithstanding any difference between the PURCHASER and the CONTRACTOR or any dispute or disputes raised/pending before any court, Tribunal, Arbitrator or any other authority.
 - 4 This Guarantee will not be discharged due to the change in the constitution of the Bank or the CONTRACTOR(S)/SUPPLIER(S).
 - 5 This Guarantee will become invalid three months after the successful completion of the performance tests by the CONTRACTOR and acceptance thereof by the PURCHASER of all the parts of the _____ equipment under the said Contract or as soon as this letter of guarantee has been returned to us, at the latest, however, on _____ 20 _____ unless a claim has been lodged with us under this guarantee before that date.
 - 6 The PURCHASER shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee from time to time to extend the time of performance by the CONTRACTOR. The Bank shall not be released from its liability under these presents by any exercise of the PURCHASER of the liberty with reference to the matter aforesaid.
 - 7 The Bank also agrees that the PURCHASER shall be entitled at his option to enforce this guarantee against the Bank as a Principal Debtor, in the first instance notwithstanding any other security or guarantee that it may have in relation to the CONTRACTOR'S liabilities.
 - 8 This guarantee shall remain in force upto and including _____ any shall be extended from time to time for such period as may be desired by M/s _____ on whose behalf this guarantee has been given.
 - 9 The Bank further agrees that the decision of the PURCHASER as to the failure on the part of the CONTRACTOR to fulfill the contractual obligations stipulated in the said Contract and/or to the amount payable by the Bank to the PURCHASER shall be final, conclusive and binding.
 - 10 This guarantee is revocable only with the written consent of the PURCHASER.
 - 11 This guarantee deed must be returned to us upon expiry of the guarantee.



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12 Notwithstanding anything contained herein:

- (a) Our liability under this guarantee shall not exceed Rs..... (Rupees)
- (b) This Bank Guarantee shall be valid upto..... and
- (c) We are liable to pay the Guaranteed amount or any part thereof under this bank guarantee only if you serve upon us a written claim or demand on or before.....

Signed this _____ day of _____ 2023.

Signature :
Name :
Designation :
Staff Code No :

Bank Seal

Date :

Witness:

- 1. Signature :
Full name in block letters :
Designation :
Address :
- 2. Signature :
Full name in block letters :
Designation :
Address :



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ANNEXURE – XVIII

**PRO-FORMA FOR RELEASE OF LIQUIDATED
DAMAGES BANK GUARANTEE (LDBG)**

Not Applicable



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ANNEXURE-XIX

SAFETY CODE FOR CONTRACTORS

1 GENERAL

- 1.1 Safety is the responsibility of every employee, individually and collectively.
- 1.2 Head of the Dept/Division should ensure that a copy of this Contractor's Safety Code is handed over to every Contractor working under his control and he should in turn prominently display all rules on the office/site notice board for the benefit of all the men working under him.
- 1.3 The Contractor shall in connection with provide adequate guards, illumination, fencing and watch wherever necessary at the construction site & working area, for the safety & convenience of general public.
- 1.4 Fire extinguishers adequate in number and with proper validity shall always be kept by the Contractor at the site of works, where there is risk of fire hazard, especially near the site stores.
- 1.5 Adequate washing facilities with proper drainage shall be provided and properly maintained near the place of work but at a safe distance from railway tracks and busy roads.
- 1.6 Whenever work is to be undertaken near a place, where there is a risk of drowning, arrangements to be made for safe barricading of such areas. All necessary equipment shall be provided and kept ready for use and necessary steps taken for prompt rescue of any person in danger and adequate provision shall be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work, in case of a mishap.
- 1.7 To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the Contractor shall be open to inspection by the Safety Engineer, the Labour Officer, Engineer-in-charge of the concerned Department or their representatives.
- 1.8 Notwithstanding the above clauses, there is nothing in these to exempt the Contractor from the operation of any other Act or Rule in the Republic of India for the safety of men and materials.
- 1.9 An injury sustained in the plant, must be immediately reported to the First-Aid Station or next higher Supervisor/Officer in-charge, no matter how minor the nature of the injury.
- 1.10 In case of a fatal accident, the Contractor must inform the Engineer in-charge of the department for which he is working and a report in writing should be made, clearly explaining the sequence of events leading to the accident.
- 1.11 Smoking or use of naked lights is strictly prohibited near gas lines, valves and any other equipment linked to the gas distribution networks.
- 1.12 Smoking and carrying of matches, lighters and other spark producing devices is strictly prohibited within the area where inflammable liquids are stored, handled or used or where loading or unloading operations are performed. Any tank or container containing inflammable liquid should be properly grounded for preventing ignition



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due to static electricity charges. Contractor should ear-mark such areas and provide necessary signage and warning signals.

- 1.13 Contractors should ensure that employees do not report to work while under the influence of intoxicants. Any employee found on duty under the influence of liquor or of intoxicating drugs, will be liable to severe disciplinary action.
- 1.14 Work surroundings should be kept clean, free from oil, grease and other obstructions or fallen objects like nuts bolts etc.
- 1.15 After a job or work is completed, all left-over junk and other scrap materials should be cleared from the area immediately.
- 1.16 Drums or other make-shift arrangement must not be used in place of ladders or as work benches or supports for any job.
- 1.17 Employees shall not walk through or cross any operating units unless their duties require them to do so, or they are authorised.
- 1.18 Compressed air should not be used for removing dust from one's clothes and deliberately directed or used on any person as it is likely to cause serious injury.
- 1.19 If an employee, in the course of his work, encounters conditions of unusual hazard with which he is not familiar, he should contact the supervisor for advice before proceeding further. He should also inform the Contractor as well as the Engineer in-charge.
- 1.20 Contractors should particularly ensure that they or their employees do not meddle with any equipment they are not concerned or unfamiliar with and see that they should generally keep away from such equipment.
- 1.21 It should be ensured that no one takes rest/shelter below any undercut pit/excavation or near any stock-pile of materials.
- 1.22 For any work involving repair & maintenance underground, the Contractor shall follow the safety procedural orders/instruction issued by the Purchaser.
- 1.23 The Contractor shall ensure supervision of such jobs by competent persons within the meaning of Factories Act & Rules.
- 1.24 All persons engaged on such jobs shall have to have before hand proper training instructions as required under Factories Act & Rules.

2 SAFETY MEASURES IN CONTRACT WORK

Whereas, it is necessary to take steps to ensure safety at work sites by the executing contractual agency, it is incumbent of the Purchaser to introduce all measures to guide, induce, train and bind the agencies concerned to adopt remedial steps to prevent accidents. Problem gets aggravated in contractual zones due to lack of training, in-adequate supply of personal protective equipment, shortage of skilled labour changing deployment of works etc. Accordingly, the following measures are intended to be introduced and the salient clauses will be included in the contract documents.

- 2.1 The Contractor shall take all safety precautions and provide adequate supervision in order to carry out the job safely and without damage to men & equipment.



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- 2.2 Any special safety precautions, if required to be followed by the Contractor, such clauses shall be added.
- 2.3 The executing department would take necessary shut-downs wherever there are hazards of gases, electricity, moving machinery etc. The Contractor shall ensure that the shut-down/clearance are taken before deploying workers to such locations.
- 2.4 The Contractor shall supply safety appliance such as safety shoes, safety belts, helmets, gloves, harness etc. to his workers depending on working conditions and life saving jackets shall always be kept in readiness at the site. The Contractor shall not deploy any workmen without safety shoes and safety helmet and the safety applicable to the specific work conditions.
- 2.5 Before starting the day's job, the Purchaser's Supervisor/representatives will ensure that safety briefing has been done to the Contractor's supervisor who has previously been imparted safety induction training.
- 2.6 Head/Zonal in-charge will nominate Engineer in-charge of the contractual work under reference who will be fully responsible for the safe execution of the work at site.
- 2.7 In case of injury to persons, the Contractors shall first take the injured person to nearest hospital with the necessary forms. In no case the Contractors are allowed to take injured persons directly to their own Doctors.
- 2.8 The Contractor shall abide by the provisions of Factories Act, State Factory Rules, Workmen's Compensation Act, Payment of Wages Act, Contract Labour (Regulation) Act etc. and keep the Purchaser indemnified of provision the above Acts and Rules.
- 2.9 The Head of Department executing the contract upon the satisfaction that the Contractor is not conforming to the Safety requirements may direct stoppage of work and require the Contractor to remedy the defects. The Contractor shall not proceed with the work until he has complied with each directions to the satisfaction of such Head of the Department.
- 2.10 The Contractor shall be fully responsible for accidents caused due to him or his agents or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries.
- 2.11 Without prejudice to the right conferred by the above clause, for stoppage of work for violations of safety requirements the Contractor shall be liable for penalty as deemed fit for violation of safety rules & regulations upto first two instances. For the third violation he shall be liable to be debarred from further contracts upto a period of one year from the date of issue of debarring notice.
- 2.12 The Head of the Safety Engg. Deptt. or the Head of the Deptt. executing the contract will assess the penalty amount having regard to the circumstances, in particular, the nature and gravity of the violation. After issuing a notice to the Contractor to show cause why the amount specified therein shall not be imposed as a penalty and considering the cause shown by the Contractors, if any, he shall pass final orders which shall then be final and binding on the Contractor. The penalty amount will be recoverable from any bill and/or EMD/SD of the Contractor without any further reference to him.
- 2.13 Whenever work, at heights is involved, Contractor must obtain necessary permissions and clearances from the Safety Engg. Dept. for such persons required to do work at height.
- 2.14 Contractor must insure all the workmen under the "Workmen Compensation Act."

* * * * *



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ANNEXURE – XX

GENERAL CONDITIONS FOR ERECTION AND CIVIL WORKS

A. GENERAL CONDITIONS FOR ERECTION WORKS

1 GENERAL

- 1.1 The following shall supplement the conditions already contained in the other parts of the specifications and documents and shall govern that portion of the work of the Contract to be performed/undertaken at the project site.
- 1.2 The Contactor upon signing of the Contract shall, in addition to a Project Coordinator, nominate another responsible officer as its representative at site suitably designated for the purposes of overall responsibility and co-ordination of the Works to be performed at site. Such person shall function from the site office of the Contractor during the execution of Contract. This representative shall have full technical capability and complete administrative and financial powers to expeditiously and efficiently execute the work under the Contract.
- 1.3 The Contractor shall proceed with the work to be performed under the Contract and each and every part and detail thereof, in the best and most workman like manner by engaging qualified, diligent and efficient workers, and undertake the several parts thereof, at such time and in such order as agreed in the contract , and finish such work in strict conformity with the plans, drawings and/or specifications, and any changes, modifications or amplifications thereof made by the Purchaser/Consultant.
- 1.4 The Contractor shall not sell, assign, mortgage hypothecate or remove equipment or materials or materials which have been installed or which may be necessary for the completion of the Contract, without the written consent of the Purchaser.

2 REGULATIONS OF LOCAL AUTHORITIES AND STATUES

- 2.1 The Contractor shall ensure compliance with all statutes, laws, rules and regulations of the Central or State Government or any other authority such as the Workmen's Compensation Act 1923, Payment of Wages Act, Minimum Wages Act 1948, Employees State Insurance Act, Employees Provident Fund Act, Contract Labour (Regulation) Act, Interstate Migrant Workmen Act, Building and other contract workers Act etc. and any and all statutory modifications thereof in connection with employees engaged by him or his Sub-Contractors in performance of the work.
- 2.2 The Contractor shall conform to the provisions of State Government Factory Laws, Indian Electricity Act and rules made there under, and any other acts of legislature relating to the work and to the regulations and bye-laws of any national or local authority and of any water, lighting and other companies and/or authorities with whose systems the plant/structure is proposed to be connected and shall before making any variations from the drawings or specifications that may be necessitated by so conforming, giving to the Purchaser/Consultant written notice, specifying the variations proposed to be made and the reason for making it any apply for instructions thereof.
- 2.3 The Contractor shall arrange to give all notices required by the said Acts, Regulations



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or Bye-laws to be given to any Authority or to any Public Officer and pay all fees that may be properly chargeable in respect of the works and lodge the receipts with the Purchaser/Consultant, unless otherwise, specified in the specification. Obtaining all permits and licenses required there upon is the responsibility of the Contractor.

- 2.4 All registration and statutory inspection fees, in respect of the work pursuant to the Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully payable under any other statutory laws and its amendments from time to time during erection in respect of the plant and equipment ultimately to be owned by the Purchaser shall be to the account of the Purchaser. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor or its Sub-Contractor, the additional fees for such inspection and/or registration shall be borne by the Contractor.

3 CONTRACTOR'S HEALTH AND SAFETY PROGRAM

Refer Technical specification and also Annexure-XIX of this Volume for safety code.

4 PURCHASER'S LIEN ON EQUIPMENT

The Purchaser shall have lien on all equipment including those of the Contractor brought to the site for the purpose of erection, testing and commissioning of the plant. The Purchaser shall continue to hold the lien on all such equipment throughout the period of Contract. No material brought to the site shall be removed from the site by the Contractor and/or its Sub-Contractor's without the prior written approval of the Purchaser/ Consultant.

5 INSPECTION, TESTING AND INSPECTION CERTIFICATES

- 5.1 The provisions of the clause entitled Inspection, Testing and Inspection Certificates shall also be applicable to the erection portion of the works. The Purchaser / Consultant shall have the right to re-inspect any equipment (though previously inspected and approved by him, at the Contractor's works) before and after the same are erected at Site. Inspection will be carried out as per the approved QAP for shop manufactured items. After receipt of the materials / equipments at site, in case of doubt, the Purchaser may ask for re-inspection after mutual discussion and agreement with the contractor as per the approved QAP for the materials / equipments to perform as per the contract within the contract price. If by the above inspection, the Purchaser / Consultant rejects any equipment, the Contractor shall make good for such rejections either by replacement or modifications / repairs as may be necessary, to the satisfaction of the Purchaser / Consultant. Such replacements will also include the replacements or re-execution of such of those works of other Contractor's and/or agencies, which might have got damaged or affected by the replacements or re-work done to the Contractor's work.
- 5.2 Any work, which proves faulty, shall be corrected by the Contractor without undue delay. The fact that the Purchaser / Consultant or their representatives have not pointed out faulty work or that which is not in accordance with plans and specifications, shall not relieve the Contractor from correcting such work as directed by the Purchaser / Consultant, without additional compensation.



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5.2.1 In the event finished/completed work is 'dismantled' for the purpose of re-inspection due to damage (arising due to transportation and storage at site), in case of doubt, the Purchaser may ask for re-inspection after mutual discussion and agreement with the contractor as per the approved QAP for the materials / equipments to perform as per the contract within the contract price.

5.3 The Purchaser / Consultant, their representatives and employees shall, at all reasonable times, have free access to the works and/or to the workshops, factories or other places where materials are being prepared or constructed in performance of the Contract and also to any place where the materials are lying or from where they are being obtained, and the Contractor shall give every facility to the Purchaser / Consultant and his representatives for inspection and examination and test of the materials and workmanship even to the extent of discontinuing portions of the work temporarily, or of uncovering or taking down portions of finished work after mutual agreement.

6 ACCESS TO SITE AND WORKS ON SITE

6.1 Suitable access and possession of the site shall be provided to the Contractor by the Purchaser in reasonable time.

6.2 The Purchaser shall make ready the necessary foundations to be provided by it ready, as per the agreed schedule, for the execution of the individual phases of works.

6.3 In the execution of the works, no persons other than the Contractor or its duly appointed representative, Sub-Contractor and workmen shall be allowed to undertake work on the site, except by the special permission, in writing of the Purchaser / Consultant or its representative.

6.4 Access to the site at all times shall be accorded to the Purchaser / Consultant and other authorized officials and statutory Public Authorities. Nevertheless, the Contractor shall not object to the execution of the work by other Contractors or tradesmen whose names shall have been previously communicated in writing to the Contractor by the Purchaser / Consultant and afford them to coordinate for the execution of their several functions simultaneously with his own.

7 CONTRACTOR'S SITE OFFICE ESTABLISHMENT

7.1 The Contractor shall establish a Site Office at the site and keep posted an authorized representative for the purposes of the Contract. Any written order or instruction of the Purchaser / Consultant or his duly authorized representative, shall be communicated to the authorized representative for the purposes of the Purchaser / Consultant or his duly authorized Contractor at the Site Office and the same shall be deemed to have been communicated to the Contractor at his legal address.

7.2 The Contractor shall employ at least one competent representative whose name or names shall have previously been communicated in writing to Purchaser/Consultant by the Contractor, to supervise the erection of the plant and to carry out the work. The said representative or if more than one shall be employed, then one of such representatives shall be present at the site during working hours, and any written orders or instructions which the Purchaser/Consultant may give to the said representatives of the Contractor shall be deemed to have been given to the



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Contractor. It is essential that the supervisory personnel shall be capable of speaking and writing in English language and preferably conversant with the local language.

8 CO-OPERATION WITH OTHER CONTRACTORS

- 8.1 The Contractor shall cooperate with all other Contractors or tradesmen of the Purchaser, who may be performing other works on behalf of the Purchaser and the workmen who may be employed by the Purchaser and doing work in the vicinity of the works under the Contract. The Contractor shall also so arrange to perform its work as to minimize, to the extent possible, interference with the work of other Contractors and its workmen. Any injury or damage that may be sustained by the employees of the other Contractors and the Purchaser due to the Contractor's work shall promptly be made good at its own cost. The Purchaser/Consultant shall determine the resolution of any difference or conflict that may arise between the Contractor and other Contractors or between the Contractor and the Workmen of the Purchaser in regard to their work.

If the works of the contractor is delayed because of any acts or omissions of another contractor, the contractor shall have no claim against the Purchaser on that account.

- 8.2 The Purchaser/Consultant shall be notified promptly by the Contractor of any defects in the other Contractor's works that could affect the Contractor's works. The Purchaser/Consultant shall determine the corrective measures, if any, required to rectify this situation after inspection of the works and such decisions by the Purchaser/Consultant shall be binding on the Contractor. If a part of the Contractor's work depends, for proper execution, upon the work of any other Contractor, the Contractor shall inspect and promptly report in writing to the Purchaser/Consultant any defect in such work of other Contractors that render it unsuitable for proper execution of the work under the Contract. Failure to so inspect and report shall constitute an acceptance of 'Others' work as fit and proper for the reception of his work, except as to defects which may develop in the work of 'Others' after the proper execution of the work. To ensure proper execution of his sub-subsequent work, the contractor shall inspect work already in place and shall at once report to the Purchaser/Consultant any discrepancy between the executed work and the drawings.

9 DISCIPLINE OF WORKMEN

The Contractor shall adhere to the disciplinary procedure set by the Purchaser/Consultant in respect of its employees and workmen at site. The Purchaser/Consultant shall be at liberty to object to the presence of any representative or employee of the Contractor at the site, if in the opinion of the Purchaser/Consultant such employee has misconduct himself or be incompetent or negligent or otherwise undesirable and then the Contractor shall remove such a person object to and provide in his place a competent replacement at his own expense.

10 CONTRACTOR'S FIELD OPERATION

- 10.1 The Contractor shall keep the Purchaser/Consultant informed in advance regarding his field activity plans and schedules for carrying out each part of the works. Any review of such plan or schedule or method of work by the Purchaser/Consultant shall not relieve the Contractor of any of his responsibility towards the field activities. Such



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reviews shall also not be considered as an assumption of any risk or liability by the Purchaser/ Consultant or any of his representatives and no claim of the Contractor will be entertained because of the failure or inefficiency of any such plan or schedule or method of work reviewed. The Contractor shall be solely responsible for the safety, adequacy and efficiency of plant and equipment and his erection methods.

- 10.2 The Contractor shall have the complete responsibility for the conditions of the work site including the safety of all persons employed by him or its Sub-Contractor and all the properties under his custody during the performance of the work. This requirement shall apply continuously till the completion of his 'Contract' and shall not be limited to normal working hours. The construction review by the Purchaser/ Consultant is not intended to include review of Contractor's safety measures in, on or near the work-site, and their adequacy or otherwise.
- 10.3 The work so far as it is carried out on the Purchaser's premises/the project site, shall be carried out at such time as the Purchaser may approve consistent with the construction schedule and so as not to interfere unnecessarily with the conduct of the Purchaser's business and the Purchaser will give the Contractor all reasonable facilities for carrying out the work.

11 PHOTOGRAPHS AND PROGRESS REPORT

Refer relevant clause of Section-10 of this Volume, Draft Contract.

12 MANPOWER REPORT

- 12.1 The Contractor shall submit to Purchaser/Consultant on the first day of every month, a Manpower Report for the upcoming/next month, detailing the manpower scheduled/ proposed/ planned to be deployed for the month, skill-wise and area-wise.
- 12.2 The Contractor shall also submit to the Purchaser/Consultant on the first day of every month, a manpower report of the previous month detailing the number of persons planned to have been deployed to that and actually deployed, skill-wise and the areas of employment of such labour.

13 PROTECTION OF WORK

- 13.1 The Contractor shall have total responsibility for protecting his works till it is finally accepted by the Purchaser/Consultant. No claim will be entertained by the Purchaser/ Consultant for any damage or loss to the Contractor's works and the Contractor shall be responsible for the complete restoration of the damaged works to its original condition to comply with the specifications and drawings. Should any such damage to the Contractor's works occur because of another party not under his supervision or control, the Contractor shall make and take-up its claim directly with the party concerned. If disagreement or conflict or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's 'works' the same shall be resolved as per the provisions of above Clause-8 titled 'Cooperation with other Contractors'. The Contractor shall not cause any delay in the repair of such damaged 'Works' because of any delay in the resolution of such disputes. The Contractor shall proceed to repair the work immediately and no cause thereof will be assigned pending resolution of such dispute.



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- 13.2 The Contractor and his Sub-Contractors shall be responsible, during execution, for protection of the work, which has been completed by Others. Necessary care shall be taken to see that no damage to the same is caused by its own personnel during the course of execution of their work.
- 13.3 All other work completed or in progress as well as machinery and equipment that are liable to be damaged by the Contractor's work shall be protected by the Contractor and such protection shall remain and be maintained until its removal is directed by the Purchaser.
- 13.4 The Contractor shall effectively protect all the works from action of weather and from damages or defacement and shall cover finished parts where required for their thorough protection. Face work shall be perfectly clean and free from defects.
- 13.5 The work shall be carried out onto completion without damage to any work and property adjacent to the area of his work, to whomsoever it may belong, without interference with the operation of their existing machines or equipment.
- 13.6 The Contractor shall provide the necessary temporary roadways, footways, guards as may be rendered necessary by reason of his work, for the protection and accommodation of foot passengers of other traffic of the Purchaser or occupier of adjacent property and of public. The Contractor shall at the times provide sufficient temporary barriers, notice boards and lights to protect and warn the public and post necessary watchman to guard the site and equipment. He shall take all precautions necessary and shall be responsible for the safety of the work to be performed by him. The Contractor shall also observe and display Safety First signs and shall have proper safety and fire protection equipment.
- 13.7 Adequate lighting at and near all the storage, handling, fabrication, pre-assembly and erection sites for properly carrying out the work and for safety and security shall be provided by the Contractor. The Contractor's work area shall be adequately lighted during night time too. The Contractor should also engage adequate electricians/wiremen, helpers, etc., to carry out and maintain these lighting facilities. If the Contractor fails to provide all the above listed facilities, the Purchaser may provide such facilities as it may deem necessary and charge the cost thereof to the Contractor. In any case the Contractor shall be liable for any damages and consequences arising out of its neglect in this regard.

14 EMPLOYMENT OF LABOUR

- 14.1 The Contractor/Sub-Contractors is expected to employ on the work skilled employees with experience of his particular work. No person below the age of eighteen years shall be employed.
- 14.2 The Contractor shall furnish details of the qualifications and experience of his senior supervisors and Consultants assigned to the work, including their experience in supervising erection and commissioning of plant and equipment of comparable capacity.
- 14.3 All travelling expenses including provisions of all necessary transport to and from site, loading allowances and other payments to the Contractor's employees shall be the sole responsibility of the Contractor.



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- 14.4 The hours of work on the site shall be decided by the Purchaser and the Contractor shall adhere to it. Working hours for each employee will normally be 8 (eight) hours per day.
- 14.5 The Contractor's employees shall wear suitable identification badges while on work at site clearly indicating his name, designation, Employer etc, among other essential details.
- 14.6 The Contractor shall ensure that it pays its personnel/workmen regular wages, overtime and other compensations. The attendance register and the wage register shall be submitted to the Purchaser for verification at regular intervals. The Contractor shall also furnish the Purchaser at fortnightly intervals a certificate that he has paid all the dues to his workmen. In case such payment is not made regularly by the Contractor, the Purchaser will be in his right to make such payments and deduct the same from the Contractor's progress payments.
- 14.7 In case the Purchaser becomes liable to pay any wages or dues to the labour or to any Government agency under any of the provisions of the Minimum Wages Act, Workmen's Compensation Act or any other law due to act of omission of the Contractor, the Purchaser may make such payments and shall recover the same from the Contractor's bills.
- 14.8 None of the Contractor's superintendents, supervisors, Consultants or labour may be withdrawn from the work without due notice being given to the Purchaser/Consultant. Further, no such withdrawal shall be made if, in the opinion of the Purchaser/Consultant, it will jeopardize the required pace of progress and/or the successful completion of the work.
- 14.9 In connection with the performance of work under this Contract, the Contractor shall not discriminate on the basis of race, religion, colour or national origin. It is also expected that the Contractor in his selection of personnel will give due regard to their ability to co-operate with the Purchaser/Consultant. Suggestions and recommendations made by the Purchaser/Consultant relating to the work and coordination thereof are to be carefully and courteously considered.

15 FACILITIES TO BE PROVIDED BY THE PURCHASER

15.1 Space

Refer Section-2 of this Volume

15.2 Electricity

Refer Section -2 of this Volume

15.3 Water

Refer Section -2 of this Volume

15.4 Construction Tools and Equipment

Refer Section -2 of this Volume



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16 FACILITIES TO BE PROVIDED BY THE CONTRACTOR

(Refer Section-2 of this Volume)

16.1 Tools, Tackles and Scaffoldings

16.1.1 The Contractor shall provide at its own cost & expense, all the construction equipment, false work, erection tools, machine tools, power tools, tackles, hoists, cranes, derricks, cables, slings, skids, scaffolding work benches, tools for rigging, cribbing and blocking, welding machines preheating and stress relieving equipment, X-ray and all associated protective equipment, instruments, appliances, materials, and supplies required for unloading, transporting, storing, erection, testing and commissioning that may be required to accomplish the work under the Contract unless otherwise specifically provided for. Adequacy of such tools will be subject to final determination of the Purchaser/Consultant. He shall submit a list of all such materials to the Purchaser / Consultant before the commencement of pre-assembly at site. These tools and tackles shall not be removed from the site without the written permission of the Purchaser/ Consultant.

16.1.2 The Contractor shall also furnish all necessary expandable devices like anchors, grinding and abrasive wheels, raw plugs, hacksaw blades, taps, dies, drills, reamers, chisels, files, carborundum stones, oil stones, wire brushes, necessary scaffolding, ladders, wooden planks, timbers, sleepers and consumable material like welding electrodes, oxygen, acetylene, argon, lubricating oils, greases, cleaning fluids, cylinder oil, graphite powder and flakes, fasteners, gaskets, temporary supports, stainless steel shims of various thickness as required, cotton waste, cheese cloth and all other miscellaneous supplies of every kind required for carrying out the work under the 'Contract'.

16.1.3 The Contractor shall provide all reasonable facilities including tools, personnel, etc. and ensure coordination with the Purchaser / Consultant and the sub-Contractor's erection supervisors to enable them to carry out all supervision, measurements, checks, etc. in a satisfactory manner.

16.1.4 The Contractor shall not dispose of, transport or withdraw any tools, tackles, equipment and material provided by him for the 'Contract' without taking prior written approval from the Purchaser/Consultant, and the Purchaser/Consultant at all times shall have right to refuse permission for disposal, transport or withdrawal of tools, tackles, equipment and material if, in his opinion, the same will adversely affect the efficient and expeditious completion of the 'Project'.

16.2 Communication

The Contractor will make its own arrangement for all his communication needs such as telephone, email etc. at its Site Office. The Purchaser will assist or facilitate the Contractor in obtaining the above facilities, if requested.

16.3 First-Aid

The Contractor shall provide necessary first-aid facilities for all its employees, representatives and workmen at the site.

16.4 Cleanliness



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16.4.1 The Contractor shall be responsible for proper house-keeping the entire area allotted to him, clean and free from rubbish, debris etc. during the period of 'Contract'. The Contractor shall employ sufficient number of special personnel to thoroughly clean his work area at least once in a day. All rubbish and scrap material shall be identified, stacked or disposed in a place to be identified by the Purchaser / Consultant. Materials and stores shall be so arranged to permit easy cleaning and upkeep. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil-proof sheet shall be provided to protect the floor from such damage.

16.4.2 Similarly, the offices of the Contractor shall be kept clean and neat to the satisfaction of the Purchaser/Consultant. Proper sanitary arrangements shall be provided by the Contractor in the work areas and offices of the Contractor.

17 LINES AND GRADES

17.1 All the works shall be performed to the lines, grades and elevations indicated on the drawings. The Contractor shall be responsible to locate and layout the works. Basic horizontal and vertical control points will be established and marked by the Purchaser/Consultant at site at suitable points. These points shall be used as datum for the 'Works' under the Contract. The Contractor shall inform the Purchaser / Consultant well in advance of the times and places at which he wishes to do work in the area allotted to him, so that suitable datum points may be established and checked by the Purchaser / Consultant to enable the Contractor to proceed with its works. Any work done without being properly located may be removed and/or dismantled by the purchaser/ Consultant at Contractor's expense.

17.2 Where the Purchaser/Consultant had already established the base lines and bench marks adjacent to the various sections of work, the same must be carefully preserved by the contractor, and in case of their unnecessary destruction by him or any of his employees, these will be re-established by the Purchaser/Consultant at the Contractor's expense.

17.3 The Contractor shall be responsible for the accuracy of all dimensions within the various sections of the work according to the figures of dimensions in the drawings.

18 FIRE PROTECTION – NOT APPLICABLE

19 SECURITY

Refer Section- 2, of this Volume.

20 CONTRACTOR'S AREA LIMITS

The Purchaser/Consultant will clearly demarcate the boundary limits of access roads, parking, spaces, storage and construction areas and the Contractor shall not tress-pass areas not so marked out for him. The Contractor shall be responsible to ensure that none of its personnel move out of the areas marked out for its operations. In case of such a need for the Contractor's personnel to work out of the areas marked out for him, the same shall be done only with the written permission of the Purchaser/Consultant.

21 CONTRACTOR'S COOPERATION WITH THE PURCHASER

- 21.1 In cases where the performance of the erection work by the Contractor affects the operation of the system facilities of the Purchaser/Consultant such erection work of the Contractor shall be planned to be performed only in the manner stipulated by the Purchaser/ Consultant and the same shall be acceptable at all times to the Purchaser/ Consultant. The Purchaser/ Consultant may impose such restrictions on the facilities provided to the Contractor such as electricity, water etc. as he may think fit in the interest of the Purchaser and the Contractor shall strictly adhere to such restrictions and co-operate with the Purchaser/ Consultant. It will be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and operation of the equipment systems, which are erected by him. The Contractor shall also be responsible for flushing and initial filling of all the oil and lubricants required for the equipment furnished and erected by him, so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in these documents.
- 21.2 The Contractor at all times shall work in coordination with the Purchaser's Consultants and offer them all reasonable facilities to become familiar with the erection, operation and maintenance of the equipment.
- 21.3 In respect of observations of local rules, administrative orders, working hours and the like, the Contractor and his personnel shall cooperate with the Purchaser.

22 COMMISSIONING

The 'Commissioning' of the equipment supplied and erected by the Contractor shall be the responsibility of the Contractor as detailed in Tender specification. The Contractor shall provide in addition, test instruments, calibrating devices etc. and the labour required for the successful performance of these tests. If it is anticipated that the above tests may prolong for a long time, the Contractor's workmen required for the above tests shall always be present at site during such tests.

23 MATERIAL HANDLING AND STORAGE

- 23.1 All the equipment furnished under the Contract and arriving at site shall be promptly received, unloaded and transported and stored in the storage spaces by the Contractor.
- 23.2 The Contractor shall be responsible for examining all the shipment and notify the Purchaser/Consultant immediately of any damage, shortage, discrepancy etc. for the purpose of Purchaser's / Consultant's information only. The Contractor shall submit to the Purchaser / Consultant every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damage in transit, handling and/or in storage and erection of the equipment at the site (Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor).
- 23.3 The Contractor shall maintain an accurate and exhaustive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the Purchaser/Consultant at any time.



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- 23.4 All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc shall be used for unloading and/or handling of the equipment without the specific written permission of the Purchaser/Consultant. The equipment stored shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the store shall be moved to the actual location at the appropriate time so as to avoid damage for such equipment at site.
- 23.5 All electrical panels, control gears, motors and such other devices, shall be properly dried by heating before they are installed and energized. Motor bearings, slip rings, commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected. Heavy rotating parts in assembled condition shall be periodically rotated to prevent corrosion due to prolonged storage and shall also be periodically inspected.
- 23.6 All electrical equipment such as motors, generators etc. shall be tested for insulation resistance at least once in three months from the date of receipt till the date of commissioning and a record of such measured insulation values shall be maintained by the Contractor. Such records shall be open for inspection by the Purchaser/Consultant.
- 23.7 The Contractor shall ensure that all the packing materials, and protection devices used for the various equipment during transit and storage are removed before the equipment are installed.
- 23.8 The consumables and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.
- 23.9 All the materials stored in the open or dusty locations must be covered with suitable weatherproof and flameproof and flame proof covering material wherever applicable.
- 23.10 If the materials belonging to the Contractor are stored in areas other than those earmarked for him, the Purchaser/Consultant will have the right to get it moved to the area earmarked for the Contractor at the Contractor's cost.
- 23.11 The Contractor shall be responsible for making suitable indoor storage facilities to store all equipment which require indoor storage. Normally all the electrical equipment, such as motors, control gears, generators, exciters and consumables like welding electrodes, lubricants, etc. shall be stored in the closed storage space. The Purchaser/Consultant in addition, may direct the Contractor to move certain other materials which in his opinion will require indoor storage, to indoor storage areas which the Contractor shall strictly comply with.
- 23.12 The Contractor shall arrange for periodic inspection of material/equipment in his custody until taken over by the Purchaser and shall carry out all protective and preservative measures required thereupon.
- 23.13 The Contractor shall also keep a check on the deliveries of the equipment/material covered in his scope of erection and shall advise the Purchaser well in advance regarding possible hold-ups in his work due to expected delays in delivery of equipment, to enable the Purchaser to expedite the deliveries if Supplier is different from the Contractor.



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23.14 Damage of any of the roads due to movement of heavy trucks, trailers, crane and other equipment of the Contractor shall be made good by the Contractor. Otherwise same shall be got rectified by the Purchaser at the risk and cost of the Contractor.

23.15 the specified temperature and humidity conditions.

24 CONSTRUCTION MANAGEMENT

24.1 The field activities of the Contractors working at site, will be coordinated by the Purchaser/Consultant and the Purchaser/ Consultant's decision shall be final in resolving any disputes or conflicts between the Contractor and other Contractors of the Purchaser regarding scheduling and co-ordination of work. Such decision by the Purchaser/ Consultant shall not be a cause for extra compensation or extension of time for the Contractor.

24.2 The Purchaser/Consultant shall hold weekly meetings of all the Contractor's working at site, at time and a place to be decided by the Purchaser/Consultant. The Contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of the Purchaser / Consultant and shall strictly adhere to those decisions in performing his 'Works'. In addition to the above weekly meetings, the Purchaser / Consultant may call for other meetings either with individual Contractors or with selected number of Contractors and in such a case the Contractor, if called, will also attend such meetings.

24.3 Time is the essence of the 'Contract' and the Contractor shall be responsible for performance of its works in accordance with the specified construction schedule. If at any time, the Contractor is falling behind the schedule, he shall take necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such action in writing to the Purchaser / Consultant satisfying that his action will compensate for the delay. The Contractor shall not be allowed any extra compensation for such action.

24.4 The Purchaser / Consultant shall however not be responsible for provision of additional labour and/or materials or supply or any other services to the Contractor except for the co-ordination work between various Contractors as set out earlier.

24.5 HINDRANCES

24.5.1 Events that caused hindrance to proceed and progress with the work shall be recorded daily and signed by the Construction Dept and the Contractor. The Project Coordination Committee shall take these data for settling the issues.

A record of events shall be maintained by the contractor as under with the Signature of the Contractor and the Purchaser against each case.



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HINDRANCE RECORD REGISTER

Name of work:				Value of Contract:			
Name of Contractor:				Scheduled date of Completion:			
Sl. No.	Descri ption of Hindra nce	Durat ion	Over lapping Period (if any)	Rem edy	Delay by Contractor/ Purchaser	Signature of the	
						Contractor	Purchaser

24.5.2 The details on Battery limit and the date of release of front for various items of work may also be entered in the Register.

24.5.3 The details of Hindrance Register along with the relevant factors will be taken into consideration for determining extension of time to the contract /Price Reduction.

25 FIELD OFFICE RECORDS

The Contractor shall maintain at its site Office up-to-date copies of all drawings, specifications and other Contract Documents and any other supplementary data, complete with all the latest revisions thereto. The Contractor shall use only 'Approved-For Construction' drawings on the field, showing the approval stamp & category (Approval by Purchaser/ Consultant). The Contractor shall also maintain, in addition, the continuous record of all changes, approval (by Purchaser/Consultant) status to the above Contract Documents, drawings, specifications, supplementary data, etc. effected at the field and on completion of his total assignment under the Contract shall incorporate all such changes on the drawings and other Consultant data to indicate as-built conditions of the equipment furnished and erected under the Contract. Such drawings and Engineering, data shall be submitted to the Purchaser / Consultant in required number of copies. A record of all readings taken during the alignment of the equipment shall be maintained by the Contractor. This shall be signed by the erection supervisor and the Purchaser/Consultant as a token of their acceptance of the same. All such records shall be handed over to the Purchaser on completion of the works.

26 CONTRACTOR'S MATERIAL BROUGHT TO SITE

26.1 The Contractor shall bring to site all equipment, components, parts, materials including construction equipment, tools and tackles for the purpose of the works under intimation to the Purchaser/Consultant. All such goods shall, from the time of their being brought vest in Purchaser, but may be used for the purpose of the works only and shall not on



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any account be removed or taken away by the Contractor without the written permission of the Purchaser/Consultant. But the Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.

- 26.2 The Purchaser shall have a lien on such goods belonging to the Contractor for any sum or sums, which may at any time, be due or owing to him by the Contractor, under, in respect of or by reasons of the 'Contract'. After giving a 30 (thirty) days notice in writing of his intention to do so, the Purchaser shall be at liberty to sell and dispose of any such goods, in such manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.
- 26.3 After the completion of the works, the Contractor shall remove from the site under the direction of the Purchaser/Consultant the materials such as construction equipment, erection tools and tackles, scaffolding, etc. with the written permission of the Purchaser / Consultant. If the Contractor fails to remove such materials, within 30 (thirty) days of issue of a notice by the Purchaser/Consultant to do so, then the Purchaser/Consultant shall have the liberty to dispose of such materials as detailed under Clause 16.4 above and credit the proceeds to the account of the Contractor.
- 26.4 On completion of the work, all rubbish, kilns, vats, tanks materials and temporary structures of any sort or kind used for the purpose or connected with the construction/erection work are to be removed by the Contractor and all pits and excavations filled up and the site handed over in a tidy and workmanlike condition and no final payment or settlement of the account for the said work shall held or due shall be made to the Contractor till such site clearance shall have been effected by him and such clearance shall be made by the Purchaser at the expense of the Contractor in the event of his failure to comply with this provision within 7 (seven) days after receiving notice in writing from the Purchaser to that effect. If it becomes necessary for the Purchaser to have the site cleared as indicated above at the expense of the Contractor, the Purchaser shall under no circumstances be held liable for any losses of damages to such of Contractors property as may be on such site due to such removal there from, which removal may be effected by means of public sale of such materials and property in such a way as deemed fit and convenient to the Purchaser.
- 26.5 The Contractor must take sufficient care in moving his construction/erection plant and equipment from one place to another so that they may not cause any damage to the property of the Purchaser, particularly of the existing structures and overhead and underground services and in the event of the Contractors failure to do so, the cost of such damages shall be borne by the Contractor.

27 PROTECTION OF PROPERTY AND CONTRACTOR'S LIABILITY

- 27.1 The Contractor shall be responsible for any damage resulting from his operations. He shall also be responsible for protection of all persons including members of public and employees of the Purchaser and the Purchaser/Consultant and the employees of other Contractors and Sub-Contractors and all public and private property including structures, buildings, other plants and equipment and utilities either above or below the ground.
- 27.2 The Contractor will ensure provision of necessary safety equipment such as barriers,



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signboards, warning lights and alarms, etc. to provide adequate protection to persons and property. The Contractor shall be responsible to give reasonable notice to the Purchaser/Consultant and the Owner of public or private property and utilities when such property and utilities are likely to get damaged or injured during the performance of his 'Works' and shall make all necessary arrangements with such owners, related to removal and/or replacement or protection of such property and utilities.

28 PAINTING

All exposed metal parts of the equipment including pipings, structures, railings, etc. after installation, unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or sand blasting, and the same being inspected and approved by the Purchaser for painting. Afterwards, the above parts shall be finished with two coats of machinery enamel paints. The quality of the finish paint shall be as per the standards of ISI or equivalent and to be of the colour as approved by the Purchaser/Consultant.

29 INSURANCE

Refer Clause – Insurance under Section – 10 of this Volume.

30 UNFAVOURABLE WORKING CONDITIONS

The Contractor shall confine all his field operations to those works which can be performed without subjecting the equipment and materials to adverse effects, during inclement weather conditions, like monsoon, storms, etc. and during other unfavorable construction conditions. No field activities shall be performed by the Contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the Contractor in a proper and satisfactory manner in the performance of such works and with the concurrence of the Purchaser/Consultant. Such unfavorable construction conditions will in no way relieve the Contractor of his responsibility to perform the 'Works' as per the schedule.

31 PROTECTION OF MONUMENTS AND REFERENCE POINTS

31.1 The Contractor shall ensure that any finds such as relic, antiquity, coins, fossils, etc. which he may come across during the course of performance of 'Works' either during excavation or elsewhere are properly protected and handed over to the Purchaser/Consultant. Contractor will be entitled for extension of time and cost compensation in case any work performed in relation to the monument, relic, coins, fossils under this provision.

31.2 Similarly the Contractor shall ensure that the bench marks, reference points, etc., which are marked out either with the help of Purchaser/Consultant or by the Purchaser/Consultant shall not be disturbed in any way during the performance of his 'Works'. If any work is to be performed which may disturb such references, the same shall be done only after these are transferred to other suitable locations under the direction of the Purchaser/Consultant. The Contractor shall provide all necessary materials and assistance for such relocation of reference points, etc.



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32 WORK & SAFETY REGULATIONS

Refer Technical Specification and also Annexure-XIX of this Volume.

33 ELECTRICAL SAFETY REGULATIONS

Refer Technical Specification and also Annexure-XIX of this Volume.

34 FOREIGN PERSONNEL – NOT APPLICABLE

35 PURCHASER'S INSTRUCTIONS

The Purchaser/Consultant may, in his absolute discretion, from time to time, issue further drawings and/or written instructions, details, directions and explanations, which are collectively referred to as "Purchaser's Instructions", in regard to :

- a) Any additional drawings and explanations to exhibit or illustrate details.
- b) The variation or modification of the design, quality or quantity of work or the additions or omission or substitution of any work.
- c) Any discrepancy in the drawings or between the Schedule of Quantities and/or specification.
- d) The removal from the site of any materials brought thereon by the Contractor and the substitution of other materials thereof.
- e) The dismissal from the work of any persons employed thereupon.
- f) The opening up for inspection of any work covered up.
- g) The amending and making good of any defects.
- h) The Contractor shall comply with and duly execute any work covered in such 'Purchaser's Instructions' provided always that verbal instructions, directions, and explanations given to the Contractor or his foreman upon the work by the Purchaser/ Consultant shall, if involving a variation, be confirmed in writing by the Purchaser/ Consultant within 7 (seven) days.
- i) If compliance with the 'Purchaser's Instructions' as aforesaid involves work and scope beyond that contemplated by the 'Contract', unless the same were issued owing to some breach of this 'Contract' by the Contractor, the Purchaser shall pay to the Contractor the price of the said work as hereinafter provided.
- j) If the Contractor after receipt of written notice from the Purchaser/Consultant requiring compliance, with such further drawings and/or 'Purchaser's Instructions' fails to comply with the same within 15 (fifteen) days the Purchaser may employ and pay other agencies to execute any such work whatsoever, as may be necessary to give effect thereto, and all costs incurred in connections therewith shall be recoverable from the Contractor by the Purchaser on a certificate by the Consultant as a debt or may be deducted by the Purchaser from any money that may become due to the Contractor.



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36 RIGHTS OF THE PURCHASER/CONSULTANT

36.1 Right to Illustrate and Explain Plans

- 36.1.3 The various parts of the 'Contract' are intended to be complementary to each other but should any discrepancy appear or any misunderstanding arise as to the import of anything contained therein, the explanation of the Purchaser/Consultant shall be final and binding.
- 36.1.4 The correction of any errors or omissions of the Drawings and Specifications may be made by the Purchaser / Consultant, when such correction is necessary to bring out clearly the intention which is indicated by the reasonable interpretation of the Drawings and Specifications as a whole.
- 36.1.5 Whenever in the Specifications or on the Drawings which are a part of the 'Contract' or which may be furnished to the Contractor for directing this work, the terms and descriptions of various qualities of workmanship, material, structures, processes, plant or other features of the 'Contract' are described in general terms, the meaning or fulfilment of which must depend upon individual judgement, then in all such cases the question of fulfilment of such specifications or requirements shall be decided by the Purchaser / Consultant and said material shall be furnished, said work shall be done, and said structure, process, plant or feature shall be constructed, furnished or carried on in full and complete accordance with his interpretation of the same and to his full satisfaction and approval, provided such interpretation is not in direct conflict with the Drawings and Specifications and generally accepted good engineering practice.
- 36.1.6 Details shown either on the Drawings or in the Specifications shall be done and furnished as if shown in both except where expressly except either in the Specifications or on the Drawings. Figured dimensions shall in all cases be taken in preference to scale measurements and detailed drawings consistent with general drawings shall be taken in preference to the general drawings of the same part of the work.
- 36.1.7 The Purchaser / Consultant may, from time to time, prepare for his own use estimates of quantities or bills of materials required for the work. Copies of such estimates or bills of materials which may be given to the Contractor for his convenience, or any lists, weights or quantities of materials or structures which may appear on the drawings may not be considered as finally correct, sufficiently complete or accurately covering any portion or all of the work to be done under the 'Contract'. Such bills or estimates may be carefully assembled and prepared but their accuracy is not guaranteed. They may not be accurate as to any particular details and are given only as the best information available at the time of issue of the information. It is understood that any such lists or estimates are furnished to the Contractor for his convenience only and not as lists or estimates of work to be done, and many necessary items of work might have been omitted.
- 36.1.8 Additional drawings and explanations to exhibit or illustrate details may be provided by the Purchaser / Consultant whenever necessary and if so provided, and if consistent with the Drawings and Specifications, it shall be binding upon the Contractor to take cognizance of the same. The written decision of the Purchaser / Consultant as to the true construction and meaning of the Drawings and Specifications and of such additional drawings and explanations shall be binding upon the Contractor.



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36.2 Right to Direct Work

- 36.2.3 The Purchaser / Consultant shall have the right to direct the manner in which all work under this Contract shall be conducted, in so far as it may be necessary to secure the safe and proper progress and the specified quality of the work, and all work shall be done and all material shall be furnished to the satisfaction and approval of the Purchaser / Consultant.
- 36.2.4 Whenever, in the opinion of the Purchaser / Consultant, the Contractor has made marked departures from the schedule of completion laid down in the Contract or when untoward circumstances force a departure from the said schedule, the Purchaser / Consultant, in order to assure the compliance with the schedule and the provisions of the 'Contract', shall direct the order, pace and method of conducting the work, which shall be adhered to by the Contractor.
- 36.2.5 If, in the judgement of the Purchaser / Consultant, it becomes necessary at any time to accelerate the overall plant erection work, the Contractor, when ordered and directed by the Purchaser / Consultant, shall cease work at any particular point and transfer his men to such other point or points, and execute such portion of his work, as may be required, to enable others to hasten and properly engage and carry on their work, all as directed by the Purchaser / Consultant.
- 36.2.6 Night work will be permitted only with prior approval of the Purchaser / Consultant. The Purchaser / Consultant may also direct the Contractor to operate extra shifts over and above normal day shift for the completion of 'Contract' on schedule if, in his opinion, such work is required.

36.3 Right to Order Modifications of Methods and Equipment

- 36.3.3 If at any time the Contractor's methods, materials or equipment appear to the Purchaser / Consultant to be unsafe, inefficient or inadequate for securing the safety of the workmen or the public, the quality of work or the rate of progress required, he may order the Contractor to ensure their safety and increase their efficiency and adequacy, and the Contractor shall promptly comply with such orders. If at any time, the Contractor's working force and equipment are in the opinion of the Purchaser / Consultant, inadequate for securing the necessary progress, as herein stipulated, the Contractor shall, if so directed, increase the working force and equipment to such an extent as to give reasonable assurance of compliance with the schedule of completion. The absence of such demands from the Purchaser / Consultant shall not relieve the Contractor of his obligations to secure the quality, the safe conducting of the work, and the rate of progress required by the Contract, and the Contractor alone shall be and remain liable and responsible for the safety, efficiency and adequacy of his methods, materials, working force and equipment, irrespective of whether or not he makes any change as a result of any order or orders received from the Purchaser/ Consultant.

36.4 Right to Perform

- 36.4.1 The Purchaser reserves the right to perform or have performed in and about the works during the time when the Contractor is performing his work hereunder, such other work as the Purchaser desires, and the Contractor shall make all reasonable effort to perform his work hereunder in such a manner as will enable such other work to be



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performed without hindrance and shall make no claim for damage against the Purchaser arising out of such other work to be performed against hindrance and shall make no claim for damage against the Purchaser arising out of such other work or interference there from. The Contractor shall work in harmony with such other Contractor's regardless of race, religion, colour or national origin and any dispute between Contractors shall be arbitrated by the Purchaser / Consultant.

37 MEASUREMENT OF WORK AND PROGRESS PAYMENTS

- 37.1 The Purchaser / Consultant may, from time to time, intimate the Contractor that he requires the works to be measured and the Contractor shall attend or send a qualified agent to assist the Purchaser / Consultant or its representative in taking such measurements and calculations and to furnish all particulars as may be required.
- 37.2 Where the erection of equipment, vessels and structural steel is involved, the basis of such measurements and progress evaluation shall be weights specified in the shipping documents or invoices or drawings as decided by the Purchaser / Consultant. Should the Contractor not attend or neglect or omit to send such agents, then the measurement taken by the Purchaser / Consultant or approved by him shall be taken to be the correct measurements of the work. The Contractor or its Agent may, at the time of measurement, take such notes of measurements as it may deem fit.
- 37.3 When measurements are effected by conditions already established, the Contractor shall take field measurements notwithstanding scale or dimensions shown on the drawings.
- 37.4 The measurements so taken and certified correct by the Purchaser / Consultant shall be the basis for the progress payment to the Contractor. Where the break-up of 'Contract on unit basis Price' is difficult to arrive at, the Purchaser / Consultant and the Contractor shall work out at the commencement of the 'Contract', the weightages or the cost or the cost break-ups to arrive at a mutually agreeable basis for computation of the progress estimates.
- 37.5 To the value so arrived at on the basis of the Contractor's monthly progress evaluated, shall be added the amounts earned by the Contractor under supplemental Contracts and orders if any, till date of the progress estimate. From the total thus computed, all previous payments plus any amounts due to the Purchaser in accordance with the terms of this Contract shall be deducted. The remainder shall be paid by the Purchaser to the Contractor under Interim Certificates from the Consultant.
- 37.6 In case work is nearly suspended or in case only unimportant progress is being made, or in case it is apparent that Contractor is about to forfeit his 'Contract' or that the money yet due to him shall not complete his 'Contract', the Purchaser may at his discretion withhold any payment which may be due to the Contractor.
- 37.7 The Purchaser may withhold part or whole of any payment for erection claimed by the Contractor, which in opinion of the Purchaser, is necessary to protect himself from loss on account of :
- (a) Defective work not remedied or guarantees not met.
 - (b) Claims filed against the Contractor.
 - (c) Failure of the Contractor to make due payment for materials supplied or labour

- employed by him.
- (d) Damage to other Contractor's Purchaser's or Other's property.
 - (e) Failure to meet the mutually agreed schedules.
 - (f) When the grounds for withholding payments are removed, payments of the amount due to the Contractor shall be made by the Purchaser within a reasonable period.
 - (g) The Contractor shall not demand nor be entitled to receive payment for the work of portion thereof, except in the manner set forth in this 'Contract' and only after the Purchaser / Consultant shall have given a certificate for such payment.

38 ADHERENCE TO MANUFACTURER'S INSTRUCTION

Adherence to instructions of the Manufacturer's supervisory Consultants, is compulsory. The Contractor shall work under the guidance of the Manufacturer's supervisors to ensure that erection procedures adopted by the Contractor as well as completed erection of equipment is such as not to interfere with or prevent equipment from functioning as intended, as well as to the entire satisfaction of the Manufacturer's supervisor / Purchaser / Consultant. The Contractor shall also permit and provide all facilities for the Manufacturer's erection supervisors to carry out all checks that they may wish to, and approve any erection procedure and/or final setting and alignment of components, in order to satisfy themselves that erection has not been carried out as intended by them. This shall, however, in no way relieve the Contractor of his responsibility for providing adequate and competent supervision and quality workmanship.

39 MODIFICATIONS

The Contractor shall carry out all modifications at site as directed by the Purchaser / Consultant to complete the work covered in the Contract. It is the responsibility of the Contractor to get the prior approval for such modifications from the Purchaser / Consultant before such works are taken up. The Contractor shall also get the estimates and the actual time sheets certified by the Purchaser/Consultant, and these certified time sheets will be the basis for processing his bills for such modification works which are required to be carried out for no fault of the Contractor.

40 DEFECTIVE WORK

If the work or any portion thereof shall be damaged in any way excepting by the acts of the Purchaser or if defects not readily detected by prior inspection shall develop before the final completion and acceptance of the whole work, the Contractor shall forthwith make good, without compensation, such damage or defects in a manner satisfactorily to the Purchaser / Consultant. In no case shall defective or imperfect work be retained.

41 WORK OF OTHERS

If any part of the Contractor's work depends, for proper execution, upon the work of any other Contractor, the Contractor shall inspect and promptly report in writing to the Purchaser / Consultant any defect in such work of other Contractors that render it



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unsuitable for proper execution of the work under the Contract. His failure to so inspect and report shall constitute an acceptance of the other Contractor's work as fit and proper for the reception of his work, except as to defects which may develop in the work of other Contractors after the proper execution of the work. To ensure proper execution of his subsequent work, the Contractor shall inspect work already in place and shall at once report to the Purchaser / Consultant any discrepancy between the executed work and the drawings.

This clause comes into effect only in the case of interferences between the Contractor and Purchaser's other Contractors. In such a case the Purchaser / Consultant will discuss with all the parties concerned to reach a consensus in the overall interest of the Project.

B. GENERAL CONDITIONS FOR CIVIL WORKS

- 1 The Contractor shall make its own arrangement for all labour, construction equipment, tools and tackles and construction materials. All temporary approach roads to the site for carrying out construction work shall be constructed and maintained by the Contractor at its own cost.
- 2 The Contractor shall take all necessary precautions to avoid damage to any property of the Purchaser or any third party. The Contractor shall also ensure that the progress of work of other Contractors in the adjoining areas is not hindered.
- 3 The Contractor shall take all precautions during execution, especially while excavating to avoid interference with or, damage to underground works, such as cables, pipe lines, drains etc. and provide all possible protection to these works and in case they are damaged, rebuild/divert them at his own cost.
- 4 The Contractor shall carry out necessary precision survey to set out and check the setting of all works including foundation & anchor bolts etc. to required tolerances using the grid reference points available in the plant site. The Contractor shall make and maintain proper bench mark and reference points and check lines and levels periodically.
- 5 Materials brought to the site shall not be removed from the site without the written consent of the Purchaser. The Contractor shall submit well in advance for approval, all samples and specimens as the Purchaser may demand from time to time. Any material brought to site and rejected by the Purchaser shall be removed by the Contractor from the site of work immediately within the time limit specified by the Purchaser. In case, a Contractor is not removing the rejected materials, the same will be removed by the Purchaser and cost there for shall be recovered from the bills of the Contractor.
- 6 The Purchaser may during the progress of work, order the removal of part or whole of the work executed, found not in accordance with the approved drawings/ specifications/ written instructions. No extra claims shall be entertained for removal & re-execution of such work.
- 7 No work shall be covered up or put out of view without the approval of the Purchaser. In the event of failing to do so, the Contractor shall uncover any part of the work or make openings in or through the works as the Purchaser may direct and they shall be



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made good with materials approved by the Purchaser and should match with workmanship of the surrounding work.

- 8 The Contractor shall dismantle and remove the stagings and other temporary facilities like stores, offices, etc. on completion of work, clear and clean the site where such temporary facilities were built and restore the same to original condition at his own cost.
- 9 The Contractor shall provide all necessary storage. At the site in specified areas for all materials such as timber, cement, lime and such other materials which are likely to deteriorate by the action of sun, winds, rain, coastal conditions or other natural cause due to exposure in the open in such manner that all such materials shall be duly - protected from damage by weather or any other cause. All such stores shall be cleared away and the whole site left in good order on completion of the contract. All materials, shall be stacked in such a manner as to facilitate rapid and easy checking of such materials. The Contractor will not be permitted to store any of his material in the buildings under construction or already constructed by him without prior approval of the Purchaser.
- 10 After completion of work, the Contractor shall carry out micro-levelling of the site within battery limit ensuring proper grades and slopes to achieve efficient drainage of the site. The Contractor shall remove all debris, surplus earth etc. and dump the same at places/place as directed by the Purchaser within a distance of 25 km from the site.
- 11 The Contractor shall be held responsible for proper performance for buildings and structures including all other civil work during the guarantee period. Any defect found during this period will be made good by the Contractor at his own cost failing which the Purchaser reserves the right to take remedial measures at the Contractor's risk and cost.
- 12 All excavated materials shall remain the property of the Purchaser. In case the Contractor wishes to utilise the boulders excavated by him during the excavation work at the site, the same may be issued to him at prevailing rates on cost recovery basis. Percentage of voids on stack measurement shall be mutually agreed. Contractor shall have to account for all excavated hard rock.
- 13 In respect of any portion of works which is to be embedded or covered up by other works, the Contractor shall submit them to Purchaser for technical inspection and have the necessary clearance certificates duly signed by the Purchaser and Contractor before letting such portion to be embedded or covered.
- 14 Wherever works are to be carried out in proximity or within existing facilities, contractor may have to adopt special methodology of construction suited to prevailing conditions. He shall make necessary schemes in advance and finalise the same with the approval of the Purchaser/Consultant.
- 15 On progressive completion of work, the Contractor shall submit to the Purchaser the following documents for the passing of the work:
 - (a) Certificate on control checking.
 - (b) A copy of each of the concerned working drawings showing thereon all approved additions and alterations, if any, in the process of execution.



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- (c) Clearance certificates for embedded/covered up works.
 - (d) Manufacturer's certificates, guarantees and test certificates, as relevant.
- 16 The Contractor shall carry out structural load check with structure test, ultra-sonic test for foundation & pedestal at locations specified by the Purchaser in accordance with the agreed QAP on any part of the building/structure at its own cost if so directed by the Purchaser.
- 17 As the works under the contract are to be carried out within the protected area, the Contractor shall abide by all the security regulations promulgated from time to time by the Purchaser/other concerned authorities.
- 18 Blasting with explosives or other means is not allowed at site. If required it shall be done with prior approval of Purchaser without any extra cost.



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ANNEXURE – XXI

LETTER OF AWARD



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**ANNEXURE – XXII
INTEGRITY PACT**



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ANNEXURE – XXIII

DEED OF JOINT UNDERTAKING (DJU)



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PROJECT IN GSECL'S SOLAR PARK AT KHAVDA (GSECL
STAGE-2) WITH THREE YEARS OF O&M**

VOLUME – IB

ANNEXURE – XXIV

Pro-forma for BG for shortfall in generation during O&M Period of 3 years

Note:-

- 1) This guarantee has to be furnished by a Scheduled Commercial Bank, authorized by RBI, except Bank of China.
- 2) The Bank Guarantee should be furnished on stamp paper of value of not less than Rs.80.00
- 3) The stamp papers should be purchased in the name of Bank executing the guarantee/Name of the Contractor. The date of purchase of stamp paper shall be on or before the date of execution of Bank Guarantee.
- 4) The BGs must be sent to the organization directly by the issuing bank Speed Post.
- 5) In exceptional cases, where BGs are received through CONTRACTOR etc. the issuing branch shall immediately send by Speed Post an unstamped duplicate copy of the guarantee directly to the organization with the covering letter.
- 6) The bank guarantee issued by the issuing Bank on behalf of Bidder/Contractor/Supplier in favour of "Name of Company" shall also be confirmed through Structural Financial Messaging System (SFMS).
- 7) In case, B.G is issued by a Foreign Bank, the issuing Bank should be authorised by RBI.

Bank Guarantee No.....

Date:

To
The Chief General Manager / Contracts
NLC India Limited,
Corporate Office, Block-1, Neyveli- 607 801,
Cuddalore District,
Tamil Nadu, INDIA.

Dear Sirs,

- 1.0 In consideration of the NLC India Limited, Neyveli hereinafter referred to as the Purchaser, which expression shall, unless repugnant to the context or meaning, thereof include its successors, administrators, representatives and assignees, having awarded in favour of M/s. having registered office at hereinafter referred to as the Contractor, which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, representatives and assignees, a Contract, hereinafter "referred as the Contract" for the on terms and conditions set out inter alia, in the Purchaser's Contract /Letter of Award No..... dated as well as "Contract" documents, valued at (In words) and the same having been unequivocally accepted by the Contractor and the Contractor having agreed to provide a BG for shortfall in generation during O&M Period of 3 years for the O&M "Contract" to the Purchaser amounting to Rs..... (In words) (Please refer Clause 10.1.3



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(vii) (1) as O&M Contract Security in the form of a Bank Guarantee valid upto
(Completion of 3 years O&M after SCOD plus 3 months grace period).

- 2.0 We, ...(Name).....(Address) hereinafter referred to as the "Bank which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees do hereby irrevocably guarantee and undertake to pay the Purchaser merely on demand without any previous notice and without any demur and without referring to any other source, any and all monies payable by the Contractor by reason of any breach by the said Contractor of any of the terms and conditions of the said O&M Contract including non-execution of the "Contract Agreement" to the extent of 5% of revenue from Expected Net Energy Export at GRID Metering point and adherence to Time Schedule stipulated at any time up to (day/ month/ year). Any such demand made by the Purchaser on the bank shall be conclusive and binding, absolute and unequivocal not withstanding any disputes raised/pending before any court, tribunal, arbitrator or any other authority. The Bank agrees that the guarantee herein contained shall continue to be enforceable till this sum due to the Purchaser is fully paid and claims satisfied or till the Purchaser discharges this Guarantee.
- 3.0 The Bank further irrevocably guarantees and undertakes to pay on mere demand, without any demur, reservation, contest, recourse or protest any and all monies due and payable by the Contractor by reasons of non-fulfilment of any of the following obligations.
- 3.1 For the successful and satisfactory completion of O&M period under the said Contract as per the specifications and documents.
- 3.2 That the equipment installed under the said Contract shall be new and in accordance with Contract Documents and be free from all defects in design, material workmanship and performance including modifications, improvements and replacements for a period 3 years after SCOD of Solar Power Project and that immediately upon intimation / written notice from the Purchaser, the Contractor shall remedy free of expenses to the Purchaser such defects as noticed and developed under the normal use of the said equipment, within the said guarantee period.
- 4.0 The Purchaser shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time, to extend the time of performance by the Contractor. The Bank shall not be released from its liabilities under these presents by any exercise of the Purchaser of the liberty with reference to the matter aforesaid.
- 5.0 The Purchaser shall have the fullest liberty, without affecting this guarantee to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied in the Contract between the Purchaser and the Contractor or any other course or remedy or security available to the Purchaser and the Bank shall not be released of its obligations/ liabilities under these presents by any exercise by the Purchaser of his liberty with reference to the matters aforesaid or any of them or by reasons of any other act or forbearance or other acts of omission or commission on part of the Purchaser or any other indulgence shown by the Purchaser or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank Guarantee. The Bank further undertakes not to revoke this guarantee during its currency without the previous consent of the Purchaser.



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- 6.0 The Purchaser shall have the fullest liberty to lodge their claims for encashments of the guaranteed sum in full or in part, in the manner suitable to them. However, payment made for a sum lesser than the guaranteed amount, shall not relieve or discharge the Bank from their obligations guaranteed hereunder, till the contractual obligation are fully performed by the Contractor or the Bank Guarantee is discharged by the Purchaser, as the case may be and the Bank Guarantee shall continue to be in force till such time.
- 6.1 The Bank further agrees that the decision of the Purchaser as to the failure on the part of the Contractor to fulfil their obligations as aforesaid and/or as to the amount payable by the Bank to the Purchaser hereunder shall be final, conclusive and binding on the Bank.
- 7.0 The Bank also agrees that the Purchaser shall be entitled at his option to enforce this guarantee against the Bank as a principal debtor, in the first instance notwithstanding any other Security or guarantee that it may have in relation to the Contractor's liabilities.
- 8.0 This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).
- 9.0 Notwithstanding anything contained herein:
- a. our liability under this bank guarantee shall not exceed (in words)
 - b. this bank guarantee shall be valid upto; and
 - c. we are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if you serve upon us a written claim or demand on or before

WITNESS

1. Signature.....
(Name in Block Letters).....
Occupation
Address

Signature.....
Name in block letters.....
Designation
Staff Code No.....
Bank's Seal

2. Signature.....
(Name in Block Letters)

Occupation
Address.

Attorney as per power
of Attorney No..... dt.



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ANNEXURE – XXV

Pro-forma for BG for O&M period of 3 Years (i.e., Defects Liability period)

Note:-

- 1) This guarantee has to be furnished by a Scheduled Commercial Bank, authorized by RBI, except Bank of China.
- 2) The Bank Guarantee should be furnished on stamp paper of value of not less than Rs.80.00
- 3) The stamp papers should be purchased in the name of Bank executing the guarantee/Name of the Contractor. The date of purchase of stamp paper shall be on or before the date of execution of Bank Guarantee.
- 4) The BGs must be sent to the organization directly by the issuing bank Speed Post.
- 5) In exceptional cases, where BGs are received through CONTRACTOR etc. the issuing branch shall immediately send by Speed Post an unstamped duplicate copy of the guarantee directly to the organization with the covering letter.
- 6) The bank guarantee issued by the issuing Bank on behalf of Bidder/Contractor/Supplier in favour of "Name of Company" shall also be confirmed through Structural Financial Messaging System (SFMS).
- 7) In case, B.G is issued by a Foreign Bank, the issuing Bank should be authorised by RBI.

Bank Guarantee No.....

Date:

To
The Chief General Manager / Contracts
NLC India Limited,
Corporate Office, Block-1, Neyveli- 607 801,
Cuddalore District,
Tamil Nadu, INDIA.

Dear Sirs,

- 1.0 In consideration of the NLC India Limited, Neyveli hereinafter referred to as the Purchaser, which expression shall, unless repugnant to the context or meaning, thereof include its successors, administrators, representatives and assignees, having awarded in favour of M/s. having registered office at hereinafter referred to as the Contractor, which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, representatives and assignees, a Contract, hereinafter "referred as the Contract" for the on terms and conditions set out inter alia, in the Purchaser's Contract /Letter of Award No..... dated as well as "Contract" documents, valued at (In words) and the same having been unequivocally accepted by the Contractor and the Contractor having agreed to provide a BG for O&M period of 3 Years (i.e., Defects Liability period) for the O&M "Contract" equivalent to 1% of the total EPC Contract Price (total price excluding O&M cost for 3 years after



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SCOD) amounting to Rs..... (In words) as O&M Contract Security during Defect Liability Period in the form of a Bank Guarantee valid upto (Completion of 3 years O&M for after SCOD plus 3 months grace period).

- 2.0 We, ...(Name).....(Address) hereinafter referred to as the "Bank which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees do hereby irrevocably guarantee and undertake to pay the Purchaser merely on demand without any previous notice and without any demur and without referring to any other source, any and all monies payable by the Contractor by reason of any breach by the said Contractor of any of the terms and conditions of the said O&M Contract including non-execution of the "Contract Agreement" to the extent of 1% of the total EPC Contact Price (total price excluding O&M cost for 3 years after SCOD) and adherence to Time Schedule stipulated at any time up to (day/ month/ year). Any such demand made by the Purchaser on the bank shall be conclusive and binding, absolute and unequivocal not withstanding any disputes raised/pending before any court, tribunal, arbitrator or any other authority. The Bank agrees that the guarantee herein contained shall continue to be enforceable till this sum due to the Purchaser is fully paid and claims satisfied or till the Purchaser discharges this Guarantee.
- 3.0 The Bank further irrevocably guarantees and undertakes to pay on mere demand, without any demur, reservation, contest, recourse or protest any and all monies due and payable by the Contractor by reasons of non-fulfilment of any of the following obligations.
- 3.1 For the successful and satisfactory completion of O&M period under the said Contract as per the specifications and documents.
- 3.2 That the equipment installed under the said Contract shall be new and in accordance with Contract Documents and be free from all defects in design, material workmanship and performance including modifications, improvements and replacements for a period 3 years after SCOD of Solar Power Project and that immediately upon intimation / written notice from the Purchaser, the Contractor shall remedy free of expenses to the Purchaser such defects as noticed and developed under the normal use of the said equipment, within the said guarantee period.
- 4.0 The Purchaser shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time, to extend the time of performance by the Contractor. The Bank shall not be released from its liabilities under these presents by any exercise of the Purchaser of the liberty with reference to the matter aforesaid.
- 5.0 The Purchaser shall have the fullest liberty, without affecting this guarantee to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied in the Contract between the Purchaser and the Contractor or any other course or remedy or security available to the Purchaser and the Bank shall not be released of its obligations/ liabilities under these presents by any exercise by the Purchaser of his liberty with reference to the matters aforesaid or any of them or by reasons of any other act or forbearance or other acts of omission or commission on part of the Purchaser or any other indulgence shown by the Purchaser or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank Guarantee. The Bank further undertakes not to revoke this guarantee during its currency without the previous consent of the Purchaser.



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- 6.0 The Purchaser shall have the fullest liberty to lodge their claims for encashments of the guaranteed sum in full or in part, in the manner suitable to them. However, payment made for a sum lesser than the guaranteed amount, shall not relieve or discharge the Bank from their obligations guaranteed hereunder, till the contractual obligation are fully performed by the Contractor or the Bank Guarantee is discharged by the Purchaser, as the case may be and the Bank Guarantee shall continue to be in force till such time.
- 6.1 The Bank further agrees that the decision of the Purchaser as to the failure on the part of the Contractor to fulfil their obligations as aforesaid and/or as to the amount payable by the Bank to the Purchaser hereunder shall be final, conclusive and binding on the Bank.
- 7.0 The Bank also agrees that the Purchaser shall be entitled at his option to enforce this guarantee against the Bank as a principal debtor, in the first instance notwithstanding any other Security or guarantee that it may have in relation to the Contractor's liabilities.
- 8.0 This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).
- 9.0 Notwithstanding anything contained herein:
- a. our liability under this bank guarantee shall not exceed (in words)
 - b. this bank guarantee shall be valid upto; and
 - c. we are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if you serve upon us a written claim or demand on or before

WITNESS

1. Signature.....
(Name in Block Letters).....
Occupation
Address

2. Signature.....
(Name in Block Letters)

Occupation
Address:

Signature.....
Name in block letters.....
Designation
Staff Code No.....
Bank's Seal
Attorney as per power
of Attorney No..... dt.



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ANNEXURE-XXVI

Bank Account Details for e-payment and Details of the bidder

Name of the Bidder (Individual / Company / Firm) with Address	
Bank Account No.	
Name of the Bank	
Name of the Branch and Address	
Branch Code	
IFSC Code (For NEFT/RTGS Payment)	
MICR Code	
Telephone No. - Bank	
E- Mail ID - Bank	
PAN Number of the firm	
Name and Mobile number of the contact person of the firm	
e-Mail ID and Phone number of the firm	

Signature of bidder



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ANNEXURE XXVII

CONTRACT AGREEMENT

(This shall be executed on non-judicial stamp paper of value not less than Rs.20/-)

This Contract No. _____ made this _____ day
of _____

Between

NLC India Limited, a Company incorporated under the Companies Act, 1956 and having its registered office at No. 135, EVR Periyar High Road, Kilpauk, Chennai – 600 010, Tamil Nadu, India, hereinafter referred to as the "**Purchaser**" (which expression shall, unless repugnant to the context or the meaning thereof, be deemed to include its successors and permitted assignees), of the one part,

And

M/s. _____ (Contractor's Name), a Company incorporated under the Laws of _____ and having its registered office at _____ hereinafter referred to as the "**Contractor**" (which expression shall, unless repugnant to the context or meaning thereof, be deemed to include its successors and permitted assignees) of the second part,

Whereas, the Purchaser has decided for with Operation & Maintenance for 3 years as defined in Technical Specification.

For detailed Scope of work, please refer Volume - II : Technical Specification.

Whereas the Contractor has agreed to carry out the aforesaid work on the terms and conditions stated hereinafter,

Now, it is hereby agreed and declared by and between the parties as follows:

Article -1: Contract Price

In consideration of the promises and the payments to be made by the Purchaser to the Contractor, the Contractor hereby covenants with the Purchaser to perform the work as detailed in 'Section-2, Scope of Supply and Services' and 'Section-8, Contract Technical Specifications' to this Contract subject to and on the terms and conditions contained herein.

As consideration for this Contract, the Purchaser shall pay to the "Contractor" as specified in Section-3 a sum of INR _____ (Rupees _____ only) including all taxes and duties. It is clearly understood between the parties that the Contractor shall be solely responsible for completion of the Plant and for its successful sustained integrated operation.

Article -2:

Not Applicable.



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Article -3: Sub-Contractor

The Contractor should not sub-contract the whole of the work on back to back basis.

If the Contractor wishes to appoint Sub-Contractor other than those specified in the Contract during execution of the Contract or change any of the Sub-Contractor(s), the Contractor shall take prior written approval of the Purchaser detailing out the scope of the work proposed to be entrusted to the said Sub-Contractor along with the relevant experience and other details of such proposed Sub-Contractor(s).

Notwithstanding the approval accorded by the Purchaser to the appointment of Sub-Contractor(s), the Contractor shall be solely responsible for the completion of the works as per specifications and within the time schedule agreed in this Contract. Approval of any Sub-Contractor by the Purchaser shall not relieve the Contractor of any of its liabilities or obligations under the Contract and it shall be responsible for the acts, defaults and neglects of any Sub-Contractor(s) as fully as if they were the acts, defaults or neglects of the Contractor.

Article -4: Contractor's Guarantee

Notwithstanding the dispatch of plant and equipment including technological & building steel structure, tools & tackles, consumables, mandatory spares, instruments, oils and lubricants etc. required for operation & maintenance of the Package directly by the Contractor's sub-contractor to the Purchaser site, the Contractor shall remain wholly liable to perform, fulfill and discharge all the obligations and responsibilities under this Contract and the responsibilities of the Contractor shall in no way be reduced or diminished for any reason whatsoever.

Article -5: Overall Responsibility

Notwithstanding the fact that the Purchaser has made separate arrangement for making direct payment in favor of Sub-Contractors within the provisions of the Contract, the Contractor shall remain liable to perform, fulfill and discharge all the obligations and responsibilities under this Contract for the design, manufacture, transportation and delivery of materials, civil foundation and other work, storage, erection, testing, commissioning, performance guarantee, commercial operation and regular & reliable working of the plant in all respects.

Article -6: Effective Date of Contract and Time schedule

This Contract shall come into effect from __/__/2023 the date of Letter of Award.

The contractor shall complete(as mentioned in Scope of work).....within 12 months from the date of issue of LOA.

Article -7A: Price reduction (PR) for delay in time schedule

Price reduction under this Contract shall be reckoned and determined in accordance with Cl. 4.7.1 of Section – 4 (Time Schedule).

Article -7B: Compensation for non-fulfillment of PG values

Compensation under this Contract for non-fulfilment of PG values shall be reckoned and determined in accordance with Section-9 (Performance Guaranty Test).

Article -8: Terms of Payment

The terms of payment shall be as provided in Section-6 of this contract.



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Article -9: Taxes & Duties

The Contract price is inclusive of Taxes and duties to the extent of break-up shown in Section - 3 and subject to the provisions of Section-5.

Article -10: Sections

The following Sections appended to this Contract shall be deemed to form and be read and construed as part of this Contract:

Section -1:	Definitions
Section -2:	Scope of Work
Section-3:	Contract Price
Section-4:	Time Schedule
Section-5:	Taxes & Duties
Section-6:	Terms of Payment
Section-7:	Facilities to be provided by the Purchaser
Section-8:	Contract Technical Specifications
Section-9:	Deleted
Section-10:	General Terms & Conditions of the Contract
Section-11:	Quality Assurance
Section-12:	Deleted
Section-13:	Commercial Terms and Conditions for O&M for 3 years

Article -11: Annexures

In addition to the aforesaid, the following documents shall be deemed to form and be read and construed as a part of this Contract:

ANNEXURES	DESCRIPTION
Annexure-I	List of imported plant and equipment, technological and building structures, etc. - Not Applicable
Annexure-II	List of Equipment, Technological and building structures, etc.
Annexure-III	List of imported equipment to be brought directly to site- Not Applicable
Annexure-IV	List of imported equipment / components required at Indian contractor's works in India - Not Applicable
Annexure-V	List of Sub - contractor's /Sub-Suppliers /Sub-Vendors
Annexure-VI	List of mandatory spares
Annexure- VII	List of tools and tackles
Annexure- VIII	List of Initial fill, Oil and Lubricants including flushing oil and consumables
Annexure- IX	Training programme for purchaser's personnel
Annexure- X	Requirements of contractor at site



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Annexure- XI	Resource deployment schedule
Annexure- XII	Schedule of Supervisory personnel
Annexure- XIII	Pro-forma for Contract Performance Bank Guarantee
Annexure- XIV	Pro-forma for Financial Back up Bank Guarantee
Annexure- XV	Pro-forma for Advance Payment Bank Guarantee
Annexure- XVI	Pro-forma for Custody-cum-Indemnity Bond
Annexure- XVII	Pro-forma for Retention Money Bank Guarantee
Annexure- XVIII	Pro-forma for release of Liquidated Damages Bank Guarantee (LDBG) - Not Applicable
Annexure- XIX	Safety Code for Contractors
Annexure- XX	General Conditions for Erection & Civil
Annexure- XXI	Letter of Award
Annexure- XXII	Integrity Pact
Annexure- XXIII	Deed of Joint Undertaking (DJU)
Annexure- XXIV	Pro-forma for BG for shortfall in generation during O&M Period of 3 years
Annexure- XXV	Pro-forma for BG for O&M period of 3 Years (i.e., Defects Liability period)
Annexure- XXVI	Bank Account Details for e-payment and Details of the bidder

Article – 12: Interpretation

All the words and expressions used in this Contract shall, unless repugnant to the context, have the same meaning as are respectively assigned to them in Section-1. All headings and marginal notes to the Articles, Sections, Annexure, Technical Specifications or to any other part of the Contract are solely for the purpose of providing a concise indication and not a summary of a contents thereof and they shall never be deemed to be part thereof or be used in the interpretation or construction thereof.

Article -13: Agreement

This “Contract”, together with the Sections and Annexure referred to herein, constitute the agreement and understanding between the ‘Purchaser’ and the ‘Contractor’. The Contract shall also include Letter of Award (LOA), all correspondence exchanged, Minutes of Meetings and Techno-Commercial Discussions, Bidder’s Techno Commercial offer, Price offer, Tender Specification, Notice Inviting Bid(NIB).

The several Sections listed in Article-10 hereinabove and the Annexure listed in Article-11 and forming an integral part of this Contract, are to be taken as mutually explanatory to one another. However, in case of conflict between the Sections and the Annexure the provisions contained in the Sections shall prevail. In case of any conflict/contradiction between the Articles of this contract and Sections appended here in, provisions in the Articles shall prevail.



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No modifications or amendment of this Contract including Sections and Annexure hereto shall be valid unless the same is agreed to in writing by the parties hereto and issued as an amendment to the Contract.

Article -14: Order of Precedence

The order of precedence shall be

1. Any mutual agreement made after Signing of this Contract.
2. Contract
3. Letter of Award (LOA)
4. All correspondence exchanged prior to Letter of Award
5. Minutes of Meetings and Techno-Commercial Discussions
6. Bidder's Techno-Commercial Offer and Price offer
7. Tender Specification
8. Invitation for Bid

Article -15: Jurisdiction

The Contract shall be governed in accordance with the Laws of India. The civil court having ordinary original jurisdiction over the site or place of works shall have exclusive jurisdiction to try any matter arising out of this contract.

Article -16: Legal Entity

It is understood that the Contract is being signed by NLC INDIA LIMITED solely on its own behalf and not on behalf of any other person or entity. In particular, it is to note and understand that the Government of India is not a party to this contract or the associated tendering process and has no liabilities, obligations or rights hereunder. It is to note and understand that NLC INDIA LIMITED is an independent legal entity with power and authority to enter into contracts solely on its own behalf under the applicable Laws of India and general principles of Contract Law. It is to note and understand that NLC INDIA LIMITED is not an agent, representative or delegate of the Government of India. It is to be further noted and understood that the Government of India is not and shall not be liable for any acts, omissions, commissions, breaches or other wrongs arising out of the execution of the Contract or associated tendering process. Accordingly, the Contractor shall have no rights, whatsoever, against the Government of India as to any manner, claims, cause of action or thing whatsoever arising of or under this Contract or associated tendering process.

Article -17: Counter Parts

This Contract shall be executed in English language in two originals; each party receiving one duly signed copy. Both these copies shall be authentic. The Contractor shall submit 15



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(Fifteen) photocopies and one scanned soft copy in Pen drive of the entire Contract documents (free of charges) within 30 (thirty) days after signing of this Contract, to the Purchaser, for its use.

In witness whereof, the parties hereto by representatives duly authorized have executed the Contract on the day, month and the year first above written.

Signature:

Signature:

Name:

Name:

Designation:

Designation:

For and behalf of Contractor

For and behalf of Purchaser
(M/s. NLC INDIA LIMITED)

Office Seal

Office Seal

In the presence of:

In the presence of:

1.

1.

2.

2.



NLC INDIA LTD
‘Navratna’ - Government of India Enterprise
Block-1, NEYVELI - 607 801, Cuddalore District, Tamil Nadu, INDIA.

OFFICE OF THE CHIEF GENERAL MANAGER/CONTRACTS

CORPORATE OFFICE

OPEN TENDER ENQUIRY (DCB)

TENDER DOCUMENT

FOR

**BOS WORKS FOR SETTING UP OF 600 (6X100) MW GRID CONNECTED SOLAR
POWER PROJECT AT KHAVDA, GUJARAT UNDER ENGINEERING,
PROCUREMENT (EXCLUDING SUPPLY OF PV MODULES, IDT, CENTRAL
INVERTER, HT CABLES & HT SWITCH GEARS) & CONSTRUCTION WITH O&M
FOR 3 YEARS**

VOLUME – II

TECHNICAL SPECIFICATION

Tender No. CO CONTS/0024P/600 MW Solar/BOS/e-contrs/2023, Dt.30.08.2023

Phone: 04142-212308 / 218588

Web site: www.nlcindia.in

E-Mail: corporate.conts@nlcindia.in

Registered Office: 135, E.V.R. Periyar High Road, Kilpauk, Chennai- 600 010.

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SECTION 1.0 INTRODUCTION

1.1. BRIEF DETAILS

- 1.1.1.** This Technical Specification is for setting up of **600 (6X100) MW (AC)** Grid interactive Solar PV Power Project (**SPP**) at Khavda, Ran of Kutch, Gujarat, India for NLC INDIA LIMITED (NLCIL) herein after referred as Solar Power Developer (SPD). The entire work (**Excluding Supply of PV Modules, IDT ,Central Inverter, HT cables & HT Switchgears**) shall be executed on lump sum turnkey basis under "Engineering Procurement and Construction" (EPC) mode by the successful bidder herein after referred as Contractor.
- 1.1.2.** The intent of this specification is to include all the activities and services of Solar Power Plant in respect of all the equipment & works and relevant conditions furnished in the document of Request for Selection (RfS) of Solar Power Developers for Setting up of 800 MW Grid connected Solar power project in solar park at Khavda (GSECL STAGE 2), Doc. No. RfS No. GUVNL / 800 MW / Khavda / Solar (Phase-XX) Dated: 20/05/2023 as per the scope of this contract.
- 1.1.3.** The above RfS Document wherever referred in this specification is only for better understanding. However, in case any difference between the terms & conditions stipulated in this specification and said RfS document, then the conditions of this specifications will prevail. The terms and conditions stipulated in the Tender Volumes will prevail. For the definition of terms specifically used in this Project please refer Commercial Conditions of this Tender.
- 1.1.4.** The project shall be developed in the solar park at Khavda, Ran of Kutch, Gujarat, India. Coordinates of the Proposed Project location near by - 24.03N, 69.54E.
- 1.1.5.** The Land layout with coordinates for the Land parcels at Khavda, Ran of Kutch, Gujarat is attached as a [KML file](#) inline with RfS No. GUVNL / 800 MW / Khavda / Solar (Phase-XX).
- 1.1.6.** The 600 MW SPP is developed in 6X100 MW with 1.85 Ha / MW. The plot is of 100 MW each. Out of 16 plots any six plots will be allotted which can be adjacent or apart.
- 1.1.7.** PV Modules, IDT, Central Inverter, HT cables & HT Switchgears will be procured by SPD and handed over at site on free of cost to contractor for further execution.

1.2. PROJECT PARAMETERS & ESTIMATED NET ENERGY EXPORT VALUES

- 1.2.1.** The SPP shall be designed to deliver the Estimated Net Energy Export at the metering point referred as Delivery Points. The Project parameters are as given below.

Capacity of the Solar Power Project	Delivery Point	DC AC Ratio
600 (6X100) MW	400 KV side of 400/765 KV Khavda PS-II Pooling Sub-Station of CTU.	1.3

- 1.2.2.** The Capacity Utilization Factor (CUF) in percentage (%) has the same meaning as in latest CERC regulation and calculated as energy at delivery points as in the Formula,

$$CUF = \{ \text{Energy in MU} / (8.766 \times \text{Contracted Capacity in MW}) \} \times 100.$$

1.3. SCOPE OF WORK

- 1.3.1.** The entire scope of work (excluding supply of Solar PV Modules, IDT, Central Inverter, HT cables & HT Switchgears) shall be carried out by the contractor on Lump-sum turnkey basis.
- 1.3.2.** The scope of work includes the Design, Engineering, Site development, Manufacture, Inspection at supplier's works, Supply, Insurance, Transport, Storage, Erection, Installation, Testing & Commissioning of the total capacity of 600 (6X100) MW SPP and the Evacuation System up to the **Point of connection** (ie., 33KV side of 33/400KV Pooling Sub Station) **Except Supply of Solar PV Modules, IDT, Central Inverter, HT cables & HT Switch Gears.**
- 1.3.3.** The scope also includes necessary arrangements/supports to enable SPD to Declare Scheduled Commercial Operation Date (SCOD) after entire commissioning of SPP With DC overloading and conducting O&M Target Generation Test (OTGT). The scope also includes Operation & Maintenance (O&M) of entire SPP upto Point of connection. Standard 3 years O&M shall start from the date of SCOD. In addition, Scope also includes, Annual Maintenance Contract (AMC) of SCADA & Tracker for Six (6) years starting from 4th year to 9th year (ie., on completion of 03 years O&M of 600 (6X100) MW SPP).
- 1.3.4. Detailed Scope of Work:** The detailed scope of work covers the following activities and services in respect of all the equipment & works specified and covered under the specifications. All equipment, materials and services whether explicitly stated or otherwise and that are necessary for the satisfactory operation of the Solar PV System and its integration as described in the specification shall be deemed to be included in the scope of work of the Contractor and shall not be limited to the following:
1. Site preparation like vegetation removal, soil grading and levelling of the Project area.
 2. Conducting Topographical survey, Geo-Technical investigation and Soil Resistivity test in all the site locations.
 3. Detailed Design and Engineering of all the equipment and equipment system(s) including civil works.
 4. Submitting the engineering drawings, data sheets, process calculations, test certificates and reports, structural design calculations, Equipment layout, Civil

structural/architectural Drawings for Review and approval by SPD/SPDs Engineering consultant.

5. Finalization of sub-vendors, manufacturing quality plans and Field quality plans.
 6. Purchase, testing, packing and transportation from the manufacturer's works to the site including customs clearance & port clearance, port charges, (if any) of all the equipment of SPP (excluding supply of Solar PV Modules, IDT, Central Inverter, HT cables & HT Switch gears), Evacuation System i.e., all the equipment, system, sub-system etc. and receipt, storage, preservation and conservation of equipment at the site and protecting the material from theft, fire including Free Issue items by SPD.
 7. Receipt, Unloading, storage, erection, installation, testing and commissioning of Modules, IDT, Central Inverter, HT cables & HT Switch gears supplied by SPD .
 8. Fabrication, pre-assembly, (if any), erection, testing, pre-commissioning and commissioning and putting into satisfactory operation of all the equipment, system, sub-system etc. as mentioned above, Starting from the solar PV modules sections to Point of connection.
 9. Approval from CEA/statutory authorities of Central/State, before charging of the plant.
 10. Contractor shall obtain project insurance for 600 (6X100) MW SPP for the entire period of Contract excluding O&M as specified in the commercial volume.
 11. Submitting the O&M Target Generation (OTG) Test procedure, Operation & Maintenance/ instruction manuals, As-built drawings and other information for SPD/ SPDs Engineering consultant Review and acceptance.
 12. Warranty for the Works and Equipment of SPP complying to the conditions stipulated below.
 - a) The mechanical structures, electrical works and overall workmanship of the grid solar power plant must be warranted for a period of 12 months from the date of SCOD.
 - b) Transfer of Warranty by OEM for the Equipment after Contract Period to SPD as applicable.
 13. Solar O&M - Entire SPP up to Point of connection for 3 years from the date of SCOD.
 14. The Contractor shall furnish all the relevant documents and provide all necessary support to SPD in the Works related to connectivity approval and other statutory approvals.
 15. The Contractor shall furnish all the relevant documents and provide all necessary support to SPD in the Works related to filing of petitions (if any) and appearing for the petitions before Hon'ble Regulatory Commission/Court pertaining to the Project.
- 1.4.** Settlement of any disputes related to BOS works with public/statutory bodies / local authorities state authorities etc. shall rest with Contractor.
- 1.5. PROJECT SITE & LAND**
- 1.5.1.** Project site will be handed over to the Contractor as is where condition for execution of the project as provided by GSECL.

- 1.5.2. SITE INSPECTION:** The bidder is advised to visit and examine the site of the project and its surroundings and obtain for himself, on his own responsibility, all information that may be necessary for entering into contract. The Bidder is advised to assess and satisfy himself as to the adequacy of the local conditions such as approach roads to the site, adequacy of existing culverts/bridges/roads for the expected traffic, water and power supply, nature of ground and sub soil condition, water table level, accommodations required during the contract, climatic conditions, local terrain, availability of labour and construction materials, details of taxes, duties and levies as applicable and any other information required. The cost of visiting the site shall be at the Bidder's own expenses.
- 1.6. CONSTRUCTION POWER & WATER:** The Contractor need to arrange the Construction Power Supply at the project location for construction purpose. Control, protection, distribution inside the solar power plant area shall be made by the Contractor at his own cost.
- 1.6.1.** Water supply need to be arranged by the Contractor at his own cost during construction period. During O&M period of Solar Power Plant, water will be provided at one point of the each plot (ie,. 100 MW Block) . The Contractor shall arrange for Metering, storage sumps, pumps and distribution piping to various locations within the solar power plant. Water charges will be recovered based on actual usage during O&M phase if Applicable.
- 1.6.2.** It is proposed to supply maximum 6 KL/MW/Cycle so as to complete three cleaning cycle every month. However the supply of water shall be depending upon the availability of water. In view of special geographical conditions of the park, contractor shall preferably provide Dry Cleaning System for the solar module cleaning.
- 1.7. OTHER PREPARATORY WORKS** of the site for meeting the Annual Estimated Energy values is under the scope of the Contractor. Arrangements, if any, for all the other infrastructure requirements in co-ordination with SPD, for installing the solar plants including the power evacuation scheme up to the 33/400 KV Sub Station shall be made by the Contractor.
- 1.8. CABLE LAYING METHODOLOGY**
- 1.8.1.** Contractor can propose suitable alternate cable laying methodology except directly buried philosophy for Khavda location, keeping in view of the site specific issues related to water submergence, soil condition etc, which shall be reviewed during the detailed engineering. Directly buried philosophy is not acceptable in the project and must be ignored if mentioned elsewhere in the specifications.
- 1.8.2.** The contractor shall require to follow all the applicable guidelines including the guidelines of BSF/LMA and /or Defence and R&B or any other authorities issued from time to time. Contractor shall lay all the cable above ground with suitable provision after approval of SPD.
- 1.9. POWER EVACUATION AND CONNECTIVITY**

- 1.9.1.** Power evacuation shall be provided by the Contractor up to the Point of connection, by laying of 33 KV HT cable with suitable termination including all Accessories for interconnection of Solar Power Plant with 33/400 KV Solar park PSS .
- 1.10. METERING**
- 1.10.1.** The metering point will be at the point at 33KV side of 33/400 KV pooling Substation. However, Annual Estimated Net Energy Export shall be calculated at 400 KV side of 400/765 KV Khavda S-II Pooling Sub-Station of CTU. All line losses up to the delivery points (400 KV of 400/765 KV Khavda S-II Pooling Sub-Station of CTU) shall be taken into account by the contractor while calculating the Annual Estimated Net Energy Export.
- 1.10.2.** A set of Main and Check Meters of 0.2S accuracy class, as per CEA (Installation & operation of meters) Regulations 2019/IEGC amended from time to time as applicable or as specified by SPD, shall be Procured and installed by the contractor on each incoming feeder at 33KV side of 33/400 KV Solar park Pooling Sub-station.
- 1.10.3.** A set of Main and Check Meters of 0.2S accuracy class, as per CEA (Installation & operation of meters) Regulations 2019/IEGC amended from time to time as applicable or as specified by SPD, shall be Procured and installed by the contractor at 400KV side of 33/400 KV Solar park Pooling Sub-station if required.
- 1.11. GENERAL CONDITIONS**
- 1.11.1.** Any item(s) not included in the specification / schedule but required for completion of the work shall have to be carried out/supplied without any extra cost. Such works, not listed in the schedule of works but elaborately described to perform or to facilitate particular operation(s) required for completion of the project shall be deemed to have been included in the scope of this work and the Contractor shall supply, install the same without any extra cost to SPD.
- 1.11.2.** The work / material supply shall be executed in conformity with the relevant standards of Bureau of Indian standards (or equivalent International Standard), Indian Electricity Rules, 1956 (as amended up to date), Indian Electricity Act 2003(as amended up to date), BARC/DAE Rules, Explosive Act 1948, Petroleum Act 1934, National Building Code and relevant Rules in vogue at the time of execution including operation & maintenance period.
- 1.11.3.** The Contractor shall comply with all applicable laws or ordinances, codes, approved standards, rules, and regulations and shall obtain all necessary permits, approvals, licenses, clearances required from Central, State Governments and local bodies etc. for setting up and operating the Project.
- 1.11.4.** As the project site location lies between the Border Security Force-manned India Bridge and the India- Pakistan border, the statutory regulations, safety norms shall be followed by the contractor as per the guidelines.

- 1.11.5.** The procurement of all sub systems/equipment/components of the SPP and erection, testing and commissioning of the same shall be as per the requirements of MNRE for Grid connected Solar Projects and the same shall confirm to the relevant BIS/ International standards. (Particularly for general and electrical safety besides that for Quality required for ensuring expected service life and Weather resistance). Type Test certificates/Reports to be submitted as per the requirement of this specification shall be issued by NABL/ ILAC accredited Laboratory / NABL accredited agency.
- 1.11.6.** This specifications document is not exhaustive and the Contractor shall be responsible not only for the requirements specified herein but for the correct choice of materials, for proper fabrication and for the conformity to codes, regulations and legal requirements and for supplying all the documentation of these materials.
- 1.11.7.** Any preparatory works of the site for meeting the requirement of the bid is under the scope of the Contractor. Arrangements, if any, for all the other infrastructure requirements for installing the Solar Projects.
- 1.11.8.** Preparation of the lands required for Construction, Storage, fabrication, labour colony etc. are to be arranged by the Contractor. All support infrastructure for the above shall form part of the offer and no separate amount shall be payable on this account. Necessary Security arrangements against thefts and pilferages shall be made by Contractor during entire contract period till the completion of O&M period.
- 1.11.9.** The Contractor shall provide a latest rigid insulated portable Container Office Cabin of size not less than 20'x8'x8.5' with door & windows at suitable location of each site to carry out and monitor the progress of site activities, conduct review meetings, study of drawings etc. The cabin shall be furnished with all necessary provisions including Project In charge office (with Executive table, executive chair, 4 visitor chairs, one desktop PC (latest configuration & laser printer), 2 Sets of Working Table Provisions each with a desktop PC (latest configuration) & one laser printer, a revolving chair & 2 visitors chairs. Further, the Cabin shall be complete with 3 Filing cabinets, Split ACs of suitable Capacities, wall mounting fans, LED electrical fittings with wiring, water dispenser etc. In addition, Temporary Hygienic Wash room facilities in sufficient numbers shall also be provided. All running and maintenance charges including charges for energy and consumables required for smooth functioning of the Container Office Cabin and the Washrooms shall be on the account of the Contractor. After the permanent Office rooms at site buildings are ready, the Contractor shall take back this container at his possession and shall hand over to SPD the 3 Personal Computers with the Data stored during the Erection and Commissioning, the 2 Printers and the 3 Filing Cabinets with the hard copy drawings and documents.



SECTION 2.0

DESIGN BASIS

2.1 SALIENT POINTS

2.1.1. GENERAL

- i) The General design of the Solar Power Project (SPP) is briefed below for basic compliance. However, detailed and specific provisions specified in the respective technical specification of individual Equipment and Systems as per relevant Sections shall be applicable, binding and to be complied.
- ii) The Contractor shall establish with relevant design documents that the Grid Interactive Solar Power Project shall have the capacity to deliver the total project capacity at the delivery points and to meet the Estimated Net Energy Export in line with the Tender Requirement with the capability of supplying dynamically varying reactive power support so as to maintain power factor within the limits of 0.95 lagging to 0.95 leading.
- iii) The Design of the SPP shall be done with latest PVSYST Software Version available as on or after the original scheduled date of Tender Opening. The Monthly Estimated Net Energy Export values shall be furnished using the Average monthly GHI values obtained from the SOLARGIS for the coordinates of the site in Technical Schedule- 1 and shall be submitted to SPD for Approval with required supporting documents. Contractor has to share multiyear solar irradiation data from SOLARGIS for the proposed site during detailed engineering.
- iv) The Contractor shall demonstrate the Expected Net Energy Export at the Delivery points in line with the Tender Requirement with the corrections considered as given in the following point during O&M Target Generation Test (OTGT).
- v) The performance of the Solar Power Project shall be assessed with Corrections proportional to the actual Global Horizontal Irradiance (GHI), Ambient Temperature, Wind Speed values and Off take constraints like Grid unavailability and Back down that are not attributable to the Contractor and shall be considered as specified in Section 24 & Section 25 of this specification.
- vi) The Contractor shall not appeal to any delay in any of the project activities and it is the responsibility of the Contractor to strictly adhere to the Time Schedule. However, during O&M period of 3years, the degradation of PV Modules will be considered from 2nd year onwards for specifying the Estimated Net Energy Export for O&M Period indicated in Technical Schedule-4.
- vii) In case at any point of time, the peak of capacity reached is higher than the contracted capacity at delivery points and causes disturbance in the system, the contractor will have to forego the excess generation and reduce the output to the rated capacity.

2.1.2. Capacity: 600 (6X100) MW (AC) Grid Interactive Solar Power Plant shall be designed with Solar PV Modules, IDT ,Central Inverter, HT cables & HT Switchgears to be supplied by SPD and Estimated Net Energy Export at the Delivery points for the entire period of the contract.

(i) **Estimated Energy Values:** As the Solar PV Modules and central inverter are yet to be firmed up by SPD, a Common Reference module and central inverter is indicated by SPD in the Technical Schedule-1 for Estimated Energy value calculation purpose.

(ii) **Annual Estimated Net Energy Values:** Technical Schedule-1 shall be referred for the procedure to arrive the Annual Estimated Net Energy Values.

2.1.3. PV MODULES: Deleted.

2.1.4. PV ARRAY: The Solar Module Arrays layout shall be designed with **Full Single Axis Tracker** by optimal usage of space, Material & Labour, with access roads & proper lighting etc. and shall be designed after considering limited shadow & near shading losses and cable/line losses in line with this specification requirement.

- a) The arrays shall be Protected from Lightning strikes and provided with CCTV monitoring systems to avoid theft of materials.
- b) The solar PV modules of same type and rating shall be maintained at each inverter level. The type and rating of solar PV modules at the respective inverter level will be finalized during detailed engineering.
- c) Contractor shall carefully design and accommodate the SPP in the available land to achieve the Estimated Net Energy Export at the Delivery points in line with the Contract Requirement.
- d) Array tables shall be arranged in such a way to facilitate cleaning of the modules by an appropriate Wet/Dry Cleaning System. The inter row distance between solar PV arrays shall be sufficient for easy movement of men / materials for panel cleaning, maintenance works, etc.
- e) Contractor should design the array yard such that module mismatch loss should be less than 1.1 % of system DC capacity.
- f) **Soiling stations** at least one per land parcel shall be installed. If the distance between the two land parcels is less than 50 mtrs then the two land parcel will be considered as a single land parcel. The technology and other details shall be finalized during detailed engineering. The Soiling Ratio measured from the Soiling station shall be displayed in SCADA for monitoring the Soling Loss and shall be used to decide on the Module cleaning Cycles in order to maximize the performance.

2.1.5. INVERTERS: Deleted.

2.1.6. INVERTER DUTY TRANSFORMERS (IDT): Deleted.

2.1.7. POWER CABLING: Power Cabling size selection and methods of laying shall be adopted in such a way to maximize the quantum of power exported. The losses shall be kept to the bare minimum, by adopting high efficiency design of Power cables and cabling for collection & transmission of both DC and AC Power. Design Documents shall be submitted for approval of SPD during detailed Engineering. Selection of Insulation level for voltage withstanding capacity of the electrical equipment including cables shall be as per system requirement and applicable standards. Selection of cables in-terms of voltage shall be as per system requirements and system earthing.

2.1.8. POWER COLLECTION SUB STATION (PCSS): PCSS is the Sub Station for collecting power from the array yard through Inverters and transmit the power to PSS of solar park at a minimum HT voltage of 33KV through IDTs. It shall be located in a suitable location with metal type enclosed HT Switchgear with suitable control, Protection and metering.

The PCSS shall be of outdoor type as specified in "Civil works and Structural Steel works" Section. It shall comprise of outdoor HT Switchgear Panels/C&R panels, outdoor Inverters, Equipment for SCADA, Auxiliary AC (UPS) control power equipment, communication system, fire alarm panel etc. as applicable and in line with system requirements.

2.1.9. POWER EXPORT SUB STATION (PESS)/MCR:

- 1) The contractor Shall design the plant to export the power directly to the point of connection from PCSS then the following shall be complied.
 - a) A separate Control Room Building for control and monitoring the entire plant shall be provided and it shall be of conventional type and in line with requirements as specified in Section 21 for PESS/MCR. In this Building, Equipment for SCADA, Operator Work Stations, UPS for Auxiliary AC control power equipment with redundancy, communication system, fire alarm panel, Office, Stores, Pantry and Wash rooms etc. shall be installed in line with system requirements which shall be finalized during detailed engineering.
 - b) The contractor is allowed to evacuate the power from multiple PCSS to a capacity of 50 MW to the point of connection in line with system requirement.
- 2) The main Auxiliary Power Supply System for MCR shall have 100% capacity rated HT Auxiliary Transformer (33/0.44 KV) from the nearest PCSS/Power Collection Block and another Auxiliary source (415V) with 100% capacity shall be taken from the same PCSS/ Power Collection Block or as per system requirement.

2.1.10. POOLING SUB STATION (PSS): Deleted.

2.1.11. PSS SWITCH YARD BAY EXTENSION: Deleted.

2.1.12. SCADA SYSTEM: With inputs from measuring devices incorporated in the equipment installed in Solar Power Plant, the performance of the total Power Project shall be monitored continuously by the SCADA system and the critical equipment as specified shall be operated from the SCADA system Operator Work Stations.

2.1.13. Power plant controller (PPC) shall be provided with two processors (main processing unit and memories), one for normal operation and one as hot standby. In case of failure of working PPC processor, there shall be an appropriate alarm and simultaneously the hot standby PPC processor shall take over the plant control function automatically. The transfer from main processor to standby processor shall be totally bump less and shall not cause any plant disturbance whatsoever. It shall be possible to keep any of the PPC processors as master and other as standby. The standby processor shall be updated in line with the changes made in working processor. The solar plant SCADA and PPC networks shall be suitably designed, so that PPC shall directly and independently able to control the individual solar inverter. Detailed control logic in the PPC shall be finalized during detailed engineering stage.

2.1.14. OTHER POINTS

- i) The design of the system shall aim for a fully automated Power Project requiring minimum operator intervention, with daily automatic startup and shutdowns, optimized power generation features, grid monitored safety functions, data management, remote function capabilities and appropriate Module Cleaning Systems.
- ii) Detailed Project Report (DPR) with design basis, Soil test reports, Earth Resistance Test Reports, Design Simulation Reports, Shadow analysis, Performance Ratio Estimation, etc., shall be submitted by the Contractor during detailed engineering for verification. The estimated net energy export at delivery points to be calculated from PVSYST simulation tool shall be at minimum confidence level of 50%. Verification of DPR by SPD/SPDs Engineering consultant shall not relieve the Contractor from the responsibility to demonstrate the performance of the SPP as per the requirement of the Contract.
- iii) Workmanship and finish shall be in accordance with the best engineering practices. All materials used for the manufacture of equipment by the Contractor or his sub-suppliers or sub-vendors and the workmanship shall be of good quality and acceptable, as per Indian Standards or other relevant international standards.

2.2 ELECTRICAL SYSTEM PARAMETERS: The following format of power system parameters for designing the SPP shall be considered. All the parameters shall be as per the requirements of respective standards and CEA.

POWER SYSTEM PARAMETERS FOR DESIGN OF EQUIPMENT

System Parameters	Auxiliary LT System	Power Collection System	Power Evacuation System
Nominal system voltage (KV)	0.415	33	33
Highest system voltage (KV)	0.456	36	36
System frequency (Hz)	50	50	50
System Earthing	Earthed	Earthed	Earthed
Short time current rating in KA	20 KA for 1	25KA for 3 Sec	25KA for 3 Sec

(For Bus & Breakers)	Sec		
Short time current rating in KA (For Other Equipment)	As specified in respective section.		
Power frequency withstand voltage (KV)	1.1	70	70
Impulse withstand voltage (KV)	2.5	170	170
Number of Phases	3	3	3

2.3 SITE CONDITIONS

Following design conditions applicable for the project site shall be furnished in Design basis Document during detailed Engineering:

- 1) Mean annual rainfall in mm.
- 2) Maximum wind speed as per Latest BIS 875 Part III.
- 3) Seismic condition of site defined in BIS: 1893.
- 4) Maximum Ambient temperature in degree C.
- 5) Maximum Relative humidity in %.
- 6) Wind loads for outdoor structures shall be as per Latest BIS 875 Part III.
(Basic wind speed and diagonal wind loads as applicable need to be considered in the design of outdoor structures).
- 7) Barometric pressure in mbar.
- 8) Highest Flood Level (HFL) data.

2.4 PROJECT LOCATION CLASSIFICATION (CORROSION PROTECTION)

Parameter	Coastal / Non-Coastal	Corrosive Category (as per ISO12944-2)
For below Ground Structures (including up to 300mm above ground)	Coastal	C5-M
For Above Ground Structures (Beyond 300mm)	Non-Coastal	C4

Unless noted otherwise, all steel structures exposed to environment would be painted to meet the requirements of C4 corrosion category or shall be Galvanized to minimum 90microns.

2.5 DETAILED ENGINEERING AND DRAWINGS.

The Contractor shall submit the Master Drawing List (MDL) within 30 days from the date of issue of LOA by SPD. MDL shall include the Categorisation (Major and Minor) of the Drawings according to the priority for approval in line with the Project Time Schedule and the target Date of first Submission of individual Drawings. On approval of MDL, the

soft copy of individual Drawings / Design Calculations / Vendor Documents etc. prepared to meet the requirements of Specifications, safety and statutory regulations of the relevant authority, shall be uploaded, giving priority to the critical System Drawings to the CCMS Portal, for which access will be given by SPD. SPD Engineering Division/SPD'S Owners Engineering consultant (OEC) will review the Drawings /Documents and approve /approve with notes/return with comments for the submitted drawings /documents. After approval of each Drawing/ Document, 4 Hard Copies shall be submitted for Stamping by SPD/OEC. The Stamped hard copies shall be distributed by the Contractor without any delay as below.

3 copies to SPD Site Engineers and documentation

1 copy to the Contractor

This review and / or approval of the drawings by SPD/OEC shall not relieve the Contractor from any of his responsibilities under this contract. On completion of site activities, 'As built Drawings' shall be submitted by the Contractor to the SPD Site Engineer and approval stamping shall be obtained from the SPD Site Engineer and the same shall be uploaded in CCMS Portal. 2 sets of approved and stamped 'As built Drawings' in Hard Copy along with Soft Copies, stored in External Hard Drive of minimum 1 TB, shall be submitted to the SPD Site Engineer before Final Take over.

2.6 STANDARDS

The Project equipment and systems shall be designed, manufactured, assembled, tested, shipped, installed and commissioned according to the applicable local codes, standards and regulations. The design and installation shall be fully in conformity with the relevant standards and codes as applicable in general and with the standards and codes as specified in the respective Sections. Latest standards and nationally or internationally recognised codes and standards, which meet or exceed the qualities specified in this specification, shall be used. It is Contractor's responsibility to ensure the coherence of the codes and standards chosen as reference.

In case of conflict between this specification and the Standards / Codes specified or referred, this specification shall prevail.

2.7 DRAWINGS & DOCUMENTS

During Detailed Engineering, the Drawings and Documents pertaining to the Basic Design shall be submitted for approval by SPD /OEC but not limited to the following list.

1. Detailed Project Report.
2. Technical Schedule-1, with supporting Documents.
3. System Parameters & Fault Calculation Report
4. Soil Resistivity Report.
5. DC SLD.
6. AC SLD.



SECTION 3.0 SOLAR PV MODULES

- 3.1** During taking over of Solar PV Modules by Contractor at site from the SPD, the Contractor shall carry out the verification, check measurements and take over the Solar PV modules from SPD for unloading, storage, erection, testing and commissioning activities. Any Physical defects found during check measurement by Contractor in the PV modules, shall be reported to SPD. After taking over of Solar PV modules by Contractor, Physical defect reports shall not be entertained and it is the responsibility of the Contractor to replace the defective modules with same type of modules at his own cost.
- 3.2** The requirements of the Module Manufacturer in order to fulfil the conditions of warrantee of the PV modules shall be provided to Contractor during hand over and Contractor shall adhere to all the requirements during storage, handling at site, erection and commissioning of Solar PV modules.
- 3.3** The Contractor shall ensure the quality of erection activities as per the Module manufacturer's requirement/recommendation's and the same will be verified by SPD / Authorized representative(s) of SPD.
- 3.4** Module Manufacturer's requirements/recommendation's in Balance of System pertaining to modules like MMS, Earthing, Lightning protection, Electrical protection Etc. shall be provided by Contractor.
- 3.5** **Proposed PV Module Details:**
Solar PV Modules with the following basic design parameters are envisaged to procure for this Project by SPD.
- 1) Range of Capacity rating of individual module would be 540Wp.
 - 2) System voltage of 1500V.
- Further, SPD will try to share the exact PV Module characteristics including datasheet and other details by 4 to 6 months from the date of LOA for enabling the Contractor to submit Annual Estimated Net Energy values for SPD approval.



SECTION 4.0

STRING COMBINER & MONITORING BOX

4.1. General Requirements & Enclosure Details

- 4.1.1.** String Combiner & Monitoring Box (SCMB) shall be provided on the DC power side to combine the electrical power from the strings. String Monitoring Units (SMU) shall be provided for monitoring the DC power generation and other parameters at Single or Double strings level. The String Combiner Box and the String Monitoring unit shall be integrated into a single box enclosure as intelligent String Combiner & Monitoring Box (SCMB) and shall be of a standalone unit Design erected nearer to the module mounting structures at an optimized distance to reduce the DC losses.
- 4.1.2.** The box enclosure for String Combiner & Monitoring Box shall be dust, vermin and water proof, impact resistant and made of Metallic/Polycarbonate/Thermo set Fiberglass which should be sunlight/UV resistant as well as fire retardant. The box must have minimum protection to IP 65 degree of enclosure and Protection Class II.
- 4.1.3.** The other components like vent plugs, String Cable connectors, Cable Glands/Cable Seals for all the other Power and Communication Cables including Antenna cables if any, shall meet out the requirement of IP 65 degree of enclosure. The manufacturer of SCMB shall furnish a certificate to this effect and recommend the list of such connectors and Cable glands to satisfy the IP requirement. The SCMB shall have suitable arrangement for the following.
- 4.1.4.** All the components of SCMB shall be rated with the DC System Voltage of 1500V type tested for 1500V and shall be designed to satisfactorily work in a temperature range of 0-65 Deg C. The current carrying parts of SCMB shall be suitable with adequate safety factor for connecting the strings of Solar PV array to the Inverter.

The SCMB shall have the following features:

1. Shall combine a cluster or group of modules into independent charging string at Single or Double strings level that will be wired through the String Monitoring Unit.
2. DC Isolator of suitable rating for disconnection at the outgoing.
3. Test points for each sub-group for quick fault location.
4. Means to measure currents of individual DC inputs, voltage of the Combined DC, on board temperature, means to indicate the status of DC Isolator & Surge Protection Device, means to measure a randomly selected PV Module Temperature near the SCMB.
5. Enclosure shall have a mechanical impact resistance of IK 07 or better. Design of enclosure shall make sure that the temperature rise inside shall not cross 12⁰ C above the ambient temperature of 50⁰ C. All other components inside SCMB shall function satisfactorily under these conditions.

6. In case, SCMB is proposed to be mounted on structure in open, it has to be protected from top, suitable canopy/rain shed shall be provided on top of SCMB extending minimum 150 mm from all four sides. Design and dimensions of SCMB structure must be such that minimum 0.7 meter of ground clearance available below SCB at site or clearance based on Flood data of site, whichever is higher shall be considered for repair and maintenance. All the erection hardware and mounting accessories shall be of galvanized steel.
7. If metallic hinge is being used with enclosure cover, it shall be made of SS 304 and shall be rust proof. Enclosure shall be provided with captive screws so that it's screws don't fall off when cover is opened. Screw shall be made of corrosion free material. Suitable non-conducting protection cover shall be provided for any metallic hinge/screw/fastener to avoid contact with live part of the assembly.
8. Mounting plate inside the SCMB for mounting/fixing of devices shall be made of FRP/GRP or equivalent non-conducting material.

4.2. String Combiner Section

- 4.2.1. The terminals inside the SCMB shall be connected to Tinned copper bus-bar arrangement of proper sizes. The current carrying parts of SCMB shall be suitable with adequate safety factor for connecting the strings of Solar PV array to the Inverter. The SCMB shall have suitable cable entry points fitted with cable glands/Cable sealing of appropriate sizes for both incoming and outgoing cables. Suitable markings shall be provided on the bus-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification. Number of inputs in each SCMB shall be decided during detailed Engineering.
- 4.2.2. A suitably rated On load DC isolator, shall be provided to Make / Break the combined DC output circuit.
- 4.2.3. The SCMB shall have suitable Surge Protection Device (SPD) and shall consist of Metal Oxide Varistors (MOV) which shall be provided between positive and negative conductor and earthing ground. The Surge Protection Device shall have following minimum specifications.

Repetitive Surges $x15(8/20 \mu\text{S})$ In: 20kA

Surge Current $(8/20 \mu\text{S})$ I_{max}: 40kA

During earth fault and failure of MOV, the Surge Protection Device shall be capable of safely disconnecting the healthy system. SURGE PROTECTION DEVICE shall have thermal disconnecter to interrupt the surge current arising from internal and external faults. In order to avoid the fire hazard due to possible DC arcing in the SURGE PROTECTION DEVICE due to operation of thermal disconnecter, the SURGE PROTECTION DEVICE shall be capable of extinguishing the arc by itself. SURGE PROTECTION DEVICE shall have proper D/Os for indicating the status at local as well as at remote work station.

4.2.4. DC photovoltaic fuses for positive side at Single or Double strings level shall be provided. Rating of fuses shall be as per recommendation of module manufacturer. On negative side, fuses shall be provided based on the recommendation of Inverter Manufacturer.

4.2.5. Sufficient clearance shall be provided between Positive Section and Negative Section with a separator. Preference shall be given for termination of strings inputs in separate compartments for positive and negative string inputs.

In each SCMB, 5% (rounded off to next higher integer) spare terminals and connectors for String Cable Connections shall be provided.

4.3. String Monitoring Unit (SMU)

4.3.1. The String Monitoring Units along with the Communication Hardware shall be self-powered, Intelligent, multichannel, industrial grade, reliable, field proven microprocessor-based unit.

4.3.2. The SMU shall be capable of monitoring the parameters like Voltage, Current, Power for each string/Double strings, status of DC Isolator, SURGE PROTECTION DEVICE& fuses, Module Temperature.

4.3.3. Data Transmission to the respective RTU at PCSS / PESS shall be through the Optical Fiber Cable (OFC)/ Wi-Fi based wireless communication. Optical Fiber Cable (OFC)/RS485 cable/ Wi-Fi can be used for interconnecting SCB to SCB, as required by SCADA and finalized during Detailed Engineering. The communication network shall be chosen such that the latency of data communication is avoided.

4.3.4. The SMU unit shall be of RTU type to acquire data on continuous basis and transmit the data to the SCADA for further processing with provision of seamless Data interface means. The data of SMU shall have logical capabilities to perform any interlocking and protection logics as per the process requirement.

4.4. Drawings & Documents, Standards & Type Test Reports:

4.4.1. During Detailed Engineering the following details of the SCMB shall be submitted for approval by SPD.

- 1) GTP, GA, Schematic Diagrams, vendor document and Type Test Certificates
- 2) MQP
- 3) Design & details of Foundation, Mounting Structure of SCMB along with Canopy/rain shed.

4.4.2. The SCMB and Components used shall conform to the latest edition of IEC/Equivalent Standards as specified below and the respective Type Test Certificates and Reports shall be submitted during Detailed Engineering.

Enclosure:

1. UL 94V: Standard for Safety of Flammability of Plastic Materials for Parts in Devices and Appliances testing. (Flammability Test)

2. UL 746C: Standard for Polymeric Materials - Use in Electrical Equipment Evaluations (UV Resistance Test)
3. IEC 62262/EN 50102: Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts -IK code. (Mechanical Impact Test)
4. BIS 2147/IEC 60529: Degrees of Protection Provided by Enclosures for Low Voltage Switchgear and Control gear (IP Conformity)
5. IEC 62208: Empty enclosures for low-voltage switchgear and control gear assemblies - General requirements.
6. IEC 60068: Environmental Testing of Electronic Equipment (Ageing Test)

SPD:

7. IEC 61643-11: Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods

DC Isolator:

8. IEC 60947-3: Low-voltage switchgear and control gear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units.

DC Fuses:

9. IEC 60269-1,6/UL 2579: Low-voltage fuses with high breaking capacity for industrial and similar purposes - Part 1: General requirements Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems.



SECTION 5.0

SOLAR INVERTER

- 5.1 During taking over of Solar Inverter by Contractor at site from the SPD, the Contractor shall carry out the verification, check measurements and take over the Solar Inverter from SPD for unloading, storage, erection, testing and commissioning activities. Any Physical defects found during check measurement by Contractor in the Solar Inverter, shall be reported to SPD. After taking over of Solar Inverter by Contractor, Physical defect reports shall not be entertained and it is the responsibility of the Contractor to replace the defective Solar Inverter with same type of Solar Inverter at his own cost.
- 5.2 The requirements of the Solar Inverter Manufacturer in order to fulfil the conditions of warrantee of the Solar Inverter shall be provided to Contractor during hand over and Contractor shall adhere to all the requirements during storage, handling at site, erection and commissioning of Solar Inverter.
- 5.3 The Contractor shall ensure the quality of erection activities as per the Solar Inverter manufacturer's requirement/recommendation and the same will be verified by SPD / Authorized representative(s) of SPD.



SECTION 6.0

INVERTER DUTY TRANSFORMER

- 6.1 During taking over of Inverter Duty Transformer by Contractor at site from the SPD, the Contractor shall carry out the verification, check measurements and take over the Inverter Duty Transformer from SPD for unloading, storage, erection, testing and commissioning activities. Any Physical defects found during check measurement by Contractor in the Inverter Duty Transformer, shall be reported to SPD. After taking over of Inverter Duty Transformer by Contractor, Physical defect reports shall not be entertained and it is the responsibility of the Contractor to rectify the defective Inverter Duty Transformer with same type of Inverter Duty Transformer at his own cost.
- 6.2 The requirements of the Inverter Duty Transformer Manufacturer in order to fulfil the conditions of warrantee of the Inverter Duty Transformer shall be provided to Contractor during hand over and Contractor shall adhere to all the requirements during storage, handling at site, erection and commissioning of Inverter Duty Transformer
- 6.3 The Contractor shall ensure the quality of erection activities as per the Inverter Duty Transformer manufacturer's requirement/recommendation and the same will be verified by SPD / Authorized representative(s) of SPD.



SECTION 7.0**POWER COLLECTION SUB STATION**

- 7.1** The Contractor shall establish Power Collection Sub Stations (PCSS) to collect the power generated from the PV modules. If required, Sub Stations to combine a group of PCSS may also be considered.
- 7.2** The PCSS shall consist of following Outdoor equipment,
1. Outdoor / Outdoor Containerized Central Inverter(s).
 2. Outdoor type Oil cooled, (Multi Winding) Inverter Duty Transformer(s) including NIFPS.
 3. Outdoor, HT switch gear(s) with metering and protective relays.
 4. Cables, Earthing Systems & Lightning Protection Systems.
 5. UPS.
 6. Auxiliary transformer & ACDB, Lighting System.
 7. RIO /CMU for SCADA.
 8. Fire Alarm System and Fire fighting Equipment.
 9. Other Equipment as per the system requirement.
- Detailed specifications of the above equipment are furnished in their respective Sections.
- 7.3** The location of each PCSS shall be selected in such a way to minimise cable losses. Each PCSS shall be capable for collecting power from the IDT at a minimum HT voltage of 33KV and to transfer it to PSS of Solar park through over ground cables. PCSS shall be located in a suitable location.
- 7.4** The overall Layout of PCSS Outdoor equipment along with sufficient and statutorily required space allotted for each equipment shall be furnished for approval by SPD, during detailed engineering based on the system requirements.
- 7.5** The oil cooled Inverter duty transformer (IDT) which steps up LT power to HT power shall be an outdoor installation in a fenced area.
- 7.6** The HT Switchgear for PCSS shall be of outdoor type Incoming & Outgoing configuration.
- 7.7** All power, control and Communication cables shall be laid and dressed properly on cable trays as per the SPD Requirement. Proper Lightning Protection System & Earthing System shall be incorporated as per Standards / Specification.
- 7.8** Each PCSS shall be provided with suitable capacity of outdoor Industrial type UPS System for meeting the Main / Redundant power requirement of applicable equipment. The Positioning and facilities required for the normal safe operation of UPS Battery System shall be complied as per the Battery Manufacturer's recommendation.
- 7.9** Auxiliary Power System at 415 V, 3 Phase, 50 HZ shall be provided in PCSS to power up the auxiliary loads like, UPS, lighting, ventilation fans, Pumps and other system loads.

- 7.10** RIOs / CMUs and other related devices shall be installed to handle inputs / Outputs & interface between all the equipment and SCADA as per Architecture of SCADA.
- 7.11** Fire Alarm System, Fire fighting Equipment, CCTV devices and other equipment required as per System Design shall be suitably installed.
- 7.12 Drawings & Documents:** During Detailed Engineering the following details of the PCSS shall be submitted for approval by SPD/OEC.
1. PCSS Equipment Layout.



**SECTION 8.0
CABLES & CABLING**

8.1 Introduction:

8.1.1 This section intends to specify the technical requirements of the cables as identified and their cabling procedures that are used in various schemes of the Solar Power plant and the Standards that they have to conform as listed below.

Cable & Service	Standards (Latest Version)
DC Cables	
Solar EBC Cables - Modules to SCMB	EN 50618: Electric Cables for Photovoltaic Systems BS EN 60228: Conductors of Insulated Cables IEC 62852: Connectors for DC-application in photovoltaic systems - Safety requirements and tests
DC Power Cables -SCMB to Inverter	BIS 7098 (Part 2): Cross – linked Polyethylene PVC sheathed cables. BIS 5831: PVC insulation and sheath of electric cables
Control Cables – DC Control Circuits & AC Control Circuits	BIS 1554 Part 1: Specification forPVC Insulated (Heavy Duty) Electric Cables - Part 1: For Working Voltages Up to And Including 1100 V
AC Cables	
HT AC Power cables - IDT to PSS Aux Trafo to PCSS PCSS to PSS	BIS 7098 (Part 2 and 3): Cross linked Polyethylene PVC sheathed cables. BIS 8130: Conductors for Insulated Electric Cables and Flexible Cords - Specification BIS 5831: PVC insulation and sheath of electric cables BIS 3975: Mild Steel Wires, Formed Wires and Tapes for Armouring of Cables
LV Power Cables- Inverter to IDT & Other LV Power Cables - Auxiliary Supply system	
Wiring Cables – Small Power	BIS 8130: Conductors for Insulated Electric Cables and Flexible Cords - Specification BIS 694: PVC insulated unsheathed and sheathed cables/cords with rigid and flexible conductor for rated voltages up to and including 450/750 V.

8.1.2 Basic Design requirements:

8.1.2.1 DC Cables:

- 1) The size of both solar EBC cable and DC power cables shall be finalized during detailed engineering and the same shall be designed such that, the average voltage drop calculated at conductor resistance corresponds to 75°C in case of Fixed Tilt arrangement/90 Deg C in case of Tracker arrangement, from the first PV module to inverter should be less than 2%. Short circuit current for the cable sizing shall be as per system requirement and fault clearing time shall be considered for actual system fault clearing time.
- 2) Along with other standard markings on the outer sheath as per standards, SPD marking shall be provided on regular 1 meter interval for both solar EBC cable and DC power cable and both cables shall have (+) and (-) colour identification.

8.1.2.2 AC Cables:

- 1) AC Cables shall be designed such a way that voltage drop does not exceed 3% between Inverter Output to delivery points, where Tariff Metering System is installed at full load condition. Short circuit current for the cable sizing shall be as per system parameters furnished in Section 2.0 and fault clearing time shall be considered minimum 0.4 sec for cables from PCSS to PSS.
- 2) Manufacturer's identification mark, SPD mark along with ISI certification mark shall be printed on the outer sheath (at 1 meter interval of the cable), as stipulated in latest BIS 7098 part 2.

8.1.2.3 Sizing and drop calculations:

The calculation of arriving at the sizing of cables considering the above requirements shall be submitted during detailed Engineering for SPD approval.

8.1.2.4 Sampling during Factory Acceptance Test: Sample selection for final acceptance test for Solar EBC cables shall be as per **BIS 7098 P1: Cross linked Polyethylene Insulated Thermoplastics Sheathed Cables - Specification**. For other cables the criteria shall be as per their respective standards and the same shall be incorporated in MQP to be submitted for approval.

8.1.2.5 General Requirements: The clauses for Packing, installation procedures for cables at site and the Equipment & Accessories for installation are furnished commonly at the end of this Section and are valid for all the cables as applicable. All cables and connectors to be used for installation of solar field must be of solar grade which can withstand harsh environment conditions for 25 years and voltages as per latest IEC standards.

8.2 DC CABLES**8.2.1 Solar EBC Cables and trenches:**

8.2.1.1 DC cables (Electron Beam Cross linked) used for interconnecting PV modules, string to Y connector and Y connector to string combiner and monitoring boxes (SCMB) shall be suitable for 1.5KV DC system voltage, conforming to latest revision of EN 50618 and generally indicated as Solar EBC Cables for service life expectancy of 25 years. The cable shall have Tinned Copper Fine Stranded Wire Conductors (according to BS EN 60228,

class 5) and cross-linked insulation and sheath, fulfilling all the requirements of latest revision of EN 50618.

- 8.2.1.2** Type test, routine test, acceptance tests for the cables shall be, as per the standard requirement. Type test certificate & report issued by NABL/ILAC accredited agency, GTP, cable cross section drawing, sizing and voltage drop calculation, de-rating details, cable schedule etc. shall be furnished during detailed engineering for approval by SPD.
- 8.2.1.3** Cables for inter connection of modules shall be fixed to non-moving module mounting structure / column with adequate looping for allowing tilt of the module frame. Bunching of cables and tying to module frame with cable ties shall be not adopted as temperature rise of module frame tend to increase cable power loss and reduce cable life.
- 8.2.1.4** All the connectors used for the connecting solar EBC cables including Inter connecting PV modules, interconnecting rows, row interconnection to String Combiner & Monitoring Boxes and Cable to Cable to connections shall be done through Connectors / Multi-way Connectors, rated for 1500 V, confirming to latest IEC 62852 (no cable joint is allowed) and the certificate and report shall be submitted and all the connectors used should be of same make and type.
- 8.2.1.5** Solar EBC Cables from Y connector to (SCMB) shall be laid in HDPE Pipe (as applicable) of required thickness & diameter such that fill factor of the pipe should not be more than 40%. Both ends of the pipe and pipe joints, if any, shall be packed properly with suitable cable/Pipe sealing compounds / arrangements.
- 8.2.1.6** Procedure and depth of cable laying shall be as per BIS 1255 and details in this regard in relevant drawings shall be furnished during detailed engineering for approval by SPD.
- 8.2.2 DC power cables:**
- 8.2.2.1** DC cables used for connecting String Combiner & Monitoring Boxes (SCMB) and Inverters and generally indicated as DC power cable, shall be suitable for 1.5 KV DC system voltage conforming to BIS:7098 P2 and shall have compacted, stranded copper/aluminium conductors (H4 grade, conforming to BIS 8130), XLPE insulation (conforming to BIS 7098 P2), galvanized steel armour (conforming to BIS 3975 & the minimum area of coverage of armouring shall be 90%), ST2FRLSH PVC outer sheath (conforming to BIS 5831).
- 8.2.2.2** Type test, routine test, acceptance tests requirements for the cables shall be as per the requirements of latest edition of BIS:7098 P2 and type test certificate and report issued by NABL/ILAC accredited agency, GTP, cable cross section drawing, sizing and voltage drop calculation, derating details, cable schedule etc. shall be furnished during detailed engineering.
- 8.3 AC CABLES**
- 8.3.1 HT AC Cables: Scope of supply by SPD.**
- 8.3.1.1** During taking over of HT Cables by Contractor at site from the SPD, the Contractor shall carry out the verification, check measurements and take over the HT Cables from SPD for

unloading, storage, erection, testing and commissioning activities. Any Physical defects found during check measurement by Contractor in the HT Cables, shall be reported to SPD. After taking over of HT Cables by Contractor, Physical defect reports shall not be entertained and it is the responsibility of the Contractor to replace/repair the defective HT Cables with same type of HT Cables at his own cost.

8.3.1.2 The requirements of the HT Cables Manufacturer in order to fulfill the conditions of warrantee of the HT Cables shall be provided to Contractor during hand over and Contractor shall adhere to all the requirements during storage, handling at site, erection and commissioning of HT Cables

8.3.1.3 The Contractor shall ensure the quality of cable laying activities as per the HT Cables manufacturer's requirement/recommendation and the same will be verified by SPD / Authorized representative(s) of SPD.

8.3.2 Inverter AC power cable and other LV Auxiliary Power System Cables

8.3.2.1 LV power cables used between inverter and transformer shall be of single core cable configuration, 3.3KV Grade, conforming to BIS:7098 P2). The cable shall have compacted, stranded copper/aluminium conductors (H4 grade, conforming to BIS 8130), XLPE insulation (conforming to BIS 7098 P2), aluminium armour (meeting requirement of BIS 3975 & the minimum area of coverage of armouring shall be 90%), ST2FRLSH and UV resistance PVC outer sheath (conforming to BIS 5831).

8.3.2.2 Type test, routine test, acceptance tests requirements for the cables shall be as per the requirements of latest edition of BIS:7098 P2 and type test certificate and report issued by NABL/ ILAC accredited agency, GTP, cable cross section drawing, sizing and voltage drop calculation, derating details, cable schedule etc. shall be furnished during detailed engineering for approval by SPD.

8.3.2.3 All the other Auxiliary power cables used in the Solar Power Plant shall be copper/aluminium conductor cable, flat steel or steel wire armoured cables, XLPE insulated of 1100 V Grade (unless otherwise specified) and complying to latest BIS: 7098-part I. However, below 10 Sq mm, all the other LV power cables shall have copper conductor only and the minimum conductor size is 2.5 sq.mm.

8.3.2.4 Type test, routine test, acceptance tests requirements for the cables shall be as per the requirements of latest edition of BIS BIS:7098 P1 and type test certificates and reports issued by NABL/ILAC accredited agency (for all the cables with size 50 sq. mm and above), GTP, cable cross section drawing, sizing and voltage drop calculation, derating details, cable schedule etc. shall be furnished during detailed engineering for approval by SPD.

8.3.2.5 All LT cables used in the project shall be as far as possible purchased from one manufacturer only.

8.3.3 Cables for Wiring works:

8.3.3.1 The wiring cables/Insulated Wires, generally used for wiring for the Electrical Schemes of the buildings such as Lighting, Ventilation/Heating, Air-conditioning, Power outlets etc, shall be PVC/XLPE insulated single core, colour coded, stranded Copper conductor rated for 450/750 V and conforming to BIS 694. The cable shall have FRLSH property and shall have standard markings on outer surface at required interval, as per standards. Details on cable size selection and wiring layout shall be furnished during detailed engineering for SPD approval.

8.3.3.2 Conductor strands, diameter and resistance of the conductor shall be in conformity with BIS: 8130. The stranded conductor shall be made of thin strands of electrolytic copper not less than 0.25mm. The number of strands shall be suitable for the size of the cable. However, the minimum number of strands shall be as follows:

SNo	Size of the wire	Thickness of the conductor	No. of Strands.
1	1.5 Sq. mm	0.25 or 0.3 mm	32 or 22
2	2.5 Sq. mm	0.25 or 0.3 mm	50 or 36
3	4.0 Sq. mm	0.3 mm	56
4	6.0 Sq. mm	0.3 mm	84

8.3.3.3 All wiring for connecting various services shall be through Concealed /Open type PVC / Steel conduits as applicable of reputed make and shall be decided during detailed engineering.

8.3.4 Control Cables

8.3.4.1 Control cables shall be 1.1 kV grade, minimum 2.5 sq mm multi strand copper conductor, PVC/XLPE insulated, multi core, PVC inner sheathed, armoured and overall FRLSH PVC sheathed conforming to BIS: 1554. The control cables shall have a minimum of 10% sparecores. The cable shall have standard markings on outer surface at required interval, as per standards. Details on cable size selection shall be furnished during detailed engineering.

8.3.4.2 The cables shall be suitable for laying on racks, in ducts, trenches, conduits and direct buried installation.

8.3.4.3 Control cable design with drawings shall be submitted during detailed engineering for SPD approval.

8.4 GENERAL REQUIREMENTS

8.4.1 Packing of cables

8.4.1.1 Cables shall be supplied in non-returnable wooden or steel drums of heavy construction and the surface of the drum and the outer most cable layer shall be covered with water proof cover. Both the ends of the cables shall be properly sealed with heat shrinkable

PVC/ rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage and erection.

8.4.1.2 Each drum shall carry manufacturer's name, purchaser's name, address and contract number, item number and type, size and length of cable and net gross weight stencilled on both sides of the drum. A tag containing same information shall be attached to the leading end of the cable.

8.4.1.3 All cable wound in drums shall be from manufacturer and unwound cables delivered shall not be approved for installation.

8.4.2 Cable Installation

8.4.2.1 All the works pertaining to fabricating/providing cable ducting/conduit/direct burial/tray arrangement/built up trenches and covering on trench, cross sectional details of the said arrangement, drainage arrangement in built up trenches, duct banks, pull-pits and, cable laying, depth of cable laying, terminations and sealing etc. of all the cables (solar EBC, DC power cable, AC HT and LT power cables, wiring cables and control cables) shall be carried out as per latest BIS 1255/IE rules/statutory norms/relevant international standards.

8.4.2.2 Details on fabricating / providing cable ducting / conduit / direct burial / tray arrangement / built up trenches and covering on trench, cross sectional details on of the said arrangement, drainage arrangement in built up trenches, duct banks, pull-pits and, cable laying, depth of cable laying, terminations and sealing etc. of all the cables shall be furnished during detailed engineering.

8.4.3 Details of cabling equipment

8.4.3.1 Cable trays, Fittings & Accessories: Cable trays shall be ladder/perforated type and it shall be ladder type for power & control cables and perforated for instrumentation cables. Cable trays, fittings and accessories shall be fabricated out of rolled mild steel sheets and hot dip galvanized as per relevant BIS. Cable trays shall have standard width and lengths. Thickness of mild steel sheets used for fabrication of cable trays and fittings shall be finalized during detailed engineering. Branching out cables from main cable route shall be done through suitable Cable troughs and the same shall be hot dip galvanized as per relevant BIS.

8.4.3.2 Support System for Cable Trays: Cable tray support system shall be pre-fabricated type and design details will be finalized during detailed engineering. The system shall be designed such that it allows easy assembly at site by using bolting. All cable supporting steel work, hardwares fittings and accessories shall be prefabricated factory galvanized. All steel components, accessories, fittings and hardware shall be hot dip galvanized.

8.4.3.3 PIPES, FITTINGS & ACCESSORIES: The size of the pipe shall be selected on the basis of maximum 40% fill criteria. GI Pipes shall be of medium duty as per BIS:1239. Duct banks shall be High Density PE pipes encased in PCC (10% spare of each size, subject to minimum one) with suitable water-proof manholes. Hume pipes shall be NP3 type as per BIS 458.

- 8.4.3.4 Terminations & Straight through Joints:** Termination and jointing kits for 33/66kV and 3.3 kV grade XLPE insulated cables shall be of proven design and make which have already been extensively used and type tested. Termination kits and jointing kits shall be pre-moulded type, taped type or preferably heat shrinkable type. 33/66kV grade joints and terminations shall be type tested as per BIS:13573 and 3.3kV grade joints and terminations shall be type tested as per VDE0278. Critical components used in cable accessories shall be of tested and proven quality as per relevant product specification/ESI specification. Kit contents shall be supplied from the same source as were used for type testing. The kit shall be complete with the aluminium solderless crimping type cable lugs & ferrule as per DIN standard. Straight through joint and termination shall be capable of withstanding the fault level for the system.
- 8.4.3.5 Cable glands:** Cable shall be terminated using double compression type cable glands. Cable glands shall conform to BS:6121 and be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 microns. All washers and hardware shall also be made of brass with nickel chrome plating. Rubber components shall be of neoprene or better synthetic material and of tested quality. Cable glands shall be suitable for the sizes of cable supplied/erected.
- 8.4.3.6 Cable lugs/ferrules:** Cable lugs/ferrules for power cables shall be tinned copper solderless crimping type suitable for aluminium compacted conductor cables. Cable lugs and ferrules for control cables shall be tinned copper type. The cable lugs for control cables shall be provided with insulating sleeve and shall suit the type of terminals provided on the equipment. Cable lugs and ferrule shall conform to relevant standard.
- 8.4.3.7 Trefoil clamps:** Trefoil clamps for single core cables shall be pressure die cast aluminum or Fiber glass or nylon and shall include necessary fixing accessories like G.I. nuts, bolts, washers, etc. Trefoil clamps shall have adequate mechanical strength to withstand the forces generated by the peak value of maximum system short circuit current.
- 8.4.3.8 Cable Clamps & Straps:** The cable clamps required to clamp multicore cables on vertical run shall be made up of Aluminium strip of 25x3 mm size. For clamping the multicore cables, self-locking, de-interlocking type nylon clamps/straps shall be used. The clamps/straps shall have sufficient strength and shall not get affected by direct exposure to sun rays and outdoor environment.
- 8.4.3.9 Galvanizing:** Galvanizing of steel components and accessories shall conform to BIS:2629, IS4759 & BIS:2633. Galvanizing shall be uniform, clean smooth, continuous and free from acid spots. The amount of zinc deposit over threaded portion of bolts, nuts, screws and washers shall be as per BIS:1367. The removal of extra zinc on threaded portion of components shall be carefully done to ensure that the threads shall have the required zinc coating on them as specified.
- 8.4.3.10 Welding:** The welding shall be carried out in accordance with BIS:9595. All welding procedures and welders qualification shall also be followed strictly in line with BIS:9595.

8.5 INSTALLATION REQUIREMENTS OF CABLES:**8.5.1 Cable tray and Support System Installation**

8.5.1.1 Cables shall run in cable trays mounted horizontally or vertically on cable tray support system which in turn shall be supported from floor, ceiling, overhead structures, trestles, pipe racks, trenches or other building structures.

8.5.1.2 Horizontally running cable trays shall be clamped by bolting to cantilever arms and vertically running cable trays shall be bolted to main support channel by suitable bracket/clamps on both top and bottom side rails at an interval of 2000 mm in general. For vertical cable risers/shafts cable trays shall be supported at an interval of 1000mm in general. Fixing of cable trays to cantilever arms or main support channel by welding shall not be accepted. Cable tray installation shall generally be carried out as per the approved guidelines/ drawings. Contractor shall design the support system along with tray, spacing etc in line with relevant standard.

8.5.1.3 The cantilever arms shall be positioned on the main support channel with a minimum vertical spacing of 300 mm unless otherwise indicated. The Contractor shall fix the brackets/ clamps/ insert plates using anchor fasteners. Minimum size of anchor fasteners shall be M 8 X 50 and material shall be stainless steel grade 316 or better. Anchor fastener shall be fixed as recommended by manufacturer and as approved by site engineer. For brick wall suitable anchor fasteners shall be used as per the recommendations of manufacturer. Make of anchor fasteners subject to QA approval.

8.5.1.4 All cable way sections shall have identification, designations as per cable way layout drawings and painted/stenciled at each end of cable way and where there is a branch connection to another cable way.

8.5.1.5 In certain cases, it may be necessary to site fabricate portions of trays, supports and other nonstandard bends where the normal prefabricated trays, supports and accessories may not be suitable. Fabricated sections of trays, supports and accessories to make the installation complete at site shall be neat in appearance and shall match with the prefabricated sections in the dimensions. They shall be applied with one coat of red lead primer, one coat of oil primer followed by two finishing coats of aluminium paint.

8.5.2 Conduits/Pipes/Ducts Installation

8.5.2.1 The Contractor shall ensure for properly embedding conduit pipe sleeves wherever necessary for cabling work. All openings in the floor/ roof/ wall/ cable tunnel/ cable trenches made for conduit installation shall be sealed and made water proof by the Contractor either with any proven fire sealing system rated for one hour or Modular multi-diameter cable sealing system consisting of frames, blocks, Compression wedge and its accessories. The Cable sealing system should have been tested for fire insulation for min. 1 hr as per BS 476 and shall also provide water sealing. System shall be anti-rodent and anti- termite.

8.5.2.2 GI pull wire of adequate size shall be laid in all conduits before installation. Metallic conduit runs at termination shall have two lock nuts wherever required for junction

boxes etc. Conduit runs/sleeves shall be provided with PVC bushings having round edge at each end. All conduits/pipes shall have their ends closed by caps until cables are pulled. After cables are pulled, the ends of conduits/pipes shall be sealed with Glass wool/Cement Mortar/Putty to prevent entrance of moisture and foreign material.

8.5.2.3 Exposed conduit/pipe shall be adequately supported by racks, clamps, straps or by other approved means. Conduits /pipe support shall be installed square and true to line and grade with required average spacing between the supports shall be provided.

8.5.2.4 For bending of conduits, bending machine shall be arranged at site by the Contractor to facilitate cold bending. The bends formed shall be smooth.

8.5.3 Junction Boxes Installation

8.5.3.1 Junction boxes shall be mounted at a height of 1200mm above floor level or as specified in the drawings and shall be adequately supported/mounted on masonry wall by means of anchor fasteners/ expandable bolts or shall be mounted on an angle, plate or other structural supports fixed to floor, wall, ceiling or equipment foundations.

8.5.4 Cable laying

8.5.4.1 For Cable unloading, pulling etc. following guidelines shall be followed in general:

8.5.4.2 Cable drums shall be unloaded, handled and stored in an approved manner on hard and well drained surface so that they may not sink. In no case shall be drum be stored flat i.e., with flange horizontal. Rolling of drums shall be avoided as far as possible. For short distances, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cables. For unreeling the cable, the drum shall be mounted on suitable jacks or on cable wheels and shall be rolled slowly so that cable comes out over the drum and not from below. All possible care shall be taken during unreeling and laying to avoid damage due to twist, kink or sharp bends. Cable ends shall be provided with sealed plastic caps to prevent damage and ingress of moisture.

8.5.4.3 While laying cable, ground rollers shall be used at every 2 meters interval to avoid cable touching ground. The cables shall be pushed over the rollers by a gang of people positioned in between the rollers. Cables shall not be pulled from the end without having intermediate pushing arrangements. Pulling tension shall not exceed the values recommended by cable manufacturer. Selection of cable drums for each run shall be so planned so as to avoid using straight through joints. Care should be taken while laying the cables so as to avoid damage to cables. If any particular cable is damaged, the same shall be repaired or changed to the satisfaction of Project Manager. Cables shall be laid on cable trays strictly in line with cable schedule.

8.5.4.4 Power and control cables shall be laid on separate tiers in line with approved guidelines/ drawings. The laying of different voltage grade cables shall be on different tiers according to the voltage grade of the cables. In horizontal tray stacks, H.T. cables shall be laid on topmost tier and cables of subsequent lower voltage grades on lower tiers of

trays. Single core cable in trefoil formation shall be laid with a distance as per design calculations between trefoil center lines and clamped at every two meters. All multi core cables shall be laid in formation, as per design calculations. Power and control cables shall be securely fixed to trays/support with self-locking type nylon cable straps with de-interlocking facilities. For horizontal trays arrangements, multi core power cables and control cables shall be secured at every five-meter interval. For vertical tray arrangement, individual multi core power cables and control cables shall be secured at every one meter by nylon cable strap. After completion of cable laying work in the particular vertical tray, all the control cables shall be bound to trays/supports by aluminium strips at every five-meter interval and at every bend.

- 8.5.4.5** Bending radii for cables shall be as per manufacturer's recommendations and BIS: 1255.
- 8.5.4.6** Where cables cross roads/rail tracks, the cables shall be laid in Hume pipe.
- 8.5.4.7** Joints in critical equipment in main plant area shall not be permitted. No joints shall be allowed in trip circuits, protection circuits and CT/PT circuits. The Contractor shall identify and accordingly procure the cable drum length.
- 8.5.4.8** In each cable run some extra length shall be kept at suitable point to enable one LT/two HT straight through joints to made, should the cable develop fault at a later stage. Control cable termination inside equipment enclosure shall have sufficient lengths so that shifting of termination in terminal blocks can be done without requiring any splicing.
- 8.5.4.9** Wherever few cables are branching out from main trunk route troughs shall be used.
- 8.5.4.10** Wind loading shall be considered for designing support as well Cable trays wherever required.
- 8.5.4.11** The installation work shall be carried out in a neat workman like manner & areas of work shall be cleaned of all scraps, water, etc. after the completion of work in each area every day. Contractor shall replace RCC/Steel trench covers after the Installation work in that particular area is completed or when further work is not likely to be taken up for some time.
- 8.5.4.12** Separation of cable types between HT power & LT power cables, LT power & LT control/instrumentation cables as stipulated in the BIS 1255.
- 8.5.4.13** In direct burial if applicable, construction of cable trench for cables shall include excavation, preparation of sieved sand bedding, riddled soil cover, supply and installation of brick or concrete protective covers, back filling and compacting, supply and installation of caution tapes, route markers and joint markers. Laying of cables and providing protective covering shall be as per BIS:1255. While crossing the floors, un-armored cables shall be protected in conduits up to a height of 500 mm from floor level if not laid in tray.
- 8.5.4.14** RCC cable route and RCC joint markers shall be provided wherever required. The voltage grade of the higher voltage cables in route shall be engraved on the marker. Location of underground cable joints shall be indicated with cable marker with an additional

inscription "Cable Joint". The marker shall project 150 mm above ground and shall be spaced at an interval of 30 meters and at every change in direction. They shall be located on both sides of road crossings and drain crossings. Top of cable marker/joint marker shall be sloped to avoid accumulation of water/dust on marker.

- 8.5.4.15** Cable tags shall be provided on all cables at each end (just before entering the equipment enclosure), on both sides of a wall or floor crossing, on each duct/conduit entry, and at every 20 meters in cable tray/trench runs. Cable tags shall also be provided inside the switchgear, control and relay panels etc. where a number of cables enter together through a gland plate. Cable tag shall be of rectangular shape for power cables and control cables. Cable tag shall be of 2 mm thick aluminum or of a suitable material with number punched /engraved/Printed on it and securely attached to the cable by not less than two turns of 20 SWG GI wire conforming to BIS:280. Alternatively, the Contractor may also provide cable tags made of nylon, cable marking ties with cable number heat stamped on the cable tags.

8.5.5 Cable Terminations & Connections

- 8.5.5.1** The termination and connection of cables shall be done strictly in accordance with cable termination kit manufacturer" instructions, drawings and/or as directed by Project Engineer. Cable jointer shall be qualified to carryout satisfactory cable jointing/termination. Contractor shall furnish for review documentary evidence/experience reports of the jointers to be deployed at site.
- 8.5.5.2** All the Works of Cable Terminations & Connections shall include all clamps, fittings etc. and clamping, fitting, fixing, plumbing, soldering, drilling, cutting, taping, preparation of cable end, crimping of lug, insulated sleeving over control cable lugs, heat shrinking (where applicable), connecting to cable terminal, shorting and grounding as required to complete the job to the satisfaction of the Project Manager. All cable terminations shall be appropriately tightened to ensure secure and reliable connections
- 8.5.5.3** The equipment will be generally provided with undrilled gland plates for cables /conduit entry. The Contractor shall be responsible for punching of gland plates, painting and touching up. Holes shall not be made by gas cutting. The holes shall be true in shape. All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively sealed by 2mm thick aluminium sheets / Stopper.
- 8.5.5.4** Control cable cores entering control panel/switchgear/MCC/miscellaneous panels shall be neatly bunched, clamped and tied with self-locking type nylon cable ties with de interlocking facility to keep them in position.
- 8.5.5.5** All the cores of the control cable to be terminated shall have identification by providing ferrules at either end of the core, each ferrule shall be indelible, printed single tube ferrule and shall include the complete wire number and TB number as per the drawings. The ferrule shall fit tightly on the core. Spare cores shall have similar ferrules with suffix sp1, sp2 etc. along with cable numbers and coiled up after end sealing.

8.6 DRAWINGS AND DOCUMENTS: During Detailed Engineering the drawings & Documents for the following Cables shall be submitted for Approval by SPD.

1. DC Solar EBC Cables
2. DC Power Cables
3. AC LV Cables - Inverter Power, Aux Power & Control Cables
4. AC 33 KV Cables

All the Cable documents shall cover the following details individually.

- a) Sizing & drop calculation
- b) GTP, GA, Vendor Documents, de-rating factor Test certificates and reports as applicable.
- c) Cable schedule with loss calculation
- d) Cable routing/laying/tray arrangements
- e) MQP



SECTION 9.0**POWER EXPORT SUB STATION /MAIN CONTROL ROOM (MCR)**

- 9.1** PESS/MCR shall be located in a suitable location and shall comprise of Equipment for SCADA, Operator Work Stations, UPS for Auxiliary AC control power equipment with redundancy, communication system, fire alarm panel, Office, Stores, Pantry and Wash rooms etc. The Auxiliary Power Supply System for PESS shall have 100% capacity source from Auxiliary Transformer of 33 /0.44 kV required rating, considering the loads at 0.8 pf. The Auxiliary Power Supply System shall have another 100% capacity source from another Auxiliary Transformer or from the nearest PCSS/Power Collection Block and the same shall be decided during detailed engineering.
- 9.2** The Power Export Sub Station (PESS)/MCR shall consist of
1. A conventional concrete Building to accommodate the indoor equipment & other space for office / Store etc.
 2. Cables, Conductors, Earthing & Lightning Protection Systems.
 3. UPS.
 4. 33 /0.44 KV Auxiliary transformer & 415 V ACDB, Lighting System.
 5. SCADA and Work Stations.
 6. Fire Alarm System and Fire fighting Equipment.
 7. Data and communication facilities.
 8. Other Equipment as per the system requirement.
- Detailed specifications of the above equipment are furnished in their respective Sections.
- 9.3** The PESS/MCR building shall be built as per section 21.0
- 9.4** Proper Lightning Protection System & Earthing System shall be incorporated as per Standards / Specification.
- 9.5** PESS/MCR shall be ventilated with adequate number of exhaust fans mounted on wall openings provided with louvers and insect proof screen. Exhaust Fans shall be of industrial type of suitable air flow capacity and installed in sufficient numbers. Exhaust fans shall also be provided in the toilets.
- 9.6** PESS/MCR office room, SCADA and AC store room shall be equipped with adequately rated energy efficient (minimum 3 star as per BEE standards) split type air conditioning system.
- 9.7** Auxiliary Power System at 415 V, 3 Phase, 50 HZ shall be provided in PESS /MCR to power up the auxiliary loads like UPS, lighting, ventilation fans, Pumps and other system loads.
- 9.8** Fire Alarm System, Fire fighting Equipment, Voice Communication gadgets, CCTV System devices and displays and other equipment required as per System Design shall be suitably installed.

9.9 Drawings & Documents: During Detailed Engineering the following details of the PESS/MCR shall be submitted for approval by SPD.

1. PESS/MCR Equipment Layout.



SECTION 10.0
HT SWITCH-GEAR

- 10.1 During taking over of HT Switch gear by Contractor at site from the SPD, the Contractor shall carry out the verification, check measurements and take over the HT Switch gear from SPD for storage, erection, testing and commissioning activities. Any Physical defects found during check measurement by Contractor in the HT Switch gear, shall be reported to SPD. After taking over of HT Switch gear by Contractor, Physical defect reports shall not be entertained and it is the responsibility of the Contractor to replace/repair the defective HT Switch gear with same type of HT Switch gear at his own cost.
- 10.2 The requirements/ recommendation of the HT Switch gear Manufacturer in order to fulfil the conditions of warrantee of the HT Switch gear shall be provided to Contractor during hand over and Contractor shall adhere to all the requirements/ recommendation during storage, handling at site, erection and commissioning of HT Switch gear.
- 10.3 The Contractor shall ensure the quality of erection activities as per the HT Switch gear manufacturer's requirement/recommendation and the same will be verified by SPD / Authorized representative(s) of SPD.



SECTION 11.0

EARTHING

11.1. DC Earthing System for PV ARRAY YARD

The earthing for PV array and DC Power system shall be made with earth mat connected with a total number of earth pits corresponding to at least one Number earth pit for every 1 MW(AC) uniformly distributed around array yard. Design calculations along with drawings shall be submitted for approval by SPD to establish the adequacy of earth pits as above. Electrical Resistivity Test (ERT) of the soil at the project site shall be made by the Contractor before commencing the earthing system design. The earthing system design calculations shall conform to latest CEA regulations for electrical safety- with amendments and Indian Electricity Rules / Indian Electricity Act. The design calculation for the DC System earthing shall be as per IEEE 2778-2020: Guide for Solar Power Plant Grounding for Personal Protection.

DC System fault level shall be considered as per System Requirement and fault duration shall be considered as per BIS3043 for designing earth conductors and 0.5 sec duration for calculating DC earthing touch and step potential. In addition, and if necessary, more numbers of earth pits and conductors shall be provided to achieve earthing resistance less than 1 Ohm.

- 11.1.1.** Each earth pit shall be provided with an earth electrode of 3 M length copper bonded steel rod of diameter not less than 14 mm including accessories and masonry enclosure with cover plate as per BIS 3043. The pit around the electrode shall be treated with carbon-based earth enhancement compound as required as per provisions of BIS 3043. Requirements for earthing enhancing compounds shall conform to IEC 62561-7. The minimum quantity of earth enhancement compound to be used with each earth-pit shall be 25 Kg. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance. For each earth pit, necessary Test Point shall be provided.
- 11.1.2.** Galvanized steel shall be considered for earth conductors. Earth mat conductors shall be laid at a depth of minimum 600 mm below the ground level.
- 11.1.3.** Each PV Module shall have earth continuity with the adjacent PV modules, creating a Series Earthing formation through suitably designed earthing conductors fixed to the Earthing holes provided in the PV modules for earthing purpose. Two distinct earth connections are to be connected in the earth pits for the above formed PV module Series Earthing formation.
- 11.1.4.** Each Array structure of the Solar PV Yard shall be mechanically and electrically connected to provide independent return to earth with two distinct earth connections and are to be connected to earth pits as per BIS standards.
- 11.1.5.** Earth resistance of the earth pits shall be tested in the presence of the representative of SPD.

11.2. AC Earthing System for PCSS, PESS, & Extension Bay at Delivery Points

- 11.2.1.** AC earthing system for PCSS and PESS shall be made with an earth mat connected with number of earth pits uniformly distributed around each PCSS and PESS respectively. The earthing system design calculations shall conform to latest CEA regulations for electrical safety- with amendments and Indian Electricity Rules / Indian Electricity Act. The design shall ensure that the touch potential and ground potential rise are within limits in accordance with the requirements stipulated in IEEE 80-Guide for Safety in AC Substation Grounding. For touch and step potential calculations at PCSS and PESS, the actual system fault level arrived through an appropriate software based analysis (E.g., E-Tap), shall also be considered. AC System fault level shall be considered as per System Requirement and fault duration shall be considered as per BIS 3043 for designing earth conductors and 0.5 sec duration for calculating AC earthing touch and step potential. The earthing system shall also conform to BIS 3043. The Contractor shall ensure adequate Earthing system protection to provide an acceptable degree of protection as per BIS for each PCSS. If necessary, more numbers of Earth pits & conductors shall be provided to achieve acceptable value of the earthing resistance. Theoretical earthing design calculations with necessary drawings shall be submitted for SPD approval during detailed Engineering.
- 11.2.2.** Each earth pit shall be provided with an earth electrode of 3 M length copper bonded steel rod of diameter not less than 14 mm including accessories and masonry enclosure with cover plate as per BIS 3043. The pit around the electrode shall be treated with carbon-based earth enhancement compound as required as per provisions of BIS 3043. Requirements for earthing enhancing compounds shall conform to IEC 62561-7. The minimum quantity of earth enhancement compound to be used with each earth-pit shall be 25 Kg. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance. For each earth pit, necessary Test Point shall be provided.
- 11.2.3.** Galvanized steel shall be considered for earth conductors. Earth mat conductors shall be laid at a depth of minimum 600 mm below the ground level. The risers and equipment connections shall be made by using suitably sized GI flats. All cable trays are to be earthed by suitably sized GI flats at regular interval of 25 meters to the earthing grid or nearest earthing pit.
- 11.2.4.** The complete earthing system shall be mechanically & electrically connected to provide independent return to earth. In compliance to Rule 33 and 61 of Indian Electricity Rules, 1956 (as amended up to date), all non-current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode.
- 11.2.5.** Earth resistance of the earth pits shall be tested in the presence of the representative of SPD.
- 11.2.6.** For Earthing of electronic equipment such as SCADA, UPS, Communication System Etc. Contractor shall follow the OEM's recommendation to provide dedicated earth pit/s near the equipment as applicable.

11.3. DRAWING & DOCUMENTS:

During Detailed Engineering the following particulars of the "Earthing System" shall be submitted for approval by SPD

1. DC Earthing for PV Array - Design calculation with Touch & Step potential Verification and GA Layout.
2. AC Earthing for PESS/MCR and PCSS - Design calculation with Touch & Step potential Verification and GA Layout.

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SECTION 12.0

SCADA & VOICE COMMUNICATION SYSTEM

12.1 Introduction: The Solar PV power plant shall be provided with a comprehensive control automation system which shall acquire all data, store, analyze and control the operation of various equipment and systems of Solar PV Power Plant such that minimal operator interaction is needed. For this purpose, a Supervisory Control and Data Acquisition (SCADA) system with Operator Work stations shall be provided in the Control Room at PESS /MCR building.

12.2 The Control Automation system shall be configured with three levels of pecking order.

12.2.1 Level 1: PV Module String Level Monitoring: All the PV Module strings shall be monitored through their respective String Monitoring Units provided in the String Combiner & Monitoring Boxes (SCMB). Refer Section 4.0 String combiner & Monitoring Box for interfacing of SMUs with the SCADA. SMBs at inverter level shall be connected in a ring network.

12.2.2 Level 2: PCSS Equipment Control & Monitoring: The following equipment / Sub Systems at PCSS shall be connected to the suitably designed Remote I/O Units (RIO) or Control and Monitoring units (CMU) for effective automatic control and monitoring from SCADA.

1. The Group of SCMBs
2. Inverters
3. Inverter Duty Transformer
4. NIFS
5. HT Switchgear System
6. Evacuation System and its related Equipment
7. Point of connection and its related Equipment and Tariff Metering System
8. 415 V Auxiliary Power system
9. UPS System
10. Fire alarm system
11. CCTV Surveillance System as applicable.

All the RIO/CMU of respective PCSS shall be connected with each other in a redundant (2 sets of connections) Optic Fiber Ring network and the ends of such rings shall be connected to the Central Processing Unit (CPU) at PESS.

12.2.3 Level 3: PESS/MCR Equipment Control & Monitoring: The following equipment / Sub Systems at PESS/MCR shall be connected to the Redundant Central Processing Unit (CPU) with suitable interfacing devices for effective automatic control and monitoring from SCADA.

1. The Ring Ends of Level 2 RIOs/CMUs

2. Work Stations and Printer
3. GPS for Time Synchronization
4. Data Communication Panel to grant access to Procurer and MNRE or any other designated agency to the remote monitoring portal of the Solar power plant on a 24x7 basis.
5. Firewall

The following PESS/MCR plant level equipment and Systems shall be connected to the CPU using suitable interfacing devices and communication protocols.

- 1) Weather Monitoring station
- 2) LT Switchgear System
- 3) 415 V Auxiliary Power system
- 4) Lighting System
- 5) UPS System
- 6) Fire alarm system - Master
- 7) CCTV Surveillance System as applicable
- 8) If PESS/MCR is integrated with a Block of PCSS, the PCSS level Equipment listed in 12.2.2, as applicable.

12.3 Main Control Panel: Main control panel shall have Central Processing unit (CPU) and Remote I/O Unit (RIO) / Control and Monitoring unit (CMU), suitable rated power supplies with SPD protection and network switches. Panel front and rear door shall be of minimum 2 mm thickness with CRCA sheet steel. Panel shall have a minimum protection of IP-42.

12.3.1 The Central Processing unit shall be a rugged industrial type microprocessor-based unit with built in redundancy. Main control SCADA panel shall be provided with two processors (main processing unit and memories), one for normal operation and one as hot standby. In case of failure of working processor, there shall be an appropriate alarm and simultaneously the hot standby processor shall take over the complete plant operation automatically. The transfer from main processor to standby processor shall be totally bump less and shall not cause any plant disturbance whatsoever.

12.3.2 Remote I/O Units (RIO) / Control and Monitoring units (CMU): The RIO /CMU shall be industrial grade microprocessor based unit with direct digital interface to the redundant Data bus formed through Optic Fiber Cable Network or with appropriate Data Switches and Light Interface Units (LIU) and shall be capable of controlling the operations of the main Equipment like Inverters, HT Vacuum/SF6 Circuit Breakers (VCB) etc. with intelligent interlocks, safety configurations & protection logics as per the process requirement from SCADA.

Status abnormality of all equipment connected to RIO/CMU shall be monitored for providing necessary alarm / alerts. RIO /CMU shall be with built-in memory and extended removable flash memory cards to acquire data on continuous basis and store

the data in the memory modules. RIO /CMU shall have other standard features like RTC, self-diagnostic routines, event logging, alarms etc.

- 12.4 PCSS SCADA panels** shall be provided in each PCSS and shall have Remote I/O Unit (RIO) / Control and Monitoring unit (CMU) as specified in clause 12.3.2 above, suitable rated power supplies with SPD protection and network switches. Panel front and rear door shall be of minimum 2mm thickness with CRCA sheet steel. Panel shall have a minimum protection of IP-42.

12.5 Optic Fiber Cable Ring Network:

- 12.5.1** An optic Fiber cable network in ring architecture shall be provided to connect all PCSS and PESS/MCR for data transfers in a most economical manner. Single mode 12 core or above, corrugated steel tape armoured Optic Fiber cable conforming to IEC60794 shall be used and the Fibers shall be allocated for each system as below.

- 1) For Main Equipment Data Transfer PCSSs to SCADA - 2 Circuits (4 Fibers)
- 2) For Fire alarm System - 1 circuit (2 Fibers)
- 3) Voice communication - 1 circuit (2 Fibers)
- 4) CCTV surveillance - 1 circuit (2 Fibers)

- 12.5.2** The OFC shall be routed buried at a safer depth below ground inside a protective HDPE pipe and below the Protective brick layer or ducts or racks. The ring network shall consist of necessary splitter boxes, Light interface Units (LIU), closure terminals, couplets, drop / patch cables, attenuators, etc. of reputed make.

- 12.5.3** The other systems may also be hooked up to the main OFR network by using additional pair of Fibers. Details of Proposed OFC, routing and quantity, along with its Network Scheme shall be submitted for approval by SPD during detailed engineering.

- 12.5.4** An optic Fiber cable link with minimum 6 Fibers shall be incorporated to connect PESS with the Delivery Points Switch yard through buried OFC /OPGW.

12.6 Supervisory Control and Data Acquisition system (SCADA)

- 12.6.1** The computer aided SCADA of Solar PV Power Plant shall be designed for simultaneous monitoring and recording of various parameters of different sub-systems in the solar power plant, power generation on the DC and AC sides, capable of computing performance ratios and efficiency of different sub system operations and implement corrective action for achieving maximum plant output. With inputs from various measuring devices in the field, the performance ratio shall be dynamically calculated and displayed. Solar PV Power Plant SCADA shall be connected with necessary hardware and software for establishing proper linkage to power evacuation Sub Station SCADA for operational interface.

- 12.6.2** The SCADA system shall be designed on reliable operating platform and time-tested software featuring control & Monitoring of Solar PV inverter, HT Switchgear System, Monitoring of PV module Strings, insolation level and weather, DC & AC switch gears,

- UPS power systems & battery, lighting system, security, alerts, analytical reporting, auditing and data archiving functions etc.
- 12.6.3** SCADA shall be capable of providing different on-screen dashboards for overall / zone of the plant, combiner box monitoring, weather station parameters, DC / AC SLD, Trend Charts, Alarm / Alert listing, Audit Reports, Equipment parameters, communication link monitoring, GIS based plant view with dynamic change key performance indices and operating parameters, etc. All Numerical relay functions shall be programmable from SCADA.
- 12.6.4** Minimum of three operating stations with servers is envisaged for the SCADA system. Personal computer (PC) with monitor and key board shall serve as servers. One server shall be Operating Station with data storage, second server shall serve as back up data storage as well as Operating Station cum Engineering Station and the third server shall be web connected to act as Web Station with web data storage. SCADA software shall be OPC compliant with standard DNP3 and modbus control interfaces over TCP/ IP having the provision to add protocol converters to implement custom and secure communications protocol standard for providing real time online data (including but not limited to irradiance, plant generation (instantaneous/ daily/ monthly/ yearly), Daily Peak Generation, temperature, wind speed etc.).
- 12.6.5** Earthing requirements of SCADA system shall be maintained as per OEM recommendation. System earth pit shall be isolated from panel earth pit.
- 12.6.6** The proposed SCADA configuration, equipment details, software features, on screen dashboards and other operational highlights shall be clearly furnished by the EPC. Necessary design documents and drawings of SCADA including Plant Monitoring Desk shall be submitted for approval by SPD during detailed engineering.
- 12.6.7** Each Operating station PCs shall be of reputed make, rugged & robust in nature to operate in a hostile environment. Each PC shall have minimum Intel Core i7 processor having 500 GB SSD and 1 TB HDD with 8 GB RAM. The PC shall also have 21" or higher preferably high-Resolution Backlit LED Color monitor, DVD Drive with Writer, USB ports, Keyboard & Scroll Mouse. The PCs shall be preloaded with suitable Licensed Operating System and Licensed MS office.
- 12.6.8** The printer shall be A4 colour laser type rugged & robust in nature and of reputed make. The printer shall be equipped for printing, scanning, copying and faxing and shall be a network printer.
- 12.6.9** Powder coated, Plant Monitoring Desks of modular, welded construction, console system design and made of CRCA Steel Sheet of suitable thickness to accommodate each Operating station components {CPU [on a sliding Rack Platform], power sockets, terminals complete with wiring arranged in the internal space of the console and monitor, Keypad and Mouse [on a sliding Drawer] on the Top} shall be provided. Appropriate matching desk to place the printer shall be provided. Connections from SCADA and other systems shall be through the bottom cable entries. All the above

desks shall be positioned and installed aesthetically and the visible wires/cables shall be neatly routed and dressed.

Ergonomically designed Computer station height adjustable cushioned chairs with arm rests, matching with the consoles shall be provided. GA, Layout and Schematic drawings of the Plant Monitoring Desks shall be submitted for approval by SPD during detailed Engineering.

12.6.10 The Data Acquisition System shall perform the following minimum operations:

Measurement and continuous recording of:

- 1) Energy Export at PESS and Delivery Points.
- 2) Solar insolation (GHI)
- 3) Ambient temperature
- 4) Wind speed and direction
- 5) Module Surface Temperature
- 6) Rainfall
- 7) AC and DC side power of each inverter
- 8) HT Voltage and frequency
- 9) Fire Alarm Status and monitoring
- 10) Any other parameters considered necessary by SPD based on current Solar PV Power Plant practice

12.6.11 SCADA shall provide One minute (Or as required by the Site Engineers), daily, monthly and annual average of Solar Insolation value (GHI).

12.6.12 SCADA shall provide fifteen (15) Minutes, (Or as required by the Site Engineers) daily, monthly and annual average of following parameters:

- 1) Module Surface Temperature
- 2) Exported energy
- 3) Energy output from each inverter
- 4) Plant output power
- 5) Inverter status & efficiency
- 6) Performance Ratio (PR)

Provision shall also be made for graphic display not limited to the following required but shall be as per the requirements of Site Engineers:

- 1) AC power Vs Time
- 2) GHI Vs Time
- 3) PR Vs Time
- 4) Bar chart for Plant Performance and PV module performance
- 5) DC & AC Side SLD with combiner box and Inverter status

12.6.13 All data shall be recorded in a common work sheet chronologically and shall be MS Excel compatible. All instantaneous data can be shown in the Work Station Display as required by the site engineer.

12.6.14 SCADA shall have features to be integrated with the local system as well remotely via the web using either a standard modem or a GSM/WIFI modem. The EPC shall provide compatible software and hardware so that data can be transmitted via standard

modem. Plant generation data shall be made available for SPD website for display in SPD intranet. Email daily reports of Plant performance shall be configured in plant SCADA.

- 12.6.15** The SCADA system shall enable automatic operation of entire solar PV power plant in all modes, during power generation as well as in non power generation periods. SCADA shall be in addition to proprietary data logging and control system provided by the EPC and it shall be the responsibility of EPC to ensure all system interfacing are properly matched to have an integrated operation from SCADA.
- 12.6.16** The Solar PV Power Plant will be requiring interface with the load dispatch center (LDC)/Procurement/MNRE/Any Designated Agency for providing the Solar Power Plant Data as per the requirements of Regulations on Communication System for transmission of electric power (as amended from time to time). It is the responsibility of contractor to make provisions in SCADA to have required networking with the abovementioned agencies. The present required protocol for SLDC is IEC 60870-5-104 protocol and subject to amendment. The Contractor shall provide necessary hardware to meet the requirements of above mentioned agencies and their standards for transmission of data and requirements of their communication Protocol. Charges as prescribed by SLDC towards data connectivity with LDC either by VSAT or any other communication including speech communication to the adjacent station shall be borne by contractor without any extra cost to SPD.

12.7 Voice Communication System

- 12.7.1** A Voice Communication Network interconnecting Power Export Sub Station/ Main Control Room, Security Buildings shall be provided with necessary hardware, software and network interface. Exact locations for Voice Communication shall be finalized during detailed engineering. Separate network shall be considered for Voice Communication.
- 12.7.2** Suitable capacity electronic IP PBX with a provision for connecting SPD phone network shall be provided at PESS/MCR with cable network for IP phones inside the project site building.
- 12.7.3** Proposed Voice Communication System Scheme, exchange and phone data sheet, number and location of hand sets, etc., shall be submitted for approval by SPD during detailed Engineering.

12.8 Communication Cables

- 12.8.1 RS485 Cable** - Design, Transmission and Constructional features of RS485 cable shall conform to the general and special requirements of EN 50290-2-23, BS EN 50288-7, IEC 60228, BS 5308, BIS 5831 and IEC 60332-1. The cable shall have FRLS properties as per ASTM-D-2863.
- 12.8.2 Ethernet Cable** – Ethernet cable of type CAT6 or above. Design, Transmission and Constructional properties shall conform to the general and special

requirements of TIA568B, IEC 60332-3, IEC 11801 and EN 50173. The cable shall have FRLS properties as per ASTM-D-2863.

12.9 Drawings & Documents: During Detailed Engineering the following particulars of the "SCADA system" and "Voice Communication System" shall be submitted for approval by SPD.

- 1) SCADA - Configuration /Architecture Diagram with list of I/O signals
- 2) SCADA - Vendor Documents, GA drawing & Schematics
- 3) SCADA - MQP
- 4) Optical Fiber Cable Network - GTP, GA, Vendor Documents, Routing diagram with schedule & MQP
- 5) Communication Cables - GTP, GA, Vendor documents and MQP
- 6) Communication Cables - Schedule
- 7) IP Telecom System - Block Diagram, GTP, GA, Vendor Documents & MQP



SECTION 13.0

WEATHER MONITORING SYSTEM (WMS) & INSTRUMENTS

13.1. The Weather Monitoring System shall be installed in each site of land parcel. Contractor shall provide in the Weather Monitoring System (WMS), all measuring instruments as listed below for the project along with all necessary software & hardware to make it compatible with SCADA.

- (1) Performance Monitoring Station (PMS) consisting of following set of instruments.
 - a. Pyranometer – 2 Nos, with provision for tilting arrangement.
 - b. RTD type measuring instrument for Ambient Air Temperature – 2Nos
 - c. Wind Speed sensor - 2 Nos.
- (2) Module Surface temperature sensor- 1 no in each PCSS zone.
(All the Meteorological instruments listed above shall have accuracy of Class A, as specified in IEC 61724-1)
- (3) Wind Direction Sensor – 1 No
- (4) Rain Gauge – 1 No
- (5) Soiling Monitoring Station. - 1 No.
- (6) Data Logger (DL) – 1 No

For each land parcel, the number of PMS with Data Logger (DL) including the PMS at WMS according to the respective capacity shall be as below.

SN	SPP Capacity Range	Number of PMS with DL
1	Less than 5 MW	1
2	≥ 5 MW to < 40 MW	2
3	≥ 40 MW to < 100 MW	3
4	≥ 100 MW to < 200 MW	4
5	≥ 200 MW to < 300 MW	5
6	≥ 300 MW to < 500 MW	6
7	≥ 500 MW to < 750 MW	7
8	≥ 750 MW	8

Each PMS shall be provided in appropriate locations and shall be finalized during detailed Engineering. The Average of the maximum (GHI and Wind Speed) / Average of minimum (Ambient Temperature) readings of all the sets, as applicable, shall be used for Performance Evaluation calculations for the entire contracted capacity.

Necessary chain link fencing shall be provided around each Weather Monitoring Station and shall be secured with steel gate arrangement to prevent unauthorized entry / tampering of readings. CCTV coverage facility (180 deg view) on each WMS shall be provided to monitor activities around the WMS area.

13.2. PYRANOMETER: Typical specification for Pyranometers, for measuring incident global solar radiation shall be as follows:

SN	Parameter	Value
1	Detector type	Thermopile
2	Spectral Response	Lower range 0.285 to 0.3 Microns Upper range 2.8 to 3.0 Microns
3	Sensitivity	Minimum 7 Microvolt/w/m ²
4	Time response (95%)	Less than 15 s
5	Zero offset	
(a)	Response to 200 W m ⁻² net thermal radiation (ventilated)	7 W/m ²
(b)	Response to 5 K h ⁻¹ change in ambient temperature	2 W/m ²
6	Resolution	1 W/m ²
7	Stability (percentage of full scale)	0.8
8	Directional response for beam radiation (as per the definition of WMO)	10 W m ⁻²
9	Temperature response (percentage maximum error due to any change of ambient temperature within an interval of 50 K)	2
10	Non-linearity (percentage deviation from the responsivity at 500 W m ⁻²)	0.5
11	Spectral sensitivity (percentage deviation of the product of spectral absorptance and spectral transmittance)	2
12	Tilt response (percentage deviation from the responsivity at 0° tilt (horizontal))	0.5
13	Achievable uncertainty (@P95)	
(a)	Hourly totals	3%
(b)	Daily totals	2%
14	Output Signal	Analogue form which is compatible with the Data Logger System & SCADA
15	Input Power for instrument & Peripherals	As per system requirement
16	Humidity Range	0-%
17	Field of view	180°
18	Operating temperature range	- 40 to -10 deg C (lower) +70 to 80 deg C (higher)
19	Zero offset thermal radiation	As per manufacturers data

		sheet
20	Zero offset temperature change	As per manufacturers data sheet

Two numbers calibrated Pyranometers shall be installed by the Contractor at project location, preferably near PESS/MCR building as applicable, in a non-shadowed area, to measure the GHI. The exact location shall be finalized during detailed engineering. The output of these two Pyranometers shall be made available to SCADA through the data logger. In addition, provision for downloading the recorded GHI values of the Pyranometers directly from data logger shall also be made.

Calibration Certificate for Pyranometers: Valid Calibration tower certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the Test Reports generated during FAT for approval by SPD. The Calibration Certificates shall be issued by the accredited Third-Party Testing Labs and shall be furnished during FAT. Method & Frequency of calibration of Pyranometers shall be as per Class A of IEC 61724-1.

The readings of the Pyranometers shall not vary beyond addition of the modulus values of their 'Total Instrument Calibration Uncertainty', mentioned in the calibration certificates, on daily basis. The Pyranometer which reads higher GHI value, for the period when they were simultaneously in service will be considered for performance evaluation during O&M Target Generation Test (OTGT) and the O&M period.

During O&M Target Generation Test (OTGT), if the variation of Pyranometer readings is beyond the addition of the modulus values of their 'Total Instrument Calibration Uncertainty' then the GHI values from both Pyranometer will not be considered. O&M Target Generation Test (OTGT), shall be suspended for the entire Solar Power Plant and data of that particular day(s) shall be discarded. The O&M Target Generation Test (OTGT), shall be resumed only after rectification / replacement of sensors, if required, so as to bring down the readings within the limit. The Test periods shall be extended by same numbers of suspended day(s).

During O&M Period, if the variation of Pyranometer readings is beyond the addition of the modulus values of their 'Total Instrument Calibration Uncertainty' then necessary maintenance / corrective action shall be done to bring back the difference within the limits within 3 days. The Pyranometer which reads higher GHI value, for the period for these 3 days will be considered for performance evaluation. If the problem is not resolved within three days, the O&M Charges for the day(s) shall be deducted on pro rata basis while the Pyranometer which reads higher GHI value, for the period will be considered for performance evaluation.

- 13.3. Ambient Air Temperature Sensor:** To measure Ambient Air Temperature, Contractor shall install 2 numbers of RTD type measuring Instruments with proper installation methods. The Instruments shall measure the temperature in the range of - 4°C to +70°C

and shall communicate the Temperature value continuously to SCADA through the Data Logger.

The readings of the Temperature Sensors shall not vary beyond addition of the modulus values of their 'Total Instrument Calibration Uncertainty', mentioned in the calibration certificates, on daily basis. The Temperature Sensor which reads Lower Temperature value, for the period when they were simultaneously in service will be considered for performance evaluation during O&M Target Generation Test (OTGT), and the O&M.

The methodology described for consideration of GHI values from Pyranometers shall be adapted for the Ambient Temperature measurement during O&M Target Generation Test (OTGT), and O&M period also, except for the value considered will be the lower value among the two values.

Valid Calibration certificate shall be furnished along with the Test Reports generated during FAT for approval by SPD. The Calibration Certificates shall be issued by the accredited Third-Party Testing Labs and shall be furnished during FAT. Method and Frequency of subsequent calibration of Sensors shall be as per IEC 61724-1 of Class A.

- 13.4. Wind Speed Sensor:** 2 numbers of Cup type anemometer wind speed sensors shall be provided. The whole sensor shall have high strength, weather resistance, corrosion resistance, and water resistance and will ensure the long-term use of the instrument, and the accuracy of the wind speed collection.

The readings of the wind speed sensors shall not vary beyond addition of the modulus values of their 'Total Instrument Calibration Uncertainty', mentioned in the calibration certificates, on daily basis. The wind speed sensors which reads Higher Wind Speed value, for the period when they were simultaneously in service will be considered for performance evaluation during O&M Target Generation Test (OTGT), and the O&M.

The methodology described for consideration of GHI values from Pyranometers shall be adapted for the wind speed measurement during O&M Target Generation Test (OTGT), and O&M period also.

Valid Calibration certificate shall be furnished along with the Test Reports generated during FAT for approval by SPD. The Calibration Certificates shall be issued by the accredited Third-Party Testing Labs and shall be furnished during FAT. Method and Frequency of subsequent calibration of Sensors shall be as per IEC 61724-1 of Class A.

- 13.5. Module Temperature Sensor:** To measure module Temperature, Contractor shall install 1 temperature sensor per PCSS Block with proper installation methods, as described in IEC 61724. The Instruments shall measure the temperature in the range of - 4°C to +80°C and shall communicate the Temperature value continuously to SCADA through the Data Logger.

Valid Calibration certificate shall be furnished along with the Test Reports generated during FAT for approval by SPD. The Calibration Certificates shall be issued by the accredited Third-Party Testing Labs and shall be furnished during FAT. Method and

Frequency of subsequent calibration of Sensors shall be as per IEC 61724-1 of Class A.

- 13.6. Data logger:** The Data Logger shall be an industrial microprocessor-based unit capable of collecting weather data from field instruments of WMS and PMS have suitable required number of Input Ports. The Output of Data Logger shall be connected to SCADA through suitable interfacing & data network and shall be programmed to stream the measured Weather Parameters of field instruments continuously. Data Logger shall also be programmed to monitor the weather parameters obtained from field instruments constantly to detect abnormality of any Instruments to enable SCADA to initiate appropriate Alarm and immediate warning for recalibration of instrument. Data logger panel shall have a minimum protection of IP 65. The sensitivity of Pyranometer and resolution of Data Logger of Weather Monitoring System shall match such that the Data Logger shall read and record even 1W/m^2 in irradiation with sampling interval and recording interval not less than the values stipulated in the IEC 61724 -1 of class A (However, for accurate measurement of GHI, the data logger shall have the resolution of minimum $0.05\text{micro volt/w/sqm}$ for GHI and the bits of ADC of data logger shall be minimum 24). For other parameters like Ambient Temperature & Wind Speed, the sensitivity of the respective instrument shall match with resolution of data logger and the logger shall be capable of read and record minimum variation of temperature and wind speed sensors and sampling interval and recording interval not less than that of specified in IEC 61724-1 for class A instruments. For other field instruments, the data logger shall follow class B category of IEC 61724-1, as applicable. Contractor shall provide all the documents for data logger capability, instrument manuals and Data Logger Program details during Detailed Engineering.
- 13.7.** Each Instrument to be connected to Data Logger shall be supplied with necessary cables. The signal cable length shall not exceed 20 meters from the instrument to the Data Logger. (The standard 10 m long cable with a pre wired water proof connector plug is preferred).
- 13.8. General requirements of the Meteorological instruments:** All the critical Sensors and Data Loggers shall be installed with tamper proof arrangements and maintained properly to measure the critical meteorological parameters accurately within the tolerance values as specified. Required number of Spare calibrated Instruments and spares for the Data Loggers shall be maintained at site throughout the Contract period for trouble free and interruption free measurement operation, usage during the recalibration of them etc. All the instruments shall have valid Calibration Certificates from accredited Calibration Agencies throughout the contract period.
- 13.9. METEOROLOGICAL DATA**
- 13.9.1.** Sampling and Recording Intervals: As per Class A accuracy of IEC 61724-1 and as specified in section 12.
- 13.9.2.** PVSYST Input File for Performance Evaluation: The input file to the PVSYST software shall be prepared using the data stored in data logger and shall be in PVSYST required format (Standard/Custom) and the time period (Hour/Sub hour) shall be finalized during Detailed

Engineering.

13.9.3. Data Processing: Data processing shall be done as per IEC 61724.

13.10. Drawings & Documents: The following drawings / Documents shall be submitted to SPD during Detailed Engineering for approval.

1) Weather monitoring System - GTP, GA Layout, vendor documents and MQP



SECTION 14.0

LIGHTNING PROTECTION SYSTEM

14.1. General Requirements

14.1.1. The Solar PV Power plant shall be provided with Lightning Protection System (**LPS**) covering Solar array (DC) side and AC side. The lightning protection system must be completed prior to start-up of commissioning activities of the project. The main aim of Lightning Protection System is to protect PV Modules or other sub-system components, Outdoor Electrical Equipment and buildings from any over voltage surge before it reaches the above equipment. The source of over voltage can be lightning or other atmospheric disturbance.

14.1.2. Down Conductor

1. Down conductor shall be straight and follow a direct path to the earth electrode. Length of the conductor shall be minimized. Any joints to the down conductor shall be welded type only.
2. The Down conductor shall be of Hot Dip Galvanized Iron strip in accordance with latest BIS 2633 & BIS 4759 standards and of minimum size 25 X 3 MM. For ESE type Air Terminals, sufficiently sized Earthing Copper Cables with proper support and termination arrangement are also acceptable.
3. For buildings, Down conductors shall be welded outside building Steel columns at one-meter intervals or provide cleats with an interval of 0.75 meter on building walls as applicable. On roofs, necessary arrangement shall be made with supporting blocks of insulating material at an interval of 1.5 meters and avoid directly cleating on surface of roof. Down conductor shall be bonded with metallic structures which are within two-meter vicinity of it. Running of Down conductor through GI conduits shall be avoided.
4. Test link shall be provided to the down conductor at a height of one meter above the ground and there shall not be any other connection below the test link except connection to the earth electrode.

14.1.3. Earth Pit

Each earth pit shall be provided with an earth electrode of 3 M length copper bonded steel rod of diameter not less than 14 mm including accessories and masonry enclosure with cover plate as per BIS 3043. The pit around the electrode shall be treated with carbon-based earth enhancement compound as required as per provisions of BIS 3043. Requirements for earthing enhancing compounds shall conform to IEC 62561-7. The minimum quantity of earth enhancement compound to be used with each earth-pit shall be 25 Kg. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance. For each earth pit, necessary Test Point shall be provided. The distance between earth pits shall be more than 3 meters.

14.2. Lightning Protection of PV Array Yard

- 14.2.1.** The PV Array Yard and the other sub-system components shall be protected against lightning using Early Streamer Emission Type in accordance with the latest NFC 17-102 and shall be of class III or higher and the same shall be type tested. Wherever required, ESE Air Terminals shall be provided at the highest point to cover the Array and sub-system components. Design calculation for the required Number of ESE Type lightning system shall be submitted during detailed engineering for approval by SPD. The selection of location of each Lightning System shall be done in proper approach so that it does not cast shadow on the PV Modules in conformation with the overall shadow analysis.
- 14.2.2.** The lightning system shall include ESE type lightning terminal, a Supporting Pole and 2 sets of separate Earthing arrangement with down conductor, test links and Earth pits Etc. as described in Clause 14.1.
- 14.2.3.** Necessary concrete foundation for holding the Supporting Pole for the ESE type lightning terminal at the desired height in position along with supporting anchors shall be provided. Consideration of maximum wind speed and maintenance requirement at site in future also shall be done during design.
- 14.2.4.** Each of the Down Conductor shall be connected to the respective Earth Electrodes in the Earth Pit. Both Earth Electrodes shall be interconnected to achieve Earth Resistance not more than 10 Ω .

14.3. Lightning Protection for Sub Stations & Buildings:

- 14.3.1.** Lightning protection for Sub Stations & Buildings shall be as per BIS/IEC 62305. The Lightning protection system for buildings shall comprise of lightning conductors on the roof with spike rods at the highest point above roof.
- 14.3.2.** The lightning conductor shall be earthed through flats and connected to the Earth mats as per applicable Indian Standards with earth pits. Each Lightning Conductor shall be connected to the individual earth pit as per required Standards including accessories.
- 14.3.3.** The EPC shall ensure adequate lightning protection to provide an acceptable degree of protection (minimum protection class 3) as per BIS for the substation including transformer. Adequate number of Lightning Protection Systems shall be provided in accordance with the theoretical lightning design calculations which shall be submitted for approval by SPD during detailed engineering.
- 14.3.4.** Alternatively, Lightning protection for Sub Stations & Buildings with Early Streamer Emission Type in accordance with the latest NFC 17-102 will also be acceptable.
- 14.4. Drawings & Documents:** During Detailed Engineering the following Drawings and Documents for Lightning Protection System and its Earthing System of PV Array, PCSS, PECS & Buildings shall be submitted for approval by SPD.
1. LA - Design calculation & LA - Layout
 2. LA - GTP, GA & vendor documents, Type Test Certificate for ESE Terminal.



SECTION 15.0
AUXILIARY POWER SUPPLY SYSTEM

15.1. General Requirements

- 15.1.1. Contractor shall provide exclusive Auxiliary Power Supply System to cater the needs of 415 V, 3 ϕ , 4 Wire, 50 Hz loads, in order to meet auxiliary power requirements of the solar power plant.
- 15.1.2. The Power distribution shall be through Auxiliary transformers and appropriately designed AC Distribution Panels to cater the requirements of Critical and general Loads of the solar power plant.
- 15.1.3. For sizing calculation of auxiliary transformers, power factor of 0.8 lag, design margin of 20% for future needs shall be considered.
- 15.1.4. Associated cable rating for the Auxiliary Power Supply System shall be chosen such that the voltage drop at any of the remote consumption points shall not exceed 3%.
- 15.1.5. The Auxiliary Power Supply System shall feed Lighting System, UPS system with battery, some auxiliary loads of SCADA System & switchgear panels, Air Conditioners, ventilation fans, water pumps, IDT auxiliary supply, Inverter auxiliary supply, CCTV and other system loads as applicable.
- 15.1.6. Design details of both Auxiliary Power Supply System in PESS/MCR and PCSS: The Auxiliary Power Supply System shall be fed from two 100% capacity rated sources. The status and alarm conditions of both the sources shall be indicated to the SCADA System. Design details shall be submitted for approval of SPD during detailed engineering.

15.2. Power Collection Sub Station (PCSS)

- 15.2.1. PCSS shall have Auxiliary Power Supply System with ACDB (LT Panel) integrated with suitable rated LV Auxiliary Transformers. The Power shall be drawn from LV sides of Inverter Duty Transformer or as per the system requirement.
- 15.2.2. In PCSS, the Auxiliary Power Supply System shall be fed from two 100% capacity rated sources, one Normal and the other Standby, with an Automatic Change Over Scheme. Normal source shall supply power during regular operation, failure of which shall result in Auto Changeover to Standby source.

15.3. Power Export Sub Station (PESS)/Main Control Room (MCR)

- 15.3.1. PESS/MCR shall have Auxiliary Power Supply System with ACDB (LT Panel) which shall be fed from HT (as per system requirement) supply through one number of suitable 100% capacity rated auxiliary transformer and another 100% capacity rated Auxiliary Transformer from the nearest PCSS/MCR/Power Collection Block, as applicable or using another HT auxiliary transformer.
- 15.3.2. Total loads in PESS/MCR shall be distributed between the two sources such that each auxiliary source supplies 50% of the total load. Bus coupler shall be used in order to

separate the loads and proper arrangement shall be made to supply the total load by any one source in case of failure of other source automatically.

- 15.3.3. The (as per system requirement) PESS/MCR auxiliary Transformer shall comply to the General requirements of Transformer and shall be sized as per the system requirement.

15.4. Auxiliary LT Panel:

- 15.4.1 Incoming AC supply from Auxiliary Transformers shall be fed to Aux. LT Panel through suitable MCCBs and shall be sized in such a way to cater the auxiliary loads of the PESS/MCR.
- 15.4.2 LT Panel shall be of metal enclosed, Indoor/Outdoor, floor-mounted, freestanding type. LT Panel frames and load bearing members shall be fabricated using suitable Mild Steel structural sections or pressed and shaped Cold Rolled Sheet Steel of thickness 2.0 mm. Frames shall be enclosed in cold rolled sheet steel of thickness 1.6 mm. Doors and covers shall also be of cold rolled sheet steel of thickness 1.6 mm. Stiffeners shall be provided wherever necessary. The gland plate thickness shall be 3.0 mm for hot / cold-rolled sheet steel and 4.0 mm for non-magnetic material.
- 15.4.3 LT Panels shall be of dust-proof and vermin-proof construction and shall be provided with a degree of protection IP 5X outdoor or better as per BIS/IEC 60947. All doors and cut-outs shall be provided with EPDM / Neoprene gaskets. The doors shall be of hinged type.
- 15.4.4 LT Panels shall be supplied with base frames made of structural steel sections, along with all necessary mounting hardware required to the foundation.
- 15.4.5 LT Panels shall be provided with three phase and neutral bus bars. Bus bars shall be of Copper or Aluminium. Entire busbar system shall be insulated with PVC sleeves. Busbar sleeves shall be compliant to UL224 (Extruded insulating tubing), CE/UL certified, having fire retardant properties and working temperature of 105°C.
- 15.4.6 The cross-section of the bus bars shall be uniform throughout the length of switchboard section and shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents. Neutral busbar short circuit strength shall be same as main bus bars.
- 15.4.7 The Contractor shall furnish calculations establishing the adequacy of bus bar sizes for specified current ratings. All bus bars shall be colour coded as per BIS: 375.
- 15.4.8 A galvanized steel / Copper / Aluminium earth bus shall be provided at the bottom of each panel and shall extend throughout the length of each switchboard. It shall be welded / bolted to the framework of each panel. The earth bus shall have sufficient cross section to carry the momentary short circuit and short time fault current to earth without exceeding the allowable temperature rise.
- 15.4.9 The minimum clearance in air between phases and between phases and earth for the entire bus bars (sleeved or insulated) shall be 25 mm. For all other components, the clearance between "two live parts", "a live part and an earthed part", shall be at least ten (10) mm throughout. Wherever it is not possible to maintain these clearances, insulation shall be provided by sleeving or barriers. All connections from the bus bars up

to switch / fuses/MCCB shall be fully insulated and securely bolted to minimize the risk of phase to phase and phase to earth short circuits.

- 15.4.10 Cable termination arrangement for power cables shall be suitable for heavy duty, 1.1 kV grade, stranded aluminium conductor, PVC/ XLPE insulated, armoured / unarmoured and PVC sheathed cables. All necessary cable terminating accessories such as supporting clamps and brackets, hardware etc., shall be provided by the Contractor, to suit the final cable sizes.
- 15.4.11 All auxiliary wiring shall be carried out with 650 V grade, single core stranded copper conductor, colour coded, PVC insulated wires. Conductor size shall be 1.5 mm² (min.) for control circuit wiring and 2.5 mm² (min) for CT and space heater circuits.
- 15.4.12 The MCCBs shall be fixed modular type, air break type, having trip free mechanism with quick make and quick break type contacts. All MCCBs shall have current limiting feature, inbuilt front adjustable releases (overload & short circuit) and shall have adjustable earth fault protection unit also. The protection settings shall have suitable range to achieve the required time & current settings. LED indications & Auxiliary switches for remote monitoring shall also be provided for faults, MCCB status (on/off etc.).
- 15.5. **SCADA Requirement:** The Status / parameters of the following Equipment of Auxiliary Power System shall be communicated to SCADA.
- a) Status of the MCCBs and Critical MCBs.
 - b) Parameters of Aux. Transformer.
- 15.6. **Small Power Installation:** Sufficiently rated, 415 V, 3 Ø, 4/5 pin configuration, industrial, interlocked switch socket outlets, in weather proof enclosure shall be provided in appropriate locations for the purpose of availing supply during Testing / maintenance of outdoor equipment like transformer Etc.
- 15.7. **Drawings & Documents:** During Detailed Engineering the following particulars of the "Auxiliary Power Supply System" shall be submitted for approval by SPD.
- 1) Auxiliary Power Supply System - Sizing Calculation & SLD
 - 2) Auxiliary Power Supply System ACDBs - GTP, GA and vendor documents
 - 3) Auxiliary Power Supply System ACDBs - MQP
 - 4) Auxiliary Transformer - GTP, GA and vendor documents
 - 5) Auxiliary Transformer - MQP
 - 6) Auxiliary Transformer - Foundation details



SECTION 16.0
CONTROL POWER – DC SYSTEM: CHARGERS & BATTERIES

DELETED



SECTION 17.0

CONTROL POWER – AC SYSTEM: UPS & BATTERIES

17.1. General Requirements

17.1.1. Uninterrupted Power Supply (UPS) shall be provided to SCADA and other systems requiring uninterruptible power as part of PESS /MCR & PCSS Auxiliary Power Supply Systems.

17.1.2. The UPS System shall consist of rectifier/charger, batteries, inverter, static bypass, manual bypass, protective devices, UPSDB and accessories. During normal operation, UPS System shall satisfactorily function without Battery in the circuit under all load conditions. Upon failure or deterioration of the normal AC Input supply, UPS shall automatically provide continuous supply of electric power to its load within tolerances and without interruption.

17.2. Uninterrupted Power Supply (UPS)

17.2.1. The UPS module shall be Industrial Grade, Static type providing 100% power backup for one (1) Hour to SCADA and other systems powered by it. The continuous power rating of the UPS shall be selected by the Contractor based on the power demand. The minimum UPS rating shall be 2 KVA and it shall be over entire battery voltage range at specified power factor. UPS shall maintain the output voltage within acceptable limits at all loads, from full load to no load.

17.2.2. Power factor of 0.8 lagging shall be considered for capacity calculation of UPS with a design margin of 10% at 50 deg C. The UPS shall have an overload capacity of 125 % rated capacity for 10 minutes and 150 % rated capacity for 10 seconds.

17.2.3. The UPS system shall be of double-conversion type conforming to BIS: 16242 / IEC 62040. The overall efficiency of the UPS system, output to input, shall not be less than 90% at 50% of rated load. Selection of overall rating, output power characteristic variations, wave form, frequency and load limits, response times, battery type & sizing, alarm & shut down conditions, etc., shall be the responsibility of the Contractor.

17.2.4. The UPS system shall be of modular / non modular type design and made up of one or more physically detachable equipment modules or cabinets, preferably of the draw-out type and removable from the front of the UPS. The UPS System shall be constructed in heavy duty metal enclosure, the housing / rack of the battery shall be corrosive resistant and both shall be designed for floor mounting. The Enclosure shall be of outdoor type and with protection class IP-5X.

17.2.5. All active electronic devices shall be solid state. All semiconductor devices shall be hermetically sealed. All relays shall be of dust proof design. All power semiconductors in the module shall be protected by fast acting fuses so that the failure of any one power semiconductor will not cause cascading failures. Each fuse shall be provided with a blown fuse indicator on the control panel.

- 17.2.6.** The UPS module shall not incur permanent damage to itself and the connected load under all predictable types of failure conditions within itself and the connected load. Fast acting current limiting devices shall be used to protect against failures of solid-state devices. The total harmonic current distortion that generated by the UPS shall be within acceptable limits i.e., total harmonic content shall be less than 5% and any single harmonic content shall be less than 3%.
- 17.2.7.** The UPS system module shall be provided with built in digital panel for control and monitoring. In addition, the UPS system shall be provided with suitable output interface for connection to SCADA to allow remote monitoring of the operating status of the UPS system.
- 17.2.8.** The temperature rise inside all the cabinets/enclosures shall not exceed 10 deg. C above ambient temperature.

17.3. Battery

- 17.3.1.** The rated name plate AC output capacity of UPS shall be taken for UPS battery size calculation for one (1) hour backup.

Battery:

Specifications:

1.	Type of cell	:	Valve regulated lead acid type (VRLA) only and the battery shall be located in a safe environment as recommended by the OEM.
2.	Load	:	To meet the requirements SCADA system panels and auxiliaries, Emergency lighting etc. as per System requirement.
3.	Battery capacity	:	Sizing of battery shall include a design margin of 10%, ageing factor of 1.25, End Cell voltage of 1.75 V, Temperature correction factor corresponding to 10° C and the AH Capacity shall be based on 1 - hour rate of discharge.
4.	Duty	:	Sub Station duty
5.	End cell voltage	:	1.75 Volts.
6.	Nominal voltage per cell & Float Voltage per cell	:	As per System requirement
7.	Ampere hour efficiency	:	Better than 90%
8.	Watt hour efficiency	:	Better than 80%
9.	Self-discharge	:	Not to exceed 1% per week.

10.	Accessories	:	• Battery rack made of acid resistant paint coated steel sheet. • Set of lead coated heavy-duty copper strips with bolts and nuts as inter cell and inter row connectors. • Cell testing voltmeter. • Thermometer with temperature correction chart.
11.	Standards to comply (Latest editions) All Battery components such as containers, electrolyte, connectors, fasteners, vent plugs, plates, sediment space, cell insulators, racks etc. shall comply respective standards	:	1. IEEE 485 - Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications 2. IEC 60896: Stationary lead-acid: Valve regulated types - Requirements 3. BIS 266: Sulphuric Acid - Specification 4. BIS 1069: Quality Tolerances for Water for Storage Batteries - Specification 5. BIS 1146: Specification for Rubber and Plastics Containers for Lead-Acid Storage Batteries 6. BIS 1652: Stationary Cells and Batteries, Lead-Acid Type with Plante Positive Plates- Specification 7. BIS 3116: Sealing Compound for Lead-acid Batteries (Bitumen Based) - Specification 8. BIS 8320: General Requirements and Methods of Tests for Lead-acid Storage Batteries 9. BIS 6071: Specification for Synthetic separators for lead-acid batteries. 10. if any other international or national standard followed; details shall be furnished.

17.4. Drawings & Documents: During Detailed Engineering Sizing, scheme, SLD, rating calculations of rectifier/charger, batteries, inverter and battery sizing calculations and data sheets etc. of “UPS and Batteries” shall be submitted under the following Drawing titles for review and approval by SPD.

- 1) UPS with Battery for PESS, PCSS (as applicable)– Sizing Calculation
- 2) UPS with Battery for PESS, PCSS (as applicable)– GTP, GA & vendor documents
- 3) UPS with Battery for PESS, PCSS (as applicable) – MQP



SECTION 18.0 LIGHTING SYSTEM & CCTV SYSTEM

18.1. Lighting System

18.1.1. General Requirements

- 1) Solar Plant shall be provided with adequate lighting throughout the plant.
- 2) Lighting system shall be fed from 415V, 3 phase, 4 wire system from ACDB of PESS /MCR & PCSS respectively, through Lighting Distribution Boards (LDBs). 20% of the total lighting system shall be considered as Emergency lighting and it shall be supplied from UPS DB as per the scheme adopted by Contractor and the 20% of the emergency lighting load shall be considered for sizing of UPS. Emergency lighting shall be provided at each PCSS, PESS, Security Room / Main gate.
- 3) **Lighting fixtures and accessories:** All lighting fixtures shall be complete with lamp, lamp holder, clamps, terminal blocks, brackets, locking arrangements, etc. Fixtures shall be designed for minimum glare and not to form any bright spots by direct lighting or by reflection. The reflectors shall be manufactured from CRCA sheet steel or aluminum.
- 4) All lighting fixtures shall be provided with an external, brass/GI earthing terminal suitable for connecting to 14 SWG, GI earthing wire. All metal or metal enclosed parts of the housing and accessories shall be bonded and connected to the earthing terminal as so to ensure satisfactory earthing continuity throughout the fixture.
- 5) **LED Luminaries:** LED Luminaries shall be used for indoor / outdoor lighting in Array Yard, PCSS, PESS, PSS, Security room / main gate as applicable. For DC Lighting LED Luminaries shall be used subject to the availability. LED lamp fixtures shall be indoor type and pre-wired comprising of Lamp(s) with lamp holder(s), Electronic powering unit(s) and metal reflector(s). The lamp fitting shall be covered by Glass or Perspex material. The Lamp Fixture shall be fitted on roof. The number of lighting fixtures should be such that it should give sufficient luminance level for comfortable operation as per BEE standards. All the LED Luminaries shall comply to the respective Indian Standards (BIS).
- 6) **Switches:** All the switches and receptacles shall be of modular type and these shall be provided with pre-galvanized/galvanized modular switchbox & plate.
- 7) **Junction Boxes:** Junction boxes for indoor / outdoor lighting shall be provided as applicable. Indoor junction boxes shall be fire retardant and outdoor junction boxes shall have IP 55 degree of protection.
- 8) **Conduits, Pipes and Accessories:** Heavy duty PVC conduits conforming to BIS: 9537(Specifications Conduits for Electrical Installations: Part-III - Rigid Plain Conduits of Insulating materials) along with various accessories shall be used for

indoor wiring in the buildings. These conduits shall be concealed in the wall/floor/roof.

- 9) **Lighting Wires, Lighting Poles:** For Technical requirements of wires, refer to the Section 8.0 of this specifications. Lighting Poles shall be designed as per the respective BIS and shall be capable of withstanding the wind gust prevailing at site. The lighting poles shall have loop in loop out arrangement for cable entry. The Lighting Poles shall be positioned in such a way to avoid casting Shadow on the nearby PV array.
- 10) **Earthing:** Junction boxes, switch boxes, fixtures, etc. shall be earth through a separate earth conductor. Lighting panels shall be earthed to plant earthing system with two separate connections.
- 11) Automated switching control through industrial timers provided at LDBs shall be made available for the outdoor lighting such as PV array yard / road lighting. There shall also be provision for manual operation of switching by bypassing the timers.
- 12) Lighting and its power system design, calculations and drawings shall be submitted for approval by SPD during Detailed Engineering.

18.1.2. PV Array Yard Peripheral Road & Internal Road Illumination:

- 1) The Contractor shall provide adequate PV array Yard Lighting System that includes erection of poles, fixtures and cables as per BIS standards, along the internal roads and Peripheral Roads keeping the general security in mind. The PV array Yard Lighting System shall be fed from the Auxiliary Power Supply System of the nearest PCSS / PESS, through buried cable network. Also, contractor is allowed to adapt solar lighting system which shall be finalized during detailed engineering.
- 2) Along the Peripheral & Internal Roads, illumination shall be provided with Street light poles of minimum pole height of 3.5 meters and 35 meters inter-pole spacing and luminaries of LED type with minimum 30 W.

18.1.3. Power Collection Sub Station: Deleted.

18.1.4. Power Export Sub Station Building/Main Control Room: Indoor lighting for the SCADA and Office rooms shall have adequate average illumination level of 300 Lux, Store room and Switch gear rooms shall have an average illumination level of 200 Lux and 150 Lux respectively. External Wall mounted luminaries shall be provided on all directions to have a uniform and sufficient lighting around the PESS building.

18.1.5. Outdoor Electrical Equipment: To illuminate the outdoor space wherein electrical equipment are installed, sufficient number of luminaries with necessary supports / Poles shall be provided to achieve an average Illumination level of 50 Lux on the equipment and 20 Lux in general.

18.2. CCTV SYSTEM

- 18.2.1.** Surveillance CCTV system is required to ensure effective surveillance of solar power plant area (array yard, PCSS Control Rooms, PESS, PSS Control Room, etc.) as well as create a tamperproof record for post event analysis. The System shall provide an online display of video images on Large LCD/LED monitors as per Industry standard of not less than 65" size shall be located in SCADA Control Room. Necessary Devices to view the same display at a remote location through internet shall be provided.
- 18.2.2.** The Contractor shall make use of the 2 allocated cores of Fiber optic Network of SCADA for CCTV system. Also, wireless communication may be used according to the site requirement in certain areas.
- 18.2.3.** System should facilitate viewing of live and recorded images and controlling of all cameras by the authorized users present in the CCTV Local Area Network (LAN). System should provide interoperability of hardware, OS, software, networking, internet connection, printing, database connectivity, reporting, and communication protocols. System expansion should be possible through off-the-shelf available hardware. Equipment with better specifications shall be accepted.
- 18.2.4.** All CCTV Cameras provided shall be day/night vision type and should have low lux so that the same can operate in minimum illumination also. Cameras should be IP cameras, should have remote swivel arrangement, should have both auto/manual focus mode and control should also be both manual/auto.
- 18.2.5.** The system should be based on Stand Alone Integrated NVR (Network Video Recording). Specifications of Stand-Alone Integrated NVR
- 1) Ability to connect Cameras as per requirement,
 - 2) Facility to store 90 days of Video,
 - 3) Capability to set the frame rate, contrast, brightness of each individual camera,
 - 4) Should have facility to view live video (with audio) images in a monitor, in a PC and web browser.
 - 5) Remote Administration: Should be fully administrable/ programmable remotely through client software and web browser.
 - 6) Recording rate per channel – NTSC/30 fps per channel, PAL/25 per channel.
 - 7) Configurable/adjustable recording rate.
 - 8) Full recording and playback facilities on remote machine.
 - 9) Smart monitoring (Motion Detection).
 - 10) Adjustable motion detection (motion detection sensitivity should be adjustable).
 - 11) Ability to convert H.264 video into AVI files.
 - 12) Date and time stamping of video files.
 - 13) Viewing for all cameras.
 - 14) Should support backup devices like USB drive, DVD writer NVR Software must be able to take backup in DVD writer, USB drive etc. Remote controller shall be available for operating the NVR.
 - 15) Should have live display, playback, record facilities.

- 16) Should have minimum 1 USB port.
- 18.2.6.** System should have the capability of increasing the storage capacity as and when required.
- 18.2.7.** It should have low maintenance cost and should be upgradeable to inputs for more cameras, as and when required, with minimum cost.
- 18.2.8.** It should be compatible with alarm system.
- 18.2.9.** IP Cameras are to be provided with suitable LAN and the Cameras should be C-mount type.
- 18.2.10.** The firm installing the system should have adequate infrastructure for providing after sales/installation service.
- 18.2.11.** Minimum 15 nos. of suitable Cameras shall be strategically located to uniformly cover the entire area of the SPP including the following Locations.
- 1) Power Collection Sub Station Control Room
 - 2) Array Yard
 - 3) Main Entrance gate
 - 4) Power Export Sub Station Control Room
 - 5) Critical Locations of the Periphery (CCTV may be placed on separate poles / on Lighting Poles).
 - 6) WMS.
- 18.2.12.** Technical Specifications of Cameras
- 1) Box/PTZ Camera - 1/3" CCD / CMOS Colour camera with C mount Auto iris lens
 - 6mm Lens with Auto Iris Lens
 - 1920*1080 HD resolution
 - 0.5 Lux at F 1.2 minimum illumination
 - PTZ camera with 270 deg swivel arrangement with remote operation shall be used at important places and Box camera at other places which shall be finalized during detailed Engineering.
 - 2) Dome Camera – 1/3" CCD / CMOS Colour Camera
 - 4mm Fixed focal lens
 - 1920*1080 HD resolution
 - 0.4 Lux at F 1.2 minimum illumination
 - 3) Camera – Infra Red (Night Vision)
 - 1/3" CCD / CMOS Color
 - 3.6/4 mm lens with Infra-Red
 - Selectable mode for Day and Night
 - C/CS mount
 - Fixed Board Lens
 - lux minimum illumination
- 18.2.13.** Video Cable: Video cable suitable for NVR shall be provided by the Contractor.

18.2.14. Power Cable: Where ever provided, the power cables shall be of suitable rating to with stand the load and Voltage spikes.

18.2.15. Other technical requirements:

- 1) The NVR system should have CE certification with certificates
- 2) All Cameras must be provided with suitable mounts/housings Wall, Dome etc.
- 3) All cameras must be connected with NVR system with suitable cables (with heavy gauge PVC conduits) and Contractor must lay and dress the necessary cables to connect NVR with cameras.
- 4) The NVR system offered must be an integrated NVR system and should not be an NVR system assembled using third party Personal Computers and NVR cards.

18.2.16. Training Aspect - At the time of installation of equipment, the vendor shall offer free training at site specific to CCTV system.

18.3. Drawings & Documents: During Detailed Engineering the following particulars of the "Lighting System & CCTV System" shall be submitted for approval by SPD.

- 1) Lighting system PESS& PCSS - Design, Luminaire details & Layout
- 2) Lighting system security building - Design, Luminaire details & Layout
- 3) Lighting system Outdoor Yard and Roads - Design, Luminaire details & Layout
- 4) Lighting pole foundation details.
- 5) CCTV System – Design, Scheme, Layout & Data sheets etc.



SECTION 19.0

FIRE PROTECTION SYSTEM

19.1 Introduction

Fire Protection System shall consist of a Central Fire Detection & Alarm System with Fire alarm Control Panels and Fire Fighting Equipment and shall be installed in the Solar Power Plant premises. The system shall be suitable for protection of entire equipment including outdoor Electrical Equipment, as per CEIG requirements against the risk of fire. Contractor shall comply with recommendation of Tariff Advisory Committee / LPA for incurring minimal premium for insurance. Contractor shall be responsible for getting the approval for the fire protection system from concerned authorities for insurance, meeting any additional requirement as demanded by such authorities without any extra cost to SPD.

19.2 Fire Detection & Alarm System:

19.2.1 Central Fire Detection & Alarm System (CFDAS):

1. A Central Fire Detection & Alarm System shall be provided in the Power Export Sub Station (PESS) to monitor all the Equipment and the Buildings located in all PCSS and PESS against any fire related events and initiate Unambiguous Visual & Audible alerts. This dedicated, floor mounted, standalone Central System shall have the CPU & suitable Display Unit installed in an Enclosure and serves as the Master.
2. All the Fire Alarm Control Panels (FACP) installed across the Solar Power Plant shall be connected to this Master CFDAS through suitable interfacing devices & dedicated redundant Fibers of FO cables in a ring network and all signals from FACPs shall be brought to this Master CFDAS.
3. The Central System shall be able to represent the whole configuration of site graphically with reference to the Fire Protection system and shall have the facility to monitor, navigate and control the FACPs installed at various locations from a single window. Visual & Audible alerts for all the events like fire/ smoke, fault in the CFDAS / FACP Systems, power supply failure, communication failure etc. shall be made available. Provision to analyze the system through an extensive History log shall be one of the features of this Central Fire Detection & Alarm System.
4. All the Alarm conditions of entire zones of solar Power Plant shall be immediately announced on CFDAS through Audio / Flashing Visual alarms. Necessary features like Acknowledge, Sound Cancel, Steady Display of active alarm conditions, and recognition & Reset of inactive alarms shall be provided.
5. The Central Fire Detection & Alarm System shall be integrated with SCADA system replicated with the above features through proper interface, communication means and authenticated software. Mod bus RS485 communication, as applicable, is also acceptable.

19.2.2 Fire Alarm Control Panel (FACP):

1. FACP shall be an intelligent microprocessor based addressable Control Panel of modular construction complete with central processing unit, input and output modules, power supply module, supervision control and isolator modules with 10% spare provisions.
2. All the potential locations/ Electrical equipment for Fire Vulnerability shall be installed with adequate number of alarm initiating devices (e.g., multi sensor type Heat / Fire / smoke detectors), Audio device, Manual Call Points and alarm notification appliances etc. and shall be connected to the dedicated FACP. All the rooms where Electrical Equipment and Air conditioners are installed, Office Room, Store Room, SCADA room etc. are some of the locations considered as potential locations for Fire Vulnerability. For Outdoor Electrical Equipment, suitable Heat / Fire / smoke Sensors shall be installed and connected to the FACP. The status of NIFPS of Transformers also shall be monitored through FACP.
3. Alarm conditions initiated by the sensors in a zone connected to the FACP shall be immediately announced by the FACP through flashing Visual alarm accompanied with the Audio alarm continuously until the alarm has been acknowledged. Acknowledgment shall stop the Audio Alarm and make the visual alarm to be steady till it is active. Reset of the Visual Alarm shall be done only after the alarm condition vanishes. A subsequent alarm condition received from another zone after acknowledgement shall announce the new alarm information as above.
4. All the addressable FACPs shall be connected with the Master CFDAS located at PESS. FACPs shall be installed in Power Collection Sub Stations (PCSS), Power Export Sub Station (PESS) and the Security Office at the Main Gate and any other mandatory locations.

19.3 Fire Fighting Equipment: The firefighting equipment like portable DCP type fire extinguishers for fighting electrical fires shall be kept in strategic locations of all the buildings inside the Solar Power Plant including Security office at the main gate, HT Switch gears and the Transformer fire protection cubicle as applicable. The design basis for the selection of location, type, capacity and quantity of such portable DCP fire extinguishers shall be furnished during detailed Engineering.

19.4 Drawings and Documents: The following drawings / Documents shall be submitted to SPD during Detailed Engineering for approval.

- 1) Fire Detection & Alarm System - CFDAS & FACP and other accessories - GTP, GA, Schematic Diagram, Layout, vendor documents & MQP.
- 2) Fire protection system - DCP fire extinguisher and Clean agent gas extinguisher etc. - Design, Layout, GTP and vendor documents.



SECTION 20.0

POWER EVACUATION SYSTEM & TARIFF METERING

20.1. Power Pooling System: Power evacuation of the proposed Solar PV plant from PCSS to the point of connection shall be done by Contractor, through OG (Over Ground) cables.

The scope of the Power evacuation works shall include Engineering, Supply (Excluding supply of 33KV cables), Erection and Testing & Commissioning of the following systems to enable export of Power.

1. Power Evacuation System between PCSS and Point of connection at System required voltage level.
2. All the interfacing works like protection, control, data integration, and display etc. in coordination with the respective Original Equipment Manufacturers (OEM) & SPD shall be in the scope of the Contractor.
3. Energy Tariff metering System shall be with two energy meters (main and check) shall be erected at the Point of connection as per the requirements of concerned authorities. Energy Meters shall be with 0.2s accuracy and they shall abide by the relevant CERC / GERC Regulations, Grid Code, and Central Electricity Authority (Installation and Operation of Meters) Regulations, 2019 as amended from time to time.
4. SCADA equipment and data communication scheme through Fiber Optic Cable for extending the designated data from the PSS as applicable to SCADA system and voice communication arrangement.
5. Provision of required & Statutory (IE rules/CEA norms) Protection Systems for the Equipment / Systems of SPP from PCSS to Point of connection including the Relay coordination setting calculations shall be under the scope of Contractor.
6. Establishing Grid connectivity between PCSS/PESS and Point of connection by following necessary precautions and safety measures in coordination with the concerned authorities.
7. Suitably designed Earthing and lightning Protection scheme for the total Power Evacuation system as per the existing practice and requirements of the latest Standards and Regulations.
8. All other related works for evacuation of power as per system requirement.

20.2. OG CABLES:

The OG cables to evacuate the power generated to Point of connection shall conform to the requirements as per Section 5.0 and as per the existing practice and requirements of latest CEA Regulations / IE Rules and shall be finalized during detailed engineering and approved by SPD.

20.2.1. Conductor: Deleted**20.2.2. Applicable Standard: Deleted****20.3. TRANSMISSION TOWERS: Deleted****20.4. Optical Ground Wire Scheme (OPGW): Deleted****20.5. Detailed & Check Survey**

- a) The Contractor shall take care of the following points while doing the detailed survey.
 - i. The route of power evacuation through OG Cables up to Point of connection shall be as per approval from SPD.
 - ii. Crossing with permanent objects shall be minimum but where unavoidable preferably with smooth curvature.
 - iii. Final quantity of the OG cables shall be estimated by the Contractor, on completion of the detail survey, preparation of route profile drawing and designing of the different items as elaborated in the specification and scope of work.
- b) After completing the detailed survey, the Contractor shall submit the final profile and route layout for final approval by the SPD. To facilitate checking of the alignment, suitable reference marks shall be provided.
- c) The Contractor shall undertake the check survey during execution on the basis of the alignment profile arrived after the detailed survey. During check survey, minor changes due to unavoidable constraints, the Contractor may have to change the said alignment after obtaining prior approval from the SPD.

20.5.1. Outdoor Switchyard Equipment & Works: Deleted.**20.5.2. Steel Structural Work: Deleted.****20.5.3. Aluminium Tubular conductors, Clamps and Connectors: Deleted.****20.5.4. Vacuum Circuit Breakers: Deleted.****20.5.5. Isolators: Deleted.****20.5.6. Instrument Transformers: Deleted.****20.5.6.1 General Requirement of Current Transformers (CTs) : Deleted.****20.5.6.2 General Requirement of Potential Transformers (PTs): Deleted.****20.5.7. Surge Arrestor: Deleted.****20.5.8. Insulators & Fittings: Deleted.****20.5.9. Control and Protection Relay Panel: Deleted.****20.5.9.1 Protection Relays: Deleted.****20.5.9.2 Instruments and Meters: Deleted.**

20.5.9.3 Interlocking Facilities: Deleted.**20.5.9.4 TESTS: Deleted.**

20.5.10. TARIFF METERING SYSTEM: Suitably designed Tariff Metering System to measure the generated energy shall be placed at the Point of connection. Tariff Metering scheme shall have the following features.

- 1) Available based tariff (ABT) Net energy meters shall be microprocessor based multi-function type and shall be suitable for billing purposes with necessary sealing arrangement as per system requirements. Energy meter shall be 0.2s accuracy class suitable for ABT requirement with metering panel. Two nos. of ABT energy meters (Main and check) as per system requirement shall be provided by the Contractor. CT & PT signals shall be extended to the ABT energy meters from the dedicated metering CT (0.2S class of accuracy) & metering PT (0.2 Class of accuracy).
- 2) ABT Meters shall be suitable for interfacing and synchronizing the built-in clock of the meter by GPS time synchronization equipment. Contractor shall synchronize the meter using GPS time synchronization equipment. All the hardware required for synchronization shall be in scope of Contractor.
- 3) The responsibility of arranging for the meters, its inspection/calibration/testing charges etc. from Statutory authorities rests with the Contractor and all charges incurred on Meter testing, shall be borne by the Contractor.

4) Technical Requirements of Energy Meters

- I. The meters shall be capable of measuring voltage, current, frequency, power factor, active and reactive power, real and reactive energy, maximum demand etc. The meters shall have facility to monitor power interruptions, run hour with power on time and off time with date. The meters shall have crisp high visibility display and scrolling facility to display the desired parameter.
- II. The meters Shall carry out measurement of active energy (both import and export) and reactive energy (both import and export) by 3-phase, 4 wire principle suitable for balanced/ unbalanced 3 phase load.
- III. The active and reactive energy shall be directly computed by using CT & PT primary ratings. The reactive energy shall be recorded for each metering interval in four different registers as MVARh (lag) when active export, MVARh (Lag) when active import, MVARh (lead) when active export, MVARh (Lead) when active import.
- IV. The meters Shall have an optical port and /or RS 232/485 port on the front of the meter for data collection from either a hand-held meter reading instrument (MRI) having a display for energy readings or from a Laptop with suitable software. The Contractor shall supply the MRI and/or Laptop complete with all optical interface unit required.
- V. Two separate registers shall be provided to record MVARH when system voltage is more than 103% and is lower than 97%.

- VI. The meters Shall compute the net MWh and MVARh during each successive 15-minute block metering interval along with a plus/minus sign, instantaneous MWh, instantaneous MVARh, average frequency of each 15 minutes, net active energy at midnight, net reactive energy for voltage low and high conditions at each midnight.
- VII. Each energy meter shall have a display unit. It shall display the net MWh and MVARh with a plus/minus sign and average frequency during the previous metering interval; peak MWh demand since the last demand reset; accumulated total (instantaneous) MWh and MVARh with a plus/minus sign, date and time; and instantaneous current and voltage on each phase.
- VIII. All the registers shall be stored in a non-volatile memory. Meter registers for each metering interval, as well as accumulated totals, shall be downloadable. All the net active/reactive energy values displayed or stored shall be with a plus /minus sign for export/import.
- IX. The meters Shall have a built-in clock and calendar with an accuracy of less than 15seconds per month drift without assistance of external time synchronizing pulse.
- X. Date/time shall be displayed on demand. The clock shall be synchronized by GPS time synchronization equipment being supplied by the Contractor.
- XI. The voltage monitoring shall be inbuilt feature provided to signal failures to the Substation Automation System, the meter shall be suitable to operate with power drawn from the PT supplies. The burden of the meters shall be less than 2 VA.
- XII. The power supply to the meter shall be healthy even with a single-phase PT supply. An automatic backup, in the event of non-availability of voltage in all the phases, shall be provided by a built-in long-life battery and shall not need replacement for at least 10 years with a continuous PT interruption of at least 2 years. Even under absence of PT input, energy meter display shall be available and it shall be possible to download data from the energy meter. In case data downloading is not possible in absence of PT supply, meter with provision of required auxiliary power supply shall be provided. Date and time of PT interruption and restoration shall be automatically stored in a non-volatile memory.
- XIII. The meter shall have access to test MWh and MVARh accuracy and calibration at site and test terminal blocks shall be provided for the same.
- XIV. Each meter shall have a unique identification code provided by SPD and shall be permanently marked on the front of the meter and stored in the non-volatile memory of the meter.
- XV. Type Test requirement for Energy Meter: All Type Test Reports shall be provided as per IEC 62052-11/IEC 62053-22/ BIS 14697

20.6. SCADA requirements:

The following equipment of PSS shall be connected to the suitably designed Remote I/O Units (RIO) or Control and Monitoring units (CMU) for effective automatic control and monitoring from SCADA at PESS/MCR.

- 1) Energy Meters.
- 2) Numerical Relays.
- 3) Status of Breaker & Isolators.
- 4) MFM.

20.7. Documents & Drawings:

- 1) Schematic wiring diagrams of the control & Protection circuits of the Total Plant Scheme.
- 2) GTP, GA, Vendor documents and test certificates for Tariff Metering System.



SECTION 21

CIVIL WORKS AND STRUCTURAL STEEL WORKS

CONTENTS

SI No.	DESCRIPTION
21.1	GENERAL CIVIL SPECIFICATION
21.2	PRELIMINARY WORKS
21.3	TRACKER SYSTEM
21.4	POWER EXPORT SUB STATION (PESS)/MAIN CONTROL ROOM (MCR)
21.5	POWER COLLECTION SUB-STATION (PCSS)
21.6	INTERNAL ROAD, APPROACH ROAD AND PERIPHERAL ROAD
21.7	PERIPHERAL FENCING
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21.9	SIGN BOARD
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21.12	MODULE CLEANING SYSTEM
21.13	STORM-WATER DRAINAGE NETWORK
21.14	LANDSCAPING DESIGN
21.16	POWER EXPORT SWITCHYARD AND TOWERLINES
21.17	TIMELINE FOR CRITICAL CIVIL ENGINEERING ACTIVITES

21.1 GENERAL CIVIL SPECIFICATION

- 21.1.1 The scope of civil works detailed below is only indicative. Any other civil and Structural steel work, which is not mentioned or not included here, but necessary for the establishment and operation & maintenance of Solar Power Plant shall be included in the scope and borne by the Contractor.
- 21.1.2 This specifications document is not exhaustive, and the contractor shall be responsible not only for the requirements specified herein but for the correct choice of materials, for proper fabrication and for the conformity to codes, regulations and legal requirements and for supplying all the documentation of these materials.
- 21.1.3 In General, all civil works shall be carried out as per relevant latest Indian Standards and Codes of Practice, as well as all applicable laws and regulations of the Government of India and local codes and ordinances should such provisions exceed the requirement of Indian Standards.
- 21.1.4 General civil material specification for all RCC / Foundation works shall be as mentioned below:

Cement	Cement of the following Grades shall be used for all works. It shall conform to the following standards. (a) 43 Grade OPC BIS 8112 (b) 53 Grade OPC BIS 12269 (c) Portland - Pozzolana Cement BIS 1489 (Parts 1 & 2)
Aggregate	Coarse aggregate - Shall confirm to latest BIS 383. Fine aggregate - Sand shall confirm to latest BIS 383. However, quarry dust shall not be used for construction activities. Approval shall be obtained from SPD site in-charge for source of M-Sand.
Water	Potable water confirming to BIS 456
Reinforcement	Reinforcement steel shall be of high strength deformed TMT steel bars with corrosion inhibitors, Corrosion Resistant Steel (CRS), Fusion bonded Epoxy coated re-bars or Zinc coated bars of minimum grade Fe-500, shall confirm to IS 1786. Dense concrete around reinforcement, provision of thick covers and addition of corrosion protection with re-bars shall be provided to RCC structures. Binding wire for reinforcement shall be annealed steel wire 20 BWG conforming to BIS: 280 "Specification for Mild Steel Wire".

	The number of strands shall be as per BIS specification.
Bricks	Bricks shall conform to the requirements laid down in BIS: 1077. Class 5 bricks shall be used for the work. Brickwork shall be as per BIS: 2212. Fly ash lime bricks shall confirm to latest IS 12894 Chamber burnt bricks shall be used for : ✓ 230 mm thick walls up to substructure in CM 1:5. ✓ 115 mm thick above and below substructure in CM 1:4. Fly ash bricks shall be used for: ✓ All 230 mm thick brick wall above substructure in CM 1:5. In case of non-availability of fly ash bricks, AAC Blocks/Autoclaved Concrete blocks confirming to IS 6041 can be used.

21.1.5

Basic design criteria shall conform to the following:

Seismic Data & Design Criteria	Seismic Zone V, IS 1893 (Part 1) shall be followed
Wind Data & Design Criteria	Basic wind speed shall be as per IS 875 (Part-3) (Based on survey of India Political map printed in 2002).
Corrosion Criteria as per ISO 12944-2	For below Ground Structures (including up to 300mm above ground)- C5M For above Ground Structures (Beyond 300mm)-C4

Minimum Grade of RCC work shall be as follows:

All buildings/structures	Water retaining structures	PCC
M30	M30	M20

The Contractor shall get mix design approved from Govt. Engineering College / NABL accredited laboratories. Advance action should be taken by the contractor for Mix design approval using the locally available coarse & fine aggregates before commencement of the concreting works.

21.1.6 The structural design along with STAAD file and detailed drawings of all buildings/structures shall be submitted to SPD/ SPD's Engineering Consultant for approval, before commencement of work. Provisions of IS 1893 and Ductile detailing in accordance with IS 13920 shall be followed for all buildings/structures, which fall under earthquake zone 3 & above.

21.1.7 During the execution of solar project, all debris/waste materials generated like construction waste, packaging of civil materials, packaging of electrical equipments, hazardous waste etc. shall be removed from the project site premises and shall be

disposed off safely as per Govt. guidelines/norms. Similarly, excavated earth shall either be re-used for backfilling purpose if suitable else, shall be disposed off from the project site, suitably without causing any obstruction to nearby drainage.

- 21.1.8 For storage of civil construction materials and electrical equipments during project execution stage, temporary storage shed shall be erected in project site in vacant land. Safety and security of the stored materials/equipments shall be ensured by contractor on his own.
- 21.1.9 Contractor shall clear the project site of trees, bushes, vegetation. Necessary approval for cutting trees/vegetation shall be obtained by contractor from State/Central Govt. authorities. Demolition of existing structures / facilities, if any encountered within the project site premises is in contractor scope.
- 21.1.10 All construction materials including cement, bricks, aggregates, rebars, structural steel etc. and finishing materials viz. paints, tiles, false ceilings, sanitary fittings & sanitary wares, plumbing fixtures, electrification fixtures etc. shall be of branded quality and make. Prior approval for installation of the same at site shall be taken by the contractor from the SPD.

21.2 PRELIMINARY WORKS

21.2.1 TOPOGRAPHICAL SURVEY

Topographical survey for the entire project site in both directions shall be carried out:

- Grid interval –5 m x 5 m in undulated terrain and 10 m x 10 m in relatively flat terrain.
- Contour interval – 1 m
- Northing & Easting co-ordinates shall be based on UTM (Universal Transverse Mercator of respective Zone).

At least 50-meter width of the adjoining solar plots and area shall also be covered in the survey for correlation with adjoining plots. Presence of any well and/or tube well in the site or adjoining areas and water level in them shall be marked in the documents / Drawings. The work shall include construction of two permanent Benchmarks and reference pillars which shall be shown on the survey drawings.

The field work shall be done with Total Station Equipment in the following steps:

Establishing horizontal and vertical controls and locating reference grids and benchmark in the area. Surveying for establishing spot levels and plotting contours. Surveying for locating the natural and manmade details as described earlier. The grids for the survey work shall be established in N-S & E-W direction (Corresponding to Magnetic North).

Topographical survey can be carried out through drone survey also subjected to adherence of statutory compliance with respect to the region/site. Establishment of Ground Control Points (GCP) shall be carried out by drone survey

agency. In case of drone survey, unwanted features such as vegetation, water body and infrastructure should be removed to obtain only ground points.

After completion of topographical survey, the contractor shall submit draft survey report consisting of following documents:

- Write-up consisting of details of survey agency, equipments used for surveying & period of surveying and reference Bench Mark adopted
- Contour layout for entire project area (AutoCAD file) with recommendation for micro grading required for the Solar Project Site. Features such as waterways, railway tracks, trees, cultivation, houses, fence, pucca and kucha roads, culverts, foot tracks, telephone posts, electrical lines, transmission towers etc., to be indicated in the drawing by means of conventional symbols (Preferably symbols of survey of India Maps). Any unusual condition or formations on the ground, locations of rock outcrops (if visible on the surface) and spring/falls, possible aggregate deposits etc. shall also be noted and plotted on the maps.
- Topographical survey drawing with spot levels for the entire project area (AutoCAD file)
- Excel file consisting of XYZ data at every 5 m in undulated terrain/ 10 m in flat terrain in both directions for entire project area.

After attending SPD/SPD's Engineering Consultant's comments if any in this regard, two (2) sets of hard copy and one (1) set of soft copy (in editable AutoCAD format) of the Final Survey report with all relevant drawings shall be submitted to SPD/ SPD's Engineering Consultant for approval.

21.2.2 SOIL INVESTIGATION

21.2.2.1 The contractor shall have to perform the soil investigation at the respective locations to ascertain the soil parameters of the proposed solar power Plant for construction of Solar Module support structure foundations, Power Collection Sub Station, Power Export Sub Station, etc., The Contractor shall carry out sub soil investigation from a NABL certified agency.

21.2.2.2 The scope of sub-soil investigation includes: execution of complete soil exploration including boring according to the site requirement, drilling, collection of undisturbed soil sample where ever possible, otherwise disturbed soil samples, Standard Penetration Test (SPT), California Bearing Ratio (CBR) test, Electrical Resistivity test (ERT), etc., conducting laboratory test of samples to find out the various parameters mainly related to load bearing capacity and settlement, ground water table level, sub soil conditions such as chemical characteristics of soil. The soil test also includes analysis of ground water sample. For swelling type of soil, the effect of swelling pressure shall be taken into account in arriving at pile capacity as well as safe bearing capacity of the soil.

21.2.2.3 Before conducting soil investigation at site, borehole/test location layout shall be furnished to SPD/ SPD's Engineering Consultant for approval. Layout shall indicate

locations of bore holes along with PESS/MCR, PCSS, roads & fencing/plant boundary in proposed solar project site. UTM Coordinates of the borehole location shall tabulated in bore location layout indicatively considering location of PESS/MCR & PCSS.

21.2.2.4 After completion of soil investigation, the contractor shall submit draft soil investigation report consisting of following details:

- a) Recommended type of foundation for all structures, Recommended depth and type of foundation for RCC structures in case of shallow foundation. Recommendations on treatment for soil, foundation, based on subsoil characteristics, soft soils, aggressive chemicals, expansive soils, etc. shall also be covered in the report, as applicable.
- b) Bore log details along with soil classification (As per BIS 1498) and SPT data
- c) Bore location layout with UTM coordinates of all boreholes
- d) Laboratory test results of different strata of soil –Dry density, Specific gravity, Atterberg limits, Shrinkage limit, Sieve analysis data, Shear parameters (C and Phi values), Swelling pressure & Free swell index. It shall be mentioned whether the tested sample is Disturbed/Undisturbed.
- e) Safe bearing capacities of various soil strata for different types of foundations based on shear strength and settlement characteristics defining clearly, how these capacities were arrived at. Typical SBC calculation shall be added in report based on BIS 6403. SBC shall be arrived based on shear criteria and settlement criteria. Least value among Shear and settlement criteria shall be recommended SBC in each case.
- f) Pile capacity (i.e., Compression, uplift as per BIS 2911, Part 1/Sec 2 & lateral capacity (short pile) based on Brom's method) shall be tabulated in report for a depth of 1.20 m to 3.00 m at an interval of 0.30 m, with minimum 300 mm diameter or above. Sample calculation for the same shall also be included in soil report
- g) Chemical analysis of soil sample
- h) Chemical analysis of water sample - Source of water sample shall be mentioned.
 - For construction purpose – Results shall be compared with construction water requirement as per BIS 456. It shall be concluded if the water is suitable for construction purpose or not.
 - For module cleaning purpose - Results shall be compared with BIS 10500:2012 and CPHEEO standards. On comparison, suitable conclusion shall be arrived in report to indicate if water is potable or not. Requirement of any RO/UV treatment to be indicated in recommendation.
- i) Electrical resistivity test results
- j) CBR Test Results.

21.2.2.5 After attending SPD/SPD's Engineering Consultant comments if any in this regard, three (3) sets of hard copy and one (1) set of soft copy of the Final Soil investigation report shall be submitted to SPD for approval.

21.2.3 OVERALL PLANT LAYOUT

Contractor shall prepare Overall Solar Plant layout in UTM grid of 50 m x 50 m and approval shall be obtained from SPD before execution of work at site. Overall plant layout shall be developed by the contractor ensuring no water logging takes place in the array-yard area or near boundaries. Necessary pitch distance shall be maintained between rows of MMS Tables for easy approach & maintenance point of view.

Overall plant layout shall indicate location of MMS tables, Power Export Sub Station (PESS)/MCR, Power Collection Sub Station (PCSS), String Monitoring Units (SMU), Lightning arrestors (LA), Security cabin, approach road, peripheral road, internal road, gate and peripheral fencing.

The contractor shall prepare array layout to suit their design and plan the total power plant within the available land area without involving any major site modifications. The Contractor shall ensure that no ponding and flooding occurs in low lying areas and effective drainage system is provided in the whole plot area. All building and other structures shall be constructed in levelled area. Adequate slope protection measures and sand erosion control measures shall be undertaken by the contractor.

21.2.4 COORDINATE LAYOUTS

MMS Coordinate layout indicating relative locations of all the column legs of MMS in UTM Coordinate for each block shall be submitted for approval.

Similarly, coordinate layout for Power Export Sub-station and Power Collection sub-station indicating locations of all the column positions in UTM Coordinate shall be submitted for approval.

Fencing layout indicating boundary coordinate of project site shall be submitted by contractor for approval.

21.3 MODULE MOUNTING STRUCTURE (MMS) WITH TRACKER SYSTEM

21.3.1 VENDOR QUALIFICATION REQUIREMENT:

The Bidder/Sub-vendor should have designed, manufactured, supplied, erected/supervised erection, and commissioned/supervised commissioning Solar Tracker System of the proposed design/type of cumulative capacity of 40 MWp higher in maximum of 4 agreements/orders, out of which at least one such supply order for a single plant should be of 10 MWp or above capacity. The bidder/its Sub-Vendor may use the credentials of its Parent/Group/Holding company for meeting the requirement. The reference plant in which 10 MWp or above capacity Solar Tracker System was supplied, must have been in successful operation for at least one (1) year as on the original scheduled date of Tender opening.

21.3.2**GENERAL:**

The PV modules shall be mounted on Module Mounting Structures (MMS) having adequate strength and appropriate design, to withstand various loads on the MMS including design wind pressures. Modules shall be mounted on noncorrosive support structures with Automatic motor-powered **Real time East-West tracking**.

21.3.2**TRACKER SYSTEM:**

The Tracker System shall be of proven design capable of tracking Sun's path actively, intended to maximize the energy output from PV Module. Design shall be based in accordance with the site climatic conditions and seismic loads, soil characteristics, thermal loads caused by expected fluctuations of materials and ambient temperatures and the minimum required design wind speed.

21.3.3**TECHNICAL PARTICULARS**

- a) Single axis East-West real time tracking.
- b) Configuration - Both, single and multi-rows options are accepted.
- c) Tracker Range of Movement (ROM): +/- 45 degrees or better.
- d) DC/AC Self-powered drive system with battery backup of 3 days autonomy.
- e) Individual row-level bi-directional control.
- f) Redundant communication (wireless) for individual Trackers.
- g) Stow configuration: Optimal Angle, as per aero elastic instability analysis.
- h) Operational temp: -10 to 50 degree Celsius.
- i) Integration to Plant SCADA

21.3.4**TECHNICAL REQUIREMENTS**

- a) Tracking system shall be followed by either means of sun's positioning algorithm or backtracking philosophy or optimization algorithm with a minimum tracking accuracy of $\pm 2^\circ$ between the pointing vector of the sun and the pointing vector of the modules.
- b) The algorithm shall optimize irradiance for row avoidance shading and diffuse light optimization.
- c) All local tracking controls shall be mounted on the tracking structure. A suitable arrangement/bellows shall be provisioned to protect actuator assembly from extreme outdoor harsh condition, dust and UV rays.
- d) In case of failure of supply, the arrays should return to the stow position. Bidder shall supply a tracking mechanism with an inbuilt feature for meeting the requirement.
- e) All modules associated with a specific tracking system should be connected to a common inverter.
- f) Suitable redundancy in sensing and auxiliary power supply shall be provided for fail-safe stowing of trackers. Redundancy in control is also desirable for the safe operation of trackers. Details of the scheme for various redundancy shall be finalized during detailed engineering.

- g) Safety measures such as stop devices shall be applied to ensure personal safety.
- h) Tracker shall be equipped with safety features like, auto high wind stow to the designed angular position and shall have uninterrupted communication with monitoring console/station. It should be capable of sending alarms to the monitoring station in case of failure or abnormal operations of the tracking systems.
- i) For each row an earthing cable shall be installed to interconnect all metallic parts of foundation, tracker structure and PV modules of each table.
- j) Tracker design shall also include a provision for fastening DC cables to the structure each 500mm without causing tearing or fluttering of cables.
- k) Tracker shall be able to track as per proposed stow strategy supported by Wind Tunnel test.

21.3.5 MODULE MOUNTING ARRANGEMENT

21.3.5.1 Module mounting structures shall be designed to withstand the extreme weather conditions in the area. The site design wind speed factors k1, k2, k3 and k4 and pressure coefficient shall conform to IS 875 (Part-3): 2015 or as per a Wind tunnel Study from a reputed national/international facility, for the design of MMS. If the Bidder is going for wind tunnel test for the analysis & design of complete MMS and solar tracking system following shall be ensured.

- i. It must be done from an institute of repute.
- ii. Bidders must ensure that offered tracker has proven design with wind tunnel test simulating relevant site conditions. The analysis and design shall be completed within two months from the actual date of issue of LOA.
- iii. Tests and design must comply with relevant Indian/ International codes.
- iv. The design shall be shown in STAAD pro or similar commercially available software for further checking by SPD/SPD's Engineering Consultant as and when required.

21.3.5.2 Design shall be based in accordance with the site climatic conditions and seismic loads, wind load, soil characteristics, thermal loads, Corrosion resistant Class (C5) caused by expected fluctuations of materials and ambient temperatures and the minimum required design wind speed.

21.3.5.3 The structural Material Yield Strength and Minimum Design Thickness can be as per "Proprietary Design" of Tracker supplier, and it shall conform to relevant Indian / International codal design provisions. The Proposed Solar PV tracker system should be certified for successful performance of MMS and tracker system by designer for its design life of 25 Years after SCOD.

21.3.5.4 The design and the calculations for the MMS and the foundation system shall be submitted for prior approval of SPD/SPD's Engineering Consultant before the commencement of construction and shall be based on the soil Geotechnical Investigation report.

- 21.3.5.4 The Structure shall be analyzed and designed in accordance with finite element method and the fundamental principles of Engineering using commercially available software (such as STAAD pro or similar), with dead loads and imposed loads considered as per IS 875 (Part 1 & 2) respectively, and with wind loads considered as per IS 875 (Part 3) or as per Wind Tunnel study done from an Institute of Repute. Analysis shall be done as per appropriate load combinations preferably as per IS codes.
- 21.3.5.5 The Structure must be provided with limit switches to control the rotation of the frame.
- 21.3.5.6 All nuts & bolts or clamps shall be of Stainless steel, Aluminium or Metal Alloy type for a module to structure connection, and other structural bolts shall be of grade HDG 5.6 or 8.8 or exclusively designed for solar tracker systems by manufacturers which should suffice the design life for 25 years and more for Corrosive Category proposed for Solar Park and confirm to Indian / International codal provision.
- 21.3.5.7 Tracker Based MMS would be provided with Module Supporting Member(s) including the provision for fixing of modules. The maximum pressure in module frame under Wind Load or any Combination shall be based on actual inputs and module fixing location at the time of detailed design engineering.

21.3.6 TRACKER SYSTEM – FOUNDATION

Type of foundation	Cast-in-situ Pile foundation as per latest BIS 2911.
Minimum pile diameter (Outer to outer)	300 mm
Minimum Grade of concrete for pile foundation	M 30
Minimum clearance between lower edge of the Module and Finished Ground Level (FGL)	600 mm
Height of collar for foundation above FGL	300 mm

- ✓ The depth of the pile foundation shall be designed by contractor based on design parameters & to prevent lift-off of structure, due to critical wind load combination.
- ✓ Contractor shall conduct Initial Pile Load Test as per latest BIS 2911 (Part-4) and submit pile test report to SPD for approval for firming up depth of pile foundation.
 - Minimum number of pullout test results – 10 Nos./150 hectare land
 - Minimum number of lateral load test results – 10 Nos. /150 hectare land

- ✓ As the Pile load test report is vital parameter to decide the depth of pile for tracker foundation, the same shall be conducted by NABL accredited agency & submitted by contractor to SPD for approval within 45 days from date of LOA.

Foundation work of Tracker System shall commence only, after the proper micro-levelling of the site.

21.3.7 BEARING

- a) The bearing should be type tested for operation cycles which solar plant will go through in its life of 25 years.
- b) Preferably there should not be any lubrication in the bearing, but if there is any, then it should be maintenance free. No cleaning should be needed.
- c) The bearing should also be resistant to dust, water and any other external parameters.

21.3.8 MOTOR AND ACTUATOR

- a) The motor should be IP 65 or better and it should be powered by reliable supply to drive the link through gear or hydraulic/electric actuator.
- b) The temperature rises in the motor during operation specified in IS12802: 1989 should not be more than approximately 10°C.
- c) The location and moisture or fumes shall not seriously interfere with the operation of the motor.
- d) The severity of vibration for the motors shall be within the limits specified in IS 12075: 1987.

21.3.9 CONTROLLERS

- a) Trackers should have an industrial grade system for its automatic control and operations. For all outdoor controllers, it should be housed in IP-65 enclosure.
- b) Battery back-up should be provided for Controller and motor for at least 15 minutes with power pack cum UPS. Alternatively, the bidder can provide backup power from the Auxiliary supply of PCSS or PESS/MCR.
- c) The controller must be enabled with a feature of stowing during high-speed winds.
- d) The Real Time Clock (RTC) of the trackers shall have a facility to be time synchronized with SCADA on Network Time Protocol.
- e) A suitable communication link between the master controller of tracker and tracker SCADA system shall be arranged. The software for communication and analysis shall be provided by the tracker supplier. Tracker SCADA shall be interfaced with solar SCADA on an open protocol such as MODBUS.
- f) Battery back-up should be provided for Controller and motor as per design specified in Technical Particulars above. Alternatively, the bidder can provide backup power from the Auxiliary supply of PCSS or PESS/MCR.

21.3.10 WARRANTY

- a) Minimum 25-year lifetime design considering local ambient conditions and in respect of all standards for the PV modules support structures and foundations.
- b) 10-year warranty starting with SCOD for the complete mounting structure including but not limited to the design, material, and installation of the tracker, substructure, power unit, piles, and foundations.
- c) 25 years for corrosion protection.

21.3.11 STANDARDS

- a) UL 2703: Standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels or equivalent
- b) UL 3703: Standard for Solar Trackers or equivalent

21.3.12 DRAWINGS & DOCUMENTS

- a) Tracker - Design Documents
- b) Tracker - GTP, GA, Test Reports and Vendor Documents
- c) Tracker – MQP

21.4 MAIN CONTROL ROOM (MCR)
21.4.1 GENERAL REQUIREMENTS:

The MCR building shall be designed as single storey RCC framed structure with external staircase (Minimum 1.50 m width) with aesthetic appearance and shall be designed based relevant latest BIS standards and National Building Code (NBC) of India.

MCR Building shall be provided with the following rooms/facilities:

Type of room	Minimum area requirement	AC/False ceiling requirements
Office room	20 m ²	Air conditioned, With false ceiling
SCADA Room/ Operator Room	20 m ²	Air conditioned, With false ceiling
Store room (For storage of spare parts)	50 m ²	-
Electrical Panel room, Battery room, AC Distribution panel area etc	As per detailed engineering	False ceiling
Portico with RCC flat roof at main entrance	Min. 4.50 m x 3.60 m	-

Pantry room	12 m ²	-
Gents toilet including wash area	7.5 m ²	-
Ladies toilet including wash area	7.5 m ²	-

Finished Floor Level (FFL) from NGL shall be determined by the bidder on basis of Highest Flood Level Data pertaining to the project site location.

All passages / corridors shall be provided with a minimum width of 2.0 m. PESS/MCR building shall be provided with necessary electrical fittings and water supply & drainage system. Necessary anti-termite treatment shall be adopted for the PESS/MCR building.

The structural design along with STAAD file and detailed drawings of PESS/MCR building shall be submitted to SPD for approval, before commencement of work.

21.4.2 Minimum Grade of concrete for PESS/MCR building shall be M30.

21.4.3 PLASTERING, PAINTING & FALSE CEILING

Plastering - All internal and external surfaces of wall shall have 15 mm thick plastering in CM 1:5. Ceiling plastering shall be 12mm thick in CM 1:3.

Painting - Painting for various rooms of PESS building shall be as follows:

Rooms	Internal wall finish	Ceiling finish
Switchgear room, Store room, Gents and ladies toilet, Pantry room, Portico & corridor	Emulsion paint of anti-fungal quality of reputed brand over putty coat	Ceiling Emulsion (White colour)
Office, SCADA Room,	Emulsion paint of anti-fungal quality of reputed brand over putty coat	Ceiling Emulsion (White colour)
Battery room	Alkali/ Acid resistant paint	Ceiling Emulsion (White colour)

The emulsion paint for all external walls shall be anti-fungal quality of reputed brand suitable for masonry surfaces for medium rainfall zone.

All painting on masonry or concrete surface shall preferably be applied by roller. If applied by brush then same shall be finished off with roller. All paints shall be of approved make and quality. Minimum 2 finishing coats of paint shall be applied over a coat of primer. For painting on concrete, masonry and plastered surface BIS: 2395

shall be followed. For painting on steel work and ferrous metals, BIS: 1477 shall be followed.

False ceiling - All AC rooms (Office room and SCADA room) and Switchgear room, Battery room and AC/DC Distribution panel area shall be provided with false ceiling of suitable type using approved materials. The false ceiling shall be designed aesthetically and shall be from reputed Manufacturer. False ceiling of 15 mm thick mineral fibreboard, in tile form of size 600mm x 600mm, along with galvanised light gauge rolled form supporting system in double web construction pre painted with steel capping, of approved shade and colour, to give grid of maximum size of 600x600 mm as per manufacturers details including supporting grid system, expansion fasteners for suspension arrangement from RCC, providing openings for AC ducts(if required), return air grills(if required), light fixtures, etc., all complete.

21.4.4 FLOORING

Flooring/Finishing schedule for various rooms of PESS building shall be as follows:

Rooms	Flooring details
Electrical Panel room	Heavy Duty Vitrified ceramic tiles
Office, SCADA Room, Store room, corridor	Heavy Duty Vitrified ceramic tiles
Battery room	Acid/ Alkali resistant tile flooring - 10 mm thick (Confirming to BIS 4457)
Gents and ladies toilet	➤ Anti-skid ceramic tiles ➤ Dado glazed ceramic tiles up to 2.1m height
Pantry room	➤ Anti-skid ceramic tiles ➤ Polished Granite slab -12 to 16mm thick ➤ Dado glazed ceramic tiles up to 2.1m height
Portico	Anti-skid Paver block/Anti-skid flooring
External Staircase steps	Anti-skid step tiles

All rooms shall be provided with skirting of 150 mm height.

Vitrified ceramic tiles of approved quality, approved colour and shade of minimum size 600 mm x 600 mm shall be laid over PCC.

21.4.5 ROOFING

Roof of the PESS/MCR building shall be Cast-in-situ RCC slab treated with approved chemical waterproofing system to prevent water leakage and seepage issues. Roof shall be finished at a slope of 1:100 towards rain water down take pipe. Roof shall be laid with weatherproof ceramic cool roof tiles of reputed brand.

For efficient disposal of rainwater, the run-off gradient for the roof shall not be less than 1:100 and the roof shall be provided with PVC (110 mm dia.) rain water down take pipe, wherever required.

The roof slab shall be projected 300mm from wall face. A parapet wall of 750 mm height shall be provided on terrace using 115mm thick brick wall with stiffeners 230x230mm at a spacing of 2.4m c/c.

21.4.6 DOORS AND WINDOWS

All doors, windows and ventilators shall confirm to the following:

Doors except toilet doors	➤ Electro colour dyed (15 micron thickness) aluminum framework with glazing. ➤ To be provided with 6 mm thick tinted glass. ➤ Minimum door size - 1.20 m x 2.10 m ➤ Projection of sunshade from wall for door openings – 750 mm
Toilet doors	➤ FRP frame with FRP shutter ➤ Minimum door size - 0.75 x 2.10 m
Windows and ventilators	➤ Electrocolour dyed (15 micron thickness) aluminum framework with glazing. ➤ To be provided with 4mm thick tinted glass ➤ To be provided with suitable MS grill protection ➤ Projection of sunshade from wall for window openings – 600 mm
Rolling shutter (RS)	➤ Shall confirm to IS6248 ➤ Size based on functional requirement ➤ Projection of sunshade from wall for RS openings – 1000 mm

Doors and windows on external walls of the buildings shall be provided with RCC sunshade over the openings with 150 mm projection on either side of the openings. All glazing work shall conform to relevant BIS.

21.4.7 PLINTH PROTECTION

Plinth protection to a minimum width of 0.75m with 75mm thick of cement concrete 1:2:4 over 75mm bed of dry brick ballast 40mm nominal size well rammed and consolidated and grouted with fine sand including finishing the top with suitable slope & edge drain.

21.4.8 TOILET & WATER SUPPLY

Heavy Duty Rigid PVC pipes of reputed manufacturer and high quality conforming to BIS: 4985 shall be used for all water supply and plumbing works in the building. SINTEX make HDPE storage water tank conforming to BIS: 12701 shall be provided over the roof for a capacity of minimum 1000 liters with all required pipeline & fittings.

Each toilet shall have the following minimum fittings:

- All Sanitary ware shall be using low flow Chrome Plated (CP) fittings and fixtures.
- Each toilet shall have the following minimum fittings:
 - WC (Western type) of approved quality with seat cover, low level flushing tank, paper holder, health faucet etc.
 - Flat back semi-stall urinals for Gents Toilet
 - Wash basin of approved quality with all fittings.
 - Mirror (600 x 450 mm) with PVC beading
 - Stainless steel towel rail with brackets
 - Stainless steel soap holder and liquid soap dispenser.

Pantry shall be provided with stainless steel sink with drain board.

21.4.9 SEWAGE SYSTEM

Adequate sewage disposal arrangements shall be provided. The septic tank and soak pit shall be designed as per NBC guidelines. The Contractor can also propose Bio septic tanks (As per manufacturer recommendation). The outfall of septic tank shall be led to soak-pit of suitable dimensions for dispersion. The drainage system design and construction drawings of sewage piping / septic tank shall be submitted to SPD for approval before commencement of work.

21.4.10 FURNITURE

Adequate and appropriate ergonomically designed furniture of approved make for the Office and SCADA rooms, stores shall be included in the offer. The furniture should be chosen in such a way that it matches with the décor of the rooms. Furniture shall be modular design. The furniture to be included in the scope shall not be limited to the list given below. The type of the furniture proposed to be supplied shall be submitted for approval by SPD. After award of contract, Contractor shall arrange to get the modular furniture arrangement as well as furniture types approved by SPD before proceeding with the procurement.

Sl.No.	Description of Furniture and Fittings	Quantity
1	Executive steel table with glass top and 3 sliding drawers for office	4 Nos.
2	Height adjustable cushioned chair with arm rest for office	7 Nos.
3	Steel table with 3 sliding drawers for stores	3 Nos.
4	SCADA workstation table (Modular design)	1 Set
5	Computer station chair with hand rest, back and height adjustment	3 Nos.
6	Standard filing Cabinet	3 Nos.
7	Standard steel cupboard	3 Nos.

8	Slotted angle racks for stores	9 Nos.
9	Slotted angle racks for tools and tackles	5 nos.
10	Workers locker (6 compartment design)	3 Nos.

21.5 POWER COLLECTION SUB-STATION (PCSS)

21.5.1 GENERAL:

The PCSS shall be provided as per manufacturer's recommendation with easy passage for O&M activities. The complete assembly should be placed on a raised RCC platform with a canopy made of structural steel section preferably tubular/hollow section and color coated metal sheets for roof with BMT 0.5 mm and at least 600 mm projection on all side. MS handrail of 1 m height shall be provided around the PCSS Platform. Paints for Structural steel Canopy shall be as per BIS: 1477.

The RCC platform for PCSS shall be raised from the NGL in accordance with the HFL data pertaining to the project site and suitable staircase with MS handrail of minimum 1.00 m height shall be provided. Cable bending radius and other relevant factors to be considered during platform design. This shall be reviewed during detailed engineering.

21.5.2 INVERTER DUTY TRANSFORMER FOUNDATION

Foundation for inverter transfer shall be designed based on manufacturer's loading & relevant latest BIS code. Necessary chain link fencing with steel gate arrangement shall be provided around the transformer to meet the statutory requirement. Burnt oil pit at a distance connected to transformer soak pit depending upon oil quantity in Transformers. It shall be sized to accommodate the oil volume of the transformer connected to it, without backflow. Also, 40mm BG metal filling with thickness as per design shall be provided around the transformer.

21.6 INTERNAL ROAD, APPROACH ROAD AND PERIPHERAL ROAD

21.6.1 The roads shall be designed and constructed based on the General layout of the Solar Power Plant.

- ✓ Approach road shall be laid by contractor from Main road to PESS/MCR building of Project site via Entrance gate.
- ✓ Internal roads shall be provided connecting PESS/MCR building of Project site to all PCSS locations.
- ✓ Peripheral road shall be provided abutting peripheral fencing around the project site.

All internal and peripheral roads shall be provided with shoulder of width of minimum 300 mm on either side as per IRC requirement. Internal and peripheral drains shall be provided within project site based on detailed drain design.

- 21.6.2 Carriage way width of all approach roads shall be of 3.50 M (Single lane) with minimum 500 mm wide shoulder on both sides. Moorum/brick, with a minimum 125 mm thick shall be provided for the shoulder along the approach road. The crown of the road shall be minimum 1000 mm above NGL. The final finished roads shall have a camber of 1 in 50. These roads shall be laid with:

Top coat	One layer of SDBC of 40 mm thick as per MORTH specification along with seal coat. To be provided with necessary cat eye, thermoplastic painting, road side berm painting with yellow and black colour as per requirement
Base Course and Sub base Course	Two layers of WBM laid over Granular Subbase, thickness of layers to be as per Detailed Design Engineering Bidders can also propose Wet Mix Macadam (WMM) in place of Water Bound Macadam (WBM) for approach road base construction. All execution shall be in compliance with MORTH/IRC specifications.
Subgrade	Sub-grade under road and its shoulders shall be compacted to achieve 95% or more of standard proctor's MDD. CBR value of the subgrade level should be minimum 4%. If actual CBR is less than 4% in a particular stretch, then GSB thickness shall be increased suitably in accordance with MORTH/IRC specifications.

Carriage way width of all internal, and peripheral roads shall be of 3.50 M (Single lane). These roads shall be laid with:

Base Course	WBM or WMM as per bidder's proposal based on site condition in accordance with MORTH/ IRC specifications.
Soling layer	This bottom layer shall be laid in layers using laterite/BG Boulders/locally available natural rock boulders - Each of 115 mm thickness, total thickness as per requirement of site condition and each layer shall be blinded with gravel with 1/3 quantity of laterite/boulders.

Approach road, internal road and Peripheral road detailed drawing and layout shall be submitted to SPD/ SPD's Engineering Consultant for approval, before commencement of work.

21.7 **PERIPHERAL FENCING**

The entire Solar Power Plant array yard shall be provided with Peripheral fencing.

Type of fencing	PVC Coated chain link fencing with RCC fence post- The bottom portion of fencing shall be with 1.8 M height PVC coated Chain link Fencing. Top 0.30 M with barbed wire fencing (2 rows & one cross diagonal) which act as anti-climbing device for safety.
PVC Coated Chain link fencing (Bottom 1.8 m)	PVC Coated chain link fencing shall be of Min. 2.5 mm dia (10 gauge) with mesh size Min. 50 mm x 50 mm confirming to latest BIS 2721. Chain link fencing shall be stretched and fixed to post by line wire (GI) of Min 3.15 mm dia (8 gauge) which in turn shall be fixed to RCC post. PVC coating thickness over mesh wire shall confirm to ASTM F-668-07
Barbed wire fencing (Top 0.3 m)	Barbed wire shall confirm to latest BIS 278. Barbed wire shall be of Min. 2.24 mm dia (12 gauge). Barbed wire shall be galvanized per latest BIS 4826
RCC Fence post	2.1 M high Fencing arrangement using RCC (Minimum M30 Grade) Fence Posts of 2.7m length. RCC fence post shall confirm to latest BIS 4996. Maximum spacing of RCC Fence post - 3.00 M with strut posts at every 15 M Spacing (maximum) and at corners

All fasteners shall confirm to BIS 1367 & shall be hot dip galvanized as per latest BIS 1367 (Part XIII)

PVC coated Chain link Fencing & GI Barbed wire shall be of reputed make and shall be got approved before use on works.

Fencing details and layout drawings shall be submitted to SPD for approval, before commencement of work.

21.8 **ENTRANCE GATE**

The main entry to each plant / project area shall be provided with a main gate of size 5.00 x 2.40 M and a wicket gate of size 1.20 x 2.40 M (both using MS Structural Steel). RCC gate pillars of required size shall be provided at the main entrance. Apart

from this main gate, additional gates of size 1.20 x 2.40 M shall be provided at appropriate locations within each project site, wherever necessary.

Entrance gate detailed drawing shall be submitted to SPD for approval, before commencement of manufacturing / construction.

21.9 SIGN BOARD

Aesthetically designed sign board 2.40 M x 1.50 M shall be provided at the entrance of approach road to Solar Power Plant at each plant site. The sign board shall contain brief description of the Power Plant. The Signboard shall be made of stainless steel tubular frame with SS steel plate of not less than 3 mm. Necessary SS steel tubular support column with concrete foundation shall be provided. Letters on board shall be designed with proper colour scheme and fluorescent paint system / arrangement. The design & size of the signboard shall have to be befitting the landscaping planned for the main entrance to power Plant. The sign board design and drawing shall be submitted to SPD for approval, before the commencement of manufacturing.

21.10 SECURITY BUILDING

The Security Building shall be provided near the main entrance of each plant project site. The security building shall be of single storeyed Pre- Fabricated / RCC framed structure 3m x 3.6 m (inner dimension) with an internal toilet provision for 1.5m x 1.2 m size, water facility and front verandah for a minimum width 1.20 m. Finish floor level of security building/rooms shall be minimum 450 mm above from Finish graded level.

Security building shall be provided with all necessary electrical fittings and sanitary items along with adequate sewage disposal system.

The structural design and detailed drawings of security building shall be submitted to SPD for approval, before commencement of work.

21.11 TWO/ FOUR WHEELER PARKING SHED

Separate two / four wheeler parking shed to house minimum four (4) wheelers and ten (2) wheelers using MS structural framework with colour coated metal /Galvalume sheet roofing and flooring with paver block shall be provided adjacent to the PESS Building.

21.12 STORE ROOM

Store room of minimum 200 sqm floor area, using structural framework with colour coated metal /Galvalume sheet roofing and RCC flooring shall be constructed for storing equipment, tools and their spare parts including materials necessary for the operation & maintenance of the Solar Power Plant. It shall be ensured that the materials inside the store room shall be protected from rain, dust and corrosion.

21.13 MODULE CLEANING SYSTEM

Contractor shall design and install Robotic/Wet cleaning system for the entire project site for successful operation of the plant for 25 years.

21.13.1 In case of Wet Module cleaning system, contractor shall adhere to following specification:

Water for module cleaning purpose	✓ Permanent source of water shall be identified for module cleaning and uninterrupted water supply for the plant. ✓ Contractor shall conduct chemical analysis of water and ascertain the treatment requirements to make the water potable as per IS 10500:2012. ✓ Based on chemical analysis of water, if any equipment/system (RO/UV) is required for treatment of raw water before it is used for module cleaning, the same shall be submitted to SPD for approval. ✓ Contractor shall design module cleaning system considering minimum quantity of water as 2.50 liters / module/cycle.
Treatment unit (RO/UV)	Treatment unit (RO/UV, PSF, ACF, Feed pumps etc., as applicable) shall be housed within closed shed: ✓ Columns, rafter, purlin and girts shall be structural steel provided with 2 coats of enamel paint of approved brand over one coat of red oxide primer. ✓ To be provided with side cladding and roofing with colour coated galvalume sheet. ✓ To be provided with RCC platform 600 mm above ground level.
Water storage tank	For storing raw water/treated water, RCC sump/PVC/FRP water tanks shall be provided.
Module cleaning pipeline network	✓ Contractor Shall provide necessary arrangement for module washing in the Solar Power Plant. This shall include construction of a water storage sump, pump & motor (with stand by arrangement) and routing buried main and distribution lines using UPVC pipe network (confirming to latest ASTM D1785) or HDPE Pipe network (Confirming to latest IS 4984) covering all areas of Solar arrays. ✓ Tap off points from the PVC supply pipe network with manual isolating valves shall be provided at number of locations to enable the cleaning of modules using hoses of adequate length. ✓ Necessary pressure relief valves shall be provided in all the pumps to control the desired pressure at outlet on safety requirements to prevent any damage to PV modules.

- ✓ To the extent feasible, the run-off from washing shall be designed to get absorbed in the soil below the solar arrays. Excess water during rains shall be drained through storm water drains built in the Plant area and finally let into the main storm water drain leading to the Nallah.

Contractor shall submit detailed design document and Module cleaning system layout drawings for SPD approval. The Contractor shall lay main & distribution pipelines required for wet cleaning purpose.

21.13.2 In case of Dry/Robotic Module cleaning system, contractor shall adhere to following specification:

- a) Though the cleaning system is dry type and waterless, but should be able to use water sprinkled for cleaning more stubborn stains.
- b) It shall be automatic, SCADA enabled robot-based cleaning system without the usage of rail. It should have Smart embedded micro controller for robot control and operation with remote SCADA to ensure cleaner operation, monitor various faults, battery status through cloud-based software. It should withstand high temperature of 80°C and lowest temperature of 15°C, and should withstand wind speed of minimum 47m/s or as per IS 875 (Part III) (based on Survey of India Political Map printed in 2002) when it is docked at the docking station.
- c) It shall have provision to be powered by its own solar panels and rechargeable LiFePO4 batteries to have fully autonomous operation of cleaning. There should be provision for External Charging Facility of Battery at Docking Station. Can perform one cleaning cycle Forward & Reverse of any length of panel row as fast as possible. It should run suitable Battery Capacity Lithium Iron Phosphate batteries with maximum cycle life
- d) The cleaning system shall not cause any stress to the main solar module glass. The robot should have wheels and should move on panel frames and on bridge rails between adjacent tables.
- e) Design shall ensure that any misalignment in panel layout does not affect cleaning and enable inter-string/table traversal.
- f) It shall be docked at home position extending beyond the panels, without casting shadow on the solar modules. It should have Non-abrasive, nonconductive and electrically safe brush material such as micro fibre or nylon.
- g) It shall be Light weight with material that ensure that the robot has smooth surface exerts minimal stress on the panel frames and doesn't get corroded.
- h) The Robot should employ flexible brush assemblies that mechanically adjust to the vertical variations and offsets in adjacent panels.
- i) Whatever may be the layout (portrait or landscape) or the dimensions of the panels, the robot should ensure that the panels are uniformly cleaned with the help of flexible brush assemblies.

- j) Each robot should have separate high torque DC motor with encoder, for linear movement on the panel in forward and reverse directions. Suitable motors to be employed for operation of the brushes to clean the dust from the panels without affecting the glass surface of the module
- k) Robotic module cleaning system shall also have:
 - i. Provision for Emergency Stop and local manual operation
 - ii. System and Controller panel housing - IP65 enclosure
 - iii. Facility to be integrated to Solar Plant SCADA System
 - iv. Locking Arrangement of Robot at the docking station.
 - v. Suitable track changer for robotic cleaner to move from one row to another automatically
 - vi. Required Rail arrangement for moving robot within a row from one table to another
 - vii. A system Warranty of minimum 3 years from date of Commissioning of cleaning system.
- l) The manufacturer should provide the list of the vendors from whom, they have supplied.

Contractor shall supply the complete robotic cleaning system at site as per approved Array / Plant layout drawings, and supervision of installation & commissioning by supplier along with SPD O&M team, all other activities related to robotic cleaning including storage, loading, unloading, transportation within site, its supply including start end docking station, bridge material required complete in all aspect, nuts and bolts, fasteners, installation, coordination, commissioning and any other activity not specified herein but required for successful commissioning of robotic cleaning system is included in the scope of contractor.

21.14 STORM-WATER DRAINAGE NETWORK

Contractor shall design and provide storm water drainage network consisting of internal drains and peripheral drains taking into account the topography of the plant area, array layout, area drainage patterns and intensity of rainfall as per latest BIS / IRC standards.

Rainfall intensity for design of drains: Heaviest rainfall in one hour (in mm) for nearest city/town as per Appendix A of IRC SP 13:2004 or 60 mm/hr whichever is more.

All internal drains shall be earthen drain, trapezoidal in section and shall be minimum 600 mm wide at the base with side slope 1V:1.5H.

Contractor shall provide all drain - road intersections with pipe culverts (other than main entrance) / box culverts of adequate size and reinforcement. Pipe culvert/Box culvert shall conform to latest BIS specifications. However, RCC Box culvert shall be provided at the main entrance of the Project site.

Rain Water Harvesting (RWH) system shall be established by the contractor for project site by using rooftop rain water harvesting system, ground water recharge

pits /ground water recharge trenches / recharge wells / percolation ponds etc., Collected rain water shall be effectively used by the contractor for gardening and flushing purpose without treatment and in case of drinking purpose with water treatment. Details of rain water harvesting system shall be submitted by contractor along with storm water drainage design & drawing.

21.15 LANDSCAPING DESIGN

The contractor shall design landscaping / garden etc., aesthetically by considering the aerial view of the entire Plant causing no shadow on the solar panels.

- ✓ Landscaping work of the Plant premises shall be designed with suitable plant species.
- ✓ Contractor shall provide landscaping using kerb walls, walkways, lawns, plants, palm trees, shrubs, bushes etc...
 - From entrance gate to PESS/MCR building
 - Around PESS/MCR building and
 - Around PCSS building
- ✓ Contractor shall provide a flag pole for flag hoisting in important days in front of PESS/MCR building. Interlocking paver block shall be provided for walkways.
- ✓ The landscaping drawings shall be submitted to SPD and got approved before commencement of work.
- ✓ The contractor shall have to maintain the gardens /landscaping during the construction as well as entire O&M period.

SPD reserves the right to modify the landscaping design at any stage as per local site conditions/requirements.

1.16 POWER EXPORT SWITCHYARD AND TOWER LINES

- Deleted

21.17 TIMELINE FOR CRITICAL CIVIL ENGINEERING ACTIVITES

Contractor shall adhere to the following tentative timelines in completing critical civil engineering activities. Contractor shall also ensure these activities are reflected in overall project timeline.

(1) General civil works:

SI No.	Name of work	Timeline (Within)
1	Submission of topographical survey report in CCMS	21 days from date of LOA
2	Submission of Mix design report with 14 days cube strength result in CCMS	25 days from date of LOA
3	Submission of Soil investigation	35 days from date of LOA

	report in CCMS	
4	Submission of Overall plant layout in CCMS	40 days from date of LOA

(2) Module mounting structure – Pile load test and foundation

Sl No.	Name of work	Timeline (Within)
1	Submission of MMS Pile test layout for approval in CCMS	20 days from date of LOA
2	Submission of MMS Pile load test report in CCMS on completion of Pile tests	50 days from date of LOA
3	Submission of MMS Foundation drawing in CCMS	55 days from date of LOA

(3) Module mounting structure – General arrangement & fabrication

Sl No.	Name of work	Timeline (Within)
1	Submission of Module mounting structure (GA drawing) in CCMS	50 days from date of LOA
2	Submission of MMS Fabrication drawings in CCMS	60 days from date of LOA
3	MMS Prototype inspection	75 days from date of LOA

(4) Power Export Sub-station (PESS)/MCR

Sl No.	Name of work	Timeline (Within)
1	Submission of PESS/MCR Equipment layout in CCMS	45 days from date of LOA
2	Submission of PESS/MCR Architectural drawing in CCMS	60 days from date of LOA
3	Submission of PESS/MCR Design document and foundation drawing in CCMS	75 days from date of LOA

4	Submission of PESS/MCR Plinth beam and staircase drawing in CCMS	90 days from date of LOA
5	Submission of PESS/MCR Lintel beam, roof beam and roof slab drawings in CCMS	105 days from date of LOA

(5) Power Collection sub-station (PCSS)

Sl No.	Name of work	Timeline (Within)
1	Submission of PCSS Equipment layout in CCMS	50 days from date of LOA
2	Submission of PCSS Architectural drawing in CCMS	65 days from date of LOA
3	Submission of PCSS Design document and foundation drawing in CCMS	80 days from date of LOA
4	Submission of PCSS Structural drawings in CCMS	100 days from date of LOA

- c) IEC TS 62727: Photovoltaic systems - Specification for solar trackers
- d) IEC 62817:2014+AMD1:2017 CSV: Photovoltaic systems – Design qualification of solar trackers



SECTION 22.0

QUALITY ASSURANCE, INSPECTION & TESTING AND SAFETY

22.1. Quality Assurance and Quality Control

22.1.1. The Manufacturing Quality Plan (MQP) of individual Equipment / System will be mutually discussed and agreed with the Contractor during detailed Engineering. The list of such MQP documents shall be included in the Master Drawing List (MDL).

22.1.2. MQP shall consist of four sections viz.

1. Checking of Raw materials/Bought out items
2. In-process inspection & Routine Tests
3. Factory Acceptance Tests (FAT)
4. Packing & Dispatch Checks.

Checks and Tests in each section shall be finalized during detailed Engineering. Along with each Inspection call for FAT, Approved MQP, detailed test / Check procedures, Forms / Check Sheets to fill up the observations with Pass Criteria of each test / Check shall be furnished.

22.1.3. Following major equipment / Bought Out Items will be inspected in line with the FAT procedures furnished in the corresponding and approved MQP. The cost of carrying out testing will be deemed to be included in the cost of the equipment. FAT shall be performed at the Factory premises or NABL/ILAC accredited labs as applicable and to be Performed by the OEM/LAB and shall be witnessed by SPD Engineers/Owners Third Party inspection Agency along with the competent Engineers of Contractor / Third party Inspection agency. Approval request for the Inspecting Engineers of Contractor / Third party Inspection agency, together with their CV shall be submitted along with the respective inspection call.

- 1) Module mounting structure for SPV module.
- 2) Cables - Solar Cables, DC Cables, AC LT Cables, Control cable.
- 3) String Combiner & Monitoring Box.
- 4) Earthing Devices.
- 5) Transformers - HT Aux Transformer & NIFPS.
- 6) LT Switchgear - LT Panel, UPS DB and LDB.
- 7) Uninterrupted Power Supply (UPS) - Battery and UPS Panel.
- 8) Tariff Energy Metering System.
- 9) Optic Fiber Cables and Accessories.
- 10) SCADA System and communication interface panel.
- 11) Weather Monitoring Station.
- 12) Fire Alarm Panel and repeater panels.
- 13) Any other equipment/system considered by the SPD for FAT during Detailed Engineering.

22.1.4. In the end of the inspection, MoM will be made and if found satisfactory by the SPD Engineer, Provisional Material Dispatch Clearance may be issued as a part of MoM. However, Material Dispatch Clearance Certificate (MDCC) shall be issued from SPD HQ on receipt of request from Contractor, along with the Inspection reports / Documents as per approved MQP and after scrutiny of the same. SPD has the right to cancel the previously given Provisional Material Dispatch clearance, if any discrepancy found in the submitted Reports.

22.1.5. No dispatches shall be made by the supplier without obtaining Provisional Material Dispatch Clearance / MDCC from SPD. Wherever reworks are involved, re-inspections shall be conducted and all expenditure towards the same shall be borne by the Contractor.

22.2. Field Inspection & Testing

22.2.1. Field Quality Plans (FQP) shall detail out all the site activities, tests / checks to be carried out during receipt, unloading, storage, erection of the equipment and have attachments of OEM documents like Erection & commissioning manuals, inspection procedure and other reference documents. FQP will be mutually discussed and finalized preferably in the format suggested by SPD during Detailed Engineering. In these Field Quality Plans, Contractor / SPD shall indicate customer hold points (CHP), i.e., test/checks which shall be carried out in presence of SPD/ Project Manager or his authorized representative and beyond which the work will not proceed without consent of SPD in writing.

22.3. SAFETY

For Safety requirements, refer to Section 10 of Volume-1B.

22.4. Drawings & Documents: During Detailed Engineering the following particulars of the "Quality Assurance, Inspection & Testing" shall be submitted for approval by SPD.

- 1) MQP for All the Individual Equipment / Systems as listed in 22.1.3 above and other equipment / systems as applicable.
- 2) FQP for AC Works
- 3) FQP for DC Works
- 4) FQP for Civil works



SECTION 23.0**SPARES, TOOLS & TACKLES AND DOCUMENTS****23.1. SPARES AND CONSUMABLES**

- 23.1.1. The Contractor shall be responsible for maintaining the required spares and consumables at site in sufficient quantities as per the recommendation of respective Equipment / System OEMs for startup, commissioning, and O&M of the Solar Project along with Power evacuation system.
- 23.1.2. The Mandatory Spares to be kept shall be as per the recommendation of the respective OEMs of the Equipment /System. The Minimum required Mandatory spares is listed in Annexure - 2.
- 23.1.3. Mandatory spares, consumables and various other components required for replacements and repairs during O&M period shall be the responsibility of the contractor without any extra cost. Contractor shall complete the supply and maintain the stock of Mandatory spares required before commencement of O&M Target Generation Test. Contractor shall maintain the mandatory spares, consumables & various components of the Project for smooth running of O&M during O&M Target Generation Test Period. During the O&M Target Generation Test and O&M period, if the contractor uses the mandatory spares from their stock, then the same shall be replenished then and there by the contractor without any extra cost. The Stock verification of Mandatory Spares as per list shall be done by SPD at end of each financial year.
- 23.1.4. The mandatory spares supplied shall be strictly interchangeable with parts for which they are intended for replacement.
- 23.1.5. The mandatory spares shall be treated, packed and maintained for long storage (as applicable with respect to Expiry date) under the climatic conditions prevailing at the site.
- 23.1.6. During final take over, all the Mandatory spares shall be handed over to SPD as per the list in Annexure -2.

23.2. TOOLS AND TACKLES

- 23.2.1. Tools and tackles are not a supply item. A list of tools and tackles which are required for O & M shall be maintained by the Contractor in the project site during the O & M period and the same can be taken back by the Contractor after completion of the O & M period. Apart from the tools and tackles, the Contractor shall also maintain other special equipment if any required for smooth operation and maintenance activities.
- 23.2.2. Such special equipment used by the contractor during operation and maintenance period shall be handed over to SPD at free of cost to ensure smooth takeover of the Project by SPD from the contractor at the end of O& M period.

23.3. GENERAL REQUIREMENTS OF DRAWINGS AND DOCUMENTS

- 23.3.1. Contractor shall furnish drawings and documents during Detailed Engineering as indicated in each Section which are not exhaustive. The Master Document List (MDL) shall be submitted for approval in line with requirements of the specification.
- 23.3.2. General formats and Content: All the drawings shall contain material list, brief description of components, make of bought out component, overall dimensions, dimensions to check the suitability of the equipment, dimensions relevant to other facilities. These drawings shall show sufficient overall dimensions, clearances and space requirements of all apparatus to be furnished, to enable SPD to determine the design and layout of the installation.
- 23.3.3. The Contractor shall not, without SPD's prior written consent, disclose the contract or any provision thereof or any specification, plan, drawing, pattern therewith to any person other than person employed by the Contractor in performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend strictly for purpose of performance only.
- 23.3.4. With the delivery of equipment, following shall be supplied:
- a) All approved drawings & documents relevant to the equipment & Certified dimension drawings including details of all parts subject to wear and breakage.
 - b) Instruction in English language for unpacking, assembly and erection of all equipment including handling / unpacking / erection drawings / sketches.
 - c) Instruction in English language for operation and maintenance of equipment and control.
 - d) Spare parts lists with drawings, specification, and manufacturer's catalogue.
 - e) Complete list of items detailing individual items with ratings, capacity, services etc.
- 23.3.5. On successful completion of O&M Target Generation Test Period for the Project, and on completion of each year of O&M Period, the following shall be supplied:
- a) O&M Target Generation Test Evaluation Report.
 - b) Operation log book for 1 year
 - c) Power export log for 1 year
 - d) Inventory of spares at project site
 - e) As-Built Drawings – Where ever corrections involved
 - f) List and description of major maintenance works done on equipment and buildings
 - g) Off Take Constrain Registers
 - h) Stock List of Mandatory Spares
- 23.4.** For Closure of the contract, the contractor has to submit Completion Report highlighting all major milestone events, module & inverter ID list, Spares list with part number, Mandatory Spares, Transfer of Live Warranty by OEM for Specified Equipment after O&M Period to SPD for the remaining period, do's and don'ts, special instructions, lessons learnt, Project potential, etc.



SECTION 24.0

TESTING & COMMISSIONING, SCOD & O&M TARGET GENERATION TEST

24.1. TESTING & COMMISSIONING

- 24.1.1 On completion of erection of individual equipment, Contractor or Contractor appointed Testing Agency shall carry out testing, pre commissioning checks, operational checks, instrument and device calibrations, control loop checks, interlock and trip checks, etc. The Test reports of each and every equipment based on a systematically planned procedure as above shall be submitted to SPD Project in charge for approval and clearance for commissioning.
- 24.1.2 The Contractor shall do cleanup of all equipment and area within project site prior to preparing the equipment for Pre-commissioning testing and submit the schedule and the Checklists as per the approved format, of such Pre-commissioning tests to the SPD Project Engineer for approval. For each equipment, all the pre - commissioning Checks / tests specifically recommended by manufacturer shall be performed at site. All test results in the Checklist formats containing the details of each test - like the detailed procedure, Testing equipment / Instruments required, safety precautions to be taken before and after the tests, Parameters to be recorded with limit values & actual values and the result of test along with the remarks of the testing Engineer etc. shall be provided to SPD for verification and acceptance during commissioning of the equipment and Project.
- 24.1.3 Power and control cabling shall be done as per approved scheme and in sections in line with statutory requirement, taking adequate precautions against electrical shocks. As the solar PV modules are capable of producing power on exposure to light, necessary covers shall be supplied for covering the solar PV modules during cabling termination works.
- 24.1.4 Calibration and commissioning of all instruments and control equipment supplied under this contract shall be executed by the Contractor. Hardware and software required for erection of all instruments and control equipment covered under this contract and the same shall be supplied by the Contractor.
- 24.1.5 Pre-commissioning checks, individual loop checks, power initialization, verification of system functioning, trouble shooting, final solutions to application and / or instrument problems etc., are responsibility of Contractor. All the required software and hardware changes, if any, shall also be incorporated as required for successful commissioning to SPD's satisfaction.
- 24.1.6 To identify each equipment / instrument / accessories / Cables etc., tags with appropriate ID Descriptions / Numbers shall be fixed / tied at a suitable place on the equipment / instruments / accessories / Cables after erection by the Contractor. The

tags and connecting wires shall be of suitable and durable material and the size of the tags shall be adequate to accommodate tag number.

24.1.7 Follow up of all the required activities to obtain State / Central Electrical Inspectors approval for the installation and carrying out any changes called for by the Inspector shall be carried out without extra cost to SPD.

24.1.8 Based on the individual equipment approval status, Statutory clearances and readiness of the required equipment, the startup and commissioning of the Power Project shall be executed by the Contractor in a planned coordinated sequence along with the power evacuation system.

24.2. COMMISSIONING & PART COMMISSIONING: The Definition of Commissioning & Part Commissioning shall be referred in Commercial Volume of the Contract agreement.

24.3. SCHEDULED COMMERCIAL OPERATION DATE (SCOD): The Definition of SCOD shall be referred in Commercial Volume of the Contract agreement.

24.4. O&M TARGET GENERATION TEST (OTGT): This O&M Target Generation Test has to be carried out to monitor and assess the overall plant performance. After SCOD, the Contractor shall notify in writing to SPD, that the Project is ready for O&M Target Generation Test as per Contract requirements. All auxiliary systems shall be taken into service before commencement of O&M Target Generation Test of the plant. Any special equipment, instrumentation, tools and tackles and manpower required for the successful completion of the O&M Target Generation Test shall be provided by the Contractor free of cost. The accuracy class of the instrumentation shall be as per the relevant clause of documents.

The O&M Target Generation Test shall be conducted based on the O&M Target Generation Test procedure as briefly described below and the Detailed O&M Target Generation Test procedure along with requisite forms /Checklists /Manuals & Calibration Certificates of the Instruments used for O&M Target Generation Test shall be submitted by the contractor for approval by SPD's Site In charge. This test shall be conducted in the presence of SPD and shall be binding on all the parties of the Contract to determine compliance of the equipment with the functional guarantee.

On verification of the above and approval by SPD, O&M Target Generation Test shall be carried out from a mutually agreed date, (Which shall be scheduled within 2 months from the date of SCOD) for a period of 90 Days consecutively.

24.5.1. The procedure for O&M Target Generation Test: The procedure for O&M Target Generation Test is briefly furnished below.

1. The Annual Expected Net Energy Export & Month wise Expected Net Energy Export for the Total capacity in **Technical Schedule -2**, approved by SPD during detailed Engineering shall be the basis of O&M Target Generation Test.
2. The Actual Net Energy Export Readings recorded at the Metering Station at the Delivery points in kWh and the actual GHI values in kWh/m², Average Ambient

Temperature in Degree Celsius and Wind Speed in m/Sec shall be the Primary Data. These readings shall be noted by the Contractor and shall be monitored & Certified by the Site in charge of SPD on daily basis for entire O&M Target Generation Test period.

3. Effect of any other meteorological parameters shall not be considered except for the above 3 mentioned meteorological parameters.
4. The above actual values shall be measured and recorded at site as described in Section 13.

24.5.2. O&M Target Generation Test Calculations: Technical Schedule - 3 is the Format adapted from IEC 61724-3, for the O&M Target Generation Test calculations and Calculation of Compensation for the underperformance, if any.

Following factors shall be considered for computing the Expected Net Energy Export and shortfall (if any).

- a) Actual measured GHI, T_{amb} and Wind Speed.
- b) **Grid outage or unavailability of power evacuation system:** Generation loss due to Grid outage or unavailability of power evacuation system for the reason not attributable to the Contractor, the GHI measured during the period of outage of the power evacuation system shall be excluded to calculate the Actual Average GHI value.

A separate Register shall be maintained from SCOD throughout the contract Period to record such events with relevant details like Timing, Cause and the Measured Average GHI values etc. by the Contractor and submitted to the SPD Site In-charge immediately after the resumption of Grid for approval. Based on the data of such register, Technical Schedule 4 shall be prepared to arrive at the 'Actual Average GHI values Considering Grid Outage' and got approved by SPD after the resumption of Grid.

- c) **Back down /Surrender Constrains:** Back down / Surrender of Power might be ordered by the authorities on account of events like consideration of grid security or safety of any equipment or personnel or any other conditions warranting Back down / Surrender of Power. If the reason for the Back down / surrender is not attributable to the Contractor, the GHI measured during such duration of Back down / Surrender shall be calculated as described in Technical Schedule 4 and got approved by SPD on such Back down days.

A separate Register shall be maintained from SCOD throughout the contract Period to record such events with relevant details like Back down / Surrender Order references, Timing, the Quantum of Surrendered Power in MW, Measured Average GHI values for the period etc. by the Contractor and submitted to the SPD Site In-charge immediately after the withdrawal of Back down / Surrender for approval. Based on the data of such register, Technical Schedule 4 shall be

prepared to arrive at the modified GHI values. The Entries shall be got approved by SPD each time after Normalization.

- d) The Expected Net Energy Export shall be calculated using the actual measured GHI, T_{amb} and Wind Speed (Technical schedule-6) by feeding them in the PVSYST software, keeping all the other Parameters fixed as per the approved design values as mentioned in (Technical schedule-1) to meet out the Expected Net Energy Export (Technical Schedule-2).
- e) The O&M Target Generation Test shall be repeated in case of outage of any one of the following equipment for more than 7 days continuously.
 1. Evacuation System Equipment including Extended Bay & metering at 33/400KV PSS.
 2. Inverter Duty transformer
 3. Inverter
 4. SCADA System
 5. Pyranometer, Ambient Temperature & Wind Speed Sensors.

24.5.3. Evaluation of O&M Target Generation Test Results:

- a) If short fall in Actual Net Energy Export is observed in the Monthly O&M Target Generation Test Calculations, the contractor shall analyze the reasons for such shortfall and submit a report with the proposed necessary corrective actions for strict implementation to improve the generation in the subsequent months and implement the corrective actions without any cost.
- b) After the end of the O&M Target Generation Test, the contractor shall submit the following records and approved documents within ten working days.
 1. Technical Schedule - 2
 2. Technical Schedule – 3
 3. Technical Schedule – 4
 4. Authenticated measured Data (Net Energy Export, GHI, $T_{ambient}$ & Wind Speed).
 5. PVSYST simulation report along with all input Data and files (Met. Data, PAN, OND, Etc.)
- c) On verification and perusal of the above documents submitted for the O&M Target Generation Test Period, if the Actual measured Net Energy Export is found to be equal or more than the Expected Net Energy Export in the O&M Target Generation Test Calculations as per Technical Schedule - 3, then completion of O&M Target Generation Test will be declared by SPD.
- d) If there is a shortfall in the Expected Net Energy Export in the O&M Target Generation Test Calculations, the Contractor shall repeat the O&M Target Generation Test for another 90 days by following the same procedure furnished above, after taking corrective actions like necessary modifications/ replacements to

avoid the short fall in energy. At least 10 days Prior to start of the 2nd O&M Target Generation Test, the Contractor shall notify in writing to SPD, that the Project is ready for 2nd O&M Target Generation Test along with the list of modifications/replacements. The Date of Commencement of the second O&M Target Generation Test shall be scheduled in such a way that O&M Target Generation Test completes well before one year from the SCOD.

24.5.4. Final Takeover: The contractor shall refer to commercial volume for details on final take over.

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SECTION 25.0

OPERATION AND MAINTENANCE (O&M)

25.1 GENERAL

Operation & Maintenance (O&M) of entire SPP till extended bay at point of connection shall be undertaken by the Contractor from SCOD and O&M of SPP for a period of 3 years from SCOD.

Free O&M of the commissioned Blocks of the SPP till SCOD is also in the scope of Contractor, to ensure maximum generation.

The Contractor shall carry out O&M activities for the entire Solar PV Power Plant including its associated civil structures, approach roads, Power export substation and control room buildings, Entire power evacuation system comprising of OG cables, interfacing bays & allied equipment in the connecting substation till the terminal point of connectivity, Gate complex, Security Buildings, Garden etc., The O & M activities also includes Security of the entire Power Plant Land & Equipment.

Operation work includes day-to-day operation of Solar PV Power Plant in co-ordination with the concerned LDC/Solar park authorities including the power evacuation system, maintenance of LT, and HT system up to the terminal point of grid connectivity and maintenance of all Civil Works.

- 25.1.1 The Contractor shall furnish proposed maintenance (preventive) schedule for the operation and maintenance of the power plant including the complete power evacuation system up to the point of grid connectivity. The long-term maintenance/ replacement schedule indicating the unit replacement of parts/ equipment, if any, shall also be furnished considering the life of such parts/ equipment. Equipment overhaul schedule indicating the loss of generation during such periods, if any, and the proposed catch-up plans for maintaining the scheduled/ committed generation shall also be furnished.
- 25.1.2 The operation & maintenance staff for the Solar PV power plant including the power evacuation system shall be available at all times in the plant premises.
- 25.1.3 The Contractor shall maintain attendance register for all their staff deployed for carrying out jobs on regular basis and shall be produced for verification on demand by authorized personnel of SPD.
- 25.1.4 The Contractor shall ensure that all safety measures are taken at the site to avoid the accidents to his employees or his Sub Contractor employees.
- 25.1.5 In order to ensure longevity, safety of the core equipment and optimum performance of the system, the Contractor shall use only genuine spares of high-quality standards.
- 25.1.6 The O&M is inclusive of replacement of parts/equipment, spares, consumables, etc.

25.2 SCOPE

- 25.2.1 The Contractor shall provide operation and maintenance staff for the entire Solar Power Plant including the power evacuation system for day-to-day operation and maintenance. The operation and maintenance personnel shall be qualified, certified by competent authorities and well trained so that they can handle any type of operational hazards quickly and timely. The responsibility of providing suitable Personal Protection Equipment rests solely with the Contractor.
- 25.2.2 The security of the Solar Power Plant including power evacuation system will rest with the Contractor, till such time, the operation and maintenance of the power plant and its auxiliaries have been finally taken over by SPD after completion of the O&M contract period.
- 25.2.3 The maintenance personnel shall be in a position to check and test all the equipment regularly, so that, preventive maintenance, could be taken well in advance to save any equipment from damage. Abnormal behaviour of any equipment shall be brought to the notice of SPD not later than 2 hours for taking appropriate action.
- 25.2.4 All repairing & replacement works are to be completed by the Contractor within reasonable time from the time of occurrence of fault or defect. If it is not possible to set right the equipment within reasonable time, the Contractor shall notify SPD indicating nature of fault & cause of damage etc. within 12 hours from the time of occurrence of the fault.
- 25.2.5 During operation and maintenance, if there is any loss or damage to any component of the power plant and the evacuation system due to miss-management/ miss-handling or due to any other reasons, what so ever, the Contractor shall be responsible for immediate replacement / rectification of the same. The damaged component may be repaired, if it is understood after examination that performance of the components shall not be degraded after repairing, otherwise the defective components shall have to be replaced by new one without any extra cost to SPD.
- 25.2.6 Regular operation and maintenance of the Solar PV Power Plant and Power Evacuation System including water supply system and submission of daily performance data of the power plant. The Contractor shall maintain log book in this respect to clearly record the date of checking & comments for action taken etc.
- 25.2.7 The scope of operation and maintenance includes all equipment/accessories of the Solar Power Plant and the Power Evacuation System up to the Grid Connecting Substation. Proper records of operation of the entire Power Plant System are to be kept as per direction of SPD.
- 25.2.8 Cleaning of the Power Plant including array yard on regular basis.
- 25.2.9 Cleaning of module surface shall be done periodically taking in to account of the measured Soiling Ratio from the soiling stations, in such a way to maximize Generation.

- 25.2.10 Normal and preventive maintenance of the Power Plant including power evacuation system such as tightening of all electrical connections, Line accessories, Transformers and associated switchgears, Circuit Breakers, protective equipment at Point of connection etc.
- 25.2.11 Keeping & recording daily log sheet as per approved format for the Power Plant System to be supplied after commissioning of the Power Plant.
- 25.2.12 Under no circumstances, the operator shall run the power plant damaging the substation or grid.
- 25.2.13 Contractor employees shall use no part of the power plant building for residential or any other purpose except for running the plant.
- 25.2.14 The Contractor shall submit monthly Performance report of Solar PV Power Plant indicating cumulative energy export data as per approved format within three days of the following month. The reporting shall also include any mismatch or abnormality in the performance of the power plant based on SCADA details review. Day to day coordination with SPD authorities and sending details required by them are also under the scope of the O & M contract.
- 25.2.15 The Contractor shall preserve all recorded data in either/both manual or Digital formats as required by the contract and shall submit to SPD every month.
- 25.2.16 The Contractor shall develop & maintain the garden, which will be developed by the Contractor himself as per landscaping including daily watering and manuring as and when necessary and on regular basis.
- 25.2.17 During operation and maintenance period, the Contractor shall refill the fire extinguishers as per manufacturer's recommendation before expiry.

25.3 TOOLS AND TACKLES

Tools and tackles is not a supply item. A list of tools and tackles which are required for O & M of the solar power plant including the power evacuation scheme along with the separate list of special tools supplied along with the equipment, if any, shall be furnished to SPD during commencement of the O&M period. Such tools and tackles shall be maintained by the Contractor in good condition for use during the O&M period. Regular maintenance tools and tackles may be taken back by the Contractor after completion of O & M period. However, the special tools & Tackles supplied by the respective OEMs shall be handed over to SPD in good condition.

25.4 TESTING INSTRUMENTS FOR ELECTRICAL & ELECTRONICS

All details like Make, Type, Numbers, Range, Accuracy, etc. of onsite testing instruments / equipment shall be furnished to SPD during commencement of the O&M period. Details of equipment / instrument, make, numbers, range, accuracy, etc shall be furnished to SPD.

25.5 SCOPE OF CIVIL MAINTENANCE

- 25.5.1 Cleaning of surface drain, sewerage line, drainage outfall, down pipes, soil pipes, water pipe lines.
- 25.5.2 Repairing or replacement, whatever necessary, and cleaning of all joineries in the PCSS as and when necessary.
- 25.5.3 Repairing or replacement, whatever necessary, of doors, window fixtures, toilet accessories, etc. in PESS/MCR and other buildings as and when necessary.
- 25.5.4 Cleaning & maintaining of power plant area clearing all weeds, leaves and other wood rejects. Vegetation removal inside the power plant and also vegetation removal & cutting of trees/branches en route the OG Cables of the power evacuation system up to Grid Connecting substation on periodical basis as directed by SPD.
- 25.5.5 Painting of iron parts of array structures posts once in a year.
- 25.5.6 Painting of the buildings, structures/PCSS, PESS/MCR, Security room, compound wall, fencing, gates, control room etc. once in two years.
- 25.5.7 All minor repair maintenance in case of buildings and all other structures as and when required as per the instructions of Project incharge/SPD.

25.6 PERFORMANCE EVALUATION AND COMPENSATION FOR SHORTFALL IN ENERGY DURING O&M:

The performance of the Solar Power Plant will be monitored and reviewed by SPD on a monthly basis and Compensation shall be levied for any short fall in Expected Net Energy Export from the Solar Power Plant as per the Actual Net Energy Export indicated in Technical Schedule - 5 for the period of O&M of three years.

- 25.6.1 **The procedure for Performance Evaluation during O&M:** The procedure is briefly furnished below.
 1. The Annual Expected Net Energy Export & Month wise Expected Net Energy Export for the Total MW(AC) capacity for O&M period will be calculated using the actual meteorological values (GHI, Ambient temperature and wind speed) and this Expected Net Energy Export value will be corrected, considering the Expected Net Energy Export calculated during O&M period and Actual Net Energy Export from ABT meter at delivery points during the corresponding period.
 2. The Actual Monthly Net Energy Export Value Readings recorded at the Metering Station at the Delivery points and the actual GHI values, ambient temperature and wind speed shall be the Primary Data. These readings shall be noted on daily basis for entire O&M period.
 3. The required actual meteorological values shall be measured and recorded at site as described in Section -13.

25.6.2 **O&M Performance Calculations:** Technical Schedule - 5 is the Format for the Data collection during O&M and Calculation of Compensation for the underperformance, if any, from the Expected Net Energy Export (O&M) as applicable.

The performance of the entire capacity of the plant shall be monitored monthly by the short fall, if any, in the Expected Net Energy Export using the Technical Schedule - 5.

Following factors shall be considered for computing the Expected Net Energy Export (O&M) and shortfall (if any)

- a) Actual Meteorological parameters– GHI values, Ambient Temperature and Wind Speed.
- b) **Grid outage or unavailability of power evacuation system:** Generation loss due to Grid outage or unavailability of power evacuation system for the reason not attributable to the Contractor, the measured GHI of the period of the outage of the power evacuation system shall be excluded to calculate the Monthly Actual Average GHI value.

A separate Register shall be maintained during contract Period to record such events with relevant details like Timing, Cause and the Measured Average GHI values etc. by the Contractor and submitted to the SPD Site In-charge immediately after the resumption of Grid for approval. Based on the data of such register, Technical Schedule 4 shall be prepared to arrive at the 'Actual Average GHI values Considering Grid Outage' and got approved by SPD after the resumption of Grid.

- c) **Back down /surrender Constrains:** Back down / Surrender of Power might be ordered by the authorities on account of events like consideration of grid security or safety of any equipment or personnel or any other conditions warranting Back down / Surrender of Power. If the reason for the Back down / surrender is not attributable to the Contractor, the GHI measured during such duration of Back down / Surrender shall be calculated as described in Technical Schedule 4 and got approved by SPD on such Back down days.

A separate Register shall be maintained during the contract Period to record such events with relevant details like Back down / Surrender Order references, Timing, the Quantum of Surrendered Power in MW, Measured Average GHI values for the period etc. by the Contractor and submitted to the SPD Site In-charge immediately after the withdrawal of Back down / Surrender for approval. Based on the data of such register, Technical Schedule 4 shall be prepared to arrive at modified GHI value due to Back-Down for the month. The Entries shall be got approved by SPD each time after Normalization.

- d) In case of outage of any one of the following equipment for more than the stipulated days as indicated below continuously in any Quarter, then the quarterly payment of O&M Contract value for the respective Quarter will be reduced for the quantum of such outage duration.

1. SCADA System - 3 Days

2. Data Logger - 3 Days

3. Pyranometer, Ambient Temperature & Wind Speed Sensors -3 Days

25.6.3 Evaluation of Performance of O&M Services and Levy of Compensation for Shortfall in Energy:

If short fall in Expected Net Energy Export (O&M) is observed in the Monthly Calculations of Technical Schedule - 5, the contractor shall analyze the reasons for such shortfall and submit a report with the proposed necessary corrective actions for strict implementation to improve the generation in the subsequent months and implement the corrective actions without any cost.

If there is a shortfall in the Calculations of Technical Schedule - 5, Compensation for deficiency in the Services of the O&M shall be levied for the quantum of such short fall as per the calculation method described in Technical Schedule - 5.

Any Electrical /Civil maintenance work which are not mentioned or not included above but necessary for the Safety, Smooth functioning of the Plant and longevity of the plant shall be carried out by the Contractor.



SECTION 26.0

SUB VENDORS & SUB CONTRACTORS

26.1 SUB VENDORS

26.1.1 The Contractor is responsible for performance/guarantee of the complete project including bought out items and outsourced processes. The equipment / Sub Systems are classified in to two groups as below and listed in Clause 26.1.6.

- 1) Class - I items - Main & Critical Equipment / Components / Sub Systems
- 2) Class-II items - Essential Equipment / Components / Sub Systems

The Contractor shall supply the class I items from the approved Manufacturers only.

26.1.2 The Contractor shall furnish in their bid, the proposed list of sub vendor(s) for each of the bought out items of both class - I and II.

26.1.3 Sub Vendors are categorized as below.

a) Category – I: Sub Vendors accepted:

The Category – I Sub Vendors are enumerated based on past experience of SPD in their PV Solar Power Projects and listed in Clause 26.6.1. No separate approval is required for Category - I listed Sub Vendors. However, SPD reserves the right to accept or reject any of the Category -I Sub Vendors based on latest information, if any, available with SPD.

b) Category – II: Sub Vendors enlisted for future acceptance:

The contractor shall submit the List of proposed Category – II Sub Vendors which are not listed in Category -I Sub Vendors List during Bidding in Annexure -1. The Category – II Sub Vendors proposed shall be based on the various details regarding capacity, capability, experience etc. The Contractor shall submit the compiled details and credentials of the Sub Vendors under category II for scrutiny and acceptance by SPD during detailed engineering.

The acceptance criteria are mentioned below.

However, SPD reserves the right to accept or reject any of the proposed Sub Vendors based on information available with them.

c) Category - III: New Sub Vendors:

Proposing New Sub Vendors by the Contractor after finalization of contract is discouraged and shall be rejected by SPD without assigning any reason. However, SPD reserves the right to accept such Sub Vendors with Conditions, based on the merits & in the overall interest of the project, after establishing that the sub vendor proposed meets the acceptance criteria for Category - II sub vendors. However, price advantage if any, arising out of the inclusion of new sub vendor shall be passed on to SPD. It is the responsibility of the Contractor to establish the quantum of such Price Advantage with valid

authenticated documents.

The consolidated list of accepted Sub Vendors & Sub Vendors enlisted for future acceptance under category I and category II will be made available to the Contractor in the contract agreement.

26.1.4 For all other components/equipment/systems which are not figuring in the bought out items list, Contractor's standard practice of selecting of vendors may be carried out.

26.1.5 **Acceptance criteria for Category - II Sub Vendors:**

26.1.5.1 **For all Mechanical, Electrical and Control & Instrumentation:**

1) For Class I Items: Contractor to furnish documentary evidence to show that similar or higher capacity component/equipment /system has been supplied by the vendor or their associate/collaborator and the same has been operating satisfactorily for minimum six months as on the original scheduled date of Tender opening. The documentary evidence shall be in the form of Performance certificates furnished by the end user.

2) For Class II Items: Contractor to furnish documentary evidence to show that similar or higher capacity component/equipment /system has been supplied by the vendor or their associate/collaborator. The documentary evidence shall be in the form of Material Receipt Certificate/Site Inspection Report/Installation or erection report etc. from the end user, site/purchaser premises for having received the material.

26.1.5.2 **For Structural Steel:**

- 1) It should conform to relevant Indian / International Standards.
- 2) It should be of reputed make of supplier to similar construction / infrastructure projects.
- 3) The Contractor should furnish documentary evidence to prove (1) and (2) above.

26.1.5.3 **For Cement and Reinforcement Steel:**

- 1) It should conform to Indian / International Standard
- 2) It should be of reputed makes supplied to similar construction/ infrastructure projects
- 3) The Contractor should furnish documentary evidence to prove (1) and (2) above

26.1.6 Category - I Sub Vendors List:

A. Class I items:

Sl. No	Equipment list for Class I items	Category I Sub Vendor Name(s)
1	Solar PV modules	NA
2	Central Inverter	NA
3	String Combiner & Monitoring Unit	HENSEL, JACKSON, AEG, CAPE Electric, L&T, SMA, Statcon Power Controls, Adarsh Control & Automation, Solaris, Jakson, AEG, StatconEnergiaa Pvt Ltd, Raychem RPG Pvt. Ltd, Trinity Touch Pvt Ltd, ABB India Ltd
4	Inverter Duty Transformer	NA
5	Grid Tie Power Transformer	NA
6	HT Auxiliary Transformer	IPL Products, Automatic Electric Ltd, Voltech
7	LT Panel	----
8	HT Switchgear/Panel	NA
9	Instrument Transformers	Pragati, Kappa, Prayog, AE, BHEL, CGL, JYOTILTD, PRECISE, Schneider, Southern Electric, EMCO, Controls & Systems, Vishal Transformers & Switch gears Pvt Ltd, Mehru Electrical & Mechanical Engineers (P) Ltd, Precise, Emmess Control Pvt Ltd, ABB India Ltd, Megawin Switchgear Pvt Ltd, Pragati Electricals Pvt Ltd
10	HT Power Cables	NA
11	LT power cables	Asian cables, KEI, RPG, CCI, Incab, Nicco, UNIVERSAL, FortGloster, Hinudthan Vidyut Products, Torrent Cables, GemsCab, KEC, Cords, GuptaPower, RAVIN CABLES, Cable Corporation of India, Finolex, Torrent Power, Havells India Ltd, KEC International Limited, Polycab India Limited, Apar Industries Limited

12	DC Cables	Lapp, Bizlink, KEI, Polycab, Universal, HAVELLS, Finolex, NICCOCABLES, RAVINCABLES, RPG, TORRENT CABLES, Siechem Technologies Pvt Ltd, Torrent Power Limited, Apar Industries Limited, Polycab India Limited, Ravin Cables Ltd, KEC International Limited
13	HT OH Line Conductors	NA
14	HT OH Line Insulators	NA
15	Battery Charger	NA
16	UPS	Emerson, NUMERIC, Hitachi, Dubas, HIREL, HITACHI-HIREL, ConsulNeowatt, Numeric, PowerOne Micro systems Pvt Ltd
17	Batteries	Exide, HBL, Amco, HBL Nife, Consul Neowatt, Voltech, HBL Power Systems Ltd, Exide Industries Ltd, Amara Raja Power Systems Ltd
18	SCADA	Honeywell, GE, Schneider, Rockwell, Allan Bradley ALSTHOM, BHEL, Emerson, GE Fanuc, Hitachi, L&T, Siemens, Rockwell Automation India Pvt Ltd, Trinity Touch Pvt Ltd, ABB India Ltd, GE Intelligent Platforms Pvt. Ltd
19	C&R Panel	----
20	Numerical Relays	Schneider, Alstom, L&T, ABB, Siemens, AREVA, GE, C&S Electric Ltd, Ashida Electronics
21	Transformer Fire protection system / NIFPS	TYCO, AGNI, HONEYWELL, KIDDE, Mather & Platt, Notifier, Agni Easun -MR, CTR Manufacturing Industries Ltd, Vendere, Tectonicus Services (India) Pvt. Ltd
22	Fire detection alarm panel	AGNI, Honeywell, KIDDE, Mather& Platt, Notifier, TYCO, Ravel electronics Pvt Ltd, MX Systems International Pvt Ltd
23	ABT Energy Meter	ABB, Elster, Secure, L&T, Electrical Controls & Systems

24	WMS (Class A meteorological Sensors and data loggers)	Pyranometer: Kipp&Zonen. Wind Sensor: Davis Instruments, Firstrate sensor Products, Lufft, Jambhekar, Equinox. Ambient temperature: Mas Technologies, Rotronic, IMT, Campbell Scientific, Jambhekar. Data Logger: Aeron, Trinity Touch, Jambhekar
25	Tracker system	----

B. Class II items:

Sl. No	Equipment list for Class II items	Category I Sub Vendor names
1	Cable termination kits	Raychem, 3M, Denson
2	LED Lamp fixtures for indoor	Bajaj, CGL, Havells, Philips, Wipro
3	LED Flood light fittings for outdoor	Bajaj, CGL, Havells, Philips, Wipro

26.2 SUB CONTRACTORS / AGENCIES

Acceptance Criteria:

In case the Contractor is engaging Sub Contractors / Agencies for the PV Solar Project Works in the fields of Civil, Electrical, Control & Instrumentation, Mechanical etc. for the following works, approval shall be obtained from SPD before engaging them as sub- Contractor / Agencies for the works.

- 1) Solar Project Design Consultancy works
- 2) Erection works
- 3) Civil & Structural works.
- 4) Third party Inspection works
- 5) Third Party Commissioning works
- 6) O&M works
- 7) Security Services

Approval shall be given by SPD, based on the request by the Contractor for the approval along with the following documentary evidence.

- 1) Contract award copy to show that similar works were carried out by the Sub Contractor / Agency as on the original scheduled date of Tender opening.
- 2) Performance certificate (End user's certificate) to show that the job referred above has been completed satisfactorily.



**SECTION 27.0
ATTACHMENTS**

27.1 The following Annexure / Technical Schedules referred at the respective clauses are attached in this section.

Sr. No.	Section No.	Title	Description
1	26	Annexure -1	List of Category II Sub Vendors for Bought out Items
2	23	Annexure - 2	List of Mandatory Spares
3	2, 24	Technical Schedule - 1	Monthly & Annual Estimated Net Energy Export Values
4	24	Technical Schedule - 2	Monthly & Annual Expected Net Energy Export Values
5	24	Technical Schedule - 3	Calculation of O&M Target Generation Test Results
6	24,25	Technical Schedule - 4	Format for Actual Average GHI Values During Grid Outage/Backdown (GO/BD)
7	25	Technical Schedule - 5	Calculation of O&M Performance Test Results & Methodology for levying Compensation for Energy Short fall
8	24	Technical Schedule - 6	Monthly & Annual Expected Net Energy Export with actual GHI, Tamb, wind speed, Grid Outage, Backdown

Annexure -1

List of Category II Sub Vendors for Bought out Items

(Contractor to Propose and Submit during Bid)

Class I items:

Sl.	Equipment list for Class I items	Sub Vendor Name(s)
1	Solar PV modules	NA
2	Central Inverter	NA
3	String Combiner & Monitoring Unit	
4	Inverter Duty Transformer	NA
5	Grid Tie Power Transformer	NA
6	HT Auxiliary Transformer	
7	LT Panel	
8	HT Switchgear	NA
9	Instrument Transformers	
10	HT Power cables	NA
11	LT Power cables	
12	DC Cables	
13	HT OH Line Conductors	NA
14	HT OH Line Insulators	NA
15	Battery Charger	NA
16	UPS	
17	Batteries	
18	SCADA	
19	C&R Panel	NA
20	Numerical Relays	
21	Transformer Fire protection system / NIFPS	
22	Fire detection alarm panel	
23	ABT Energy Meter	
24	WMS (Class A meteorological Sensors and data loggers)	
25.	Tracker System	

Class II items:

Sl.	Equipment list for Class II items	Sub Vendor Name(s)
1	Cable termination kits	
2	LED Lamp fixtures for indoor	
3	LED Flood light fittings for outdoor	



Annexure – 2
List of Mandatory Spares

Sr. No	Description	Unit & Quantity
Spares related to Solar PV Modules		
1	Solar PV Module	NA
2	Module Mounting Structure (MMS)	0.25% of total population for each type
3	Module Connector Set (Male & Female) with wire	0.25% of total population for each type
Spares related to SCMBs		
4	String Combiner & Monitoring Box	2% of total population
5	DC fuses	25 nos. of each type and rating
6	Surge Protection Devices	2% of total population
Spares related to 33kV Switchgear		
7	33kV Circuit Breakers	NA
8	33 KV Current Transformer for HT switchgear	NA
9	33 KV Potential Transformer for HT switchgear	NA
10	33 KV Bus Potential Transformer	NA
11	33 KV Surge Arrestor for HT switchgear	NA
12	33 KV Isolators (As Applicable)	NA
13	Earthing Trolley (Bus Earth & Cable Earth)	NA
14	Numerical relay for 33kV HT Switchgear (PCSS, PESS & PSS)	NA
15	Auxiliary Relays	NA
16	33kV Switchgear-Voltage Detecting Insulator (VDI) and Voltage Presence Indicator (VPI) as applicable	NA
Spares related to Inverters		
17	Electronic Cards / Modules for Inverters	NA
18	IGBT Unit for Inverters	NA
19	Semiconductor Fuse	NA
20	All the Other Fuses used in Inverter	NA
21	Cooling System Fans	NA
22	Air Filters	NA
Spares related to SCADA		
23	SCADA ethernet switch	1 no of each type
24	CPU / PLC	1 no of each type
25	I/O Modules	2 nos of each type
26	Power Supply Module	1 no of each type

Spares related to Cables

27	DC Solar Cable (SPV Module to SCMB)	10 km
28	DC Cable (SCB to PCU) of highest size	2 km
29	AC Cable from inverter to Inverter transformer	1 km
30	HT Cable 33kV (PCSS to PESS) of highest size	NA
31	HT Cable 33kV (PESS to EHV Tie-transformer)	NA
32	HT Cable 33kV Jointing /Termination Kits	2 nos of each type

Spares related to Aux Power Supplies

33	LV Auxiliary transformer PCSS (Highest size)	1 No
34	Cells for battery banks	5 Nos of each type and rating in dry condition with required electrolyte in separate containers
35	UPS/DC System charger's Power / Control Cards	1 no of each type

Spares related to Inverter Transformer (replaceable for all ratings supplied under package)

36	Set of Valves for Inverter transformer	NA
37	WTI with contacts of Inverter transformer	NA
38	OTI with contacts of Inverter transformer	NA
39	Buchholz relay complete of Inverter transformer	NA
40	Pressure Relief Device of Inverter Transformer	NA
41	Magnetic Oil Gauge (MOG) of Inverter Transformer	NA
42	HV and LV Bushing with metal parts and gaskets of Inverter Transformer (Each Type)	NA
43	Breather	NA
44	Gaskets	NA
45	NRV for NIFS	1 no of each type
46	Marshalling Box Terminals	NA

General Spares

47	MCCB / ACB	1 no. of each type and rating
48	MCB	3 nos. of each type and rating
49	All the Fuses not Covered in the list	25 nos. of each type and rating



Technical Schedule – 1
(To be submitted during Bidding by the bidder)

MONTHLY & ANNUAL ESTIMATED NET ENERGY EXPORT VALUES

SPP Unit Place:

SPP Unit Capacity:

Sl. No.	Month	Estimated Average GHI Values (kWh/m ²)	Estimated Net Energy Export (MU)
1	January		
2	February		
3	March		
4	April		
5	May		
6	June		
7	July		
8	August		
9	September		
10	October		
11	November		
12	December		
Annual Values Y			

Signature and Seal of the Bidder.

Note:

1. The Month-wise Average Global Radiation on horizontal surface (kWh/m²/ Day) shall be taken for the Co-ordinates of the Location (Latitude: 24.03° N & Longitude: 69.54° E) from the SOLARGIS database.
2. The Reference Solar PV Module details, mandatory Losses and other parameters to be considered during PVSYS Simulation are as listed below.

Sr. No	Parameter Description	Considered Value
1.	Annual Global Horizontal Irradiance (GHI) from SOLARGIS	2042.9 kWh/m ²
2.	Reference Solar PV Module Capacity and Characteristics*	Capacity - 540 Wp Bifacial Dim. - 2272 (±10)mm x1133 (±3)mm Weight- 32.3 kg Isc - 13.85A Hole Distance - 400 ± 1mm 960 to 1000 ± 1mm 1400 ± 1mm(Longer edge) 1091mm (short edge) Bifaciality factor - 70 % Rear shading factor - 5.0% Rear mismatch loss - 10.0% **Reference characteristics: Jinko solar JKM-560N-72HL4-BDV
3.	Inverter Characteristics*	**Reference: SINENG ELECTRIC CO., LTD. EP-3300-HB-UD
4.	Array Soiling Losses	1.5%
5.	Thermal Loss factor	Uc-29 Watts/m ² -K Uv-0.0 Watts/m ² -K
6.	Wiring Ohmic Loss (DC)	1.5 %
7.	LID - Light Induced Degradation Loss	2.0 %
8.	Module Quality Loss	0 %
9.	IAM Losses	As per PV Module Characteristics
10.	Module & String mismatch losses	1.1 %
11.	AC Wiring loss (From Inverter to Delivery points)	1.5 %
12.	Transformer Loss	As per datasheet (max. 1.5%)
13.	System Unavailability Loss	1.0% (in 3 periods and one period each in Mar, Jun, Nov)
14.	Auxiliary Loss	5 Watts/kW

Note: * Based on the actual Solar PV Module data and Inverter data the parameters may be modified suitably as per site conditions.

** The following module and central inverter available in the PVSYST Software shall be considered as reference module and central inverter for PVSYST Simulation and shall be used for bidding purpose only.

- The PVSYST Reports with simulation parameters / variants, shading diagrams, production charts, loss diagrams etc. are to be furnished.

Technical Schedule – 2
(To be submitted during detailed engineering)

MONTHLY & ANNUAL EXPECTED NET ENERGY EXPORT VALUES

SPP Unit Place:

SPP Unit Capacity:

Sl. No.	Month	Expected Average GHI Values (kWh/m ²)	Expected Net Energy Export (MU)
1	January		
2	February		
3	March		
4	April		
5	May		
6	June		
7	July		
8	August		
9	September		
10	October		
11	November		
12	December		
Annual Values Y			

Signature and Seal of the Bidder.

Note:

1. The Month-wise Average Global Radiation on horizontal surface (kWh/m²/ Day) shall be taken for the Co-ordinates of the near by Location (Latitude: 24.03° N & Longitude: 69.54° E) from the SOLARGIS database.
2. The PVSYST Reports with simulation parameters / variants, shading diagrams, production charts, loss diagrams etc. are to be furnished

3. PVSYST report with SPD's Module and inverter datasheet shall be generated by keeping all the other parameters of the report in point (2) above of technical schedule-1, fixed and replacing the PAN file and OND file of reference module and Inverter with the PAN file and OND file provided by SPD. The generation arrived in this report shall be furnished in the Technical Schedule-2 table given above which will be the basis for O&M Target Generation Test (Technical Schedule-3) and Performance evaluation during O&M (Technical Schedule-5).



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Technical Schedule – 3

Calculation of O&M Target Generation Test Results & Methodology for levying Compensation for Energy Short fall

O&M Target Generation Test Number:

Date of Commencement of the O&M Target Generation Test Period:

Date of Completion of the O&M Target Generation Test Period:

S. No.	Description	Unit	Methodology	Month 1	Month 2	Month 3	Month 4	Σ Value (Added Values of Month 1, 2, 3 and 4)
A	Month	(month)						
B	Total Number Days in the Month	Nos.						
C	Number of O&M Target Generation Test Days	Nos.						90
D	Expected Net Energy Export of the Month	(kWh)	Taken from Technical Schedule 2					
E	Expected Net Energy Export of the month corrected to the number of O&M Target Generation Test days	(kWh)	D x (C/B)					ΣE
F	Actual Net Energy Export derived from measurements at Delivery Points	(kWh)						ΣF
G	Expected Net Energy Export, considering Actual GHI, T _{amb} , Wind Speed, Grid Outage and Back down by simulation in the PVSYST	(kWh)	Taken from Technical Schedule 6					ΣG
H	Short Fall in Expected Net Energy, if any, during O&M Target Generation Test Period.	(kWh)	(G-F) (Expected - Actual)					ΣH
Counter signed by SPD								

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Note:

- i. The data shall be filled in appropriately by the contractor as the OTGT Test progresses and shall be submitted to SPD on a monthly basis for verification. This Record is to be maintained throughout the OTGT Test Period by the Contractor and submitted to SPD on completion of OTGT Test period.
- ii. If Actual measured Net Energy Export (**ΣF**) is equal or more than the Expected Net Energy Export (**ΣG**) in the above Calculations (i.e., **ΣH is 0 or negative**), then completion of OTGT Test will be declared by SPD.



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Technical Schedule – 4

Format for Actual Average GHI Values During Grid Outage/Backdown (GO/BD)

Billing Cycle Month:

Sl. No	Event	GO/BD Start Time	GO/BD End Time	Duration of GO/BD	Total GHI During GO/BD	GHI to be incorporated In PVSYST Input File	Approval by SPD
Day	(GO/BD)	(hh:mm)	(hh:mm)	(Hours)	(kWh/m ²)	(kWh/m ²)	
	(a)	(b)	(c)	(d)=(c)-(b)	(e)	(f)= (e)xMF [#]	
1							
.....							
31							

MF = 0, during Grid Outage.

= (1 - %backdown), during Backdown

Note: The adjusted GHI values shall be used in the Hourly Input File of PVSYST Software.



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Technical Schedule – 5

Calculation of O&M Performance Test Results & Methodology for levying Compensation for Energy Short fall

1. The data shall be filled in appropriately by the contractor as the O&M progresses and shall be submitted to SPD for verification on a monthly basis. This Record is to be maintained throughout the O&M Period by the Contractor and submitted to SPD on completion of a financial year and O&M Contract.
2. The Year wise Expected Net Energy Export O&M period of 3 years is given below.
- 3.

TABLE - 1: Year wise Expected Net Energy Export

S No	O&M year	Expected Net Energy Export (MU)
1	First	Y= Taken from technical schedule-2
2	Second	$Y1 = (1-X\%) \times Y1$
3	Third	$Y2 = (1-X\%) \times Y2$
4		

Here, X - Annual degradation value of the Solar PV Module to be supplied by SPD.

O&M Year: First / Second / Third

Date of Commencement of the O&M Period:

Date of Completion of the O&M Period:

S. No.	Description	Unit	Methodology	Month 1			Month 12	Σ Value (Added values of Month1 to Month12)
A	Month& number of O&M days							
B	Actual Net Energy Export derived from measurements at Delivery Points	(kWh)						Σ B
c	Expected Net Energy Export, considering Actual GHI, T _{amb} , Wind Speed, Grid Outage, Backdown and	(kWh)						Σ C

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	degradation of 0.5%/year as in Table 1 above, by simulation in the PVSYST							
D	Expected Net Energy Export considering OTGF*	(kWh)	C x OTGF*					Σ D
E	Short Fall in Net Energy Export, if any, during O&M PERFORMANCE Test Period	(kWh)	(D – B) (Expected - Actual)					Σ E
Counter signed by SPD								
Note: * OTGF=O&M Target Guarantee Factor = Actual Net Energy Export during OTG test / Expected Net Energy Export during OTG Test. = (ΣF/ΣG) of Technical Schedule 2 and the value of OTGF shall be 1 or more. Compensation per unit (kWh) for shortfall in Energy during O&M period on yearly basis: In case Σ D< or = Σ B then no Compensation for the corresponding O&M period. In case Σ D> Σ B then Compensation for the corresponding O&M period shall be calculated and levied as below.								
F	Yearly Short Fall in Expected Net Energy Export	(kWh)	Σ E					
G	Applicable Tariff	(INR/kWh)	Refer to Commercial Volume					
H	Yearly loss of Revenue and applicable Compensation	(INR)	F x G					

Note:

The commercial document of contract shall be referred for the other details on Compensation and for applicable GST on Compensation amount payable by contractor.



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Technical Schedule – 6

MONTHLY & ANNUAL EXPECTED NET ENERGY EXPORT WITH ACTUAL GHI, T_{amb}, WIND SPEED, GRID OUTAGE, BACKDOWN

SPP Unit Place:

SPP Unit Capacity:

Sl. No.	Month	Actual average GHI Values (kWh/m ²)	Actual average T _{amb} (celcius)	Actual average Wind speed (m/s)	Actual Average GHI Values During Grid Outage/Backdown (GO/BD)	Expected Net Energy Export, considering Actual GHI, T _{amb} , Wind Speed, Grid Outage, Backdown by simulation in the PVSYST
1	January					
2	February					
3	March					
4	April					
5	May					
6	June					
7	July					
8	August					

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9	September					
10	October					
11	November					
12	December					
Annual Values Y						

Signature and Seal of the Site Incharge/SPD.

Signature and Seal of the Contractor.

Note:

1. The PVSYST Reports with simulation parameters / variants, shading diagrams, production charts, loss diagrams etc. are to be furnished