NEW TOWN KOLKATA DEVELOPMENT AUTHORITY

(A Statutory Authority Under Government of West Bengal)
3, Major Arterial Road, New Town, Kolkata - 700 156

Memo. No. 1651 /NKDA/Engg-36/2010(XI) **Date: 05/05/2020**

NOTICE INVITING e-TENDER

Notice Inviting e-Tender No. WBNKDA/03/EE-I/NKDA/2020-21

Item rate E-Tenders are hereby invited by Executive Engineer-I, New Town Kolkata Development Authority (NKDA) from the resourceful, reliable, bona-fide and experienced manufacturers of SPV module/ System Integrators having specific experience of supply, installation, testing & commissioning of SPV Power Plants without battery with modern construction machineries and skilled manpower, are requested to submit their offer for the work as detailed below.

(Submission of Bid through **online**)

Sl. No	Name of the work	Estimated Amount (Rs.)	Bid Security (Rs.)	Price of Tender documents (Rs.)	Period of Completion
1.	Supply, Installation & Commissioning with Five years comprehensive Operation & maintenance of 1000 kW(2X500kW) on Grid SPV Power Plants on Canal Top at Bagjola Canal, New Town, Kolkata	Lump Sum Amount to be quoted by the bidders	18,00,000=00 (Rs Eighteen lakhs only)	Rs 10,005=00 (Rs Ten thousand and five) per set to be paid only at the time of execution of agreement.	12 (Twelve) months With 05 (five) years operation and Maintenance.

1. In the event of e-filling, intending bidder should download the tender documents from the website http://wbtenders.gov.indirectly with the help of Digital Signature Certificate. All the bidder shall have to submit earnest money & necessary earnest money will be deposited by the bidder through the following payment mode as finance dept. order no-3975-F (Y) dated 28th July 2016 (Annexure–A)

   i) Net Banking (any of the banks listed in the ICICI Bank payment gateway) in case of payment through ICICI payment gateway).

   ii) RTGS/NEFT through bank account in any bank. The EMD shall be deposited in favour of "New Town Kolkata Development Authority"

payable at Kolkata.

DATE & TIME SCHEDULE

Sl. No.	Particulars	Date & Time
1	Date of uploading of NIeT and other documents (online)	**05/05/2020**
2	Date and venue of pre bid meeting	**20/05/2020 at 1.00 P.M.** **Conference Hall of NKDA at 01, MAR, New Town, Kolkata - 700156**
3	Documents download start date (Online)	**05/05/2020 from 4.00P.M.**
4	Documents download end date (Online)	**08/06/2020 upto 4.00P.M.**
5	Bid submission start date (On line)	**05/05/2020 from 4.00P.M.**
6	Bid Submission closing (On line)	**08/06/2020 upto 4.00P.M.**
7	Bid opening date for Technical Proposals (Online)	**10/06/2020 at 4:00P.M.**
8	Last date of uploading list for Technically qualified Bidder(online)	Will be intimated in due course
9	Date of opening of Financial Proposal(online)	Will be intimated in due course
10	Last date of intimation to the successful bidder	Will be intimated in due course

Contents

SECTION A

1. GENERAL TERMS & CONDITIONS

Tender Documents consisting of the following, shall be submitted duly digitally signed by the contractor without which the contract is liable to be rejected.

i. Notice Inviting e-Tender (NIeT)
ii. General Terms and Conditions, Special Conditions of Contract, Scope of Work, Special Terms and Conditions
iii. Technical Specifications & Drawings
iv. Schedule of Work and Payment Schedule (Price Break up)
v. BOQ-filled up and submitted in the financial folder.
vi. WBF 2912

1. The bidder would be at liberty to point out any ambiguities, contradictions, omissions etc. seeking clarifications thereof or interpretation of any of the Clause(s), conditions etc. of the tender documents before the Authority. Every effort shall be taken by Tender inviting authority to clarify and take required course of action. Any claim on this ground shall not be entertained.
2. The bidder is required to inspect the site of work with particular reference to location, site condition and infrastructural facilities at their own cost. They are to make a careful study with regard to accessibility, availability of materials and its sources, labor (skilled and unskilled) and all relevant factors. Extra claim or any concession on the ground of insufficient data or information and absence of knowledge of conditions prevailing at the site or situation arising during the execution of the work shall not be entertained.
3. The bidder will have to strictly comply with the conditions, specifications etc. laid down in the tender documents and no unilateral variation in any form is permissible.
4. The successful bidder will be notified in writing of the acceptance of his Tender. The **Tenderer** then becomes the **Contractor** and shall have to forthwith take steps to

execute documents forming the formal Contract and to take steps for fulfillment of all his obligations under the contract.

5. The bidder is to obtain License from the Registering Officer & Assistant Labor Commissioner of the respective Division / Office under The Contract Labor (Regulation & Abolition) Act 1970 and Rules framed there under and to submit the same to the concerned EIC within seven days from the date of issue of work order.
6. Any typographical mistake/omission if found may immediately be brought to the notice of the authority for rectification. In case of any inadvertent typographical mistake in the specific price schedule of rates, the same will be treated to be so corrected as to confirm with the prevailing relevant schedule of rates and/or technically sanctioned estimate.
7. The Contract shall be governed by and construed in accordance with the governing law of India and also the laws in force in the State of West Bengal and no suit or other proceeding relating to the Contract shall be filed by the Contractor in any Court of Law except in the High Court of Kolkata which shall have exclusive jurisdiction to hear and determine all actions and proceedings in connection with any dispute arising out of the contract, and the Contractor shall submit to the jurisdiction of the aforesaid Court of Law of the purpose of any such action and proceeding.
8. Income Tax and GST will be deducted as per Govt. orders issued from time to time and would be applicable on the date of making payment of the bills. Building and other construction workers' cess @ 1.0% will be deducted from the progressive bill(s) in pursuance with G.O. No. 599A/4M-28/06 dated 27/09/2006.
9. Departmental materials will not be issued under any circumstances. Department or Authority, unless otherwise stated means **New Town Kolkata Development Authority.**
10. The provision of the Power of Attorney, if any, must be subject to the approval of the department. Otherwise the department shall not be bound to take cognizance of such Power of Attorney.

Executive Engineer–I
New Town Kolkata Development Authority

Memo. No. 1651 /1(2)/ NKDA / Engg – 36 / 2010 (X) Date: 05/05/2020

Copy forwarded for information to:-

Copy forwarded for information to:-

1. The Chief Executive Officer, New Town Kolkata Development Authority.
2. The Chief Engineer, New Town Kolkata Development Authority
3. The Chief Executive Officer, New Town Kolkata Green Smart City Corporation Limited
4. Administrative Officer I & II New Town Kolkata Development Authority
5. Chief Finance officer, NKGSCCL
6. Chief Technical Officer, NKGSCCL
7. Technical Officer, NKGSCCL
8. The Finance Officer, New Town Kolkata Development Authority
9. Executive Engineer-II, Executive Engineer III, Executive Engineer I & ME New Town Kolkata Development Authority
10. The Estimator/ Sr. Accountant / Cashier, New Town Kolkata Development Authority.
11. Office Notice Board.
12. Official Website of New Town Kolkata Development Authority (www.nkdamar.org)

Executive Engineer-I,
New Town Kolkata Development Authority

2. INSTRUCTION TO BIDDERS REGARDING e-TENDERING

The Instructions/ Guidelines for electronic submission of the tenders have been elucidated in this section for assisting the contractors to participate in e-Tendering.

1. **Registration of Contractor** Any contractor willing to take part in the process of e-Tendering will have to be enrolled & registered with the Government e-Procurement system, through logging on to https://wbtenders.gov.in (the web portal of public works department) the contractor is to click on the link for e-Tendering site as given on the web.
2. **Digital Signature certificate (DSC)** Each contractor is required to obtain a class-II or Class-III Digital Signature Certificate (DSC) for submission of tenders, from the approved service provider of the National Informatics Centre (NIC) on payment of requisite amount. **Details are available at NIC (National Informatics Centre) Web Site and are stated in Clause 2 of Guideline to Tenderer. DSC is given as a USB e-Token.**
3. **Search & Download** The contractor can search & download NIeT & Tender Documents electronically from computer once he logs on to the website mentioned as above in Clause 2 using the Digital Signature Certificate. This is the only mode of collection of Tender Documents.
4. **Submission of Tenders.** Tenders are to be submitted through online to the website stated in Cl. 2 in two folders at a time for each work, one as Technical Proposal & the other as Financial Proposal before the prescribed date & scanned and Digitally Signed. The documents will get encrypted (transformed into non readable formats).
5. **Technical proposal** The Technical proposal should contain scanned and digitally signed copies of the following further two covers (folders).

   A-1.Statutory Cover Containing:-

   a) Demand Draft (follow the instructions as in Cl.-1 and Cl.-16) in the NIeT, against each serial of work in favor of "New Town Kolkata Development Authority" payable at Kolkata.

b) Tender form No. WBF 2912 & NeIT with all addenda and corrigenda (In case quoting any rate in WBF 2912 the tender is liable to be summarily rejected.)

Sl No.	Category Name	Sub-Category Description	Detail (s)
A	Certificate(s)	Certificate(s)	1. GST Registration Certificate & latest payment Acknowledgement. 2. PAN. 3. Professional Tax (Challan) (2019-20) latest payment Acknowledgement. 4. Latest IT Receipt.IT-Clearance certificates for Assessment year 2019-20.
B	Company Detail(s)	Company Detail	1. Proprietorship Firm (Trade License) Partnership Firm (Partnership Deed, Trade License) Ltd. Company (Incorporation Certificate, Trade License) Society (Society Registration Copy, Trade License) Power of Attorney. Proof of address from any Govt. Department, local authority, MLA, Councilor of the area with Telephone no. etc.
C	Credential	Credential – 1 Credential – 2 ...	1. Similar nature of work done & completion certificate, which is applicable for eligibility in this tender.

c) Special Terms, Conditions & Technical Specifications of works, if any as included in the bid document.

A-2. Non statutory Cover Containing:-

Click the check boxes beside the necessary documents in the My Document list and then click the tab "Submit Non Statutory Documents' to send the selected documents to Non-Statutory folder. Next Click the tab "Click to Encrypt and upload" and then click the "Technical" Folder to upload the Technical Documents.

6. Financial proposal:-

i. The financial proposal should contain the following documents in one cover (folder) i.e. Bill of quantities (BOQ) the contractor is to quote the rate (on Lump-Sum basis) online through computer in the space marked for quoting rate in the BOQ.

ii. Only downloaded copies of the above documents are to be uploaded virus scanned & Digitally Signed by the contractor.

3. ELIGIBILITY CRITERIA

This invitation for the Bid is open to any bidder who is an original manufacturer of any solar photovoltaic equipment or authorized representative of the manufacturer, who meets the qualifying requirements stipulated hereunder for participation in the tender. The bidder shall furnish satisfactory evidence to establish that the bidder meets the following qualifying requirements.

3.1 General Eligibility Criteria:

i) The Bidder shall be a Registered Company/Firm incorporated in India under the Companies Act, 1956 or 2013/Indian Partnership Act, 1932/LLP Act, 2008 including any further amendments for a minimum of 5 years in the field of solar power.

ii) Bidder should have valid ISO 9001:2015 certificate. The bidder shall not been blacklisted by any state/central Govt. /PSU organization in India or debarred by court of law. In addition, the bidder should not be involved in any major litigation that may have an impact of affecting or compromising the delivery of services as required under this tender.

iii) Bidders shall have to submit the:
   a) Audited Annual Accounts for the last five financial years ending FY2018-19.
   b) Submission of Tax Audit Report for last three financial years2016-17, 2017-18 & 2018-19. The bidder shall have PAN, IT Return of the last 3 (three) years, Professional Tax Enrolment certificate with current year challan, Valid Trade License, proof of GST Registration, and PF Registration/ESI registration. Proof of Registration document (s) to be provided by the bidder.

3.2 Technical Eligibility Criteria:

The Bidder, who intends to participate in the Bid, must have to meet the following criteria:

i) The bidder must be a manufacturer of solar PV Module or Solar Inverter/Power Conditioning Unit (PCU) equipment.

ii) The bidder must have experience on Design , Engineering, Manufacture/Procurement, Testing, Supply, Installation and Commissioning of at least 1 no Roof/Ground mounted Grid Connected Solar PV Power Plants of total array capacity 500kWp or above capacity including five (5) years Comprehensive

Maintenance on turnkey Basis in any state/central Govt./PSU organization inside India in last 5 years.

iii) Also the bidders must have experience on Design & Engineering, Manufacture/Procurement, Testing, Supply, Installation and Commissioning of at least 1 no Roof/Ground mounted Grid Connected Solar PV Power Plants of total array capacity 100kWp or above capacity including five (5) years Comprehensive Maintenance on turnkey Basis in any state/central Govt./PSU organization inside West Bengal in last 5 years.

iv) a) The intending bidders should produce credentials of at least a single work of similar nature during 05 (Five) years prior to the date of this tender notice of a minimum value of 40% of the quoted amount put to tender by the bidder.

or

b) Intending bidders should produce credentials of 02 (Two) similar nature of work, during 05 (Five) years prior to the date of issue of this tender notice with each of the minimum value of 30% of the quoted amount put to tender by the bidder.

or

c) Intending bidders should produce credentials of one single running work of similar nature which has been completed to the extent of 80% or more and value of which is not less than desired value at (a) above

In case of running works, only those bidders who will submit the certificate of satisfactory running work from the concerned Executive Engineer, or equivalent competent authority will be eligible for the tender. In the required certificate it should be clearly stated the work is in progress satisfactorily and also that no penal action has been initiated against the executing agency, i.e., the bidder.

Similar works stands for Design & Engineering, Manufacture/Procurement, Testing, Supply, Installation and Commissioning of ground mounted and/or rooftop Solar PV Power plants at any Institution/Agency/SNA/PSU/Government Organization Connected Solar PV Power Plants each of minimum array capacity10kWp or above on turnkey Basis which should be in satisfactory operation with no adverse report during last five years as on date of bid opening (technical bid) in anywhere in India.

Bidders has to submit work/purchase order, completion certificate duly signed by the concerned authority as proof of the above eligibility criteria.

Experience related to Solar Pump, solar streetlight will not be considered.

3.3 Financial Eligibility Criteria:

The Bidder, who intends to participate in the Bid, must ~~have to~~ meet the following criteria:

i. Minimum Average Annual Turnover (MAAT) of the Bidder for last 3 (three) financial years (i.e. for 2016-17, 2017-18 & 2018-19) shall at least Rs 30 crores (Rupees Thirty crore only).

ii. Net worth at the last financial year (2018-19) shall be positive and financial solvency should be at least Rs. 20 crore (Rupees Twenty crore only).

Bidders has to submit last 3 years audited financial statements, Net Worth & Solvency Certificate duly certified by authorized bank.

Joint ventures/Consortium is not allowed for this tender.

4. BID EVALUATION CRITERIA

Sl No. (A)	Criteria (B)	Documents to be submitted (C)	Particulars in brief of the Documents submitted by Bidder on Covering Letter (D)	Marks. (E)
1	The agency should be a firm registered/incorporated under Companies Act, 1956 or Companies Act, 2013, and further amendment (s) for a minimum of 5 yearsi n Solar Photovoltaic sector (No Consortium is allowed in this tender)	Photocopy of Certificate of Incorporation issued by the Registrar of Companies AND Memorandum of Association, Article of Association needs to be attached along with the bid. The bidder should also highlight the relevant provision/ article number which highlights the objects relating to automated in-house manufacturing/ assembling facilities for Solar PV Modules or Inverters/PCUs	1. Nature of firm: under Companies Act 2. Company Incorporation Certificate No._____ Date : _____, 3. Article Number in AoA/MoA No. showing similar business activity.....	Registered company above 15 years - **15 marks** Registered company above 10 years upto 15 years - **10** Registered company above 5 years upto10 years – **5** Less than 5 years : 0
2	The bidder should have in-house production capacity of Mono/Poly Crystalline Solar PV modules or Solar Inverters/Power Conditioning	Copy of NSIC Certificate / Copy of Factory License under the Indian Factories Act, 1948 / Any	NSIC Certificate No: .....and date	Manufacturers : 5marks Others : disqualified

	Unit (PCU).	other document supporting the fact of the bidder being engaged in the business fields mentioned in the previous column.	Factory License No…… and date…….	
3	**PAN-INDIA EXPERIENCE** The bidder must have experience on Design , Engineering, Manufacture/Procurement, Testing, Supply, Installation and Commissioning of at least 1 no Roof/Ground mounted Grid Connected Solar PV Power Plants of total array capacity 500kWp or above capacity including Maintenance on turnkey Basis in any state/central Govt./PSU organization inside India in last 5 years	Copy of the Work/Purchase/Supply Orders/Contracts/LOAs AND Material Receipt Certificates/Work Completion Certificates successful completion of Order are required to be submitted.	Documents comprising of Order No.; Order Date; Client's Name; Description of Project; Supply/Completion dates	Experience of 1000kWp and beyond : 10 Experience above 500kWp upto1000kWp : 5 Less than 500kWp : Disqualified
4	**STATE SPECIFIC EXPERIENCE** The bidder should have experience on Design & Engineering, Manufacture/Procurement, Testing, Supply, Installation and Commissioning of at least 1 no Roof/Ground mounted Grid Connected Solar PV Power Plants of total array capacity 100kWp or above capacity including Maintenance on turnkey Basis in any state/central Govt./PSU organization inside West Bengal in last 5 years.	Copy of the Work/Purchase/Supply Orders/Contracts/LOAs And Material Receipt Certificates/Work Completion Certificates successful completion of Order are required to be submitted.	Documents comprising of Order No.; Order Date; Client's Name; Description of Project; Supply/Completion dates	Experience of 500kWp and beyond : 15 Experience above 100kWp upto500kWp : 10 Less than 100kWp : Disqualified
5	**WORK SPECIFIC EXPERIENCE** The bidder should have experience on Design & Engineering, Manufacture/Procurement, Testing, Supply, Installation and Commissioning of at least 1 no canal top Grid Connected Solar PV Power Plant of total array capacity 300kWp or above capacity including	Copy of the Work/Purchase/Supply Orders/Contracts/LOAs AND Material Receipt Certificates/Work Completion Certificates successful completion of Order are required to be submitted.	Documents comprising of Order No.; Order Date; Client's Name; Description of Project; Supply/Completion dates	Experience of 500kWp and beyond : 15 Experience above 100kWp upto500kWp : 10 Less than 100kWp : Disqualified

	Maintenance on turnkey Basis in any state/central Govt./PSU organization in last 5 years.			
6	Bidders should have Average Annual Turnover (ATO) of at least INR 30 Cr for immediately for last three financial years i.e Financial Years 2016-2017, 2017-2018 and 2018-19. The bidder may produce the CA Certified financial statement for Financial Years 2016-2017, 2017-2018 and 2018-19.	Duly authorized copy of audited annual Balance sheets and Profit /Loss Account statements to be submitted by respondent along with CA certificate.	1. M/s _____ 2016-17: _____ 2017-18: _____ 2018-19: _____	Average ATO for last three years >=50 crore : 10 Average ATO: less than 30 crore Disqualified
7	The bidder should be profitable in last financial year 2018-2019. For financial years 2016-17 and 2017-18 the respondent should be profitable in any one of the years.	Duly authorized copy of audited annual report is to be submitted by respondent along with CA certificate.	M/s _____ 2016-17: _____ 2017-18: _____ 2018-19: _____	Proof of profitability: 5 nos Not profitable: disqualified
8	The Financial Solvency of bidder for the last financial year (2018-19) shall not be less than 20 Crores.	Duly authorized copy of audited annual report/statement is to be submitted along with a practicing CA's certificate.	Net worth Details 1. M/s _____ 2018-19: _____	Net Worth > 20 Crore : 10 Net Worth 10 crore to 20 Crore : 5 Less than 10 crore: 0
9	The bidder should have latest and valid ISO-9001:2015 certification. The Applicant shall not be blacklisted by any Department/ Central/ State Government/ Public Sector Undertaking in India or debarred by court of Law.	ISO Certificates/ Documents to be submitted in support.		Yes : 10 No : Disqualified
9	Service Facility in West Bengal : Bidder shall have demonstrable presence in after sales servicing in state of west Bengal for minimum of 3 years	Service branch outlet details with GST number and Declaration of existence along with valid address proof (CE from local body/post paid land line bill/electricity bill).		Complied: 10 marks Others: Disqualified

Bidders scoring 65 and above shall be considered technically eligible and proceed for opening of price bid

5. SPECIAL CONDITIONS OF CONTRACT

1. The provision under this Chapter may supersede the provisions of any conditions of contract in W.B.F. 2912 wherever necessary.
2. The entire work would be a fixed time & fixed price contract. The work is to be continued any time of the year for timely completion. No delay in execution of work for the reason whatsoever shall be entertained. No price escalation and additional claim for any supplementary, temporary, additional & other allied works whatsoever shall be admissible. No plea shall be entertained during execution of work for any extra payment for any type of work (supplementary, additional ,temporary, allied work etc whatsoever) not considered and or wrongly evaluated while quoting the rates (offered value)
3. The tendering process will consist of price bid only based on departmental design. All the documents will form Part of Tender Document. Successful tenderer, whose tender will be accepted will have to execute tender agreement in W.B.F.2912 after completion of formalities as will be required under Government Rules and Regulations.
4. The Contract shall be in the form of Lump Sum Basis for the works covered under scope of this tender which are required for successful completion and commissioning of the work as a whole under this contract agreement.
5. The department reserves the right to issue addenda to the tender document to clarify, amend, modify, delete or supplement any portion of the Technical Specification. Each addendum issued by the Department, shall be treated as if the portion added or deleted was there from the very inception of Notice Inviting Tender.
6. No tenderer shall contact the Tender Inviting Authority on any matter relating to its tender offer after the time of submission of the same unless requested so in writing. Any effort by a tenderer to influence the Tender Inviting Authority in the decision in respect of tender evaluation will result in the rejection of that tender.
7. The Tender Inviting Authority shall neither be liable for any such action nor be under any obligation to inform the applicant(s) of any grounds concerning the above.
8. The Tender Inviting Authority shall not be responsible to reimburse any cost incurred by the applicant in preparation and submission of the tender or in connection with any site visit(s) made whatsoever.
9. All offers shall remain valid for acceptance by the Department for a period of 180days (One Hundred Eighty Days) from the date of the tender opening.
10. Payment will be made only in Indian Currency by A/c Payee Cheque(s) against completion of individual activity related to different components as per approved agreed billing break-up schedule as to be finalized with the successful tenderer.

Payment of any other items will not be made if it is not incorporated in the billing break-up schedule.

11. The Contractor shall be responsible to maintain satisfactory progress for timely completion of the entire work being prepared that there may be some delays in making payment against running A/c. Bill(s) of the Contract. The Contractor, if necessary, will have to cover up such delays for payments by own arrangement to complete the work in time and within the specified cost without any extra payment.
12. The tender inviting authority reserves the right to add, amend, omit, modify any of the item of works, shown in the schedule of works of the Tender Documents (Price Bid), as deemed necessary without showing any reason.
13. This is a lump-sum contract. So, not for individual item of works but for total lowest offered amount only to be considered for acceptance, if otherwise found reasonable and fair. The details break-up of offered rate for each and every item shall have to be furnished by the successful tenderer, when asked for if necessary, before issuance of acceptance order.
14. Price once offered cannot be withdrawn within 6(six) months. If any tenderer desired to withdraw the offer before such time, earnest money will be liable to be forfeited without assigning any reason. Further extension of time of validity, for acceptance of tender may be done by mutual consent of the tenderer and the tender inviting authority.
15. All expenses for site visits and other all activities for the preparation and submission of the offer shall be borne by the tenderer.
16. Offers which have been considered valid on the result of the general examination at the time of opening of Tender Document (Price Bid) shall be subject to subsequent detailed scrutiny. Notwithstanding the general examination carried out earlier, the tender receiving authority reserves the right of rejection of any tender which may found to be defective during the detailed scrutiny.
17. Price to be quoted by the tenderer inclusive of all taxes, duties, freight charges, insurance, packing, carriage, loading, unloading, handling, storage, labour, overhead, profit, weigh bill, escalation etc. as would be applicable, payable and as necessary including statutory levies by the State Government, Central Government and autonomous bodies as applicable and payable.
18. Rates on “Lump Sum” basis shall have to be quoted against different components of the entire work.
19. The right is reserved by the officer inviting the tender to extend the time mentioned in the document. Such extension shall be communicated to all concern in the form of addendum or corrigendum as may be considered necessary.
20. The participating tenderers will not be entitled to take any advantage whatsoever owing to any typographical mistake / omission in anywhere of the Tender Document (Price Bid) if detected subsequently. The same shall immediately be brought to the notice of the tender inviting authority for rectification. However the Tender Inviting Authority reserves the right to rectify / ratify mistake / omissions if detected, at any point of time even during execution of work.
21. Tender accepting authority reserves the right to accept or to reject any or all tenders or to relax any clause without assigning any reason whatsoever.

22. The tender inviting authority reserves the right to annul the documenting process and reject the tender at any point of time without any obligation to inform the tenderer(s) of the grounds for such decisions or action. The tender inviting authority shall neither be liable for any such action / decisions nor to be under any obligation to the tenderer(s).

The set of tender documents consist of:

i. **General Terms and Conditions**
ii. **Special Conditions of Contract.**
iii. **Scope of Work**
iv. **Special Terms and Conditions**
v. **Technical Specifications&Drawings**
Annexures
vi. **Schedule Of Work and Payment Schedule (Price Break up)**
vii. **BOQ-Price Bid.**
viii. **WBF 2912**

6. SCOPE OF WORK

The work shall include Supply, Installation, Testing& Commissioning of Solar PV Power Plant in accordance with the design, drawing technical specifications on canal roof top at selected location(s) as per the enclosed site plan, at Bagjola Canal, New Town , Kolkata along with 05 (five) years comprehensive maintenance.

Scope of works shall include:

1. All works required for proper installation of Solar PV Power Plant including necessary civil works for foundation and welding works for mounting supporting structures of solar module shall be done by the contractor. The entire work shall be performed as per departmental design and drawings of NKDA/IIEST (Indian Institute of Engineering Science & Technology, Shibpur, Howrah, West Bengal) on lump sum rates quoted for different components of the project. However, all detailed fabrication and shop drawings for the module supporting structures will have to be submitted by the successful bidder within 21 days after award of the contract for approval by NKDA/IIEST. All the works related to the proper installation and functioning of the system shall have to be carried out by the contractor as per lump sum prices offered byhim.

2. Leveling the site, Construction of fencing, pathway, yard lighting along with power evacuation system as per departmental drawings and specification.

3. All necessary electrical wiring from electrical distribution box up to Solar Inverter of Solar PV Power Plant and there after upto the Biswabangla convention centre

substation shall have to be provided by the contractor, along with provision of generation meters, grid synchronization paneletc.

4. The complete Solar PV Power Plant including all BOS items shall be warranted by the contractor against any manufacturing/ design/ installation defects for a minimum period of 5 years from the date ofinstallation.

5. PV modules used in Solar PV Power Plant shall be warranted by the contractor for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. The average yearly performance ratio of the plant should not be less than75%.
6. The contractor will make all necessary arrangements for satisfactory operation, maintenance and performance of the Power Plant during 05 years maintenanceperiod.
7. Rectification of all the defects developed in the Solar PV Power Plant during maintenance period shall have to be done by the contractor promptly, at the most within 3 days from the date of receipt ofcomplaint.

8. Maintenance will include rectification /replacement of all the defective and consumable components/items. During maintenance period, all the arrangements for keeping all the Solar PV Power Plant functional shall be the sole responsibility of the contractor.

9. After completion of the proposed works, removal of all temporary works/ materials shall be the sole responsibility of the contractor and this shall be removed immediately after the requirement of such temporary work is completed.
10. Supply and Installation of Permanent Display board showing all technical information of SPV plant for each Power Plant shall be done by contractor. The matter written on these boards shall be finalized with NKDA.
11. All the non-functional parts/ materials/ items replaced during the maintenance period shall be removed by thecontractor.
12. The contractor will conduct on-site training with no extra cost of the purchaser/user's personnel regarding the assembly, start-up, operation, maintenance and repairs of the Solar PV Power Plant.
13. During CMC period, the contractor shall have to submit annual performance report from user contractor regarding functionality of the system.

General:-

(i) **The tenderers are to duly comply with all requirements, terms and conditions, guidelines etc. as stated in the biddocuments.**

(ii) The work should be of highest construction standard, involving quality civil and

electricalworks.

(iii) The arrangement for construction water, electricity, labourers and work force, tools, tackles, machineries are to be made by the construction contractor at their own arrangement andcost.

(iv) The contractor shall construct hutments for labourers, provide first- aid services when needed, keep provision for insurance to losses, damages and injuriestoworkmen at his own cost. The contractor shall also provide and continue health checkup of employees and workers deployed.

(v) The contractor shall also be responsible for any accident or damage to life and property. The contractor should also indemnify New Town Kolkata Development Authority from all sorts of losses, damages, injuries to workmen, general people and public property, caused during the work.

(vi) All materials will be under the sole custody of the contractor till completion of the work and handing over of the project to New Town Kolkata Development Authority. However the contractor should have supply cum erection insurance of all the materials. Necessary premium in this regard will have to be paid by the contractor with underwriter being NKDA.

Executive Engineer-I
New Town Kolkata Development Authority

SECTION – B
SPECIAL TERMS AND CONDITIONS

The provision under this Chapter will follow the provisions of any conditions of contract in W.B.F. 2912 wherever necessary.

1. Definitions and Interpretations

The following words and expressions used in this Sections as also in the other Sections of these tender documents shall, unless there is anything repugnant in the subject or context have the meaning hereby assigned to them except where the contract otherwise refers.

i) **Executive Engineer** & **Assistant/ Sub-Assistant Engineer** mean Engineer Officers of the New Town Kolkata Development Authority designated as such.

ii) **Contractor** means the persons or persons, firm or company who have entered into the contract for execution of the work.

iii) **Engineer-in-Charge** (E.I.C.) means the concerned Executive Engineer in- Charge of the work.

iv) **Drawings** means the drawings referred to in the tender documents and any modification of such drawings approved in writing by the Executive Engineer or his representatives and such other drawing as may from time to time be furnished or approved in writing by the Executive Engineer or his representative.

v) **Approved** means approved in writing including subsequent written confirmation of any previous verbal approval and approval means approval in writing including as afore said.

vi) **Employer** means New Town Kolkata Development Authority(NKDA)

vii) **Site** means the land and other places envisaged by New Town Kolkata Development Authority where work or works to be executed and carried out and also to be used for working space.

viii) **Holiday** means a public holiday for the purpose of section 25 of the Negotiable Instrument Act 1881 or such other day on which the office remains closed for the day.

ix) **Month** means English Calendar month.

x) **Specification** means specifications referred to in the tender and any modification thereof or addition thereto as may from time to time be furnished or approved in writing by the Executive Engineer.

xi) **Temporary Works** means all temporary works of any kind required in or about the execution, completion or maintenance of the work. **Permanent works** mean the permanent works to be executed, maintained in accordance with the contract.

xii) **Work** means all of the works called for or shown in the tender documents, including

preparation, construction, improvement and cleaning of sites including removing of debris etc. and maintained in accordance with the contract.

xiii) **Tests** mean such tests as are prescribed by the specifications or considered necessary by the Engineer-in-Charge.

xiv) **Cost** – The work **cost** shall be deemed to include overhead cost whether on or off the site and statutory taxes as applicable.

2. i) Unless otherwise stipulated all works are to be carried out in accordance with the General Conditions and Specifications of P.W.D Schedule in force at the time of acceptance of the tender.

ii) The specification for work not covered by the specification laid down in the PWD Schedules shall be governed by I.S.I code of Practice, National Building Code and as per best practice according to the Engineer-in-Charge.

iii) In addition to the above, the Special terms and Conditions and specifications as mentioned hereinafter shall be applicable.

3. Duties of Engineer-in-Charge and His Representatives

The Representative of Engineer-in-Charge (not below the rank of Sub-Assistant Engineer) shall be responsible to the Engineer-in-Charge and his duties are to watch and supervise the works and to test and examine any materials to be used or workmanship employed in connection with the works. He shall have no authority to relieve the contractor of any of his duties or obligations under the contract, nor, to order any work involving delay or any extra payment by the Employer, not to make any variation of or in the works.

4. Responsibility and Power of Engineer-in-Charge and His Representative

The Engineer-in-Charge or his representative shall watch and supervise the work. He shall have authority to stop the work whenever such stoppage may be necessary, reasoning the matter in the site order book under his signature and immediately thereafter by bringing the matter to his superior officer for approval, to ensure proper execution of the contract. Similarly he shall have authority to reject any work or materials which do not conform to the contract documents, to direct the application of forces to such portion of the work as in his judgment is required, to order the labour force increased or diminished, to direct the sequence of the work and to decide all questions which arise in the execution of the work.

The Engineer-in-Charge or his representative shall have the power of inspection of all work to be performed under this contract. All work shall be performed only in the presence of the Engineer-in-Charge or his representative. In order that inspection services may be provided, the contractor shall keep the Engineer-in-Charge or his representative posted concerning his operation plans at least two working day in

advance.

5. Custody of Drawings

All the approved Drawings shall remain in the sole custody of the Engineer-in-Charge but two copies thereof shall be furnished to the contractor free of charge. The contractor shall provide and make at his own expenses any further copies required by him. At the completion of Contract the contractor shall return to the Engineer-in-Charge all drawings provided under the Contract.

One copy of the Drawings, furnished to the contractor as aforesaid, shall be kept by him on the site and the same shall at all reasonable times be available for inspection and use by the Engineer-in-Charge and his Representatives and by any other person authorized by the Engineer-in-Charge.

6. Disruption of Progress

The contractor shall give written notice to the Engineer-in-Charge on progress of the works likely to be delayed or disrupted unless any further approval of drawing or order, including a direction, instruction or approval, is issued by the Engineer-in-Charge within a reasonable time. The notice shall include details of the drawing or order required and of why and by whom it is required and of any delay or disruption likely to be suffered if it is late.

7. Delays and Cost of Delay for Drawings

If, by reason of any failure or inability of the Engineer-in-Charge to issue within a time reasonable in all the circumstances any approval of drawing or order requested by the contractor in accordance with clause (6) of this section, the work remains suspended or delayed then the contractor shall be granted necessary extension of time only. But he shall have no claim to extra payment or compensation whatsoever on the grounds of above delay.

8. Contractor's General Obligations and Responsibility

The Contractor shall, subject to the provision of the contract, and with due care and diligence, execute and maintain the works and provide all labour, including the supervision thereof, materials, constructional Plant and all other things, whether of a temporary or permanent nature, required in and for such execution and maintenance, so far as the necessity for providing the same is specified in or is reasonably to be inferred from the contract.

The contractor shall be entirely and solely responsible for any eventualities including criminal offences, caused by the labor deployed by him, which tends to arrest under law, if arises during the work.

9. Programme of Work

The Contractor shall furnish within a fortnight from the date of order to start the work, a progress schedule indicating a fortnightly periodical target of progress expected to be achieved indicating dates of completion of each major item of the work, also indicating the dates of arrival of major equipments required for completion of the work as per contract and also indicating intermediate progress at various stages of work within the total period of completion. The Schedule should aim and include practicable achievement towards completion of the whole work in the stipulated time and of proportionate completion of work on due dates. In case it is subsequently foundnecessary to alter the schedule, the contractor shall submit in specified time a revised schedule for approval of the Engineer-in-Charge. The overall programme of the works shall be submitted in the form of a bar-chart at the time of issuing work order, showing timely completion of the work. The contractor shall also furnish the methodology to be adopted for execution of the individual item of work so as to ensure completion of the work within the target date of completion indicated elsewhere in this document. The submission to and approval by the Engineer-in-Charge or his Representative of such Programme or the furnishing of such particulars shall not relieve the contractor of any of his duties or responsibilities of timely completion of the work under the contract.

The work is to be continued throughout the year including in rainy season for timely completion. No delay in execution of work for the reason whatsoever shall be entertained. No price escalation and additional claim for any supplementary, temporary, additional &other allied works whatsoever shall be admissible.

10. Contractor's Superintendence

The Contractor shall engage at his cost an experienced and technically qualified Site-in-Charge to be in day-to-day charge of the work and he should be authorized to receive instructions from the Engineer-in-Charge. He shall receive orders given by the E.I.C. from time to time and shall take action on them promptly. Besides the Site-in- Charge, the Contractor shall maintain at his cost Supervisors having sufficient training and experience to supervise various items and operations of the supervision of works at his own cost. The Contractor shall furnish the names, qualification, and experience of the above Supervisors within 15(fifteen) days of receipt of work order. Any change of technical personnel on Contractor's side if made, should be brought to the notice of E.I.C in writing and such replacement should be proper and appropriate.

11. Contractor to Arrange All Labour : Materials : Tools &Plants

Unless otherwise specifically provided for in the schedule of materials attached to the Tender, all materials required for execution and completion of the work shall be of

approved type and as per specifications and shall be procured, brought at site and stored by the contracting firm at his cost and risk.

The quoted rates shall be inclusive of all costs of materials, labour, transportation, storage. The rates shall also cover all taxes viz. VAT, cess, any local taxes, duties etc. that are payable by the firm under the law of the land. Statutory increase on such elements, if any during the period of contract shall not be paid extra.

12. Site Order Book

The Contractor within 7(seven) days from the written order to commence work shall supply at his own cost, a site order book to be kept at the site of work under the custody of the Assistant Engineer or his authorized representative. The site order book shall have numbered pages in triplicate, which will be initialed by the Assistant Engineer-in-Charge. The directions or instructions from the Deptt. Officers to be issued to the Contractor will be entered (in triplicate) in the site order book (except when such direction given by separate letters). The Contractor or his authorized representative/agent shall regularly note the entries in the order book and also record thereon the action taken or being taken by him in compliance with such directions or instructions including any other relevant point relating to the work.

The Contractor or his authorized representative/agent may take away the duplicate pages of the site order book for his own record. A duly authorized representatives/agent of the Contractor shall receive such instructions as above.

13. Delay in Getting Site of Work

If at any time after the issue of work order, the work, and/or any part thereof cannot be started or shall remain suspended due to public opposition, non-availability of site, delay in shifting public utilities or for any other reason whatsoever within the period of completion of work, the Contractor shall be granted necessary extension of time. But he shall have no claim to extra payment or compensation whatsoever on the grounds of above delay.

If, however, the above hindrances are not removed within the schedule time and the Contractor is not agreeable to execute further works in the extended time, the Contract may be terminated and the Contractor shall have no claim to any payment on account of idle labour, establishment etc. or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the aforesaid work in full or inpart.

14. Survey : Layout and Access

The Contractor shall satisfy himself regarding the correctness of the site Layouts, levels etc. as shown in the drawings or given in the specifications. Before starting the work he

shall also carry out at his own cost survey of the whole work site jointly with the Department. Discrepancies noticed between Departmental drawing and the joint survey shall be informed in writing to the Engineer-in-Charge and got corrected by the Engineer-in-Charge. Such deviations as may arise out of the joint survey shall not vitiate the provisions of contracts and shall not entitle the Contractor to any extra payment of claim in anyway.

After the joint survey a survey plan shall be prepared by the Contractor at his cost and got approved by the Engineer-in-Charge. Reference line and points shall be established by the Contractor at his own cost so as to serve as reference and "Dimensional Checking" of works. He shall prepare and submit a plan in quadruplicate to the E.I.C. showing such reference points with their full description at his cost.

The Contractor shall provide for all arrangements labour, equipment and materials needed for carrying out survey, setting out, layout checking, inspections measurements, testing at his own cost for which no separate payment will be made.

The Contractor shall also provide proper approach and access to all the works and stores including clearance of sites at his own cost.

15. Arrangement of Land

If on account of restriction of space within the project site, the Contractor experiences difficulties (on installation of plant and machinery and also) in stacking construction materials within the project site, he may have to arrange for lands (Road side flank, private land etc.) adjacent to the project site on his own and at his cost. The Contractor will not be entitled to any payment or any other incidental charges caused due to such arrangement.

16. Site Godown

The Contractor must provide at his own cost suitable godown for cement, MS/Tor/HYSD bars and other materials at/near the site of work as may be instructed by the Engineer-in-Charge. The Cement godown shall independent with adequate capacity and shall be constructed as per directions of Engineer-in-Charge or may be hired as per approval of Engineer-in-Charge. The godown should be readily accessible and open to inspection by any officer of NKDA at any time during the pendency of the Contract.

17. Stock of Materials:-

The Contractor have to procure all the materials required for the works well in advance based on the programme of the work as submitted, and he shall have to maintain a stock book showing receipt, consumption and balance of major materials like cement, reinforcing steel, sand, stone chips, bricks etc. daily with such other information as may be directed by the Engineer-in-Charge. The Contractor must satisfy Engineer-in- Charge regarding the stock of materials collaborating with the programme of the works. The

cost carriage for transporting all materials shall be borne by the contractor.

18. Watching and Lighting

The Contractor shall in connection with the works provide and maintain at his own cost all light, guards, fencing and watching when and where necessary or as required by the Engineer-in-Charge, for the protection of the works, or for the safety and convenience of the existing plant, contractor's employees, employers supervisors or for any other reason deemed fit by the Engineer-in-Charge.

19. Discrepancies

Should any discrepancy appear in any of the documents and drawings included in this contract or between different parts of the same documents or any ambiguity or insufficiency of information the Contractor shall point out the same to the Engineer-in-Charge in writing and receive his instructions, explanations or decision in the matter. Decision of Engineer-in-Charge is final and binding on the Contractor.

20. Materials to be Supplied by Contractor

The Contractor shall supply all materials required for successful completion of the work. The quality of such materials as stated above shall conform to the requirements of the BIS (Bureau of Indian Standard), P.W.D. or any other approved standard specification.

In all cases, the latest modification or revision of such specifications will be applicable for use.

All sampling, testing and transportation of such materials shall take place under the direction of the Engineer-in-Charge at the testing laboratory as may be designated by the Department at the cost of the Contractor. Tests will be made in accordance with the standard methods of testing of the I.S. or other standard specifications. The Engineer-in-Charge have full power to reject or condemn any workmanship or materials that he may deem unsuitable.

All materials not conforming to the requirements of these specifications shall be considered as defective and shall be rejected for use and shall be removed by theContractorfromthesiteoftheworkwithin24hrsathisowncost.

In case of non-compliance with such orders, the Engineer-in-Charge shall have the full authority to cause such removal at the cost and expense of the Contractor and the Contractor shall not be entitled to any loss or damage on that account. The Engineer-in-Charge will have full right to inspect the store of materials supplied by the Contractor for the use of this contract work.

All materials and workmanship shall be of the respective kinds described in the contract and in accordance with the Engineer-in-Charge's instructions and shall be subjected from time to time to such tests as the Engineer-in-Charge may direct at the

place of manufacture or fabrication, or on the site or at such other place or places as may be specified in the contract, or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any materials used and shall supply samples of materials before incorporation in the works for testing as may be selected and required by the Engineer-in-Charge, be it at site or at the manufacturer/Vendor's premises. Contractor will have to procure materials from manufacturers / vendors as may be approved by the E.I.C. No variation will be allowed. Contractor will have to furnish original documentary evidence of procurement of the materials from the specified vendors if required by the EIC. Cost of samples – all samples of materials/articles to be tested as may be required by the Engineer-in-Charge shall be furnished by the Contractor at his cost.

If the rate for completed items of work are inclusive of supply of stone materials, the Contractor shall arrange for procurement of such stone materials required for the work by his own resources and it shall be clearly understood that the Department shall not sponsor any traffic movement by wagon for stone materials.

21. Workmen's Compensation

In every case in which by virtue of the provisions of the Workmen's Compensation Act, 1923, and any other relevant Acts and Rules, compensation to a workman employed by the Contractor, is payable, then this should be done by the Contractor. If the Department is obliged to make any compensation under the said Rules and Acts, then the amount shall be recovered without prejudice, from the bills and dues of the Contractor. The Department shall not be bound to contest any claim made against it in respect of workmen's compensation under Section 12 sub section 1 of the said Act, except on the written request of the Contractor and upon his giving to NKDA full security for all the costs for which NKDA might become liable in consequence of contesting such claims.

22. Hours of Work : Night Work

All works enumerated in the tender including other works in connection therewith or incidental thereto, shall be carried out during the hours of sunrise to sunset. No works will be held on Sunday's and Holiday's except with the special permission of the Engineer-in-Charge.

For all works in the area, the Contractor may have to execute the work during night as well, as per direction and permission of the Engineer-in-Charge with arrangement of necessary lights, barricades etc. at his own cost . The E.I.C. may also specify the nature of work to be carried out during night. No extra claim or compensation will be admissible for night work or any ancillary work including costs incurred towards generator, precautionary measures like arrangement of medical facilities, etc. thereto

save and except which has been provided in the schedule of work. The contractor will have to obtain necessary police permission for execution of work during night time, if necessary.

23. Contractor's Employees

No labour below the age of eighteen years shall be employed on the work. Any labour supplied by the Contractor to be engaged on the work on day work basis either wholly or partly under the direct order or control of his representative shall be deemed to be a person employed by him.

The Contractor shall comply with the provision of all labour legislation including the requirement of the Payment of Wages Act and the rules framed there under and modifications thereof in respect of men employed by him in carrying out the contract.

The Contractor shall comply at his own cost with any order or requirement of any Health Officer of the State or any local authority and the Engineer-in-Charge regarding the maintenance of proper environmental sanitation of the area where the labours are housed or accommodated, for the prevention of any communicable diseases. The Contractor shall provide, maintain and keep good sanitary condition and provide facilities for potable water at all times for the use of men engaged on the work and shall remove and clear away the same on completion of the work. Adequate precaution shall be taken by the Contractor to prevent nuisance of any kind in the site of work.

The Contractor shall provide efficient medical attendant and care for his staff and for the workmen employed to the satisfaction of the Engineer-in-Charge or his representative. The Contractor shall arrange to provide first aid and treatment facilities to the labourers engaged on the works and shall within 24-hours of the occurrence of any accident at or about the site in connection with the execution of the work, report each accident to the Engineer-in-Charge and also to the competent authority where such report is required bylaw.

24. Safety Measures and Public Convenience

The Contractor shall in the course of execution of the work take all necessary precautions for the protection of all persons and property at his cost.

The entire site of works shall be well illuminated from sunset to sunrise at his cost.

The Contractor shall take adequate measures to protect the work and prevent accidents during the Project work and prevent accidents during the construction. He shall provide and maintain temporary side-walks access to construction site and where necessary, danger signals, Road closed sign, watchman and necessary appliances for properly safeguarding life and site of work for safety. The lamp must kept lit from sunset till at least one hour after sunrise. He shall protect all excavations equipment

and materials with barricades and danger signals so that no life may be endangered.

The Contractor shall so conduct his operation as to cause the least possible obstruction and inconvenience to the other users and contractors in adjacent site. He shall have under construction not more than such amount of work as he can handle properly with due regard to the right of others.

25. Loss and Damage

Neither the department nor the Engineer-in-Charge or his representative shall be answerable or accountable in any manner for any loss or damage that may happen to the work or any part thereof or to any of the materials or other things used in the performing the work, or for injury to any person, either a workman or any member of the public, or for damage to any property for any cause which might have been provoked by the Contractor. The Contractor shall properly guard against all these injuries or damages to persons or property resulting from his operations under this contract at any time before issuance of the certificate of completion and maintenance. He shall indemnity and save harmless the Department from all suits or actions of every description brought for, or on account of, any injury or damage received or sustained by any person or persons by reason of the construction of the work, negligence in guarding the same, the use of improper materials or of any act of omission or deviation from the contract.

26. Supervision of Work

The Engineer-in-Charge shall have the power at any time and from time to time by notice to the Contractor to delay or suspend the progress of the work or any part of the work during unsuitable weather for any other adequate reasons and on receipt of such notice, the Contractor shall forthwith suspend further progress of the work until further notice from the Engineer-in-Charge.

The Contractor shall recommence work immediately on receiving a notice to do so from the Engineer-in-Charge. The whole or any part of the time lost for such delay or suspension shall, if the Department in its absolute discretion thinks fit but not otherwise, be added to the time allowed for completion. The Contractor shall have no claim to extra payment or compensation whatsoever on the grounds of above delay.

As the entire work as envisaged in this tender consists of both Civil and Electrical works, the related works will be supervised by the respective engineering wings of NKDA.

27. Department's Right to Terminate Contract

(a) Despite any **hindrances** what so ever might be caused to the working Contractor arising out of his insolvency, bankruptcy, labor problems, delay in collection of materials to be used in work as per specification save and except the causes due to

natural calamities it is the duty on the part of the Contractor to achieve proportionate progress of work in proportionate time so elapsed failing which the Contractor shall be liable to this Department to show cause for such delay for which penal action as per **relevant** clause of **agreement** may be effectuated against him/them. On his/their failure to achieve desired result even after action taken as **per relevant clause** and if it is considered by the Engineer –in-charge that the Contractor is not able to complete the work even within the time extended for **nor** it will be feasible to wait any longer in the interest of work notice under **relevant** clause of **agreement** the contractor shall have **to show cause for** his/their failure to achieve the desired result. **If the** reply is either received without any satisfactory and convincing reasons or not received within the time the Authority as per condition of the agreement shall have the power to terminate the contract by invoking **relevant clause** of the agreement or suitable action if deemed to **be** justified to be taken by invoking either of the sub **clauses under the relevant clause of the agreement.**

(b) In case the Contractor doesn't commence the work after **a considerable time elapsed from** issuance of the work order to him/them for any reason what so ever and **even after** issuance of letter/reminder in this respect the whole earnest money as deposited by the contractor for the work in question shall be forfeited to NKDA and the contract will automatically be terminated for the default of the Contractor.

(c) Without any prejudice to any extra time is granted to the contractor on his/their request and/or granted unilaterally for the interest of work the Contractor shall be liable to keep proportionate pace of completion of work in the proportionate time so **remained** in the consideration **that** extra time **since** allowed **is the extended** completion time despite any hindrances **as might be** caused to him/them due to his/their own default and in violation of the same the Authority may decide to terminate the contract.

(d) If the Contractor is proved guilty by laws, ordinance and order or for a substantial violation of any provision of the contract Authority may by giving written notice terminate the contract.

(e) If the Contractor is employed in any other branch/wing of any department, offices, local bodies under the Govt. of West Bengal and is found there guilty for any gross violation of laws that may lead to imprisonment, Authority may, **upon the notice served on it by the Court of Law may take suitable action as per law.**

In case Contractor make(s) himself or themselves liable for compensation for the reason of his/their insolvency or he/they become(s) bankrupt(s) or in case the Contractor is a company, it goes to voluntary or judicial requisition or he/they should make a general assignment for the benefit of his/their creditors or receiver should be appointed on his/their insolvency or work he/they should persistently/repeatedly refuse or should fail to accomplish the work/complete the

supply of materials as **per** provision of tender schedule only due to his/their insolvency/dilatory method on his/their part or to stop the work for sustaining any loss for quoting any low tendered rates or sustain or achieve anticipated loss or gain due to escalation of prices of materials or due to labour problems or due to non procurement of adequate **quantities** of materials to be required for construction conceiving delay in execution and ultimately tending to failure to complete the work either on time or **within** any extended time that may be allowed by **The Authority** for the interest of work even after issuance of notice under **relevant clause of the agreement**. **The Authority** should have the right to rescind or terminate the tender or contract by **invoking** any of the sub clauses **under the relevant clause of the agreement.**

28. Occupying Prior to Completion

The Department expressly reserves the right to occupy at any time and for so long a time as the Engineer-in-Charge deems fit in issuing a notice to the Contractor, require any portion or portions of the site of works, whether the works to be executed thereof be commenced or in progress or temporarily suspended or completed and to employ thereon agents and workmen other than the contractor or his men in the execution of matters not included in the contract.

The Contractor shall not obstruct such agents and workmen, and without extra charge and without relief from any liabilities or responsibility, or such allowance provide them free access to the work and to such facilities as in the judgment of the Engineer-in- Charge may be reasonably required.

29. Supplementary Specification

Whenever reference is made in these documents to certain special specifications, the reference shall be construed to include all subsequent amendments, changes or additions that are published and in effect at the date of signing of this contract.

The department reserves the right to issue additional conditions, specification etc. if necessary which will be incorporated with tender documents already sold to tenderers for the purpose of this work.

30. Land for Contractor's Establishment

For the purpose of constructing Contractor's Store yard, godowns, site office and ancillaries, he may utilize portion of the land belonging to the Employer at such location as would not interfere with the execution of works. For all these, the Contractor shall have to obtain the requisite permission of the Engineer-in-Charge. The Contractor shall for this purpose submit to the Engineer-in-Charge for his approval a plan of the proposed layouts for the site facilities. The Engineer-in-Charge reserve the right to alter and modify the Contractor's proposals as he may deem fit. In case sufficient land is not available with the Employer, the Contractor will have to arrange for private land of his cost to meet his requirements.

31. First-Aid Facilities

The Contractor shall provide at his own cost for medical attention to be promptly available when necessary. He shall for this purpose provide a number of First-Aid stations at suitable location within easy reach of the workmen and other staff engaged in the Works. Each First-Aid station shall be properly equipped and will remain in charge of a suitably qualified person. The Contractor shall also provide for transport of serious case to the nearest hospital. All these arrangements shall be to the approval of the Engineer-in-Charge.

The Contractor shall provide, to the satisfaction of Govt. or Local Authority concerned, adequate medical attendance for his employees and labours.

32. Fire Fighting Arrangement

The Contractor shall provide at his own cost suitable arrangement for fire fighting. For this purpose he shall provide requisite number of Fire Extinguishers and adequate number of buckets, some of which are to be always filled with sand and some with water. These equipments shall be provided at suitable prominent and easily accessible places and shall be properly maintained.

33. Construction Records

The Contractor shall keep and supply to the Engineer-in-Charge the up-to-date records of the dimensions and positions of all permanent works (showing therein any approved deviation between the drawing and the work as actually executed). The information available from the records must be adequate and complete to enable preparation of completion drawing by the Contractor at his own cost from these records.

34. Satisfactory completion of various items

The various items of the sub-work are to constitute the whole work complete in every respect as per satisfaction of the Engineer-in-Charge. Each sub-work will be considered as complete when it is completed as per drawing & specifications, as per standards, as a successful component part of the whole work.

35. Reports and Returns

The Contractor shall maintain at Site daily records of progress with regard to the works carried out, labour engaged and construction equipment deployed. These will form the basis of preparing periodic reports and returns as may be required by the Engineer-in- Charge and in the manner as directed by him.

36. Terms & Stages of Payment

As stipulated in Price Schedule / Price Break-up showing mode of payment.

37. Insurance of works, etc.

Without limiting his obligations and responsibilities, the Contractor shall insure in the names of the Employer and the Contractor against all loss or damage from

whatever cause arising for which he is responsible under the terms of the contract and in such manner that the employer and Contractor are covered for the period of execution as well as during the period of Maintenance for loss or damage arising from a cause, and for any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations as follows:

(a) The works for the time being executed to the estimated current contract value thereof together with the cost of materials.

(b) All equipments, plants etc. brought on to the site by the Contractor and the replacement value of the same. These shall include materials belonging to the Employer but issued to or intended to be issued to the Contractor for use in the work, if any.

Such insurance as mentioned in para (a) and (b) above shall be effected with an insurer and in terms approved by the Employer. The Contractor shall bear the cost of all such insurance and whenever required, produce to the Engineer-in-Charge or his representative the policy or policies of Insurance and the receipts for payment of the current premiums.

38. Damage to Persons and Property

The Contractor shall, except; if an so far as the contract provides otherwise, indemnify the Employer against all losses and claims in respect of injuries or damage to any person or materials or physical damage to any property whatsoever which may arise out of or inconsequence of the execution and maintenance of the works and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation or damages for or with respect to:

(a) The Permanent use or occupation of land by the works or any part thereof.

(b) The right of the employer to execute the works or any part thereof on over, under, in or through any land.

(c) Injuries or damage to persons or property, which are the unavoidable result of the execution or maintenance of the works in accordance with the contract.

(d) Injuries or damage to persons or property resulting from any act or neglect of the Contractor, his agents, servants or other contractors, not being employed by the Contractor or for or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the Contractor, his servants or agents such part of the compensation as may be just and equitable having regard to the extent of the

responsibility of the Employer, his servants or agents or other contractors for the damage or injury.

39. Accidents or Injury to Workmen:

The Employer shall not be liable for or in respect of any damages or compensation payable at law in respect or inconsequence of any accident or injury to any workman or other, person in the employment of the Contractor or any sub-contractor, have and except any accident or injury resulting from any act or default of the employer, his agents, or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, save and except as aforesaid and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

40. Insurance against Accident etc. to Workmen:

The Contractor at his cost shall insure against all liabilities as indicated in clause 38, 40 and 42 with an insurer, and shall continue such insurance during the whole of the time that any person is employed by him on the works and shall, when required, produce to the Engineer-in-Charge or his representative such policy of insurance and the receipts forpaymentofthecurrentpremium.Providedalwaysthat,inrespectofanypersons employed by any sub-contractor, the Contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub-contractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy, but the Contractor shall require such sub-contractor to produce to the Engineer-in-Charge when required, such policy of insurance and the receipt for the payment of the current premium.

41. Notification to Insurer:

It shall be the duty of the Contractor to notify the insurers under any of the insurances referred in any matter or count which by the terms of such insurances are required to be notified and the Contractor shall indemnify and keep indemnified the Employer against all losses, claims, demands, proceedings, costs, charges and expenses whatsoever arising out of or resulting from any default by him in complying with the requirements of this sub-clause whether as a result of the avoidance of such insurance or otherwise.

42. All Insurance at Contractor's Cost:

The insurances referred to in this Tender document shall be entirely at the cost and expense of the Contractor.

43. Remedy on Contractor's Failure to Insure:

If the Contractor` shall fail to effect and keep in force the insurances referred to Clauses hereto, or any other insurance which he may be required to effect under the terms of the Contract, then and in any such case the Employer may effect and keep in force any such insurance and pay such premium or premium or premiums as

may be necessary for that purpose and from time to time and deduct double the amount so paid by the Employer as aforesaid from any monies due or which may become due to the Contractor, or recover the same as a debt due from the Contractor.

44. Idle Labour

No claim for idle labour would be entertained under any circumstances.

45. Inspection Facilities

The Contractor shall provide necessary facilities for inspection of work for quality control by the Engineer and for the purpose of carrying his instructions as may be recorded in writing in site Order Book.

46. Testing & Testing Equipment

Testing of materials to be used in the permanent work or of the quality of finished items, shall have to be done from approved laboratory at the expense of the Contractor.

Should the E.I.C. consider it necessary to satisfy himself as to quality of work, the Contractor shall offer sample of work done as necessary, pull down reasonable part of the work required for such inspection and testing. The Contractor shall bear the cost of pulling down and shall make good the same at his own cost and to the full satisfaction of the

E.I.C. without any extra cost.

The Contractor shall provide at his own cost necessary equipments for such testing which by nature of work may have to be done at work site. These include sufficient number of slump cones, standard 150 mm metal cube moulds, Cube crushing test machine, set of I.S. sieves, weighing balances, graduated measuring cylinders, equipment for in-situ density test, holding detector, thermometers and any other miscellaneous equipment that may be required by the Engineer-in-Charge. The Contractor shall also provide at his cost facilities for curing of concrete cubes for testing purpose and he shall afford at his own cost necessary facilities in providing requisite materials and assistance that may be required by EIC including transportation charges to laboratory.

47. LabourAct

The Contractor should obtain the license under the provision of the Contract Labour (Regulation and Abolition) Act 1970 and the Contract Labour (Regulation and Abolition) General rules, 1971 including the provisions of amendments made there under of the same.

48. LocalEmployment

No labour should be imported from any district other than where work is to be executed without prior consent of the Executive Engineer. Imported labor can only be engaged with permission of the Executive Engineer when the exigency or progress of work so demands and sufficient local labours are not available. For

importing special class of labor for any specialized work no extra cost will be paid to the contractor.

49. Import License and Imported Equipments

Use of any imported equipment for the work is not envisaged. However, if it becomes absolutely necessary, requisite Foreign Exchange and import license shall have to be arranged for by the contracting contractor independently and NKDA will not take any responsibility in this regard. A certificate stating the necessary of the particular materials for the work entrusted to the Contractor may be issued at its discretion by NKDA on request. Delay in getting any materials will not be entertained for extension of time limit of contract.

50. Water Supply, Sanitation &Power

The Contractor shall have to make his own arrangement for supply of electrical power and water at all stages of execution of work. Arrangement for obtaining water for the work as well as for the labourers and sanitation facilities for labourers shall have to be made by the Contractor at his cost. The quality of water shall be conducive for construction works in terms of soluble, insoluble materials and chloride content. The cost of erection/installation for obtaining either electricity or water from N.T.E.S.C.L or Municipality or any other contractor shall have to borne by the Contractor for which no extra claim can be placed before NKDA. However, NKDA may provide power and water if the same is available at site. If the contractor draws power and water from NKDA's point then he is required to pay the prevailing charges for power and water connection and usage.

But supply of power and water should not be considered as the responsibility of NKDA. Nevertheless electrical power from NKDA's point may not be continuously available due to various reasons including load shedding. In that case water supply from NKDA's point will also stop and the Contractor will make his own arrangement for water and power through generator at his cost.

51. Storage and Safety of Equipments

The equipment at site shall have to be stored in waterproof shed with proper security arrangement made by the contractor. The Contractor shall insure at his cost all the equipment against pilferage and breakage at site during storage and erection under their custody till the work is completed and handed over to the Employer.

52. Language for Correspondences

All written materials and correspondence in connection with the contract shall be in English.

52. Contractor's Local Address

The Contractor shall furnish the postal address of his site Office. Any notice or instruction to be given to the Contractor under the terms of contract shall be deemed

to have been served if it has been delivered to his authorized agent or representative of site or sent by registered letter to the site office or to the address.

53. Recoveries

Any recovery from the Contractor advised by the Employer/Government shall be recovered from any bill or money retained from this contract.

54. Reduced Rates

Reduced rates as decided by the E.I.C. shall be allowed for the works, which in the opinion of the E.I.C. are not done in strict conformity with specification and schedule of works but are acceptable. Works which are not in conformity with the specification and not acceptable in the opinion of E.I.C. will not be paid for and the cost of rectification or dismantling of such unacceptable work will have to be fully and solely borne by the Contractor.

55. Maintenance: Guarantee Period

Before final acceptance, all items of work shall be completed, ready to operate and in a cleaned condition. All debris, unused material and temporary structures shall be removed from the site of work. Tools and construction machinery (except which is needed for repair and adjustment of the work consequent to operational tests) shall not remain on the site.

All defects or fault or shortcomings, minor or major, which may appear or result in any part of the work during defect liability period arising out of defective, improper or faulty construction, workmanship or supplies must be rectified and/or replaced by the Contractor at his cost. If the Contractor fails to rectify or replace the defects in reasonable time, the same will be done by employing other contractor/agencies and the relevant expenditure will be realised from the S.D. Money.

56. Minimum Wage Act

The Contractor is required to follow the provisions of Minimum Wage Act.

57. Precedence of Contract Documents

If any stipulation indicated in any component of contract documents are at variance in any respect with those in the other, the decision of the Executive Engineer will stand final and binding.

58. Time of Completion

The original work as per offer shall be completed **within 6 months** from the date of issue of work order. The time of completion is firm and final and supersedes any other time mentioned elsewhere in any clause(s) of tender document.

The period of completion given includes the time required for mobilization and testing as well, rectifications, if any, re-testing and completion in all respects to the entire satisfaction of the Engineer-in-Charge including the monsoon season.

The contractor shall scrupulously adhere to the targets/program as envisaged in his micro- plan of work program by deploying adequate personnel and construction tools and tackles and he shall also supply all materials of his scope of supply in time to achieve the targets set out.

The contractor shall give regular report on category-wise labour and equipment deployed along with the progress of work. The progress of work shall be proportionate to completion time.

Time is the essence of this contract and the allotted work must be completed within the specified time. Extension of time will be granted except in very exceptional circumstances beyond the control. This clause of extension of time will have precedence over any other similar clauses if they are at variance with this clause. There will be penalty for non-completion of the work in time as indicated else where.

59. Action for Non-Compliance

Failure to comply with above conditions and specifications will result in the department taking action at the risk and cost of the contractor. Execution of agreement binds the Contractor for complying with requirements of the above conditions and specifications without any extra payment on any account.

60. Arbitration

The relevant clause in WBF 2912 stands deleted.

61. Deduction of Tax

Deduction of VAT, Income Tax and any other taxes payable as per prevailing tax Laws at the prescribed rate at the time of making payment to the Contractor.

62. Typographical Error

Typographical errors detected or pointed out are subject to corrections by E-I-C. Any party on account of such error can derive no benefit. Any Typographical error shall immediately be brought to the notice of the authority for rectification. NKDA reserves the right to rectify mistake / omissions if detected, at any point of time even during execution of work.

63. Completion of Work:

The work shall be deemed to be completed when all works itemized in the Schedule of work and the entire work as per drawing or otherwise undertaken have been

completed in all respect including successful testing .

The Final Bill for the work shall be processed by EIC on completion of work in all respect including submission of all test certificates by the Contractor in quadruplicate.

64. Safety Requirements:

Contractor shall use safety belts, whenever his workmen work at a high altitude to avoid risk of any accident or fall Hard Top Hats to be used by the Contractor's workmen at the places wherever required.

Necessary Fire Protection arrangements by installing portable fire extinguishers on suitable locations at work site and material storage area. The Contractor shall also use Safety devices like Welder's apron, hand gloves, goggles, helmets etc. and other accident preventive arrangement at work site as per prevailing safety code.

65. I.E.Act.

The Contractor is required to comply with the I.E. Act and Rules framed the under. He will have to produce to the EIC evidence of possession of Electrical Contractor's license with current validity and also copy of Electrical Supervisor's Certificate with qualification, registration no. etc. in respect of employees involved in electrical works.

66. Reduced Rates and Part Rates:

A) Reduced Rates:

For any improper / inferior grade and quality of material or item of work, in the opinion of the Executive Engineer / Assistant Engineer, not found in strict compliance and conformity to specifications, but are acceptable, if found technically viable the relevant item rates shall be reduced and approved by the **Tender Accepting Authority,** on the basis of analysis, which shall be binding to the contractor.

B) Part Rates:

Part rate for items, which are not fully complete as per specification of the contract, may be allowed by Engineer-in-Charge in cases if it is found to be ensured that the items can be completed as per specification, in following days, by the contractor, following such certificate by the Assistant Engineer in-charge of work. Application of this provision is non mandatory and can only be allowed as a special case under approval of the EIC strictly.

67. Supplementary Works

During execution of work following supplementary works may crop up, the execution of which is binding on the executing contractor as per clause of WBF

2912. However no major deviation from the existing drawings or specifications as laid in the tender document is allowed unless approved by the E-I-C. The drawings as laid hereunder are purely indicative. The contractor is advised to thoroughly inspect the site to assess actual quantity of works to be executed and accordingly quote ther ates.

Supplementary works are categorized as follows:

a) Quantitative increase of item of works as shown in the drawings.

b) Additional items of work not shown in the drawings or elucidated in the specification of works.

c) Substituted items of works by alternative items.

The specification of items and rate for (a), (b), and (c) shall be finalized and accepted by the Tender Accepting Authority of NKDA as per Current PWD Schedule of Rates and payments thereof are to be made as new items on receipt of proposal from the contractor provided that the total value of work inclusive of any or all the supplementary items as stated above should not exceed 3% of the accepted amount.

Similarly in case of non-execution of certain items or reduction in quantities of items as per drawings and specifications laid herein, the amount for such non- execution shall be arrived as per current PWD schedule of rate and shall be deducted from the lump-sum rates quoted for the respective items/ components of the project.

It should be taken into consideration in connection with the above that in cases when such rates are not available from current PWD Schedule of Rates it then may be determined from current market rates of materials and labour in which usual profit (nor more than 10% on the basis price) percentage will be extended.

However for any tit-bit work where there is no major deviation from the departmental drawing the above clause may not be applicable and such tit-bit work shall be executed through negotiation and mutual agreement by both the bidder andE-I-C.

68. Accepting Authority.

Not withstanding to what has been stated elsewhere, any item of work which can be legitimately considered as not stipulated in the 'Scope of work' of the contract, but becomes necessary as a reasonably contingent during actual execution of the work, it will have to be done by the contractor as and when directed by the Executive Engineer (EE) or the Assistant Engineer(AE)**.**

69. Progress Photographs:

The Contractor shall at his own cost and expenses, arrange to take periodic still digital photographs to show the progress of work or interesting features

thereof. The time and the position wherefrom a photograph is to be taken would be as per direction of the Engineer-in-Charge or his Representative. Colored prints of each of these still Photographs to an enlarged size of about 25 cm x 15 cm shall be supplied to the Engineer-in-Charge in albums by the Contractor at his cost and these shall become the property of the Employer. Each photograph shall be suitably captioned with the date of the photograph, location and other relevant particulars.

The Contractor in C.D shall submit soft copy of photographs showing monthly progress, stages of work with dates to EIC. Any circulation of these photographs to any other source other than NKDA shall be treated as breach of security and shall make them liable for prosecution and consequences.

Restrictions to photography or security restrictions that may be applicable to any particular area must be carefully and rigidly observed. The number of hard photographs (each consisting of two prints) for the complete works is not expected to exceed 25 (twenty-five).

70. Force Majeure

The progress of work as defined as Clause 16 of WBF 2912 can get hampered due to natural calamities as for example storm, earthquake etc. and for many other reasons beyond the control of the authority for which the contractor shall have no claim to the authority nor the authority shall be bound to make any payment towards compensation of losses due to such reasons, to the contractor. However, the contractor on the aforesaid ground and of his / their having been unavoidably hindered in its execution may appeal for time extension if so desired subject to approval by Engineer-in-Charge.

71. Security Deposit

Retention money towards performance Security amounting to 8% (*eight percent*) of the value of the work shall be deducted from the running account bill of the tenderer as per prevailing order. No interest will be paid on the money retained for Security Deposit. Notwithstanding anything as mentioned in Clause 13 of WBF 2912, the security deposit for the entire work (including the original work and 05 years operation and maintenance) i.e. 10% of the total value of the work will be released in 05(five) equal installments after completion of each year of successful maintenance of the plant and project. The lump sum rate quoted for five years maintenance should be at least 10% of the total value of the work.

72. Special Security Deposit (S.S.D)

Special Security Deposit amounting to Rs. 20,00,000.00 (Rupees twenty lakhs only) will have to deposited by the selected Agency at the time of execution of agreement, which shall be retained by the Authority till the Maintenance Period (05 years) is over. The Special Security Deposit will be released without any interest in 05 equal installments [i.e. after every 01 (one) year], subject to successful periodic

comprehensive maintenance of the Solar PV plant. The Special Security Deposit will have to be submitted through only Demand Draft or Banker's Cheque in favour of New Town Kolkata Development Authority, payable at Kolkata.

Executive Engineer – I

New Town Kolkata Development Authority

SECTION – C

TECHNICAL SPECIFICATIONS AND INFORMATION

Civil and Structural Works

1.0 Civil & Structural Works for:

(a) **Site Survey by Total Station**
(b) **Conformatory Boring**
(c) **Pile Foundation with RCC Columns**
(d) **Module Mounting Structure (MMS) and Maintenance Pathway**
(e) **Landscaping and Fencing**
(f) **Water Sourcing &Plumbing for Module Cleaning Arrangement**

1.1 Application of specification and item of work:

1.1.1. This specification forms part of the contract and shall be read in conjunction with other documents forming the contract.

The rates for all items, unless specifically stated otherwise in the contract, must cover the cost of all materials, all taxes & duties in vogue, labour, tools, machinery, plant, scaffolding staging, shoring, props, bamboos, ropes, templates, pegs, and all appliances and operations whatever necessary for efficient execution and completion of the work including Operation and Maintenance work.

1.1.2. All works are to be executed in accordance with descriptions in the schedule of works along with the specifications, terms, conditions provided elsewhere in the tender documents.

1.1.3. Item and manner of works and their details, which are not covered by this specification, shall be carried out as per those of P.W. Department, Govt. of West Bengal, Presidency Circle and relevantI.S.S.

1.1.4. The overall outline of works to be done by the contractor and the details have been mentioned in the schedule of works and in the specification, drawing elsewhere in the tender documents. Each scheduled item has to be carried out and completed by the contractor at the accepted rate covering the full extent outline in the schedule and specification and not withstanding any omission in mentioning

of supply and execution of such component of works except in special case specifically mentioned. Items indicated in the schedule are exhaustive. Yet if there be any short fall felt by the tenderer he may include the same while quoting his rate so as to make the item complete in all respect for successful operation of theplant.

The contractor's works shall be guided by the total requirement briefly outlined and shall include additional works other than those component of works mentioned in the schedule to complete the work. The tenderer or the contractor has to completely execute the full requirements ensuring performance guarantee of each component of the works, equipment and machinery so that all the individual components are brought up to the optimum condition for sustained and satisfactory operation individually andcollectively.

1.2 Setting out and leveling:

The contractor is to set out and level the works, and will be responsible for the accuracy of the same; he is to provide all instruments and proper qualified staff required for checking the contractor's work.

1.3 SafetyCode:

The contractor shall take adequate precaution to provide complete safety for prevention of accidents on the site.

1.4 Keeping works free from water:

The contractor shall provide and maintain at his own cost, electrically or other power driven pumps and other plant and equipment to keep the site and foundation pits and trenches free from water and continue to do so till the site is handed over to the complete satisfaction of E.I.C.

1.5 Clear Site:

The site during the execution of works should have sober and tidy appearance with everything necessary for the work neatly and systematically arranged.

The contractor at his own cost, shall clear the site of all trees, roots and obstructions. Where excavation is required, that should be done strictly upto the required level. Any surplus earth should be spread over the low lands or used in earth filling works for development of site.

After the completion of the work, the entire site shall be cleared satisfactorily with (a) all pits, diggings and trenches properly filled up (b) all surfaces adequately dressed (c) all surplus materials, sheds, tents and all other ancillaries removed from the site at his own cost.

1.6 Bench Marks and Ground WaterGauges:

The contractor shall establish and protect surveyor's benchmarks and base line marks from damage or movement during work at his cost.

1.7 Inspection:

The contractor shall inspect the site of work and ascertain site conditions and the nature of soil to be excavated.

1.8 Contractor's Staff:

The contractor must provide at all times efficient staff of trustworthy, skillful and experienced assistants capable of carrying out the work in accordance with the drawings and specifications and to correct levels.

1.9 Measurement of Work:

The CONTRACTOR shall be available at site at all reasonable times to take joint measurement of work done for the purpose of payment and shall also provide without any extra charges, the necessary measuring instruments and men.

1.10 List of I.S. Code of Practices & IS Publications:

A list of few important Indian Standard (latest edition) is given which does not cover all the relevant sides of practices.

Wherever reference towards the Indian standards mentioned below or otherwise appears in the specification, it shall be taken as reference to the latest version of the standard.

SL.NO.	IS NO.	DESCRIPTION
1.	General IS-1200 (Part-I to	Measurement of Building Works, method materials &details of
	28)	construction.
2.	Cement	Ordinary, Rapid hardening & low heat Portland
	IS-269 : 1989	Cement – 33 Grade
3.	IS-8112 : 1989	Ordinary, Rapid hardening & low heat Portland
		Cement – 43 Grade
4.	IS-12269 : 1987	Ordinary, Rapid hardening & low heat Portland
		Cement – 53 Grade
5.	IS-1489(Part-I & 2) : 1991	Portland Pozzlona Cement.

6.	SandIS-1542	Sand for plaster
7.	IS:2116-1980	Sand for masonry mortars
8.	Aggregates	Aggregates course and fine from natural sources for concrete.
	IS:383-1970	
9.	Aggregates	Aggregates for use in Mass Concrete Natural and
	IS:515-1959	manufactured.
10.	Bricks	Common Burnt clay building bricks.
	IS: 1077-1992	
11.	IS:2212-1991	Code of practice for brick work.
12.	Soil	Classification & Identification of Soil for General
	IS:1489-1970	Engineering purpose.
13.	Concrete	Code of Practice for plain & reinforced concrete (3rd
	IS-456 : 2000	revision) with Amendment No.2.
14.	IS-455 :1989	Portland slag cement.
15.	IS:2250-1981	Preparation & use of masonry mortar.
16.	IS-6452 :1989	High Alumina Cement for structural use.
17.	IS-8041 :1990	Rapid hardening Portland cement.
18.	IS:3370	Part-I/1965-Code of Practice for concrete structures for the
		storage of Liquids-General requirements.
19.	IS-3370	Part-II/1965 – Code of Practice for concrete structures for the
		storage of reinforced concrete structures.
20.	Test	Sampling & Analysis of concrete.
	IS-1199 : 1959	
21.	IS-8142 : 1976	Tests for setting time of concrete.

22.	IS-516 : 1959	Tests for strength of concrete.
23.	IS-9013 : 1978	Tests for compressive strength.
24.	IS-4031	Tests for cement.
25.a)	Steel : Iron Work	High yield strength deformed bar (Grade Fe 415).
	IS-1786 : 1985	
b)	IS-1786 : 1985	Tor steel reinforcement.
c)	IS-2751 : 1966	Welding of reinforcement.
26.	IS-2502 : 1963	Bending & fixing of bars for concrete reinforcement.
27.	IS-9077 : 1979	Corrosion protection of steel reinforcement in R.C.C.
		structure.
28.	IS-2062 : 1992	Structural steel.
29.	IS-2062 (Grade-A)	Low Carbon structural steel.
30.	IS-800 : 2007	Use of structural steel in general building construction.
31.	IS-808 : 1989	Rolled Steel Beams, Channels and angles.
32.	IS-1038 : 1983	Steel doors, windows & Ventilators.
33.	IS-7452 : 1990	Hot rolled steel section for doors, windows and ventilators.
34.	IS-4021 : 1995	Timber door window and ventilator frames.
35.	IS-1003 : 1991	Timber paneled and glazed door shutters.
36	IS-2202 :1991	Wooden flush door shutters.(Solid core type).
37.	IS-2571 :1970	Laying insitu cement concrete flooring.
38.	IS-7198 :1974	Damp proofing using bitumen mastic.
39.	IS-1230 : 1979	CI Rain Water Pipes & Fittings.

40.	IS-2114 : 1984	Laying in situ tettazzo floor finish.
41.	IS-1609 : 1991	Laying Damp Proof treatment using bituminous felt.
42.	IS-1322 : 1993	Bitumen felt for water proofing and damp proofing.
43.	IS-6494 :1988	Water proofing of under-ground water reservoir and swimming pools.
44.	IS-3067 :1988	General design details and preparatory work for damp proofing and water proofing of building.
45.	IS-4082 :1996	Stacking of storage of constructional materials at site-recommendation.
46.	IS-816 : 1991	Use ofmetalarc welding forgeneralconstructionin mild steel.
47.	IS-822 : 1970	Procedure for inspection of welds.
48.	IS-814 : 1991	Electrodes for manual metal arc welding.
49.	IS-1052 : 1983	Specification for Collapsible Gate.
50.	IS-1868 : 1983	Code of practice for Fabrication of Aluminum Door & Window
51.	SP – 34	Hand book of Conc. Reinf & detailing
52.	SP – 23	Hand book of Conc. Mix design
53.	SP – 35 (S & P)	Hand book on Water Supply & Sanitary works.
54.	I RC – SP – 63	Guide line for use of interlocking concrete Block pavement.
55.	IS-2911:2010	Piling Work (RCC)

1.11 Discrepancies and Clarification in the Drawings

Immediately after making formal agreement the contractor should thoroughly peruse all drawings related to the work and should point out discrepancies, inadequacies or clarifications in such drawings and specifications required if any within 7(Seven) days. All

attempts will be made from this end to rectify or clarify the same at the earliest after due consultation with the consultant. However progress of work should not get hampered or delayed under any circumstances due to any discrepancy/ inadequacy/clarification/ rectification in the drawings supplied.

2. APPROVAL OFMATERIALS:

2.1 Sample of materials in sufficiently large quantity with descriptive data thereof shall be furnished by the contractor to the Engineer-in-charge well before the collection of such materials and equipments so as to permit inspection, testing and approval. The sample shall be properly marked to show the name of the materials, name of manufacturer, place of origin and item for which it is to be used. After approval, the sample shall be available for inspection at alltime.

2.2 Galvanized Structural steel materials, RCC/PVC pipes and C.I. pipes, all types of valves and other appurtenant to be supplied by the contractor shall conform to the requisite I.S. specification properly tested and duly certified. Those are to be approved by the Engineer-in-charge beforeuse.

3. MATERIALS:

3.1 StoneChips:

These should be obtainable by the contractor from Chandil / Pakur, well graded conforming to the standard specifications of P.W.D. and approved by the Engineer- in-charge.

3.2 Sand:

Sand for construction purpose shall have to be collected either from Simlagar or river bed of Damodar / Mayurakshi / Kangsabati or Ajoy and should be coarse, cleaned, screaned and washed & of quality conforming to the standard specificationor
P.W.D. / this Directorate and also to be approved by the Engineer-in-charge.

3.3 Brick:

Bricks shall be of first class quality, well burnt in kiln, sound hard, true to shape and of the standard dimensions, and to be got approved by the Engineer-in- charge before use.

3.4 Pipes, specials, valves, penstocks, equipments / instruments etc.:

All Pipes, specials, valves, channel shutters, pen-stocks, instruments, weighing machines, R.S. joist, hoists, air blowers etc. should conform to relevant I.S. specification, bear I.S.I. certificate mark, where applicable, and as regards their make, the LIST OF MANUFACTURERS! Mentioned in Annexure enclosed with the tender document, shall have

to be strictly followed.

4. EXCAVATION AND FILLING:

4.1 Excavations necessary for the works may require digging and penetration through any soil or strata, removal of stems and roots of tress, breaking and removal of old structures, dewatering from all sources e.g. rain, seepage, leakage, subsoil water etc. protecting the trench and well pit and adjoining structures and service lines, by timbering, shoring, propping, sheet piling etc. Excavation shall be done only upto the required level and all extra depth of excavation, if made, has to be filled in with materials and manners approved by the Engineer-in-charge.

4.2 All excavated materials must be carefully deposited in spoil bank allowing the access to workers and plant machinery. The toe of the spoil bank shall be set at sufficient distance and should not be less than 3 to 4 times the depth of excavation. If so ordered by the Engineer-in-charge, the excavated materials have to be carried away and placed within a lead of 75 mtr. Such quantity of extra materials as may be required, shall be brought back to back-fill the trench with proper consolidation in layers of 500 mm thickness, properly rammed. Flooding of trench pit during back filling may be resorted to if so directed by the Engineer-in-charge. If required filling in low land, ditches etc. with good earth arrange by contractor in layers not exceeding 500 mm including breaking clods and consolidating the same by ramming and dressing up to be done by carried earth.

4.3 Contractor must make good at his own cost, all damages or settlements sustained by any structure founded on the trench or adjacent to the trench.

4.4 All excavated materials will remain the property of the Government and the contractor shall be responsible for their custody till the completion of the works or taking over by the Department.

4.5 Fill below the pipe trenches, inside building below the floor etc. shall have to be done with sand free from any foreign material.

4.6 In case of over-excavation below the stipulated depth the space between the foundation bottom and over-excavated area shall be filled up with silver sand consolidated by watering and vibrating. Where such consolidation is not achievable, the depth of excavation shall be filled with plain cement concrete of mix 1:4:8. The cost in both the cases shall have to be borne by the Contractor.

4.7 All materials obtained from any excavation required to be carried out under this contract will be utilized by the contractor for spreading over the land uniformly at hiscost.

4.8 Sand filling:

The sand fills as shown in the drawings beneath the foundations should constitute medium to coarse grained sand in layers of 300mm in saturated condition and compacted properly up to the founding depths. The sand fill should achieve 90 %(minimum) of its maximum dry density at each layer at site.

5. MAT CONCRETE OR FOUNDATIONCONCRETE:

5.1 Mat concrete is to be provided beneath all column footings of module foundation and control room.

5.2 150 mm thick nominal mix M-15 concrete with 20 mm down Stone chips shall be provided below R.C. foundations and structures over a layer of Polythene Sheet as approved by Engineer-in-Charge.

5.3 Foundations for brick work below plinth shall have 100 mm thick mat concrete of grade M-15 (nominal mix) with 20mm Stone chips over a layer of Polythene Sheet as approved by Engineer-in-charge.

5.4 All Mat concrete stated above shall be provided over at least 150 mm thick consolidated medium yellow sand.

6. BRICKMASONRY:

6.1 Brick work shall be laid in English bond with mortar in proportion 4:1 unless otherwise specified. Brick work shall always be carried up regularly in plumb and true to plan and lines, in level along the entire length. No brick work shall be carried up more than one scaffolding height of 1 .5 metre in the stage. Bricks are to be well soaked with water before use and brick work shall be kept clean and joints raked out for subsequent pointing or plastering.

6.2 Brick work in foundation and superstructure not in contact with water, shall be provided with 20 mm and 15 mm thick plaster to rough and fair faces respectively with cement sand mortor in 1:6 proportion. Brick work in contact with water shall be in cement sand mortar 1:4 20 mm thick with water proofing compound as per specification including 1.5 mm thick cement punning in the water contact face, 15 mm thick plastering in 1:6

cement sand mortar in the outer face shall be provided. “Cement Brick” will mean brick work in cement sand mortar in proportion as mentioned above.

7. R.C.C.WORKS:

The R.C.C. works are generally to be conducted on the concept of design mix shall be as per specification of I.S. codes, and stated elsewhere in the specification and schedule of this work along with Drawings provided.

7.1 Mixing and Laying:
All concrete shall be mixed in Mechanical mixer/batching plant (as required) and all concrete work in foundation, sub-structure etc. shall be properly vibrated with the help of mechanical vibrator as per direction of Engineer-in-charge.

7.2 Mortar and Concrete:
Contractors are particularly warned against the use of inferior materials (to that specified or approved) at site or use of incorrect proportion of different materials in the makeup of concrete or mortar. Detection of any such practice will lead to rejection of all such works and imposition of penalty, Engineer-in-charge has the right to reject any mortar or concrete which does not conform to the specification. Cube test for concrete are to be done as per I.S. code at the cost of thec ontractor.

7.3 The water cement ratio is to be determined by proper slump test or as per provision of relevant I.S. In case of slump test the slump cones 30 cm. High 20 cm. Dia. at bottom and 10 cm. At top are to be kept at site at the cost of the contractor.

7.4 Finishing:
If the surface of the concrete is found uneven or spongy in the appearance, the contractor will have to rectify or reconstruct at his own cost.

7.5 All R.C.C. work in wall, column, beam, roof, foundation etc., not forming part of water retaining structure shall be done in M20 grade concrete as per I.S:456-2000 with cement content not less than 350 kg/cu.m. of concrete. Plasticizer @ 0.2% by weight of cement shall be used. The water cement ratio should not exceed 0.45.For pile and pile cap grade of concrete shall be M25 as per IS456:2000.

7.6 The concrete shall be cured as perI.S:456-2000.

7.7 Cement and Aggregate:
7.7.1. Cement shall conform to relevant I.S., grade OPC-53. Cement tests shall have to be carried out at contractor’s expenses as and when directed. The contractor shall

make arrangement with necessary equipment to carry out crushing strength of 150 cm. Cube concrete block for 7 day's & 28 days of proper curing. Testing procedure, sample size shall be in accordance with relevantI.S.

7.7.2. Aggregate:

The fine course aggregates shall conform to relevant I.S. Stone chips and sand for construction work shall have to be supplied as per clause 3.1 and 3.2 respectively mentioned in this specification for Civil Engineering Works.

7.8 Concrete shall be sampled, analyzed tested in accordance with I.S. as furnished in the list.

7.9 Joints in Concrete Structure:

Type of joints, spacing of joints, use of all jointing materials and other features pertaining to the provision of movement joints in liquid-retaining structures shall be as per relevantI.S.

7.10 Water Tightness:

All the earth retaining structures and under ground floor must be made completely water tight as per relevant I.S specifications. For porous concrete resulting in leakage, this is to rendered good by cement slurry grouting at the cost of the contractor.

7.11 Reinforcement of R.C.C. Works:

7.12 The M.S. work should include cutting to sizes, bending, hooking and fabricating including the supply of B.W.G. wire, and all other works according to specification, drawing or otherwise.

7.13 The M.S. reinforcement rods if to be procured by the tenderer shall be HYSD bars (Fe-115) as per relevant I.S. Code. The contractor shall intimate the department regarding the quantity of steel to be procured by him in the works and the same may be supplied at the agreed rate specified in General terms and conditions.

7.14 The following clear cover to main reinforcement shall be maintained.

a) Water retaining face : As per relevant IS Code
b) Other than water retaining ace : As per relevant IS Code
c) Column, Pedestal Foundation and Pile : As per relevant IS Code

7.15 The Lap length of reinforcement shall be provided as given below:
As per relevant IS Code.

7.16 Following Development length/Anchorage length shall be provided.

ConcreteGrade	M15	M20

DevelopmentLength	: As per relevant IS Code
Anchorage	as per I.S. –456

7.17 The reinforcement work will include cutting to sizes, bending, hooking binding with 14 to 18 S.W.G. soft pliable wire etc. as per P.W.D. schedule. The work shall also be inclusive of stirrups, distributors, binders etc.

7.18 Chases, Holes, Recesses & Inserts:

All Chases, holes, recesses for foundation bolts, various services and other requirements shall be as per approved drawing or as directed. The contractor shall fix all necessary inserts in concrete for embedding and support of hangers for pipes and cables. Necessary ducts are to be provided by the contractor. For any inserts sufficient space shall be kept for jointing/dismantling to facilate installation and maintenance.

7.19 Embedding of C.I./M.S. Fittings:

The C.I./M.S. fittings to be embedded shall be thoroughly cleaned and tar coating, if any, shall be removed completely. Such type of fitting having puddle at one end shall be placed at the center of concrete section, plumbed, aligned and leveled perfectly ensuring throw of pipe or fitting to be integration. The surrounding of the fitting to be embedded shall be provided with diagonal reinforcement in layer/layers. The inside and outside shall be projected at least 150mm from the finished faces of the wall.

7.20 Special Provisions regarding Ready Mix Concrete(RMC)

The contractor is required to submit original or attested photocopies of challans of the RMC product with machine numbered being mandatory. Also with regards to testing of cubes for both RMC or nominal mix concrete, the contractor is required to set up cube testing machine on his own ,with proper calibration certificate , for testing the cubes as per prevailing IS codes. If the contractor is unable to set up cube testing machine on his own, as an alternative he is required to undertake cube testing from recognized institute, as approved by NKDA.

7.21 Protection of concrete and Water Curing

Immediately after compaction, concrete shall be protected against harmful effect of weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes and premature dying out. It shall be covered with wetsacking, Hessian or other similar absorbent material approved by the Engineer- in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 21 days

from the date of placement. Masonry work over the foundation concrete may be started after 48 hours of it's laying but the curing of concrete shall be continued for a minimum period of 21 days.

7.22 Concreting in Extreme Weather:

When depositing concrete in very hot weather, precaution shall be taken so that the temperature of wet concrete does not exceed 38 deg. C. while placing. This shall be achieved by stacking aggregate under sheds and keeping it moist using cold water or crushed or flaked ice if specified and permitted by the Engineer, reducing the time between mixing and placing to the minimum, cooling formwork by sprinkling water on the exterior, starting curing before the concrete dries out and restricting concreting, as far as possible, to mornings and evenings. During hot weather and rains the concrete shall be covered with tarpaulin and transported and placed in the forms and consolidated to final state in as short a time as possible. Commencement of concrete pours shall he avoided during heavy rains, storms and highwinds.

7.23 Quantum of cube testing

The minimum frequency of cube testing shall be as follows. 2 tests for each set of sample which consist of 4 cubes.

Concrete Quantity	Number of Samplesets
Up to 5 cum a day	1
5 cum to 15 Cum a day	2
15 cum to 30 cum a day	3
30 cum to 50 cum a day	4
More than 50 cum per day	4 + one additional for each50 Cum or part thereof.

Three cubes shall be tested on the 7th day and three cubes on the 28th day.

7.24 Brand Specifications for Cement & Steel

The contractor is required to adhere to the following brands as specified by competent authority of NKDA, for cement and steel.

Material	Specified Brands

Cement	Ambuja, Ultra-Tech, ACC, Lafarge or anyother approved by PWD
Steel	SAIL, TISCON, RINL,SRMB, Elegant or anyother approved by PWD

8. SHUTTERING ANDSTAGING:

The formwork shall conform to relevant I.S.S. and shall be 25mm to 30mm thick Wooden shuttering without staging in foundation and either made of steel or 9mm to 12mm thick approved quality ply board. Surface of shuttering in contact with concrete shall be made smooth & at joints rendered smooth. In every case the loss of liquid from the concrete. All shuttering form work must be adequately stayed and braced to the satisfaction of The Engineer-in-charge for properly supporting the concrete during the period of hardening. All form works shall be removed without shock or vibration. Before the form work is stripped, concrete surface shall be exposed when necessary in order to ascertain that the concrete has set hardened sufficiently.

9. Curing and Finishing:

9.1 The joint shall be cleaned off the grey cement slurry with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement. The floor shall then be kept wet for 7 days. After curing the surface shall be washed and finished clean. The finished floor and wall shall not sound hollow when tapped with a woodenmallet.

10. PLASTERING PAINTING & SURFACETREATMENT:

10.1. Cement:

It should be fresh Portland cement as specified in relevant I.S. Different Types of cement shall not be mixed together. In case more than one type of cement is used, a record shall be kept showing the location and the types of cement used.

10.2. Sand:

It shall be hard, durable, clean and free from adherent coatings and organic matter and shall not contain the amount of clay, silt and fine dust more than 5% by mass. It shall not also contain any harmful impurities such as iron pyrites, alkalis, silts, coal or other organic impurities, mica, shale or similar laminated materials, soft fragments, sea shale in such a form or in such quantities as to affect adversely the hardening, strength or durability of the mortar. The grading of sand for use in Plaster

shall be conforming to I.S. :1542-1977.

In case the sand is damp at the time of preparation of mortar, its quantity shall be increased suitably to allow for bulkage in conforming to I.S. : 2386 (Part-III) 1963.

10.3. Preparation of Mortar:

The materials shall be at first mixed dry thoroughly in suitable proportion as stated in the schedule till uniform colour reaches and then shall be mixed wet adding water slowly and gradually for at least four times to give a uniform paste. The mix as prepared shall be used within 30 minutes. Wherever plasticiser is required to use, the quantity of water shall be reduced in such a proportion that required consistency isachieved.

10.4. Preparation of Surface:

The surface of wall shall be brushed, cleaned, washed, watered and wetted with water before plastering. All the projections extending more then 13 mm form the general face of the masonry should be knocked off so as to maintain thinner plaster layer. All the joints in masonry should be raked for a depth of about 20 mm. In case of plastering on concrete surfaces, the face should be roughened by chipping of about 5 mm. Oily, greasy and efflorescence spots should be removed either by brushing, scrapping or both.

10.5. Laying:

In order to maintain uniform thickness of the plaster, the screeds are formed on the prepared wall surface before actual plastering is started. Patches of plaster 15 cm X 15 cm first of all applied at an interval of about 2 m both horizontally and vertically over the surface. The two dots lying in a vertical strip of mortar are formed between dots. Then the plastering shall be started from the top and worked towards the bottom. The whole surface shall be made flush between the screeds with wooden straight edges and rubbed thoroughly with wooden floats. Rounding of corners if desired by the Engineer-in-Charge, shall be carried out in one operation.

10.6. Curing:

The plastered surface shall be kept wet by sprinkling water after 12 hours for atleast 7 days and shall be protected from rain or sun.

10.7. Thickness:

Unless otherwise specified or desired by E.I.C., the thickness of plaster shall be as follows –

a) Plumbed Surface ofBrickWork - 15mm.
b) Rough Surface ofBrick Work - 20mm.
c) VerticalConcreteSurface - 15mm.

10.8. Cement Pointing to Exposed Brick Facing :

10.8.1. Where shown on the approved drawings or specified in schedule of work, exposed brick **faces shall be cement ruled pointed. The mortar shall be raked out of the joints to a** depth of 6 m. The dust shall be brushed out of the joints and the wall well-wetted. The pointing shall be made with cement and sand mixed in prop.1:3.

10.8.2. The joints of the plaster work shall be neatly finished truly vertical and horizontal or as directed and the lines be kept wet till the cementing materials have set and become hard. If desired after the joints have been cured the whole brick face shall be rubbed and polished with fine grade of carborandum stones to the satisfaction of the E.I.C. This rate also includes, necessary scaffolding etc., mending, good damages ifany.

10.9. Surface Finishing:

The rates of all the items of work under this caption includes, necessary scaffolding, staging, preparing base, removing stains from the floor, skirting, woodwork, glass etc. caused through execution of the work etc., and is for the complete works in all respects including Rendering the surface of walls and ceiling with plaster of paris (thickness not less than 1.5mm.)

11. WaterSupply: -

11.1. Jointing and laying of PVC water supply pipes:

PVC pipes as per PWD specification and approval will have to be used for carrying water and joining thereof.

11.2. Cleaning and disinfecting:

All storage tanks, water supply fittings and pipes before being put into commission, shall be disinfected by the Contractor at his own cost.

12. Landscaping andFencing

As per Specification: As approved by EIC, NKDA.

13. MODULES MOUNTINGSTRUCTURE (MMS):

The contractor shall furnish all materials, labor operation, equipment, tools and plant

and incidentals necessary and required for the completion of all metal work in connection items of metal work as called for in the drawings. The drawing and specifications cover the major requirements only. The supplying of additional fastenings, accessory features and other items not mentioned specifically herein but which are necessary to make a complete installation shall be a part of the contract. The foundations for module mounting structures should be at perfect alignment as shown in the drawings. If necessary protection work will have to be done for constructing foundations as per drawings andspecifications.

13.1. All Modules shall be mounted on non-corrosive supportingstructures.

13.2. The frame assembly of the array structures shall be made of hot dip Galvanized steel as per IS1161-1979. Minimum thickness of galvanization should be at least 120 microns. All pipes shall conform to IS: 1161-1979. The contractor is required to produce Dye-Test and X-Ray Test certificate for welding fromreputed NABL accredited testing agency. All GI Pipes should be of TATA make, All GI Pipes should be cleaned and epoxy/galvanized painted at welding junction / joints, post-completion ofwelding.

13.3. All fasteners shall be of Hot Dipped Galvanised Grade 8.8, Nut & Bolts, supporting structures including module mounting structures shall have to be adequately protected against all climaticcondition.

13.4. The structure shall facilitate easy replacement of any module and should also facilitate easy access of the O&M staff and P&P (Personnel and Protection). The pathway should be made as perdrawing.

13.5. The structure shall facilitate simple mechanical and electrical installation. It shall support Solar PV modules at a given orientation, absorb and transfer the mechanical loads to the groundproperly.

13.6. The overall design of module mounting structure and the civil foundation works should be done according to the basic design and drawing supplied by NKDA (enclosed in Annexure).

13.7. <u>APPLICABLE STANDARDS</u>

IS-226-1975 - Structural Steel (standard quality) (fifth revision)
IS-456-1978 - Code of practice for plain and reinforced Concrete (third revision) IS-696-1972 - Code of practice for general engineering drawings (second revision) IS-786-1967- (supplement) SI supplement to Indian standard conversion factors and conversion tables (firstrevision)
IS-812-1957 - Glossary of terms relating to welding and cutting of Metals IS-813-

1961 - Scheme of symbols for welding
IS-814- Covered electrodes for metal arc welding of structural steels: 814(part-1)-1974 part-1 for welding products other than sheets (fourthrevision)
IS-816-1969 - Code of practice for use of metal arc welding for general onstruction in mild steel (first revision)
IS-817-1966 - Code of practice for training and testing of metal arc welders (revision)
IS-819-1957 - Code of practice for resistance spot welding for light assemblies in mild steel
IS-875-1964 - Code of practice for structural safety of buildings: Loading standards(revision)
IS-919-1963 - Recommendations for limits and fits for engineering (revision)
IS-961-1975 - Structural steel (high tensile) (second revision)
IS-962-1967 - Code of practice for architectural and building drawings (first revision)
IS-1030-1982 - Carbon steel castings for general engineering purposes (second revision)
IS-1148-1973 - Hot-rolled steel rivet bars (up to 40 mm diameter) for structural purposes (second revision)
IS-1149-1982 - High tensile steel rivet bars for structural purposes
IS-1261-1959 - Code of practice for seam welding in mild steel
IS-1278-1972 - Filler rods and wires for gas welding (second revision)
IS-1363-1967 - Black hexagon bolts, nuts and lock nuts (diameter 6 to 39 mm) and black hexagon screws (diameter 6 to 24 mm) (first revision)
IS-1364-1967 - Precision and semi- precision hexagon bolts, screws, nuts and lock nuts (diameter range 6 to 39 mm) (first revision)
IS-1367-1967 - Technical supply conditions for threaded fasteners (first revision)
IS-1393-1961 - Code of practice for training and testing of oxy-acetylene welders
IS-1395-1982 - Molybdenum and chromium molybdenum vanadium low alloy steel electrodes for metal arc welding (secondrevision)
IS-1477 - Code of practice for painting for painting of ferrous metals in buildings: 1477 (part-1) 1971 part-1 pretreatment (first revision) (part-2) 1971 part-2 painting
IS-1929-1961 - Rivets for general purposes (12 to 48 mm diameter)
IS-1977-1975 - Structural steel (ordinary quality) (second revision)
IS-2062-1984 - Weld able structural steels (third revision)
IS-2155-1962 - Rivets for general purposes (below 12 mm diameter)
IS-3613-1974 - Acceptance tests for wire-flux combination for submerged-arc welding of structural steels (first revision)
IS-3757-1972 - High-tensile friction grip bolts (first revision)
IS-4000-1967 - Code of practice for assembly of structural joints using high tensile friction grip fasteners

IS-5369-1975 - General requirements for plain washers and lock washers (first revision)

IS-5370-1969 - Plain washers with outside diameter 3Xinside diameter

IS-6419-1971 - Welding rods and bare electrodes for gas shielded arc welding of structural steel

IS-6623-1972 - High tensile friction grip nuts

IS-6649-1972 - High tensile friction grip washers

IS-7205-1974 - Safety code for erection of structural steel work

IS-7215-1974 - Tolerances for fabrication of steel structures

IS-7280-1974 - Bare wire electrodes for submerged arc welding of structural steels

IS-8500-1977 - Weld able structural steel (medium and high strength qualities)

13.8. SHOP DRAWINGS

Includes:

13.8.1. Shop drawings for 3-Dframes.

13.8.2. Indicate profiles, sizes, spacing and location of structural members, connections, attachments, fasteners, cambers, loads and designs ofjoints.

13.8.3. Indicate welded connections using standard welding symbols and net weldlengths.

13.8.4. Indicate the method of erection, shop and field joints.

13.8.5. Indicate and identify all transportable parts and sub assemblies, associates with special erection instructions, ifany.

13.8.6. Provide design calculations for splices, joints, other details not specifically detailed in design drawings on fabrication drawings considering standard detailing practices and developing full member strengths if required.

13.8.7. 22.8.7 Submit 3 sets of shop/fabrication drawings (both hard & soft format) within 21 days after receiving LOI (Letter of Intent) to engineer-in-charge for approval.

13.8.8. 22.8.8. Allow three weeks for engineer-in-charge to approve the shop/fabrication drawings.

13.9. MATERIALS

All metal materials shall be free from defects impairing strength, durability and appearance and they shall have structural properties that comply fully with thestandards set out in clause 3/2.61.1.3, which follows. All ferrous metal shall be free from rust, scale and other defects. All non- ferrous metal shall have uniform finished surfaces, machined and buffed, free from defects. All sections shall conform accurately to sizes and shapes required.

13.9.1. FABRICATION

13.9.1.1. Fabricate structural steel members in accordance with IS Specifications 800 section V and approved shopdrawings.

13.9.1.2. Defective material used shall be replaced by thecontractor.

13.9.1.3. Fabricated items delivered at site shall be suitably protected from anydamages.

13.9.2. EXECUTION

13.9.2.1. Erect structural steel in accordance with ISSpecifications.

13.9.2.2. Make provision for erection loads and for sufficient temporary bracing to maintain the structure in proper plumb and in true alignment until completion of erection and installation of permanentbracing.

13.9.2.3. Do not field cut or alter structural members without approvalof engineer-in-charge.

13.9.2.4. Cut edges shall be ground as per IS 823.Cutting tolerances shall be: Members connected at bolt ends: ±1 mm. 0R Other members: ± 3mm.

13.9.2.5. 22.10.5. All bolt holes shall be drilled and to the sizes specified in drawings.

13.9.2.6. Tolerance for spacing between two holes: ±1mm.

13.9.2.7. Tolerance between two perpendiculars of any oval holes: ± 1mm.

13.9.2.8. Bolt holes for field joints shall be drilled in the shop to the required diameter andtested.

13.9.2.9. Drilling holes for standard sizes of varies can be reamed to next higher sizes. The tolerance for hole reaming shall not exceed 15% of the total number of holes for onejoint.

13.9.3. PREPARATION OF MEMBERS OFWELDING

13.9.3.1. Proper jigs and fixtures shall be used to ensure correct positioning of structural members duringassembly.

13.9.3.2. Sharp edges, rusting of cutting edges, notches, irregularities, and fissures due to faulty cutting shall be chipped andground.

13.9.3.3. Edge preparation for welding shall be done properly taking care of cleaning. Providing dry surface, removing grease, dust of dirt, foreign matter,etc.

13.9.3.4. Finished dimensions of structure shall be ensured after taking into account the shrinkage and distortions duringwelding.

13.9.4. WELDING

(a) Welders shall be fully trained, experienced and certified by the recognized welding institutes.

(b) Welders' qualification tests shall be as per IS 823 and approvedby engineer-in-charge.

(c) Welding shall be done in accordance with IS823.

(d) Welding parts shall be marked with welders'identification.

(e) Protect the welded parts, electrode wires against wind andrain.

(f) Discontinued seams shall be melted before resuming weldingoperation.
(g) Welding seams shall be cooled slowly and not by any other quickmethods.
(h) Before welding a second layer over the existing layer of weld, the layer shall be cleaned metal bright by light chipping and wirebrushing.
(i) Execution shall proceed in strict compliance with section 2/7 safetyprocedures.
(j) Welded parts shall not have anydeformations.
(k) Welded joints should compensate for contraction due towelding.
(l) Defective welds must berectified.
(m) Weld seams shall correspond to design shapes anddimensions.
(n) Weld seams shall not have cracks, fusion, under cuts, rough surfaces, burns, blowholes, and incompletepenetration.
(o) Approval of finished elements, inspections and tests shall be as perannexure

13.9.5. BOLTING

a) Bolts, nuts shall be in accordance with IS 1367 and tested as per IS1608.
b) Washers shall be as per IS2016.
c) Members shall be assembled for bolting with proper jigs and fixtures to sustain the assemblies without deformation andbending.
d) All sharp edges, shavings, rust, dirt, etc. shall be removed beforeassembly.
e) Temporarily the assembly shall be done and checked for co-axiality of the holes after which the assembly shall be finallybolted.

13.10. FIELDERECTION

1. To get approvals of foundation, column pedestals or other related structure on which the structural steel members are to beerected.
2. To get approvals of the members receiving structural steel members regarding their levels dimension alignments and verticality well inadvance.
3. To carry out any minor discrepancies at no additionalcost.
4. To get approvals of pockets, bolt locations, levels of base plates beforeerection.
5. Erection to commence after satisfying the aboveconditions.
6. Erection to be done in an organized way so that any individual member is not subjected to instability during the erectiontime.
7. Precautionary measures to be taken during erection of trusses, purlins and other steel members by providing properbracing
8. Faulty erections done without caring for safety of members and of personal shall be made good at no additionalcost.

9. Contractor is not relieved of his responsibilities, guarantees even after the engineer-in-charge approves the fabrication, erection, etc. at any stage ofwork.
10. Contractor is solely responsible for the correctness accuracy and quality of the fabrication erection and final approvals to be obtained by the engineer-in-charge.To position and level the structure including aligning and to plumb the stanchion and fixing every member in position with bolts, erection bolts, weld as per design and drawings.
11. To inform the engineer-in-charge of any variation, deviation in location of foundations deviate the prefabricatedmembers.
12. Engineer-in-charge to give suitable solutions in case of above deviations well in advance for the contractor to proceed with the fabrication of members including any modificationsnecessary.
13. Contractor to rectify any minor deviation in foundations, location of steel bolts and orientation of bolt-hole positions at no extracost.
14. To erect structural steel members ensuring that the system is stable against inherent weight, wind and any erectiontrusses.
15. To anchor and fasten the erection joints after duly checking the plan, elevation positions of the members with reference to the drawings after the approval of engineer-in-charge.
16. To fasten bolts to the final position with bolt heads and nuts resting on the member and on tapered with members having a slopingsurface.

13.11. FINAL ACCEPTANCE AND HANDING OVER THESTRUCTURE

1. Contractor to submit As-built shop drawings for the approval of the engineer-in-charge, as per the stipulation given in conditions ofcontract.

2. Documents to be submitted for final acceptance are asfollows:

a. Shop acceptancedrawings.
b. Quality certificate for structural members, plates, flats,bolts.
c. Quality certificate for material used for fabrication including electrodes, welding wire, bolts, nuts, washersetc.
d. Acceptance and intermediate control procedure adopted during the process of fabrication assembly, transportation, delivery and erection orstructure.

13.12. GROUTING

17. To level, align and plumb the structural steel work and the base of stanchions by providing steel shimplates.
18. To align anchor bolts in foundation to the required level, location and orientation by usingtemplates.
19. To clean the underside of base plates, pockets to receive grout by usingcompressedair.
20. To use cement mortar 1:2, 1 of cement and 2 of sand, non-shrink grout under base plates.To use grade M30 concrete to fill up the grout pockets left for fixing anchorbolts.
21. To pour the grout under a sufficient head and tam until the voids are thoroughly filled and the groutoverflows.

13.13. TOLERANCES

1. Steel work for lineandlevel ±3mm
2. For structural steelforplumb 3.5mm for 10M and not more than 7mm for30M
3. To follow any tolerance criteria provided on thedrawings.
4. To provide tolerances for all structural steel members as per IS code other than that what is mentionedabove.

All nuts, bolts, washers and other fittings and fixtures as required for proper installation of solar modules are to be supplied by the contractor as per direction of EIC, NKDA.

14. PATH WAY:

14.1. Pathway shall be provided on top of truss with chequered plate at interval of 5 mtr throughout the length of structure across the canal. The width of pathway shall be atleast 0.5mtr, covering the entire cross sectional length of structure. (Refer included Drawings)

15. SITE SURVEY

Contractor has to conduct detail site survey by using "TOTAL STATION" before staring the construction and conformatory boring work. The survey report has to be submitted to NKDA for necessary approval.

16. CONFORMATORY BORING

Contractor has to carry out conformatory boring of at every pile location as detailed under:

Scope of work for Conformatory Boring

Sl.No	Description of Items	Unit	Quantity
1	**Carriage of all Disturbed & Undisturbed Samples** from site of work to the Divisional office or elsewhere including loading and unloading as per direction of Engineer-in-Charge.	L.S	1
2	**Making Bore-Holes** of 150mm to 250mm dia. by any standard method to any depth below ground level / bed level in all kinds of soil like clay, , silt, sand, stiff clay, mixed soils etc. except rocks (for the purpose of collecting Disturbed & Un disturbedsoil samples, conducting Standard Penetration Testat suitable intervals etc.) including preparation and submission of bore-log as per IRC : 75 and 78 and Clause 2400 of Specifications for Road & Bridge Works (5th Revision), Published by IRC, as per the direction of Engineer-in-Charge.		
i.	Depth 0m to 10m	metre	10
ii.	Depth greater than 10m and upto 20m	metre	10
3	**Field Investigation:**		
	Collection of Undisturbed soil sample from the bore hole to be made by the concerned Division / Party at their cost.		
i.	0.0m - 10.0m	Per sample	3
ii.	10.0m-20.0m	Per sample	3
4	Standard Penetration Tests (S.P.T.) by Split Spoon Sampler in the bore hole as per IS 2131.		
i.	0.0m - 10.0m	Per sample	6
ii.	10.0m-20.0m	Per sample	6
5.	Filling bore hole by bentonite slury/sand filling	each	1
i.	Preparation and submission of report in 6 (Six) copies, giving all relevant information data like site plan, Bore log and water table,		
ii.	Detailed Investigation	L.S	1
	for 1nos. of Bore Hole upto 20m depth. – Total 84 nos. of similar Bore Hole		

17. PILING WITH RCC COLUMNS.

17.1. Providing RCC cast -In -Situ bored Pile in position as per specification in all kinds of soil

including cost of boring using drilling mud to stabilized the bore and flushing the bore of excess mud with freshly prepared drilling fluid by using pumps prior to placing concrete by trammie pipe in one continuous operation and including the cost of all materials and labour for placing of concrete and also including cost of mobilisation and hire charge of all equipments necessary for boring, welding of reinforcement cage as necessary and lowering of reinforcement cage & steel liner (if any) , preparation and placing of concrete complete including reinforcement and labour for bending and binding etc. Work to be executed as per IS-2911 (part II- section 2)(cement concrete should have ultimate crushing strength of not less than **250kg/ sq.cm** on 15 cm cube after 28days.

17.2. Performing lateral load test on two piles or two groups of piles by introducing a hydraulic jack with gauge between two piles or pile groups under test by applying horizontal loads in increments of about 20% of the estimated safe load at each stage and applying the next increment after the rate of displacement is nearer to 0.1 mm. per 30 minutes till the total displacement becomes, 12 mm at the cut-off level including the cost of arranging the entire set-up, hire charges of all implements including at least two dial gauges, preparing the pile head if necessary, and removal of all arrangement after completion of etc. complete in all respect as per direction of Engineer-in-charge and as per ISspecification.

17.3. Performing Vertical Load Test (Compression) by hydraulic jack on pile/ piles with 1.5 times the design load including the preparation of the head of the piles with concrete of required strength for receiving the jacks with all ancillary arrangement for setting up gauge, construction of suitable platforms , keeping the loads and dismantlingandremoving all arrangement etc. complete as per direction of engineer in charge including cost of carriage of all material and as per IS specification on single pile.

17.4. No changes will be permissible with respect to drawings for thefollowing:-

17.4.1. All RCC structures namely pile, pile cap, stool columns etc and their centre to centre distance in both directions. (i.e. longitudinal and transversedirections)

17.4.2. The transverse and longitudinal trusses and their centre to centre distance in bothdirections.

17.4.3. Arrangement of purlins and catwalks on both sides

However the bidders have liberty to modify the following, namely –

(a) Members of the grid structure assembly wherein the solar panels will be fitted and which will ultimately be connected to thepurlins.

(b) If the bidder wishes to make any changes with regards to arrangement as well as modify the total area of the solar panels, the same needs approval from

competent authority of New Town Kolkata Development Authority, subject to submission of necessary calculation and justification regarding production of specified outputparameters.

(c) In addition to the longitudinal catwalks, some transverse catwalks of 300 mm width may be provided by the bidders for proper cleaning operation, if desired. Due to inclusion of transverse catwalks, the overall length of structure may be increased. However, the bidders will have to restrict the entire structure within the actual area of work as shown in the relevant drawing. Due to increase in length, if any, the bidders will have to increase the number of bays along the longitudinal direction but the centre to centre distance of the bays, trusses etc. should be according to the drawings as supplied by N.K.D.A. Such revised drawing of the structure, if any, with increased number of bays will have to be got approved from NKDA, by the lowest bidder within 15 days of issuance of Letter of Intent. Such drawing now becomes the final drawing for execution of the module mountingstructures.

Bidders will also have to submit shop drawings for fixing of modules with the grid assembly and connection of the grid assembly with purlins or any other electrical working drawings required, if any, within 21 days of issuance of LOI for final approval by N.K.D.A

Note: Pile load test (if required) shall be carried out by NKDA.

18. Sign Board

18.1. The sign board will contain brief description of the power plant having size of 2.4 meter X 0.9meter.

18.2. The board will be of inject vinyl printing in matter over L.G. Sunrise make film with matted lamination on the picture and pasted the same on aluminium composite panel board of Aludecor or equivalent make of 3mm. thickness including making frame work with aluminium box (50mm x 25mm) and border with aluminium angle (25mm x 40mm) including fitting, fixing in position fibre glass panes of approved quality with resin, nail, clip etc. as per I.S. 12866-1989, 2.00mm. thick (3.36 kg/sq.m.) all complete as per direction upto the satisfactory level ofE.I.C.

18.3. The board will be erected in the space provided by the authority with M.S. frame structure embedded in M20 concrete with mat concrete as per direction ofE-I-C

19. WATER SOURCING & PLUMBING FOR MODULE CLEANING ARRANGEMENT:

Contractor has to provide plumbing arrangement of water line for module cleaning purpose. Sprinklers of 0-90 Degree and 0-180 Degree rotation of suitable numbers to be provided for the entire solar array field. Design and layout for the proposed water cleaning system to be installed along with the array structure has to be approved by NKDA.

Technical Specification of Electrical Work

1. PV MODULES:

a) **The PV modules must conform to the latest edition of any of the following / equivalent MNRE, Govt. of India/BIS/IEC/National or International Standards for PV module design qualification and type approval:**

The present plan is to **use minimum 370 Wp Monocrystalline Passivated Emitter Rear Contact (PERC) Solar cell based PV Modules**. The open circuit voltage of the module is 48V confirming to IEC 61215, IEC 61730 IEC 61701, IEC 62716 certifications.

b) IV curves both soft copy & hard copy must be provided.
c) Maximum power rating of each module at STC shall not be less than 370Wp.
d) The module efficiency of crystalline module shall be more than 19% at standard test condition and should be corrosionresistant.
e) Each solar PV module shall be warranted by the manufacturer for at least 90% of its rated power after initial 10 years and 80% of its rated power after 25 years from the completion of the trialrun.
f) All wires used for connecting the modules and array should conform to the NEC/ISstandards.

Note : In case of nonavalibility of SPV Modules of 370 Wp of sufficient numbers SPV modules of other capacity between 335 to 400 Wp may be used with corresponding modification of the Module Mounting Structure and other related accessories. The modified design of SPV Module Array layout and corresponding MMS needs to be approved by NKDA.

Identification and Traceability:

Each PV module must use a RF identification tag (RFID), which must contain the following information:

i. Name of the manufacturer of PVModule
ii. Name of the Manufacturer of Solarcells
iii. Month and year of the manufacture (separately for solar cells andmodule)
iv. Country of origin (separately for solar cells andmodule)
v. I-V curve for themodule
vi. Maximum Wattage, Im, Vm and FF for themodule
vii. Unique Serial No and Model No of themodule
viii. Date and year of obtaining IEC PV module qualificationcertificate
ix. Name of the test lab issuing IECcertificate
x. Other relevant information on traceability of solar cells and module as per ISO 9000series.

2. Power Conditioning Unit (PCU):

As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust the voltage levels before powering equipment designed for nominal mains AC supply. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices.
All these components of the system are termed the "Power Conditioning Unit" OR simply PCU. In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), to maximize Solar PV array energy input into the System. PCU should conform IEC 61683, IEC 60068 as per specifications. The nominal capacity of each PCU will be of 100kW and such 10nos. will be recurred for whole plant. The typical specification of PCU is given below:

Specification:

- Maximum DC input voltage : 1000-1100V
- MPP Voltage range : 480-550V
- No. of MPPT input : 5-9
- Max DC input current : 30-36V

- AC Output power : 100KW, 3Phase AC @ 400V (+/-10%)
- Rated AC grid voltage : 400-415V
- Rated output frequency : 50 Hz
- Total Harmonic Distortion : <3%
- Maximum Efficiency : 98.4-99%
- Interfaces : Data Logging & Remote Monitoring should be available
- Protection class : IP65(or higher)
- Make : ABB/DELTA/SUNGROW or Equivalent (As per approval from NKDA)

3. REMOTE MONITORINGUNIT:

The Power Plants should have suitable inbuilt instrumentation for remote monitoring of its Real Time Status. Power Plants shall be capable of transmitting its monitorable parameters over CDMA/GPRS/ TCP IP Network and conform to respective standard protocols. The Power Plants shall also have suitable Data Logging & Storage capacity for at least 7 days event logs. The data transmission shall be routed to NKDA application MIS as well as the Vendor location. The systems should also be able to monitor through internet at anytime.

4. ARRAY JUNCTION BOX (AJB):

The array junction boxes shall be dust, vermin and waterproof and made of FRP /Thermo Plastic with front panel transparent type. The terminals shall be connected to copper bus bar arrangement of proper sizes. The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables. Suitable markings shall be provided on the bus bar for easy identification and cable ferrules shall be fitted at the cable termination points for identification. The junction boxes shall be of reputed make and should be as per IP 65 (for outdoor) and as per IEC 62208.

The junction boxes shall have suitable arrangement for the Following: The basic single line diagram has been provided with component specification in Annexure. The vendor needs to follow this basic design and the working drawing should be submitted to NKDA for approval.

Note: If the safety and other features are available inside the Inverter, then provision of separate AJB may be avoided.

Make:
Enclosure: Hensel /Spelsberg/ Ensto /Equivalent
Terminals: Elmex /Equivalent
Fuse & Holder: Copper Bushman / equivalent
SPD: OBO/Equivalent
DC Isolator: Santon / Telergon /ABB / Equivalent

5. CABLES & WIRINGS:

- All cables to be supplied should be as per IEC 60189/IS 694/IS 1554/IEC 69947 and should have proper current carryingcapacity.
- The DC cables should be of PV1-Fgrade.
- All DC cables and wires used shall be of copper conductors of suitable cross section with crossed linked polythene or polyvinyl insulated with polyvinyl sheath. Stranded and flexible cable shall be used. Non-stranded cable shall not be acceptable expect otherwise mentioned andpermitted.AC cables are to be of Aluminum Armoured.
- Conductor size of cables and wires shall be selected based on efficient design criteria such that the overall electrical energy loss in any section of cable or wire is shall be less than 3% under the designed operating conditions.
- Cable/wire connections shall be soldered, crimp on type or split bolt type. Wire nut connections shall not beused.
- All cables shall be adequately supported. Outside of the terminals/panels/enclosures shall be protected by conduits. Cables shall be provided with dry type compression glands wherever they enter junction boxes/panels/enclosures.
- All cables shall be suited marked or coded for easyidentification.
- Vendor needs to submit the calculation and size to NKDA forapproval.
- All DC cables up to 35 mm size should be TUV XLPO certified as per 2Pfg. 1169/08.2007.
- Cross sectional area of the control cable should not be less than 2.5 mm^2.
- Make:
  DC Cable: Lapp/Top Solar/Siechem/ Havells /Polycab/Apar
  AC Cable: Poly Cab/Mescab/KEI/Gloster/Havells

6. AC DISTRIBUTION SYSTEM

The AC Distribution box shall be dust, vermin and waterproof and made of FRP/Thermo Plastic with front panel transparent type. The terminals shall be connected to copper bus bar arrangement of proper sizes. The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables. Suitable markings shall be provided on the bus bar for easy identification and cable ferrules shall be fitted at the cable termination points for identification. The junction boxes shall be of reputed make and should be as per IP 65 (for outdoor) and as per IEC62208.

- Vendor needs to follow the basic design and submit the working drawing to NKDA for approval.
- 2 numbers of ACDB has to be provided of each capacity 500kW. The underground cable shall be laid from each ACDB to the grid (drawing attached in Annexure).
- Cables from each inverter will be taken through a tunnel to Bishwabangla Convention Centre Substation.
- Details of cable used for the distribution and transmission purpose along with their current carrying capacity and make has to be submitted for approval.
- Energy Meter from reputed company should be provided. Test certificate shall be submitted.

Make:

- Enclosure: Hensel/Spelsberg /Ensto/Equivalent
- Enclosure: Hensel/Spelsberg /Ensto/Equivalent
- Terminals: Elmex/Equivalent
- SPD: OBO/Equivalent
- Isolator: ABB/Siemens/GE/equivalent
- MCCB: ABB/L&T/Siemens/GE/Equivalent
- Energy Meter: Secure/LandisGyr/ L&T/Equivalent

7. POWER EVACUATION SYSTEM & GRID INTERFACING

The AC outputs from the inverters will be taken through underground cable trench to Biswabangla Convention substation through SFUs. Inside the substation two separate panels each for 500kWp will be installed for interfacing with the LT side of the existing 33kVA WBSEDCL distribution panel through bus coupler. The panels should have suitable PT/CT, circuit breakers and displays for each of the inverters. The schematic drawings is enclosed for reference.

8. EARTHING & LIGHTNING PROTECTION:

Earthing:

The earth for array, distribution system & power plant equipment shall be made with GI pipe, 4.5m long 40 mm diameter including accessories and providing masonry enclosures with cast iron cover plate having locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS:3043. Necessary provision shall be made for bolted isolating joints of each earth pit for periodic checking of earthresistance.

Each array structure & array junction box in DC side of the SPV yard shall be grounded properly. The array structures are to be connected to earth through 50 mm X 6mm GI strip.

The PCUs and all equipment in AC side of SPV yard will have to be connected to earth through 50 mm X 6 mm GI strip. The basic design has been provided in Annexure. The vendor needs to submit the working drawing with numbers of earth pits to NKDA forapproval.

Lightning Protection:

The SPV Power Plant shall be provided with lightning protection, suitable numbers of lightning arrestors as per site conditions have to be provided throughout the array yard. Separate earthing arrangements are to be provided to each lightning arrestor. The working drawing has to be provided to NKDA for approval.

9. WEATHER MONITORING SYSTEM:

Vendor shall provide following measuring instruments with all necessary software & hardware required to make the weather monitoring system compatible with remote monitoring unit.

PYRANOMETER:

Vendor shall provide certified good quality Pyranometer (minimum 2 Nos) of reputed make for measuring incident global solar radiation confirming to ISO 9060: 2018/IEC 61724-1:2017, class-c type. It shall be supplied with necessary cables & calibration certificate. Vendor shall provide Instrument manual for same.

Temperature Measuring Instrument:

Contractor shall also provide suitable number of sensors (minimum 4 nos) for ambient temperature as wells as module back surface temperature measuring instrument at suitable places in PV array field. Instrument shall have a range of -5° C to60°C.

Wind Sensor/ANEMOMETER:

Vendor shall provide ultrasonic wind sensor (anemometer) capable of measuring wind speed of 0-60mtr/Sec ± 2% ; wind direction 0-350 Degree ± 2% confirming to IP66BSEN60529:1992, whichshall have valid calibration certificates and to be produced at the time of commissioning of the plant.

Humidity Sensor: Suitable sensor and measuring provision shall be provided for humidity measurement at site.

Other Accessories: Provision for remote monitoring of all weather data through internet.

Work Station PC: A separate work station PC with necessary hardware and software arrangement to be provided at Biswabangla Convention Substation for remote monitoring of electrical as well as weather data.

10. SURVEILLANCE CAMERA

Security cameras will be placed at strategic locations and the images will be sent to a computer for monitoring purpose. Minimum 20 nos of CC Cameras at site and LCD display of 52inch shall be provided. Vendor must survey the site and estimate the numbers and submit the layout drawing with data sheet of cameras to NKDA for approval.

11. YARD LIGHTING:

Supply, installation &commissioning of LED luminaries of suitable wattage, quantity, height and structure for illuminating the solar array field and the adjacent yard. The design of the lighting should enhances the aesthetic of solar power plant and the adjacent yard.

SECTION D

PRICE SCHEDULE / PAYMENT CONDITION

Sl No.	Description of work	Mode of Payment
1	Site survey and submission of complete drawing of civil construction showing location of piles for approval by NKDA	100% of the quoted amount after completion of work.
2	Site grading, leveling, and consolidation of the area pertaining to the total plant and project. The applicant has to levelize the site by clearing of bushes (if required) leveling of ground(wherever required) etc for commencing the project	100% of the quoted amount after completion of work.
3	Conformatory boring and construction of piles upto pier cap.	Running Account bills on measurement basis as per schedule rate.
4	Construction of fencing along the periphery of project area as per approved drawing & design.	**i.** 50% of quoted amount after erection of M.S. posts. **ii.** 50% of quoted amount after completion of fencing and gate.
5	Submission of Module Mounting structure design, drawings and specification for approval by NKDA.	100% of the quoted amount after completion of work.
6	Fabrication, supply & erection of Module Mounting Structure as per drawing & approved design specification at site.	**i.** 50% of quoted amount after inspection of fabricated Module Mounting Structure. **ii.** 50% of quoted amount after erection of Module Mounting Structure and completion of work.
7	Supply, delivery, installation and commission at site of Solar PV Module as per technical specification. Actual requirement of 2 X 500 kW PV panel capacity must be 10,00,000 Wp	**i.** **80**% of the quoted amount after supply, delivery, at site. **ii.** **20**% of the quoted amount after installation & commissioning at site as a whole.

8	Supply, delivery, installation and commission at site of 100kW Inverters as per technical specifications. (Total 10 Nos - 5nos. for each 500 kW SPV plant).	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.
9	Supply, delivery, installation and commissioning at site of Remote Monitoring Unit as per technical specifications.	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.
10	Supply, delivery, installation and commissioning at site of Array Junction Box and related accessories as per technical specifications.	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.
11	Supply, delivery & laying of DC Cables. All cables to be supplied as per actual requirement at site and as per specifications.	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.
12	Supply, delivery & laying of AC Cables All cables to be supplied as per actual requirement at site and as per specifications.	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.
13	Supply, delivery, installation and commissioning at site of AC Distribution Box (Optional) ACDB shall have suitable AC Bus Bars, Breakers & Protections. All ACDBs shall have proper cable entry and exit with IP65 protection as per drawing. (1 no for each 500 kW SPV Plant)	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.
14	Supply, delivery, installation and commissioning at site of Earthing Material – as per specification	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.
15	Supply, delivery, installation and commissioning at site of Lightning Arrestors - as per specification	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.

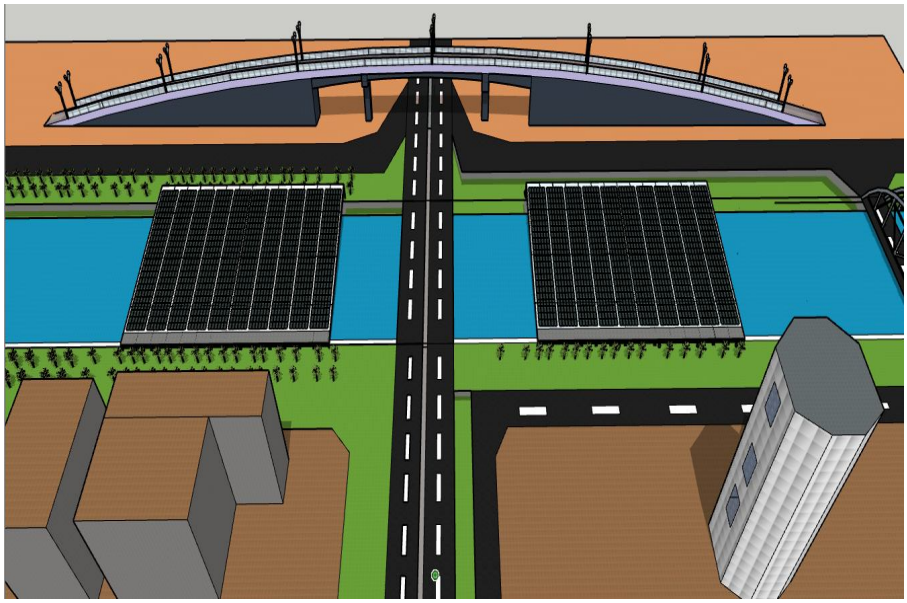
16	Supply, delivery, installation and commissioning at site of Weather Monitoring System - as per specification	**i.** 80% of the quoted amount after supply, delivery, at site. **ii.** 20% of the quoted amount after installation & commissioning at site as a whole.
17	Supply, delivery, installation and commissioning at site of CC TV Camera - as per specification The security cameras will be placed at strategic locations and the images will be sent to a computer for monitoring.	**iii.** 80% of the quoted amount after supply, delivery, at site. **iv.** 20% of the quoted amount after installation & commissioning at site as a whole.
18	Supply, delivery, installation and commissioning at site of Yard Lighting. - as per specification. Yard lighting keeping the general security in mind using the auxiliary power supply (conventional)	**iii.** 80% of the quoted amount after supply, delivery, at site. **iv.** 20% of the quoted amount after installation & commissioning at site as a whole.
19	Supply, delivery, installation and commissioning at site of Power Evacuation System & Grid Interfacing. - as per specification.	**iii.** 80% of the quoted amount after supply, delivery, at site. **iv.** 20% of the quoted amount after installation & commissioning at site as a whole.
20	Supply, delivery, installation and commissioning of sign board, fire extinguishers and other items as per tender specifications.	**iii.** 80% of the quoted amount after supply, delivery, at site. **iv.** 20% of the quoted amount after installation & commissioning at site as a whole.
21	Operation & maintenance of the plant and project for 5 years (Rate quoted for this item should be atleast 10% of the total quoted rate for the entire work)	5% of the total quoted amount per quarter (Total 20 such quarters in 5 year) after completion of Operation & maintenance.

SECTION E

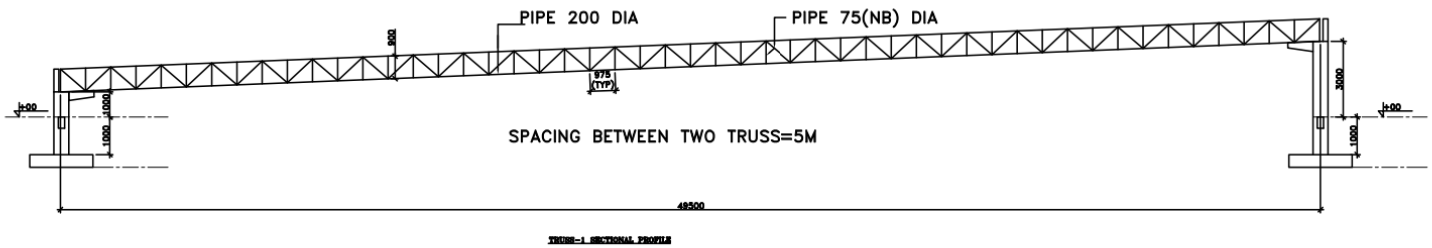
DRAWINGS

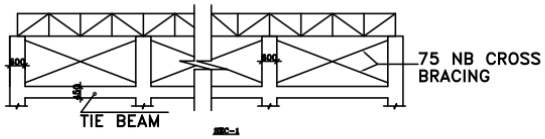
Proposed Location of canal top solar PV plant

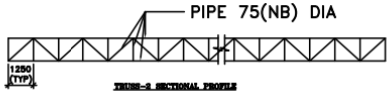
Bagjola Canal is located at 22.5837° N 88.4741° E in Newtown, West Bengal.

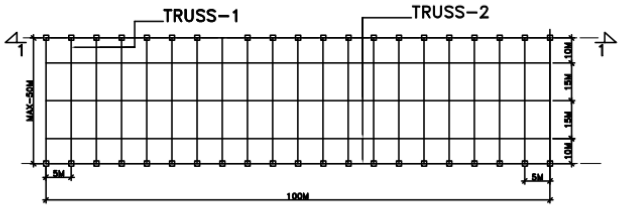


Artistic View of 2X500kWp canal top solar PV plant

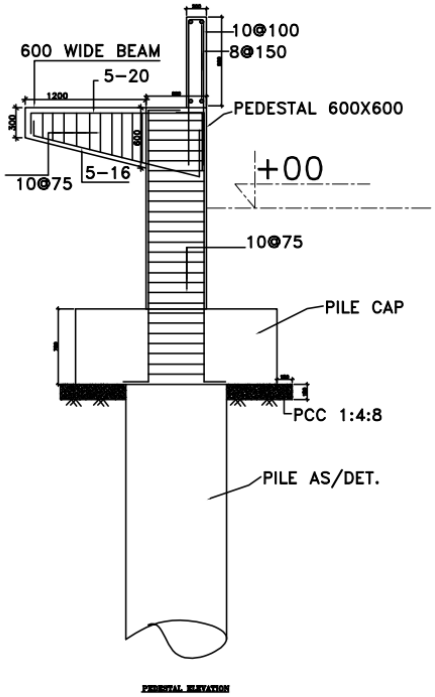


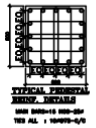






PLAN

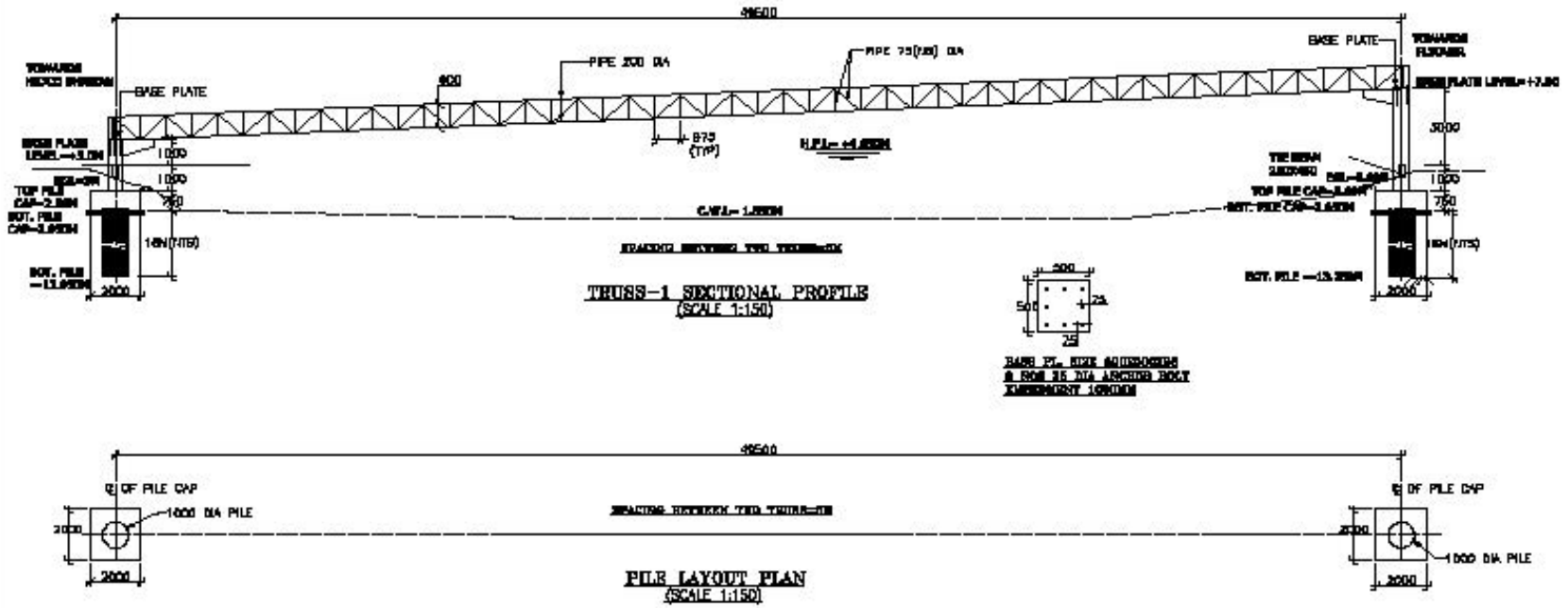




TRUSS-1 LENGTH MAXIMUM 50M, TRUSS-2=100M

ITEM	NOS	WEIGHT
TRUSS-1	42	210 MTon
TRUSS-2	10	25 MTon
FIXING	42	10 MTon
CROSS BRACING	42	6 MTon
	TOTAL	251 MTon

BAGJOLA CANAL TOP STRUCTURE



NOTES :
1. ALL DIMENSIONS ARE IN MM.

CLIENT :
GOVERNMENT OF WEST BENGAL
SOLAR CITY CELL,NKDA,KOLKATA

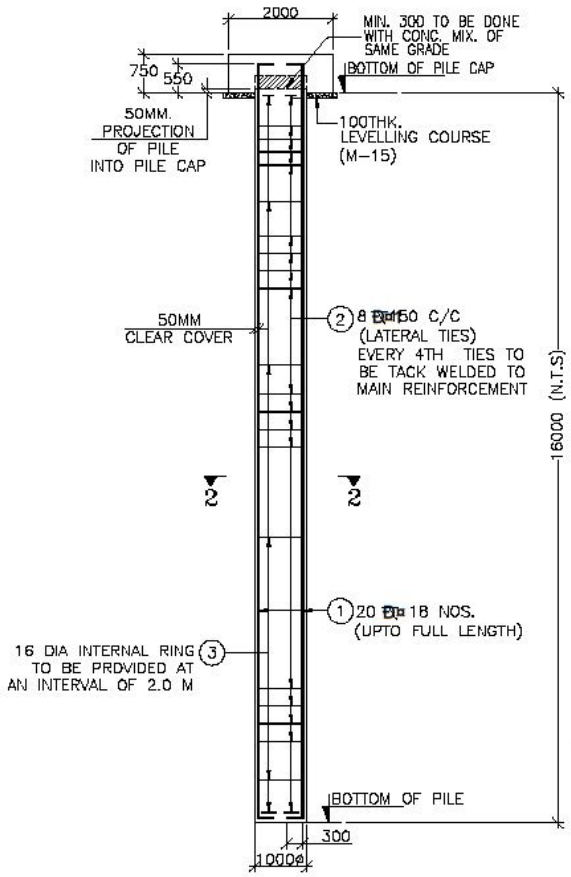
PROJECT :

CONSULTANT :
Zeoin Infracon Projects Opc Pvt. Ltd.

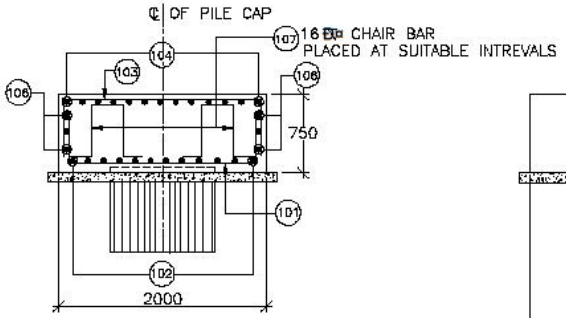
TITLE :

SCALE : AS SHOWN | DATE : SEPTEMBER, 2016

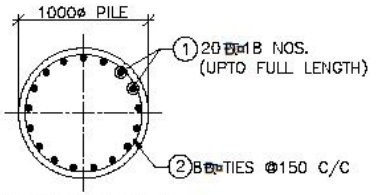
SHEET NO. 1 OF 1 | REV. 0



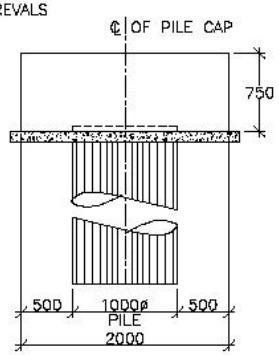
REINFORCEMENT DETAIL OF PILE
(SCALE 1:100)



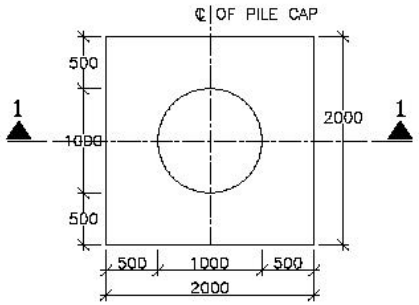
SECTIONAL ELEVATION SHOWING REINFORCEMENT DETAIL OF PILE CAP
SCALE 1:50



SECTION 2-2
SCALE 1:40



SECTION ON 1-1
SCALE 1:50



PLAN OF PILE ARRANGEMENT
SCALE 1:50

REINFORCEMENT SCHEDULE

LOCATION	BAR MARK	DESCRIPTION
PILE CAP	101	20Ø @150 C/C
	102	20Ø @150 C/C
	103	20Ø @150 C/C
	104	20Ø @150 C/C
	105	3 NOS. 16 Ø
	106	3 NOS. 16 Ø
	107	16Ø CHAIR BAR

NOTES :
1. ALL DIMENSIONS ARE IN MM.
2. CONCRETE GRADE SHALL BE M-35
3. GRADE OF REINFORCEMENT Fe 500.

100 KW INVERTER,
3-PHASE, 440 V, 50 Hz
100 kW INVERTER,
3-PHASE, 440 V, 50 Hz
TO LT SIDE
BBCC
415V, 50H
3-phase, A
TO LT SIDE
BBCC
415V, 50H
3-phase, A
INDIAN INSTITU
AND TECH
CLIENT:- NKDA
DESCRIPTION:- BAGJOLA CANEL-
THIRD ANGLE
PROJECTIONS
NOTES:
PREPARED
DESIGN:- LUCKIE
DRAWING SIZE
DATE:- 19/09/19
DATE:- 19/09/19