

## **SPECIAL TERMS & CONDITIONS OF CONTRACT**

1. **THE GENERAL DIRECTIONS AND CONDITIONS OF CONTRACT (GDCC) (for Civil Contract) WHICH WILL FORM PART OF THE CONTRACT AGREEMENT MAY BE STUDIED BY THE CONTRACTORS BEFORE SUBMISSION OF THEIR TENDERS, IN THE ABSENCE OF WHICH IT WILL BE PRESUMED THAT THE CONTRACTOR HAS SEEN, STUDIED AND ACCEPTED THE GDCC. THESE CONDITIONS OF CONTRACT AS STIPULATED IN THIS DOCUMENT ARE IN CONTINUATION OF GDCC & GTC AND SHALL ALSO FORM PART OF THE CONTRACT.**

1.1.0 In case of a discrepancy between the Special Conditions, General Terms & Condition and General Direction & Condition of Contract the following order of preference shall be applicable:

1. Special Terms & Conditions of Contract
2. General Terms & Conditions
3. General Directions and Conditions of Contract

1.1.1 If there are varying or conflicting provisions made in any one document forming part of the contract, the decision of Engineer In charge shall be final and binding on the contractor.

1.1.2 The parties, who have got issued / purchased the tender documents, should either quote or send a regret letter with reasons for not participating in the tender. Intimation regarding non- participation is essential otherwise they may not be considered for issue of tenders in future

1.2.0 If the tenderer does not quote rate of any item, it may be noted that for evaluation purposes the same shall be taken based on the highest rate quoted by the other tenders. However, order shall be placed for the same item based on the lowest rate quoted by the other tenderers.

1.3.0 In case the tenderer withdraws his offer during the period of its validity period of offer, the Earnest Money Deposit submitted by him for the Tender shall be forfeited.

1.4.0 The Tenderer should deposit **EMD of ₹50000/-** as Earnest Money and **₹750/-** as Tender Fee by an A/C Payees Demand Draft, drawn on any Scheduled Bank except Rural or Co-Operative Bank in favor of "National Fertilizers Limited, Panipat" payable at PANIPAT. **The EMD & Tender fee shall not be accepted in any form other than specified above. EMD and Tender Fee should accompany the tender in separate envelope without EMD and Tender Fee, tender will not be opened and it will be considered as rejected.**

**The Benefits of the Public Procurement Policy for MSEs Order, 2012 on MSMED Act 2006 shall not be applicable on Works Contracts means wherein transfer of property in Goods involved in execution of such contracts i.e. wherein both material and services are involved, so it means that MSME Certificate will not be accepted for this tender.**

1.5.0 **VALIDITY OF CONTRACT:**

The contract shall remain valid for a period of **18 (Eighteen) Months** reckoned from the date of its award. The job can therefore, be got done any time during the tenure of the contract. Normally a notice period of **07 (Seven) days** shall be given for starting the job but the Contractor should be able to mobilize within **24 (Twenty Four) hours**, if the necessity so arises.

The Contract Validity Period can be extended at the sole discretion of NFL for a further period of 03(Three) Months on Same Rates, Terms & Condition of Contract.

### 1.6.0 COMPLETION PERIOD

The entire job is to be completed within **08 (eight) Months** from the date of handing over of the site. Date of start of job / handing over of site shall be intimated in writing. **Work can be executed in a phased manner, depending upon the handing over of site, as per plant requirement and security.** Hence total period of work will be considered as per actual execution of working days.

### 1.7.0 DEFECT LIABILITY PERIOD :

Defect liability period of works unless otherwise specified shall be **12 (Twelve) months** from the actual date of completion of work as per completion certificate issued.

The contractor shall at his own cost and initiative, correct repair and/or rectify any / and all defect(s) and/or imperfections in the design of the work (in so far as the contractor shall be concerned with the design of the work or any part thereof) and/or in the work performed and/or materials, components or other items incorporated therein as shall be discovered during the said defect liability period and in the event of the contractor failing to do so, NFL reserves the right to get the same repaired **at the risk & cost** of the contractor PLUS 25 % (Twenty Five percent) Departmental Charges, and the expenditure so incurred by NFL shall be adjusted towards the said Security Deposit and/or any other due lying with NFL.

### 1.7.1 SECURITY DEPOSIT:

The contractor shall deposit SD towards faithful performance of the contract.

The Security Deposit together with EMD/Initial Security Deposit shall be 10% of the contract / Works order value. Initial Security Deposit (ISD) shall be 2.5% of the Contract Work Order Value which is required to be deposited within 15 days of the issue of the Letter of Intent (LOI) /Work Order (WO) by the successful tenderer. EMD can be adjusted against SD.

The balance security deposit amount shall be recovered @ 7.5% from each running bill and the final bill so as to make the total security deposit at 10% of the Contract / Work Order Value. In case work is split between two or more parties, SD shall be submitted based on the value of split order.

No interest shall be paid on security deposit. Any amount recoverable from the contractor shall be deducted from RA bill/security deposit. Security deposit shall be returned to contractor after successful completion of the contract and obtaining "No objection certification" from executive department after expiry of Defect Liability Period.

The successful tenderer can furnish a Bank Guarantee from any of the scheduled bank excluding Garmin / Co-operative Bank in the form specified by NFL against Security Deposit / Performance Guarantee (as applicable) for the faithful and proper fulfillment of the contract. The Bank Guarantee should be valid for a period of 30 months (contract period plus defect liability period) plus 3 months claims period. The Bank guarantee should be submitted by Bankers directly to NFL in a sealed cover and not through contractor.

The Contractor shall also arrange a copy of swift message, for confirmation of BG (including all amendments) through SFMS mode, from the BG issuing bank generated on communication regarding issue of BG to our designated bank ICICI Bank Ltd, K1, Senior Mall, Sector-18, Noida, UP, 201301, IFSC Code ICIC0000031, as per following details:-

- (i) IFN 76 COV for issuance of bank guarantee
- (ii) IFN 767 COV for amendment of bank guarantee

- (iii) Issuing bank shall mention IFSC code as ICIC0000031 in field 7035 of IFN 76 COV/IFN 767 COV.
- (iv) Issuing bank shall mention NFL beneficiary code as NFLNATIONAL04022015 in field 7037 of IFN760COV/IFN767COV.

### 1.8.0 **APPLICABILITY TAXES:**

- a) GST shall be paid extra, Clause with regard to GST given in the NIT / GTC shall be applicable. To remain competitive, bidders are advised to work out their rates excluding the impact of taxes paid on the input materials/services to be used in execution of contract as the same shall be set off in the form of input tax credit against GST paid by NFL on their billed amount.
- b) TDS @ 2 % (1% CGST and 1% SGST or 2% IGST) shall be deducted as per provisions under GST Act in case taxable contract value of services/goods or both is more than Rs.2.50 lac.
- c) Clause 1.6.0 of GTC also applicable.

### 1.8.1 **Applicability of Building & Other Construction Workers Welfare Cess Act, 1996:**

NFL shall deduct Income Tax / Commercial Tax / Cess including BOCW Cess at source from all payment due and to be made to the contractor under this contract in accordance with provisions of relevant Act and Rules framed there under including any amendment and modifications thereof as applicable from time to time.

**Note: Minimum rate for recovery of BOCW Cess is 1% of the Contract Value.**

### 1.9.0 **PENALTY:**

If there is any delay in the final completion of the work at any job site or specific works in respect of which a separate progress Schedule has been established, beyond the final completion of the work or works aforesaid at the job site as stipulated in the Progress Schedule, the owner shall (without prejudice to any other right of owner in this behalf) be entitled to recover liquidate damages for the delay at **1% (one percent) of the total contract value for each week or part thereof** that the work remains incomplete beyond the scheduled date of final completion for the work or works, as the case may be at the job site, **subject to a maximum of 10% (Ten Percent)** of the total contract value of work on completion. These Liquidated Damages shall be recovered from the R.A. / Final Bill of the contractor of this work, or from any other dues of the contractor against any other contract, or from any other dues of contractor lying with NFL. The total contract value means the total value of work executed on completion.

1.10.0 **Quantum of Job** : *NFL does not guarantee any quantum of work to be executed. Quantity of any item may decrease or increase at time of execution depending upon requirement. No claim from contractor shall be entertained on behalf of this.*

1.11.0 The work in factory area is to be executed in the running plant and at critical place. Contractors may have to work round the clock or have to deploy extra labor for execution of emergent jobs informed at short notice. Emergent jobs are to be executed at any time round the clock as directed by Engineer-in-Charge and nothing extra shall be payable beyond the quoted/agreed rates on any account.

## 2.0 **SPECIFICATIONS:**

### 2.1.0 **GENERAL SPECIFICATIONS**

2.1.1 The specification for workmanship shall be as described in the Central Public works Department latest "specifications" including amendments, unless otherwise specified. These CPWD specifications shall be deemed to form part of this contract.

2.1.2 The CPWD specifications shall take precedence over the provisions in the Bureau of Indian Standards (BIS) specifications/Indian Road Congress (IRC). Wherever CPWD specifications are silent, the relevant BIS/IRC specifications shall be referred.

2.1.3 **Material Brand / Specification:**

S.No.	Item Name	Name of Brand/Grade/Specification
01	Cement	Ultratech/Shree Cement/Ambuja/Birla/ACC/CCI
02	Steel	TATA/SAIL/TISCO/RINL
03	Grouting Material	Sika GP2 or Fosroc
04	Bitumen Coating	Berger/Shailtex

**Note-** This above list contains approved Makes/Brand for few items only. Make/Brand for other item shall be finalized by NFL Engineer-in-Charge. The contractor must obtain approval of makes of all materials before Execution of Job. The contractor must submit the sample(s) before procurement of material. NFL shall not be responsible for rejection of any sample not accepted by NFL officials.

2.1.4 In case of any class of work for which there is no such specification as laid down in the contract, such work shall be carried out in accordance with the instructions and requirement of the Engineer-in-charge with necessary test.

**3.0 TERMS OF PAYMENT :**

a) Payment of monthly running account bill complete in all respect shall be made after making necessary recoveries as per contract within 30 days of receipt of bill by NFL, complete in all respects.

Payment of final bill shall be released within 60 days or otherwise stipulated in the NIT/WO after receipt of bill completed in all respect. Payment of 10 % security deposit/deducted shall be released after completion of defect liability period on demand within 30 days. Payment to MSME Parties shall be made with in a period applicable as per MSMED Act or payment terms as per NIT/WO , whichever is earlier.

b) The contractor has the option to receive payment through Electronic Funds Transfer (EFT)/RTGS Process. For this option, they may submit their bank particulars i.e. Customers Name, Name of the Bank, Bank Account No.(All digits in case of CBS branches),Place of branch, Branch Code(IFSC CODE-II digits) to enable NFL to release payment accordingly. All bank charges will be to their account.

c) Contractor shall submit bill in triplicate to the Department along with measurement sheet duly verified by area in-charge. The area in-charge will forward the bill after verification to F&A Department for payment through HOD.

d) NFL shall deduct TDS-Income Tax as per Income Tax Act, TDS/TCS–GST wherever applicable as per GST law, Commercial Tax, Cess including BOCW Cess at source from all payments due and to be made to the Contractor under this contract in accordance with provisions of relevant Act and Rules framed there under including any amendment and modifications thereof as applicable from time to time.

(e) The contractor shall furnish along with each running bill a certificate that he has complied with statutory provisions relating to Minimum Wages, PF & ESI and Contract Labour (R&A) Act, 1970 etc. and shall also submit copies of Wage Sheet, PF & ESI Challan.

(f) Bill should be signed by a person holding power of attorney or authorized representative of contractor.

(g) In addition to above terms, payment of final bill will be made subject to, inter alia, following terms:

1. Payment of final bill will be made to the contractor after submission of certificate from CISF Gate that all the gate passes issued to the labourers of the contractor have been returned alternatively no objection certificate may be provided from CISF.

2. The Payment of final bill will not be made until the contractor has handed over the peaceful vacant possession of land, if any, handed over to him free from all encumbrances including offices, stores, workshop, temporary structure, lighting, fixture poles etc.
3. Return of empty packing material, scrap and unconsumed material issued by NFL.
4. The contractor shall be required to give a certificate along with final bill that he has made all payments towards wages as defined under the Payment of Wages Act, 1936 and Contract Labour (R&A) Act, 1970 and has also complied with other provisions of Labour Laws in respect of manpower engaged/employed for the execution of work.
5. The contractor is further required to give an undertaking stating that in case any dispute arises on account of deployment of manpower/labour, contractor would be responsible to discharge the statutory obligations, if any, and NFL will stand indemnified against any such claim/demand made in future.

### **3.1 Payment to MSME Parties**

GOI has introduced electronic platform for facilitating the financing of trade receivables of MSMEs from buyers, through financiers which is termed as Trade Receivables Discounting System (TReDS). NFL is already registered on RXIL TReDS platform.

MSME Bidders are requested to kindly register on the TReDS platform and avail the TReDS facility, if they want to

The detail of RXIL contact person is as below:

Contact Name : Mr. Prajay Shukla

Contact No. : 8090051171

Email Id : prajay.shukla@rxil.in

Bidders upon successful delivery shall submit their invoices along with the mandated enclosures including TReDS details. Upon receipt and acceptance of the supplied material/services and receipt of invoices with the mandated enclosures, NFL shall process the invoice for payment as per details submitted on TReDS platform. Any unfinanced invoice/s of MSME bidders seeking payment from NFL directly shall be processed as per the standard payment terms agreed in PO/ contract.

All financing cost for using the facility shall be borne by the MSME bidder only.

### **4.0 ELECTRIC POWER CONNECTION:**

- a) Three Phase / Single Phase Electric Power connection shall be provided FREE OF CHARGE, by NFL, subject to availability, for operation of Electrical equipment, tools, Concrete mixer, Concrete Vibrator, Dewatering Pumps, Elect. Drill machines, Cutters, Grinders, Hand Saws, Screw Drivers, Flood Lights, Hand Lamps, etc. or any other elect. Tool / Appliances required for executing the work. The contractor will provide at his cost, Extension Boards fitted with on / off switches, sockets etc and wire required for taking connection from main receiving line upto place of working.
- b) All the apparatus brought by the contractor in the plant / working areas should be electrically operational and healthy with sufficient length of cable having proper size and insulation. All single-phase equipments like drill machines, grinders, floodlights, hand lamps, small pumps, etc. shall be fitted with 3-pin plug top. Industrial plug tops shall be provided by the contractor, for free tapping of power from the points wherever industrial plug sockets are provided in the field for flood lights / Hand Lamps, operating cutting tools / drill machines and the like. No loose wires are to be used in the sockets for topping the electrical connection.

- c) It will be the responsibility of the contractor to ensure that NFL Plug Points/installations are not tampered. All electrical connection from power outlets will be connected by NFL staff. Wherever portable hand lamps are used in the vessels, the voltage shall not exceed 24 volts.

## **5.0 Agreement:**

**Successful party should be required to submit the Agreement required as per Clause No.1.38.0 of GTC on the Non-judicial Stamp Paper (NJSP) of the appropriate value which will be applicable at the time of its execution in the State of Haryana.**

## **6.0 SCOPE OF SUPPLY OF MATERIALS BY NFL.**

### **6.1 Free supply of Cement and Tor Steel Reinforcement**

Cement and Tor Steel Reinforcement required to be consumed in the different items of work shall be supplied by NFL free of cost. **For Ready Mix Concrete (RMC), Cement shall be procured by the contractor.** Tenderers shall have to quote their rates for Cement and Tor Steel consuming items other than RMC considering Cement and Tor Steel as free supply by NFL.

- 6.2** The above materials shall be supplied from NFL Main Stores situated in Factory area. The contractor has to transport the material from Main Stores to the site of work in CISF Township areas including loading and unloading of the same within their quoted rates. The supply of above materials shall be governed by contract clause No. 3.1.0.0 of GDCC.

## **7.0 Conciliation & Arbitration**

### **7.1 Arbitration for CPSE and Government Department**

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs) /Port Trusts inter se and also between CPSEs and Government Departments / Organizations (excluding disputes relating to Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for its resolution through AMRCD as mentioned in DPE OM No. 5/0003/2019-FTS-10937 dated 14th December 2022 and decision of AMRCD on the said dispute will be binding on both the parties.

This clause will supersede clause 1.35.0 iii) of GTC.



### SCOPE OF WORK

The scope of work of “**Construction of Foundations and other allied civil jobs for erection and commissioning of new BFW Pump at NFL Panipat**” under this contract broadly includes:-

Construction of foundations of new BFW Pump by mechanical/manual means by excavating the final location of foundation, dismantling the old concrete surfaces & carrying out the civil works i.e. piling if required, plain cement concrete, reinforcement, formwork and concreting work of the foundations and then backfilling & leveling the balance area with excavated soil, sand including watering, ramming, consolidating, dressing & compaction complete and then laying plain cement concrete/reinforced cement concrete layer on the compacted surface as per instruction of engineer in charge in phased manner. The other allied civil jobs includes grouting of pockets, base plates of feed pumps, motors, machines etc. and civil pedestals for pipe supports & trenches if any required for electrical cables. The same shall be paid in relevant items of SOQ.

1. Work shall be carried out strictly in accordance to specification as per instruction of NFL Executive.
2. Before purchasing of any material(s) for above work, contractor must submit a sample to NFL, which will be approved by Engineer-in- Charge.
3. After completion of every day's work in particular area, the agency has to clean all rubbish/ dismantled / serviceable/ non-serviceable material from ground/ floor to avoid any hindrance in running plant.
4. The sand aggregate bed shall be compacted with Road Roller to achieve proper compaction, as decided by the Engineer-In-charge.
5. Samples of concrete shall be taken at random in cubes of 150 mm nominal size and will be tested for 7 days and 28 days strength as per relevant IS Code. The contractor shall bear the complete cost of sending the test(s) samples to Government Approved Laboratories (decided by NFL) or set up site laboratory with Compression testing machine installed. The expenditure for all required test(s) will be borne by the contractor.
6. Tractor Trolley, Hydraulic Excavator (JCB Machine), Road Roller etc. used for execution of work must have all valid documents and Driver/Operator must have valid driving/operation license.
7. For executing the works in Factory area, safety work permits will be issued for doing the jobs, without any safety work permit duly issued by NFL, work will not be allowed to be carried out.
8. The contractor as such shall have to keep a stock of various construction materials at site such as bricks, sand, aggregate etc.
9. For doing the work in plant area the workers, supervisors, Engineers are allowed to come in the plant area with proper gate passes. NFL will issue necessary gate passes to such persons for whom the request is made by the contractor. NFL will not be responsible for late entry of the persons through the gate due to the absence of gate passes.
10. All consumable, non-consumable materials are to be got entered in the register being maintained by security personnel at the factory's Main Gate, for which NFL will issue instructions for their entry at the gate.
11. The contractor has to construct a covered Office-cum-Store for **Safe and Sound** storing of Free Issued Material i.e Cement / Steel and other material at site at his own cost. The land will be provided by NFL and ground rent charges shall be recovered as specified in GDCC.

12. The Excavation work if required , ***may be done manually*** as per instruction of Engineer-in-Charge to prevent damage of any important cable, pipe line etc. (as per site condition due to presence of underground cables, pipelines, underground structure, Gas lines etc.).
13. Service able material / scrap obtained from dismantling shall be deposited in the NFL store and rubbish shall be disposed of with in factory area/CISF Township as per direction of Engineer-in-charge.
14. The contractor shall provide and maintain all tools, safety equipment and accessories, required for safely and satisfactory execution of work during the period of the contract at his own cost.
15. The arrangements for all types of staging / scaffolding, to approach the site have to be arranged by the contractor at his own cost within the quoted / finally agreed rates as per work order.
16. No person shall be allowed to enter inside Factory Area / Construction Site without helmet, shoes etc. Smoking is strictly prohibited.

## **17. Technical Specifications**

### **17.1 Concrete Grade**

The cement and reinforcement steel should be, normally OPC and high yield deformed bar as per latest IS code.

The minimum M25 grade of reinforced cement concrete shall be used for all structures and foundations except for grade slabs / paving for which M20 may be used

### **17.2 Admixtures**

Admixtures shall conform to IS:9103 and to be mixed with concrete (if required) strictly as per manufacturer's recommendations.

### **17.3 Compacting Concrete**

The concrete shall be fully compacted throughout the full extent of the layer. It shall be thoroughly worked against the moulds, and around any reinforcement and other embedded items without displacing them, and in to corners of the moulds. Successive layers of the same lift shall be thoroughly worked together adjacent to the common face. The date of laying concrete shall be marked for curing and removal of form work.

Immersion vibrators shall be of approved type and shall have frequency of not less than 10000 oscillations per minute. They shall penetrate the full depth of the concrete to be vibrated and be immersed at sufficiency close spacing so that the whole volume of the concrete is satisfactorily and uniformly compacted.

Where the underlying layer is of fresh concrete, immersion vibrators shall also penetrate that layer to ensure homogeneity. Immersion vibrators shall be withdrawn slowly to prevent formation of voids. Vibrators shall not be used to work the concrete along the moulds or in such a way as to damage shuttering or other parts of the structure or to displace the reinforcement or other embedded items. Immersion vibrators shall only be operated by those who have received proper instruction and training in their use.

External vibrators shall be of approved type and shall have a frequency of not less than 3000 oscillations per minute. They shall be securely and rigidly clamped to the shuttering. External vibrators shall only be used on shuttering which is strong enough to withstand the vibration without displacement, distortion or other damage.

The contractor shall ensure that sufficient standby vibrators and ancillary equipment are available during concreting operations.



## **17.4 Quality Control**

- i) In order to ensure that the quality of materials and the mix proportions are suitable for the particular grade of concrete required are so maintained, sampling and testing shall be carried out regularly during the course or the works.
- ii) Workability testing shall be carried out in accordance with IS:456. The results shall lie within the range upon which the accepted mix design is based. Testing shall be carried out at such a frequency that the required workability is consistently achieved.
- iii) Samples of concrete shall be taken at random in accordance with IS: 516 at the time and place of deposition of the concrete at a frequency of sampling for each grade.
- iv) Notwithstanding the foregoing, additional samples shall be taken by the contractor when directed by the Project Manager. The test cube procedure shall be in accordance with IS: 516 throughout.
- v) Compliance with the specified characteristic strength shall be assumed if :
  - a) Each of the six cubes in a group has a test strength not less than the characteristic strength or,
  - b) Not more than one cube has a test strength less than the specified characteristic strength but not less than 85% of the specified characteristic strength and the average strength of the group of four test results is not less than the specified characteristic strength plus the standard deviation of the group.

### Seven day cube tests

Acceptance of concrete is based on the 28th day results. However, the contractor shall establish a relationship between 7 days and 28 days strengths by carrying out 7 days tests at the time of performing the laboratory testing and from subsequent quality control testing. This relationship shall be used in interpreting any further test results to predict the probable value of the corresponding 28 days cube strengths. The contractor shall without delay advise the Project Manager of any sample that appears likely to fail to meet the specification and the contractor shall take any necessary action to minimize the effect of such failure.

### Acceptance Criteria

The general Acceptance Criteria of any and all of the concrete work shall be as per the relevant Clauses of IS. 456.

If any of the works tests are not up to the standard, the engineer in charge shall have the power to stop the work until the reason is investigated and steps taken to prevent further low results. The contractor shall not be entitled to any claims on account of such delays. Any concrete carried out from the batch that is afterwards found to be faulty, will be liable for rejection and if so directed, the contractor shall at his own expenses dismantle and replace the defective work and any work built thereon or shall take such other measures as may be deemed necessary by the Architect/Project Manager. At the discretion of the Architect/Project Manager, the contractor may be allowed to prove by means of a load test to be carried out at his own expense, that the concrete is capable of safely withstanding the loads as specified in the test.

## **17.5 Cold Bitumen Paint**

All underground structures including top surface of foundations shall be painted with two coats of cold bitumen as per manufacturer specification.

Where the excavation has to be carried out below the foundation level of adjacent structure, the precautions should be taken such as under pinning, shoring and strutting etc.

If the excavation is done in depth greater than required, the bidder should fill the extra excavation with lean concrete.

Soil filling – Soil material should be free from rubbish, roots, hard lumps and any other foreign organic material. In the building plinths, only selected earth (non expansive) should be used.

Coarse aggregate should be well graded crushed stone of 20 mm & down size for general concrete and 40 mm & down size for lean concrete.

Minimum cement content should be 350 kg/m<sup>3</sup>

All the materials i.e. cement, sand, coarse aggregate, water, reinforcement etc. and workmanship i.e. mixing, placing, compaction, curing, testing etc. should be as per provision of relevant codes/specifications.

Approved curing compounds may be used in place of moist curing after approval of owner.

All quality control should be followed strictly in accordance with provision of relevant codes/specifications.

### **17.6 Steel Reinforcement**

All joints in reinforcement should be lapped adequately to develop the full strength of the reinforcement.

1. M.S. round bars should be hooked at ends as specified. Ribbed tor Steel should be bent right angles at ends.
2. Welding of tor steel reinforcement bars should be taken up only after specific approval by owner.
3. Lap welding with longitudinal beads should only be adopted.

The form work or shuttering should be so constructed as to remain sufficiently rigid during placing and compaction of the concrete and should be sufficiently tight to prevent loss of water from the concrete. Surface that becomes exposed on the removal of forms should be examined by owner before any defects are made good. Work that has sagged or bulged out, or contains honey combing, should be rejected. All shuttering materials should be plywood or steel and suitable for exposed finish or concrete surfaces.

### **17.7 Pile Foundations**

The piling work shall be carried out in accordance with IS:2911 (Relevant part) and accepted construction methodology.

The initial pile load test shall be conducted with test load upto three times the estimated pile capacity. In case of vertical compression test (initial test) the method of loading shall be cyclic as per IS:2911 (relevant part).

Testing of piles and interpretation of pile load test results shall be carried out as per IS:2911 (Part-4). Contractor shall ensure that all the measuring equipment and instruments are properly calibrated at a reputed laboratory / institute prior to their use. Settlement / movement of the pile top shall be made by Linear Variable Differential Transducers (LVDT) having a least count of 0.01mm.

The test load on initial test piles shall be applied by means of reaction from anchor piles / rock anchors alone or combination of anchor piles / rock anchors and Kent ledge.

Low Strain Pile Integrity test shall be conducted on all test piles and job piles. This test shall be used to identify the routine load test and not intended to replace the use of static load test. This test is limited to assess the imperfection of the pile.

shaft and shall be undertaken by an independent specialist agency to be approved by Engineering department of Owner. The test equipment shall be of TNO or PDI make or equivalent. The process shall confirm to ASTM.

The contractor shall provide and maintain all tools, pipes, accessories, required for satisfactory execution of work during the period of the contract at his own cost.

### **17.8 Supervision**

A competent person shall be employed whose first duty will be to supervise all stages in the preparation and placing of the concrete. The contractor will be required to nominate and depute one experienced engineer, one supervisor and one surveyor who shall meet the concerned Engineers. daily between 8.00 AM to 8.30 AM for receiving day-to-day instructions and shall also contact concerned Engineers daily at 4.30 PM for job progress and planning the work for the next day. In case, contractors fails to depute his engineer, Engineer-in-Charge reserves the right to get the work done at the risk and cost of the contractor through another agency and may take other actions as may be deemed fit. All test of materials, the making and testing of cubes and the maintenance and calibration of all mixing and measuring plant shall be carried out under his direct supervision. The contractor has to establish laboratory during course of work for testing materials at site and should install calibrated concrete testing machine with calibration certificate at site.

### **17.9 List of Brands of material**

1. Reinforcement Steel: TATA/SAIL/TISCO/Rashtriya Ispat Nigam Ltd. ( RINL )
2. Cement should be OPC and of brand : Ultratech, ACC, Ambuja, CCI, Shree cement
3. Grouting Material : Sika GP2 or fosroc
4. Bitumen coating : Berger/Shailtex

### **17.10 Concrete placement**

#### General

The concrete shall be placed in the positions and sequences indicated on the drawings, in this specification and/or as directed by the Project Manager.

Contractor shall give adequate notice to the Engineer in charge of his intention to concrete any section of the works.

Except where otherwise directed, concrete shall not be placed unless the representative of the Project Manager is present and has previously examined and approved the positioning, fixing and condition of the reinforcement or any other items to be embedded and the cleanliness, positioning and suitability of the concreting surface.

The concrete shall be deposited as nearly as possible in its final position. It shall be placed in such a manner as to avoid segregation of the concrete and displacement of the reinforcement, other embedded items, or formwork. It shall be brought up in horizontal layers not exceeding 450 mm in compacted thickness unless otherwise authorized or directed by Project Manager. Concrete shall not be placed simultaneously on each side of large horizontal specified or approved construction joints.

Shutters for walls or thin sections of considerable height shall be provided with openings or other devices that will facilitate the cleaning of the accumulation of hardened concrete on the shutters or on the metal reinforcement above the level of the concrete and the removal of concrete in the case of segregations.

### **17.11 Form Work**

#### Form work construction

The contractor should submit detailed drawing of the centering & shuttering and get the same approved from the Architect/Project Manager/Client and before laying concrete also he should get the centering shuttering approved in writing before start of concreting. The concreting should be done in the scientific and methodical manner so as to give a uniform finish in line and level, so that minimum rendering or plastering is done. The work found defective, should be dismantled & redone and site cleared.

Form work shall be so constructed that concrete can be properly placed and thoroughly compacted. Form work shall be firmly supported and adequately strutted, braced or tied. It shall be capable of adjustment to the lines and dimensions of the finished concrete, and it

shall be sufficiently strong to resist without excessive distortion under the influence of the weather.

All form work shall be constructed to be rigid during the casting of concrete and constructed so that the surfaces adjacent to the concrete are with plus minus 6 mm or the required surfaces when supporting the concrete and sufficiently watertight to prevent loss of liquid from the concrete, and it shall be capable of being removed without shock or vibration to the concrete. Forms shall be cleaned with compressed air immediately before placing concrete to remove all rubbish. The inside faces of the form work shall be treated with a mould oil of type to be approved by the Engineer in charge and every care shall be taken to prevent mould oil from getting on to the reinforcement.

Shuttering shall be braced and strutted to prevent deformation under the weight and pressure of the wet concrete, constructional loads, wind and other forces. The deflection shall not exceed 3 mm bottoms of beams boxes shall be erected with an upward camber of 6 mm for each 3 M. of span.

#### Removal of Form work (Striking Time)

Unless certainly specified in the drawing, or directed by the Engineer in charge, the following shall be minimum intervals of time which should be allowed between the placing of the concrete and the striking of the mould where ordinary Portland cement is used.

The contractor may be required to produce evidence that the concrete has attained strength sufficient to support the live and dead loads to which that part of the structure may be subjected. This evidence shall consist of reports of compression tests made on job cured test cubes. The cost of such tests shall be borne by the contractor. The foregoing provisions of this clause shall not relieve the Contractor of his responsibility to ensure that the stability and strength of any structure or part of

#### Type of form work

Two quantities of form work shall be used i.e Rough form work and wrought form work, as noted on the Architect/Project Managers' drawings or described hereafter.

Rough form work may be constructed of sawn timber or other material as agreed by the Architect/Project Manager. The edges of the boards shall be planned or otherwise rendered grout tight. Provided it remain grout tight, rough form work may be used any number of time.

Wrought form work, to all surfaces for which a smooth fair faced finish is required, shall be constructed of purpose-made metal, fibre glass, water proof ply wood panel, hardboard lined form work or of planed timber with edges shot so that tight joints can be formed which will prevent loss of liquid from the concrete. The use of a particular material for wrought form work shall be consistently maintained throughout the structure. The surfaces of the form work in contact with the concrete shall be smooth and free from all blemishes. The number of times wrought form work may be used shall be subject to the surfaces, joints and edges being clean and undamaged.

### **17.12 Surfaces of concrete**

The contractor shall ensure that the finished face of concrete offers a suitable keyed surface for the application of the finishing media, e.g. plaster, sand and cement screed, etc. The contractor shall also ensure that where thin films of finished, e.g. skim coats "Snowcem", paint, etc. are to be applied that the previous provisions regarding supporting of form work are complied with, so that the concrete faces to be treated are left smooth, unblemished and true to line both vertically and horizontally and require no making good before applying the finish.

Should the contractor fail however, to comply with the provision of this Clause, he shall submit details of his proposed method of redoing the situation to the Architect/Project Manager and must obtain written consent from the Architect/Project Manager to the proposals before continuing with any further work on the affected surfaces.

### **17.13 Curing**

Canvass, Hessian or other approved screens shall be erected at all points where concrete is being placed to shade the concrete from the direct sun or from drying winds and such screens shall be kept in position until the surface of the concrete has been protected as specified in the following Clauses. The contractor shall be responsible for removing such screens and preparing surface of concrete.

As soon as possible after it has been placed and concrete shall be covered with Hessian or other approved material to protect it from the sun and all concrete surfaces shall be kept visibly wet continuously for 14 days after placement, the Hessian being kept in position throughout this period. Surfaces cast against forms shall also be kept moist and covered with Hessian for these periods if the form work is removed before the periods have elapsed.

The top surface of slab shall be kept flooded with water at all times till the curing period of 14 days is over. Columns, wall and beam sides and other surface shall be completely covered by gunny bags and kept thoroughly wet continuously for the period specified for curing. The ceiling of slabs shall be frequently sprayed with water until the end of curing period.

The contractor shall ensure that all times there is an adequate supply of fresh water available for curing the concrete.

### **17.14 Examinations and Repairs**

The contractor shall not proceed with the surface finish or making good of concrete surfaces until he has received the Architect/Project Managers' written permission to do so and he shall not apply cement slurry or mortar or any other coating to the concrete surfaces as struck from the shuttering or do anything else which would hinder the proper inspection of the concrete by the Architect/Project Manager.

Concrete which is defective, has honeycombs, or which contains defective parts shall be cut out completely unless the Architect/Project Manager agrees that a repair may be satisfactorily effected. This agreement shall not preclude subsequent condemnation of the repaired work.

The method of repairing defective concrete which the contractor proposes to adopt shall be submitted to the Architect/Project Manager for his prior written agreement in each particular case.

No repairs or remedial work shall be carried out without prior inspection and instructions of the Architect/Project Manager. (No extra shall be paid to the contractor for the repair works).

Fair face finish to concrete surfaces

Concrete surfaces shall be finished smooth fair faced where indicated as such on the drawings. These areas shall be entirely free from honey combing, stains, fins, lipping, nail or screw marks, raised grain marks, air holes or any other imperfections. They shall also be of even texture throughout. Very slight variations between member and member may be acceptable but any such variations within a single member cannot be tolerated. The concrete faces shall not be marked with mould oil.

The form work to these areas shall be wrought form work as specified herein.

Following inspection by the Architect/Project Manager the whole surface shall be rubbed down by hand. Any surfaces with major imperfections, i.e. greater than can be easily, completely and permanently obliterated by rubbing down shall be reported immediately to the Architect/Project Manager.

Remedial work is not normally possible to the above fair faced finish surfaces and the Contractor will be required to demolish and recast defective works.

### **17.15 Bar bending Schedule**

The Contractor shall submit to the Project Manager, for the Project Managers approval, bar bending schedule for all the works, not less than Ten days before the contractor intends to bend the reinforcing steel.

The Approval of the Architect/Project Manager shall in no way absolve the contractor of his responsibilities under the Contractor.

#### **Bending and placing reinforcement**

Reinforcement shall be cut and bent to the shapes and dimensions shown on the finally agreed bending schedules in accordance with the requirements of IS: 2502 and to the tolerances set out therein.

Bending shall be carried out with an appliance which provides a continuous and uniform application of the bending deformation at every section of the bend. There shall be provision for the free movement of the surface of the bar during bending and the bends shall follow the contour of the former without peaking.

High Yield reinforcement must be bent without the application of artificial heating.

Mild steel reinforcement may be bent either hot or cold but shall not be heated to a temperature greater than 850C., and if heated not cooled by quenching.

Mild steel reinforcement temporary left projecting from the concrete at construction or other joints shall not be bent out of position unless shown on the drawings or agreed by the Architect/Project Manager. Where such bending and subsequent rebinding takes place the radius of the bend shall not be less than 4 bar diameters.

Reinforcement shall be fixed without forcing in the position shown on the drawings within a tolerance of 5 mm or 5% of the minimum dimension of cross section, whichever be the greater and maintained so that it is not displaced during concreting or other operations.

Horizontal bars shall be supported sufficiently to prevent displacement. This may be plastic spacers, chairs bent from steel bar, or by concrete blocks. The method and sufficiency of the support shall be subject to the approval of the Engineer in charge.

Where concrete blocks are used, they shall be precast from concrete (not mortar) of the same class as the concrete in which they are to be embedded, except that the largest size of aggregate shall be 10 mm. Each block shall be secured to the reinforcement with wire or a clip embedded in the centre of the block so that, it shall not be in contact with the shuttering or subsequently cause rust marks on the concrete. Intersections of reinforcement shall be bound together with 16 gauge annealed soft iron binding wire.

Unless otherwise noted on the drawings, no intersections of reinforcement may be fixed by welding without the permission of the Project Manager. High yield and cold worked steel shall, in no circumstances, be welded together.

Should any difficulty arise during the placing of steel in obtaining the appropriate cover, the contractor shall immediately draw the attention of the Architect/Project Manager to the difficulty and shall carryout such corrective measures as the Architect/Project Manager may suggest.

#### **Protection of reinforcement and concrete**

The Contractor shall ensure that movement of men and material subsequent to steel fixing is organized so that reinforcement is not thereby displaced.

Reinforcement left projecting from any concrete shall be protected so that there is no risk of corrosion staining to any exposed concrete surface or to any other part of the works. For this purpose a stiff grout wash will normally be acceptable to the Engineer, this wash shall be wire-brushed vigorously before further concrete is placed to remove any ill- bonded material.



## **17.16 Ready mix concrete**

### Grades and Strength Requirements of Concrete

General Ready mix Concrete shall consist of the material described under site batched concrete sections, using separate coarse and fine aggregate in an appropriate combination determined in the course of the of mix design . The overall grading shall be such as to produce a concrete of the specified quality which will work readily in to position without segregation. The ready mix concrete shall conform to IS:4926 and shall be delivered in agitating trucks.

### **RMC (Ready Mix Concrete) Plant**

Alternatively, the contractor may be allowed by Engineer-in-Charge to arrange Ready Mix Concrete (RMC) from producing plants. The RMC plant proposed to be engaged by the contractor shall fulfill the following requirement

It shall be fully automatic and computerized with facility for providing printed advice showing ingredients of concrete carried by each mixer.

It should have supplied RMC for projects of similar magnitude.

The Engineer-in-Charge will reserve the right to inspect at any such stage and reject the concrete if he is not satisfied about quality of product.

Ingredients, admixtures & water declared unfit for use in production of mix shall not be used. A batch mix found unfit for use shall not be loaded into the transit mixer for transportation.

Each truckload/ transit mixer dispatched to site shall carry computer printout of the ingredients of the concrete it is carrying. The printout shall be handed over to Engineer in-Charge or his representative at site before RMC is used in work.

Use of Fly ash/ mineral based admixtures in RMC shall not be permitted without prior approval of Engineer-in-Charge.

No addition of water or other ingredients shall be permitted in the RMC at site or during transit.

Concrete shall be placed by pump of suitable capacity or tower crane or boom placer and the contractor shall arrange sufficient length of pipe at site to place the concrete in the minimum required time. Nothing extra shall be paid for placing of concrete through concrete pump/ tower crane/boom placer.

### Slump

The water shall be added to the cement and aggregate during mixing to produce concrete having a sufficient workability to enable it to be well consolidated, to be worked in to the corners of the shuttering and around the reinforcement to give the specified surface finish, and to have the specified strength. Water cement ratio shall be maintained as per IS. 456-1978 when a suitable amount of water has been determined, the resulting consistency shall be maintained throughout the corresponding parts of the work and tests shall be conducted to ensure the maintenance of this consistency. The max slump at the point of the discharge should not exceed 110mm max.

### **Mixing**

All cement concrete plain or reinforced shall be machine mixed. Mixing by hand may be employed where quantity of concrete involved is small, with the specific prior permission of

the Engineer-in-Charge. 10% extra cement shall be added in case of hand mixing as stipulated in IS-456.

For large and medium project sites the concrete shall be sourced from ready- mixed concrete plants or from on site or off site batching and mixing plants (IS 4926)

Water Cement Ratio, Laying & Curing shall be done as per IS: 456.

A sieve analysis test of aggregates shall be carried out as and when the source of supply is changed without extra charge notwithstanding the mandatory test required to be carried out as per CPWD specification.

**All tests in support of mix design shall be maintained as a part of records of the contract. Test cubes for mix design shall be prepared by CONTRACTOR under his own arrangements and at his costs, but under the supervision of the Engineer-in- Charge.**

Testing of Concrete

Testing of concrete, sampling and acceptance criteria shall be in accordance with IS

#### **17.17 Precast Slabs**

Lifting hooks, wherever necessary or as directed by Engineer-in-Charge shall be embedded in correct position of the units to facilitate erection, even though they may not be shown on the drgs. and shall be burnt off and finished after erection. Pre cast concrete units, when ready shall be transported to site by suitable means approved by Engineer-in-Charge. Care shall be taken to ensure that no damage occurs during transportation. All adjustments, levelling and plumbing shall be done as per the instructions of the Engineer-in-Charge. CONTRACTOR shall render all help with instruments, materials and staff to the Engineer-in-Charge for checking the proper erection of the pre cast units.

After erection and alignment the joints shall be filled with grout or concrete as directed by Engineer-in-Charge. If shuttering has to be used for supporting the pre cast unit they shall not be removed until the joints has attained sufficient strength and in no case before 14 (fourteen) days. The joint between pre cast roof planks shall be pointed with 1:2 (1 cement : 2 sand) mortar.

#### **17.18 STEEL REINFORCEMENT**

High yield strength deformed TMT steel bars of grade Fe500D conforming to IS:1786 shall be used.

All joints in reinforcement shall be lapped adequately to develop the full strength of the reinforcement as per provision of IS: 456 or as per instruction of Engineer-in- Charge.

#### **17.19 Form Work**

The shuttering or form work shall conform to the shape, lines and dimensions as shown on the drawings and be so constructed as to remain sufficiently rigid during placing and compacting of the concrete and shall be sufficiently tight to prevent loss of liquid from the concrete. The surface that becomes exposed on the removal of forms shall be examined by Engineer-in-Charge or his authorized representative.

#### **17.20 Dismantling Work**

The site of demolition shall be well cordoned off from the other areas to the satisfaction of the Engineer in charge, with all necessary warning and signals, erected in the vicinity by the Contractor.

All dismantling/demolition works shall include excavation of the ground, wherever necessary, to dismantle the existing foundations, and back filling, including compacting to the satisfaction of the Project Manager. The material used for back filling shall be as per specifications and as approved by the Engineer in charge.

All dismantling/demolition works shall be carried out in such a manner, so as not to cause any damage, whatsoever, to the properties or persons in the vicinity of the site. If such damages occur, the contractor shall be liable for full reinstatement, of all such damages, at his own cost.

All dismantling/demolition works shall include excavation of the ground, wherever necessary, to dismantle the existing foundations, and back filling, including compacting to the satisfaction of the Architect/Project Manager. The material used for back filling shall be as per specifications and as approved by the Engineer in charge.

All dismantling/demolition works shall be carried out in such a manner, so as not to cause any damage, whatsoever, to the properties or persons in the vicinity of the site. If such damages occur, the contractor shall be liable for full reinstatement, of all such damages, at his own cost.

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