TIRUPATI URBAN DEVELOPMENT AUTHORITY, TIRUPATI

NIT No.: :……./DM/TUDA/TPT/2022-23

(Participation through E-Tender only)

Visit: www.apeprocurement.gov.in

Help: For any help in connection with E-Tendering process please contact at helpdesk no.08645246370 /71 /72 /73 /74 and e mail id eprocsupport@vupadhi.com

TIRUPATI URBAN DEVELOPMENT AUTHORITY, TIRUPATI
Website: www.tudaap.in

TIRUPATI URBAN DEVELOPMENT AUTHORITY, TIRUPATI

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BID DOCUMENT

e-PROCUREMENT TENDER cum AUCTION (REVERSE TENDERING)

NIT No:……./DM/TUDA/TPT/2022-23

VOLUME – I

NAME OF WORK	:	**"CONSTRUCTION OF TUDA TOWERS AT NORTH-WEST CORNER OF ANNAMAIAH CIRCLE ABUTTING RC ROAD AND AIR BY-PASS ROAD IN TIRUPATI, TIRUPATI DISTRICT, ANDHRA PRADESH"**
NAME AND ADDRESS OF THE CONTRACTOR WHO DOWN LOADED THE BID DOCUMENTS.	:	_____ _____ _____ _____

I N D E X

NOTICE INVITING TENDER
(NIT)

TIRUPATI URBAN DEVELOPMENT AUTHORITY, TIRUPATI

ENGINEERING DEPARTMENT

***** *** *****

e-PROCUREMENT TENDER CUM AUCTION (REVERSE TENDERING)
NOTICE INVITING TENDER (NIT)

1	Name of the Employer	:	TUDA representing by the Vice-Chairman for inviting tender
2	Circle/Division	:	Executive Engineer,TUDA.
3	Tender Notice No.	:	**Adv. No. ……./DM/TUDA/TPT/2022-2023, Dated: ……-09-2022**
4	NIT No	:	**NIT No:……./DM/TUDA/TPT/2022-23**
5	Name of Work	:	**"CONSTRUCTION OF TUDA TOWERS AT NORTH-WEST CORNER OF ANNAMAIAH CIRCLE ABUTTING RC ROAD AND AIR BY-PASS ROAD IN TIRUPATI, TIRUPATI DISTRICT, ANDHRA PRADESH.**
6	ECV		**Rs. 210,94,27,091.40** **(BOQ items)**
7	SCOPE OF WORK		The Scope of the work is as detailed in INSTRUCTIONS TO TENDERERS
8	Tender can be down loaded	:	https://tender.apeprocurement.gov.in
9	Tender Documents (in zip format)	:	Tender Doc.zip
10	Period of Completion (in Months)	:	27 Months (With 60 months Defect Liability period for RCC frame work& components and 24 months DLP for balance components).
11	Form of Contract	:	Lump Sum (L.S)
12	Class of Contractor eligible for tendering		**SPECIAL CLASS (Civil)** (Eligible to quote this value of work as per the terms and conditions of Registration certificate)

A. GENERAL REQUIREMENTS:

1) The eligible intending bidders would be required to enroll themselves on the e-procurement market place www.apeprocurement.gov.in and submit their bids online only.

Registered Contractors or Firms of Government Department of State / Central / Other state Contractors who are eligible to quote for this value of work and have registered in category mentioned as per G.O. Ms. No. 521, dated: 10-12-1984 or Eligible contractors as per G.O. Ms No. 132, TR&B (R.I) Department, dated: 11-08-1998, GO. Ms. No: 178 I& CAD, dated: 27-09-1997, GO. Ms. No: 8 (R&B), dated: 08-01-2003, G.O. Ms. No: 94 I&CAD, dated: 01-07-2003. G.O.Ms. No. 67 WR (Reforms), Dept., dt. 16.08.2019 &as per GO.MS.No.50 WATER RESOURCES (REFORMS) DEPARTMENT, Dated: 15-10-2020

B)TECHNICAL REQUIREMENT:

The Contractor should satisfy the following.

1) (a) The contractor should have satisfactorily completed one work of RCC Multistoried building (s) 12 floors and above under single contract with a built up area of 7,70,000Sqftand above including MEP works, Finishing works, Electrical works, Firefighting etc., for any of Central (or) State Government departments (or) central or state government autonomous bodies (or) Central/state public sector undertakings.

Multi-storied building(s) 12Floors & above can include floors in Basement/Stilt

(b) The Contractor should have executed Minimum quantities in any one year during last Five Financial Years **(2017-18 to 2021-22)**

Sl.No	Description of item	Quantity
1.	CC/RCC/VCC	**11920.00 Cum**
2	Providing Reinforcement of Fe415 / Fe500 / Fe250 / Fe550 / Other grades (or) Combined quantity	**878.20 MT**

2) Should possess the key/critical equipment and key technical personnel as shown (either owned or leased) below

Sl.No	Equipment type and characteristics	Minimum Nos. required
1	Pin vibrators	10 Nos
2	Pan vibrators	10 Nos
3	Tower Cranes	1 No
4	BATCHING PLANT not less than 30 cum /per hour / Yard or Site	1 No
5	Concrete mixers with hopper	2 Nos
6	Concrete Pump	1 No
7	Lorry / Tippers	5 Nos
8	Transit Mixers	5 Nos

The tenderer has to upload a certificate for availability of critical equipment issued by the Executive Engineer (or) Declaration on non-judicial stamp paper worth Rs.100/- as prescribed in Statement-V of Tender Schedule along with proof of document in support of owning, such as invoice / certificate of registration by competent authority in support of the critical equipment.

In case of lease, the tenderer should upload the lease deed executed duly specifying aforesaid work on non-judicial stamp paper worth Rs.100/- along with sufficient proof in support of owning the equipment by the Lessor such as invoice/certificate of Registration.

The lease period shall be for a period not less than 27 months covering the contract period of 27 months to count from date of LOA followed by contract agreement and with a provision that in case of any extensions of time of completion the lease shall be under taken to be extended till completion & commissioning

Note: The major equipment to attain the completion of works in accordance with the prescribed construction schedule is to be shown in the above table.

3) Availability of the Key personnel: ***must be the full time employees and out of them atleast 30% must be having experience in Quality control*.**

i) **Graduate Engineer (Civil) - 4 Nos**.

ii) Graduate Engineer (Mechanical)- 2 Nos

iii) Graduate Engineer (Electrical) - 2 Nos.

iv) Safety Engineer- 1 No.

4) Quality Control laboratory

The bidder shall submit quality plan and also show proof of owning Quality Control Laboratory OR tie up with established quality control testing laboratories bearing NABL accredition. The following equipment is required for the worksite.

1.	Vernier calipers 0-150 mm	:	3Nos
2.	Screw gauge 0-25 mm:	:	3Nos
3.	Measurement tapes both Steel (3.0 m, 5.0 m) & Fiber (15.0 m) 30 cm steel scale:	:	5 Noseach
4.	Weighing Machines 5.0 kg capacity	:	3Nos
5.	Sieves for Coarse aggregate	:	3Sets
6.	Sieves for fine aggregate	:	3Sets
7.	Cube moulds ISI marked 150 x150 x 150 mm	:	30Nos
8.	Compression Test Machine 100 MT:	:	1 No / Arrangement for testing at approved lab.
9.	Slump cone	:	3 Nos
10.	Carpenter'ssquare150mmwith graduations	:	6 Nos
11.	Electrical Meggar 1100 V	:	6Nos
12.	Spirit level	:	6Nos
13.	Plumb bobs	:	6Nos
14.	Measuring Jars 250ml	:	6 Nos
15.	Magnetic compass	:	2Nos
16.	Non-destructive concrete strength equipment	:	1No
17.	Cement testing equipment	:	1 Set

C. FINANCIAL REQUIREMENT:

The Contractor should satisfy the following.

1. Satisfactorily completed as a PRIME CONTRACTOR, Similar works of value not less than Rs. 46,87,61,575.87/- [at current price level] in any one financial year during last 5 financial years i.e., 2017-18 to 2021-22 and updated to2022-23.

Similar works means, BUILDING works of following types only:

(a) Construction of RCC Multi-storied buildings12 floors and above.

Note:**i)** RCC Multi-storied buildings12Floors & above can include floors in Basement/Stilt. The cost of completed works of previous years will be given weightage of 10% per year to bring them to current price level, (the financial year in which bids are invited).

2. Liquid assets and / or credit facilities of not less than **Rs. 23,43,80,787.94/-** (Credit facility / letter of credits / Solvency certificates from any scheduled bank). The solvency certificate should not be older than one year from the date of bid submission and should have the validity sufficiently beyond the date of tender

3. Assured available Bid capacity as per formula (2AN-B) shall be greater than ECV assessed by Department.

Available Bid Capacity :

$2AN-B \geq ECV$ (i.e Rs.210,94,27,091.40)

A = Maximum value of Civil Engineering works executed in any one financial year during the last 5 (FIVE) financial years i.e., 2017-18 to 2021-22 (updated to 2022-23 price level) taking in to account the completed as well as works in progress. In case of CA certificate, the Certificate shall clearly specify that the turnover pertains to works from Government Departments/Government autonomous Bodies/Government Public Sector Undertakings.

N = Number of years prescribed for completion of the Works for which tenders are invited.

B =Value of existing commitments and ongoing works to be completed during the period of completion of works for which tenders are invited

			Note: **i.** Annual turnover, cost of completed works and balance works on hand etc., shall be updated by giving weightage of 10% per year to bring them to current price level. If the certificate is from C.A. **ii.** **(a)** It should clearly specify that the turnover is from civil Engineering works from **Government Departments/Government autonomous Bodies/Government Public Sector Undertakings.** Experience relating to the works executed in **Government Departments/Government autonomous Bodies/Government Public Sector Undertakings** will only be considered. **4**. The tenderer though he meets the above Qualification Criteria, will be disqualified if he has: **a)** Record of poor performance such as abandoning the works, not properly completing or financial failures etc., in preceding 5 (five) financial years **(2017-18 to 2021-22).** **b)** Consistent history of litigation or arbitration awards against the Contractor in preceding 5 (five) financial years **(2017-18 to 2021-22).** **5 a)** Sub-contractor's experience, in his name will be taken in to account in determining the Tenderer's compliance to the Qualification criteria, if it is as per GO Ms. No.8, dated 8.1.2003. **b)** The experience gained in a registered JV firm to the extent of the Tenderers share shall be considered if the tenderer happens to be the lead partner, for similar works criteria also.Bids, which fulfill the Eligibility Criteria, will only be considered though meet the above c) The "B" value as to the existing commitments and on going works concerned, shall invariably be certified by the Superintending Engineer of the department concerned or he has to file an affidavit as detailed below. d) In case the bidder submits that there are no existing commitments and ongoing works anywhere in the country or in case of existing commitments, he shall **file an affidavit duly** notarized **in proof of it** with undertaking that he is liable for civil, criminal and other legal consequences besides termination of the contract at any time if anything found untrue.

13	Tender Type	:	Open
14	Bid Call (Nos.)	:	1st Call
15	Type of Quotation	:	**PERCENTAGE**
16	Transaction Fee	:	All the participating bidders shall pay a transaction fee (non-refundable) on-line (non-refundable) (Generated Online) in favor M/S APTS, Vijayawada. It is mandatory for the bidders to pay the transaction fee through the Electronic payment Gateway
17	EMD / Bid Security (INR)	:	**Rs. 2,10,95,000/-** (drawn on/or After **-10-2022**) (EMD shall be Mandatorily paid in the shape of BG / on line payment made in favour of Vice-Chairman, TUDA, Tirupati and payable at Tirupati. (BG/ online payment, shall be scanned in the place of BG).(In case of on-line payment: Name of Account Holder: VICE-CHAIRMAN, TUDA - EMD, Account No. 10624527922, STATE BANK OF INDIA, TUDA Tilak Road Branch, IFSC CODE: SBIN0003187, MICR NO. 517002006).Online payment can be by Net banking/ RTGS/NEFT from the bidders registered bank accounts only.(Online payments to any other accounts / EMD paid through Demand draft will be summarily rejected). ❖ The EMD payable at the time of tender shall be 1%of ECV in the shape of BG / on line payment. The BG furnished towards EMD along with tender shall be valid up to 6 months initially. ❖ After issue of LOA, the successful bidder shall submit the same along with the submission of hard copies of tender documents. The same will be discharged, on submission of DD/new BG (As per proforma prescribed for EMD for successful bidder), for 1 % contract value and additional security deposit (If ASD applicable) by way of DD / BG from Scheduled Bank. This new BG furnished for EMD shall be valid up to project completion period + DLP period of 60 months + 28 days grace period. Also, the BG furnished for ASD (For applicable cases only) shall be valid up to project completion period + 28 days grace period. The date of issue of the Bank Guarantee shall not be older than three months from the scheduled date of submission of EMD, Security deposit and Performance Guarantee. The banker should be informed that the Bank Guarantee should not be liquidated without official consent in writing of the Employer. The bidders shall furnish a declaration online stating

			that the photostat copies uploaded by them are all genuine. Any incorrectness/deviation noticed will warrant disqualification duly forfeiting the EMD, besides initiation of criminal action, apart from blacklisting /suspension from participating in the future tenders for a specified period as the case may be.
18	Bid Document Downloading Start Date	:	**-10 – 2022 5.00 PM**
19	Bid Document Downloading End Date	:	**-10 - 2022 1.00 PM**
20	Last Date & Time for Receipt of Bids	:	**-10-2022 3.00 PM**
21	PQ Stage Date & Time	:	**-10-2022 3.00 PM**
22	Commercial Stage Date & Time	:	**-10-2022 11.00 AM**
23	Auction Date & Time (Reverse Auction)	:	**Will be intimated at later date.**
24	TQ Stage Date & Time	:	----------
25	Bid Validity Period	:	**120 Days**
26	Declaration of successful bidder by competent authority (L1 after e-auction and physical document verification) subject to reverse tendering process Vide GO Ms No 67 dt 16-08-2019 GO.MS.No.50 WATER RESOURCES (REFORMS) DEPARTMENT, Dated:15-10-2020	**:**	**The successful bidder Will be intimated soon after finalization of Tender.**
27	Tender inviting authority i.e. Officer inviting bids	:	Vice Chairman, TUDA.
28	Bid opening authority and address	:	The Executive Engineer, Tirupati Urban Development Authority, Tata nagar, Near Gangammagudi street, Tirupati, Andhra Pradesh India. Phone No. 0877-2225730.
29	Contact Details	:	0877-2225730.
30	Procedure for bid	:	As per Notice Inviting Tender

	submission		
31	General Terms & Conditions / Eligibility criteria	:	As per Tender Document
32	Procedure for Bid Submission.	:	**A)** Tender schedule can be downloaded from the web site: https://tender.apeprocurement.gov.in **a)** Intending bidder can contact O/o the Executive Engineer, TUDA, Tirupati for any clarification, information on any working day during working hours. **b)** All bidders shall fill out the pre-qualification checklist and sign on the self-declaration form stating their compliance with all the technical and financial pre-qualification criteria. EMD for **Rs. 2,10,95,000/-**to be paid (drawn on/or After -10 -2022) shall be Mandatorily paid in the shape of BG / on line payment in favour of Vice-Chairman, TUDA, Tirupati and payable at Tirupati. (BG/ online payment, shall be scanned in the place of BG).(In case of on-line payment: Name of Account Holder: VICE-CHAIRMAN, TUDA - EMD, Account No. 10624527922, STATE BANK OF INDIA, TUDA Tilak Road Branch, IFSC CODE: SBIN0003187, MICR NO. 517002006). Online payment can be by Net banking/ RTGS/NEFT from the bidders registered bank accounts only. (Online payments to any other accounts / EMD paid through Demand draft will be summarily rejected). ❖ The EMD payable at the time of tender shall be 1%of ECV in the shape of BG / on line payment. The BG furnished towards EMD along with tender shall be valid up to 6 months initially. ❖ After issue of LOA, the successful bidder shall submit the same along with the submission of hard copies of tender documents. The same will be discharged, on submission of DD/new BG (As per proforma prescribed for EMD for successful bidder), for 1 % contract value and additional security deposit (If ASD applicable) by way of DD / BG from Scheduled Bank. This new BG furnished for EMD shall be valid up to project completion period + DLP period of 60 months + 28 days grace period. Also, the BG furnished for ASD (For applicable cases only) shall be valid up to project completion period + 28 days grace period. The date of issue of the Bank Guarantee shall not be older

			than three months from the scheduled date of submission of EMD, Security deposit and Performance Guarantee. The banker should be informed that the Bank Guarantee should not be liquidated without official consent in writing of the Employer. The bidders shall furnish a declaration online stating that the photostat copies uploaded by them are all genuine. Any incorrectness/deviation noticed will warrant disqualification duly forfeiting the EMD, besides initiation of criminal action, apart from blacklisting /suspension from participating in the future tenders for a specified period as the case may be. **c)** All bidders shall upload documents in the e-Procurement portal validating their declarations under the technical and commercial pre-qualification criteria laid out in the checklist **d)** The bidders shall quote their initial price offer at the prescribed field / place provided in the e-market place. **NOTE: A) The tender invited is in PERCENTAGE SYSTEM.** **NOTE: (B) Bidders should quote their offer in percentage mode. The percentage quoted shall not be more than the prescribed ceiling limit of 5 percent as per G.O MS. No:133, I & CAD dated:20-11-2004 & G.O.Rt.No.230, T.R&B (R.I) Dept., Dt.13.08.2007.** **NOTE: (C) Bids will be evaluated based on the lowest offer received after Reverse auction.** **NOTE: (D) In reverse auction, auction will start with L1 amount initially quoted by the bidders for the total work in e-tender.** **f) The quoted initial price offer cannot be in excess of 5% over ECV provided, failing which it is liable to be rejected outright by the department.** **g)** The bidder shall sign on all the documents uploaded by him including EMD owning responsibility for their correctness / authenticity and upload along with Tender. **h)** Submission of Hard Copies of uploaded Scan copies of Bank Guarantee towards EMD by participating bidders to the tender Inviting authority before opening of Price Bid is dispensed

			with. **i) Only those bids will be evaluated and considered for comparison to arrive at L1 value and allowed to participate in reverse bidding in whose favour an authorised communication or a letter or a scanned and uploaded copy of that letter on e- procurement Website or an e-mail from the issuing bank or any authorised communication from the bank with regard to issue of the Bank Guarantees is sent to the Tender Inviting authority before opening of PQ stage as per GO.MS.No.50 WATER RESOURCES(REFORMS) DEPARTMENT, Dated: 15-10-2020** **j)** All Bank Guarantees uploaded by all Bidders would be verified with the issuing Bank, subsequently and if any uploaded Bank Guarantee is found to be forged or tampered with or fake, then it would be considered as fraud and would be liable for criminal action invariably. **k)** All the bidders shall invariably upload the scanned copies of Bank Guarantee in e-Procurement system and this will be the primary requirement to consider the bid as responsive. **l)** The Department shall carry out the technical bid evaluation solely based on the uploaded certificates / documents, BG / Online payment / Challan towards EMD / affidavit, in the e-Procurement system and open the price bids of the responsive bidders and proceed further for reverse auctioning. **m)** The Department will notify the successful bidder for submission of original hard copies of all uploaded documents, BG/Online payment towards EMD prior to entering into agreement. **n)** The successful bidder shall invariably furnish the original certificates /documents of the uploaded scanned copies to the Tender Inviting Authority and original Bank Guarantee towards EMD before entering into agreement either personally or through courier or post and the receipt of the same within the stipulated date shall be the responsibility of the successful bidder. The Department will not take any responsibility for any delay in receipt / non-receipt of Original BG towards EMD certificates /documents, from the successful bidder before the stipulated time. On receipt of documents, the Department shall ensure the genuineness of the BG towards EMD and all other certificates / documents uploaded by the bidder in e-Procurement system in support of the qualification criteria before concluding the agreement. **o)** If any successful bidder fails to submit the original Hard Copies of uploaded certificates / Documents, BG towards EMD within the stipulated time or if any variation is noticed

			between the uploaded documents and the hard copies submitted by the bidder, the successful bidder will be suspended from participating in the tenders on e-Procurement platform for a period of 3 years. The e-Procurement system would deactivate the user ID of such defaulting successful bidder based on the trigger / recommendation by the Tender Inviting Authority in the system. Besides this, the Department shall invoke all Processes of Law including criminal prosecution of such defaulting bidder as an act of extreme deterrence to deter frivolous bidders and to avoid delays in the tender process for execution of the development schemes taken up by the Government. The information to this extent may be displayed in the e- Procurement platform website and all Govt. Dept. / Public Sector Units / Local Bodies /Autonomous Bodies in AP would prevent such bidders from participating in the bidding process. **p)** e-procurement corpus fund: The successful bidder shall pay 0.04% of estimate contract value towards e-procurement corpus fund through on-line or as generated in e-procurement platform in favour of Managing Director, Andhra Pradesh Technology Services, Vijayawada on or before concluding the agreement.
33	E-Auction (Reverse Tendering)	:	After identifying, the eligible agencies / bidders will be allowed to participate in e-auction process on e - procurement plat form in terms of guidelines issued vide G.O.Ms.No.67, WR (Reforms) Dept., Dt.16.08.2019. and G.O.Ms.No.50, WR (Reforms) Dept., Dt.15.10.2020. **a)** After identification of the L-1 Initial Price Offer, eligible bidders shall be transferred to the Reverse Auction Platform. **b)** The initial period of the Reverse tendering process will start after 3 hours, following which there will be auto extensions of time by 15 minutes in case of any reduction in bids recorded in the past 15 minutes. **c)** Only the current L-1 bid will be visible to all bidders who may revise their bids until the end of process **d)** Decrements made in each subsequent bid shall not be less than **0.50%** of the IBM / ECV uploaded.
34	Conclusion of the Reverse Tendering Process	:	**a)** After conclusion of the reverse auction process, the L-1 Bidder will be declared and the EMDs of unsuccessful bidders shall be refunded.

			b) If any variation is noticed between the uploaded documents and the self-declaration submitted by the bidder, the bidder will be suspended from participating in the tenders on e-procurement platform for a period of 3 years. If any of the documents furnished by the bidder are found to be false / fabricated / Bogus, at any time the bidder will be black listed and the EMD will be forfeited.
35	Special conditions	:	**1** The Scope of Work shown above is only indicative and detailed scope has been described in the Bid Document. 2 The time for completion of the Construction Works is 27 months, followed by Defect Liability Period of 60 months for RCC frame work & its components and 24 months for balance components, after successful completion of Construction Works in full shape. 3 Issue of Bid Document will not automatically construe the eligibility of the Contractor(s) for participation in the subsequent Bidding process and will be determined during evaluation. **4** The Department/TUDA reserves the right to accept or reject any or all the Bids without assigning any reason whatsoever. **5** The dates stipulated in the NIT are firm and under no circumstances they will be relaxed unless officially extended / notified. **6** The Contractors shall submit their Bids online and in time only. Any sort of snags or the glitches in the internet/web site etc., in submission of tenders, the Department / TUDA is not responsible. **7.** Bids received with an excess of more than 5% over the Internal Benchmark value / ECV Specified by the Department / TUDA shall be summarily rejected. Negotiations are not permitted to be conducted at any level. **8**. As per GO MS No. 50 Water Resources(Reforms) Department, dated 15-10-2020, Tenders up to 25% less (-25%) than the estimate may be accepted. Tenders which are less beyond

			minus 15% {(<-15%)}of the estimate but upto minus 25%, a Bank Guarantee or Demand Draft for the difference between the tendered amount and 85% of the estimate value should be taken, over and above other guarantee, which would be released after the completion of work with other Bank Guarantees. Illustration: If a L1 bidder quotes **Rs**. 75 for an estimated value of Rs.100, then the bidder will have to give an additional BG of Rs 10 {Rs.85 (that is 85% of Est. Value)- Rs 75 (Tendered amount)}. **9.** The Contractor shall submit a copy of valid GST registration certificate issued by the registration authority. **Note: The Contractor shall have GST (REGISTRATION IN THE STATE OF AP, if having, else shall give an undertaking affidavit to register in AP and submit before entering into L.S Agreement for the work.** **FAILURE TO FURNISH THE AFFIDAVIT WILL RESULT IN DISQUALIFICATION OF THE BIDDER IN THE TECHNICAL STAGE AND FAILURE TO COMPLY TO FURNISH GST IN THE STATE OF AP AT THE TIME OF AGGREMENT WILL RESULT IN CANCELATION OF TENDER AND REMOVING OF TENDERER FROM e-PROCUREMENT SITE FOR A PERIOD OF 3 YEARS.** **10.**The Contractor shall submit copy of PAN card and copy of latest Income Tax returns submitted to IT Department along with proof of submission. **11**.Any other condition regarding receipt of Bids in conventional method appearing in the Bid documents shall be treated as not applicable. **12.**The Contractors should invariably upload the scanned copies of Bid Security and experience certificates and other relevant documents duly signed by them. ❖ The EMD payable at the time of tender shall be 1%of ECV in the shape of BG / on line payment. The BG furnished towards EMD along with tender

			shall be valid up to 6 months initially. ❖ After issue of LOA, the successful bidder shall submit the same along with the submission of hard copies of tender documents. The same will be discharged, on submission of DD/new BG (As per proforma prescribed for EMD for successful bidder), for 1 % contract value and additional security deposit (If ASD applicable) by way of DD / BG from Scheduled Bank. This new BG furnished for EMD shall be valid up to project completion period + DLP period of 60 months + 28 days grace period. Also, the BG furnished for ASD (For applicable cases only) shall be valid up to project completion period + 28 days grace period. ❖ In case any valid extension of contract period is granted, the validity of EMDBG shall also be extended for the corresponding period. The Bank Guarantee furnished by the tenderer towards additional security amount if any shall also be extended till the work is completed in all respects. **14**. Bids shall be valid for a period of **4 months** from the last date of submission of Bids. Before expiry of validity, the authority who called for the Contractor, shall seek for further extension of validity from the Contractors and in case the validity is not extended by any Contractor, his Bid shall not be considered after such expiry and his Bid Security shall be returned. **15**. The retention amount from the running bills will be deducted at the rate of 2% as per G.O.Rt.No.117 Finance (HR-V-TFR-A&L-EEF) Department dated 17.05.2022. **16.** All necessary permissions / clearances / approvals for carrying out the work are to be processed and obtained by the Contractor only at his own cost. As a user agency, the Department/TUDA will cooperate in processing the proposals in respect of the above. **17**. In case of discrepancy between the Price Bid quoted online and in supporting documents uploaded, the Price Bid quoted

			in the template provided online only would be considered for evaluation. **18.** Bid Price(s) should be quoted online in the specified template. **19. (a)** Experience relating to the works executed in State / Central Government Departments/Government Autonomous bodies /PSUS/TUDA shall only be considered**.** **20.** Incase of Projects executed in Government Departments/Government autonomous Bodies/Government Public Sector Undertakings, the experience certificates should be certified by the Executive Engineer or equivalent and counter signed by the Superintending Engineer or equivalent and copies may be uploaded along with tender duly self-attested. **21.** Further, the Department/TUDA reserves the right to undertake a verification of the experience so stated, through engaging the services of a Professional Agency or by TUDA wing and if any discrepancies are noticed in the information provided by the Successful bidder/ Contractor regarding previous relevant experience, the said Successful Bidder/Contractor will be disqualified duly forfeiting EMD and value of work done and shall be liable to pay damages as determined by the Department/TUDA. Further, the Successful Bidder/Contractor will be blacklisted. **22.**The Successful Bidder/Contractor is bound to be disqualified and liable for blacklisting and forfeiture of Bid Security, if he is found to have misled or furnished false information in the documents submitted in proof of qualification requirement. **23.** Even during execution of the work, if found that the Contractor had produced false/fake certificates of experience, he will be liable for black listing and the Contract will be liable for termination duly forfeiting EMD and all the amounts due to him. **24.**The Department/TUDA reserves the right to relax the

			conditions if required for eligibility of the Contractor in the public interest. The contractor(s) shall not have any right to question the decision taken by the Department/TUDA in this regard.
36	**General Terms & Conditions**		**1**. The details and certificates are to be furnished as per the proforma available in the tender schedules in proof of Qualification Criteria. The details of works not furnished in the relevant formats will not be taken in to consideration for evaluation, though up loaded along with Bid. **2**. The bidder should have the key and critical equipment (either owned or leased) as mentioned in the Bid Document. **3**. The bidder shall submit a written Power of Attorney duly registered authorizing the signatory of the Bid to sign for the Contractor.

1.1 **Procedure for bid submission:** Bids shall be submitted online on https://www.tender.apeprocurement.gov.in

1. The bidders who are desirous of participating in e-procurement shall submit their bids as per the standard formats available at the e-market place.

2. All bidders must fill in the pre-qualification checklist in the templates provided and sign on the self-declaration form stating their compliance with all the technical and financial pre - qualification criteria and up load the same.

3. E.M.D. **Rs. 2,10,95,000/-** drawn on / or after .10.2022 (EMD shall be Mandatorily paid in the shape of BG / Online payment in favour of Vice-Chairman, TUDA, Tirupati and payable at Tirupati. (BG/ Online payment shall be scanned in the place of BG).**(In case of on-line payment: Name of Account Holder: VICE-CHAIRMAN.TUDA - EMD, Account No. 10624527922, STATE BANK OF INDIA, TUDA Tilak Road Branch, IFSC CODE: SBIN0003187, MICR NO. 517002006).** Online payment can be by Net banking/ RTGS/NEFT from the bidders registered bank accounts only. **(Online payments to any other accounts will be summarily rejected).**

- ❖ The EMD payable at the time of tender shall be 1%of ECV in the shape of BG / on line payment. The BG furnished towards EMD along with tender shall be valid up to 6 months initially.
- ❖ After issue of LOA, the successful bidder shall submit the same along with the submission of hard copies of tender

documents. The same will be discharged, on submission of DD/new BG (As per proforma prescribed for EMD for successful bidder), for 1 % contract value and additional security deposit (If ASD applicable) by way of DD / BG from Scheduled Bank. This new BG furnished for EMD shall be valid up to project completion period + DLP period of 60 months + 28 days grace period. Also, the BG furnished for ASD (For applicable cases only) shall be valid up to project completion period + 28 days grace period.

- ❖ The date of issue of the Bank Guarantee submitted shall not be older than three months from the scheduled date of submission of EMD, Security deposit and Performance Guarantee.

- ❖ The banker should be informed that the Bank Guarantee should not be liquidated without official consent in writing of the Employer. The bidders shall furnish a declaration online stating that the photostat copies uploaded by them are all genuine. Any incorrectness/deviation noticed will warrant disqualification duly forfeiting the EMD, besides initiation of criminal action, apart from blacklisting /suspension from participating in the future tenders for a specified period as the case may be.

4. All bidders must upload all supporting documents in the e-Procurement portal validating their declarations and uploaded in the templates provided for the same under the technical and commercial pre-qualification criteria laid down in the check list.

5. The bidders should quote their initial price offer at the prescribed field / place provided in the e-market place within the prescribed period.

6. The bidder shall sign on all the documents uploaded by him including EMD along with the self-declaration for fulfilling pre - qualification criteria set by the Department (on the check list) owning responsibility for their correctness / authenticity and upload along with Tender.

7. The price bids will be opened on the date and time fixed.

8. The bidders shall furnish willingness in participating reverse tendering process and an undertaking shall be uploaded to that effect along with submission of initial price offer.

9. After opening and identification of the L-1 Initial Price Offer, eligible bidders shall be transferred to the Reverse Auction Platform (online). The time and date will be displayed for reverse tendering process.

1.2 General Terms & Conditions

1. Transaction fee: All the participating bidders shall pay a transaction fee (non-refundable) on- line (non-refundable) (Generated Online) in favour M/S APTS, Vijayawada.
2. E.M.D. **Rs.2,10,95,000/-**drawn on or after….10.2022 (EMD shall be Mandatorily paid in the shape of BG / Online payment made in favour of Vice-Chairman, TUDA, Tirupati and payable at Tirupati. (BG/ Online payment shall be scanned in the place of BG).**(In case of on-line Name of Account Holder: VICE-CHAIRMAN.TUDA - EMD, Account No. 10624527922, STATE BANK OF INDIA, TUDA Tilak Road Branch, IFSC CODE: SBIN0003187, MICR NO. 517002006).** Online payment can be by Net banking/ RTGS/NEFT from the bidders registered bank accounts only. **(Online payments to any other accounts will be summarily rejected).**

- The EMD payable at the time of tender shall be 1%of ECV in the shape of BG / on line payment. The BG furnished towards EMD along with tender shall be valid up to 6 months initially.
- After issue of LOA, the successful bidder shall submit the same along with the submission of hard copies of tender documents. The same will be discharged, on submission of DD/new BG (As per proforma prescribed for EMD for successful bidder), for 1 % contract value and additional security deposit (If ASD applicable) by way of DD / BG from Scheduled Bank. This new BG furnished for EMD shall be valid up to project completion period + DLP period of 60 months + 28 days grace period. Also, the BG furnished for ASD (For applicable cases only) shall be valid up to project completion period + 28 days grace period.

- The date of the issue of the Bank Guarantee submitted shall not be older than three months from the scheduled date of submission of EMD, Security deposit and Performance Guarantee.

- The banker should be informed that the Bank Guarantee should not be liquidated without official consent in writing of the Employer. The bidders shall furnish a declaration online stating that the photo stat copies uploaded by them are all genuine. Any incorrectness/deviation noticed will warrant disqualification duly forfeiting the EMD, besides initiation of criminal action, apart from blacklisting /suspension from participating in the future tenders for a specified period as the case may be

3. Any other condition regarding receipt of tenders in conventional method appearing in the tender documents may please be treated as not applicable.

4. The successful bidder shall pay 0.04% of estimate contract value towards e-procurement corpus fund in the online payment in favour of Managing Director, Andhra Pradesh Technology Services, Vijayawada at the time of conclusion of agreement and online payment receipt should be submitted.

5. "The bidder shall authenticate the bid with his digital certificate for submitting the bid electronically on e-procurement platform and the bids not authenticated by digital certificate of the bidder will not be accepted on the e-procurement platform." (G.O.Ms.No.6, dated 28/02/2005 of IT & C Dept., Govt. of AP) and as per G.O.Ms. No.67, WR (Reforms) Dept., Dt.16.08.2019.

6. As per the G.O.Ms 174, I&CAD (PW-Reforms) Department dated 01-09-2008 , that the successful bidder found defaulting in submission of hard copies of uploaded certificates / documents, Original BG/ Online payment towards EMD within the stipulated time i.e. before concluding the agreement or if any variation is noticed between the uploaded documents and the hard copies submitted by the successful bidder, the successful bidder will be suspended from participating in tenders on e-Procurement platform for a period of three years.

7. Tenders with an excess of above 5% of the estimated contract value shall not be allowed to quote in online and the tender percentage to be quoted should be inclusive of all taxes excepting GST.
8. Single Tender received in 1st Call is liable for Cancellation.

N.B: The above General Conditions of the Contract incorporated are from the formats with modifications if any. The General Conditions of the Contract are to be read in conjunction with the Special Conditions of the Contract. In case of inconsistency or irreconcilability between the General Conditions of the Contract and the Special Conditions of the Contract, the Special Conditions shall prevail over the general conditions.

1.3) Reverse Tendering Process: As per G.O.Ms. No. 67 Water Resources (Reforms) Department dated: 16-08-2019 and as per GO.MS.No.50 WATER RESOURCES (REFORMS) DEPARTMENT, Dated: 15-10-2020,

1. All bidders shall self-declare their details under each technical and financial criterion on the e-procurement platform along with an undertaking confirming their compliance with the technical and financial criterion prescribed in the bid document.

2. All bidders shall submit supporting documents for their submittals under each technical and financial criterion. In case of documents found to be defective, incorrect or forged and therefore claim of Qualification is not supported, severe action including forfeiture of EMD shall be taken.

3. The threshold values of Technical and Financial qualification as prescribed by the department shall be displayed to the bidders on the screen of online e-procurement site. The bidders have to submit their details of qualification criterion in prescribed text boxes along with their self-declaration on the fulfillment of qualification criterion prescribed. The system automatically evaluates the qualification details uploaded by the bidders and enable the qualified bidders only to quote for their price bid in the prescribed box for the work.

4. All bidders satisfying pre-qualification criterion as per their submittals and self-declaration on e-procurement site shall quote their price offer.

5. Submission of Hard Copies of uploaded Scan copies of Bank Guarantee towards EMD by participating bidders to the tender Inviting authority before opening of Price Bid is dispensed with.

6. Only those bids will be evaluated and considered for comparison to arrive at L1 value and allowed to participate in reverse bidding in whose favour an authorized communication or a letter or a scanned and uploaded copy of that letter on e- procurement Website or an e-mail from the issuing bank or any authorized communication from the bank with regard to issue of the Bank Guarantees is sent to the Tender Inviting authority within the stipulated time.

7. All Bank Guarantees uploaded by all Bidders would be verified with the issuing Bank, subsequently and if any uploaded Bank Guarantee is found to be forged or tampered with or fake, then it would be considered as fraud and would be liable for criminal action invariably.

8. All the bidders shall invariably upload the scanned copies of Bank Guarantee in e- Procurement system and this will be the primary requirement to consider the bid as responsive.

9. The Department shall carry out the technical bid evaluation solely based on the uploaded certificates / documents, / BG towards EMD/affidavit, in the e-Procurement system and open the price bids of the responsive bidders and proceed further for reverse auctioning.

10. At the start of the Reverse Tendering process the Maximum Allowable Bid Price will be set and bidders shall submit their bids in an online platform.

11. Names of the bidders/ vendors shall be anonymously masked in the Reverse Tendering process and vendors will be given suitable dummy names.

12. The initial period of the Reverse tendering process will start after 3 hours, following which there will be auto extensions of time by 15 minutes in case of any reduction in bids recorded in the prior 15 minutes.

13. Only the current L-1 bid shall be visible to all bidders who may revise their bids until the end of the process.

14. Decrements made in each subsequent bid shall not be less than 0.5% of the IBM/ECV uploaded.

15. The reverse tendering process shall continue until the determination of a successful bidder

16. After conclusion of the reverse auction process, the L-1 Bidder will be declared and the EMDs of unsuccessful bidders shall be refunded.

SIGNATURE OF THE BIDDER

2. INSTRUCTIONS TO TENDERERS (BIDDERS)
A – GENERAL

NOTICE INVITING TENDER (NIT)

Name of work: "CONSTRUCTION OF TUDA TOWERS AT NORTH-WEST CORNER OF ANNAMAIAH CIRCLE ABUTTING RC ROAD AND AIR BY-PASS ROAD IN TIRUPATI, TIRUPATI DISTRICT, ANDHRA PRADESH".

2.1 Scope of work:

a) Brief description and location of work: Tirupati is a Famous temple Town in Tirupati District and hub for Educational and Medical &Health Institutions well connected by Rail, Road and Air. Lot of industries also coming up in the Vicinity of Tirupati and the people cherish to have permanent accommodation in Tirupati. Also the site where TUDA TOWERS is proposed is amidst well developed commercial and residential Zone and is adjacent to 80 feet Annamaiah Marg (AIR by-pass Road) and close to 200 feet National Highway NH-71.

The Proposed TUDA Towers building comprises 14 Floors (B+G+13) above ground level in RCC Framed structure with Commercial and Residential Blocks of (Basement - I + G + 13), Commercial block facing Main Annamaiah Road on South side and Residential Block facing Rayalcheruvu Road on East side and Provisions in each Floor are as follows: -

- Basement Floor: Mechanical stack parking for both Commercial and Residential Blocks is proposed. Separate access is provided for commercial and Residential Parking. Parking Capacity in Basement Floor=349 Cars. On site Parking=47 Cars. Total Parking:396 Cars.
- Ground Floor: Grand entrance Lobby,12 Shops, 1 Banquet Hall, Cafeteria and common washrooms for Gents and Ladies separately. Besides, Swimming pool, and Onsite parking are provided outside the building.
- First Floor: 16 shops, Food Court, Banquet Hall and common washrooms for Gents and Ladies separately.
- Second Floor: Office Space-3 Nos, 3 BHK-10 Nos, 2BHK- 2Nos, Multipurpose Hall.
- Third Floor: Office Space-3 Nos, 3 BHK-10 Nos, 2BHK- 4Nos.

- Fourth Floor: Office Space-3 Nos, 3 BHK-10 Nos, 2BHK- 4 Nos.
- Fifth Floor: 3BHK -10 Numbers and 2BHK – 4 Numbers
- Sixth Floor: 3BHK -14 Numbers and 2BHK – 2Numbers and 4BHK-4 Numbers.
- Seventh Floor: 3BHK -14 Numbers and 2BHK – 4 Numbers and 4BHK-4 Numbers.
- Eighth Floor: 3BHK -14 Numbers and 2BHK – 4 Numbers and 4BHK-4 Numbers.
- Ninth Floor: 3BHK -14 Numbers and 2BHK – 4 Numbers and 4BHK-4 Numbers.
- Tenth Floor: 3BHK -14 Numbers and 2BHK – 4 Numbers and 4BHK-4 Numbers.
- Eleventh Floor: 3BHK -14 Numbers and 2BHK – 2 Numbers and 4BHK-4 Numbers.
- Twelfth Floor: 3BHK -14 Numbers and 2BHK – 4 Numbers and 4BHK-4 Numbers.
- Thirteenth Floor: 3BHK -14 Numbers and 2BHK – 4 Numbers and 4BHK-4 Numbers.
- Podium floor with landscaping gardens.
- Refuse areas in Sixth and Eleventh Floor.
- The building is of R.C.C. framed structure with AAC Block Panel walls, with necessary MEP Services, Firefighting Services etc.,
- Other Essentials like, UGT, Fire static tank, Overhead tanks *(*above building*);* external sewers are connected to Existing Underground drainage system.
- **The Plinth area details Floor wise:**

Floor	**Built-up area sqft**	**Built-up area sqm**
Basement	99096.45	9206.40

Ground floor	73532.83	6831.44
1st floor	70164.59	6518.60
2nd floor	52539.89	4881.20
3rd floor	52857.96	4910.70
4th floor	52857.96	4910.70
5th floor	26324.95	2445.70
6th floor	50526.82	4694.10
7th floor	48798.14	4533.50
8th floor	48798.14	4533.50
9th floor	48798.14	4533.50
10th floor	48798.14	4533.50
11th floor	50526.82	4694.10
12th floor	48798.14	4533.50
13th floor	48798.14	4533.50
TOTAL	**821217.11**	**76293.94**

b) **List out Principal Components of the work:** 1. RCC Footings, RCC columns, Shear/Flexural Walls, Prestressed/Conventional Flat Slabs, Beams, 4. Autoclave aerated Blocks and plastering and finishing works, 5. Flooring with Vitrified and Granite stone slabs, 6. Water supply and sanitary installations, 7. Internal and External Electrical installations, 8. Firefighting system

ECV put to tender.**:Rs. 210,94,27,091.40**

Period of completion: **27 Months**

c) SSR adopted CSSR 2022-23

d) **Cement**: **Rs.4220/- per M.T**

e) **Steel: Rs.68000/- per MT**(Fe500/Fe500D) as per C. Memo No. 146/T4/AE/Steel/2021, Dt:24.02.2022.

f) Structural Steel: Rs.63000/- per MT (at Site & Excl. GST)

Details of provisions included in the ECV put to Tender.

i) Seigniorage charges: Excluded

ii) Contractor's Profit & Overhead charges @ 13.365% added

Regarding contractor's profit, overheads etc., in scheduled items: As specified in clause 4.102 of General, the provision is made under the component of overhead charges, contractor's profit and other provisions in the estimate as per CSSR @ 13.365% (Excluding provision of 0.25% since Site engineers are provided with transport facilities and insurance) and include other facilities i.e., site accommodation, site arrangements, office furniture, equipment and communications including administrative and managerial requirements etc., as per the break up specified in Memo of Govt. of A.P. H&M, H&I,D/APMSIDC, No.2807, dt.18-11-2011. entitle to deduct the amount being arrived out of the provision from the final bill. If any of the facility is not required by the department or the facility is not provided by the contractor, proportionate amount as per the break up envisaged in the said Memo dt 18-11-2011 will be deducted in running bills and balance if any in final bill.

iii) **Other allowances: 25% allowance on labour portion due to municipal limits.**

iv) **Reimbursable Provisions: GST, Seigniorage charges & NAC.**

g) **Soil Test report**:-The soil test report of the proposed site is enclosed here with for reference. However, during actual excavation of foundations, the same may vary based on the soil strata met with and considering the variations if any, revised foundation drawings will be issued.

2.2 The Vice Chairman, TUDA, Tirupati**, representing the TUDA** invites tenders for the above work vide NIT No……./DM/TUDA/TPT/2022-23 under **Adv. No. ……./DM/TUDA/TPT/2022-23, Dated: …….-10-2022**

2.3 Online bids for the above work will be received from the Registered Contractors / Firms in Government of Andhra Pradesh / Central / Others states contractors eligible to quote the value of this work. The eligible Contractors / Firms as specified shall submit bids online on www.eprocurement.gov.in before the date and time stipulated in Notice Inviting Tender [NIT].

The online bids will be opened by the Executive Engineer, TUDA or his nominee at his office, on the dates mentioned in NIT. If the Office happens to be closed on the date, the opening of tenders gets automatically postponed to the next working date, the time being unaltered, unless extended by a notification published or through amendment on TUDA's web site.

The successful tenderer is expected to complete the work within the time period specified in the NIT.

2.4 Firms Eligible to Tender:

The Firms who

i) Possess the valid registration in the class and category mentioned in the NIT and satisfy all the conditions therein.

ii) Intend to participate should not have been blacklisted or debarred or suspended or participating in tenders by the Government for whatever the reason, prohibiting them not to continue in the contracting business, as on the date of submission of bids

iii) have complied with the eligibility criteria specified in the NIT are the eligible tenderers.

2.5 Firms Ineligible to Tender:

i) A retired officer of the Govt. of AP or Govt. of India or TUDA executing works is disqualified from tendering for a period of two years from the date of retirement without the prior permission of the Government or TUDA.

ii) The Tenderer who has employed any retired officer as mentioned above shall be considered as an ineligible tenderer.

iii) The contractor himself or any of his employees is found to be Gazetted Officer who retired from Government/TUDA Service and had not obtained permission from the Government/TUDA for accepting the contractor's employment within a period of 2 years from the date of his retirement.

iv) The Contractor or any of his employees is found at any time after award of contract, to be such a person who had not obtained the permission of the Government/TUDA as aforesaid before submission of the tender or engagement in the Contractor's service.

v) Contractor shall not be eligible to tender for works in the division / circle where any of his near relatives are employed in the rank of Assistant Engineer or Assistant Executive Engineers and above on the Engineering side and Divisional Accounts Officer and above on the administrative side. The Contractor shall intimate the names of persons who are working with him in any capacity or are subsequently employed. He shall also furnish a list of Gazetted /Non-Gazetted, State Government Employees related to him. Failure to furnish such information tenderer is liable to be removed from the list of approved contractors and his contract is liable for cancellation.

Note: Near relatives include

1. Sons, step sons, daughters, and step daughters.
2. Son-in-law and daughter-in-law.
3. Brother-in-law and sister-in-law.
4. Brothers and Sisters.
5. Father and Mother.
6. Wife / Husband.
7. Father-in-law and Mother-in-law
8. Nephews, nieces, uncles and aunties
9. Cousins and
10. Any person residing with or dependent on the contractor.

vi) The Bidder either Individual or other legal entity like JV or Consortium or Partnership or even any member of the JV/Consortium/partnership applied for or availed corporate debt restructuring/strategic debt restructuring and not cleared the loan for more than six years/whether DRT/NCLT proceedings pending or not, is not eligible to participate in the bid.

2.6 Qualification data of the Tenderers

2.6.1 The tenderer shall furnish the following particulars in the formats enclosed, supporting by Documentary evidence as specified in the formats

a) Check List to accompany the tender (in Annexure-I).

b) Attested copies of documents relating to the Registration of the firm, Registration as Civil Contractor, Partnership deed, Articles of Association, GST Registration. The contractors shall furnish their copy of permanent Account Number (PAN) card and copy of latest income tax returns submitted along with proof.

c) Besides submission of the above and Valid GST registration in State of AP etc.,, since payment of professional tax is mandatory as per G.O.Ms.No.44, WR (R) Dept.,dt.09-09-2021, as per Cir. Memo. No.ICD01-COOR/ 167/ Reforms/2020-21,dt.09-09-2021,the bidder is required to submit proof of payment of annual professional tax for the previous year by duly uploading the same and to produce the original when required as part of the eligibility criteria in the bid evaluation. If not already having AP GST registration, AP GST registration shall be obtained and submitted the application to Department for issuance of LOA, if he becomes successful bidder. An undertaking to this effect in Rs. 10/- Stamped paper shall be given. If the successful bidder fails to submit Valid AP GST registration in time, he is liable not only for forfeiture of EMD/Security Deposit but also Penal and Legal actions.

Note: The Partnership firms, which are registered as Contractors shall intimate the change in partnership deed, if any, as per GO Ms No.58, I & CAD, dt.23.4.2002 within one month of such change. Failure to notify the change to the registration authority in time will entail the firms to forfeit their registration and their tender will be rejected. The intimation of change of partners if any and the acceptance by the Registration authority may be enclosed.

d) Value of all Civil Engineering building works executed every year during the last five financial years (i.e., from **2017-2018 to 2021-2022**) in Statement - I.

e) **(i) Details of similar works completed in the name of the tenderer as Prime Contractor during the last five financial years i.e., from 2017-2018 to 2021-2022 showing year wise break up of value of work executed in Statement - II. (Similar Works means Construction of RCC Multistoried buildings 12 floors and above).**

(ii) Details of satisfactorily Completion of one work of RCC Multistoried building(s) 12 floors and above under single contract with a built up area of 7,70,000 sqft and above including MEP works, Finishing works, Electrical works, Firefighting etc., for any of the Government Departments/Government autonomous Bodies/Government Public Sector Undertakings.

f) Year wise specified quantities executed by the tenderer during the last five financial years in Statement-III

g) Details of the existing commitments i.e., works on hand and works for which tenders are submitted in Statement - IV. (all works)

h) Availability of Key & critical construction/quality control equipment in Statement - V;

i) Availability of key personnel for administration / site management and execution viz., technical personnel required for the work (Statement - VI);

j) Information regarding any litigation, with Government during the last five years, in which the Tenderer is involved in (Statement - VII);

k) Availability of working capital for the work [Liquid assets, credit facility and availability of other financial resources such as solvency etc];

l) The proposed methodology and program of construction, backed with equipment planning and deployment, duly supported with broad calculations, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones.

m) The particulars of quality control testing Lab owned, OR tie up with established quality control testing laboratories for the value of works more than Rs.200.00 lakhs. The equipment as detailed in Sl. No. 12 (4) under Notice Inviting Tenders is required

n) A self-declaration by the bidder in proof of going through all bid conditions.

o) Consent letters from eligible contractors for Electrical works with "A" Grade License along with their registrations is required, if registration in APSPDCL OR SIMILAR STATE OR GOVT DEPARTMENTS is not available.

p) Copy of proof of payment of professional tax for the previous year (2021-22).

NOTE: i) The bidder shall sign all the statements/documents and certificates uploaded by him owning the responsibility for their correctness/authenticity. The certificates shall invariably be self-attested failing which they are liable to be rejected.

ii) The bidder shall produce the originals when required as part of the eligibility criteria in the bid evaluation.

2.6.2 Conditions/Requirements for Joint venture.

Joint Venture will also be allowed for participation in the bid for the subject work.

Requirements of Joint Venture:

(i) The Joint Venture/ Consortium not exceeding two bidders/ contractors, who are either individuals or firms or other entity only permitted. In case if Joint venture registration is not available at the time of bidding, an MOU on Rs 100/- non-judicial stamp paper to be provided and Joint Venture registration must be provided before entering into the agreement.

(ii) Both the partners of the Joint Venture should be of Special Class (civil) Contractors (eligible to quote this value of work as per the terms and conditions of Registration certificate).
Also, at least one of the Partners should have satisfactorily completed one work of RCC Multistoried building(s) of 12 Floors and above under single contract with a built up area of 7,70,000 sft and above including MEP works, Finishing works, Electrical works, Firefighting etc., for any of the Central (or) State Government departments (or) Central (or) State Government Autonomous bodies (or) Central/state public sector undertakings.

(iii) The qualifying criteria parameter i.e for financial resources (turnover) of the individual partners of the JV will be added together, for the relevant period, and the total criteria should not be less than as per the requirement of the NIT

(iv) The individual credentials of both partners of the Joint Venture will be added together for the relevant period and total criteria should be as per the requirement of the NIT regarding qualifying criteria parameters i.e value of similar nature of work executed as prime contractor and required minimum quantities as per NIT

(v) The formation of Joint Venture or change in the Joint Venture character/ partners, after submission of the bid and/ or any change in the bidding regarding Joint Venture will not be permitted.

(vi) In case of successful bid by Joint venture, the agreement shall be signed, so as to legally bind all partners jointly (i.e by both the partners) and severally and bid shall be submitted with a copy of the Joint Venture Agreement providing the joint and several liabilities with respect to the contract.

(vii) The JV Agreement must include the relationship between joint venture partners in the form of JV Agreement to legally bind all partners jointly and severally for the proposed agreement which should set out the principles for the constitution, operation, responsibilities regarding work and financial arrangements, participation (percentage share in the total) and liabilities (joint and severally) in respect of each and all of the firms in the joint venture. Such JV Agreement must evidence the commitment of the parties to bid for the facilities applied for and to execute the contract for the facilities if their bid is successful.

(viii) One of the partners shall be nominated for being in charge of the contract and shall be designated as Lead Partner with condition of that lead partner shall not be less than 51% share in Joint Venture. This authorization shall be evidenced by a Power of Attorney signed by legally authorized signatories of all the partners at the time of bidding.

(ix) The JV Agreement must provide that the Lead Partner shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the Joint Venture and the entire execution of the contract shall be done with active participation of the Lead Partner.

(x) The contract agreement should be signed jointly by each Joint Venture Partners. Subsequent declaration/ letters/ documents shall be signed by the lead partner authorized to sign on behalf of the Joint Venture or by the authorized signatory on behalf of the JV.

(xi) The bid should be signed by both the partners of the Joint Venture.

(xiii) An entity can be a partner in only one Joint Venture. Bid submitted by Joint Ventures including the same entity as partner will be rejected.

(xiv) The JV agreement may specify the share of each individual partner for the purpose of execution of this contract. This is required to fulfil eligibility and also for the purpose of apportioning the value of the contract to that extent to individual partner for subsequent submission in other bids if he intends to do so for the purpose of the qualification in the bid.

(xv) The Earnest money/ Bid security/ Bank guarantee is to be submitted by the Joint Venture (JV) only.

(xvi) The JV agreement must be specific that it is valid for the project for which the bidding is done. If the JV breaks up midway before award of work/during bid validity period the bid will be rejected. If the JV breaks up midway before award of work/ during bid validity/ after award of work/ during pendency of the contract; in addition to normal penalties as per provisions of the bid document, all the partners of the JV shall be debarred from participating in future bids for a minimum period of 36 months in TUDA.

(xvii) JV agreement shall be registered in accordance with the law so as to become legally valid and binding on the members before making any payment.

(xviii) JV shall open a Bank Account in the name of JV and all payments due tothe JV shall be credited by TUDA to that account only. To facilitate statutory deductions all statutory documents like PAN/GSTIN, etc. in the name of the Joint Venture shall be submitted by JV before making any payment.

(xix) The Joint Venture must be duly registered as Partnership firm with joint liability unlimited. In case if Joint venture registration is not available at the time of bidding, an MOU on Rs 100/- non-judicial stamp paper to be provided and Joint Venture registration must be provided before entering into the agreement.

(xx) Both the JV partners shall have valid GST Registration with Commercial Tax department of A.P. Shall submit proof of payment of professional tax for the previous year for both firms.

(xxi) Both the JV partners should furnish copy of Permanent Account Number (PAN) card and copy of latest Income Tax returns

(xxii)Liquid assets / credit Facilities / Solvency certificates of the individuals of the JV shall be of their share value agreement percentages totaling to the requirement as per NIT.

(xxiii) Statement showing the existing commitments of partners of the Joint Venture shall be sum of the individual commitments.

(xxiv) Information on Litigation history in which either member of Joint Venture involved, if any.

(xxv) A declaration regarding key & critical equipment owned/leased shall be produced by the lead partner on a non-judicial stamp paper of Rs.100/-.

(xxvi) For Annual turnover in Civil Engineering works, combined resources of the partners of the Joint Venture will be considered.

(xxvii) The bidder (either Individual or Company or any group of any among them not exceeding two members formed as Joint Venture and registered as a partnership firm with name of all partners should be shown in the registration of firms) against whom Vigilance / disciplinary / blacklisting cases are pending in the TUDA are not entitled to participate in the tender for the above work.

(xxviii) The JV partners should be responsible for liability individually proportionate to the extent of their share in the JV and jointly for 100% share.

(xxix) The change of MOU/ Joint Venture partner shall not be accepted under normal conditions after submitting the Bid documents. However the change in joint venture/MOU partner may be considered in the event of insolvency, death, stoppage of business, abstaining from country for longer period and participation in terms of people's representation Act of India etc, only with the prior approval of the TUDA.

(xxx). The TUDA reserves the right to reject such requests/proposals from any joint venture / MOU partner if it adversely affects the Joint venture/ MOU strength.

(xxxi). The Bidder nominated as in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and both partners of the MOU/Joint venture and the entire execution of the contract including payments shall be made in favour of joint venture only.

(xxxii) Both partners of MOU/Joint Venture shall be liable jointly and severally responsible for the execution of contract in accordance with contract terms and a relevant statement to this effect shall be included in the MOU/Joint Venture partnership deed.

(xxxiii) The Bidder either Individual or other legal entity like JV or Partnership or even any member of the JV/partnership applied for or availed corporate debt restructuring /strategic debt restructuring and not cleared loan for more than six years/ whether DRT/NCLT proceedings pending or not, is not eligible to participate in the bid.

(xxxiv) Each bidder shall submit only one Tender for the work. A Bidder who submits more than one Tender either in the form of individual or a partner in the firm / J.V. partners / Companies will cause dis-qualification of all the Tenders submitted by the Bidder.

(xxxv) i) The non-lead member shall execute a Power of Attorney (duly stamped and notarized or registered) in favor of the Lead Member authorizing the Lead

Member to conduct all business for and on behalf of the Consortium/ J.V. during (a) Tendering process and (b) execution and for successful performance of the Works including the Defect Liability and Operation and Maintenance periods in case of award of work.

ii) All the Consortium /J.V. Partners shall execute a Power of Attorney in favor of one of its officers to be the Authorized Signatory for signing the Bid Documents and also to undertake all other acts and deeds on the behalf of the Consortium/J.V. in connection with the Bid and the Contract.

iii) All the Consortium /J.V. members/partners shall be responsible for the contract work completion and for defect liabilities, operation and maintenance if any and for further three months jointly and severally and they shall undertake to the same effect so that they cannot terminate the Consortium / Joint Venture of partnership meantime.

iv) The authorisation if at all to be given other than to the lead member as managing partner for this purpose of this bids, it shall be by a duly stamped and registered or notarized power of attorney by other partner.

v) All the Consortium /J.V. members/partners shall give written undertaking that none of them are disqualified either by black listing in any government contract within India nor involved in any criminal cases and no any insolvency or bankruptcy proceedings pending against them.

2.7 QUALIFICATION CRITERIA FOR OPENING OF THE PRICE BID and for e-Reverse auction

A) To qualify for opening the Price Bid each contractor / firm in its name, should have, during the last five financial years from **2017-2018 to 2021-2022**(specify the financial years; those immediately preceding the financial year in which the tenders are invited).

B) **(i**) Satisfactorily completed as a PRIME CONTRACTOR, Similar works of value not less than **Rs.46,87,61,575.87**[at current price level] in any of one year during last 5 financial years i.e.,**2017-2018 to 2021-2022and updated to 2022-23.**

(ii) Similar works means, BUILDING works of following types only:

(a) Construction of RCC Multi-storied buildings 12floors and above.

(b) RCC Multi-storied buildings 12 Floors & above can include floors in Basement/Stilt.

1) The cost of completed works of previous years shall be given weightage of 10% per year to bring them to current price level, (the financial year in which bids are invited).

C) **The contractor should have satisfactorily completed one work of RCC Multi-storied building(s) 12 floors and above under single contract with Plinth area of 7,70,000 sqft and above, including MEP works, Finishing works, Electrical works, Firefighting etc., for any of the Central (or) State Government departments (or) central or state government autonomous bodies (or) Central/state public sector undertakings.**

D)

(i) Each Bidder should have executed the following minimum quantities in any one financial year during the last five years period from i.e., from **2017-2018 to 2021-2022**

Sl.No	Description of item	Quantity
1.	CC/RCC/VCC	**11920.00 Cum**
2	Providing Reinforcement of Fe415 / Fe500 / Fe250 / Fe550 / Other grades (or) Combined quantity	**878.20 MT**

E) **Each bidder should further demonstrate:**

Availability [either owned or leased or to be procured] of the following key and critical equipment for this work. The bidder should submit the latest Certificate obtained from the Executive Engineer / Invoices for the owned machinery and lease deed along with proof of owning machinery for the leased machinery and for the machinery to be procured. Should possess the Key/Critical equipment (either owned or leased)

Sl.No	Equipment type and characteristics	Minimum Nos. required
1	Pin vibrators	10 Nos
2	Pan vibrators	10 Nos
3	TowerCranes	1 No
4	BATCHING PLANT not less than 30 cum /per hour / Yard or Site	1 No
5	Concrete mixers with hopper	2 Nos
6	Concrete Pump of Capacity----	1 No
7	Lorry / Tippers	5 Nos
8	Transit Mixers	5 Nos

The tenderer has to upload a certificate for availability of critical equipment issued by the Executive Engineer(or) Declaration on non-judicial stamp paper worth Rs. 100/- as prescribed in Statement-V of Tender Schedule along with proof of document in support of owning, such as invoice / certificate of registration by competent authority in support of the critical equipment.

In case of lease the tenderer should upload the lease deed executed on Non - judicial stamp paper worth Rs 100/- with work specific along with sufficient proof in support of owning the equipment by the Lessor such as invoice/certificate of Registration.

The lease period shall be for a period not less than 27 months covering the contract period of 27 months to count from date of LOA followed by contract agreement and with a provision that in case of any extensions of time of completion the lease shall be under taken to be extended till completion & commissioning

Note: The major equipment to attain the completion of works in accordance with the prescribed construction schedule is to be shown in the above table.

Quality Control laboratory

The bidder shall submit quality plan and also show proof of owning Quality Control Laboratory OR tie up with established quality control testing laboratories with NABL Accreditation because this work is costing more than 2.00 Crores. The following equipment is required for the work site:

1.	Vernier calipers 0-150 mm	:	**3** Nos
2.	Screw gauge 0-25 mm:	:	3Nos
3	Measurement tapes both Steel (3.0 m, 5.0 m) & Fiber (15.0 m) 30 cm steel scale:	:	5 Noseach
4	Weighing Machines 5.0 kg capacity	:	3Nos
5	Sieves for Coarse aggregate	:	3Sets
6	Sieves for fine aggregate	:	3Sets
7	Cube moulds ISI marked 150 x150 x 150 mm	:	30Nos
8	Compression Test Machine 100 MT:	:	1 No / Arrangement for testing at approved lab.
9	Slump cone	:	3 Nos
10	Carpenter'ssquare150mmwith graduations	:	6 Nos
11	Electrical Meggar 1100 V	:	6Nos
12	Spirit level	:	6Nos
13	Plumb bobs	:	6Nos
14	Measuring Jars 250ml	:	6 Nos
15	Magnetic compass	:	2Nos
16	Non-destructive concrete strength equipment	:	1No
17	Cement testing equipment	:	1 Set

Availability of the Key personnel: ***must be the full time employees and out of them atleast 30% must be having experience in Quality control.***

i. **Graduate Engineer (Civil) - 4 Nos**.
ii. **Graduate Engineer (Mechanical)- 2 Nos**
iii. **Graduate Engineer (Electrical) - 2 Nos.**
iv. **Safety Engineer- 1 No.**

F) Liquid assets and / or credit facilities of not less than**Rs.23,43,80,787.94** (Credit facility / letter of credits / Solvency certificates from Nationalized Banks or any scheduled commercial bank etc.). The solvency certificate should not older than one year from the date of bid submission and should have the validity sufficiently beyond the date of tender.

G) The tenderer shall submit the copies of documents of (i) Registration as Civil Contractor required as per NIT (ii) Registration copy GST Act 2017 i.e Taxpayer Identification Number (iii) PAN Card and copy of latest I.T returns submitted along with proof (iv) Necessary B.G / Online payment towards E.M.D. (v) Transaction fee at 0.03% of ECV+ GST as applicable of ECV (as generated at the time of bidding) through the electronic payment Gateway.

H) Information on litigation history in which bidder is involved if any.

I) Signed undertaking of tenderer.

J) The price-bids of such tenderers who are determined to have complied with the eligibility criteria, will only be opened.

K) If the office happens to be closed on the dates specified above, the respective activity will be performed at the designated time on the next working day without any notification.

L) The Bidder shall authenticate the bid with his digital certificate for submitting the bid electronically on e-Procurement Platform and the bids not authenticated by Digital certificate of the bidder will not be accepted on the e-Procurement platform.

2.8 Bid capacity.

Assured available Bid capacity as per formula (2AN-B) shall be greater than Internal Bench Mark value / ECV assessed by Department/TUDA

The tenderer who meets the above qualification criteria and whose available bid capacity is more than the estimated contract value will be qualified for opening of Price bid. The available bid capacity will be calculated as under:

Available Bid Capacity : **2AN-B ≥ ECV (i.e., 210,94,27,091.40)**
Where,

A= Maximum value of civil engineering works executed in its name in any one financial year during the last five financial years (updated to current Price level) taking into account the works completed as well as works in progress**. If this is from CA's certificate, it should clearly certify the turnover is from works from Government Departments/ Government Autonomous Bodies/ Government Public Sector Undertakings/TUDA.**

N= Number of years prescribed for completion of the work for which Tenders are invited [months / 12].

B= Updated value (at current Price level), of all existing Commitments i.e., ongoing works, works likely to be awarded to be executed during the next / **2022-2023**years. (Period of completion for which Tenders are invited).

Annual turnover cost of completed works and balance works on hand etc., shall be updated by giving weightage of 10% per year to bring them to current price level. **If the certificate is from chartered accountant, it should clearly specify that the turnover is from civil works from Government Departments/ Government Autonomous Bodies/ Government Public Sector Undertakings/TUDA. Then only CA s certificate will be considered. If necessary, TUDA can ask for Bank Scrolls of contractor.**

Experience relating to the works executed in State / Central Government Departments or State / Central Government under takings in India / Semi Govt /PSUS/Quasi Govt /TUDA shall only be considered.

No relaxation will be given to any of the qualification criteria.

Note:a) Sub-contractor's experience, in his name will be taken in to account in determining the Tenderer's compliance to the Qualification criteria, if it is as per GO Ms No.8, dated 8.1.2003.

b) The experience gained in a registered JV firm to the extent of the Tenderers share shall be considered if the tenderer happens tobe the lead partner, for similar works criteria also.

c) The GPA holder's experience shall not be taken into account in determining the bidder's compliance with qualifying criteria.

d) The "B" value as to the existing commitments and on going works concerned, it invariably requires certification by the Superintending Engineer concerned. Without compliance to the above, the calculation shown by the bidder simply on bid capacity cannot be considered but for rejection of bid on the said requirement".

e) The "A" value(maximum) of Civil Engineering works concerned, it invariably requires certification by the Superintending Engineer concerned.

f) In case the bidder submits that there are no existing commitments and ongoing works anywhere in the country, he shall file an affidavit to that effect duly notarized with undertaking for civil, criminal and other legal courses besides the right of the employer to terminate the contract at any time, if anything found in the affidavit information is untrue.

g) Without compliance to the above, the calculation shown by the bidder simply on bid capacity cannot be considered but for rejection of bid on the said requirement".

2.9 <u>Even though the tenderers meet the above qualifying criteria, they are liable to be disqualified and debarred / suspended / blacklisted if they have</u>

i. Furnished false / fabricated particulars in the forms, statements and / annexures submitted in proof of the qualification requirements and/or

ii. Not turned up for entering into agreement, when called upon.

iii. record of poor progress such as abandoning the work, not properly completing the contract, inordinate delays in completion, litigation history or financial failures etc. and/or

iv. participated in the previous bidding for the same work and had quoted unreasonably high tender percentage and

v. even while execution of the work, if found that the work was awarded to the Contractor based on false / fake certificates of experience, the Contractor will be blacklisted and work will be taken over invoking clause 61 of PS to APSS.

vi. The tender of the contractor will be disqualified along with the forfeiture of E.M.D and the contractor will be debarred from future tendering for a further period of 3 years in the event of furnishing of false/fraudulent certificates along with the tender

2.10 Tenders with an excess of above 5% of the estimated contract value shall summarily be rejected as per G.O.Rt.No.230, T.R&B (R.I) Dept., Dt.13.08.2007 &*GO.MS.No.133, I & CAD, DATED.20-11-2004)*

2.11 As per GO MS No.50 Water Resources(Reforms) Department, dated15-10-2020 Tenders up to 25% less (-25%) than the estimate may be accepted. Tenders which are less beyond minus 15% {(<-15%)}of the estimate but up to minus 25%, a Bank Guarantee or Demand Draft for the difference between the tendered amount and 85% of the estimate value should be taken, over and above other guarantee, which would be released after the completion of work with other Bank Guarantees. Illustration: If a L1 bidder quotes Rs 75 for an estimated value of Rs.100, then the bidder will have to give an additional BG/ of Rs. 10/- {Rs.85 (that is 85% of Est. Value)- Rs 75 (Tendered amount)}.

2.12 a) If the percentage quoted by a tenderer is found to be either abnormally high or with in the permissible ceiling limits prescribed but under collusion or due to unethical practices adopted at the time of tendering process, such tenders shall be rejected.

b) A tenderer submitting a Tender which the tender accepting authority considers excessive and or indicative of insufficient knowledge of current prices or definite attempt of profiteering will render himself liable to be debarred permanently from tendering or for such period as the tender accepting authority may decide. The tenderer overall percentage should be based on the controlled prices for the materials, if any, fixed by the Government or the reasonable prices permissible for the tenderer to charge a private purchaser under the provisions of clause-6 of the hoarding and profiteering prevention ordinance of 1943 as amended from time to time and on similar principle in regard to labor supervision on the construction.

2.13 <u>One Tender per Tenderer</u>

Each Tenderer shall submit only one Tender for the work. A Tenderer who submits more than one Tender will cause dis-qualification of all the Tenders submitted by the Tenderer.

2.14 <u>Cost of Tendering</u>

The Tenderer shall bear all costs associated with the preparation and submission of his Tender and the tender inviting authority will in no case be responsible and liable for those costs.

2.15 <u>Site visit and duty to utilise best of the available resources:</u>

The bidder/contractor along with qualified engineers of expertise must at his expense visit the site of the works contract and also the available quarries and sand points as well as sources of water etc., and make use/utilise best of the available resources and also upload the photographs of said site visit. ***After submission of the bid and Letter of Acceptance issued, no contractor can claim that the Site Visit not properly made. It is deemed for all purposes that the Site Visit has been properly conducted by the contractor with any Technical Assistance required at their cost and with their men, for nothing contra is left open to raise.***

B. TENDER DOCUMENT

2.16 Contents of Tender document.

One set of Tender document, comprises of the following:

a. Technical bid

1) Notice Inviting Tenders (NIT)
2) Instruction to Tenderers
3) Forms of tender and qualification information
4) Tender
5) Conditions of Contract.
6) Technical Specifications
7) Drawings.
8) Forms of Securities i.e., EMD, Additional Security etc.,

b. Price bid

1) Bill of Quantities and Price bid. Schedule-A
2) Bill of quantities – part-II (Reimbursable provisions)

2.17 Clarification on Tender Documents

A prospective Tenderer requiring any clarification on Tender documents may contact the Bid Opening Authority at the address indicated in the NIT. **There will be no separate pre bid meeting after completion of Judicial Preview process and there will no change contrary to the process supra to seek even as clarification.**

2.18 Amendment to Tender Documents

2.18.1 Before the last date for submission of tenders, the tender inviting officer may modify the contents of the Tender Notice, Tender documents by issuing amendment / addendum.

2.18.2 Any addendum/amendments issued by the Tender Inviting Officer shall be part of the Tender Document and it shall either be communicated in writing to all the purchasers of the Tender documents or notified in the News Papers/ e-Procurement site in which NIT was published.

2.18.3 To give prospective Tenderers reasonable time to take an addendum into account in preparing their bids, the Tender Inviting Officer may extend if necessary, the last date for submission of tenders.

C. PREPARATION OF TENDERS.

2.19 Language of the Tender.

All documents relating to the tender shall be in the English Language only.

2.20 Documents comprising of the tender.

2.20.1 The bidders who are desirous of participating in e-procurement shall submit their technical bids, price bids etc., through online in the standard prescribed in the tender documents, displayed at e market place. The bidders should upload the scanned copies of all the relevant certificates, documents etc., in the e market place in support of their technical bids. The bidders shall sign on all the statements, documents, certificates, uploaded by him, owning responsibility for their correctness/authenticity.

2.20.2 As per the G.O. Ms. No. 174, Irrigation & CAD (PW-Reforms) Department, Dated: 01-09-2008, Submission of original Hard Copies of the uploaded scan copies of BG towards EMD by participating bidders to the tender Inviting authority before opening of the price bid is dispensed with. All the bidders shall invariably upload the scanned copies of BG in e- Procurement system and this will be the primary requirement to consider the bid as responsive. The Department shall carry out the technical bid evaluation solely based on the uploaded certificates/documents, BG towards EMD in the e-procurement system and open the price bids of the responsive bidders. The Department will notify the successful bidder for submission of original hard copies of all uploaded documents, BG / Payment of online receipt towards EMD, certificates, prior to entering into agreement.

However as per GO.MS.No.50 WATER RESOURCES (REFORMS) DEPARTMENT, Dated: 15-10-2020 only those bids will be evaluated and considered for comparison to arrive at L1 value and allowed to participate in reverse bidding in whose favour an authorized communication or a letter or a scanned and uploaded copy of that letter on e- procurement Website or an e-mail from the issuing bank or any authorized communication from the bank with regard to issue of the Bank Guarantees is sent to the Tender Inviting authority within the stipulated time.

2.20.3 The successful bidder shall invariably furnish the original BG /Payment of online receipt towards EMD, certificates/documents of the uploaded scanned copies to the Tender Inviting Authority before entering into agreement either personally or through courier or post and the receipt of the same with in the stipulated date shall be the responsibility of the successful bidder.

2.20.4 The Department will not take any responsibility for any delay in receipt/non-receipt of original BG / Payment of online receipt towards EMD, certificates/ documents, from the successful bidder before the stipulated time. On receipt of documents, the Department shall ensure the genuinity of the BG towards EMD and all other certificates / documents uploaded by the bidder in e-Procurement system in support of the qualification criteria before concluding the agreement.

2.20.5 If any successful bidder fails to submit the original Hard Copies of uploaded certificates/Documents, BG / Payment of online receipt towards EMD with in the stipulated time or if any variation is noticed between the uploaded documents and the hard copies submitted by the bidder, the successful bidder will be suspended from participating in the tenders on e-Procurement platform for a period of 3 years. The e-Procurement system would deactivate the user ID of such defaulting successful bidder based on the trigger/recommendation by the Tender Inviting Authority in the system. Besides this, the Department shall invoke all processes of law including criminal prosecution of such defaulting bidder as an act of extreme deterrence to avoid delays in the tender process for execution of the development schemes taken up by the Government. The information to this extent may be displayed in the e-procurement platform website.

2.20.6 The bidder shall mandatorily pay the transaction fee to APTS through the electronic payment Gateway.

2.20.7 The tenderers shall furnish a declaration in online stating that the soft copies uploaded by them are genuine. Any incorrectness/deviation noticed will be viewed seriously and apart from canceling the work duly forfeiting the EMD, criminal action will be initiated including suspension of business.

2.20.8 The Bidder shall authenticate the bid with his digital certificate for submitting the bid electronically on e-procurement Platform and the bids not authenticated by Digital certificate of the bidder will not be accepted on the e-procurement platform.

2.20.9 The technical bids will be opened on line by the concerned Executive Engineer, TUDA/ Vice Chairman, TUDA at the time and date as specified in the tender documents. All the statements, documents, certificates, BG etc., uploaded by the tenderers will be down loaded for technical evaluation. The clarifications, particulars if any required from the bidder swill be obtained or in the conventional method by addressing the bidders. The technical bids will be evaluated against the specified parameters/ criteria, same as in the case of conventional tenders and the technically qualified bidders will be identified.

2.21 Bid Offer:

2.21.1 Bill of Quantities called Schedule "A" and the bid offer accompanies the tender document as Volume - II. It shall be explicitly understood that the Tender Inviting Officer does not accept any responsibility for the correctness or completeness of this schedule 'A' and this schedule 'A' is liable to alterations by omissions, deductions or additions at the discretion of the Vice-Chairman or as set forth in the conditions of the contract. The Schedule "A" shall contain the items of work indicated as part-I and the LS provisions as Part-II. The percentage quoted by the contractor shall be applicable only to Part-I of Schedule "A" items. However the provisions contained in the Part-II will be operable basing on the conditions provided in the tender document. The tenderers will have to state clearly their willingness to execute the work at certain specific percentage of excess or less or at par of the ECV indicated in Part-I in the space provided therein in Schedule 'A'. The tenderer should however quote his lump sum tender based on this schedule of quantities. He should quote his offer as a overall tender percentage.

2.21.2 The Schedule –A (or Price-bid) contains not only the quantities but also the rates worked out by the Department and the amount for each item and total value of the estimated contract. The tenderer should workout his own rates keeping in view the work, site conditions and quote his overall tender percentage with which he intends to execute the work. The rates shall be inclusive of maintenance till the completion of defect liability period

2.21.3 The bid offer shall be for the whole work and not for individual items / part of the work.

2.21.4 All duties, taxes, and other levies payable by the contractor as per State / Central Government rules shall be included in the tender percentage quoted by the tenderer, however keeping in view the maximum reimbursable amounts specified Part-II of price bid.

2.21.5 The tendered contract amount as computed based on tender percentage is subject to variation during the performance of the Contract in accordance with variation in quantities etc.,.

2.22 Charges Payable to APTS

The successful Bidder will pay further fee @ 0.04% of TCV i.e., payable to APTS.

Once the L-1 bidder is finalized, the system automatically generates the e-Procurement fund (Corpus Fund) to be paid.

The option for payment of e-Procurement Fund (Corpus Fund) is enabled to Bidders / Contractors in their login.

2.22.1 (The ceiling amount of Transaction fee for works costing ECV up to ₹. 50.00 crores is ₹ 10,000/- and for works costing with ECV above ₹ 50.00 Crores the ceiling amount of transaction fee is ₹ 25,000/-) to create e procurement corpus fund to be administered by APTS. The above fee is payable by the successful bidder through online payment in favour of M/S APTS , Vijayawada at the time of conclusion for the agreement. The copy of receipt shall be submitted to the VC, TUDA, who is entering in to agreement with the successful bidder.

2.23 Validity of Tenders:

2.23.1 Tenders shall remain valid for a period of not less than **FOUR Months** from the last date for receipt of Tender specified in NIT.

2.23.2 During the above mentioned period no plea by the tenderer for any sort of modification of the tender based upon or arising out of any alleged misunderstanding of misconceptions or mistake or for any reason will be entertained.

2.23.3 In exceptional circumstances, prior to expiry of the original time limit, the Tender Inviting Officer may request the bidders to extend the period of validity for a specified additional period. Such request to the Tenderers shall be made in writing. A Tenderer may refuse the request without forfeiting his E.M.D. A Tenderer agreeing to the request will not be permitted to modify his Tender, but will be required to extend the validity of his E.M.D. for a period of the extension.

2.23.4 Earnest Money Deposit

2.23.5 The Tenderer shall furnish, Earnest Money Deposit of **Rs.2,10,95,000/-**at the time of tender (Para 7.0 of GO Ms. No 36) either in the form of BG / Online payment. The BG shall be from a Scheduled Commercial Bank valid for a period of 6 months (six months in case of BG) photo copy of the BG is to be scanned and uploaded along with the Bid and as per the G.O.Ms 174, I&CAD (PW-Reforms) Department dated 01-09-2008 , that the successful bidder found defaulting in submission of hard copies of uploaded certificates / documents, original BG towards EMD with in the stipulated time i.e. before concluding the agreement or if any variation is noticed between the uploaded documents and the hard copies submitted by the successful bidder, the successful bidder will be suspended from participating in tenders on e-Procurement platform for a period of three years.

- The EMD payable at the time of tender shall be 1%of ECV in the shape of BG / on line payment. The BG furnished towards EMD along with tender shall be valid up to 6 months initially.

- After issue of LOA, the successful bidder shall submit the same along with the submission of hard copies of tender documents. The same will be discharged, on submission of DD/new BG (As per proforma prescribed for EMD for successful bidder), for 1 % contract value and additional security deposit (If ASD applicable) by way of DD / BG from Scheduled Bank. This new BG furnished for EMD shall be valid up to project completion period + DLP period of 60 months + 28 days grace period. Also, the BG furnished for ASD (For applicable cases only) shall be valid up to project completion period + 28 days grace period.

- In case any valid extension of contract period is granted, the validity of EMD BG shall also be extended for the corresponding period. The Bank Guarantee furnished towards additional security amount, if any shall also be extended till the work is completed in all respects.

2.23.6 The Earnest Money deposited by the successful tenderer will not carry any interest and it will be dealt with as provided in the conditions stipulated in the tender.

2.23.7 **The E.M.D. shall be forfeited.**

(a) In the case of a successful tenderer, if he fails to sign the Agreement for whatever the reason.

(b) In consideration of the Executive Engineer / Superintending Engineer /Chief Engineer of Tenders undertaking to investigate and to take into account each tender and in consideration of the work thereby involved, all earnest money deposited by the tenderer will be forfeited to the TUDA, Tirupati in the event of such tenderer either modifying or with-drawing his tender at his instance within the said validity period of four months.

2.24 Signing of Tenders

2.24.1 If an individual makes the tender, it shall be signed with his full name and his address shall be given. If it is made by a firm, it shall be signed with the co-partnership name by a member of the firm, who shall also sign his own name, and the name and address of each member of the firm shall be given, if the tender is made by a TUDA it shall be signed by a duly authorized officer who shall produce with his tender satisfactory evidence of his authorization. Such tendering TUDA may be required before the contract is executed, to furnish evidence of its corporate existence. Tenders signed on behalf of G.P.A. holder will be rejected.

2.24.2 The Tender shall contain no alterations or additions, except those to comply with instructions issued by the Tender Inviting Officer, or as necessary to correct errors made by the Tenderer, in which case all such corrections shall be initialed by the person signing the Tender.

2.24.3 No alteration which is made by the tenderer in the contract form, the conditions of the contract, the drawings, specifications or statements / formats or quantities accompanying the same will be recognized; and, if any such alterations are made the tender will be void.

D. SUBMISSION OF TENDERS.

2.25 Submission of Tenders:

2.25.1 The tenderer shall invariably ensure that the scanned copies of the following documents are uploaded and attached online towards qualification criteria furnished by them:

a) All the items as listed in Check list

b) Copy of contractor's registration certificate under appropriate class with Government of Andhra Pradesh / TUDA / CPWD etc.,

c) Copy of Permanent Account Number (PAN) Card and copy of latest Income Tax returns submitted along with proof of receipt.

d) Copy of GST Registration certificate. Copy of proof of payment of professional tax for the previous year (2021-22).

e) (i) Value of all Civil Engineering works executed every year during the last five financial years (i.e., from **2017-2018 to 2021-2022)** in Statement - I.

(ii) Details of satisfactorily Completion of **one work of RCC Multi-storied building(s)with 12 floors and above under single contract with Plinth area of 7,70,000 sqft and above** including MEP works, Finishing works, Electrical works, Firefighting etc., for any of the Central (or) State Government departments (or) Central/state public sector undertakings in Statement-I.

f) The details of similar works executed as Prime Contractor (in the same name) during the last five financial years, showing year wise break up of value of work executed in Statement-II duly supported with work done certificates, work wise.

g) The physical quantities of specified works executed as Prime Contractor (in the same name) in the last five financial years with year wise and work wise break up in Statement-III duly supported with work done certificates.

h) The information on 'existing commitments' with supporting certificates in Statement-IV.

i) The availability of Key / critical construction / quality control equipment in Statement-V & Statement-VIII.

j) The availability of Key personnel in Statement-VI.

k) The information and litigation history in Statement-VII.

l) Proof of Liquid assets in the shape of Solvency certificate for the required amount

m) Willingness for participation in Reverse Tendering.

NOTE: The bidders shall sign on all the statements, documents, certificates, uploaded by him, owning responsibility for their correctness/ authenticity.

2.25.2 The bidders who are desirous of participating in e-procurement shall submit their technical bids, price bids etc., through online in the standard prescribed in the tender documents, displayed at e market place. The bidders should upload the scanned copies of all the relevant certificates, documents etc., in the e market place in support of their technical bids. The bidders shall sign on all the statements, documents, certificates, uploaded by him, owning responsibility for their correctness/authenticity.

2.25.3 Furnishing of hard copies by the tenderers before opening of the Price bids is dispensed with.

2.25.4 The technical bid evaluation of the tenderers will be done on the certificates / documents uploaded through online only towards qualification criteria furnished by them.

2.25.5 The bidder shall mandatorily pay the transaction fee to APTS through the electronic payment Gateway.

2.25.6 The successful tenderer shall furnish the original hard copies of all the documents / certificates / statements uploaded by him before concluding agreement.

2.25.7 If successful tenderer fails to submit the original BG / Online payment receipt for EMD, hard copies of uploaded documents within the stipulated time, the tenderer will be suspended /disqualified from participating in the tenders on e-procurement platform for a period of 36 months from the date of bid submission. The suspension of tenderer shall be automatically enforced by the e-procurement system.

2.25.8 The tenderers shall furnish a declaration in online stating that the soft copies uploaded by them are genuine. Any incorrectness/deviation noticed will be viewed seriously and apart from canceling the work duly forfeiting the EMD, criminal action will be initiated including suspension from Participating in the tenders /blacklisting. Non-submission of the originals to be produced as and when required also leads to above consequences.

Note: Experience relating to works executed in State/Central Government Departments or State/ Central government undertakings and certificates issued by the Executive Engineer or equivalent officer and countersigned by Superintending Engineer or equivalent officer shall only be considered.

2.26 Important Note:

The Bidder shall authenticate the bid with his digital certificate for submitting the bid electronically on e-procurement Platform and the bids not authenticated by Digital certificate of the bidder will not be accepted on the e-procurement platform.

2.27 Last date / time for Submission of the Tenders.

2.27.1 Tenders must be submitted not later than the date and time specified in NIT. In the event of the specified date/time for the submission of bids declared as holiday, the bids will be received on the next working day.

2.27.2 The Executive Engineer, TUDA, may extend the dates for Bid submission / Price bid opening of Tenders by issuing an amendment in which case all rights and obligations of the Superintending Engineer/Chief Engineer will remain same as previously.

2.28 Modification to the Tender.

NO Tenders can be modified after the last date/time of submission of tenders.

E. TENDER OPENING AND EVALUATION

2.29 Tender opening

2.29.1 Clarification on the Technical Bid.

2.30 Examination of Technical Bids and Determination of Responsiveness

2.30.1 Only those bids will be evaluated and considered for comparison to arrive at L1 value and allowed to participate in reverse bidding in whose favour an authorised communication or a letter or a scanned and uploaded copy of that letter on e- procurement Website or an e-mail from the issuing bank or any authorised communication from the bank with regard to issue of the Bank Guarantees/ Demand Draft is sent to the Tender Inviting authority before opening of PQ stage as per GO.MS.No.50 WATER RESOURCES (REFORMS) DEPARTMENT, Dated: 15-10-2020

2.30.2 The Department shall carry out the technical bid evaluation solely based on the uploaded certificates / documents, BG / Online payment towards EMD / affidavit, in the e-Procurement system and open the price bids of the responsive bidders and proceed further for reverse auctioning.

2.30.3 If any condition is made by the tenderer as addition / alteration to the tender documents, the conditions of the contract, the drawings, specifications or statements / formats or quantities the tender will be rejected.

2.31 Price Bid Opening:

2.31.1 Only the price bids of qualified tenderers whose technical bids are found satisfying the eligibility criteria shall alone be opened on the date and time fixed.

2.31.2 The price bid of the unqualified tenderers will not be opened and thereafter E.M.D. will be returned to the tenderers.

2.31.3 Tenders shall be scrutinized in accordance with the conditions stipulated in the Tender document. In case of any discrepancy of non-adherence Conditions the Tender accepting authority shall communicate the same which will be binding both on the tender Opening authority and the Tenderer. In case of any ambiguity, the decision taken by the Tender Accepting Authority on tenders shall be final.

2.32 Evaluation and Comparison of Price Bids

E-AUCTION (REVERSE TENDERING)

2.32.1 After identifying, the eligible agencies / bidder will be allowed to participate in e-auction process on e - procurement plat form in terms of guidelines issued vide G.O.Ms.No.67, WR (Reforms) Dept., Dt.16.08.2019. and G.O.Ms.No.50, WR (Reforms) Dept., Dt.15.10.2020.

(a) After identification of the L-1 Initial Price Offer, eligible bidders shall be transferred to the Reverse Auction Platform.

(b) The initial period of the Reverse tendering process will start after 3 hours, following which there will be auto extensions of time by 15 minutes in case of any reduction in bids recorded in the prior 15 minutes.

(c) Only the current L-1 bid shall be visible to all bidders who may revise their bids until the end of process

(d) Decrements made in each subsequent bid shall not be less than 0.5%of the IBM / ECV uploaded.

2.32.2 **CONCLUSION OF THE REVERSE TENDERING PROCESS (AS PER G.O.Ms.No.67, WR (Reforms) Dept., Dt.16.08.2019. and G.O.Ms.No.50 , WR (Reforms) Dept., Dt.15.10.2020)**

(a) After conclusion of the reverse auction process, the L-1 Bidder will be declared and the EMDs of unsuccessful bidders shall be refunded.

(b) If any variation is noticed between the uploaded documents and the self-declaration submitted by the bidder, the bidder will be suspended from participating in the tenders on e-procurement platform for a period of 3 years. If any of the documents furnished by the bidder are found to be false / fabricated / Bogus, at any time the bidder will be black listed and the EMD will be forfeited.

2.32.3 Negotiations at any level are strictly prohibited. However, good gesture rebate, if offered by the lowest tenderer prior to finalization of tenders may be accepted by the tender accepting authority.

2.33 Process to be Confidential.

2.33.1 Information relating to the examination, clarification, evaluation and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Tenderers or any other persons not officially concerned with such process until the award to the successful Tenderer has been announced by the tender accepting authority.

2.33.2 Any effort by a Tenderer to influence the processing of Tenders or award decisions may result in the rejection of his Tender. The entire process of tender procedure shall be kept confidential and shall not be disclosed to any tenderers until the award to the successful tenderer been announced by competent authority.

2.33.3 No Tenderer shall contact the Superintending Engineer or any authority concerned with finalization of tenders on any matter relating to its Tender from the time of the Tender opening to the time the Contract is awarded. If the Tenderer wishes to bring additional information to the notice of the Superintending Engineer, It should be done so in writing.

2.33.4 Before recommending / accepting the tender, the tender recommending / accepting authority shall verify the correctness of certificates submitted to meet the eligibility criteria and specifically experience. The authenticated agreements of previous works executed by the lowest tenderer shall be called for.

2.33.5 Tenders will be finalized by the Executive Engineers / Vice Chairman, TUDA Authority according to the powers vested with them.

F. AWARD OF CONTRACT

2.34 Award Criteria

2.34.1 The Superintending Engineer/Chief Engineer will award or recommend to the competent tender accepting authority for award of the contract to the tenderer who is found technically qualified as per the tender conditions and whose price bid is lowest in Reverse Auction.

2.34.2 The tender accepting authority reserves the right to accept or reject any Tender or all tenders and to cancel the Tendering process, at any time prior to the award of Contract, without thereby incurring any liability to the affected Tenderer or Tenderers or any obligation to inform the affected Tenderer or Tenderers of the reasons for such action.

2.35 Notification of Award and Signing of Agreement.

2.35.1 The Tenderer whose Tender has been accepted will be notified of the award of the work by the Executive Engineer / Superintending Engineer / Chief Engineer, prior to expiration of the Tender validity period by registered letter. This letter (hereinafter and in the Conditions of Contract called "Letter of Acceptance") will indicate the sum that the TUDA will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Amount").**The LOA can also be sent by Fax / Email / Whatsapp.**

2.35.2 When a tender is to be accepted the concerned tenderer shall attend the office of the Superintending Engineer concerned on the date fixed in the Letter of acceptance. Upon intimation being given by the Executive Engineer / Superintending Engineer / Chief Engineer, of acceptance of his tender, the successful bidder, shall submit DD/new BG (As per proforma prescribed for EMD for successful bidder), for 1 % contract value and additional security deposit (If ASD applicable) by way of DD / BG from Scheduled Bank. The DD furnished shall be with validity period of 3 months. This new BG furnished for EMD shall be valid up to project completion period + DLP period of 60 months + 28 days grace period. Also, the BG furnished for ASD (For applicable cases only) shall be valid up to project completion period + 28 days grace period. This BG shall be drawn in favour of the VICE CHAIRMAN, TUDA, Tirupati. The successful bidder shall submit the above EMD & ASD (If applicable) and sign an agreement in the form prescribed by the department for the due fulfillment of the contract. Failure to attend the Executive Engineer's office on the date fixed, in the written intimation, to enter into the

required agreement shall entail forfeiture of the Earnest Money deposited. The written agreement to be entered into between the contractor and the TUDA shall be the foundation of the rights and obligations of both the parties and the contract shall not be deemed to be complete until the agreement is first signed by the contractor and then by the proper officer authorized to enter into contract on behalf of the TUDA

2.35.3 The successful tenderer has to sign an agreement within a period of 15 days from the date of receipt of communication of acceptance of his tender. This shall be done along with submission of all the uploaded documents, attested copies of uploaded documents BG/Online Payment Receipt for EMD, DD / BG as required at the time of concluding the agreement for EMD, online payment receipt towards e-Corpus Fund for APTS and other documents if any. On failure to do so his tender will be cancelled without issuing any further notice and action will be initiated for black listing the tenderer.

2.35.4 If the lowest bidder backs out at the time of agreement, penalty of forfeiture of EMD will be imposed and business of the agency will be suspended for one year with all the Departments in A.P in respect of conventional tenders also vide G.O.Ms.No. 259 of T, R&B (R.V) dept., dt. 6.9.2008.

2.36 <u>Corrupt or Fraudulent Practices</u>

2.36.1 The TUDA requires that the bidders/ suppliers / contractors under TUDA financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the TUDA.

(a) Define for the purposes of the provision, the terms set forth below as follows:

(i) "Corrupt practices" means the offering, giving, receiving or soliciting of anything of value to influence the action of a TUDA official in procurement process or in contract execution: and

(ii) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the TUDA and includes collusive practice among Tenderers (prior to or after Tender submission) designed to establish in Tender prices at artificial non-competitive levels and to deprive the TUDA of the benefits of free and open competition.

(b) Will reject a proposal for award if it determines that the Tenderer recommended for award has engaged corrupt or fraudulent practices in competing for the contract in question.

(c) Will blacklist / or debar a firm, either indefinitely or for a stated period of time, if at any time determines that the firm has engaged corrupt or fraudulent practices in competing for, or in executing a TUDA Contract.

(d) Furthermore, Tenderers shall be aware of the provisions stated in the General Conditions of Contract.

2.37 Right of the DEPARTMENT:

2.38.1 The Department reserves the right to reject any or all of the tenders, without assigning any reason whatsoever.

2.38.2 In the event of any dispute regarding any of the tender conditions, the decision of the Department shall be final.

2.38.3 During the execution of the work, Engineer-in-charge of the work reserves the right for their selves to withdraw any of the items/work to be executed from the scope of work.

2 Annexure –I

QUALIFICATION INFORMATION

3.1 CHECKLIST TO ACCOMPANY THE TENDER

S.No	Description	Uploaded	
1	2	3	
1	Copy of valid registration of the firm/Registration of Contractors under appropriate Class (i.e Special Class) with Government of Andhra Pradesh / TUDA / CPWD etc., Eligible to quote to the value of ECV of this work.	Yes / No	
2	Consent letters from eligible contractor's for Electrical works with "A" Grade License along with their registrations is required if self-registration is not available.	Yes / No	
3	The contractor shall furnish their copy of permanent account number PAN Card & Latest Income Tax Returns	Yes / No	
4	Registration copy under GST Act 2017 i.e. Taxpayer Identification Number in the prescribed proforma	Yes / No	
5	EMD by BG (valid for 6 Months) or Online payment as per NIT and also furnish copy of on line receipt in the case of on-line payment.	Yes / No	
6	**a)** Details of value of Civil Engineering works executed in the last 5 financial years in the Tenderers name in Statement-I with supporting certificates duly issued by the EEs and countersigned by the SE/Higher authorities OR Certificate from Chartered Accountant supported with Annual Balance Sheet tallying with I.T. Clearance certificate & Profit & Loss account. **(b) Details of satisfactorily Completion of one work of RCC Multistoried building(s) 12 floors and above under single contract with a built up area of 7,70,000 sqft and above including MEP works, Finishing works, Electrical works, Firefighting etc., for any of the Government Departments/Government autonomous Bodies/Government Public Sector Undertakings.**	Yes / No	
7	Details of similar works completed as Prime Contractor (in the same name) during the last five financial Years in Statement - II with supporting certificates duly issued by the EEs and countersigned by the SE/Higher authorities.	Yes / No	
8	Quantities of work executed as Prime Contractor (in the same name) in the last 5 financial years - in Statement III with supporting certificates.	Yes / No	

9	**(a)** Statement of existing commitments in ongoing Govt. works along with supporting experience certificates as in Statement- IVA **(b)** Statement of works for which tenders are submitted and likely to be awarded as in Statement IV-B **(c)** Note: Information about B value of the Bidders available through online will also be considered for evaluation purpose if necessary.	Yes / No	
10	Declaration on critical equipment on non- judicial stamp paper worth of Rs.100/- required for construction as per Statement-V.		
11	Declaration on quality control laboratory along with required equipment's on non-judicial stamp paper worth of Rs. 100/- as per statement-VIII		
12	Availability of Key personnel in Statement - VI.	Yes / No	
13	Litigation history in Statement - VII.	Yes/ No	
14	Proof of liquid assets / Credit facilities(Credit facility / letter of credits / Solvency certificates from Banks etc.) Not older than one year.	Yes / No	
15	List of certificates enclosed	Yes/No	
16	Declaration as per Annexure-II	Yes/No	
17	Declaration in on line stating that the soft copies uploaded by them are genuine and willingness to participate in Reverse Auction.	Yes/No	
18	The Tenderer shall submit quality plan and also show proof of owning quality laboratory.	Yes/No	
19	Any other certificates / declarations required as per NIT	Yes/No	
20	Partnership deed of Joint venture in case of Joint venture	Yes/No	
21	Copy of proof of payment of professional tax for the previous year (2021-22)	Yes/No	

Note:-

1. Documents may be uploaded in ZIP format with suitable description as defined above.

2. The scanned documents shall be **"legible"** failing which they will not be considered.

3. Shall sign on all statements, documents, certificates uploaded owning responsibility for their correctness/authenticity.

4. **All experience certificates issued by Government Departments including those in support of existing commitments issued by an Officer not below the rank of Executive Engineer and should be countersigned by the Superintending Engineer or equivalent authority.**

5. The E.M.D should be in shape of Online payment / BG / adhered to as per bid conditions. Any deviation will result in making the bid non-responsive. Further all other BG / Online payment to be submitted at the time of agreement and for advance payment should also be in the formats prescribed in the bid document.

6. All the statements, copies of the certificates, documents etc., enclosed to the technical bid shall be signed by the bidder and given page numbers on the right corner of each certificate. The statements furnished shall be in the **prescribed formats appended to the bid document.**

7. The information shall be filled-in by the bidder in the checklist and statements-I to VIII and shall be enclosed to the technical bid for the purposes of verification as well as evaluation of the bidders compliance to the qualification criteria as provided in the bid document. All the certificates, documents, statements as per check-list shall be submitted by the bidder.

8. The bidder shall sign on all the statements, documents, certificates uploaded by him owning the responsibility for their correctness/authenticity.

9. Certificate from Chartered Accountant supported with Annual Balance Sheet tallying with I.T. Clearance certificate. The turn over shall be from civil works and from Govt/semi Govt /Quasi Govt/PSUS/TUDA/ only. This shall clearly & explicitly brought out in the certificate. If the certificate does not specify the Turnover with reference to Govt / Quasi Govt / PSUS / TUDA then the same will not be CONSIDERED.

ANNEXURE-II

DECLARATION

I / WE ……. have gone through carefully all the Tender conditions and solemnly declare that I / we will abide by any penal action such as disqualification or black listing or determination of contract or any other action deemed fit, taken by, the Department against us, if it is found that the statements, documents, certificates produced by us are false / fabricated.
I / WE hereby declare that, I / WE have not been blacklisted / debarred / Suspended / demoted in any department in Andhra Pradesh or in any State due to any reasons.

Signature of the Tenderer

3.2 STATEMENT – I

(a) Details of value of Civil Engineering works executed in each year during the last five financial years by the Tenderer.

Sl. No.	Financial Year	Value in Rs.
1.	2017-2018	
2.	2018-2019	
3.	2019-2020	
4.	2020-2021	
5.	2021-2022	

i. Attach certificate(s) issued by the Executive Engineer concerned and counter signed by Superintending Engineer showing work wise / year wise value of work done in respect of all the works executed by the Tenderer during last five years

OR

ii. Certificate from Chartered Accountant supported with Annual Balance Sheet tallying with I.T. Clearance certificate. The turn over shall be from civil works and from Govt/PSUS/TUDA/ only. This shall clearly & explicitly brought out in the certificate. If the certificate does not specify the Turnover with reference to Govt / PSUS /TUDA then the same will not be CONSIDERED.

Signature of the Tenderer

(b) Details of satisfactorily Completion of one work of RCC Multistoried building(s) 12 floors and above under single contract with a built up area of 7,70,000 sqft and above including MEP works, Finishing works, Electrical works, Firefighting etc., for any of the Government Departments/Government autonomous Bodies/Government Public Sector Undertakings.

Sl. No	Name of the work	ADDRESS of Agt. Concluding Authority	Agreement No. & dated.	Value of Contract & Plinth area	Stipulated period of completion	Actual date of completion	Total value of work done.	Details of Major items involved
1	2	3	4	5	6	7	8	9

Attach certificates issued by the Executive Engineer concerned and countersigned by the concerned Superintending Engineer showing work wise / year wise value of work done and date of completion.

Signature of the Tenderer

3.3 STATEMENT – II

Details of similar works completed in the Name of the Tenderer during the last five financial years.

Sl. No	Name of the work	ADDRESS of Agt. Concluding Authority	Agreement No. & dated.	Value of Contract
1	2	3	4	5

Stipulated period of completion	Actual date of completion	Value of work done year wise during the last 'five' years.					Total value of work done.
		1st Year	2nd Year	3rd Year	4th Year	5th Year	
6	7	8	9	10	11	12	13

Similar works means, BUILDING works of following types only:

(a) Construction of RCC Multi-storied buildings12 floors and above.
(b) RCC Multi-storied buildings 12 Floors & above can include floors in Basement/Stilt.

Attach certificates issued by the Executive Engineer concerned and countersigned by the concerned Superintending Engineer showing work wise / year wise value of work done and date of completion.

Signature of the Tenderer

3.4 STATEMENT – III

Physical quantities executed by the Tenderer in the last five financial years. [work wise / year wise].

Sl. No.	Financial Year	Name of work	Agt. No.	Quantities executed / Year wise.		Any other items.
1	2	3	4	5	6	7
1	2017-2018					
2	2018-2019					
3	2019-2020					
4	2020-2021					
5	2021-2022					

Attach certificates in support of the quantities mentioned in the Schedule issued by the Executive Engineer concerned and countersigned by the concerned Superintending Engineer duly showing the quantities executed year wise.

Signature of the Tenderer

3.5 STATEMENT – IV

Details of Existing Commitments.

Details of works on hand and**,** yet to be completed as on the date of submission of the Tender and works for which Tenders have been awarded as on the date of submission of Tender are to be furnished.

A) **Existing Commitments on ongoing works:**

Sl. No	Name of work	Address of Agt. concluding authority	Agt. No. & Date	Value of contract	Stipulated period of completion	Value of work done so far.	Balance Value of works to be completed	Anticipated date of completion	Updated value of balance work
1	2	3	4	5	6	7	8	9	10

a) Attach certificates issued by the Executive Engineer/equivalent officer concerned and countersigned by Superintending Engineer /equivalent officer indicating the balance work to be done and likely period of completion.

Signature of the Tenderer

B) **Details of works for which Tenders are submitted awarded / likely to be awarded]**

Sl. No.	Name of work	ADDRESS of Agt. concluding authority	Estimated value of work	Stipulated period of completion	Date on which tender was submitted	Present stage of Tender.
1	**2**	**3**	**4**	**5**	**6**	**7**

Signature of the Tenderer

3.6 STATEMENT - V

Availability of Critical Equipment

The tenderer should furnish the information required below, regarding the availability of the equipment, required for construction / quality control.

Sl. No.	Details of Equipment	Number required	Number		
			Owned	Leased	To be procured
1	**2**	**3**	**4**	**5**	**6**

For all works costing more than Rs.2.00 Crore the Contractor shall submit quality plan and also show proof of owning quality lab.

Signature of the Tenderer

The tenderer has to submit either a certificate issued by Executive Engineer (or) A DECLARATION on a Non judicial stamp paper worth of Rs:100/- as prescribed Statement –V given below along with sufficient proof of documents in support of owning such as Invoice / Certificate of registration in by competent authority is support of the critical equipment.

DECLARATION

"I ……. do hereby solemnly affirm and declare that I /we own the following equipment for using on the subject work and also declare that I / We will abide by any action such as disqualification or determination of Contract or blacklisting or any action deemed fit, if the department detects at any stage that I/we do not possess the equipment listed below.

Sl. No.	Details of each Equipment	Year of purchase	Regn. Number	Capacity	Any other data.	Is it in working condition
1	2	3	4	5	6	7

3.7 STATEMENT – VI

Availability of Key Personnel

Qualification and experience of Key Personnel proposed to be deployed for execution of the Contract.

Sl. No	Name	Designation	Qualification	Total Experience	Working with the Tenderer since.
1	2	3	4	5	6

Signature of the Tenderer

3.8 STATEMENT – VII

Information on litigation history in which Tenderer is the Petitioner.

Sl. No	Case No. / Year	Court where filed	Subject Matter / Prayer in the case	Respondents i.e., SE / CE	Present Stage
1	2	3	4	5	6

Signature of the Tenderer

STATEMENT - VIII
(IN CASE OF WORKS COSTING MORE THAN RS.2.00 CRORES)
DECLARATION

"I/We .....do hereby solemnly affirm and declare that own /tie up the following equipment for using on the subject work at each and every work site and also declare that I / We will abide by any action such as disqualification or determination of Contract or blacklisting or any action deemed fit, if the department detects at any stage that I/we do not possess the equipment listed below at each and every work site.

Sl. No	Details of each equipment	Numbers required	Own	Tie up
1	2	3	4	5
1	Vernier Calipers 0-150 mm	3 Nos		
2	Screw gauge 0-25 mm	3 Nos		
3.a **3.b**	Measurement tapes both Steel (3.0 m, 5.0 m) & Fibre (15.0 m) 30 cm steel scale:	5 Nos each		
4	Weighing Machines 5.0 kg capacity	3 Nos		
5	Sieves for Coarse aggregate	3 Sets		
6	Sieves for fine aggregate	3 Sets		
7	Cube moulds ISI marked 150 x150 x 150 mm (6 nos.)	30 Nos		
8	Compression Test Machine 100 MT/ Arrangement for testing at approved lab	1 No		
9	Slump cone	3 Nos		
10	Carpenter's square 150 mm with graduations	6 Nos		
11	Electrical Meggar 1100 V	6 Nos		
12	Spirit level	6 Nos		
13	Plum bobs	6 Nos		
14	Measuring Jars 250ml	6 Nos		
15	Magnetic compass	2 Nos		
16	Non-destructive concrete strength equipment	1 No		
17	Cement Testing equipment	1 Set		

Signature of the Tenderer

3.9 CONDITIONS OF CONTRACT

TENDER

Date: ……

To
The Vice Chairman,
TUDA,
Tirupati.

Sir,

I / We do hereby tender and if this tender be accepted, under take to execute the following work viz.**"CONSTRUCTION OF TUDA TOWERS AT NORTH-WEST CORNER OF ANNAMAIAH CIRCLE ABUTTING RC ROAD AND AIR BY-PASS ROAD IN TIRUPATI, TIRUPATI DISTRICT, ANDHRA PRADESH"**

as shown in the drawings (whenever applicable) and described in the specifications deposited in the office of the Executive Engineer / Superintending Engineer – I, TUDA, Tirupati with such variations by way of alterations or additions to, and omissions from the said works and method of payment as provided for in the "conditions of the contract" for the sum of Rs. Xxx or such other sum as may be arrived under the clause of the standard preliminary specifications relating to "Payment on lump-sum basis or by final measurement at unit rates"

I/We have also quoted percentage excess or less on E.C.V., in Schedule 'A' Part-I annexed (In words and figures) for which I/We agree to execute the work when the lump sum payment under the terms of the agreement is varied by payment on measurement quantities. I/We have quoted Percentage excess or less on E.C.V., in Schedule 'A'. (In figures in online shall only prevail).

I/WE agreed to keep the offer in this tender valid for a period of **Four months** mentioned in the tender notice and not to modify the whole or any part of it for any reason within above period. If the tender is withdrawn by me/us for any reasons whatsoever, the earnest money paid by me/us will be forfeited to TUDA.

I/WE hereby distinctly and expressly, declare and acknowledge that, before the submission of my/our tender I/We have carefully followed the instructions in the tender notice and have read the A.P.S.S. and the preliminary specifications therein and the A.P.S.S. addenda volume and that I/We have made such examination of the contract documents and the plans, specifications and quantities and of the location where the said work is to be done, and such investigation of the work required to be done, and in regard to the material required to be furnished as to enable me/us to thoroughly understand the intention of same and the requirements, covenants, agreements, stipulations and restrictions contained in the contract, and in the said plans and specifications and distinctly agree that I/We will not hereafter make any claim or demand upon the TUDA based upon or arising out of any alleged misunderstanding or misconception /or mistake on my/or our part of the said requirement, covenants, agreements, stipulations, restrictions and conditions.

I/WE enclosed to my/our Tender schedule a BG / Online payment receipt No……dated:…… for Rs……, drawn on Bank:…… ……. Place: …….. as earnest money not to bear interest.

I/WE shall not assign the contractor or sublet any portion of the same. In case if it becomes necessary such subletting with the permission of the Executive Engineer shall be limited to (1) Labor contract, (2) Material contract, (3) Transport contract and (4) Engaging specialists for special item of work enjoined in A.P.S.S.

IF MY/OUR tender is not accepted the sum shall be returned to me/us on application when intimation is sent to me/us of rejection or at the expiration of four months from last date of receipt of this tender, whichever is earlier. If my/our tender is accepted the earnest money shall be retained by the TUDA as security for the due fulfillment of this contract.

If upon written intimation to me/us by the Superintending / Executive Engineer's Office, I/We fail to attend the said office on the date herein fixed or if upon intimation being given to me/us by the Superintending /Executive Engineer or acceptance of my/our tender, and if I/We fail to make the additional security deposit or to enter into the required agreement as defined in condition-3 of the tender notice, then I/We agree for the forfeiture of the earnest money. Any notice required to be served on me/us here under shall be sufficiently served on me/us hereunder shall be sufficiently served on me/us if delivered to me/us personally or forwarded to me/us by post to (registered or ordinary) or left at my/our address given herein. Such notice shall if sent by post be deemed to have been served on me/us at the time when in due course of post, it would be delivered at the address to which it is sent.

I/WE fully understand that the written agreement to be entered into between me/us and Government shall be the foundation of the rights of the both the parties and the contract shall not be deemed to be complete until the agreement has first been signed by me/us and then by the proper officer authorized to enter into contract on behalf of TUDA.

I/WE AGREE TO PAY THE CORPUS FUND AT 0.04% OR AS AMENDED FROM TIME TO TIME ON ESTIMATED CONTRACT VALUE OF THE WORK ONLINE IN FAVOUR OF MANAGING DIRECTOR, A.P TECHNOLOGY SERVICES, VIJAYAWADA AT THE TIME OF CONCLUSION OF AGREEMENT.

I AM/WE ARE professionally qualified and my / our qualification are given below:

Name	Qualified

I/WE will employ the following technical staff for supervising the work and will see that one of them is always at site during working hours, personally checking all items of works and pay extra attention to such works as required special attention (eg.) Reinforced concrete work, water proofing, centering etc.,.

Name of members of technical staff proposed to be employed	Qualification.

I / WE declare that I/WE agree to recover the salaries of the technical staff actually engaged on the work by the department, from the work bills, if I/We fail to employ technical staff as per the tender condition.

TENDERERS / CONTRACTOR'S CERTIFICATE.

(1) I/WE hereby declare that I/We have perused in detail and examined closely the Andhra Pradesh Standard Specifications, all clauses of the preliminary specifications with all amendments and have either examined all the standards specifications or will examine all the standard specifications for items for which I/We tender, before I/We submit such tender and agree to be bound and comply with all such specifications for this agreement which I/We execute in the TUDA.

(2) I/WE certify that I/We have inspected the site of the work before quoting my Percentage excess or less on ECV, I/We have satisfied about the quality, availability and transport facilities for stones, sand and other materials.

(3) I/WE am/are prepared to furnish detailed data in support of all my quoted rates, if and when called upon to do so without any reservations.

(4) I/WE hereby declare that I/We will pay further EMD and an additional security deposit in terms of conditions 3 of general terms & conditions and 2.11 of instructions to tenderers respectively.

(5) I/WE hereby declare that I am/we are accepting to reject my tender in terms of tender conditions.

(6) I/WE HEREBY DECLARE THAT I/WE WILL NOT CLAIM ANY PRICE ESCALATION, OTHER THAN PRICE ADJUSTMENT as per Clause 4.47 (As per GO No. 62 WRD, dt.30-11-2021).

(7) I/WE hereby declare that I am/we are accepting for the defect liability period as 60 months for RCC frame work and its components and 24 months for all balance works.

(8) a) I/WE declare that I/WE will procure the required construction materials including earth and use for the work after approval of the Engineer-in-Charge. The responsibility for arranging and obtaining the land for borrowing or exploitation in any other way shall rest with me/us for the materials for construction, I/WE shall ensure smooth and un-interrupted supply of materials.

b) I/WE declare that the responsibility for arranging and obtaining the land for disposal of spoil/soil not useful for construction purposes shall rest with me/us.

c) I/WE declare that I/WE shall not claim any compensation or any payment for the land so arranged for disposal of soil and the land for borrow area. My/our quoted percentage excess or less ECV., are inclusive of the land so arranged and I/We will hand over the land so arranged for disposal of soil to the department after completion of work.

d) I/WE declare that I/WE will not claim any extra amount towards any material used for the work other than the quoted works for respective schedule 'A' items.

(9) I/WE declare that I/WE will execute the work as per the mile stone programme, and if I/WE fail to complete the work as per the mile stone programme I abide by the condition to recover liquidated damages as per the tender conditions.

(10) I / WE declare that I/WE will abide for settlement of disputes as per the tender conditions.

DECLARATION OF THE TENDERER.

1) I/WE have not been black listed in any department in Andhra Pradesh or any State or Centre or Statutory Bodies due to any reasons as on the date of participating in tenders.

2) I/WE have not been demoted to the next lower category for not filing the tenders after buying the tender schedules in a whole year and my/our registration has not been cancelled for a similar default in two consecutive years.

3) I/WE agree to disqualify me/us for any wrong declaration in respect of the above and to summarily reject my/our tender.

I/WE ……. HAVE GONE THROUGH CAREFULLY ALL THE BID CONDITIONS AND SOLEMNLY DECLARE THAT I/WE WILL ABIDE BY ANY PENAL ACTION SUCH AS DISQUALIFICATION OR BLACK LISTING OR DETERMINATION OF CONTRACT OR ANY OTHER ACTION DEEMED FIT, TAKEN BY, THE DEPARTMENT AGAINST US, IF IT IS FOUND THAT THE STATEMENTS, DOCUMENTS, CERTIFICATES PRODUCED BY US ARE FALSE/FABRICATED.

Address of the bidder:
Phone No:
Fax No:
E-mail:

Signature of the bidder

Phone No.:
Fax No.:

Note: If the bid is made by an individual, it shall be signed with his full name and his address shall be given. If it is made by a firm, it shall be signed with the co-partnership name by a member of the firm, who shall also sign his own name and the name and address of each member of the firm shall be given. Bids signed on behalf of G.P.A holder will be rejected.

4. CONDITIONS OF CONTRACT

A. GENERAL

4.1 Interpretation:

4.1.1 In interpreting these Conditions of Contract, singular also means plural, male also means female, and vice-versa. Headings have no significance. Works have their normal meaning under the language of the contract unless specifically defined. The Engineers-in-charge will provide instructions clarifying queries about the conditions of Contract.

4.1.2 The documents forming the Contract shall be interpreted in the following order of priority:

1) Agreement
2) Letter of Acceptance, notice to proceed with the works
3) Contractor's Tender (Technical bid)
4) Conditions of contract
5) SPECIFICATIONS
6) Drawings
7) Bill of quantities (Price-bid)
8) Any other document listed as forming part of the Contract.
9) EMD.

4.1.2 a The contractor once entered contract agreement, cannot withdraw, nor ask for novation, alteration or tinker with any of the contract terms and conditions, otherwise from default in performance makes liable for forfeiture of any amounts due and also the performance security, with all other consequences under the contract. It is the duty of the contractor to secure skilled and unskilled staff as per the pattern of strength.

4.2 Engineer-in-Charge's Decisions:

4.2.1 Except where otherwise specifically stated, the Engineer-in-charge will decide the contractual matters between the Department and the Contractor in the role representing the Department.

4.3 Delegation:

4.3.1 The Engineer-in-charge may delegate any of his duties and responsibilities to other officers and may Cancel any delegation by an official order issued.

4.4 Communications and Legal Address – NOTICES :

4.4.1 Communications between parties, which are referred to in the conditions, are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act)

4.5 Sub-contracting:

4.5.1 No subletting of works will be permitted.

The contractor / firm will not be permitted to sublet either the whole work or a part of the work without prior permission from the competent authority. If the contractor / firm is found at any instance during the period of execution, that the whole work or a part of the work is Sub-let to any other agency / firm or to any other contractor without the approval of competent authority, legal proceedings will be initiated and such contractor for the default and further the work done not paid and all the security deposits lodged by the contractor will be forfeited and no correspondence will be entertained in this regard.

4.6 Other Contractors:

4.6.1 The Contractor shall cooperate and share the Site with other contractors if any, Public authorities, utilities, and the Department. The Contractor shall also provide facilities and services for them as directed by the Engineer-in-charge.

4.7 Personnel:

4.7.1 The Contractor / Agency shall employ the required Key Personnel named in the Schedule of Key Personnel to carry out the functions stated in the Schedule or other personnel approved by the Engineer-in-charge. The Engineer-in-charge will approve any proposed replacement of Key Personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

4.7.2 Schedule of Key Personnel:

The successful tender shall have to employ the following technical staff on full time basis to be available at site.

Cost of work (Technical sanction amount)	**Qualification of Technical Staff**
1	**2**
Above Rs. 5000.00 lakhs	**i.** Four Civil Graduate Engineers, Two Mechanical Graduate Engineers and Two Electrical Graduate Engineers, **Safety Engineer- 1 No.**

4.7.3 Employment of technical personnel shall be with reference to the estimate cost of work put to tender.

4.7.4 The appointment of technical staff shall be on full time basis and out of them at least 30% must be having experience in Quality control.
The Technical staff shall be available at work site for supervising the work including quality checking of all items from time to time. Failure to employ the required technical personnel by the contractor, amounts will be recovered at the following rates from the contractor.

Graduate Engineer - Rs. 37,650/- Per Month

4.7.5 The Engineer-in-charge/Agreement authority is the sole judge (a) to decide whether qualified technical staff is actually supervising the work and (b) to decide the actual period of absence of such staff which requires the above recovery to be enforced and his decision is final and binding on the contractor.

4.7.6 The technical agents appointed by the contractor shall have to maintain properly all the records required by the department under safe custody at site, like checklists, calibration registers/records, quality test registers, test reports file site order book etc., and make signatures at appropriate places towards proof of verifications, conduction of tests, compliance to instructions etc.,

4.7.7 The technical personnel should be on full time and available at site whenever required by Engineer-in-Charge to take instructions. The technical staff shall be available at work site for supervising the work including quality checking of all items from time to time and shall have to maintain properly all the records required by the department under safe custody at site like checklists, calibration registers/records, quality test registers, test reports file, site order book, etc. and make signatures at appropriate places towards proof of verifications, conduction of tests, compliance to instructions etc.

4.7.8 The names of the technical personnel to be employed by the contractor should be furnished in the statement enclosed separately for each work and should not be employed elsewhere on any other work. Even if the contractor is himself a technically qualified person, he shall employ required technical staff on the scale prescribed for supervising all the works separately irrespective of location of work sites in case the overheads are allowed in the data for each work.

4.7.9 In case the contractor is already having more than one work on hand and has undertaken more than one work at the same time, he should employ separate technical personnel on each work.

4.7.10 If the contractor fails to employ technical personnel the work will be suspended or department will engage a technical personnel and recover the cost thereof from the contractor.

4.7.11 If the Engineer-in-Charge asks the contractor to remove a person who is a member of contractor's staff or his work force stating the reasons the contractor shall ensure that the person leaves the site forthwith and has no further connection with the work in the contract.

4.7.12 The contractor has to certify that the same technical persons appointed shall not be utilized during agreement period on any other work in any other organization and if found at any stage, liable to recover the amount in addition to the normal recovery.

4.7.13 No reimbursement will be made to the contractor towards engaging technical staff as the data includes overhead charges which covers engaging technical staff also.

4.8 Contractor's Risks:

All risks of loss of or damage to physical property and of personnel injury and death, which arise during and in consequence of the performance of the Contract are the responsibility of the Contractor.

4.9 Insurance:

4.9.1 Insurance is totally at the risk and responsibility of the Contractor from the Start Date to the end of the Defects Liability Period i.e., 60months,aftercompletion of the work for all the events.

(a) ***The employer is not intending to take any Insurance coverage as the G.O.Ms.No.5, Finance (Works &Projects–F7) Dept., dt.05.03 .2014 have issued orders dispensing with mandatory insurance cover of all works. However, it will not exempt the bidder/ contractor so far as statutory liability to take insurance coverage for vehicles, workmen/ employees of the contractor and as such it is for the contractor to take insurance for the workers and plant machinery, vehicles etc., besides property and material of him and of the employer with him, else to bear own risk to make good for any loss/damage etc., accidental or otherwise.***

(b) ***In case of any claim by any workman pending in any court of law or tribunal involving the employer also with the contractor, the employer is entitled to retain amount in relation to the claim from final bill of contractor till the claim is cleared.***

4.10 Site Inspections:

4.10.1 The contractor should inspect the site and also proposed quarries of choice for materials, source of water and quote his percentage including quarrying, conveyance and all other charges etc. ***After submission of the bid and Letter of Acceptance issued, no contractor can claim that the Site Visit / proposed quarries not properly made. It is deemed for all purposes that the Site Visit has been properly conducted by the contractor with any Technical Assistance required at their cost and with their men, for nothing contra is left open to raise.***

4.10.2 The responsibility for arranging the land for borrow area rests with the Contractor and no separate payment will be made for procurement or otherwise. The contractor's quoted percentage will be inclusive of land cost.

4.11 Contractor to Construct the Works:

4.11.1 The Contractor shall construct and Commission the Work in accordance with the specifications and Drawings.

4.12 Diversion of streams / Vagus / Drains.

4.12.1 The contractor shall at all times carry out construction of cross drainage works in a manner creating least interference to the natural flow of water while consistent with the satisfactory execution of work. A temporary diversion shall be formed by the contractor at his cost where necessary. No extra payment shall be made for this work.

4.12.2 No separate payment for bailing out sub-soils, water drainage or locked up rain water for diversion, shoring, foundations, bailing of pumping water either from excavation of soils from foundations or such other incidental will be paid. The percentage to be quoted by the contractor is for the finished item of work in situ and including all the incidental charges. The borrow pits are also to be de-watered by the contractor himself at his expense, if that should be found necessary. Instructed add in specification.

4.12.3 The work of diversion arrangements should be carefully planned and prepared by the contractor and forwarded to the Executive Engineer technically substantiating the proposals and approval of the Executive Engineer obtained for execution.

4.12.4 The contractor has to arrange for bailing out water, protection to the work in progress and the portion of works already completed and safety measures for men and materials and all necessary arrangements to complete the work.

4.12.5 All the arrangements so required should be carried out and maintained at the cost of the contractor and no separate or additional payments is admissible..

4.12.6 **Coffer Dams:** Necessary cofferdams and ring bunds have to be constructed at the cost of contractor and same are to be removed after the completion of the work. The contractor has to quote his percentage keeping the above in view.

4.13 Power Supply.

4.13.1 The contractor shall make his own arrangements for obtaining power from the Electricity dept., at his own cost. The contractor will pay the bills of Electricity Department for the cost of power consumed by him.

4.13.2 The contractor shall satisfy all the conditions and rules required as per Indian Electricity Act 1910 and under Rule-45(I) of the Indian Electricity Rules, 1956 as amended from time to time and other pertinent rules.

4.13.3 The power shall be used for bonafide Departmental work only.

4.13.4 The contractor shall pay for any inspection fees and for permits required for the installation of the work wherever necessary. The TUDA shall arrange only for payment of service connection charges and any other security deposit for getting electrical supply. On completion of the work, the contractor shall obtain and deliver to the TUDA, certificates of final inspection and approval by the concerned Electric Authority as may require. The TUDA shall have full powers to require the materials or work to be tested by an independent agency at the Electrical contractor's expense in order to prove their soundness and adequacy.

4.13.5 Contractor shall provide everything necessary for the proper execution of works according to the intent and meaning of the drawings, specifications, schedule of quantities. Any discrepancy in the documents shall be brought to the notice of the TUDA and got clarified prior to taking up the installation.

4.13.6 Materials and workmanship:

All materials and workmanship shall confirm to the specifications, relevant IS standards and code of practice and other standards specified and comply with APSEB/CEIG requirements as the case may be. Any work that is not up to the standards shall be dismantled and reconstructed by the contractor to the satisfaction of the TUDA.

4.14 Tollgate Charges:

4.14.1 The contractor has to pay the necessary tollgate fee wherever necessary, for conveyance of materials, machinery, vehicles etc., for the work. The contractor has to quote their rates accordingly.

4.15 Temporary Diversions (Works on Highways)

4.15.1 The contractor shall at all times carryout work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway/other roads, the contractor shall in accordance with the directions of the Engineer-in-charge provide and maintain during the execution of the work a passage for traffic, either along a part of the existing carriage way under improvement or along a temporary diversion constructed close to the highway. The contractor shall take all necessary measures for the safety of traffic during construction and provide erect and maintain such barricades, including signs, markings, flags lights and information and protection of traffic approaching or passing through the section of the highway under improvement.

4.15.2 If in the opinion of the Engineer-in-Charge, it is not possible to pass the traffic on part width of the carriage-way for any reason, a temporary diversion close to the highway shall be constructed as directed. It shall be paved with the materials such as hard morrum, gravel and stone, metal to the specified thickness as directed by the Engineer-in-Charge. In all cases, the alignment, gradients and surface type of the diversion including its junctions, shall be approved by the Engineer-in-charge before the highway is closed to traffic.

4.15.3 The contractor shall take all necessary measures for the safety of traffic during construction and provide erect and maintain such barricades, including signs, markings, flags lights and information and protection of traffic approaching or passing through the section of the highway under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic on the highway shall be drawn up in consultation with the Engineer-in-charge.

4.15.4 The barricades erected on either side of the carriage way portion of the carriage way closed to traffic, shall be of strong design to resist violation and painted with alternative black and white stripe. Red lanterns or warnings lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

4.16 Ramps:

4.16.1 Ramps required during execution may be formed wherever necessary and same are to be removed after completion of the work. No separate payment will be made for this purpose.

4.17 Monsoon Damages:

4.17.1 Damages due to rain or flood either in cutting or in banks in any manner shall have to be made good by the contractor till the work is handed over to the Department. The responsibility of de-silting and making good the damages due to rain or flood rests with the contractor. No extra payment is payable for such operations and the contractor shall therefore, have to take all necessary precautions to protect the work done during the construction period.

4.18 The works to be Completed by the Intended Completion Date:

4.18.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the programme submitted by the Contractor, as updated with the approval of the Engineer-in-Charge, and complete the work by the Intended Completion Date.

4.19 Safety:

4.19.1 The Contractor is responsible for the safety of all activities on the Site, including Covid-19 preventive precautions, if any, to the extent in force as per Centre/state/local instructions & guidelines at his cost. The contractor shall take all necessary precautions and safety measures as per the instructions, other norms and guidelines in force time to time of the state and central governments for the safety of workers, employees of the contractor/sub-contractor if any and officers of the employer and other public.

4.20 Discoveries:

4.20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the TUDA. The Contractor is to notify the Engineer-in-charge of such discoveries and carry out the Engineer-in-Charge's instructions for dealing with them.

4.21 Possession of the Site.

4.21.1 The Department shall give possession of the site to the Contractor. If possession of a part site is given, the Department will ensure that the part site so handed over is amenable to carry out the work at site by the Contractor. In the subject work, encumbrance free site is available and will be handed over to contractor in full.

4.22 Access to the Site:

4.22.1 The Contractor shall provide the Engineer-in-Charge and any person authorised by the Engineer-in-Charge, access to the site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

4.23 Instructions:

4.23.1 The Contractor shall carry out all instructions of the Engineer-in-charge and comply with all the applicable local laws where the Site is located.

4.24 Mode of Settlement of claims / disputes and place of exclusive jurisdiction:

4.24.1 If any dispute of difference of any kind whatsoever arises between the department and the Contractor in connection with, or arising out of the Contract, whether during the progress of the works or after their completion and whether before or after the termination, abandonment or breach of the Contract, it shall in the first place, be referred to and settled by the Engineer-in-charge who shall, within a period of thirty days after being requested by the Contractor to do so, give written notice of his decision to the Contractor. Upon receipt of the written notice of the decision of the Engineer-in-Charge the Contractor shall promptly proceed without delay to comply with such notice of decision.

4.24.2 If the contractor is not satisfied with the decision of the Engineer in charge, the contractor shall within 30 days from the date of such communication of decision, address the employer in writing to refer the dispute as follows:

- **a) Where the claim is up to Rs.10.00 Lakhs, there shall be an in-house arbitration for settlement of several small claims and the SE (other than of TUDA from any government department) to be named by the employer to the limit Rs.1,00,000/-so also the CE other than of TUDA, from any govt. department to be named by the employer to the limit of Rs.10,00,000/-as sole Arbitrator/s to save time, money and manpower of both parties and as per the provisions of the Indian Arbitration Act,1996 amended from time to time.**
- *b)* ***Where the claim is above Rs.10.00 Lakhs to refer the disputes up to the limit of Rs.100.00 Lakhs to ICADR (AP) for arbitration to name a sole arbitrator among its members.***
- **c) Where the claim is above Rs.100.00 Lakhs, it is only to invoke the jurisdiction of civil courts of Tirupati, Chittoor District within the State of Andhra Pradesh by excluding jurisdiction outside the State of Andhra Pradesh.**
- **d) The language shall be in English with any translation to English from documents in local language with due certification.**
- **e) The expenses in internal arbitration shall be borne by respective parties and expenses and fees of the sole Arbitrator (external) shall be borne equally by both parties subject to final decision on costs by sole external Arbitrator.**
- **f) The fees is as per Schedule IV of the Arbitration Act.**

4.24.3 ARBITRATION:

So far as seat of Arbitration and place of jurisdiction for the arbitration supra is at Tirupati (within the seat of the office of TIA) of TIRUPATI district of Andhra Pradesh by excluding seat of Arbitration and place of jurisdiction outside the State of Andhra Pradesh.

The language shall be in English with any translation to English from documents in local language with due certification.

The expenses in internal arbitration shall be borne by respective parties and fees of the sole Arbitrator if any fixed shall be borne equally by both parties subject to final decision on costs by sole external Arbitrator.

The fees if any is as per Schedule IV of the Arbitration Act.

B. TIME FOR COMPLETION

4.25 Program:

4.25.1 The total period of completion is **27 (TYWENTY SEVEN) MONTHS** from the date of entering with agreement to proceed including rainy season. Keeping in view, the schedule handing over of site given in condition 4.25.4 of (ii) work should be programmed such as to achieve the mile-stones as in "Rate of progress statement" enclosed, in clause 4.25.4

4.25.2 The attention of the tenderer is directed to the contract requirement at the time of beginning of the work, the rate of progress and the dates for the whole work and its several parts as per milestones. The following rate of progress and proportionate value of work done from time to time as will be indicated by the Executive Engineer's Certificate for the value of work done and completion of mile-stones will be required. Date of commencement of their programme will be the date for concluding agreement.

4.25.3 After signing the agreement, the contractor shall forthwith begin the work, shall regularly and continuously proceed with them.

4.25.4 Rate of progress:

i) Work programme of achieving the milestones.

MILE STONE I	7.5%	UPTO 3 MONTHS
MILE STONE 2	19.5%	UPTO 6 MONTHS
MILE STONE 3	31.50%	UPTO 9 MONTHS
MILE STONE 4	43.50 %	UPTO 12 MONTHS
MILE STONE 5	56.50%	UPTO 15 MONTHS
MILE STONE 6	68.50%	UPTO 18 MONTHS
Mile Stone7	**80.50%**	UPTO 21 MONTHS
MILE STONE8	92.50%	UPTO 24 MONTHS
MILE STONE9	100 %	UPTO 27 MONTHS

Note: Detailed programme in terms of collection of necessary materials and labor and in terms of finished items of work, to confirmation of the above rate of progress shall be prepared by the contractor and got approved by the Engineer-in-Charge/Agreement authority concerned and which shall be strictly adhered to. This programme of work shall be given based on PERT/CPM charts for works where ECV exceeds Rs.100 Lakhs in the approved format.

ii) Site Schedule of programme after signing in the agreement by the contractor.

4.25.5 The contractor shall commence the works on site within the period specified under condition 4.25.1 to 4.25.4 above after the receipt by him of a written order to this effect from the Executive Engineer / Superintending Engineer and shall proceed with the same with due expedition and without delay, except as may be expressly sanctioned or ordered by the Executive Engineer / Superintending Engineer, or be wholly beyond the contractor's control.

4.25.6 Same in so far as the contractor may prescribe, the extent of portions of the site of which the contractor is to be given possession from time to time and the order in which such portions shall be made available to him and, Subject to any requirement in the contract as to the order in which the works shall be executed, the Executive Engineer / Superintending Engineer will, with the Executive Engineer's written order to commence the works, give to the contractor possession of so much of the site as may be required to enable the contractor to commence proceed with the execution of the works in accordance with the programme if any, and otherwise in accordance with such reasonable proposals of the contractor as he shall by written notice to the Executive Engineer / Superintending Engineer, make and will from time to time as the works proceed, give to the contractor possession of such further portions of the site as may be required to enable the contractor to proceed with the execution of the works with due dispatch in accordance with the said programme or proposals as the case maybe ; if the contractor suffers delay or incurs cost from failure on the part of the Executive Engineer / Superintending Engineer to give possession in accordance with the terms of this clause, the Competent authority shall grant an extension of time for the completion of works. In the subject work, encumbrance free site is available and will be handed over to contractor in full.

4.25.7 The contractor shall bear all costs and charges for special or temporary way leases required by him in connection with access to the site. The contractor shall also provide at his own cost any additional accommodation outside the site required by him for the purposes of the work.

4.25.8 Subject to any requirement in the contract as to completion of any section of the works before completion of the whole of the works shall be completed in accordance with provisions of clauses in the Schedule within the time stated in the contract calculated from the last day of the period named in the statement to the tender as that within which the works are to be commenced or such extended time as may be allowed.

4.25.9 Delays and extension of time:

No claim for compensation on account of delays or hindrances to the work from any cause whatever shall lie, except as hereafter defined. Reasonable extension of time will be allowed by the Executive Engineer or by the officers competent to sanction the extension, for unavoidable delays, such as may result from causes, which in the opinion of the Executive Engineer, are undoubtedly beyond the control of the contractor. The Executive Engineer shall assess the period of delay or hindrance caused by any written instructions issued by him, at twenty five per cent in excess or the actual working period so lost.

In the event of the Executive Engineer failing to issue necessary instructions and thereby causing delay and hindrance to the contractor, the latter shall have the right to claim an assessment of such delay by the Superintending Engineer of the Circle whose decision will be final and binding. The contractor shall lodge in writing with the Executive Engineer a statement of claim for any delay or hindrance referred to above, within fourteen days from its commencement, otherwise no extension of time will be allowed.

Whenever authorized alterations or additions made during the progress of the work are of such a nature in the opinion of the Executive Engineer as to justify an extension of time in consequence thereof, such extension will be granted in writing by the Executive Engineer or other competent authority when ordering such alterations or additions.

4.26 Construction Programme:

4.26.1 The Contractor shall furnish within 10 days of the order of the work a programme showing the sequence in which he proposed to carry out the work, monthly progress expected to be achieved, also indicating date of procurement of materials plant and machinery. The schedule should be such that it is practicable to achieve completion of the whole work within the time limit fixed and in keeping with the Mile stone programme specified and shall obtain the approval of the Engineer-in-charge. Further rate of the progress as in the program shall be kept up to date. In case it is subsequently found necessary to alter this program, the contractor shall submit sufficiently in advance the revised program incorporating necessary modifications and get the same approved by the Engineer-in-charge. No revised program shall be operative without approval of Engineer-in-charge.

4.26.2 The Superintending Engineer shall have all times the right, without any way violating this contract, or forming grounds for any claim, to alter the order of progress of the works or any part thereof and the contractor shall after receiving such directions proceed in the order directed. The contractor shall also report the progress to the Superintending Engineer within 7 days of the Executive Engineer's direction to alter the order of progress of works.

4.26.3 The Contractor shall give written notice to the Engineer-in-Charge whenever planning or progress of the works is likely to be delayed or disrupted unless any further drawings 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 when it is required and of any delay or disruption likely to be suffered if it is late.

4.27 Speed of Work:

4.27.1 The Contractor shall at all times maintain the progress of work to conform to the latest operative progress schedule approved by the Engineer-in-Charge. The contractor should furnish progress report indicating the programme and progress once in a month. The Engineer-in-Charge may at any time in writing direct the contractor to slow down any part or whole of the work for any reason (which shall not be questioned) whatsoever, and the contractor shall comply with such orders of the Engineer-in-Charge. The compliance of such orders shall not entitle the contractor to any claim of compensation. Such orders of the Engineer-in-Charge for slowing down the work will however be duly taken into account while granting extension of time if asked by the contractor for which no extra payment will be entertained.

4.27.2 Delays in Commencement or progress or neglect of work and forfeiture of earnest money, Security deposit and withheld amounts:

If, at any time, the Engineer-in-Charge shall be of the opinion that the Contractor is delaying Commencement of the work or violating any of the provisions of the Contractor is neglecting or delaying the progress of the work as defined by the tabular statement. "Rate of progress" in the Articles of Agreement", he shall so advise the Contractors in writing and at the same time demand compliance in accordance with conditions of Tender notice. If the Contractor neglects to comply with such demand within seven days after receipt of such notice, it shall then or at any time thereafter, be lawful for the Engineer-in-Charge to take suitable action in accordance with Clause.60 of APSS.

4.28 Suspension of works by the Contractor:

4.28.1 If the Contractor shall suspend the works, or sublet the work without sanction of the Engineer-in-Charge, or in the opinion of the Engineer-in-Charge shall neglect or fail to proceed with due diligence in the performance of his part of the Contract as laid down in the Schedule rate of progress, or if he shall continue to default or repeat such default in the respects mentioned in clause-27 of the APSS Engineer-in-Charge shall take action in accordance with Clause 61 of APSS.

4.28.2 If the Contractor stops work for 28 days and the Stoppage has not been authorised by the Engineer-in-Charge the Contract will be terminated under Clause 61 of APSS.

4.28.3 If the Contractor has delayed the completion of works the Contract will be terminated under Clause-61 of APSS.

4.29 Extension of the Intended Completion Date:

4.29.1 The Engineer-in-Charge shall extend or recommend for extension, in accordance with the Government orders in force, the Intended Completion Date if a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date.

4.29.2 The Engineer-in-Charge shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

4.30 Delays Ordered by the Engineer-in-Charge:

4.30.1 The Engineer-in-Charge may instruct the Contractor to delay the start or progress of any activity within the Work.

4.31 Early Warning:

4.31.1 The contractor is to INFORM the Engineer-in-Charge at the earliest opportunity of specific likely future events or circumstances that may adversely affect the Execution of Works.

4.31.2 The Contractor shall cooperate with the Engineer-in-Charge in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer-in-Charge.

4.32 Management Meetings:

4.32.1 The Engineer-in-Charge may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the programme for remaining work and to deal with matters raised in accordance with the early warning procedure.

C. QUALITY CONTROL

4.33 Identifying Defects:

4.33.1 The Engineer-in-Charge shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer-in-Charge may instruct the Contractor to verify the Defect and to uncover and test any work that the Engineer considers may be a Defect.

4.34 Tests:

4.34.1 If the Engineer-in-Charge instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the Contractor shall pay for the test and any samples.

4.35 Correction of Defects:

4.35.1 The Engineer-in-Charge shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins on Completion. The defects liability period shall be extended for as long as defects remain to be corrected by the Contractor.

4.35.2 Every time notice of a Defect is given, the Contractor shall correct the notified defect within the length of time specified by the Engineer-in-Charge's notice.

4.36 Uncorrected Defects:

4.36.1 If the contractor has not corrected the defect within the time specified in the Engineer-in-Charge's notice, the Engineer-in-Charge will assess the cost of having the defect corrected and the contractor will pay this amount (or) the cost of correction of such defects will be recovered from the Contractor‟s deposits and from any money due to the Contractor from any work executed or being executed in this Department .

4.36.2 The Engineer-in-Charge shall introduce O.K. cards and prescribed the formats there of. O.K. cards shall relate to all major components of the work. The contractor / his authorized representative shall be required to initiate and fill in and present the O.K. card to the construction staff who would check the respective items and send to the quality control staff for final check and clearance / O.K. Any defects pointed out by the construction supervision staff or by the Quality Control staff shall promptly be attended to by the contractors and the fact of doing so be duly recorded on the back of O.K. card.

4.36.3 The Engineer-in-Charge may also introduce checklists, which shall be kept in Bound registers by the construction supervision staff. The contractor may be required to fill up these lists in the first instance and shall be subsequently checked by the Construction / Quality Control engineers.

4.37. Quality Control:

4.37.1 Establishment of quality control laboratory

The contractor shall establish a quality control laboratory at the site of work equipped with calibrated equipment to perform field tests, batch wise, for various materials, then and there itself, as per quality plan and standards.

4.37.1.a Quality control tests in laboratories:

In the works contracts even the Government has created quality control mechanism in the movement and progress of works executed through construction and quality control engineers etc., who have also to verify and give certificate on quality control in recommending payment of the bills for the works done with the standard specifications and the quantities /qualities so as to make payments by concerned as part of good governance, the quality control wing duties in some cases are more perfunctory as can be seen from Vigilance & Enforcement and Anti-Corruption Bureau investigative reports including on non-adhering to the minimum 30% of super check measure of each and every component of the respective works done, in particular on quality assessment.; thereby the Tender Initiating Authority and the Superintending Engineer concerned shall give specific circular instructions fixing responsibility on the Executive Engineer and other Subordinate officers concerned for the works on hand involved under the project are of Rs.100 Crores above and mainly meant for public utility and that to with liability on the state exchequer. The quality control tests can even be done in any laboratories certified by the National accreditation board for testing and calibration laboratories(NABL). However, no any third party quality control agency be permitted in routine or as a matter of course unless there is a clear need and that too only at the choice of employer because of existence of efficient internal quality control mechanisms of employer

4.37.1 Calibration of equipment: All the equipment maintained by the contractor at site shall be calibrated from time to time according to the calibration frequency mentioned hereunder, with calibrations traceable to national standards. Records for proof of such calibrations done for each instrument, with instrument number shall be maintained by the contractor and shall be made available for verification/counter signature by the Engineer-in-Charge. Proper storage, handling and use of these instruments shall be ensured so that their calibration does not get disturbed due to weather factors etc., Frequency of the calibration shall be as decided by the Engineer-in-Charge as per standards.

4.37.2 List of equipment which should be made available at site by the contractor for testing of materials and cubes etc., is given below:

Sl. No	Details of each equipment	Recommended calibration frequency
1	2	3
1	Vernier Calipers 0-150 mm	1 year
2	Screw gauge 0-25 mm	1 year
3.a **3.b**	Measurement tapes both Steel (3.0 m, 5.0 m) & Fibre (15.0 m) 30 cm steel scale:	At the time of purchase and the tapes to be changed after 6 months if any error is observed
4	Weighing Machines 5.0 kg capacity	6 months
5	Sieves for Coarse aggregate	-
6	Sieves for fine aggregate	-
7	Cube moulds ISI marked 150 x150 x 150 mm (6 nos.)	-
8	Compression Test Machine 100 MT/ Arrangement for testing at approved lab	6 months
9	Slump cone	-
10	Carpenter's square 150 mm with graduations	-
11	Electrical Meggar 1100 V	At the time of purchase
12	Spirit level	-
13	Plumb bob	-
14	Measuring Jars 250ml	-
15	Magnetic compass	-
16	Non-destructive concrete strength equipment	6 months
17	Cement Testing Machine	-

4.37.3 **Quality plan for raw materials:** The contractor shall collect various raw materials well in advance before its use and shall get them tested as per the quality plan.

4.37.4 If the Engineer-in-Charge instructs the contractor to carryout a test not specified in the specification to check whether any work has a defect, the contractor shall conduct the test at his own cost.

4.37.5 **Quality control inspections:** In addition to the normal inspection by the regular in charge of the construction, the work will also be inspected by the staff of quality control wings and any authorized external agency and if any sub-standard work or excess payments are noticed with reference to measurement books etc., during inspection, recovery will be ordered based on their observations and these will be effected by the Engineer-in-Charge of the execution of the work.

4.37.6 In addition, the TUDA may engage external agencies for conducting quality audit in which case the following methodology would be adopted:

4.37.7 **a)** The external agency shall conduct quality control tests as per the standard - procedures in the presence of Construction and Quality Control Engineers and the Contractor who is executing the work.

b) The observations of the external agencies on the quality of work should be recorded then and there and signatures of all the concerned obtained as a token of acceptance of the observations.

4.37.8 The recovery for any substandard work or excess payments noticed if any on account of the external quality also would be made as mentioned in the Para above.

4.37.9 The Quality control test reports and inspection reports shall invariably be accompanied along with final bill for all capital works.

4.37.10 **Records to be maintained at site:**

1) Drawings: One copy of the drawings furnished to the contractor shall be kept by the contractor on the site and same shall be available for inspection and use by the Departmental officers.

2) **Variations by way of modification, omissions or additions:**

i. For all modifications omissions from or additions to the drawings and specifications, the Engineer-in-Charge will issue revised plans, or written instructions, or both and modification, omission or additions shall be made unless authorized and directed by the Engineer-in-Charge in writing.

ii. Engineer-in-Charge shall have the privilege of ordering modifications, omission or additions at any time before the completion of the work and such orders shall not operate to annual those portions of the specifications with which said changes do not conflict.

iii. **Site Order Book:** The site order book shall be maintained by the contractors at the site of the work. As far as possible all orders regarding the work are to be entered in this book. All entries shall be signed and dated by the Departmental Officer who issues such orders and signed by the contractor or by his representative towards compliance. The Site order book shall not be removed from the work spot except with the written permission of the Engineer-in-charge.

iv. **Quality Test Register (QTR):** The contractor shall maintain the QTR at the site in the format specified and record therein the results of all the tests conducted by him. The relevant reports of the tests conducted shall be maintained in a separate file.

v. Other Documents: Other prescribed documents like register on calibration of equipments maintained at site and other checklists shall be maintained at site and produced for verification of inspecting officers.

vi. **Return of site documents:** All the site records / documents mentioned therein must be returned to the engineer-in-charge in full shape after the satisfactory completion of work.

4.37.11 **Contractor's General Obligations:** The Contractor shall design execute and complete the Works in accordance with the Contract terms, and shall also remedy any defects in the Works. When completed, the Works shall be fit for the purposes for which the Works are intended as defined in the Contract. The Contractor shall provide the Plant and Contractor's Documents specified in the Contract, and all Contractor's Personnel, consumables and other things and services, whether of a temporary or permanent nature, required in and for this design, execution, completion and remedying of defects. The Works shall include any work which is necessary to satisfy the Employer's Requirements, or is implied by the Contract, and all works which (although not mentioned in the Contract) are necessary for stability or for the completion, or safe and proper operation, of the Works. The Contractor shall be responsible for the adequacy, stability and safety of all Site operations, of all methods of installation and of all the Works. The Contractor shall, whenever required by the Employer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Employer. The Contractor shall also to submit quality assurance plan within no time from the Contract commencement date for approval of Employer. The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Employer or his representative shall be entitled to audit any aspect of the system. Details of all procedures and compliance documents shall be submitted to the Employer for information before each design and execution stage is commenced. When any documents of a technical nature are issued to the Employer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself. The contractor shall submit the quality management plan for the works. Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract. The Contractor has to make his own arrangements and at his own cost the manpower, water, drainage / sewerage and electricity or alternative power supply and any land for use and such other facilities and provisions including to site office etc., required for the works and to the accommodation of his workers and at work sites, fair wages/remuneration, statutory insurance of manpower, their security and safety measures, compliance of various statutory provisions for commencement, execution and completion of the works contract, save those specifically agreed to be provided by the employer.

In addition to that, the Quality control wing concerned of the employer shall conduct the required quality checks with reference to specifications including in quantity, physically rather superficially, also by counter verification of the quality control checks in the labs established by the contractor in respect of each and every item of the works, so that the pay and accounts officer can trust the certifications in making payments.

The contractor who has to engage the full time key personnel in the works-shall instruct atleast 30% among them to work in quality control area exclusively, that to in coordination with the field engineers and quality control wing of the employer for ensuring qualitative and quantitative performance by checks and balances.

The Contractor shall not deposit materials at any site, which will cause inconvenience to public. The Engineer-in- Charge may direct the Contractor to remove such materials or may undertake the job at the cost of the Contractor. The Contractor shall dispose of the pollutants and waste if any time to time during the execution of the contract works as per PCB norms with prior permission of the Employer or as and when required by the Employer.

The Contractor shall protect adjoining sites against structural, decorative and other damages that could be caused by the execution of the works and make good at his cost any such damages.

One copy of the plans, drawings, specifications, bill of quantities and any other supplementary data complete with all the latest revisions thereto if any, shall be kept by the Contractor on the Site and the same shall at all reasonable time be available for inspection and use by the Engineer-in-Charge any other Officers of the Employer. Likewise, an order book shall be kept at the site of the Work. As far as possible, all orders regarding the Work are to be entered in this book. All entries shall be signed and dated by the Department Officer direct charge of the Work and by the Contractor or by his representative. In important cases, the Engineer-in-Charge or the Employer will countersign the entries, which have been made. The order book shall not be removed from the Site, except with the written permission of the Engineer-in- Charge.

Further a complete set of Indian Standard specifications referred to in “Technical Specifications” and A.P.S.S. and APWD Code shall be kept at Site for reference.

D. Cost Control

4.38 Bill of Quantities

4.38.1 The Bill Quantities shall contain items for the construction work to be done by the Contractor.

4.38.2 The Contractor is paid for the quantity of the work done at the estimate rate in the Bill of Quantities for each item plus or minus Tender percentage.

4.39 Changes in the Quantities:

4.39.1 The contractor is bound to execute all supplemental works that are found essential, incidental and inevitable during execution of main work.

4.39.2 The payment of rates for such supplemental items of work will be regulated as under;

4.39.3 Supplemental items directly deducible from similar items in the original agreement.

4.39.4 The rates shall be derived by adding to or subtracting from the agreement rate of such similar item the cost of the difference in the quantity of materials, labor between the new items and similar items in the agreement worked out with reference to the Standard Schedule of Rates adopted in the sanctioned estimate with which the tenders are accepted plus or minus over all tender percentage.

(a) Similar items but the rates of which cannot be directly deduced from the original agreement.

(b) Purely new items which do not correspond to any item in the agreement.

(c) The rates of all such items shall be Estimated Rates plus or minus overall Tender premium.

4.40 Extra Items:

4.40.1 Extra items of work shall not vitiate the contract. The contractor shall be bound to execute extra items of work as directed by the Engineer-in-Charge. The rates for extra items shall be worked out by the Executive Engineer as per the conditions of the Contract and the same are binding on the Contractor.

4.40.2 The contractor shall before the 15th day of each month, submit in writing to the Executive Engineer a statement of extra items if any that they have executed during the preceding month failing which the contractor shall not be entitled to claim any.

4.40.3 Entrustment of additional items:

4.40.3.1 Where ever additional items not contingent on the main work and outside the scope of original agreement are to be entrusted to the original contractor dispensing with bids and if the value of such items exceeds the limits up to which the officer is empowered to entrust works initially to contractor without calling for tenders, approval of next higher authority shall be obtained. Entrustment of such items on nomination shall be at rates not exceeding the estimated rates or minus overall tender premium.

4.40.3.2 Entrustment of the additional items contingent on the main work will be authorized by the officers up to the monetary limits up to which they themselves are competent to accept items in the original agreement so long as the total amounts up to which they are competent to accept in an original agreement rates for such items shall be worked out in accordance with the procedure (I) For all items of work in excess of the quantities shown in the Bill of Quantities of the Tenders, the rate payable for such items shall be estimate rates for the items (+) or (-) over all tender percentage accepted by the competent authority.

4.40.3.3 Entrustment of either the additional or supplemental items shall be subject to the provisions of the agreement entered into by a Competent Authority after the tender is accepted. The Vice Chairman, TUDA on the recommendation of EE,TUDA, who entered into the agreement approves the rate for the items / variation in quantity in the current agreement. The items shall not be ordered by an officer on his own responsibility if the revised estimate or deviation statement providing for the same requires the sanction of higher authority.

Note: It may be noted that the term Estimate Rate used above means the rate in the sanctioned estimate with which the tenders are accepted, or if no such rates is available in the estimate, the rate derived will be with reference to the Standard Schedule of Rates adopted in the sanctioned estimate with which tenders are accepted.

4.41 Cash flow forecasts:

4.41.1 When the program is updated, the contractor is to provide the Engineer-in-charge with an updated cash flow forecast.

4.42 Payment Certificates:

4.42.1 The Contractor shall submit to the Engineer-in-charge monthly statements of the estimated value of the work completed less the cumulative amount certified previously. The EE concerned shall arrange payment within week to the contractor from the receipt of claim from contractor

4.42.2 The value of work executed shall be determined by the Engineer-in-charge.

4.42.3 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

4.42.4 The Engineer-in-charge may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

4.43 Payments:

4.43.1 Payment for the work done by the contractor will be made for the finished work based on the measurements recorded in measurement books by any officer of the department not lower in rank than a Assistant Engineer and check measured by any officer not lower in rank than a Deputy Executive Engineer. The measurement shall be recorded at various stages of the work done and also after work is completed. The contractor shall be present at the time of recording of each set of measurement and their check measurement and accept them then and there so as to avoid disputes at a later stage. If the contractor is not available at the work spot at the time of recording measurements or check measurements the particulars of measurements shall be signed by the authorized agent of contractor based on which the contractor shall accept the set of measurements without any further dispute. If for any reason the contractor's authorised agent is also not available at site when the department decides to suspend the work recording of measurements in the absence of the contractor or his authorised representative the department shall not entertain any claim from the contractor for any loss incurred by him on this account. The Contractor shall however note that the Department cannot indefinitely wait for recording the measurement due to the absence of the Contractor and his authorised agent and check measure them even in the absence of the contractor.

4.43.1.1 With regards to payment schedule, all parameters should be taken not to allow higher percentage of amounts for the convenient works initially taken up by the successful bidder. The payment schedule always should be proportionate to the corresponding work and should not facilitate the contracting agency for drawals of more amounts.

4.43.2 The contractor can claim part bills monthly once or unpaid amount accumulates to 20% of agreement value, which ever earlier. Accordingly, preparation & payment of part bill will be made in 14 working days from the date of receipt of claim from the contractor. In the case of final bill, payment will be made within three weeks from the date of receipt of claim from the contractor, subjected to fulfilling the agreement conditions.

Deposits will be refunded within 28 working days from the date of receipt of request from the contractor, subject to fulfilling the agreement conditions.

The actual volume of stone and aggregates shall be computed after deducing the following percentages from the volume computed by stack measurements.

S. No	Standard size of aggregate and stone	Percentage reduction in volume computed by stack measurements to arrive at the volume to be paid for
1.	Stone	40
2.	40 mm and 25 mm	10
3.	20 mm, 12 mm, 10 mm & 6 mm	5
4.	Fine aggregate	Nil
5.	Gravel	20

[Note: ***The above Table may be modified depending on the type of work.*****]**

4.43.2.1 Payments and Certificates:

4.43.2.2 Payments shall be adjusted for recovery of advance payments, liquidated damages in terms of tender conditions and security deposit for the due fulfillment of the contract. Payment will be made to the Contractor under the certificate to be issued at reasonably frequent intervals by the Engineer-in-Charge, and intermediate payment will be the sum equal to 98 % of the value of work done as so certified and balance of 2% will be withheld and retained as security for the due fulfillment of the contractor under the certificate to be issued by the Engineer-in-Charge. On completion of the entire works, the contractor will receive the final payment of all the money due or payable to him under or by virtue of the contract except retention money of a sum equal to 2% percent of the total value of the work done. The 1% EMD in the form of BG or Online payment and withheld amount of 2% (In the form of cash) from the final bill will be retained under deposits till satisfactorily completion of defect liability period of 60 months.

The 1% EMD in the form of BG or Online payment and withheld amount of 2% (In the form of cash) from the final bill will be returned to the contractor only after project completion period + DLP period of 60 months + 28 days grace period+ valid extension of contract period if granted+ Defect rectification period if extended beyond the DLP period, subject to relevant conditions specified.

4.43.2.3 Defects liability period shall be taken as Sixty (60) months for RCC frame work &RCC components and Twenty four (24) months for all balance works as defined below for the works executed under this Contract from the date of completion & commissioning of the work for building as a whole, wherein all the defects shall be rectified by the contractor at his own cost.

4.43.2.4 The major scope of the defect liability for a period of Sixty (60) months will be as follows.

S.No	Description	Defect Liability
(i)	Concrete work	**(a)** Rectification of structural /superficial/non-structural cracks. **(b)** Rectification of dampness/leakages/seepage in roof slab/floor slab/ junctions & sunken portion, depressed portion, through RCC slab, vertical ties, bands, walls, base slab, junction of RCC walls with base slab and construction joints of RCC water tanks. **(c)** Rectification of cracks in girders, beam, slab, column, lintels, vertical ties, plinth bands, lintel bands etc. **(d)** Painting the same matching with the original paint.

4.43.2.5 The major scope of the defect liability for a period of Twenty Four (24) months will be as follows. However, the DLP is not limited to these items and all the works executed other than the works covered in 60 months DLP period shall be maintained during DLP of 24 months.

S.No	Description	Defect Liability
(ii)	Brick work / AAC masonry work	**(a)** Rectification of cracks in confined masonry panel wall/partition wall in full length or in part portion. **(b)** Cracks / settlement of main wall, partition wall or dwarf walls. **(c)** Rectification of efflorescence, dampness and painting matching with original paint.
(iii)	Woodwork & Joinery	**(a)** Replacement of warped / bent / weather affected joinery, termite & borer affected joinery of wooden door / window shutters and frames. **(b)** Cracks in panels, bars / rails / styles of wooden door / window shutters, glasses etc. including painting matching with original paint.
(iv)	Builders Hardware	**(a)** Repairs / Replacement of loosened / premature failure of fittings including lever mechanics in door locks, hydraulic door closers, handles, tower blots, cupboard locks etc. **(b)** Tightening / Replacement of sag in mosquito proofing SS net.

(v)	Structural Steel, SS work & iron work	**(a)** Rectification / Replacement of defective part of girders, gate, shutter, etc. along with protective coating/ vermiculite coating & paintings. **(b)** Redoing of defective portion in fabrication / welding including painting thereon.
vi)	Roof treatment	(a) Rectification of leakage / seepage in roof slab, expansion/ seismic joints, floor junctions, inadequate/ faulty slope, drain outlets, including covering at junction till guarantee period.
(vii)	Finishing work	**(a)** Rectification of structural / superficial cracks. **(b)** Rectification of protruding / peeling off plaster. **(c)** Rectification of efflorescence, dampness appeared. **(d)** Undulation / unevenness in plaster. **(e)** Paint & polishing.
(viii)	Flooring work	**)** Rectification of sunken / deflected / depressed portion of plinth protection, flooring in rooms, toilets, entrance foyer, staircase and other locations. **(b)** Rectification / Replacement of settled floors. **(c)** Settlement of foundation & floors and resultant undulation of door finishes. **(d)** Rectification / Replacement of floor tiles which are sunken / uneven / undulating at joints / different in colour, texture, etc.
(ix)	Electrical items, accessories	**(e)** Repair of defective fittings such as lights, fans and wiring etc., **(f)** Replacement of damaged/ defective/ burnt out parts/ fittings. **(g)** Repair to damaged flooring
(x)	Water supply & sanitary items	**(h)** Repair of defective fittings, lines etc., **(i)** Replacement of damaged fittings, lines etc.,
(XII)	Fire fighting system	Shall attend all the defects arise during Defect Liability Period.

Note:1. The above list is illustrative for civil & allied work and not exhaustive. The rectification will include all Civil, Electrical and all other works including internal and external services, Fire-Fighting, Yard lighting, without any exclusion.

4.43.2.6 The defect liability period is 60 months for RCC frame work & all its components and 24 months for all balance items from the date of certification of completion & Commissioning of all works in the Project and the defect liability period shall be extended for as long as defects remain to be corrected by the Contractor, which is without prejudice to the right of the employer to cause rectify and recover. The security deposits retained in the form of Bank guarantee shall be valid for the duration

of contract period plus the defect liability period of five years and in case any valid extension of contract period is granted, the validity of BG shall also be extended for the corresponding period and further till rectification of defects. The Bank Guarantee will be refunded only after above period and compliance.

During DLP of 24months for the components other than items covered in 60 months DLP, the contractor shall guarantee for all the civil works, MEP works, Fire-Fighting, Yard lighting etc., provided by the Contractor and shall attend all defects with all necessary materials, labour, spares etc., completely.

4.43.2.7 The Contractor shall provide the required services during the DLP Period as single point ofresponsibilityandanyconsumablesorsparesshallbeincludedinthescopeoftheContractor.

4.43.2.8 The Contractor shall have its maintenance personnel available at short notice to attend any break down/repair works in the building premises.

4.43.2.9 The Contractor warrants that all the goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract. The Contractor further warrants that the goods supplied under this contract shall have no defect arising from design materials or workmanship (except insofar as the design or material is required by the specifications).

4.43.2.10 The Contractor shall at his own cost, repair or replace the defective works, goods or parts thereof at their cost as per the time limits prescribed below, during the defect liability period is 60 months for RCC frame work & all its components and 24 months for all balance items. It shall be responsibility of the Contractor to bring the defect works to normal/standard status of functioning to make it fit for utilization.

S.No.	Item	Minor repair	Major repair
1	All RCC, civil, Mechanical & Plumbing related repair works	Within 5 days	Within 2 weeks
2	Firefighting system	Within 2 days	Within 7 days
3	All Electrical related works.	Within 1 day	Within 7 days

4.43.2.11 DEFECT LIABILITY PERIOD:60 months for RCC frame work & all its components and 24 months for all balance items:

1. It is basically the responsibility of the contractor to undertake remedy in case of any structural defects observed in the above said DLP period from the date of completion of the Project and the contractor is liable to rectify the defect at his own cost.
2. "Structural defects" means actual physical damage/ defects to the designated load-bearing elements of the total building or units like faults, breakage or cracks, appearing over time in elements such as load-bearing columns, walls, slabs, beams etc. which can affect the strength and stability of the building or Units and shall include any of the following namely:
   - **i)** Defects due to design attributes of reinforced cement concrete (RCC) or structural mild/ steel (MS) elements of an engineered (structurally designed) structure.
   - **ii)** Defects due to faulty or bad workmanship of RCC work,
   - **iii)** Defects due to materials used in such RCC work,
   - **iv)** Major cracks in masonry work that are induced as a result of failures of RCC work.
   - **v)** Any defect which is established to have occurred on account of negligence, use of inferior materials or non-adherence to the regulatory codes of practice by the Contractor.

   Note: The Contractor shall not be liable for any such structural/ architectural defect induced by means of carrying out structural or architectural changes from the original specifications/ design by Others after Completion of the Project.

3. However, the following exclusions have been mentioned which will not constitute as Structural defects:
   a) Equipment (motors, firefighting system etc.) which carry manufacturer's guarantees for a limited period. Thereafter the annual maintenance contract shall be taken by the department/User with the suppliers. The Contractor shall transfer the manufacturer's guarantees/warranties to the Department.

   b) Fittings related to plumbing, sanitary, electrical, hardware, etc. have natural wear and tear.
   c) Allowable structural and other deformations including expansion quotient.
   d) The terms of work like painting etc. which are subject to wear and tear.

4.43.2.12 In case of over payments or wrong payment if any made to the contractor due to wrong interpretation of the provisions of the contract, APSS or Contract conditions etc., such unauthorized payment will be deducted in the subsequent bills or final bill for the work or from the bills under any other contracts with the TUDA / Government or at any time thereafter from the deposits available with the Government / TUDA.

4.43.2.13 Any recovery or recoveries advised by the Government Department either state or central, due to non-fulfillment of any contract entered into with them by the contractor shall be recovered from any bill or deposits of the contractor.

4.43.2.14 No claim shall be entertained, if the same is not represented in writing to the Engineer-in-Charge within 15 days of its occurrence.

4.43.2.15 The contractor is not eligible for any compensation for inevitable delay in handing over the site or for any other reason. In such case, suitable extensions of time will be granted after considering the merits of the case.

4.43.2.16 **In case of any claim by any workman pending in any court of law or tribunal involving the employer also with the contractor, the employer is entitled to retain amount in relation to the claim from final bill of contractor till the claim is cleared"**

4.43.2.17 **Duty of the Contractor to comply queries on defects in the works if any: In case if the Vigilance & Enforcement Dept., and the Anti-Corruption Beaureu have taken up any investigation and notices any defects, the contractor has to invariably follow the recommendations including to re-construct or to carry out defects and also accept recoveries for the defective work.**

4.43.3 <u>Intermediate Payments:</u>

4.43.3.1 For intermediate Stage of work, only part rates as fixed by the Engineer-in-Charge will be paid.

4.43.3.2 Part rates shall be worked out for the work done portion based on the actual operations involved keeping in view the value of the balance work to be done, to avoid unintended benefit to the Contractor in initial Stage.

4.43.3.3 Full rate shall be paid when the work is completed to the full profile as noted in the drawings/ specifications.

4.43.3.4 For earthwork in cutting, 10% of the quantity will be with-held for intermediate payments and the same will be released after completing the work to the profiles as per drawings and disposal of the spoil material at the specified places and handing over the balance useful stone.

4.43.3.5 For earthwork, embankment formation work, 10% of the quantity will be withheld for intermediate payments and the same will be released after completing the bund to the profiles as per drawings including trimming of side slopes and all other works contingent to the bund profile.

4.43.3.6 For the structure works either with masonry or concrete where the height of structure is more than three meters, the quantities executed in the lower level will be withheld at the rate of one percent for every three meters height, if the balance height of the structure work is more than three meters in being over the executed level and the same will be released only after the entire work is completed as certified by the Engineer-in-Charge.

4.43.3.7 For C.M. & C.D. works and for lining works, spread over more than 2 Km. In length 5 percent of the concrete and Masonry quantities will be with held and the same will be released after completion of all C.M. & C.D. works and lining for the entire length certified by the Engineer-in-Charge.

4.43.3.8 Where payment is intended for aggregates by Bill of Quantities item based on stack measurements, 10% of the quantity measured will be withheld. No payment or advance will be made for unfixed materials when the rates are for finished work in site.

4.43.3.9 The contractor shall supply as built drawings drawn to scale in 5 sets along with original tracings within 28 days of the issue of certificate of completion of work failing which an amount of Rs.5,00,000/- will be withheld from the amounts due to the contractor.

4.44 Interest on Money due to the Contractor:

No omission by the Executive Engineer or the sub-divisional officer to pay the amount due upon certificates shall vitiate or make void the contract, nor shall the contractor be entitled to interest upon any guarantee fund or payments in arrears, nor upon any balance which may, on the final settlement of his accounts, found to be due to him Payments shall be adjusted for deductions for advance payments, retention and other recoveries in terms of contract & taxes to be deducted at source [TDS] as per applicable law. The contractor can claim part bills monthly once or unpaid amount accumulates to 20% of agreement value, which ever earlier. Accordingly, preparation & payment of part bill will be made in 14 working days from the date of receipt of claim from the contractor, subject to fulfilling the agreement conditions. If the payment is delayed beyond 90 days, interest shall be payable at 6% simple interest per annum thereon from 91st day onwards till the date when the payment is made, except where contractor voluntarily agrees for the delayed payments, he is not entitled to interest on delayed payments.

4.44 Certificate of Completion & commissioning of works:

4.44.1 When the whole of the work has been completed and has satisfactory passed any final test that may be prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer-in-Charge accompanied by an undertaking to carry out any rectification work during the period of maintenance, such notice and undertaking shall be in writing and shall be deemed to be request by the Contractor for the Engineer-in-Charge to issue a Certificate of completion in respect of the Works. The Engineer-in-Charge shall, within twenty one days of the date of delivery of such notice either issue to the Contractor, a certificate of completion stating the date on which, in his opinion, the works were completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the Works which, in the Engineer-in-Charge'' opinion, required to be done by the Contractor before the issue of such Certificate. The Engineer-in-Charge shall also notify the Contractor of any defects in the Works affecting completion that may appear after such instructions and before completion of the Works specified there in. The Contractor shall be entitled to receive such Certificate of the Completion within twenty one days of completion to the satisfaction of the Engineer-in-Charge of the Works so specified and making good of any defects so notified.

4.44.2 Similarly, the Contractor may request and the Engineer-in-Charge shall issue a Certificate of Completion in respect of:

a) Any section of the Permanent works in respect of which a separate time for completion is provided in the Contract, and

b) Any substantial part of the Permanent Works which has been both completed to the satisfaction of the Engineer-in-Charge and occupied or used by the Department.

4.44.3 If any part of the Permanent Works shall have been completed and shall have satisfactorily passed any final test that may be prescribed by the Contract, the Engineer-in-Charge may issue such certificate, and the Contractor shall be deemed to have undertaken to complete any outstanding work in that part of the Works during the period of Maintenance.

4.45 Taxes included in the bid:

4.45.1 The percentage quoted by the contractor shall be deemed to be inclusive of the taxes on all materials that the contractor will have to purchase excluding the GST for performance of this contract.

4.45.2 Any central or state sales and other taxes on completed item of works of this contract (other than clause 4.102) as may be levied and paid by the contractor from time to time are to be borne by the contractor only.

4.46 Price adjustment

4.46.1 Price adjustment clause for cement, steel, bitumen and POL will be applicable as per G.O.No.62 Water Resources (Reforms) Department. Dt.30-11-2021.

4.46.2 The price adjustment shall apply only for the work carried out within the agreement period and shall not apply to work carried out beyond the agreed period of completion.

4.46.3 The price adjustment shall be for works for which valid extension given for natural calamities duly limiting to the actual period / days lost and for portion of work where work is delayed due to land acquisition / shifting of utilities. (This shall also be limited to actual length affected.)

4.46.4 The variation clause will be when the variation in rates is more or less than 5% of the rate provided in the technical sanctioned estimate based on which bids are invited or all India wholesale price Index of the respective item.

4.46.5 Price adjustment shall be calculated separately for the components of the payment for the work done as per the G.O.No.62 Water Resources (Reforms) Department. Dt.30-11-2021.

4.46.6 The departmental authorities will verify the actual taxes paid on the steel, if not reflected in the invoice or bill or for any doubt or ambiguity there in contacting directly with the concerned tax department. The invoice price of procured steel material shall always be compared with the estimated basic cost and quantity of the same and payment shall be regularized. If invoice cost is found less than the estimated basic cost, all the allowances such as transport, tax with input subsidy, overhead and profit, TP will be applied on the invoice cost for payment.

4.47 Retention:

4.47.1 The department shall retain from each payment due to the contractor @ the rate of 2% of bill amount until completion of the whole of the Works.

4.48 Liquidated Damages:

4.48.1 If for any reason, which does not entitle the contractor to an extension of item, the rate of progress of works, or any section is at any time, in the opinion of the Superintending Engineer too slow to ensure completion by the prescribed time or extended time for completion Superintending Engineer shall so notify the contractor in writing and the contractor shall there upon take such steps as are necessary and the Superintending Engineer may approve to expedite progress so as to complete the works or such section by the prescribed time or extended time. The contractor shall not be entitled to any additional payment for taking such steps. If as a result of any notice given by the Superintending Engineer under this clause the contractor shall seek the Superintending Engineers permission to do any work at night or on Sundays, if locally recognized as days or rest, or their locally recognized equivalent, such permission shall not be unreasonably refused.

4.48.2 If the contractor fails to complete whole of the works or any part thereof or section of the works within the stipulated periods of individual mile stones (including any bonafide extensions allowed by the competent authority without levying liquidated damages), the Superintending Engineer may without prejudice to any other method of recovery will deduct one tenth of one percent of contract value per calendar day or part of the day for the period of delays subject to a maximum of 10% of the contract value not as a penalty from any monies in his hands due or which may become due to the contractor. The payment or deductions of such damages shall not relieve the contractor from his obligation to complete the works, or from any other of his obligations and liabilities under the contract.

4.48.3 The liquidated damages for the whole of the work are

For milestone 1	Rs.	Per day
For milestone 2	Rs.	Per day
For milestone 3	Rs.	Per day
For milestone 4	Rs.	Per day
For milestone 5	Rs.	Per day
For milestone 6	Rs.	Per day
For milestone 7	Rs.	Per day
For milestone 8	Rs.	Per day
For milestone 9	Rs.	Per day

4.48.4 The maximum amount of liquidated damages for the whole of the works is ten percent of final contract price.

4.48.5 The mile stones will be filled at the time of Agreement after obtaining a Program of the work.

4.49 Mobilization Advance:

4.50.1 No advance whatsoever either for mobilization of machinery and materials of the execution of work will be given under any circumstances as per G.O.Ms.No.83 Water Resources (Reforms) Dept. dated 17.12.2019. The tender received with such conditions will be summarily rejected.

4.50 Securities:

4.50.1 The Earnest Money Deposit and Additional Security (for discount tender percentage beyond 15% as per GO MS.No: 50 Water Resources (Reforms) Department , dated 15-10-2020) shall be provided to the Department not later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank acceptable to the Department. The Earnest Money shall be valid until a date 28 days from the date of expiry of Defects Liability Period and the additional security shall be valid until a date 28 days from the date of issue of the certificate of completion.

4.51 Cost of Repairs:

4.51.1 Loss or damage to the Works or materials to the Works between the Start Date and the end of the Defects Correction Periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

4.51.2 Any delay/inaction or failure, the employer is entitled, to cause rectify the defects and recover the amount from the payment due to the contractor, during the defect liability period.

E. FINISHING THE CONTRACT

4.52 Completion:

4.52.1 The Contractor shall request the Engineer-in-Charge to issue a Certificate of completion of the Works and the Engineer-in-Charge will do so upon deciding that the work is completed.

4.53 Taking Over:

4.53.1 The Department shall takes over the Site and the Works within seven days of the Engineer-in-Charge issuing a certificate of Completion.

4.54 Final Account:

4.54.1 The Contractor shall supply to the Engineer-in-Charge a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer-in-Charge shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer-in-Charge shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the final Account is still unsatisfactory after it has been resubmitted, the Engineer-in-Charge shall decide on the amount payable to the Contractor and issue a payment certificate within 56 days of receiving the Contractor's revised account.

4.55 Termination:

4.55.1 The Department may terminate the Contract if the contractor causes a fundamental breach of the Contract.

4.55.2 Fundamental breaches of Contract include, but shall not be limited to the following.

a) The Contractor stops work for 28 days when no stoppage of work is shown on the current program and the stoppage has not been authorized by the Engineer-in-Charge.

b) The Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation.

c) The Engineer-in-Charge gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer-in-Charge; and

d) The Contractor does not maintain a security which is required and

e) The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined.

f) If the contractor, in the judgment of the Department has engaged in corrupt or fraudulent practices in competing for or in the executing the contract.

g) The Contractor does not adhere to the agreed construction program (Clause 24.1 to 24.4 of Conditions of Contract) and also fails to take satisfactory remedial action as per agreements reached in the management meetings (Clause 31) for a period of 15 days.

h) The Contractor fails to carry out the instructions of Engineer-in-Charge within a reasonable time determined by the Engineer-in-Charge.

For the purpose of this paragraph: "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the TUDA and includes collusive practice among Tenderers (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the TUDA of the benefits of free and open competition.

4.55.3 Notwithstanding the above the Department may terminate the contract for convenience.

4.55.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secured. Leave the Site as soon as reasonably possible.

4.56 Property:

4.56.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Department if the Contract is terminated because of Contractor's default.

4.57 Release from Performance:

4.57.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Department or the Contractor, then the Engineer-in-Charge shall certify that the contract has been frustrated. The Contractor shall make the site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all works carried out before receiving it and for any work carried out after wards to which commitment was made.

F. SPECIAL CONDITIONS

4.58 Water Supply:

4.58.1 It is the responsibility of the Contractor to make his own arrangements for water supply for the work and labor, at his own cost. The Department will not take any responsibility to arrange for water at work site. However In case the department supply is available at nearby point, the contractor will be permitted to draw water from this point subject to availability and the contractor has to make necessary arrangements for drawl of water by providing pipe line and installing a pump set from the source at his cost and the contractor has to pay the charges at 0.25% of the gross value of the works, which will be deducted from the running bills on pro-rata basis.

4.58.2 The water used for the construction shall be complied with, as per the relevant standards. The rates quoted by the contractor are deemed to be inclusive of all the above costs and operations and no compensation on this account will be allowed at later date.

4.59 Electrical Power:

4.59.1 The power for the construction equipment, lighting and other purposes shall be obtained directly from the APSPDCL, entering into a separate agreement with them, as per the conditions and the rates of supply obtained with the APSPDCL. The contractor will have to make his own arrangements to lay and maintain the necessary L.T. distribution lines and wiring for the works at his cost. The metering will be at a single point of initial L.T. supply. The department is not responsible for any sort of power failures and power breakdown etc., and no compensation of any kind will be paid by the department on account of failures or breakdowns in supply of power.

a. The materials supplied shall confirm to make and specifications as mentioned in the Schedule.

b. Installations generally shall be carried out in conformity with Indian standard code or practice for electrical wiring installations L.S. 732-1963 and 2274.

c. The contractor (Vide para 2.61 (p)) should possess license issued by the Secretary, Licensing Board, Government of A.P.TRANSCO/ APSPDCL to execute such type of works and he should mention the license number at the time of the tendering.

d. The list of specifications for all electrical materials is enclosed for execution.

e. In case of failure of electricity, the Contractor has to make alternative arrangements for supply of electricity by Diesel Generator sets of suitable capacity at place of work.

f. In case, sufficient capacity of power is available with the TUDA at near-by TUDA lines, the contractor may be permitted to draw power from this point on payment basis. But the contractor has to lay all the lines/transformers/other appliances required from this point.

g. The contractor will pay the bills of APSPDCL for the cost of power consumed by him.

h. The contractor shall satisfy all the conditions and rules required as per Indian Electricity Act 1910 and under rule –45(I) of the Indian Electricity Rules, 1956 as amended from time to time and other pertinent rules.

i. The power shall be used for bonafide Departmental works only.

j. The rate quoted by the contractor is deemed to be inclusive of all the above and no compensation on this account will be allowed at later date.

k. The department is not responsible for any sort of power failures and power break down etc., and no compensation of any kind will be paid by the department on account of such failures and no extension of time will be granted under such reasons.

4.60 Electric Power for Domestic Supply:

a) The contractor has to make his own arrangements for the supply of electric power for domestic purposes and the charges for this purpose have to be paid by him at the rates as fixed by the APSPDCL from time to time.

b) The contractor will have to make his own arrangements to lay and maintain the necessary distribution lines and wiring for the camp at his own cost. The layout and the methods of laying the lines and wiring shall have the prior approval of the Engineer-in-Charge. All camp area shall be properly electrified. All lines, streets, approaches for the camp etc., shall be sufficiently lighted for the safety of staff and labor of the contractor, at the cost of the Contractor and it will be subject to the approval of the Engineer-in-Charge.

4.61 Land:

4.61.1 Land for Contractor's use:

TUDA will allocate the land to the extent of availability to the contractor for Site establishments like Workmen residential accommodation, Site Office etc., However, it is the responsibility of the contractor to make his own arrangements for acquiring additional land if required and also make temporary erection/construction at his cost including to take up clearing the site, leveling, providing drainage and other facilities for labour/ staff residence/s, site office, work-shop or stores and for related activities connected to the contract work at his cost and out of the provision made if any among the 13.365% including several facilities & provisions provided and for contractors profit, needless to say any non-providing of the provision proportionate amounts shall be deducted while making final payment/s.

The Contractor shall apply to the Department within a reasonable time after the award of the contract and at least 30 days in advance of its use, the details of land required by him for the work at site and the land required for his camp and should any private land which has not been acquired, be required by the contractor for his use. The same may be acquired by the contractor at his own cost by private negotiations and no claim shall be admissible to him on this account.

The Engineer-in-Charge reserves the right to refuse permission for use of any government land for which no claim or compensation shall be admissible to the contractor. The contractor shall, however, not be required to pay cost or any rent for the TUDA land given to him.

4.61.2 Surrender of Occupied Land:

a) The TUDA land as here in before mentioned shall be surrendered to the Engineer-in-Charge within seven days, after issue of completion certificate. Also no land shall be held by the contractor longer than the Engineer-in-Charge shall deem necessary and the contractor shall on the receipt of due notice from the Engineer-in-Charge, vacate and surrender the land which the Engineer-in-Charge may certify as no longer required by the Contractor for the purpose of the work.

b) The contractor shall make good to the satisfaction of the Engineer-in-Charge any damage to areas, which he has to return or to other property or land handed over to him for purpose of this work. Temporary structures may be erected by the contractor for storage sheds, offices, residences etc., for non-commercial use, with the permission of the Executive Engineer on the land handed over to him at his own cost. At the completion of the work these structures shall be dismantled site cleared and handed over to the Executive Engineer. The land required for providing amenities will be given free of cost from TUDA/ Government lands if available otherwise the contractor shall have to make his own arrangements.

4.61.3 Contractor not to dispose of Spoil etc.: -

The contractor shall not dispose of or remove except for the purpose of fulfillment of this contract, sand, stone, clay ballast, earth, trees and shrubs or other materials obtained in the excavation made or lying on the site of the work, and all such materials and produce shall remain property of the TUDA / Government. The Department may upon request from the contractor, or if so stipulated in the conditions of the contract allow the contractor to use any of the above materials for the works either free of cost or after payment as may be specifically mentioned or considered necessary during the execution of the work

4.62 Roads:

In addition to existing public roads and roads Constructed by TUDA / Government, if any, in work area all additional approach roads inside work area and camp required by the Contractor shall be constructed and maintained by him at his own cost. The layout design, construction and maintenance etc. of the roads shall be subject to the approval of the Engineer-in-Charge. The contractor shall permit the use of these roads by the TUDA / Government free of charge.

It is possible that work at, or in the vicinity of the work site will be performed by the TUDA / Government or by other contractors engaged in work for the Government during the contract period. The contractor shall without charge permit the government and such other contractor and other workmen to use the access facilities including roads and other facilities, constructed and acquired by the contractor for use in the performance of the works.

The contractor's heavy construction traffic or tracked equipment shall not traverse any public roads or bridges unless the contractor has made arrangement with the authority concerned. In case contractor's heavy construction traffic or tracked equipment is not

allowed to traverse any public roads or bridges and the contractor is required to make some alternative arrangements, no claim on this account shall be entertained.

The contractor is cautioned to take necessary precautions in transportation of construction materials to avoid accidents.

4.63 Payment for Camp Construction:

No payment will be made to the contractor for construction, operation and maintenance of camp and other camp facilities and the entire cost of such work shall be deemed to have been included in the tendered rate for the various items of work in the schedule of quantities and bids.

4.64 Explosive And Fuel Storage Tanks:

No explosive shall be stored within ½ (half) KM of the limit of the camp sites. The storage of gasoline and other fuel oils or of Butane, Propane and other liquefied petroleum gases, shall confirm to the regulations of Andhra Pradesh State Government and Government of India. The tanks, above ground and having capacity in excess of 2000 liters, shall not be located within the camp area, nor within 200m, of any building.

4.65 Labor:

1) The contractor shall, make his own arrangements for the engagement of all staff and labor, local or other, and for their payment, housing, feeding and transport.

2) Labor importation and amenities to labor and contractor's staff shall be to the contractor's account. His quoted percentage shall include the expenditure towards importation of labor amenities to labor and staff;

3) The contractor shall, if required by the Engineer-in-Charge, deliver to the Engineer-in-Charge a written in detail, is such form and at such intervals as the Engineer-in-Charge may prescribe, showing the staff and the numbers of the several classes of labor from time to time employed by the contractor on the Site and such information respecting Contractor's Equipment as the Engineer-in-Charge may require.

4) Transportation of Labor:

The contractor shall make his own arrangement for the daily transportation of the labor and staff from labor camps colonies to the work spot and no labor or staff of the contractor shall stay at the work spot. No extra payment will be made to the contractor for the above transportation of the labor and his quoted percentage to the work shall include the transportation charges of labor from colonies to work spot and back.

5) The contractor will at all times duly observe the provisions of employment of children Act XXVI of 1938 and any enactment or modification of the same and will not employ or permit any person to do any work for the purpose under the provisions of this agreement in contravention of said Act. The contractor here by agrees to indemnify the department from and against all claims, penalties which may be suffered by the department or any person employed by the department by any default on the part of the contractor in the observance and performance of the provisions of the employment of children Act. XXVI of 1938 or any enactment or modification of the same.

6) As per Govt. memo No.721/Gr.(1)/81-35, dt:17.11.87. The contractor shall obtain the insurance at his own cost to cover the risk on the works to labor engaged by him during period of execution against fire and other usual risks and produce the same to the Executive Engineer concerned before commencement of work.

(a) ***The employer is not intending to take any Insurance coverage as the G.O.Ms.No.5, Finance (Works &Projects–F7) Dept., dt.05.03 .2014 have issued orders dispensing with mandatory insurance cover of all works. However, it will not exempt the bidder/ contractor so far as statutory liability to take insurance coverage for vehicles, workmen/ employees of the contractor and as such it is for the contractor to take insurance for the workers and plant machinery, vehicles etc., besides property and material of him and of the employer with him, else to bear own risk to make good for any loss/damage etc., accidental or otherwise.***

(b) ***In case of any claim by any workman pending in any court of law or tribunal involving the employer also with the contractor, the employer is entitled to retain amount in relation to the claim from final bill of contractor till the claim is cleared.***

4.66 Safety Measures:

The contractor shall take necessary precautions for safety of the workers and preserving their health while working in such jobs, which require special protection and precautions. The following are some of the measures listed but they are not exhaustive and contractor shall add to and augment these precautions on his own initiative where necessary and shall comply with directions issued by the Executive Engineer or on his behalf from time to time and at all times:

1. Providing protective foot wear to workers situations like mixing and placing of mortar or concrete sand in quarries and places where the work is done under much wet conditions.

2. Providing protective head gear to workers at places like underground excavations to protect them against rock falls.

3. Providing masks to workers at granulates or at other locations where too much fine dust is floating about and sprinkling water at frequent intervals by water hoses on all stone crushing area and storage bins abate to dust.

4. Getting the workers in such jobs periodically examined for chest trouble due to too much breathing in to fine dust.

5. Taking such normal precautions like fencing and lightening in excavation of trenches, not allowing rolls and metal parts of useless timber spread around, making danger areas for blasting providing whistles etc.

6. Supply work men with proper belts, ropes etc., when working in precarious slopes etc.

7. Avoiding named electrical wire etc., as they would electrocute the works.

8. Taking necessary steps towards training the workers concerned on the machinery before they are allowed to handle them independently and taking all necessary precautions in around the areas where machines hoists and similar units are working.

4.67 Fair Wage Clause:

1. The contractor shall pay not less than fair wages to laborers engaged by him on the work.

2. "Fair" wages means wages whether for time of piecework notified by the Government from time in the area in which the work is situated.

3. The contractor shall not with-standing the revisions of any contract to the contrary cause to be paid to the labor, in directly engaged on the work including any labor engaged by the sub-contractor in connection with the said work, as if the laborers had been directly employed by him.

4. In respect of labor directly or indirectly employed in the works for the purpose of the contractors part of the agreement the contractor shall comply with the rules and regulations on the maintenance of suitable records prescribed for this purpose from time to time by the Government. He shall maintain his accounts and vouchers on the payment of wages to the laborers to the satisfaction of the Executive Engineer.

5. The Executive Engineer shall have the right to call for such record as required to satisfy himself on the payment of fair wages to the laborers and shall have the right to deduct from the contract amount a suitable amount for making good the loss suffered by the worker or workers by reason of the "fair wages" clause to the workers.

6. The contractor shall be primarily liable for all payments to be made and for the observance of the regulations framed by the Govt. from time to time without prejudice to his right to claim indemnity from his sub-contractors.

7. As per contract labor (Regulation and abolition) Act. 1970 the contractor has to produce the license obtained from the licensing officers of the labor department along with the tender or at the time of agreement.

8. Any violation of the conditions above shall be deemed to be a breach of his contract.

9. Equal wages are to be paid for both men and women if the nature of work is same and similar.

10. The contractor shall arrange for the recruitment of skilled and unskilled labor local and imported to the extent necessary to complete the work within the agreed period as directed by the Executive Engineer in writing.

4.68 Indemnity Bond:

Name of work: "CONSTRUCTION OF TUDA TOWERS AT NORTH-WEST CORNER OF ANNAMAIAH CIRCLE ABUTTING RC ROAD AND AIR BY-PASS ROAD IN TIRUPATI, TIRUPATI DISTRICT, ANDHRA PRADESH

I Sri _____ S/o Sri _____aged _____ Resident of _____, do hereby bind myself to pay all the claims may come (a) under Workmen's Compensation Act. 1933 with any statutory modification thereof and rules there under or otherwise for or in respect of any damage or compensation payable in connection with any accident or injury sustained (b) under Minimum wages Act 1948 (c) under payment of wages Act.1936 (d) under the Contractor labor (Regulation and Abolition) Act. 1970 by workmen engaged for the performance of the business relating to the above contract ie., Failing such payment of claims of workmen engaged in the above work, I abide in accepting for the recovery of such claims, effected from any of my assets with the departments.

4.69 Compliance With Labor Regulations:

During continuance of the contract, the contractor and his sub contractors shall abide at all times by all existing labor enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labor law (including rules), regulations, bye laws that may be passed or notifications that may be issued under any labor law in future either by the State or the Central Government or the local authority and also applicable labor regulations, health and sanitary arrangements for workmen, insurance and other benefits. Salient features of some of the major labor laws that are applicable to construction industry are given below. The contractor shall keep the Department indemnified in case any action is taken against Department by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Department is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provision stipulated in the notifications/bye laws/Acts/Rules/ regulations including amendments, if any, on the part of the contractor, the Engineer-in-charge /Department shall have the right to deduct any money due to the contractor including his amount of performance security. The Department/Engineer-in-Charge shall also have right to recover from the contractor any sum required or estimated to be required for making good the loss or damage suffered by the Department.

The employees of the Contractor and the Sub-contractor in no case shall be treated as the Department of the Department at any point of time.

4.70 Salient features of some major labor laws applicable to establishment engaged in buildings and other construction work:

(a) Workmen compensation Act 1923: The Act provides for compensation in case if injury by accident arising out of and during the course of employment.

(b) Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if any employee has completed 5 years service or more, or on death, the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments, employing 10 or more employees.

(c) Employees P.F. and Miscellaneous provision Act 1952: The Act provides for monthly contributions by the Department plus workers @ 10% or 8.33%. The benefits payable under the Act are:

(i) Pension or family pension on retirement or death, as the case may be.
(ii) Deposit linked insurance on the death in harness of the worker.
(iii) Payment of P.F. accumulation on retirement/death etc.,

(d) Maternity Benefit Act 1951: The Act provides for leave and some other benefits to women employees in case of confinements or miscarriage etc.

(e) Contract Labor (Regulation & Abolition) Act 1970: The Act provides for certain welfare measures to be provided by the contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Department by Law. The Principal Department is required to take certificate of Registration and the contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Department if they employ 20 or more contract labor.

(f) Minimum wages Act 1948: The Department is supposed to pay not less than the Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment construction of Buildings, Roads, Runways are scheduled employments.

(g) Payment of wages Act 1936: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

(h) Equal Remuneration Act 1979: The Act provides for payment of equal wages for work of equal nature to Male or Female workers and for not making discrimination against Female employee in the matters of transfers, training and promotions etc.

(i) **Payment of Bonus Act 1965:** The Act Is applicable to all establishments employing 20 or more employees. The Act provides for payment of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs. 3500/- per month or less. The bonus to be paid to employees getting Rs.2500/- per months or above and up to Rs.3500/- per month shall be worked out by taking wages as Rs.2500/- per monthly only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

(j) **Industrial Disputes Act 1947**: The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock- out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

(k) **Industrial Employment (Standing Orders) Act 1946**: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the State and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Department on matters provided in the Act and get the same certified by the designated Authority.

(l) **Trade Unions Act 1926:** The Act lays down the procedure for registration of trade unions of workmen and Departments. The Trade Unions registered under the act have been given certain immunities from civil and criminal liabilities.

(m) **Child Labor (Prohibition & Regulation) Act 1986:** The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes; Employment Child Labor is prohibited in Building and Construction Industry.

(n) **Inter-State Migrant workmen's (Regulation of Employment & Conditions of service) Act 1979:** The Act applicable to an establishment, which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another State). The inter State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.

(o) **The Building and Other Construction workers (regulation of Employment and conditions of service) Act 1996 and the Cess Act of 1996:** All the establishments who carryon any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay Cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Department of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Department to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

(p) **Factories Act 1948:** The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 person or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

Note :- **Any new codes, rules, acts on labour laws will also be applicable from time to time during currency of the contract. However, the price adjustment in respect of labour will be payable as per the Clause 4.47 based on the very latest G.O.Ms.No.62 water resources (Reforms) dept. dated 30.11.21 only and no other kind of escalation in respect of labour will be considered, for anything above shall be borne by the Contractor.**

4.71 Liabilities of the Contractor:

4.71.1 Accident Relief and workmen compensation:

The contractor should make all necessary arrangements for the safety of workmen on the occurrence of the accident, which results in the injury or death of any of the workmen employed by the contractor, the contractor shall within 24 hours of the happenings of the accident and such accidents should intimate in writing to the concerned Asst. Engineer / Asst. Executive Engineer of the Department the act of such accident. The contractor shall indemnify Government against all loss or damage sustained by the Government resulting directly or indirectly from his failure to give intimation in the manner aforesaid including the penalties or fines if any payable by Govt. as a consequence of Govt. failure to give notice under workmen's compensation Act or otherwise conform to the provisions of the said Act. In regard to such accident.

4.71.2 In the event of an accident in respect of which compensation may become payable under the workmen's compensation Act VIII 23 whether by the contractor, by the Government it shall be lawful for the Executive Engineer to retain such sum of money which may in the opinion of the Executive Engineer be sufficient to meet such liability. The opinion of the Executive Engineer shall be final in regard to all matters arising under this clause.

4.71.3 The contractor shall at all times indemnify the Govt. of A.P. against all claims which may be made under the workmen's compensation act or any statutory modification thereafter or rules thereunder or otherwise consequent of any damage or compensation payable in consequent of any accident or injuries sustained or death of any workmen engaged in the performance of the business relating to the contractor.

4.72 Contractor's Staff, Representatives and Labor:

(a) The contractor shall, at all times, maintain on the works, staff of qualified Engineers, and Supervisors of sufficient experience of similar other jobs to assure that the quality of work turned out shall be as intended in the specifications. The contractor shall also maintain at the works, a Work Manager or sufficient status, experience and office and duly authorize him to deal with all aspects of the day-today work. All communications to any commitments by the Work Manager shall be considered as binding on the Contractor.

(b) The Contractor shall at all times submit details of skilled and unskilled labor and equipment employed to the Engineer-in-Charge in prescribed proforma as he may require to assess and ensure the proper progress of work.

(c) For the work costing more than 10.00 Lakhs, if the contractor does not employ the technical person agreed to on the work a fine of Rs. 25, 000/- will be imposed. If he does not employ for 30 days, thereafter it becomes a fundamental breach of contract.

(d) For the work costing less than 10.00 Lakhs the Executive Engineer has to impose on suitable fine of Rs. 5,000/- for non-employment of technical person. If he does not employ for 30 days, thereafter it becomes a fundamental breach of contract.

4.73 Accommodation and food:

The contractor should arrange accommodation he needs, at his own cost. The contractor shall make his own arrangements for supply of food grains, fuel and other provision to his staff and laborers including controlled commodities.

4.74 Relationship:

Contractor shall have to furnish information along with tender, about the relationship he is having with any officer of the Department, Government of Andhra Pradesh of the rank Assistant Engineer and above engaged in the work and any officer of the rank of Assistant Secretary and above of the Department of Government of Andhra Pradesh.

4.75 Protection of adjoining premises:

The contractor shall protect adjoining sites against structural, decorative and other damages that could be caused by the execution of these works and make good at his cost any such damages.

4.76 Work during night or on Sundays and holidays:

The works can be allowed to be carried out during night, Sundays or authorized holidays in order to enable him to meet the schedule targets and the work shall require almost round the clock working keeping in view:

(i) The provisions of relevant labor laws being adhered to:

(ii) Adequate lighting, supervision and safety measures are established to the satisfaction of the Engineer-in-Charge and

(iii) The construction programme given by the Contractor and agreed upon by the Engineer-in-Charge envisages such night working or working during Sundays or authorized holidays.

4.77 Layout of materials stacks:

The contractor shall deposit materials for the purpose of the work on such parts only of the ground as may be approved by the Engineer-in-Charge before starting work. A detailed survey, clearly indicating position and areas where materials shall be stacked and sheds built is to be conducted by the contractor at his own cost and only after obtaining necessary approval of the plan for use of sites by the Engineer-in-Charge, the Contractor can use the sites accordingly.

4.78 Use of blasting materials:

Procurement of blasting materials and its storage is the responsibility of the contractor. The contractor shall engage licensed blaster for blasting operation. The contractor is to act in accordance with Indian Explosive Act and other rules prevailing, during the execution of work. It is the responsibility of the contractor to see, that works by other agencies in the vicinity are not hampered, in such cases if any claim is made by other agencies that should be borne by the contractor. Carriage of blasting materials, from the magazine to the work site, is the responsibility of the contractor.

4.79 Plant and Equipment:

4.79.1 The contractor shall have sufficient plant, equipment and labor and shall work such hours and shifts as may be necessary to maintain the progress on the work as per the approval progress schedule. The working and shifts hours shall comply with the Govt. Regulations in force.

4.79.2 It is to expressly and clearly understood that contractor shall make his own arrangements to equip himself with all machinery and special tools and plant for the speedy and proper execution of the work and the department does not undertake responsibility towards their supply.

4.79.3 The department shall supply such of the machinery that may be available on hire basis but their supply cannot be demanded as matter of right and no delay in progress can be attributed to such non-supply of the plant by the department and the department cannot be made liable for any damage to the contractor. The Contractor shall be responsible for safe custody of the departmental machinery supplied to him (which will be delivered to contractor at the machinery yard at site of work) and he has to make good all damages and losses if any other than fire, wear and tear to bring it to the conditions that

existed at the time of issue to the contractor before handing over the same to the department. The hire charges for the machinery handed over to the contractor will be recovered at the rate prevalent at the time of supply. The contractor will have to execute supplemental agreement with Executive Engineer at the time of supply of the machinery.

4.79.4 The acceptance of departmental machinery on hire is optional to the contractor.

4.80 Steel forms:

Steel forms should be used for all items involving and use of centering and shuttering shall be single plane without any dents and undulations.

4.81 Inconvenience to public:

The contractor shall not deposit materials at any site, which will cause inconvenience to public. The Engineer-in-Charge may direct the contractor to remove such materials or may undertake the job at the cost of the contractor.

4.82 Conflict of interest:

Any bribe, commission, gift or advantage given, promised or offered by on behalf of contractor or his partner, agent or servant or any one on his behalf to any officer, servant, representatives, agents of Engineer-in-Charge, or any persons on their behalf, in relation to the obtaining or to execution of this, or any other contract with Engineer-in-Charge shall in addition to any criminal liability, which it may occur, subject to the cancellation of this or all other contracts and also to payment of any loss or damage resulting from any such cancellation. Engineer-in-Charge shall then be entitled to deduct the amount, so payable from any money, otherwise due to the contractor under this or any other contract.

4.83 Contract documents and materials to be treated as confidential:

All documents, correspondences, decisions and orders, concerning the contract shall be considered as confidential and/or restricted in nature by the contractor and he shall not divulge or allow access to them by any unauthorized person.

4.84 General obligations of Contractor:

4.84.1 The contractor shall, subject to the provision of the contract and with due care and diligence, execute and maintain the works in accordance with specifications and drawings.

4.84.2 The contractor shall promptly inform the Department and the Engineer-in-Charge of any error, omission, fault and the defect in the design of or specifications for the works which are discovered when reviewing the contract documents or in the process of execution of the works.

4.84.3 If Contractor believes that a decision taken by the Engineer-in-Charge was either outside the authority given to the Engineer-in-Charge by the Contract or that the decision was wrongly taken, the decision shall be referred to the

technical expert within 14 days of the notification of the Engineer-in-Charge's decisions.

4.84.4 Pending finalization of disputes, the contractor shall proceed with execution of work with all due diligence.

4.85 Security measures:

a) Security requirements for the work shall be in accordance with the Government's general requirements including provisions of this clause and the Contractor shall conform to such requirements and shall be held responsible for the actions of all his staff, employees and the staff and employees of his sub-contractors.

b) All contractors' employees, representatives and sub-contractor's employees shall wear identifications badges provided by the contractor. Badges shall identify the contractor, showing and employee's number and shall be worn at all times while at the site. Individual labor will not be required to wear identification badges.

c) All vehicles used by the contractor shall be clearly marked with contractor's name.

d) The contractor shall be responsible for the security of the works for the duration of the contract and shall provide and maintain continuously adequate security personnel to fulfill these obligations. The requirements of security measures shall include, but not limited to maintenance of order on the site, provision of all lighting, fencing, guard flagmen and all other measures necessary for the protection of the works within the colonies, camps and elsewhere on the site, all materials delivered to the site, all persons employed in connection with the works continuously throughout working and non working period including nights, Sundays and holidays for duration of the contract.

e) Other contractors working on the site concurrently with the contractor will provide security for their own plant and materials. However, their security provisions shall in no way relieve the contractor of his responsibilities in this respect

f) Separate payment will not be made for provision of security services.

4.86 Fire fighting measures:

a) The contractor shall provide and maintain adequate firefighting equipment and take adequate fire precaution measures for the safety of all personnel and temporary and permanent works and shall take action to prevent damage to destruction by fire of trees shrubs and grasses.

b) Separate payment will not be made for the provision of fire prevention measures.

4.87 Sanitation:

The contractor shall implement the sanitary and watch and ward rules and regulations for all forces employed under this contract and if the Contractor fails to enforce these rules, the Engineer-in-Charge may enforce them at the expenses of the Contractor.

The contractors special attention is invited to clause 37, 38, 39 and 51 of the preliminary specification to the A.P.S.S. and he is requested to provide at his own expenses the following amenities to the satisfaction of Engineer-in-charge concerned.

First Aid: At the work site there shall be maintained in a readily accessible place, first aid appliances and medicine including adequate supply of sterilized dressing and sterilized cotton wool. The appliance shall be kept in good order. They shall be placed under the charge of a responsible person, who shall be readily available during working hours.

Drinking water:

Water of good quality for drinking purpose shall be provided for the worker on a scale of not less than 2 gallons per head per day.

a) Where drinking water is obtained from an intermittent public water supply each work site shall be provided with a storage tank, where such drinking water shall be stored.

b) Every water supply storage shall be at a distance of not less than 10 mt from any latrine drain or other source of pollution where water has to be drained. Any existing well, which is within such proximity of any latrine, drain or other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be dust and water proof.

c) A reliable pump shall be fitted to each inner well. The trap door shall be keep locked and opened only for inspection or cleaning which shall be done at least once a month.

Washing and bathing place:

Adequate washing and bathing places shall be provided separately for men and women. Such place shall be keep clean and well drained, bathing or washing should not be allowed in or near any drinking water well.

Latrine and urinals:

There shall be provided within the area of every work site latrines and urinals in an accessible place to men and women separately. For each of them shall be on the following scales or the scale as directed by Engineer-in-charge in any particular case.

Where the No. of persons employed does not exceed 50: 2 Nos

Where the No. of persons employed exceeds 50 but does not exceed 100:3 Nos

For every additional 100: 3 Nos

If women are employed, separate latrines and urinals separated from those for men shall be provided on the same scale.

Except in work site provided with water flushed latrines connected with a water borne sewage systems all latrine shall be cleaned at least four times daily and at least twice during working hours and kept in a strict sanitary condition. The receipt scales shall be tarred inside and outside at least once a year.

The excrete from the latrines shall be disposed off at the contractors expenses in a way approved by the local public health authority. The contractor shall also employ adequate number of scavengers and conservancy shall to keep the latrines and urinals in a clean condition.

Shelters during rest:

At the work site there shall be provided free of cost two suitable sheds, one for meals and other for rest for the use of workers.

Creches:

At every work site at which 50 or more women workers are ordinarily employed there shall be provided two huts of suitable size for use of children under the age of 6 years. One hut shall be used for infants games and other as a bed room. The hut shall be constructed on a standard not lower than the following.

Thatched roofs, Mud floors and wall Planks spread over the mud floor and covered with matting. The use of huts shall be restricted to children their attendants and mothers of the children.

Canteens:

A cook for canteen on a moderate scale shall be provided for the benefit of works if it is considered essential.

Sheds for the workers:

The contractor should provide at his own expense sheds for housing the workers. The sheds shall be on a standard not less than the cheap shelter type to have in which the workers in the locality are accustomed. The sheds are to be in rows with 1.5 Mts., clear space between sheds and 2.5 Mts. clear space between roofs. If conditions permit, the workers camp shall be laid out in units of 400 persons each unit to have a clear space of 4‟ each side.

Land should be acquired temporarily for storing Contractor's materials or for housing their staff.

The contractor should make his own arrangements for temporary acquisition of land required for storing his materials and for the housing of his staff at his own expenses.

4.88 Training of personnel:

The contractor, shall, if and as directed by the Engineer-in-Charge provide free of any charge adequate facilities, for vocational training of Government Officers, students, Engineers, supervisors, foremen, skilled workmen etc. not exceeding six in number at any one time on the contractor's work. Their salaries, allowances etc. will be borne by the Government and the training schemes will be drawn up by the Engineer-in-Charge in consultation with the contractor.

4.89 Ecological balance:

a) The contractor shall maintain ecological balance by preventing de-forestation, water pollution and defacing of natural landscape. The contractor shall so conduct his construction operation as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work. In respect of the ecological balance, Contractor shall observe the following instructions.

i) Where unnecessary destruction, scarring, damage or defacing may occur, as result of the operation, the same shall be repaired replanted or otherwise corrected at the contractor's expense. All work area including borrow areas shall be smoothened and graded in a manner to conform to the natural appearances of the landscape as directed by the Engineer-in-Charge.

ii) All trees and shrubbery which are not specifically required to be cleared or removed for construction purposes shall be preserved and shall be protected from any damage that may be caused by the contractor's construction operation and equipment. The removal of trees and shrubs will be permitted only after prior approval by the Engineer-in-Charge. Special care shall be exercised where trees or shrubs are exposed to injuries by construction equipment, blasting, excavating, dumping, chemical damage or other operation and the contractor shall adequately protect such trees by use of protective barriers or other methods approval by the Engineer-in-Charge. Trees shall not be used for anchorages. The contractor shall be responsible for injuries to trees and shrubs caused by his operations. The term "injury" shall include, without limitation bruising, scarring, tearing and breaking of roots, trunks or branches. All injured trees and shrubs be restored as nearly as practicable without delay to their original condition at the contractor's expense.

iii) The contractor's construction activities shall be performed by methods that will present entrance or accidental spillage of solid matter contaminants, debris and other objectionable pollutants and wastage into river. Such pollutant and waste include earth and earth products, garbage, cement concrete, sewage effluent, industrial wastes, radio-active substances, mercury, oil and other petroleum products, aggregate processing, mineral salts and thermal pollution. Pollutants and wastes shall be disposed off in a manner and at sites approved by the Engineer-in-Charge.

(iv) In conduct of construction activities and operation of equipments the contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimise the air pollution. The excessive omission of dust in to the atmosphere will not be permitted during the manufacture, handling and storage of concrete aggregates and the contractor shall use such methods and equipment as a necessary for collection and disposal or prevention of dust during these operation. The contractor's methods of storing and handling cement shall also include means of eliminating atmospheric discharges of dust, equipment and vehicles that give objectionable omission of exhaust gases shall not be operated. Burning of

materials resulting from clearing of trees, bushes, combustible construction materials and rubbish may be permitted only when atmospheric conditions for burning are considered favorable.

vi) Separate payment will not be made for complying with the provisions of this clause and all cost shall be deemed to have been included in the unit rates and prices included in the contract if any provision is not complied with within a reasonable time even after issue of a notice in this respect, the necessary operations would be carried out by the Engineer-in-Charge at the cost of the Contractor, Orders of the Engineer-in-Charge in this respect would be final and binding on the contractor.

4.90 <u>Preservation of existing vegetation:</u>

a) The contractor will preserve and protect all existing vegetation such as trees, on or adjacent to the site which do not unreasonably interfere with the construction as may be determined by the Engineer-in-Charge. The contractor will be held responsible for all unauthorized cutting or damage of trees, including damage due to careless operation of equipment, stockpiling of materials or trekking of grass areas by equipment. Care shall be taken by the Contractor in felling tress authorized for removal to avoid any unnecessary damages to vegetation and tress that are to remain in place and to structures under construction or in existence and to workmen.

b). All the produce from such cutting of trees by the contractor shall remain the property of Government and shall be properly stacked at site, approved by the Engineer-in-Charge. No payment whatsoever shall be made for such cutting and its stacking by the Contractor. If any produce from such cutting is not handed over to the Government by the contractor, he shall be charged for the same at the rates to be decided by the Engineer-in-Charge. The recovery of this amount shall be made in full from the intermediate bill that follows.

c) The contractor shall also make arrangements of fuel deposits for supply of required fuel for the laborer to be employed for cooking purpose at his own cost in order to prevent destruction of vegetation growth in the surrounding area of the work site.

4.91 <u>Possession prior to completion:</u>

The Engineer-in-charge shall have the right to take possession of or use any completed part of work or works or any part thereof under construction either temporarily or permanently. Such possession or use shall not be deemed as an acceptance of any work either completed or not completed in accordance with the contract with in the interest of Clause 28 of APSS except where expressly otherwise specified by the Engineer-in-charge.

4.92 Payment upon termination:

If the contract is terminated because of a fundamental breach of contract by the contractor, the Engineer-in-Charge shall issue a certificate for the value of the work done less advance payment received upon the date of the issue of the certificate and less the percentage to apply to the work not completed as indicated in the contract data. Additional liquidated damages shall not apply. If the total amount due to the Department exceeds any payment due to the contractor the difference shall be a debt payable to the Department. In case of default for payment within 28 days from the date of issue of notice to the above effect, the contractor shall be liable to pay interest at 12% per annum for the period of delay.

4.93 Access to the contractor's books:

Whenever it is considered necessary by the Engineer-in-Charge to ascertain the actual cost of execution of any particular extra item of work or supply of the plant or material on which advance is to be made or of extra items or claims, he shall direct the contractor to produce the relevant documents such as payrolls, records of personnel, invoices of materials and any or all data relevant to the item or necessary to determine its cost etc. and the contractor shall when so required furnish all information pertaining to the aforesaid items in the mode and manner that may be specified by the Engineer-in-Charge.

4.94 Drawing to be kept at site:

One copy of the drawings furnished to the contractor shall be kept by the contractor on the site and the same shall at all reasonable time be available for inspection and use by the Engineer-in-Charge and the Engineer-in-Charge's representative and by any other persons authorized by the Engineer-in-Charge in writing.

4.95 BIS, ISI books and APSS to be kept at site:

A complete set of Indian Standard specification referred to in "Technical Specifications" and A.P.S.S. shall be kept at site for reference.

4.96 Site Order Book:

An order book shall be kept at the site of the work. As far as possible, all orders regarding the work are to be entered in this book. All entries shall be signed and dated by the Department Officer in direct charge of the work and by the contractor or by his representative. In important cases, the Executive Engineer or the Superintending Engineer will countersign the entries, which have been made. The order book shall not be removed from the work, except with the written permission of the Executive Engineer.

4.97 Variations by way of modification, omissions or additions:

For all modifications, omissions from or additions to the drawings and specifications, the Executive Engineer will issue revised plans, or written instructions, or both and no modification, omission or addition shall be made unless so authorized and directed by the Executive Engineer in writing.

The Executive Engineer shall have the privilege of ordering modifications, omission or additions at any time before the completion of the work and such orders shall not operate to annual those portions of the specifications with which said changes do not conflict.

Engineer-in-Charge's Decision:

It shall be accepted as in separable part of the contract that in matters regarding materials, workmanship, removal of improper work, interpretation of the contract drawings and contract specification, mode of the procedure and the carrying out of the work, the decision of the Engineer-in-Charge, which shall be given in writing, shall be binding on the contractor.

4.98 Care and diversion of river/stream:

The contractor shall submit details regarding the diversion and care of river or stream during construction of the work along with a separate print-out of the time table showing earliest and latest start and finish dates of various activities. He should submit a detailed layout plan with drawings for the diversion and care of river during construction of work. The above arrangements shall be at contractor's cost.

4.99 Income tax:

a) During the currency of the contract deduction of income tax at 2.00% + Surcharge as in force shall be made from the gross value of each bill of the contract, the contract value of which is in excess of Rs.20, 000/- for deduction of tax at rates lower than 2.00% procedure stipulated under section 194-C(4) of Income Tax Act, 1961 shall be followed.

b) Income Tax clearance certificate should be furnished before the payment of final bill. Otherwise final payment will be with held.

c) The contractor's staff, personnel and labor will be liable to pay personnel income taxes in respect of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations.

4.100 Seigniorage charges:

4.100.1 The Seigniorage charges are liable to be revised and amended from time to time by the state Government by notification in the 'Andhra Pradesh Gazette'. If the revised seigniorage charges are more than the specified mentioned, the recovery from the contractor's bills will be as per revised rates only.

4.100.2 The seigniorage charges are not included in the data part of estimate. The same is provided as L.S Provision in the general abstract of estimate and the component of seigniorage charges shall be shown in part-II. The Seigniorage charges shall be added in each of bill of the contractor and the same will be recovered and paid to the government.

i) The revised seigniorage charges are fixed by the Government in**G.O.Ms.No.11, Industries & Commerce(M-2) Department Dated.11.02.2020**shall be adopted**.**

SCHEDULE-I
RATES OF SEIGNIORAGE FEE

Seigniorage charges will be recovered as per rules from the work bills of the contract or based on the theoretical requirement materials at the following rates.

G.O.Ms.No.11, Industries & Commerce (M.II) Dept Dt.11.02.2020 RATESOF SEIGNIORAGE FEE						
S. No	Name of the Minor Mineral	Unit	Rate of Seigniorage Fee (in Rupees)			
1	2	3	4			
1	Agate	M.T.	Rs.145 (Rupees One Hundred and Forty Five)			
2	Ball Clay	M.T.	Rs.75 (Rupees Seventy Five)			
3	Barytes					
a	Grey Colour - AGrade	M.T.	Rs.480 (Rupees Four Hundred and Eighty)			
b	Grey Colour - BGrade	M.T.	Rs.355 (Rupees Three hundred and Fifty Five)			
c	Grey Colour - C + D + WasteGrade	M.T.	Rs.220 (Rupees Two Hundred and Twenty)			
d	WhiteColour	M.T.	Rs.1,100 (Rupees One Thousand and One hundred)			
e	Off Colour Otherthan Grey	M.T.	Rs.500 (Rupees Five Hundred)			
4	Building Stone	M3/M.T.	Rs.90/60 (RupeesNinety/Sixty)			
5	Calcareous Sand	M.T.	Rs.90 (Rupees Ninety)			
6	Calcite	M.T.	Rs.90 (Rupees Ninety)			
7	Chalcedony Pebbles	M3/M.T.	Rs.90/60 (Rupees Ninety / Sixty)			
8	Chalk	M.T.	Rs.95 (Rupees Ninety Five)			
9	China Clay	M.T.	Rs.60 (Rupees Sixty)			
10	Clay (Others)	M.T.	Rs.60 (Rupees Sixty)			
11	Corundum	M.T.	Rs.120 (Rupees One Hundred and Twenty)			
12	Diaspore	M.T.	Rs.415 (Rupees Four Hundred and fifteen)			
13	Dimensional Stone used for Kerbs & Cubes	M.T.	Rs.135 (Rupees One hundred and Thirty Five)			
14	Dolomite	M.T.	Rs.100 (Rupees One Hundred)			
15	Dunite or Pyroxinite	M.T.	Rs.60 (Rupees Sixty)			
16	Feldspar	M.T.	Rs.100 (Rupees One hundred)			
17	Felsite	M.T.	Rs.130 (Rupees One hundred and thirty)			
18	Fireclay	M.T.	Rs.60 (Rupees Sixty)			
19	Fullers Earth/ Bentonite	M.T.	Rs.180 (Rupees One Hundred and Eighty)			
20	Fuschite Quartzite	M.T.	Rs.90 (Rupees Ninety)			
21	Granite useful for cutting and polishing purpose	Unit	Super Gang Sawequal and above 300cmx180cm size	Mini Gang Sawequal and above 270cmx150cm size	270cm X 150 cm & Below size	Below 75cm size

a.	Black Galaxy Granite Variety	M3/ MT	Rs.4600/ Rs.1415 (Rs. Four thousand six hundred/ Rs. One thousand four hundred fifteen)	Rs.3680/ Rs.1130 (Rs. Three thousand six hundred eighty /Rs. One thousand one hundred thirty)	Rs.3450 / Rs.1060 (Rs. Three thousandfour hundred fifty/ Rs. One thousand sixty)	Rs.1550/ Rs.480 (Rs. One thousand five hundred fifty/Rs.Four Hundred eighty)
b.	Black Granite other than Galaxy variety	M3/ M.T.	Rs.3450/ Rs.1150 (Rs. Three thousandfour fifty/ Rs. One thousand one hundredfifty)	Rs.2875/ Rs.960 (Rs. Two thousand eight hundred seventyfive/ Rs. Nine hundred sixty)	Rs.2700/ Rs.900 (Rs. Two thousand Seven hundred / Rs. Ninehundred)	Rs.1150 / Rs.385 (Rs. One thousand one hundred fifty/Rs.Three Hundred eighty five
c.	Colour Granite Srikakulam Blue,Moon white,River whiteof Visakhapatnam Dist., Leptinites of Coastal Dists., Black pearl of Prakasam and Guntur Dists.	M3/ M.T	Rs.3450/ Rs.1255(Rs. Three thousand four fifty/Rs. One thousand two hundred fifty five)	Rs.2,875/ Rs.1,045 (Rs. Two thousand eight hundred seventy five/Rs. One thousand fortyfive)	Rs.2,700/ Rs.980 (Rs. Two thousand Seven hundred / Rs.Nine hundred and eighty)	Rs.1150/ Rs.420 (Rs.One thousand one hundred fifty/ Rs. Four Hundred twenty)
d.	Colour Granite of other varieties	M3/ M.T.	Rs.2700/ Rs.985 (Rs. Two thousand seven hundred/ Rs. Nine hundred eightyfive)	Rs.2470/ Rs.900 (Rs. Two thousand four hundred seventy / Rs. Nine hundred)	Rs.2300 / Rs.835 (Rs. Two thousand threehundred / Rs. Eight hundred and thirtyfive)	Rs.1150/ Rs.420 (Rs. One thousand onehundred fifty/Rs. Four Hundred twenty)

e.	Kuppam Grey Granite available in Santhipuram&Ramakuppammandals of Chittoor District	M3/ M.T,	Rs.1925/ Rs.700 (Rs. One thousand nine hundredtwenty five/Rs. Seven hundred)	Rs.1650/ Rs.600 (Rs. One thousandsix hundred fifty/Rs. Six hundred)	Rs.1375 / Rs.500 (Rs. One thousandand threehundred andseventy five/ Rs. Five hundred)	Rs.1100/ Rs.400 (Rs. One thousand onehundred / Rs. Four Hundred)
f	Chittoor Colour Granite (Other than Silver-waves, Madanapalli white and Iscon white)	M3/ M.T.	Rs.1925/ Rs.700 (Rs. One thousand nine hundred twenty five/Rs. Seven hundred)	Rs.1650/ Rs.600 (Rs. One thousand six hundred fifty/Rs. Six hundred)	Rs.1375 / Rs.500 (Rs. One thousand three hundred seventyfive/Rs. Five hundred	Rs.1100/ Rs.400 (Rs. One thousand one hundred / Rs,Four Hundred)

22	Gypsum	M.T.	Rs. 150 (RupeesOneHundredandFifty)
23	Jasper	M.T.	Rs. 145 (Rupees One Hundred and Forty Five)
24	Kaolin	M.T.	Rs. 60 (Rupees Sixty)
25	Laterite		
a.	i. Dispatched for use in Alumina& Aluminium metal extraction	M.T.	Rs. 200 (Rupees Two Hundred)
b.	ii. For use other than Alumina and Aluminium metal extraction andexport	M.T.	Rs. 100 (Rupees One Hundred)
26	Lime Kankar/ Limestone	M.T.	Rs. 90 (Rupees Ninety)
27	Lime Shell	M.T.	Rs. 120 (Rupees One Hundred and Twenty)
28	Limestone Slabs:		
a.	Color	Sq. Mt/ M.T	Rs. 10 (Rupees Ten) per Sq. Mt or Rs.120 (Rupees One Hundred and Twenty) per MT whichever is higher
b.	White	Sq. Mt/M.T	
c.	Black	Sq. Mt/M.T	Rs. 6 (Rupees Six)per Sq. Mt or Rs.110 (Rupees One Hundred and Ten) per MT whichever is higher
29	Manufactured Sand	M3/M.T.	Rs.90/60 (Rupees Ninety / Sixty)
30	Marble	M3/M.T.	Rs. 300/120 (Rupees Three Hundred / One Hundred and twenty)
31	Mica		
a.	Crude	M.T.	Rs. 2,000 (Rupees Two Thousand)
b.	Scrap	M.T.	Rs. 750 (Rupees Seven Hundred and Fifty)
32	Morrum/ Gravel & Ordinary Earth	M3/M.T.	Rs. 45/30 (Rupees Forty five / Thirty)

33	Mosaic Chips	M.T.	Rs. 90 (Rupees Ninety)
34	Ochre	M.T.	Rs. 60 (Rupees Sixty)
35	Ordinary Clay, Silt and Brick Earth used in the Manufacture of Bricks including Mangalore Tiles		Rs. 8,000 (Rupees Eight Thousand) Per Kiln Per Annum for Bricks and Tiles
36	Ordinary Sand	M3/M.T.	Rs.100/Rs.66(Rupees One Hundred/ Rs. Sixty Six)
37	Pyrophillite	M.T.	Rs. 200 (Rupees Two Hundred)
38	Quartz	M.T.	Rs. 90 (Rupees Ninety)
39	Quartzite	M.T.	Rs. 90 (Rupees Ninety)
40	Rehmati	M3/M.T.	Rs. 35/ Rs.25 (Rupees Thirty five/Twenty five)
41	Road Metal & Ballast	M3/M.T.	Rs. 90/60 (Rupees Ninety / Sixty)
42	Rough Stone/ Boulders	M3/M.T.	Rs. 90/60 (Rupees Ninety / Sixty)
43	Sand (Others)	M.T.	Rs. 100 (Rupees One Hundred)
44	Shale	M.T.	Rs. 180 (Rupees One Hundred and Eighty)
45	Shingle	M3/M.T.	Rs, 90/60 (Rupees Ninety / Sixty)
46	Silica Sand	M.T.	Rs. 100 (Rupees One Hundred)
47	Slate	M.T.	Rs. 175 (RupeesOnehundredand Seventyfive)
48	Steatite or Talc or Soapstone		
a.	FillerGrade	M.T.	Rs. 100 (Rupees One Hundred)
b.	OtherGrade	M.T.	Rs. 550 (Rupees Five hundred and Fifty)

SCHEDULE – II		
RATES OF DEAD RENT (PER HECTARE PER ANNUM)		
S.No	**Name of the Minor Mineral**	**Rate of DeadRentPer Hectare per Annum(in Rupees)**
1	**2**	**3**
1	Black Galaxy Granite and Black Granite	Rs.1,30,000/- (Rs.OneLakh ThirtyThousand)
2	All Colour Granite varieties	Rs. 1,30,000/- (Rs. One Lakh Thirty Thousand)
3	Limestone other than classified as major minerals used for lime burning for Building construction purposes, marble, boulders, building stone including stone used for Road Metal, Ballast, Manufactured sand, concrete & other construction purpose, Shale, Slate & PhyIlites, Mosaic Chips, Fullers Earth/ Bentonite & Dimensional Stone used for Cubes and Kerbs.	Rs. 65,000/- (Rs. Sixty Five thousand)
4	Gravel, Morrum, Ordinary Earth, Shingle, Limestone Slabs used for flooring purpose Limekankar, Chalcedony Pebbles used in the building purpose Limeshell for burning used for building purpose and Rehmati.	Rs. 52,000/- (Rs. Fifty two thousand)
5	Barytes and Laterite	Rs. 26,000/- (Rs. Twenty Six Thousand)
6	Agate, Corundum, Diaspore and Fluorite	Rs. 20,000/- (Rs. Twenty Thousand)
7	Mica	Rs. 15,000/- (Rs. Fifteen Thousand)
8	AllminormineralswhicharenotcoveredunderSerialnumber 1 to 7 above.	Rs. 20,000/- (Rs. Twenty Thousand)

The seigniorage charges are to be recovered as provided in the agreement. Any escalation in these charges beyond the provisions of the agreement are to be borne by the department debiting such escalated amount to the works estimate concerned

As and when the recovery is effected in the bills, the seigniorage charges will be remitted to the Government.

4.101 (a) BOCW CESS/Labor cess: As per the Building and other Construction Workers Welfare CESS Act, 1996, Section 3 of CESS Act, read with rule 4(3) of the cases rules and in accordance with S.O.No.2899, dt.28-03-1996 of Government of India, 1% CESS OR as the Central Government may, by notification in the Official Gazette, from time to time specify, will be deducted from the bills paid for works from the contractor. The deducted amount will be remitted to the concerned Government accounts. The rates quoted are deemed to be inclusive of labor cess and no separate reimbursement will be made.

4.102 GST:

4.102.1 The contractor shall comply to the provisions of GST and related charging mechanism procedures of GST Act.

4.102.2 The Contractor has to mention the GST number of TUDA in the tax invoice to be issued to TUDA. After that the same has to be uploaded properly in the monthly / Quarterly returns to be filed by the Contractor If the said amount is not recorded in the GST 2A , TUDA shall recover the amounts from the Contractor from time to time.

4.102.3 The rates included in BOQ (Schedule-A) are exclusive of GST.

4.102.4 The percentage quoted by the contractor is exclusive of Goods and Service tax (GST) but inclusive of other rates, taxes, cess fees, other than NAC and seignorage covered by theG.O.Ms.No.11 (Industries and Commerce (M-II)Dept.) Dt:11.02.2020, on all materials, subject to the Provisions contained on GST and ITC, that the contractor will have to incur for performance of this contract.

4.102.5 The contractor must have an active /valid registration number with the GST authorities **within the State of Andhra Pradesh** and shall provide copy of registration to TUDA and the applicable GST shall be paid by the contractor to the department concerned. If in case not already registered shall undertake by affidavit to cause registered before Price bid finalisation and letter of acceptance, for entering of contract agreement and for any such default not only forfeiture of EMD, but also be made liable for other civil and penal consequences.

4.102.6 The contractor will submit regular invoice/bill fulfilling all conditions of GST amended from time to time clearly indicating GST registration number, GST classification, rate and amount of GST and shall produce proof of deposit of GST in respect of preceding bills received from TUDA to the TUDA so as to claim the GST amount of the current bill from TUDA. The contractor shall produce documental evidence that GST amount in respect of the preceding bills is remitted to the Government and reflected in GST portal.

4.102.7 Estimate is prepared based on SOR rates for materials, labour charges, machinery hire charges etc., which are basic prices only(excluding GST). During course of contract, if department notices any of the item rate / any component rate is inclusive of GST, the same is liable for recovery at any time during the operation of the Agreement.

4.102.8 The GST liability is as per the rates of tax applicable (if the contract is not exempted from GST concerned), as per of the G.O.Ms.No.58, Finance(WR.I), Dept., dt.08-05-2018 and other relevant GOs/ Circulars/ Clarifications being issued from time to time by the Government of Andhra Pradesh/ GOI. The contractors are requested to ascertain themselves regarding the applicability of GST (works contract) and the prevailing rates thereof, while tendering and more so while making the payment of GST to the department. In this regard, TUDA will not undertake any responsibility whatsoever.

4.102.9 The service provider/contractor is liable to pay GST which can be deducted at source under Sec.51-GST Act, 2017 on every respective bill payment made by client which includes all components as per Sec.15(2) -GST Act, 2017.

4.102.10 It is the responsibility of the tenderer to pay the applicable GST in time and TUDA will not be responsible in the regard. Any delay in payment of GST by the tenderer for whatsoever reasons, the responsibility lies on the tenderer and any penalties, interest levied in this regard shall be borne by the tenderer only and such penalties, interest will not be paid by TUDA. Even, if the tenderer pays any extra amount towards GST than the applicable GST, the payment from TUDA will be limited to the applicable GST only. There shall not be any excess payments to the agency on A/c of GST and para (8) of G.O.Ms No. 58 Finance (WR.I)Dept., dt.08-05-2018 specifies that the tax liability under GST shall be taken in to consideration at the time of invoicing and payment there on as per the terms and conditions of the agreement between the contractor and Engineering Department. Department shall ensure that there shall not be any excess payment to the contractor.

4.102.11 The contractor shall pay the applicable GST and shall satisfy TUDA w.r.t GST claims.

4.102.12 All the rules as per GST ACT2017 and its amendments and all Notifications / Government Orders (GOs) issued from time to time by the Govt. of India (GOI) and Govt. of Andhra Pradesh with regard to GST are applicable.

4.102.13 Revenue Department, Govt. of Andhra Pradesh, has issued a notification on tax deduction at source of section 51 of GST Act and the guidelines for deduction and deposits of TDS w.e.f 01-10-2018 vide GO MS No.482 Revenue (Commercial Taxes-II) Dept. date 24-09-2018. As per the present guidelines GST at 2% (CGST at 1% and SGST at 1%) for intrastate or 2% at IGST for interstate transactions will be deducted on the taxable amount payable and necessary TDS certificate will be issued. Any amendments in this regard issued from time to time will apply.

4.102.14 As per clause 60 of APSS, the contractor is bound to produce as required by the employer all invoices, receipts, bills, accounts, vouchers, licenses, permissions etc., compliance of labour Laws applicable if any, safety and standard certificates applicable if any and produce all the above and also any exemption from GST for GST/CGST/IGST availed by and or available to him for GST in so

far as the works contract concerned with TAN & respective Registration particulars, seigniorage, NAC, Labour Cess etc., to even any component or any part of the contract works in so far as the works contract concerned.

4.102.15 The deposits (EMD /FSD) of the work will be released only when the contractor produces the documental evidence that GST in respect of final bill received is remitted to the Government and reflected in GST portal.

4.102.16 During course of contract if the contractor claims any exemption towards GST, the same must be intimated to the Employer and to the extent GST (Works Contract) will not be paid separately.

4.102.17 The TUDA will pay GST (Works Contract) at the applicable rates from time to time and as per the provisions of the agreement. The bidders are advised to quote their most competitive rates duly considering the input tax credit due to payment of GST on materials, machinery, services etc., for due fulfilment of the contract.

4.103 <u>Supply of construction materials:</u>

i) The contractor has to make his own arrangements for procurements, supply and use of construction materials.

ii) All materials so procured should confirm to the relevant specifications indicated in the bidding documents.

iii) The contractor shall follow all regulations of the Department/Government of India in respect of import licenses etc., of the procurement of the materials is through imports and he shall be responsible for the payment of applicable duties and taxes, port clearances, inland transportation etc.

iv) The contractor shall make his own arrangements for adequate storage of the materials.

4.104 The tenderer should work out his percentage without reference being made to the Public Works Department current schedule of rates or to the estimate rates.

4.105 The TUDA reserves the right to engage the services of the consultants during the course of the work, for Engineering or Architectural services and the contractor is bound to carry out such instructions as may be given by consultants from time to time.

4.106 Preliminary specifications of APSS shall apply to all agreements entered by the contractor with an inseparable condition of the contract. The tenderer is expected to examine closely the relevant specifications of the APSS and the special specifications of ISS before submitting the unit tender rates.

4.107 All the items of work including materials and workmanship should be executed as per relevant A.P.D.S.S. and I.S.I. code. If there are any variation between the above two specifications, the decision of the Executive Engineer is final and binding on the contract.

4.108 Scaffolding and gangways will have to be arranged by the contractor at his own whenever they are considered desirable or necessary by the Engineer-in-Charge of the work to facilitate the work.

4.109 **PATENT RIGHT:** In the event of any claim or demand being made or action being brought against the TUDA for infringement of letter of patent, registration for infringement of design or trade mark in respect of any machines, plant, work materials or things or method of using or working of such machine, plant work materials or things belonging to the contractor shall indemnify the owner against all costs and expenses arising from or incurred by reason of any such claim provided that the owner shall notify the contractor immediately any claim is made and that the contractor shall be at liberty, if he so desires with the assistance of the owner if required but at the contractor's expenses, to conduct all negotiations for the settlement of same or any litigation that may arise there from and provided that no such machine, plant, works materials or things shall be used by the owner for any purpose or any manner other than that for which they have been supplied by the contractor and specified under his contract.

4.110 **ASSISTANCE IN PROCUREMENT OF PROPERTIES, PERMITS, LICENCES OR OTHER FACILITIES ETC:** The Engineer in charge of work on request by the contractor will if in his opinion the request is reasonable and is in the interest of the work and its progress assists the contractor in procurement of necessary licenses for obtaining necessary plant machinery or materials not available locally.

4.111 The TUDA will also assist the contractor in securing priorities for deliveries transport etc., where such are needed. The TUDA will not however be responsible for the non-availability of any of the above facilities or delay in this behalf and for claims either in cost or time on account of such failures or delays and the contractor is not entitled for any claim against the owner.

4.112 In case of contradiction between the clauses included in this specification and the clauses of PS to APSS, the former will prevail over the latter and is binding on the tenderer.

5. TECHNICAL SPECIFICATIONS

[INCORPORATED AS PER REQUIREMENT OF THE WORK PUT TO BID WITH THE RELEVANT SPECIFICATION AND NUMBER OF AP STANDARD SPECIFICATION/SPECIAL SPECIFICATION

STANDARD SPECIFICATION FOR BUILDING WORK (AS PER A.P.S.S)

All the items of work shall be executed as per the Standard Specifications laid down in APSS, the relevant I.S Codes of the Special Specification as indicated in Schedule - 'A' of the tender.

Sl. No	Name of the specification	Specification No. of APSS
1	2	3
1.	**STANDARD SPECIFICATION FOR MATERIALS**	
1.01	General	101
1.02	Common Burnt Clay Brick	102
1.03	Broken Brick	103
1.04	Surki	104
1.05	Fly Ash	105-
1.06	Rough Stones for dry packed Revetments and aprons	106
1.07	Stone for Masonry	107
1.08	Coarse Aggregate for Concrete	108
1.09	Marble	109
1.10	Sand	110
1.11	Lime	111
1.12	Portland Cement	112
1.13	Lime Mortar	113
1.14	Surki Mortar	114
1.15	Cement Mortar	115
1.16	Cement Lime Mortar	116
1.17	Sebara Putty (Lime Putty)	117
1.18	Pan Tiles	118
1.19	Burnt Clay Flat Terracing Tiles	119
1.20	Clay Roofing Tiles, Mangalore pattern	120
1.21	Glazed Tiles	121
1.22	Bitumen Felts for Water Proofing and Damp Proofing	122
1.23	Cuddapah/Shahbad Slabs	123
1.24	Galvanized Steel Sheets (Plain and Corrugated)	124
1.25	Un-reinforced Corrugated Asbestos Cement sheets	125
1.26	Steel for Reinforcement	126
1.27	Steel for Structural Work	127
1.28	Asbestos Cement Flat Sheets	128
1.29	Water	129
1.30	Teak Wood	130
1.31	Bamboos	131

Sl. No	Name of the specification	Specification No. of APSS
1	**2**	**3**
1.32	Ballies	132
1.33	Steel Sheets piling Sections	133
1.34	Bitumen Emulsion for Roads (Anionic Type)	134
1.35	Cut back Bitumen	135
1.36	Paving Bitumen	136
1.37	Coal Tar Pitch	137
2.	**STANDARD SPECIFICATIONS FOR CLEARING SITE, DISMANTLING BUILDING AND OTHER STRUCTURES AND BLASTING**	
2.01	Clearing Site	201
2.02	Dismantling of Buildings and other Structures	202
2.03	Blasting	203
3.	**STANDARD SPECIFICATIONS FOR EARTH WORK**	
3.01	Excavation and Forming un compacted banks	301
3.02	Embankment compacted by other than power driven equipment	302
3.03	Embankment compacted by power driven equipment	303
3.04	Clay blankets	304
3.05	Filters	305
3.06	Rock-fill in toe of embankment	306
3.07	Turfing	307
3.08	Excavation of foundation	308
3.09	Filling in foundations	309
3.10	Filling in Basement	310
3.11	Well sinking for foundations	311
3.12	Well sinking for Water Supply	312
3.13	RCC Precast and Cast-in-situ pile foundations	313
4.	**STANDARD SPECIFICATIONS FOR CONCRETES**	
4.01	lime Concrete and surki concrete	401
4.02	Cement Concrete for plain and reinforced works.	402
4.03	Reinforced cement concrete work	403
4.04	Repair grouting to aprons and revetments with surki Concrete and pointing with surki mortar	404
4.05	Pre stressed concrete work.	405
5.	**STANDARD SECIFICATIONS FOR BRICK MASONRY**	
5.01	Brick Masonry-General	501
5.02	Brick in Lime Mortar	502
5.03	Brick in Surki Mortar	503
5.04	Brick in Cement Mortar	504
5.05	Brick in Cement Lime Mortar	505
5.06	Brick work in clay	506
5.07	Brick Arch work	507
5.08	Brick Honey Comb work	508
5.09	Reinforced half-brick partition walls	509
5.10	Boiler Brick works	510
5.11	Honey Comb works with white washed pan tiles	511

Sl. No	Name of the specification	Specification No. of APSS
1	**2**	**3**
5.12	Brick Nogging	512
6.	**STANDARD SPECIFICATIONS FOR STONE MASONRY**	
6.01	Stone Masonry-General	601
6.02	Cut stone in Lime Mortar	602
6.03	Cut stone in Surki Mortar	603
6.04	Cut stone in Cement Mortar	604
6.05	Cut stone-Rock Rustic or quarry faced in mortar	605
6.06	Cut stone string course band and other cornices etc. in mortar	606
6.07	Cut stone arch work	607
6.08	Rubble arching	608
6.09	Coursed Rubble in Lime Mortar (1 st sort)	609
6.10	Coursed Rubble in Surki Mortar (1 st sort)	610
6.11	Coursed Rubble in Cement Mortar (1 st sort)	611
6.12	Coursed Rubble in Mortar (2nd sort)	612
6.13	Uncoursed Rubble or random rubble in lime mortar	613
6.14	Random Rubble in surki mortar	614
6.15	Random Rubble in Cement Mortar'	615
6.16	Random Rubble in Clay	616
6.17	Dry stone masonry (for retaining walls)	617
6.18	Damp proof (or any proof) course with Shahabad stone/Cuddapah stone 50mm thick in cement mortar 1:3	618
6.19	Rough stone dry packing for aprons and revetment	619
6.20	Laterite or rough stone pitching for conservancy works	620
6.21	Moorum backing to rough stone dry packing and gravelling to top and side slopes of bunds 150 mm thick	621
7.	**STADARD SPECIFICATIONS FOR FLOORING GENERAL**	
7.01	Flooring General	701
7.02	Flooring with Shahabad/Cuddapah slabs	702
7.03	Flooring with polished Shahabad/Cuddapah slabs	703
7.04	Flooring with Cement Mortar (1 :3) 12mm thick	704
7.05	Flooring with coloured cement mortar (1 :3),12mm thick	705
7.06	Terraced flooring with brick on edge, 75mm thick broken brick aggregate concrete and 12mm thick cement plastering (1 :3) on top	706
7.07	Flooring with Glazed Tiles	707
7.08	Flooring with in-situ Terrazzo finish	708
7.09	Flooring with Cement Tiles (A) plain or coloured (B) Terrazzo (C) Chequered or embossed	709
7.10	In-situ-Granolithic concrete flooring	710
8.	**STANDARD SPECIFICATIONS FOR ROOFING AND CEILING**	
8.01	Roofing with pan tiles set mortar over flat tiles with lime mortar borders including reapers	801
8.02	Roofing with pan tiles and lime mortar borders including reapers	802

Sl. No	Name of the specification	Specification No. of APSS
1	**2**	**3**
8.03	Roofing with Mangalore tiles set in mortar over flat tiles and including reapers	803
8.04	Roofing with Mangalore tiles including reapers	804
8.05	Roofing with Mangalore tiles over ceiling tiles with air spaces and including reapers	805
8.06	Madras terraced roofing with brick on edge, 75mm thick broken brick aggregate concrete, three courses of flat tiles and three coats of lime plaster to top and bottom	806
8.07	Madras terraced roofing with brick on edge, 75mm thick broken brick aggregate concrete three courses of flat tiles and three coats of lime plaster to top and one coat of 12mm thick cement plaster (1 :3) to bottom	807
8.08	Terraced roofing with brick on edge, 75mm thick broken brick aggregate concrete two courses of flat tiles to top and one coat of cement plaster (1 :3) to bottom	808
8.09	Weather proof course for reinforced cement concrete roofing with Lime broken brick aggregate concrete and two courses of flat tiles	809
8.10	Water proof course for reinforced cement concrete roofing with two courses of flat tiles	810
8.11	Complete surface repair to leaky lime plastered terrace roof	811
8.12	Water proofing of concrete and masonry (flat or sloping) roofs with Bitumen felts Normal treatment	812
8.13	Water proofing of concrete and masonry (flat or sloping) roofs with Bitumen felts Heavy treatment	813
8.14	Roofing with corrugated galvanized steel sheets	814
8.15	Roofing with corrugated asbestos cement sheets	815
8.16	Roofing with semi-corrugated asbestos cement sheets	816
8.17	False ceilings	817
9.	**STANDARD SPECIFICATION FOR PLASTERING, POINTING, WHITE WASHING, COLOUR WASHING, DISTEMPERING AND WATER PROOF CEMENT PAINING ETC.**	
9.01	Plastering General	901
9.02	Plastering with time mortar one coat, 12mm thick or 20mm thick including fine Rendering	902
9.03	Plastering with cement mortar, one coat 12mm or 20mm thick including fine rendering	903
9.04	Plastering with cement mortar 2 coats 20mm thick with sponge finish	904
9.05	Plastering with combination mortar, one coat 12mm thick or 20mm thick including fine rendering	905
9.06	Pointing to masonry with cement mortar	906
9.07	Pointing to masonry with surki mortar	907
9.08	White-washing	908

Sl. No	Name of the specification	Specification No. of APSS
1	**2**	**3**
9.09	Colour-washing	909
9.10	Dry distempering	910
9.11	Oil bound distempering	911
9.12	Water proof cement painting	912
10.	**STANDARD SPECIFICATIONS FOR WOOD WORK**	
10.1	Wood work-General	1001
10.2	Doors, windows, ventilators, ward robes and cup-boards etc.,	1002
10.3	Frame work for Roofs	1003
10.4	Wooden Partitions	1004
10.5	Wall Paneling	1005
10.6	Wooden Railing	1006
11.	**STANDARD SPECIFICATIONS FOR STRUCTURAL STEEL WORK**	
11.01	Materials	1101
11.02	Steel work in single section of R.S. Joists, Flats, Tees Angles and Channels etc.	1102
11.03	Steel work Riveted and bolted in built-up sections, trusses and framed work	1103
11.04	Steel work (welded) in built-up sections trusses and Framed works	1104
11.05	Miscellaneous Steel work Collapsible steel structures	1105
11.06	M.S.Steel sliding shutters	1106
11.07	M.S. Sheet Doors	1107
11.08	Rolling Shutters	1108
11.09	Clamps for ceiling Fan	1109
12.	**STANDARD SPECIFICATIONS FOR PAINTING AND VARNISHING**	
12.01	Painting-General	1201
12.02	Removing old paint with patent paint remover	1202
12.03	Removing old paint with caustic soda solution	1203
12.04	Removing old paint with blow lamp	1204
12.05	Painting with wood preservative	1205
12.06	Coal tarring	1206
12.07	Painting priming coat on wood, iron or plastered surfaces	1207
12.08	Painting with ready mixed paint	1208
12.09	Painting of GI. sheets with ready mixed paint	1209
12.10	Spray painting with flat wall paint on new work including priming coat	1210
12.11	Spray painting with flat wall paint on old work	1211
12.12	Painting with synthetic enamel paint	1212
12.13	Painting with Aluminum paint	1213
12.14	Painting with acid proof paint	1214
12.15	Painting with anti-corrosive bitumanistic paint	1215
12.16	Wall painting with plastic emulsion paint	1216
12.17	Varnishing	1217
12.18	Oiling with raw linseed oil	1218

Sl. No	Name of the specification	Specification No. of APSS
1	**2**	**3**
12.19	Wax polishing with ready made wax polish	1219
12.20	Painting cast iron rain water, soil waste and vent pipes and fittings including priming coat	1220
12.21	Lettering with paint	1221
12.22	French polishing.	1222
16.	**STANDARD SPECIFICATIONS FOR MISCELLANEOUS**	
16.01	Bamboo chicks with blue Dungary cloth pulleys, rings, ropes, hooks, staples etc., complete including painting two coats.	1601
16.02	Teak wood trellis work for verandahs	1602
16.03	Forming black boards on walls	1603
16.04	Barbed wire for fencing	1604
16.05	Reinforced concrete fence posts	1605
16.06	Fencing with barbed wire or chain link mesh	1606
16.07	Protection of building and allied structures against lighting	1607
16.08	Steel doors, windows and ventilators	1608
16.09	Aluminum doors, windows and ventilators	1609
16.10	Fixing and glazing of metal (steel and aluminum) doors, windows and ventilators	1610

SPECIFICATIONS

1. PREAMBLE

The technical specifications for various items of work contained herein shall be read in conjunction with the specifications mentioned for each item of work in bill of quantities part-I (Schedule – A) and also plans and drawings in part III.

2.0 GENERAL | SPECIFICATIONS

2.1 The following are the general technical specifications to be adopted for construction of buildings. Each item of work shall be executed according to the relevant standard specification number as described in the "Andhra Pradesh Standard Specification" (APSS) and Indian Standard (I.S) Specifications, including Water supply, Sanitary and Electrical Installations. In the absence of any definite provisions on any particular item of work in the aforesaid specifications in A.P.S.S., reference may be made to the latest codes and specifications of Indian Standards or Indian Roads congress (IRC in case of Roads). Where even these are silent, the construction and completion of works shall conform to sound engineering practice as approved by Engineer-in-charge and in case of dispute arising out of the interpretation of the above, the decision of Engineer-in-charge shall be final and binding on the contractor.

3.0 GENERAL INSTRUCTIONS:

3.1 Drawings, Instructions, Measurements

All works shall be done according to the detailed drawings and specifications. Figured dimensions shall be followed. Measurement shall be taken of the actual work done but shall not exceed those marked on the drawings for payments.

3.2 Site Clearance and Demolition

The site shall be cleared of all trees, stumps, roots, brush wood, bushes and other objectionable materials. Useful and saleable material shall be the property of the Owner (A.P.S.F.C.) and shall be stacked properly as directed by the Engineer-in-charge. The areas to be covered with embankments shall be stripped of top soil to required depths to expose acceptable founding strata. Top soil unsuitable for use in embankment construction and other fills shall be disposed off as directed. All combustible materials shall be stacked and burnt in locations sufficiently remote to eliminate all danger of fire hazards. All old concrete, brick works and drains which interfere with construction works shall be dismantled with the approval of the Engineer-in-charge duly taking all necessary precautions prescribed in safety specification. Top soil which is suitable for use in construction work shall be stockpiled for later use. Other objectionable materials such as trash, debris, stones, brick, broken concrete, scrap metal etc., shall be disposed off as directed by the Engineer. Payment for cutting and removal of trees, stumps, dismantling existing structures and stripping shall be regulated by the description in the Schedule of Items or Section 2 of A.P.S.S.

3.3 **Precision**: The works shall be set to the highest precision of dimensions, levels, grades and lines as per designs and drawings using precise scientific equipments and measuring instruments.

2.38 Safety Specification:

3.4.1 On every demolition job, danger signs shall be conspicuously posted all-round the structure and all door openings giving access to structure shall be barricaded or marked except during the movement of actual workmen or equipment. However provision shall be made for at least two independent exits for escape of workmen during any emergency.

3.4.2 During night, red lights shall be placed on or about all the barricades.

3.4.3 Where in any work of demolition it is imperative, because of danger existing to ensure that no unauthorized person shall enter the site of demolition outside working hours, a watchman should be employed. In addition to watching the site, he shall also be responsible for maintaining all notices, lights and barricades.

3.4.4 All the necessary safety appliances as per IS: 4130 shall be issued to the workers and their use explained. It shall be ensured that the workers are using all the safety appliances while at work.

3.4.5 The removal of a member may weaken the side wall of an adjoining structure and to prevent possible damage, these walls shall be supported until such time as permanent protection is provided. In case any danger is anticipated to the adjoining structure the same shall be got vacated to avoid any danger to human life.

3.4.6 The power on all electrical service lines shall be shut off and all such lines cut or disconnected at or outside the property line, before the demolition work is started. Prior to cutting of such lines the necessary approval shall be obtained from the electrical authorities concerned for demolition work itself.

3.4.7 All gas, water, steam and other service lines shall be shut off and capped or otherwise controlled at or outside the building line, before demolition work is started.

3.4.8 All the mains and meters of the building shall be removed or protected from damage.

3.4.9 If a structure to be demolished has been partially wrecked by fire, explosion or other catastrophe, the walls and damaged roofs shall be shored or braced suitably.

3.4.10 Walkways and passageways shall be provided for the use of the workman who shall be instructed to use them and all such walkways and passageways shall be kept adequately lighted, free from debris and other materials.

3.4.11 All nails in any kind of lumber shall be withdrawn, hammered or bent over as soon as such lumber is removed from the structure being demolished, and placed in pipes for future cleaning or burning.

3.4.12 All the roads and open area adjacent to the work site shall either be closed or suitably protected.

3.4.13 No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electricity charged.

3.4.14 All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

3.5 Quality of work:

***To be the best quality*:** All the materials, workmanship, articles, Equipment, tools and plants should be of high and acceptable quality conforming to the standard specifications.

All materials shall be new and of the kinds and qualities described in the contract.

2.39 Testing of works and materials

3.6.1 All materials used and works done shall be subject to approval of the Engineer-in-charge.

3.6.2 The contractor shall arrange sufficiently in advance to test materials and portions of works in order to prove their soundness and efficiency if required, including samples and supporting test results from the approved laboratory and other documentary evidence from the manufacturer, wherever applicable, and indicate the types of materials and their respective sources. The delivery of materials at site shall commence only after the approval of the quality, grading and sources of the materials by the Engineer-in-charge.

3.6.3 The quality of all materials approved shall be maintained throughout the period of construction and periodical tests shall be carried out to ensure that it is maintained. The contractor shall conduct tests at work site/approved laboratories and shall maintain test reports at site for cement, coarse aggregates, fine aggregates, water, steel, bricks and concrete at the following frequency :-

Sl. No.	Description of material	Frequency of test	Allowable limits
1.	CEMENT : (IS : 8112-1989)		
	a) Fineness	One for each source of supply in a month	Shall not be less than 3500 sqcm / gm
	b) Setting time	-do-	Initial setting time shall not be less than 30 minutes and final setting time shall not be more than 60 minutes.
	c) Soundness	-do-	Expansion (un aerated) shall be not more than 10mm by "Le Chatelier" method; if it fails, expansion of aerated sample shall be not more than 5 mm.
	d) Compressive strength of cement mortar cubes 1:3 (1 cement :3 standard sand) by mass	-do-	Compressive strength for 7 days shall not be less than 330 kg/cm^2 and compressive strength for 28 days shall not be less than 430 kg/cm^2
2.	Coarse aggregate : (IS383-1970)		
	a) Gradation	One test for 15 Cum or at least on the day of concrete if concrete quantity is less than 15 cum.	40mm Metal : a)Seive analysis : -63mm – 100% 40mm-85 to 100% 20mm-0-2-%; 10mm-0.5% b) Flakeness Index : shall be less than 30% by weight 20mm Metal : a)Sieve analysis : -Limits : 40mm – 100%; 20mm-95 to 100%; 10mm-25 to 55%; 4.75-0 to 10% b) Flakiness Index : less than 25% c) Aggregate impact value: 20-40(IS 2386-1963)
	b) Aggregate impact value	Once for each source of supply or when ever change in texture is noticed.	
3.	FINE AGGREGATE (IS383 –m1970)		
	a) Gradation for concrete	One test for every 15 cum.	Fineness modules : Fine sand limit 2.2 to 2.6
	b) Gradation for masonry	At least once on the day of work	Medium sand limit 2.6 to 2.9
	c) Gradation for finishing	-do-	Coarse sand limit 2.9 to 3.2
	d) Bulkage	Three for each day of work i.e. morning noon and evening	b) Silt Content : shall be less than 4% by weight
	e) Silt content	At least once on the day of work	
4.	WATER : Chemical test	One test for each source	The water quantity shall be as per clause 5.4 of ISI 456-2000. The PH value of water shall not be less than 6.

5.	STEEL : (Fe 415/500 (IS1786-1985))		
	a) 0.2% proof stress	One for each source of supply and once in six months for fresh supply	4150/5000 kg/cm^2 (Minimum)
	b) Elongation	-do-	Percentage of elongation 14.5% minimum
	c) Tensile strength	-do-	Ultimate tensile strength 4900 kg/cm^2 (Minimum)
	d) Weight/RM	As per B.I.S.	
	e) Rebend test	As per B.I.S	
	f) Chemical compositin of Steel	As per B.I.S.	
6.	BRICKS : (IS:1077-1976)		
	a) Compressive strength	One for each source of supply and once in two months when change in texture is noticed	Shall not be less than 40 Kg/cm^2
	b) Water absorptionl	-do-	i) Shall not be greater than 20% by weight for clay bricks. ii) For fly ash bricks– As per standards iii) For Aerocon bricks- As per standards
7.	CONCRETE : (IS456:2000)	Frequency of testing as per	a) Compressive strength (7 days)
	a) Cube strength	clause 15.2 of IS 456-2000 for example 6 cube specimens, 3 each for 7 days & 28 days strength for every 15 cum. Cube shall be prepared, cured and tested in accordance with the requirement of IS 516.	M15-100 Kg/cm^2 (Minimum) M20-135 KG.cm^2 (Minimum) b) Compressive strength (28 days) M15-150 Kg/cm^2 (Minimum) M20-200 Kg/cm^2 (Minimum)
	b) Slump	Thrice in a day of concrete in morning, noon and evening	a) Foundation footing – 10mm to 25mm b) Column beams and slabs – 25mm to 40mm (with normal reinforcement) c) Beams, slabs – 4 to 50mm (with congested reinforcement)

A Register of record of material testing and Register of daily events showing materials received, labor engaged, out turn of work etc. shall be maintained at site and shall be signed by the contractor or his authorised representative and the Engineer

3.7 Rejection of Materials/works

3.7.1 Any material brought to site which in the opinion of the Engineer is defective, sub-standard, damaged, contaminated, deteriorated or does not comply with the requirement of the specification shall be rejected. The contractor shall remove from site such materials within 4 hours of notice from site.

3.7.2 If the work or portion of the work which in the opinion of the Engineer is found to be defective or unsound, the contractor shall pull it down and re-execute the same work at his own cost.

3.8 Measurement Materials

For the Controlled Concrete where site mixing is permitted shall be with concrete mixtures fitted with weigh batching scale. Materials shall be weighed and batched in mechanical weigh batchers as per the specified proportions of the approved design mix.

Materials requiring Volumetric mixing , wherever permitted, should be measured separately in boxes of appropriate size before being mixed in the specified proportions.

3.9 Storage of Materials

3.9.1 Adequate safe, dry storage shall be provided for all materials particularly cement.

3.10 Codes

3.10.1 Unless mentioned otherwise, current versions of all codes, specifications and standards issued by the Indian Standards Institution and Indian Roads Congress shall be fully applicable to these specifications. In the absence of appropriate publications by ISI or IRC, adoptable specification of the International Organization for Standardization shall apply.

3.10.2 In case of any conflict in meaning between the specifications mentioned hear in and those of ISI or IRC, the provisions of these specifications shall prevail.

3.10.3 The following codes shall be applicable for the purpose. However the latest revision of these codes shall only be used.

LIST OF SPECIFICATIONS FOR THE VARIOUS ITEMS OF WORKS SUPPLEMENTING THOSE DESCRIBED IN SCHEDULE 'A' BY S.S. NUMBERS

GENERAL SPECIFICATIONS

Sl. No	Short title/ Description	IS No. and as amended from time to time
A)	**LIST OF INDIAN STANDARDS**	
I.	**CEMENT**	
1	Specifications for 43 Grade ordinary portland cement	**IS 8112:1989**
2	Methods of physical tests for hydraulic comments	**IS 4031 (part 1 to 15) :1988**
3	53 Grade cement	**IS 12269:1989**
II.	**AGGREGATES**	
1	Specifications for Coarse and Fine aggregates from Natural resources for concrete	**IS 383:1970**
2	Specification for Sand for Masonry	**IS 2116:1980**
3	Methods of tests for aggregates for concrete. Part-1 Particle seize and shape Schedule - B Estimation of deleterious materials & Organic impurities Part-III – Soundness	**IS 2386:1963 (Part I to IV)**
4	Specification for test sieves. Part-I Wire cloth test sieves	**IS 460:1978 (Part-I)**
III.	**BRICKS**	
1	Specifications for Common burnt clay building bricks	**IS 1077:1992**
2	Methods of test for burnt clay building bricks	**IS 3495:1992 (Part I to IV)**
3	Pulverized Fuel Ash-Lime Bricks - Specification	**IS 12894:2002**
4	Specification for concrete masonry units Part 3 Autoclaved cellular Aerated concrete blocks	**IS 2185:1984 (Part-III)**
IV	**BUILDING STONES:**	
1	Method of Tests for determination of strength properties of natural building stones (compressive strength, Transverse strength, Tensile Strength, Shear Strength.	**IS 1121 (Part –1 to Part 4): 1974**
2	Schedule of properties and availability of stones for construction purposes	**IS 7779:1975 (Part 1 to Part 5)**

Sl. No		Short title/ Description	IS No. and as amended from time to time
	3	Quarrying stones for construction purposes, recommended practice	**IS 8381:1977**
	4	Stone Masonry: Specifications for dressing natural building stones	**IS 1129:1972 (Part-IV)**
V.	**STEEL**		
	1	Specification of Mild steel and medium tensile steel bars and hard drawn steel wires for concrete reinforcement. Part-I Mild Steel & Medium tensile steel bars	**IS 432:1982 (Part I & II)**
	2	Specifications for Cold-worked steel, High strength deformed steel bars and wires for concrete reinforcement.	**IS 1786:2008**
	3	Specification for steel for General structural purposes	**IS 2062:2001**
	4	Specification for structural steel (Standard quality)	**IS 226:1975**
	5	Specification for steel tubes for structural purposes	**IS 1161:2014**
	6	Hand Drawn Wire	**IS432:1982**
	7	Specification for composite Construction in structural steel and concrete	**IS 11384-1985 & IS 3935-1966**
VI	**CERAMIC TILES**		**IS 13712:2006**
VII	**STACKING AND STORAGE OF MATERIALS**		
	1	Recommendation of stacking and storage of construction materials and components at site	**IS 4082:1996**
VIII	**MASONRY**		
	1	Brick Masonry	**IS 2212:1962**
	2	Code of practice for construction of Stone Masonry Part-1 (Rubble stone masonry)	**IS 1597:1992**
	3	Code of practice for permeability test for masonry (during and after construction)	**IS 11216:1985**
	4	Code of practice for brick work	**IS 2212:1991**
	5	Construction of hallow and solid concrete block masonry	**IS 2572:2005**
	6	Code of practice for construction of autovlaved cellular concrete block masonry	**IS 6041:1985**
IX	**CONCRETE**		
	1	Code of practice for Plain and reinforced concrete	**IS 456:2000**
	2	Method of Sampling and analysis of concrete	**IS 1199:1959**
	3	Method of test for strength of concrete	**IS 516:1959**
	4	Recommended guide lines for Concrete Mix Design	**IS 10262:1982**

Sl. No		Short title/ Description	IS No. and as amended from time to time
	5	Code of practice for Ready-Mixed Concrete	**IS 4926:2003**
	6	Specification for Admixtures for concrete	**IS 9103:1999**
	7	Guidelines for false work for concrete structures.	**IS:14687:1999**
	8	Code of practice for use of immersion vibrators for consolidating concrete	**IS 3558:1983**
	9	Specifications for Pre-cast concrete coping blocks	**IS 5751:1984**
	10	Laying in situ cement concrete flooring	**IS 2571:1970**
	11	Code of practice for concrete structures for the storage of liquids	**IS 3370: 11500 (Part 1 & 2)** **IS 3370-1967 (Part 3 & 4)**
	12	Code of practice for concrete roads	**IRC: 15-2002**
X	**REINFORCEMENT/ STRUCTURAL STEELWORK**		
	1	Code of Practice for Bending and fixing of bars for concrete reinforcement	**IS 2502:1963**
	2	Recommendations for detailing of reinforcement in reinforced cement concrete works	**IS 5525:1969**
	3	Mils steel wire for General Engineering purposes	**IS 280:2006**
	4	Recommendation for welding of cold worked bars for Reinforced concrete construction	**IS 9417:1989**
	5	Code of practice for general construction in steel	**IS 800:1984**
	6	Code of practice for use of metal arc welding for general construction in mild steel	**IS 816:1969**
	7	Safety code for erection of structural steel work	**IS 7205:1974**
	8	Tolerance for fabrication of steel structures	**IS 7215:1974**
XI.	**JOINERY:**		
	1	Specifications for timber paneled and glazed door, window and ventilator shutters	**IS 1003-Pat 1-2003 and IS1003-Part2-1994**
	2	Specifications for cut size timber	**IS 1331:1971**
	3	Code of practice for Glazing in Buildings	**IS 3548:1988**
	4	Specification for aluminium doors, windows and ventilators	**IS 1948:1961**

Sl. No		Short title/ Description	IS No. and as amended from time to time
XII	**EARTH WORK:**		
	1	Code of Safety for excavation works	**IS 3764:1966**
	2	Safety code for piling and other deep foundations	**IS 5121:1969**
	3	Code of practice for earth work on canals	**IS 4701:1982**
	4	Methods of Test for soils	**IS 2720**
XIII	**OTHER SUBJECTS:**		
	1	Code of practice for design and insulation of joints in buildings.	**IS 3414:1968**
	2	Code of practice for design and construction of foundations in soils : general requirement	**IS 1904:1986**
		Colours for Ready mixed paints & enamels	**IS5: 2004**
XIV.	**MACHINERY**		
	1	Batch type concrete mixer	**IS 1791:1968**
	2	Concrete Vibrators – Immiscible type	**IS 2505:1980**
	3	Specifications for moulds for use in tests of cement and concrete	**IS 10086:1982**
	4	Compression testing machine used for testing of concrete and mortar	**IS 14858:2000**
	5	Sheep foot roller	**IS 4616:1968**
XV.	**SAFETY**		
	1	Code of practice for fire safety of buildings (general):	**IS 1641:1989**
		Details of construction	**IS 1642:1989**
	2	Criteria for earthquake resistant design of structures.	**IS 1893:2002 Part-1**
	3	Code of practice for earthquake resistant design and construction of buildings.	**IS 4326:1993**
	4	Safety code for scaffolds and ladders	
		Part-I – Scaffolds	**IS 3696:1987 (Part-I)**
		Part-I – Ladders	**IS 3696:1991 (Part-II)**

Sl. No		Short title/ Description	IS No. and as amended from time to time
XVI	**DRAWINGS:**		
	1	Code of practice for general engineering drawings	**IS 696:1972**
	2	Code of practice for architectural and building drawings (First revision).	**IS 962: 1989**
XVII	**MEASUREMENT**		
	1	Methods of measurement of building and civil engineering works.	**IS : 1200**
XVII		**Standard Practice for Application of Sprayed Fire-Resistive Materials (SFRMs).**	**ASTM E1513**

Note:- The above I.S specifications mean latest over and above with amendments if any.

3.11 PERFORMANCE OF WORK

3.11.1 Execution of Works

3.11.1.1 All the works shall be executed in strict conformity with the provisions of the contract documents, explanatory detailed drawings and specifications.

3.11.1.2 The site should be cleared of all obstructions, vegetation, loose stones and materials before start of work.

3.11.1.3 The Engineer in charge, Supervisor will inspect the work on a Day-to-Day basis.

3.11.2 Work in Monsoon

3.11.2.1 The construction may entail working in monsoon also. The contractor must maintain a minimum labor force and execute the construction according to the prescribed schedule.

3.11.2.2 Contractor is responsible for keeping the construction work site free from water.

3.11.3 Plinth Levels

3.11.3.1 A proper level should be maintained, in terms of horizontal and vertical alignment. A minimum acceptable plinth level above road level shall be maintained. The plinth level shall be agreed with the Engineer's representative.

4.0 DETAILED SPECIFICATIONS OF MATERIALS

4.1 Water (APSS No. 129)

4.1.1 Water should be clean, fresh and free from all chemicals, oils, salts and deleterious materials and vegetable growth. Water has to meet the requirements mentioned in Cl. 5.4 of IS: 456-2000. Storage for water should be sufficient and adequate for the regular consumption of works and for the use of labor on site.

4.2 Earth (APSS No. 309 & 310)

4.2.1 For filling, the soil shall be free from all rubbish, organic or vegetable growth including roots, weeds etc. Black cotton soil should not be used for basement filling.

4.3 Sand/ fine aggregate (APSS No. 110)

4.3.1 Sand to be used shall be composed of hard silicious material and shall be clean, sharp, hard, strong and angular type. Sand shall be clean river or pit sand of approved quality and free from salts, earth, dust or other impurities. Sand for plain and reinforced concrete shall confirm to IS: 383-1970. Sand for various purposes shall confirm grading as below.

Sand for Masonry --- table 110-A of APSS No.110

Sand for Plastering --- table 110-B & 110-C of APSS No. 110

Sand for Plain and Reinforced concrete — Zone I to III of table 110-D of APSS No.110

TABLE - II
4.3 FINE AGGREGATE (SAND)

	Percentage passing by Mass			
L.S. Sieve Designation	**Grading Zone - I**	**Grading Zone – II**	**Grading Zone - III**	**Grading Zone - IV**
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	55-90	75-100	90-100
600.00 microns	15-34	35-59	60-79	80-100
300.00 microns	5-20	8-30	12-40	15-50
150.00 microns	0-10	0-10	0-10	0-15

4.4 Stone for Masonry (APSS No. 107)

4.4.1 Stones used shall be strong, durable, dense, compact, close grained, homogeneous, fire resistant and shall be obtained from sources approved by Engineer. Stones shall additionally be hard, sound, free from cracks, decay and other flaws or weathering and shall be easily workable. Stones with round surfaces shall not be made use of.

4.4.2 Stones shall have a crushing strength of not less than 1000 Kg/cm^2. Stones with lesser crushing strength may be used in works with prior approval of the Engineer. Stones shall be non-porous and when tested in accordance with IS: 1124-"Method of Test for Determination of Water Absorption" etc., shall show water absorption of less than 5% of its dry weight when soaked in water for 24 hours. Tests for durability and weathering shall be done in accordance with IS: 1126 and IS: 1125 respectively. The working of stones to required sizes and their dressing shall be as per IS: 1127 "Recommendations for dimensions and workmanship of natural building stones for Masonry work" and IS: 1129 "Dressing of Natural Building Stones". Stones especially lime stones and sand stones, shall be well seasoned by exposure to air before use in construction works.

4.5 Cement (APSS No. 112)

4.5.1 Cement should comply with the requirements of IS:8112-1989 and should be 43 grade ordinary Portland Cement, for making plain and reinforced concrete, mortar etc. The quality of cement shall be inconformity to the performance characteristics given in IS : 8112 - 1989.

4.5.2 The contractor shall procure bulk cement required for the works only from reputed cement factories (main producers) acceptable to the Engineer and should obtain, furnish from suppliers of cement a test certificate for every consignment of cement. The cement bag shall bear the manufacturer's name or their registered trade mark. Cement shall be tested in accordance with IS : 4031-1988 and IS : 4032-1988.

4.5.3 The cement should be delivered to the site in sound dry bags and shall be stored properly. Cement packed in LDPE Bags may be preferred to ensure protection from moisture and dampness.

4.5.4 The contractor has to make his own arrangements for the procurement of cement of required specification for works subject to the following:

a) The contractor shall procure bulk cement required for the works, only from cement factories (Main producers) of approved make and brand only as approved by the Engineer-in-charge. The contractor shall make own arrangements for adequate storage of cement.

b) The contractor shall procure cement in standard packing (50 Kg per bag) from the authorised manufacturers. The contractor shall make necessary arrangement at his own cost to the satisfaction of Engineer-in-charge for actual weighment of random sample from the available stock and shall confirm with the specification laid down by the Bureau of Indian standards or other standard institutions as the case may be. Cement shall be got tested for all the tests as directed by the Engineer-in-charge at least once in a month in advance before the use of cement bags brought and kept at site godown.

c) Cement bags required for testing shall be supplied by the contractor free of cost.

d) The contractor should store the cement of 60 days requirement at least one month in advance to ensure the quality of cement so brought to site and shall not remove the same without the written permission of the Engineer-in-charge.

e) The contractor shall forthwith remove from the works area any cement that the Engineer-in-charge may disallow for use on account of failure to meet with required quality and standard. Damaged or reclaimed or partly set cement will not be permitted to be used and shall be removed from the site.

f) The contractor will have to construct sheds for storing cement having capacity not less than the cement required for 90 days use at appropriate locations at the work site. The Engineer-in-charge or the representatives shall have free access to such stores at all times.

g) The contractor shall further at all times satisfy the Engineer-in-charge on demand by production of records and books or by submission of returns and other proofs as directed that the cement is being used as tested and approved by Engineer-in-charge for the purpose and the contractor shall at all times keep his records up to date to enable the Engineer-in-charge to apply such checks as he may desire.

h) Cement which has been unduly long in storage with the contractor or alternatively has deteriorated due to inadequate storage and thus become unfit for use on the work shall be rejected by the department and no claims will be entertained. The contractor shall forthwith remove from the work area any cement the Engineer-in-charge may disallow for use on work and replace it by cement complying with the relevant Indian Standards.

4.5.5 STORAGE OF CEMENT

4.5.5.1 Portland cement readily absorbs moisture not only in the form of free water but also moisture from the atmosphere or from damp material in contact with it and becomes hydrated and loses strength. It is necessary therefore that it should be protected from absorption of moisture before it is used if it is to fulfill its function. An absorption of one or two percent of water has not appreciable effect but further amounts of absorption, results in hardening of the cement and reduced the strength. If the absorption exceeds 5% the cement is for all ordinary purposes ruined.

4.5.5.2 American, Spanish and German experiments have shown that on average the strength of cement stress in bags is reduced.

After 3 months by 15 to 20 percent.
After 6 months by 20 to 30 percent.
After 115 Months by 30 to 50 percent.
After 2 years by 40 to 50 percent.

These figures prove that special attention should be paid to the storage of cement, even when its strength is equal to or suspense's the specified normal strength.

4.5.5.3 As a general principle the cement must be protected as far as possible from any form of moisture prior to mixing concrete mortar.

4.5.5.4 The cement should be stored in a well constructed dry godown or shed. The cement store should be weather tight construction with a sound wooden or ground to ensure that it is damp proof building. The storage place required for a given quantity of cement can be calculated at the rate of 2.50 sqm for a ton of cement. Cement should not be placed directly on cement plaster flooring and other types of flooring commonly meant with which are not damp proof. A wooden platform or false floor a sheet of water proof paper should be provided.

If none of these is possible, then floor should be covered with straw, hay, cinder or ash or such other material densely and uniformly packed to a thickness of at least one inch and over a laid worth tarpaulin of old cement. Large windows and ventilators if any should be tightly shut to prevent from circulation of air inside the stores. Drainage should be provided if necessary to prevent accumulation of water in the vicinity of the store.

4.5.5.5 Cement should be stored in piles arranged parallel to the walls. It is not advisable to pile bags against the walls and an allowance of at least 0.3M all round should be made between the exterior walls and piles. At least 0.6M wide should be left for each access and delivery.

When storing the bags, the floor should be raised 30 cms., above the ground and stacked in rows not exceeding 10 bags high. The cement is to be stored in such a manner that easy access and proper inspection and counting is possible.

Successive consignments covered with some water proof cover as a both measure of protection and prevent the free circulation of air as each lot of proper fresh air will bring in more moisture. Once the cement has been properly stored should not be disturbed until it is to be used. There is no advantage in moving and stacking the bags to reduce where house set as this practice only exposes fresh cement to the air resulting in loss due to the shifting of cement through the cloth mesh and in damage to the stacks.

4.5.5.6 Even during the dry weather and when the relative humidity of the atmosphere even in nights is low (that is to say when there is very little moisture in the air) the cement in its stock shall be protected with a tarpaulin through for the stack. When the atmosphere is damp at any time of day or night, greater care has to be taken of the cement and proper strength provided it from the damp.

4.5.5.7 Cement required for use immediately after delivery to the site may be stored in the open on a raised damp proof floor so long as it is fully protected by tarpaulin or either weather resisting covers. Storage under these conditions should be limited to 48 hours. The tarpaulin should be raised well above the top most Tie of bags and must be sloped for rapid drainage in case of showers.

4.5.5.8 Consignments should be used in the same sequences as they are delivered. To ensure this the date of arrival of each consignment should be clearly indicated. This is best done by tying a piece of country twins or cord to the end bags in the bottom most tier of the days pile, tacking the two places of card up the sides and along the top of pile an tying the main the center. The date of receipt in the store being clearly written on a bin card high from the card. Dead storage where the cement remains in place for a long time which other consignments of cement come in and out should be avoided.

4.5.5.9 In issuing cement from a store the cement bags should be removed in vertical column of the pile and not horizontal so as to avoid dead stoppage space.

4.5.5.10 As a rule cement should not be stored longer than three months. Cement held in storage for a period of 90 days or longer shall be re-tested. Especially in the rainy season prolonged storage should be avoided. If stock is likely to be held over for more than three months anticipatory measures should be taken to use it on the works.

4.5.5.11 Cement that has become supply due to storage in damp positions due to exposure to the weather is generally useless for making concrete and should be removed from the site.

4.6 Bricks (APSS No. 102)

4.6.1 Bricks for masonry shall be as specified in the specification and shall have minimum crushing strength and shall conform the relevant specifications.

4.6.2 They shall be sound, hard and thoroughly well burnt, but not over-burnt, with uniform size having rectangular faces with parallel sides and sharp straight right angled edges and be of uniform colour with fine compact uniform texture. Bricks shall be of uniform deep red cherry or copper colour. They shall be free from flaws, cracks and nodules of free lime.

4.6.3 Water absorption after 24 hours immersion in cold water shall be not more than 20% by weight. They shall not absorb more than 10% by weight of water after immersion for six hours.

4.6.4 They shall emit a clear metallic ringing sound when struck by a mallet and shall not break when dropped on their face, from a height of 60 cm.

4.6.5 Fractured surface shall show homogeneous, fine grained uniform texture, free from cracks, air holes, laminations, grits, lumps of lime, efflorescence or any other defect which may impair their strength, durability, appearance and usefulness for the purpose intended. Under-burnt or vitrified bricks shall not be used.

4.6.6 Samples of bricks brought to the site shall be tested periodically for compression and other tests according to IS:3495, Parts-I, II & III - "Method of Test for Burnt Clay Building Bricks".

4.6.7 *The possibility and technical feasibility of CLC type (cellular light weight blocks-concurrent) Light Weight Bricks which helps to control temperature levels, subject to availability of skilled workers otherwise danger of wall cracks in course of time. Shall be considered in due course of execution, if necessary.*

4.7 Coarse Aggregate (APSS No. 108)

The coarse aggregate shall be from hard granite crushed stone conforming to IS 383**:** 1970. The pieces of aggregate shall be non porous, hard, strong durable clean and free from clay, rounded in shape and shall have granular or crystalline non powdery surfaces. The aggregate shall be well graded. Tests where required shall be carried out in accordance with IS: 2386 - 1963.

I.S. 383 / 1970 Table – I
4.7.1 Coarse Aggregate

I.S. Sieve designation	Percent passing for single-seized aggregate of metal size			Percentage passing for graded-aggregate of nominal size		
mm	40 mm	20 mm	12.50 mm	10 mm	40 mm	20 mm
(1)	(3)	(4)	(6)	(7)	(8)	(9)
80 mm	---	---	---	---	100	---
63 mm	100	---	---	---	---	---
40 mm	85-100	100	---	---	95-100	100
20 mm	0-20	85 - 100	---	---	30-70	95-100
16 mm	---	---	100	---	---	---
12.50 mm	---	---	85 – 100	100	---	---
10 mm	0-5	0-20	0-45	85 - 100	10-35	25-55
4.75 mm	---	0-5	0-10	0-20	0-5	0-10
2.36 mm	---	---	---	0-5	---	---

TABLE – III
ALL-IN AGGREGATE GRADING

L.S. Sieve Designation	40mm Nominal	20mm Nominal
80.00 mm	100	---
40.00 mm	95-100	100
20.00 mm	45-75	95-100
4.75 mm	25-45	30-50
600.00 microns	8-30	10-35
150.00 microns	0-6	0-6

4.8 Steel Reinforcement (APSS No. 126)

4.8.1 General:

a) This section covers specifications for providing steel reinforcement to Bridges. Under Tunnels, Aqueducts, Super passages, retaining walls, Canal Side Walls, Inlets, Outlets, Head Walls, Cut off Walls; cross Regulators. Off-take Sluices and other similar Structures.

b) A list of IS code applicable is furnished below:

List of I.S. Codes:

I.S.456-1978	:	Code of practice for plain and Reinforced Concrete.
I.S. 1786-1985:		Specification for High Strength deformed steel bars and wires for concrete reinforcement
I.S.432-1982 (Part.I)	:	Specifications for mild steel and medium tensile steel bars for Concrete reinforcement and hard drawn steel wire.
I. S. 818-1968	:	Code of practice for safety and healthy requirement and gas welding and cutting operations.
I.S. 3016-1986	:	Code of practice for fire precautions in welding and cutting operations.
I.S.280-1978	:	Mild steel wire for general Engineering purposes.
I.S.2502-1963	:	Code of practice for bending and fixing of bars for concrete reinforcement.
I.S. 9417-1989	:	Recommendations for welding cold worked bars for reinforced concrete construction.
I.S.2751-1979	:	Welding of mild steel plain and deformed bars for reinforced Construction.
I.S.814-1991 carbon	:	Covered electrodes for manual metal arc welding of and carbon manganese steel.
I.S. 1278-1972	:	Filler rods and wires for gas welding.
IS 11384-1985 & IS 3935-1966	**:**	Specification for composite Construction in structural steel and concrete

In addition to the above Indian Standard specifications, wherever necessary, the specifications prescribed in APSS shall also be followed.

4.8.2 Scope:

Supplying, fabrication and placing gills of M.S./HYSD Reinforcement of different diameter including cost and conveyance of Reinforcement bars, sampling, testing, binding wire, cleaning, cutting, bending, welding, tying the grills and placing them in position with necessary chars and cover blocks in including all leads, lifts, delifts and all other operations necessary to complete the finished item of work, as per drawings, specifications and as directed by the Engineer-in-charge.

4.8.3 Materials:

i) The provisions of schedule 'D' shall apply.

ii) Cutting, bending and Binding of Reinforcement:

a) Reinforcing Steel shall conform accurately to the dimensions given in the bar bending schedules shown on relevant drawings.

b) Bars shall be bent cold to the specified shape and dimensions by a bar bender by hand or power to attain proper radii of bands as shown in drawings or as directed by the Engineer.

c) Bars shall not be bent or straightened in a manner that will injure the material.

d) bars bent during the transport or handling shall be straightened before being used on work, they shall not be heated to facilitate bending.

e) "U" hooks shall invariably be provided at the end of each bar. If specified in Drawing or ordered by the Engineer. The radius of the bend shall not be less than twice the diameter of round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the round bar. In a case of bars which are not round and in the case of deformed bars, the diameter shall be taken as the diameter of a circle having an equivalent effective area.

f) The hook shall be suitably encased to prevent any splitting of the concrete

4.8.4 Placing of reinforcement:

a) Before the reinforcement is placed, the surface of the bars and the surfaces of any metal bar supports be cleaned of the rust, loose mill scale, dirt, grease and other objectionable foreign substances..

b) All reinforcing bars shall be securely held in position during placing of concrete by annealed binding wire, and by using stays, blocks or metal chairs, spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals.

c) Wire for binding reinforcement shall be soft and annealed mild steel of 16 SWG and shall conform to IS: 280-1978. Binding wire shall have tensile strength of not

less than 5600 Kg/CM2, and an yield point of not less than 3850Kg/CM2.

d) Bars shall not allowed to sag between supports. They shall not be displaced during concreting or any other operation over the work.

e) The contractor shall also ensure that there is no disturbance caused to the reinforcing bas already placed in concrete.

f) All devices used for positioning shall be of non-corrodible material. Metal supports shall not extend to the surface of the concrete, except where shown on the drawing. Pieces of broken stone or brick and wooden blocks shall not be used. Where portions of such supports will be exposed on concrete surface designated to receive F2 or F3 finish, the exposed portion of support shall be galvanized or coated with other corrosion resistant material without which the concreting will not be permitted. Such supports shall not be exposed on surfaces designated to receive F4 finish unless otherwise shown on the drawings.

g) Placing of layers of freshly laid concrete as work progresses for adjusting bar spacing shall not be allowed.

h) Layers of bars shall be separated by space bars, precast blocks or other approved devices.

i) Rein forcemeat after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be taken to prevent any displacement of reinforcement in concrete already placed.

j) To protect reinforcement from corrosion, concrete cover shall be provided as indicated on the drawings. All bars protruding from concrete and to which other base are to be splided and which are likely to be exposed for an indefinite period shall be protected by thick coat of neat cement grout.

k) bars crossing each other, where required, shall be secured by binding wire (annealed) of size not less than 1mm media and conforming to IS: 280-1978 in such a manner that they do not slip over each other at the time of fixing and concreting.

n) As far as possible, bars of full length shall be used. In case this is not possible, overlapping of bars shall be done as directed. by Engineer. When practicable, overlapping bars shall not touch each other, but be kept apart by 25mm or11/4 times the maximum size of the coarse aggregate whichever is greater, by concrete between them. Where not feasible overlapping bars shall be bound with annealed steel wire, not less than 1mm thickness twisted tight. The overlaps shall be staggered for different bars and located at points, along the span where neither hear nor bending moment is maximum.

o) The minimum allowable clearance between parallel round bars shall not be less than 11/2 times the diameter of the larger bars and for square bars shall not be less than twice the side dimensions of the larger bars or 11/2 times, the maximum size aggregate whichever is greate.

O) Dissimilar diameter rods should not be jointed together.

4.8.5 <u>Splicing:</u>

a) Where it is necessary to splice reinforcement, the splices shall be made by lapping, by welding or by mechanical means.

i) When permitted or specified on the drawings, joints of reinforcement bars shall be butt welded so as to transmit their full strength. Welding of bars shall be done as directed by the Engineer and conforming with requirements of Clause 11.4 of IS. 456-1978.

4.113 If it is proposed to use welded splices in reinforcing bars, the equipment, the material and all welding and testing procedures shall be subject to the approval of the Engineer. The Contractor shall also carryout test welds as required by the Engineer. No extra rate will be paid for welding reinforcement test-welds as tender rate in schedule-A is inclusive of this item.

iii) For welded splices for reinforcing bars conforming to IS 1786-1985, welding shall be done in accordance with I : 9417-1979. For reinforcing bars conforming to IS : 432 (part-I) -1982, welding shall be done in accordance with IS: 2715-1979. Electrodes for manual metal arc welding shall conform to IS: 814 (part.I) - 1974 and IS : 814 (part.II) - 1974. Mild steel filler rods of Oxy-acetylene welding shall conform to IS : 1278-1972 provided they are capable of giving a minimum butt weld tensile strength of 41 kg/mm2.

iv) Only electric arc welding using process which excludes air from the molten metal and conforms to any or all other special provisions for the work shall be accepted. Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding and when welding is done in tow or three steps. Previous surfaces shall be cleaned well. Ends of bars shall be cleaned of all Iron, scale, rust grease, paint and other foreign matter before welding.

b) Reinforcing bars of 28mm is diameter and larger may be connected by butt welding provided that lapped splices will be permitted if found to be more practical than butt welding and if lapping does not encroach on cover limitation or hinder concrete or reinforcement placing.

c) Reinforcing bars 25mm in diameter and less may be either, lapped or Butt welded, whichever is the most practicable.

i) Butt welding of reinforcing bars shall be performed either by the gas pressure or

flash pressure welding process or by the electric arc methods under cover from weather.

ii) Welded pieces of reinforcement shall be tested at the rate of 0.5% of total number of joints welded. Specimen shall be taken from the actual site of work. Strength of the weld provided shall be at least 25% higher than the strength of bar.

d) Welded joints of splices shall preferably be located at points where steel will not be subject to more than 75% of the maximum permissible stresses and welds so staggered that at any section not more than 20% of rods are welded. Approval of such additional splices will generally be restricted to splices not closer than 8 meters in horizontal bars or 4 meters in vertical bars measured between midpoint of laps.

4.8.6 <u>Coupling of Bars:</u>

a) Wherever indicated on the drawings or desired by the Engineer to use mechanical couplings for reinforcing bars, bars shall be joined by couplings which shall have a cross-section sufficient to transmit the full strength of bars. The ends of bars that are joined by couplings shall be for sufficient length, so that the effective cross-section of the base of threads shall be standard whit-worth threads. Steel for couplings shall conform to IS. 226. The contractor shall submit samples of the proposed coupling to the Engineer for approval not less than 60 days prior to their proposed use.

4.8.7 <u>Care of placed Reinforcement and Concrete:</u>

a) Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position, care shall be taken to ensure that at no time the radius of the bend is less than 6x diameter for deformed bars and 4x diameter for plain mild steel bars. Care shall also be taken, when bending such bars, to ensure that the concrete around the bars is not damaged.

4.8.8 <u>Tolerances:</u>

a) As specified in clause 11.3 of IS : 456-1978 unless otherwise specified by the Engineer reinforcement shall be placed within the following tolerances.

i) For effective depth 200mm or less = + 10mm.

ii) For effective depth more than 200mm + 15mm

c) The cover shall in no case be reduced by more than one third of specified cover or 5mm which ever is less.

4.8.9 Dowels:

a) The dowels shall be of the same H.Y.S.D bars of grade Fe 415/500 conforming to I.S. 1786-1985 as used for reinforcement.

b) Details for dowel shall be as shown on the drawings or as directed by the Engineer.

c) Dowels shall be placed in the concrete where shown on the drawings or where directed and will be inspected for compliance with requirements as to size, shape, length, position, and amount after they have been placed, but before being covered by concrete.

d) Before the dowels are embedded in concrete, the surfaces of dowels shall be cleaned of all dirt, grease or other foreign substances which in opinion of the Engineer are objectionable.

e) The dowels shall be accurately placed and secured in position so that they will not be displaced during the placing of the concrete.

4.8.10 Measurement and Payment:

a) Measurement: Measurement for payment, for furnishing and placing reinforcing barswill be made only on the calculated weight of the bars placed in concrete, in accordance with the drawings or as directed by the Engineer.

b) The calculated weight for reinforcing bars shall be determined as follows:

i) Reinforcement shall be measured in length separately for different diameters as actually used in the work excluding overlaps. Length shall include hooks at ends.

ii) From the length measured, weight of reinforcing bars shall be calculated on the basis of weights specified in the table in schedule 'D'.

iii) Wastage, overlaps, couplings, welded joints, spacer bars, dowels and annealed steelwire for binding shall not be measured and the cost of these items shall be deemedto have been included in the rates for reinforcement.

iv) The unit for payment shall be one metric tonne weight of steel.

c) <u>Payment Rate:</u> The tender rate in the schedule-A for reinforcement shall include cost of steel sampling and testing binding wire or welding material at site of work, its cutting, bending, cleaning, placing, binding or welding and fixing in position as sown on the drawings and as directed by the Engineer. The unit rate shall also include cost of all devices for keeping reinforcement in approved position, cost of jointing as per approved methods and all wastage, overlaps, dowels, binding wire or welding material and spacers of bars and cost of all incidental operations necessary to complete the work as per drawings and as per specifications.

4.8.11 Mild steel bars shall conform to Grade I of IS: 432.

4.8.12 High yield steel strength deformed bars shall conform to IS: 1786-1985. Binding wire shall conform to IS: 280. The various types of steel shall conform to the relevant IS specification as provided in A.P.S.S. No.126.

4.8.13 The contractor has to make his own arrangements for procurement of tested steel required for the work. He shall also make his own arrangements for transportation and storage.

4.8.14 The contractor shall procure mild steel (MS) reinforcement bars, High yield strength deformed bars (HYSD) bars, rods and structural steel etc., required for the works, only from the reputed main steel manufacturing units i.e SAIL, VSP, TATA manufacturing the steel to the prescribed specification of Bureau of Indian Standards or equivalent and licensed to affix ISI or other equivalent certifications, marks and acceptable to the Engineer-in-charge.

4.8.15 The contractor should invariably obtain necessary ISI test certificates from the suppliers of steel for each and every consignment and furnish them to the Engineer-in-charge, before use on works. Test certificates conforming to IS 1786-1985 are to be furnished. The HYSD steel (IS 1786-1985) bars should have TOR mark.

The original bills of procurement should be submitted to the Engineer-in-charge for making payment of the item. The contractor shall purchase the steel on the name of the work, number and the name of the contractor and furnish the same to the Engineer-In-Charge. The steel without the above two names will not be accepted on the works. Vendors test certificates and weighment bills are to be furnished to the Engineer-In-Charge and any quantity purchased without test certificates will not be accepted for use on the works.

4.8.16 If any difference is observed on carriage inwards, carriage outwards and theoretical requirement of steel for finished work, the contract will be cancelled and the contractor will be blacklisted.

4.8.17 The diameter and weight of steel should be as per IS 1786-1985 or relevant IS specification with subsequent revisions from time to time:

S.No.	Diameter of rod	Sectional weight in Kg/ RM both for Plain and HYSD steel
1	6 MM	0.22
2	8 MM	0.39
3	10 MM	0.62
4	12MM	0.89
5	14 MM	1.21
6	16 MM	1.58
7	18 MM	2.00
8	20 MM	2.47
9	22 MM	2.98
10	25 MM	3.85
11	28 MM	4.83
12	32 MM	6.31
13	33 MM	6.71
14	36 MM	7.99
15	40 MM	9.86
16	42 MM	10.88

Note: If any rods other than those diameters specified above are procured the weights shall be as per standard steel tables.

4.8.18 Quality control: The contractor shall furnish the samples for testing for each batch and consignment along with the test certificates issued by the vendors to the Engineer-In-Charge immediately after receipt of the steel in the stockyard at site of work for verification and testing.

No steel procured by the contractor shall be used in any work until the Engineer-In-Charge has given notice that the test results are satisfactory.

4.8.19 **STEEL STORAGE**:

a) Reinforcement steel and binding wire shall be stored above ground surface upon platform, skids or other supports protected as for as possible from surface deterioration by direct contact with undesirable elements or by exposure to conditions producing rust and corrosion. Bars shall be so supported as to avoid distortion and sagging of long lengths. All the reinforcement of same designation shall be stacked separately and distinctly marked.

b) Steel shall be stacked and stored in accordance with IS 4082: 1996 as per Recommendations on stacking and storage of construction materials.

c) If the reinforcing rods have to be stored for a long duration, they shall be coated with cement wash before stacking and/or be kept under cover.

4.8.20 Reinforcement shall be free from pitting due to corrosion and free from loose rust, dirt, dust, mill scale, paint, oil, grease, adhering earth etc.

4.8.21 Erected and secured reinforcement after fabrication shall be inspected and approved by the Engineer-in-Charge prior to placement of concrete.

4.9.1 TEAK WOOD FOR JOINERY/ DOORS

The wood shall be well seasoned, uniformly coloured and shall be free from knots, cracks, shakes, splits, cross grains etc.

The wood shall be durable and of reasonably straight grains.

Moisture content of wood used shall be as near as possible to the following values:
Recommended values of moisture content in timber at the time of assembly or framing:

Type of work	Coastal area	Inland area
Frames for doors and windows	16 to 18%	14 to 15%
Shutters of doors and windows etc	15 to 16%	12 to 14%

4.9.2 GLAZED TILES (APSS No. 121)

The tiles shall be covered by a glaze on the top and under side. The edges shall be free from glaze in order that the tiles may adhere properly to the base. The glaze shall be uniform in quality and free from welts, ships, craze, specks, crawlings, or other imperfections visible from a distance of one meter. The glazed tiles shall be white or colour and size of 300mm x 200 mm with a thickness of 7mm. The tiles shall be true to shape and conform to the performance requirements of IS 13712:2006 and supplier shall submit a certificate with respect to the quality of tiles and detailed there in.

5.0 DETAILED SPECIFICATION OF WORKS

5.1 Standard

A high standard of workmanship in all trades will be required. The Contractor shall ensure that only skilled and experienced workmen are employed.

5.2 Supervision

5.2.1 The Contractor’s supervising staff shall be fully qualified and experienced in the types of work being carried out under the supervision and shall be capable of ensuring that they are done well and efficiently.

5.3 Temporary works

Where required, the Contractor shall furnish such details of his temporary works as may be called for by the Engineer and the Contractor shall satisfy the Engineer as to their safety and efficiency. The Engineer may direct that temporary works, which he considers unsafe or insufficient, shall be removed and replaced in a satisfactory manner.

5.4 Codes

5.4.1 Unless mentioned otherwise, current versions of all codes, specifications and standards issued by the Indian Standards Institution and Indian Roads Congress, wherever mentioned, shall be fully applicable to these specifications. Where standards are not yet published by the ISI or IRC, adaptable British Standards or Specifications of the International Organization for standardization shall apply.

5.4.2 In case of any conflict in meaning between the specifications mentioned herein and those of ISI or IRC, the provisions of these specifications shall be prevail.

5.5 Base lines and bench marks

5.5.1 The Contractor shall establish and maintain, to the satisfaction of Engineer, the base lines and bench marks, based on which the works are set out. Where such base lines and bench marks are provided by the Engineer, the Contractor shall maintain these throughout the period of construction without causing any disturbance to them.

5.6 Setting out

5.6.1 The Contractor shall set out all the works to be executed by him, in line with the standard base lines, position and bench marks and truly as per drawings within the accepted tolerance limits at no extra cost to Owner. The Contractor shall be solely responsible for the correct setting out of all the works, to be executed by him and the approval of such setting out by the Engineer shall in no way absolve the Contractor of his responsibility for carrying the work to the true lines, levels and positions as per drawings.

5.7 Dewatering

5.7.1 The Contractor shall carryout all the works, in dry and workable condition and maintain the same in dry condition till the final handing over of works at no extra cost to the Owner. For this the Contractor shall make at his cost all the necessary provisions of dewatering, wherever necessary, to the full satisfaction of the Engineer, except in the case of Foundations where there is seepage of water due to high Water Table.

5.8 Safety of existing work

5.8.1 Before taking up any construction adjoining other property or existing work, the Contractor shall take all steps necessary for the safety and protection of such property or work.

5.9 Protection of existing services

5.9.1 The Contractor shall take all precautions necessary to prevent damage to or interference with under-ground or over-ground services such as cables, drains, piping or piles, whether shown on drawings or not. Equipment etc., mounted in position shall be protected against falling debris etc., by means of tarpaulin or such other material.

5.10 Handing over of work site

5.10.1 On completion of work, the Contractor shall remove all rubbish, debris, surplus materials, temporary work etc., from the site. The site shall be handed over in a tidy and workmanlike manner.

5.11 CRS Masonry in CM (1:8) in 1st sort (APSS 107 & APSS 611)

5.11.1 The work shall consist of a facing of selected stones hammer dressed at faces and joints with only a small proportion of smaller stones in the hearting.

5.11.2 The face stones shall be set in regular courses of uniform thickness from bottom to the top throughout. The height of the course should be uniform throughout by using stones of same height. The face stones shall be laid in headers and stretchers alternately so as to break joint by atleast 75mm and headers shall project atleast 100mm beyond stretchers. The stones shall be solidly bedded, set full in mortar with joints not exceeding 12mm in thickness and shall extend well back into the hearting.

5.11.3 Bond stones shall be placed in the wall @ interval of 2m in length and 600mm in height and shall run through the wall if the wall is not more than 600mm thick. If the wall is more than 600mm thick line of headers shall be laid from face to back each header overlapping the other by atleast 150mm.

5.11.4 The heart portion shall be filled with good flat bedded stones set as close as possible, well set in mortar.

5.11.5 The work on interior face shall be precisely the same as on the exterior face unless the work is to be plastered in which case the side joints need not be vertical.

5.12 Coursed Rubble Masonry in CM (1:8) 2nd sort: (APSS NO. 612)

5.12.1 This work shall be executed similar to the specifications for C.R.S. masonry 1st sort with the exception that the hearting and backing shall conform to the standard specification for random rubble masonry and bond with the face stones being carried up continuously with the face work.

5.13 RRS Masonry in CM (1:8) (APSS 107 & APSS 615)

5.13.1 The face stone be hammered dressed on the face, side and the beds to enable to come into close proximity with the neighbouring stone. Face stone shall be of not less width in plan than 150mm for walls of 400mm thick, 200mm for walls of 450mm thick. The face stone shall be laid in headers and stretchers alternatively so as to break joints by at least 75mm. Care is to be taken to break joints vertically.

5.13.2 Bond stones should built in the wall at intervals of 2m in length and 600mm in height and shall run through the wall if the wall is not more than 600mm thick. The heart portion shall be filled with good flat bedded stone set as close as possible, well set in mortar.

5.14 Brick Work: (APSS 102 APSS 501 & 504)

5.14.1 All bricks to be used in the work shall be thoroughly soaked in water before use to prevent absorption of water from the mortar.

5.14.2 The bricks shall be set in cement mortar of **1:8** proportions by adopting a proper bond (preferably either English bond or a Flemish bond) throughout the wall.

5.14.3 The walls shall be taken up truly plumb. All courses shall be truly horizontal (level) and truly vertical. Vertical joints of consecutive courses shall not come directly over one another. Vertical joints, in alternate course shall come directly over one another. Joint's shall be fully filled with mortar and raked. Every brick shall be laid with full joints of cement mortar on its bed, ends and side in one operation. No feeding of mortar by using excess water shall be allowed.

5.15 Reinforced Half Brick Partition Walls (APSS 102, 501, 504, 509)

5.15.1 All bricks to be used in the work shall be thoroughly soaked in water before use to prevent absorption of water from the mortar.

5.15.2 The cement mortar used for reinforced brick work shall be in cm (1:4) and mortar used shall conform APSS No. 113. Reinforcement for half brick walls shall be in the form of MS Bars and shall be of specified qualities. The brick shall be constructed only in stretcher bond. The reinforcement shall be well embedded in cement mortar at every third course and half the joint thickness of mortar shall first be laid and the other half laid after the reinforcement is placed in the position. The free ends of the reinforcement where ever possible shall be pegged into the mortar joints of main brick walls.

5.16 NOTES ON MASONRY

5.16.1 **i)** All stones, bricks etc., used in the masonry work shall be thoroughly soaked in water before use to prevent absorption of water from the mortar.

ii) Stones shall be laid on their broadest faces which gives better opportunity to fill the faces between stones.

iii) To give sufficient lateral bond a stone in any course shall overlap the stone in the course below i.e. joints parallel to the pressure in two adjoining course shall not lie too closely in the same vertical line. A minimum overlap of 6" shall be maintained.

iv) To give sufficient transverse bond, prescribed no. of headers shall be used.

v) The practice of building two thin faces, tying width occasionally through stones and filling up the middle with small stones or dry packing shall be strictly guarded against.

vi) Jambs for door and window opening shall be formed with quoins of the full height of the course. The quoins shall be of breadth atleast one and a half times the depth for the course and in length atleast twice the depth.

vii) It is advisable to erect the door and window frames first and build the masonry around.

viii) Thickness of the joint should not be more than 12mm.

ix) Every course of the masonry shall be truly vertical. Use of plumb bob to check verticality by the mason shall be encouraged.

x) Care should be taken to keep all corners and sides including door and window opening truly vertical.

5.16.2 Theoretical requirement of cement should be as follows: Cement bags of 50 kgs

a.	C.R.S. Masonry in C.M. (1:6)	1.54 bags per Cum
b.	C.R.S. Masonry in C.M. (1:8)	1.15 bags per Cum
c.	Brick Masonry in C.M. (1:4)	1.44 bags per Cum
d.	Brick Masonry in C.M(1:6)	0.96 bags per Cum
e.	Brick Masonry in C.M. (1:8)	0.72 bags per Cum

5.17 Plain and Reinforced cement concrete (A.P.S.S. 402 & 403)

5.17.1 All R.C.C. work shall be carried out in strict accordance with latest IS specification. No concrete work shall be cast in the absence of the works-in-charge/Engineer. All the materials used should be of good quality as mentioned in Sec. 4.0 above.

5.17.2 Cast-in-place concrete for the structures shall conform to the requirements of the section. The structures shall be built to the lines, grades and dimensions as per the designs and drawings.

5.18 **Controlled concrete**: Controlled concrete shall be used on all concrete works. Reinforced cement concrete shall correspond to **M20/M25/M30** grade as per **IS 456**-2000.

5.19 **Mix Proportions & Strength requirement of concrete:** The proportions of various ingredients to be used in the concrete for different parts of the work shall be established by proper mix through design mix. The contractor shall produce concrete mix design and establish the strength of concrete with this concrete mix design for 3 days, 7 days and 21 days as per IS 456-2000. For controlled concrete, the mix design shall be so designed as to attain in preliminary tests a strength atleast 33 percent higher than that required on work tests. The design mix shall be got approved by the Engineer-in-charge before proceeding with the concreting. The contractor is required to carryout the mix design and the design mix shall be got approved by the Engineer-in-charge, APSFC within the limitations of parameters and other stipulations laid down in IS-456/2000.

The specified characteristic compressive strength of 150 mm size cube at 28 days attained for M20, M25 and M30 grades of concrete shall be 20 N/sqmm, 25N/sqmm and 30 N/sqmm respectively. The mix shall be designed to produce the grade of concrete having the required workability and a characteristic strength at 28 days not less than the appropriate values mentioned in Table-2 of IS-456**:**2000. The target mean strength of the concrete mix should be equal to the characteristic strength plus 1.65 times the standard deviation.

TABLE

MINIMUM COMPRESSIVE STRENGTH OF 15 CM. CUBES AT 7 AND 28 DAYS AFTER MIXING, CONDUCTED IN ACCORDANCE WITH IS.516

Class	Preliminary test N/mm^2		Works test N/mm^2		Maximum size of aggregate mm
	at 7 days	at 28 days	at 7 days	at 28 days	
M40&ABOVE	AS PER RELEVANT CODE				
M40	33.50	50.00	27.00	40.00	20
M35	30.00	44.00	23.50	35.00	20
M30	25.00	38.00	20.00	30.00	20
M25	22.00	32.00	17.00	25.00	20
M20	17.50	26.00	13.50	20.00	20
M15	13.50	20.00	10.00	15.00	20

Whenever the grade of concrete such as M30 etc., is specified it shall be Contractor's responsibility to ensure the minimum crushing strength stipulated for the respective grade of concrete is obtained at works.

The contractor shall maintain the test results on regular basis as indicated in I.S.456/2000 and subsequent amendments thereon.

In all cases, the 28 days compressive strength specified shall be the criterion for acceptance or rejection of the concrete.

The sample of water taken for testing shall be typical of the water proposed to be used for concreting.

The contractor shall be responsible for production of controlled concrete as per design mix to ensure the required works cube strength is attained and maintained. In the designation of concrete mix, letter 'M' refers to the Mix and the number to the specified 28 days works cube compressive strength in Newton per sq.mm.

The concrete where site mixing is permitted shall be with concrete mixtures fitted with weigh batching scale. All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked.

5.19.1 The proportions of cement concrete specified in the above schedule are nominal and are indication of approximate proportion of cement, fine aggregate and coarse aggregate which may have to be altered suitably at site to obtain desired strength and workability. However, the quantity of cement shall not be less than specified below.

Nominal Mix	**Cement in bags of 50 Kgs per one Cubic metre (net) of cement concrete**
a. 1:1.5 : 3	8.84 bags of 50 Kgs.
b. 1:2:4	6.62 bags of 50 Kgs.
c. 1:2.5:5	5.30 bags of 50 Kgs.
d. 1:3:6	4 42 bags of 50 Kgs.
e. 1:4:8	3.31 bags of 50 Kgs.
f. 1:5:10	2.65 bags of 50 Kgs.
g. 1:6:12	2.21 bags of 50 Kgs.
h. 1:8:16	1.66 bags of 50 kgs.

5.19.2 The quantity of water shall be varied to suit the moisture content of the aggregate and shall be just sufficient in produce a dense concrete with workability. Workability should be checked at frequent intervals as per **IS: 1199.** An accurate and strict control shall be kept on the quantity of mixing water.

5.20 Concrete quality control measures and concrete quality Assurance Test Programme

a) Concrete quality control measures: The contractor shall be responsible for providing quality concrete to ensure compliance of the bid requirements.

b) Concrete quality Assurance Programme: The concrete samples will be taken by the Department and its quality will be tested in any other recognized laboratory per the relevant Indian Standard Specifications IS 516:1959 and IS: 1199-1959.

Samples shall be drawn on each day for each type of concrete.

Tests: The Department will obtain samples and conduct tests as specified in B.I.S. 456- 2000, I.S. 1199- 1959 and I.S. 416 - 1959

Test Facilities: The contractor shall furnish free of cost samples of all ingredients of concrete for testing and obtain approval from the Engineer-in-Charge. He should also supply free of cost, the samples of all the ingredients of concrete for conducting the required tests.

Test results: The Engineer-in-charge will pass the concrete if average strength of the specimens tested is not less than the strength specified. Concrete not meeting requirements of specification in all respects may be rejected by the Engineer-in-charge in which case it shall be removed and reconstructed entirely at the expense of the contractor.

5.21 **Preparation for placing:** No concrete shall be placed until preparation of surface involved, all form work, reinforcement, installation of items to be embedded have been approved by the Engineer-in-charge.

5.21.1 All surfaces, forms, embedded material shall be free from dried mortar, dirt, foreign substances, waste papers etc. Temporary openings shall be provided to facilitate inspection, especially of bottoms of columns and wall forms, to permit removal of sawdust, wood shavings, binding wire, dirt etc. Such openings/holes shall be suitably plugged later.

5.21.2 Foundation surface: Rock surfaces shall be free from oil, objectionable coatings, loose, semi detached and unsound fragments. Immediately prior to placement of concrete, surfaces of rock shall be washed with an air water jet and shall be brought to a uniform surface dry condition.

5.21.3 Concrete shall not be placed in standing water or on a water-covered surface. Any concrete that has been washed away by heavy rains shall be entirely removed, there is any sign of cement and sand having been washed away from the concrete mixture.

5.21.4 Starters: Before proceeding with erection of form work for RCC columns, Starters shall be cast with 25 mm thick concrete with string lines placed in position as per the layout.

5.21.5 Slots, openings, holes, pockets etc shall be provided in the concrete work in the positions specified or required or as directed by Engineer-in-charge.

5.21.6 Reinforcement and other items to be cast in concrete shall have clean surfaces that will not impair bond.

5.21.7 Approval by the Engineer-in-charge of any materials and work as required herein shall not relieve the contractor from his obligation to produce finished concrete in accordance with the requirements of the specifications.

5.22 **Placing of Concrete**: The contractor shall notify the Engineer–in-charge before batching begins. Batching, mixing and placing of concrete shall be performed only in the presence of an authorized representative of the Engineer-in-charge.

5.23 **Weather**: Concrete shall not be placed in rain sufficiently heavy or prolonged to wash mortar from concrete.

The contractor is not entitled for any additional payment over the unit prices bid in the schedule for concrete, by reason of any limitation in placing of concrete under the above paragraphs.

5.24 PRODUCTION OF CONCRETE:

5.25 BATCHING OF MATERIALS:

All materials entering into the concrete shall be batched by weight except water which shall be in liters, when the weight of cement is determined on the basis of weight of cement per bag, a reasonable number of bags should be weighted periodically to check-the net weight. Admixtures if permitted by the Engineer-in-Charge should be added to the concrete by weight. All measuring equipment and weight batching machinery shall be approved by the Engineer- in- Charge and maintained in a clean serviceable condition and their accuracy shall be periodically checked. The batching and mixing plant for concrete is to be designed to suit the local conditions and output requirements as per IS: 4925 - 1968 specification of batching and mixing plant for concrete.

The aggregates of different sizes should be stocked in separate stock piles, the same shall be blended in right proportions to ensure a uniform grading of aggregate as determined by the Engineer -in- Charge.

In case uniformity in the materials used for concrete making has been established over period of time, the proportioning may be done by volume batching, provided periodic checks are made on weight / volume relationships of materials.
Where weight batching is not practicable, the quantities of fine coarse aggregate (not cement) may be determined by volume.

The amount of the added water to concrete shall be adjusted to compensate for any observed variations in the moisture contents determined by the above tests for both design and nominal mix of concrete making for weight and volume batching.

5.26 Mixing:

Concrete shall be mixed in a mechanical mixer complying with IS: 1791 - 1968 - specification of batch type concrete mixtures. The mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency. If there is a segregation after unloading from the mixer, the concrete should be remixed. The mixing shall comply with the relevant specification for higher grade of concrete.

The Mixing time may be 1.5 to 2 minutes for all normal cements.

In exception circumstances, such as (i) mechanical breakdown, (ii) work in the remote areas, (ii) when the quantity of concrete work is small Hand mixing is permitted subject to adding 10 percent extra cement.

The Hand mixing shall be carried out in a watertight platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency.

All cement concrete shall be machine mixed and machine vibrated.

The mixers with other accessories shall be kept in first class working condition and so maintained throughout the construction.

Any mixer that at any time produces unsatisfactory mix, shall not be used until repaired. If repair attempts are not successful, the defective mixer shall be replaced.

The Cement and aggregates shall be mixed thoroughly in the specified proportion in a mechanical mixer until the mixture is of uniform colour. Where machine mixing is done the concrete shall be mixed, until the mixture is of uniform colour and, in no case, for less than two minutes.

5.27 Workability:

Work ability of concrete should be controlled by direct measurement of water content. Workability should be checked is frequent intervals as per the procedure laid down in IS: 1199 - 1959 methods of sampling and analysis of concrete.

SLUMP TEST TO CHECK WORKABILITY:

The Slump test for concrete shall be adopted only for concretes of medium to high work abilities (i.e., slump 25 to 100mm). For very stiff mixes having zero slump, the slump test does not indicate any difference in concrete of different work abilities.

TYPE	SLUMP
1. (A) Structure with exposed inclined surface requiring low slump concretes, to allow for proper compaction	25mm
(B) Plain cement concrete	25mm
2. RCC, structures with widely spaced reinforcement: e.g.; solid columns, piers abutments footing, well steining.	40-50mm
3. RCC structures with fair degree of congestion of reinforcement e.g. pier, and abutment caps, box culverts well curbs and caps, walls with thickness greater than 300mm. .	50-75mm
4. RCC and PSC structures with highly congested reinforcements e; g; deck slab girders, box girders, walls with thickness less than 300.	75-125mm
5. Under water concreting through tremie eg : bottom plug, cast in- situ -piling.	100-200mm

VEE -: BEE test method to check workability:

VEE - BEE test shall be done for stiff concrete mixes having ‘ low or very’ workability. The ranges for VEE-BEE -TIME method for some placing conditions are given in clause:6 or IS: 456 - 1978, which shall be followed.

5.28.1 Transportation, placing and compaction of concrete:

Concrete shall be transported from the mixer to the form work as rapidly as possible by methods approved by the Engineer-in-charge, which will prevent the segregation or loss of any of the ingredients and maintaining the required workability.

The concrete shall be transported, laid and compacted in its final position within 30 minutes of its discharge from the mixer unless carried by in properly designed agitators. Where the time of haul exceeds 20 minutes, mixed concrete shall be transported in a suitable agitators or transit mixer as directed and approved by the Engineer-in-charge.

5.28.2 Placing of concrete:

All surfaces upon or against which concrete is to be laid shall be prepared in accordance with the drawings.

No concrete shall be placed until all form works installation of parts to be embedded and preparation of surface involved in the placing have been approved by the Engineer-in-charge. No concrete shall be placed in water except when specifically so permitted. All surfaces of forms and embedded materials have become incrusted with dried mortar from previously placed shall be cleaned before surrounding of adjacent concrete is placed.

If concreting is not started within 24 hours of to approval being given, it shall have to be obtained again. The contractor shall notify the Engineer at least 24 hours before matching begins for placement of concrete.

All absorptive surfaces against which concrete is to be laid shall be moistened thoroughly so that moisture will not be withdrawn from the freshly placed concrete. The concrete shall be deposited as nearly as possible in its final position and compacted before setting commences and should not be subsequently disturbed.

Methods of placing should be such as to preclude segregation.

Care should be taken to avoid displacement of reinforcement or movement of form work.

Placing is allowed with a limitation of free fall of 1.5meter.

All concrete shall be placed in continuous and approximate horizontally layers, the thickness of which shall not more than 450mm for mass concrete and 150mm for RC.C and plain cement concrete works.

Concrete shall not be placed faster than the placing crew can compact it properly.

On sloping surfaces, concrete should be placed at the lower end of the slope first, progressing upwards, and thereby increasing natural compaction of the concrete.

High velocity discharge which may cause segregation of the concrete should be avoided. Recommended methods of placing concrete in segregation prone locations are:

5.28.3 a) In narrow forms: If very wet concrete is to be placed in narrow, deep form work, water content in the upper layers should be gradually reduced to compensate for water gain.

b)Placing through side ports in column form work: Concrete shall be dropped vertically into the outside pockets under each form work opening (port) so that concrete stops and then flows easily into the column form work.

c) Placing on sloping surfaces: Concrete shall not be discharged from free end of a chute on to a sloping surface, as the heavier coarse aggregates are separated and carried down the slope. The chute should be fitted with a baffle and a drop at its end, so that concrete remains on slope.

d) Temperature: Concrete when deposited shall have a temperature of not less than 5 degree Celsius, and not more than 40 degrees Celsius.

e) REQUIREMENTS OF PUMPING CONCRETE:

The pipe diameter should be at least 3 times the maximum aggregate size. Large aggregates can especially tend to get blocked near the bends.

The bends in the pipes conveying concrete from the pump should be minimal in order to avoid losses. In addition, these should not be sharp. Each 10^{o} bend is equivalent to an extra length of pipe of 1 m.

The economy of pumping depends on the number of interruptions. Each time, the priming of the pipes using mortar is required (0.25 m^3/100 m of 6 inch pipe), and the pipe also has to be cleaned.

Aluminium pipes should be avoided, as the Al reacts with alkalis in the cement, and leads to the evolution of hydrogen gas. These gases tend to introduce voids in the concrete, which reduce the efficiency of pumping.

Pumping enables concreting of inaccessible areas. Moreover, the direct conveyance of concrete from the truck to formwork can avoid double handling of the concrete.

Requirements for pumped concrete

- Concrete mixture should neither be too harsh nor too sticky; also, neither too dry nor too wet
- A slump between 50 and 150 mm is recommended (note that pumping induces partial compaction, so the slump at delivery point may be decreased)
- If the water content in the mixture is low, the coarse particles would exert pressure on the pipe walls. Friction is minimized at the correct water contents. The presence of a lubricating film of mortar at the walls of the pipe also greatly reduces the friction
- High cement content in concrete is generally beneficial for pumping
- Water is the only pumpable component in the concrete, and transmits the pressure on to the other components
- Two types of blockage to efficient pumping could occur: (1) Water can escape from the mixture if the voids are not small enough; this implies that closely packed fines would be needed in the mixture to avoid any segregation. The pressure at which segregation occurs must be greater than that needed to pump concrete. (2) When the fines content is too high, there could be too much frictional resistance offered by the pipe. The first type of blockage occurs in irregular or gap-graded normal strength mixtures, while the second type occurs in high strength mixtures with fillers. In order to avoid these two types of failure, the mixture should be proportioned appropriately
- Other mixture factors that could affect pumping are the cement content, shape of aggregate, presence of admixtures such as pumping aids or air entrainment. Air entrainment is helpful in moderate amounts, but too much air can make pumping very inefficient
- When flowing concrete is being pumped, an over-cohesive mixture with high sand content is recommended. For lightweight aggregate concrete, pumping can fill up the voids in the aggregate with water, making the mixture dry.

The pipe diameter must be at least three times the maximum aggregate size.

Rigid or flexible pipe can be used but the latter causes additional frictional losses and cleaning problems.

Aluminium pipes should not be used because this metal reacts with the alkalis in cement to form hydrogen, which then creates voids in the hardened concrete with consequent loss of strength.

The mix required to be pumped must not be harsh or sticky, nor too dry or too wet, i.e. its consistence is critical.

A slump of between 40 and 100 mm (1 and 4 in.) or a compacting factor of 0.90 to 0.95, or Vebe time of 3 to 5 sec is generally recommended for the mix in the hopper.

Pumping causes partial compaction so that at delivery the slump may be decreased by 10 to 25 mm (to 1 in.).

The requirements of consistence are necessary to avoid excessive frictional resistance in the pipe with too-dry mixes, or segregation with too-wet mixes.

In particular, the percentage of fines is important since too little causes segregation and too much causes undue frictional resistance and possible blockage of the pipeline. The optimum situation is when there is a minimum frictional resistance against the pipe walls and a minimum content of voids within the mix. This is achieved when there is a continuity of aggregate grading. For concretes with maximum aggregate size of 20 mm (in.), the optimum fine aggregate content lies between 35 and 40 per cent, and the material finer than 300 mm (No. 50 ASTM) should represent 15 to 20 per cent of the mass of fine aggregate. Also, the proportion of fine aggregate which passes the 150 mm (No. 100 ASTM) sieve should be about 3 per cent, this material being sand or a suitable additive (tuff or trass) so as to provide continuity in grading down to the cement fraction.

Placing and compacting:

The operations of placing and of compacting are interdependent and are carried out almost simultaneously. They are most important for the purpose of ensuring the requirements of strength, impermeability, and durability of the hardened concrete in the actual structure.

As far as placing is concerned, the main objective is to deposit the concrete as close as possible to its final position so that segregation is avoided and the concrete can be fully compacted. To achieve this objective, the following rules should be borne in mind:

(a) hand shovelling and moving concrete by immersion or poker vibrators should be avoided;

(b) the concrete should be placed in uniform layers, not in large heaps or sloping layers

(c) the thickness of a layer should be compatible with the method of vibration so that entrapped air can be removed from the bottom of each layer;

(d) the rates of placing and of compaction should be equal; (

e) where a good finish and uniform colour are required on columns and walls, the forms should be filled at a rate of at least 2 m (6 ft) per hour, avoiding delays (long delays can result in the formation of cold joints.);

(f) each layer should be fully compacted before placing the next one, and each subsequent layer should be placed whilst the underlying layer is still plastic so that monolithic construction is achieved;

(g) collision between concrete and formwork or reinforcement should be avoided. For deep sections, a long down pipe or tremie ensures accuracy of location of the concrete and minimum segregation;

(h) concrete should be placed in a vertical plane. When placing in horizontal or sloping forms, the concrete should be placed vertically . against, and not away from, the previously placed concrete. For slopes greater than 10°, a slip-form screed should be used.

- There exist specialized techniques for placing concrete, such as slipforming, the tremie method, shotcreting, preplaced aggregate concrete, and roller compacted concrete.
- Slip-forming is a continuous process of placing and compaction, using low workability concrete whose proportions must be carefully controlled.
- Placing concrete by tremie is particularly suited for deep forms, where compaction by the usual methods is not possible, and for underwater concreting.
- In the tremie method, high workability concrete is fed by gravity through a vertical pipe which is gradually raised. The mix should be cohesive, without segregation or bleeding, and usually has a high cement content, a high proportion of fines, and contains a workability aid (such as pozzolan or an admixture).
- The purpose of compaction is to remove as much of the entrapped air as possible so that the hardened concrete has a minimum of voids, and, consequently, is strong, durable and of low permeability.
- Low slump concrete contains more entrapped air than high slump concrete, and, hence, the former requires more effort to compact it satisfactorily. This effort is provided mainly by the use of Vibration of concrete.
- The process of compacting concrete by vibration consists essentially of the elimination of entrapped air and forcing the particles into a closer con- figuration. Extremely dry and stiff mixes can be vibrated satisfactorily.
- in the case of vibration, non-uniform compaction can occur due to inadequate vibration or to over-vibration which causes segregation; the latter can be prevented by the use of a stiff and well-graded mix.

- The specified consistence of the mix governs the choice of the vibrator as, for example, mixes suitable for pumping may have too-wet a consistence for vibration. Thus, for efficient compaction, the consistence of the concrete and the characteristics of the available vibrator have to be matched.

(I) Essentially, there are three basic methods of compacting concrete by vibration, and these are detailed below.

Internal vibrators : Poker vibrator or immersion vibrator. The frequency of vibration usually varies between 70 and 200 Hz with an acceleration greater than 4 g. The poker should be easily moved from place to place so that the concrete is vibrated every 0.5 to 1 m (or 2 to 3 ft) for 5 sec to 2 min, depending on the consistence of the mix.

The actual completion of compaction can be judged by the appearance of the surface of the concrete, which should be neither honeycombed nor contain an excess of mortar.

Gradual withdrawal of the poker at the rate of about 80 mm/sec (3 in./sec) is recommended so that the hole left by the vibrator closes fully by itself without any air being trapped.

The vibrator should be immersed, quickly, through the entire depth of the freshly deposited concrete and into the layer below if this is still plastic or can be made plastic. In this manner, monolithic concrete is obtained, thus avoiding a plane of weakness at the junction of the two layers, possible settlement cracks, and the internal effects of bleeding.

It should be noted that, with a lift greater than about 0.5 m (2 ft), the vibrator may not be fully effective in expelling air from the lower part of the layer. Unlike other types, internal vibrators are comparatively efficient since all the work is done directly on the concrete. They are made in sizes down to 20 mm (in.) in diameter so that they are useful for heavily reinforced and relatively inaccessible sections.

External vibrators: This type of vibrator is rigidly clamped to the formwork which rests on an elastic support, so that both the form and the concrete are vibrated. As a result, a considerable proportion of the work done is used in vibrating the formwork, which has to be strong and tight so as to prevent distortion and leakage of grout. The principle of the external vibrator is the same as that of an internal one, but the frequency is between 50 and 150 Hz; sometimes, manufacturers quote the number of impulses, i.e. half-cycles. External vibrators are used for precast or thin in situ sections having a shape or thickness which is unsuitable for internal vibrators. The concrete has to be placed in layers of suitable depth as air cannot be expelled through too great a depth of concrete, and the position of the vibrator may have to be changed as concreting progresses. Portable, nonclamped external vibrators may be used at sections not otherwise accessible, but their range of compaction is very limited. One such vibrator is an electric hammer, sometimes used for compacting concrete test specimens.

Weather Conditions:

Concreting operations shall temporarily suspended during excessively hot or rainy weather when conditions are such that. The concrete cannot be placed and cured.

During the hot weather, no concrete shall be deposited when the temperature with in the forms is more than 49 degree Celsius. When ever necessary exposed surface of fresh or green concrete shall be shaded from the direct rays of sun and immediately protected against premature setting or drying by being cured under continuous fine spray of water.

During continued rainy weather or heavy downpour all freshly placed concrete shall be covered and protected against surface wash. Then all badly washed or stressed surface shall be removed and washed before depositing the next course.

e) Preparation of foundation surface: Immediately. before placing concrete all surfaces of foundations upon or against which concrete to be placed shall be free from standing water mud, debris, free from oil objectionable coatings, loose, semi detached or unsound fragments of rock. Surface of rock shall be cleaned with the use of high velocity audit.; wet sand blasting, stiff brooms, picks or by effective means.

f) Preparation of concrete surface: Concrete surface upon which fresh upon which fresh concrete is to be placed shall be chipped and roughened to a depth of not greater than 25mm. The roughing shall be performed by chipping or other satisfactory methods and in such a manner as not to loosen, crack or shatter, any part of the concrete beyond the roughened surface. After being roughened, the surface of the concrete shall be cleaned thoroughly of all loose, dirt and other objectionable substances and shall be sound and hard and in such conditions as to assure good mechanical bond between old and new concrete. All concrete which is not hard, dense and durable shall be removed to the depth required to secure a satisfactory surface.

g) Cement slurry and mortar layer : After surfaces have been prepared satisfactorily, all surfaces, rock, old concrete and old masonry shall be coated with a thin layer of cement slurry (comprising 1 cement to 23 water by volume) and covered with a layer of mortar not less than 12mm, not more than 20mm thick. The mortar shall be similar to the mortar in the regular concrete mixture having the same cement sand ratio of the mortar used in concrete unless other wise directed. The cement slurry and mortar shall be spread uniformly and shall be worked thoroughly into all irregularities of the surface, concrete shall be placed immediately upon the fresh concrete.

5.28.4 COMPACTION OF CONCRETE:

Compaction should preferably be achieved by mechanical vibration. But in is located locations. It can also be achieved if approved by the Engineer-in-charge by manual methods, namely, rodding, spading and tamping. The mechanical compaction is achieved by vibration. The methods like spinning mechanical tamping and use of shock are restricted to special situations as approved by the Engineer.

Under-vibration is harmful should be avoided. Over vibration may cause:
(i) Settlement of the coarse aggregate (ii) heavy bleeding of the concrete, (iii) excessive form work deflection and form work damage.

The following vibrators shall be used for compaction as per the directions of the Engineer-in-charge.

5.28.5 Immersion vibrators:

Immersion vibrators per IS: 2505-1980 be used for consolidation of plain as well as reinforced concrete. They shall be of either

a) Flexible shaft type, powered by different types of motors or

b) Motor-in-head type, electrically or pneumatically driven.

While compacting with internal vibrators, concrete should be deposited in layers of 300 to 450mm thick and the vibrator inserted vertically at uniform spacing over the entire area of placement. The vibrator should penetrate rapidly to the bottom of the layer and at least 150mm into the preceding layer, if there is any. It should be held (generally 5 to 15 second) until the compaction is considered adequate and then withdrawn slowly at the rate of about 80mm/second.

Operational frequency: 800 to 1200 per minute.

5.28.6 Screed board type vibrators:

Concrete vibrators of screed board type as per IS : 2506 - 1964 shall be used for compaction of concrete beds, floors, pavements and thing slabs, where the area to be compacted is large or the thickness is too small (less than 200mm) to allow the use of immersion vibrators.

Operational frequency: 3500 per minute (under no load state)

5.28.7 Form work vibrators:

Form work vibrators as per IS: 4656 - 1968 shall be used for compaction of concrete, Pre cast concrete moulds, gullies and deep post - tensioned beams. They shall be used for compaction of in-situ concrete is small and narrow sections of very heavily reinforced section where immersion of vibrators cannot be used. There are two types:

a. The fixed or clamped type, and

b. The manual type.

Operational frequency: 2800 per minute (under no load state)

5.28.8 Vibrating Table:

Vibrating table as per IS: 2514-1963 shall be used for compaction of concrete in moulds for the manufacture of precast products and structural elements. They compact concrete through rapidly alternating horizontal, vertical or circular vibrations which are transmitted to moulds filled with concrete and placed or clamped on the table top.

Operational frequency: 3000 to 6000 cycles per minute.

Immediately after compaction, concrete shall be protected against harmful effects of weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes and drying out.

5.28.9 Requirement for the Pre-stressed Concrete :

High Tensile Steels:

•High tensile steel , tendons , strands or cables

The steel used in prestress shall be any one of the following:-

•Plain hard-drawn steel wire conforming to IS1785 (Part-I & Part-III)

•Cold drawn indented wire conforming to IS6003

•High tensile steel wire bar conforming to IS2090

•Uncoated stress relived strand conforming to IS6006
High strength steel contains:
•0.7 to 0.8% carbons,
•0.6% manganese,
•0.1% silica
GENERAL NOTES:

- Forms of Prestressing Steel :

Wires: Prestressing wire is a single unit made of steel.
Strands: Two, three or seven wires are wound to form a prestressing strand.
Tendon: A group of strands or wires are wound to form a prestressing tendon.
Cable: A group of tendons form a prestressing cable.
Bars: A tendon can be made up of a single steel bar. The diameter of a bar is much larger than that of a wire.

a) Because of the brittle nature of the high tensile steel and because of the high ratio of they permissible stresses in construction, it is necessary that sample tests on ultimate strength and percentage elongation are conducted on each coil of the wire.
b) It is desirable to have at least 3 to 4 percentage of elongation at the time of breaking of the wire.
c) The mean value of the ultimate strength of the wire should not be less than the characteristic strength specified.
d) Every wire is proto-tested at the time of transfer of prestress from jack to the structure, so, if a wire can stand the jacking force, it will not fail at working load conditions by strength consideration.
e) The failure of a wire, if at all it occurs during working load condition, it must be due to environmental conditions such as corrosion or creep. The engineer-in-charge of a project must see that every wire is prestressed as per specifications through which indirect proto-testing of each wire or cable is achieved.
f) Wires are usually supplied in coils by the manufacturers. The diameter of the roll must be more than 100 D in which D is the diameter of the wire. A roll having diameter less than 100 D will develop strains more than 0.005 cm/cm.
g) The usual diameter of the rolls is about 150 D. The rolls of the wires must be wrapped in damp proof paper before supplying to the users.
h) The coil of wire must be stored in damp proof room and should be taken out in the field only at the time of actual use.
i) Exposure of the wire to moist air will cause corrosion of the wire. The moisture along with some chemicals and oxygen in the air act on the surface of the wire resulting in corrosion. Presence of cracks or honeycomb in the concrete will also permit corrosion of wires.
j) The rust on the surface, if any, should be cleaned before the wires are used in the construction.
k) Oil should not be applied to the wires as the oil reduces the bond capacity of the wires. Deep rusting of wires is dangerous in two ways. The effective area of cross section is reduced considerably since the wires themselves are thin and secondly the wires are liable to special type of corrosion called stress corrosion.
l) The wires should not be exposed to even light acids as the presence of acids will result in deep cut rusting.

m) The wires should not be left in the field or in the ducts for long time without grouting. In the case of post-tensioned construction, the grouting should be done within few hours or at the most few days after tensioning.
n) A minimum number of two grout holes one on either end of the duct are necessary. One for grouting and another for allowing air to escape as the grouting is done. The second grout hole also helps in ensuring the tilling of the duct with grouting mixture.
o) Grouting mortar should come out through the other hole uninterrupted if the duct is completely filled. In some cases, specially in long metallic ducts, the cement mortar is likely to leak into the ducts while casting the concrete thus causing obstruction to the easy flow of grout. Therefore it is desirable to have more than two grout holes in long spans.
p) If it is observed that there is some clogging in the duct which will be known if the grout does not come out of the open hole but squeezes out of the grouting hole, the actual location of the clogging must be identified. Grout holes must be drilled on either side of the clogged portion and the entire duct be grouted.
q) Chloride admixtures or additives in cement must be avoided in the prestressed concrete to minimise the corrosion of steel.

Concrete:

Materials for prestress concrete members

Cement:

The cement used should be any of the following

•Ordinary Portland cement conforming to IS269

•Portland slag cement conforming to IS455. But the slag content should not be more than 50%.

•Rapid hardening Portland cement conforming to IS8041.

•High strength ordinary Portland cement conforming to IS8112.

a) Higher the grade of concrete higher the bond strength which is vital in pretensioned concrete, Also higher bearing strength which is vital in post-tensioned concrete
b) High strength concrete with low shrinkage and creep characteristics should be used.. The water-cement ratio should be kept below 0.45 and preferably in the range of 0.38 to 0.42. Such a low water-cement ratio decreases the workability of concrete therefore the aggregate must be graded well and fine clay and dust particles should be avoided.
c) The concrete must be compacted by use of vibrators. Immersion vibrators should be used in the case of large sections whereas shutter vibrators should be used in the case of small sections.
d) Higher water-cement ratio also causes segregation of particles while vibrating the concrete, therefore low water-cement ratio is preferred. The strength of the concrete increases with increase in the cement content but the increased cement content also produces higher shrinkage and creep. Therefore it is desirable to select an appropriate cement content which will give high strength at the same time will not produce high shrinkage.
e) As the water-cement ratio decreases, the cement content should be increased to maintain good workability of the concrete. Approximate quantity of cement content is in the order of 350 to 600 kg/m3 of concrete.
f) Quick setting cements are not very suitable as high heat of hydration is caused in the early stages of concrete. Because of low water-cement ratio such heat of hydration is

not absorbed easily. However quick setting cements can be used with controlled cooling of the concrete.

g) Air entraining agents have very little use in prestressed concrete construction, however the additive which decreases the surface tension of the water can be used provided they are not harmful to steel.
h) Concrete must be kept moist and a minimum temperature of 10°C be maintained
i) Preservation of moisture in concrete is the most important factor in absorbing the heat of hydration generated during hardening of the concrete. Green concrete should be covered with one to two layers of gunny bags after one to four hours of casting of the concrete. One hour in the case of summer season and two hours in other seasons are desirable.
j) The initial setting time of the concrete should be completed and the surface should get little hardened so that the gunny bags covering the surface should not leave marks on the concrete. The concrete should then be left overnight or say about 5 to 10 hours before sprinkling of the water on the gunny bags.
k) In the case of beams and columns, the form work could be left as it is so as to prevent escape of moisture from the concrete. Immersion of hardened concrete in water is the best and constant sprinkling of water at 2 to 4 hours intervals on the gunny bags so as to keep the bags wet also provide good curing. Immersion of the hardened concrete in water is the best but constant sprinkling of water so as to keep the surface wet is must.
l) Most important thing for excellent curing is to see that no moisture escapes from the concrete and the exposed surfaces are supplied with constant moisture during first seven days. Unless otherwise the concrete mix is designed, water curing should be continued for 28 days.
m) If the concrete gains the characteristic strength in less than 28 days of curing, the curing can be discontinued.
n) Concrete specimens (cubes/cylinders) cured by sprinkling of water are likely to record higher compressive strengths as compared to those immersed in water as later are water saturated. To predict a clear representative strength, it is desirable that the concrete cubes even if cured by sprinkling of water be immersed in water at least an hour before testing.
o) To save space and time it is sometimes desirable to transfer prestress at the end of seven days of water curing or 10 hours steam curing. But in such a case, the maximum compressive stress on the concrete should not exceed fifty per cent of the actual strength of the concrete at the time of transfer of prestress.
p) The rate of gain of strength decreases with the decrease in atmospheric temperature when water curing is used. The rate of gain is about ten per cent less at 6 to 10°C temperature as compared to 25 to 30°C atmospheric temperature. So seven days of curing may not be enough in winter season.
q) It is not desirable that the prestress force is transferred to the member within the first four days of curing of the concrete unless early setting cements are used.
r) The bond strength of concrete with high tensile wire is small and hence proper transfer prestress procedure shall be adopted to ensure that the bond strength is not decreased.

s) Wire should usually be cut during the transfer of prestress at the noncritical end of the beam section. For example, the wires should be cut at the top end of a prestressed concrete electric pole rather than the base end.

t) It is desirable to use a relatively stronger concrete at the ends of the elements so as to ensure better bonding.

According to IS: 1343-1980

•20 mm cover for pretensioned members

•30 mm or size of the cable which ever is bigger for post tensioned members.

•If the prestressed members are exposed to an aggressive environment, these covers are increased by another 10 mm.

Fire Resistance:

a) Structures must be capable of resisting fire to a limited time in which the limit of the time vary with the functional requirement of the building. A building must be able to withstand fire for a minimum period of 30 minutes. Some public buildings must be able to withstand the fire for about 90 to 120 minutes.

b) Fire in a building produces excessive heat and causes large deformations in a short period and a total collapse of the structure if the fire is not controlled in the limited time. As the concrete gets heated by the fire, the moisture in the concrete is converted into steam and consequently the steam burst out of the concrete causing spalling of the concrete. The rate of spalling of the concrete depends on the moisture content, size of the element, temperature and the amount of reinforcement in the outer cover of the concrete. An outer mesh of reinforcement prevents the concrete against cracking due to temperature rise. If a fine mesh is provided within 15 mm cover of the concrete, the spalling of the concrete within the mesh may take place at much higher temperature.

c) Steel cables which are pretensioned will expand extensively at high temperature not only because of the thermal expansion but also due to the decrease in the modulus of elasticity. Steel is likely to reach a semi-plastic stage around 400°C so the structure becomes unserviceable at 400°C. The cover to steel must be designed such that the steel will not be subjected to a temperature of 300 to 400°C before the minimum fire risk period.

d) The following are some of the recommendations of fire protection in prestressed concrete construction.

   i. A minimum of 20 mm cover should be provided so as to provide about 30 minutes of safety period after break of fire.
   ii. The minimum thickness of the cover must be increased from 20 to 50 mm to increase the safety period from 30 to 90 minutes.
   iii. A fine wire mesh is to be provided within the cover so as to reinforce the concrete against spalling if the safety period of fire protection is more than 30 minutes.
   iv. The fire safety period can be increased by providing 15 to 25 mm thick gypsum concrete or vermiculite concrete cover. This low thermal conductivity cover has to be rigidly attached to the concrete cover of the structure.

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5.28.10 OTHER REQUIREMENTS OF CONCRETE CONSTRUCTIONS:

All concrete construction shall conform to the permissible tolerances and technical provisions as described in the section. All structures shall be built in a workman like manner, to the lines, grades and dimensions shown in the drawings or as prescribed by the Engineer. The location of all the construction joints shall be subject to the approval of the Engineer. The dimensions of each structure shown on the drawings shall be subject to such changes as may be found necessary by the Engineer to adopt the structure to the conditions disclosed by the excavation.

CURING:

All equipment, material etc needed for curing and protection of concrete shall be at hand and ready for installing before actual concreting begins. Detailed plans, methods and procedures and protection shall be settled and got approved in writing from the Engineer sufficiently in advance of the concreting. The equipment and method proposed to be utilized shall avoid interruption or damage to the work.

The vertical and sloping concrete surfaces shall be kept saturated with a system of perforated pipes mechanical sprinklers/ porous hoses / any other suitable method which will keep all surfaces continuously wet.

5.28.11 Moist curing:

Exposed surfaces of concrete shall be kept continuously in a damp or wet condition (to avoid formation of surface cracking due to alternate wetting and drying) by pounding or by covering with layer of sacking, canvas, Hessian or similar materials and kept constantly wet for at least SEVEN DAYS from the date of placing of concrete, if O.P cement is used in concrete.
It may be reduced to 3 to 4 days when rapid hardening Portland cement is used, but greater care shall be exercised, particularly at early stages when rate of hydration is high.

5.28.12 Membrane curing:

Approved curing compounds shal1 be used in lieu of moist curing with the permission of the Engineer - in charge. These compounds shall be applied to all exposed surface of the concrete as soon as possible after the concrete had set and the free water on the surface has disappeared and no water sheet is seen. But not so late that, the compound

will be absorbed into the surface pores of the concrete.

5.28.13 SAMPLING AND STRENGTH OF CONCRETE:

The sampling shal1 be done as per the specifications laid down in IS 1199 - 1959 specification of sampling and analysis of Concrete with IS : 510 - 1959 specification for testing strength of concrete.

For relatively small and unimportant buildings and structure in which quantity of concrete is less than 15 cum, the strength tests may be waived by the Engineer - in - charge.

The sampling scheme given in clause 14 and the acceptance criteria given in clause: 154 of IS: 456 - 1978 are applicable to both design mix and nominal mix concrete. In the case of the later, the preliminary tests for establishing the mix proportions are not necessary.

Concrete of each grade shall be assessed separately.

The concrete under acceptance shall be notionally divided into lots for the purpose of sampling, before commencement of work. The of delimitation of lots shall be determined by the following:

i) No individual lot shall be more than 30 cum. in volume.

ii) At least one cube forming an item of the sample representing the lot shall be taken from concrete of the same grade and mix proportions cast any day.

iii) Different grades of mixes of concrete shall be divided into separate lots.

v) Concrete of a lot shall be used in the same identifiable component the structure.

5.28.14 <u>SAMPLING AND TESTING:</u>

a) Concrete for making 3 test cubes shall be taken from a batch of concrete at point of delivery into construction according to procedure laid down in IS: 1199.

b) A random sampling procedure to ensure that each of the concrete batches forming the lot under acceptance inspection has equal chance of being chosen for taking cubes shall be adopted.

c) 150 mm cubes shall be made, cured and tested at the age of28 days for compressive strength in accordance with IS: 516. The 28 day test strength result for each cube shall form an item of the sample.

d) Three test specimens shall be made from each sample for testing at 28 days: Additional cubes may be required for various purposes such as to determine the strength of concrete at 7 days or for any other purpose.

e) The test strength of the sample shall be the average of the strength of 3 cubes. The individual variation should not be more than + 15% or - 15% of average.

f) Frequency: The minimum frequency of sampling of concrete of each shall be :

QUANTITY OF CONCRETE IN WORK, CU.M	No. OF SAMPLES
1- 5	1
6-15	2
16 - 30	3
31 - 50	4 + one additional sample for
51 and above	each additional 50 cm. part thereof

At least one sample shall be taken from each shift of work.

5.28.15. <u>Test procedure</u>

In order to get a relatively quicker idea of quality of concrete, optional tests on beams for modulus of rupture at 72 + 2 hours or at 7 days or compressive strength tests at 7 days may be carried out in addition to 28 days compressive strength tests. For this purpose, the values given in Table may be taken for general guidance in the case of concrete made with ordinary port land cement. In all cases, the 28 days compressive strength specified in Table shall be alone be the criterion for acceptance or rejection of the concrete. If however, from tests carried out in a particular job over a reasonably long period, it has been established to the satisfaction of the Engineer that a suitable ratio between 28 days compressive strength and the modules of rupture at 72 + 2 hours or 7 days or compressive strength at 7 days may be accepted, the Engineer may suitably relax the frequency of 28 days compressive strength provided the expected strength values at the specified early age are consistently met.

OPTIONAL TESTS REQUIREMENTS OF CONCRETE

Grade of concrete	Compressive Strength on 15cm Cubes, Min, at 7 days	Modules of Rupture By Beam test, Min	
(1)	(2)	at 72 + 2h	at 7 days
		(3)	(4)
M-I0	*N/mm2* 7.0	*N/mm2* 1.2	*N/mm2* 1.7
M-15	10.0	1.5	2.1
M-20	13.5	1.7	2.4

5.28.16. <u>Standard Deviation:</u>

(i) **<u>Standard Deviation based on Test results:</u>**

a) Number of test results: The total number of test results required to constitute as acceptable record for calculation of standard deviation shall be not less than 30. Attempts should be made to obtain in the 30 test results, as early as possible, when a mix is used for the first time check additional condition of about 5 samples.

b) Standard deviation to be brought up to date: The calculation of the standard devia-

tion shall be brought up to date after every change of mix design and at least once a month.

(ii) **Determination of Standard Deviation:**

(a) The standard deviation of concrete of given grade shall be calculated using the following formula from the results of individual tests of concrete of that grade.

Estimated standard deviations = Sqrt (sigma(delta sqr) /(n-1) = $\sqrt{\text{€}\ \Delta^2}^{(n-1)}$

Where delta = deviation of the individual test strength from the average n = number of sample test results.

c) When significant changes are made in the production of concrete batches (for example" changes in the materials used, mix design, equipment or technica1.dmtrol) the standard deviation value shall be separately calculated for such batches of concrete.

5.28.17 Assumed standard Deviation:

Where sufficient test results for a particular grade of concrete are not available the value of standard deviation given in the following table may be assumed.

ASSUMED STANDARD DEVIATION

GRADE OF CONCRETE	STANDARD DEVIATION FOR DIFFERENT DEGREE OF CONTROL IN N/mm2		
	Very good	Good	Fair
M 10	2.0	2.3	3.3
M 15	2.5	3.5	4.5
M 20	3.6	4.6	5.6

However, when adequate past records for a similar grade exist and justify to the designed a value of standard deviation different from that shown in the above Table. At shall be permissible to use that value.

Acceptance criteria:

The concrete shall be deemed to comply with the strength requirements if:

a) every sample has a test strength not less than the characteristic value: or

b) the strength of one or more samples through less than the characteristic value: is in each case not less than the greater of:

1) the characteristic strength minus 1. 35 times the standards deviations: and.

2) 0.80 times the characteristic strength: and the average strength of all the.

Samplesis not less than the characteristic strength plus

(1. 65-1. 65/sqrt. (number of samples) times the standard deviation.

$$\left(1.65 - \frac{1.65}{\sqrt{\text{No. of Samples}}}\right) \text{X Standard deviation.}$$

The concrete shall be deemed not to comply with the strength requirements if:

a) the strength of any sample is less than the greater of:

1) the characteristic strength minus 1. 35 times the standard deviation; and

2) 0.80 times the characteristic strength: or

b) the average strength of all the samples is less than the characteristic strength plus.

$$\left(1.65 - \frac{3.00}{\sqrt{\text{No. of Samples}}}\right) \text{x Standard deviation}$$

(1.65-3.00/sqrt. (number of samples) times the standard deviation.

Concrete which does not meet the strength requirements as specified but has a strength greater than that required may, at the discretion of the designer, be accepted as being structurally adequate without further testing.

If the concrete is deemed not to comply the structural adequacy of the parts affected shall be investigated and any consequential action as needed shall be taken.

Concrete of each grade shall be assessed separately.

Concrete shall be assessed daily for compliance.

Concrete is liable to be rejected if it is porous or honeycombed; its placing has been interrupted without providing a proper construction just (or) tolerances have not been met. However, the hardened concrete may be accepted after carrying out suitable remedial measures to the satisfaction of the engineer.

5.28.18 Core and load tests:

Inspection: Immediately after stripping the form work, all concrete shall be carefully inspected any defective work or small defects either removed or made good before concrete has thoroughly hardened.

In case of doubt regarding the grade of concrete used, either due to poor workmanship or based on results of cube strength tests, compressive strength tests of concrete and/or load test may be carried out.

a) **Core Test:** The points from which cores are to be taken and the number of cores required shall be at the discretion of the engineer and shall be representative of the whole of concrete concerned. In no case, however, shall fewer than three cores be tested.
Cores shall be prepared and tested as described in IS : 516-1959.

Concrete in the member represented by a core test shall be considered acceptable if the average equivalent cube strength of the cores is equal at least 85 percent of the cubes strength of the grade of concrete specified for the corresponding age and no individual core has a strength less than 75 percent.

In case the core test results do not satisfy the requirements of or where such tests have not been done, load test may be resorted to.

b) Load tests on parts of structures: Loading tests should be carried out as soon as possible after expire of 28 days from the time of placing of concrete.

The structure should be subject to a load equal to full dead load of the structure plus 1.25 times the imposed load for a period of 24 hours' and then the imposed load shall be removed;

NOTE: Dead load includes self weight of the structure members plus weight of finishes and walls or partitions, if any, as considered in the design.

The deflection due to imposed load only shall be recorded. If within 24 hours of removal of the imposed load, the .structure does not recover at least 75 percent of the deflection under superimposed load, the test may be repeated after a lapse of72 hours. If the recovery is less than 80 percent, the structure shall be deemed to be un acceptance.

5.28.19. Acceptance criteria:

Two sets of criteria for demonstrating that the concrete as produced and casted either complies or does not comply with the IS : 456-1978 requirements for concrete quality.

a) requirements of strength, and

b) requirement of workmanship.

Compressive strength: When both the following conditions are met, the concrete complies with the specified compressive strength:

a) The mean strength determined from any group of four consecutive samples should exceed the specified characteristic compressive strength.

b) Strength of any sample is not less than the specified characteristic compressive strength minus 3MPa.

5.28.20 Rejection Criteria:

Concrete is liable to be rejected if it is :

a) Porous or honeycombed, (due to incorrect mix proportions or improper compaction techniques).

b) Its placing has been interrupted without providing a proper construction joint

c) The reinforcement has been displaced beyond the tolerance have not been.

d) If the core tests / load test does not yield the results.

e) If the strength of the concrete produced and casted does not yield the strength requirements of the code.

(f) If the test results of the test cubes obtained as per IS: 1199 and tested as per IS: 516 does not yield the strength requirements of the code acceptance criteria, the Engineer- in-Charge with the consolation of the Designer will consider the technical Consequences such as durability, strength, serviceability, economic consequences, .cost replacement, cost of strengthening the weak point etc...,

However, the hardened concrete shall be accepted only after carrying out suitable remedial measures to the satisfaction of the Engineer-in-Charge.

5.28.21 Unacceptable work:

All defective concreting work including but not limited to defects arising out of honeycombing, under -sizing, under strength etc. are liable to be demolished and rebuilt by the 'contractor at his cost. In the event of such work being accepted by carrying out repairs as specified by the Engineer the cost of repairs shall be borne by the can tractor. Acceptance of such works will be in accordance with the provisions of IS : 456-1978.

Visible defects noticed in the workman ship and quality which could be rectified through remedial measures, shall be rectified to. the satisfaction of the Engineer.

Deficiency in workmanship which is considered to be attributable to same inadequacy in concrete production or concrete haulage, or concrete placement method, or compaction, should be got remedied from thee-Contractors by the Engineer through additional inputs and up gradation of methodology and work taken subsequently only when the needed augmentation has been done. If the subsequent work is within acceptable level, steps should be taken to remedy the defects noted in the earlier work through appropriate measure. After the defects have been remedied to the satisfaction of Engineer and provided that the inputs (cement, aggregates, water etc.,) are within the specified quality standards, the concerned work shall be accepted.

In case the Engineer observes basic and serious deficiencies in the quality of inputs and output as well as in the workmanship, revealed through perusal of test records and visual inspection as well including say, examination of cores (taken from insight concrete lining), as also serious in adequacies in construction equipment and job facilities in enforcing the technical specifications, such portions of works shall be rejected and not accepted far any payment. In the absence of any positive measures to strengthen these structures/works, the Engineer may arrange for their demolition and reconstruction.

There could be portions of work/works. Where some sort of slight transgression of specification / quality levels has taken place and which is not feasible of rectification in full. In case it is determined that the integrity of such portions of work is not significantly impaired and that the functional capability can be assured consideration may be given by the Engineer (subject to full satisfaction of the Engineer to accept these at reduced payment to the contractor instead of demolishing the concerned portion of work and re constructing it.

5.28.22 CONCRETING UNDER SPECIAL CONDITIONS:

Concrete under water:

When it is necessary to deposit concrete underwater, the methods, equipment, materials and proportions of mix to be used shall be got approved from the Engineer before any work is started. Concrete shall contain 10 percent more cement than, that required for the same mix placed in the dry.

Concrete shall not be placed in water having a temperature below 5 degrees Celsius. The temperature of the concrete, when deposited, shall not be less than 16 degrees Celsius, not more then 40 degrees Celsius.

All under water concreting shall be carried out by tremie method only, using tremie of appropriate diameter. The number and spacing of the tremies should be worked out to ensure proper concreting. The tremie concreting when started should continue without interruption for the full height of member being concreted. The concrete production and placement equipment should sufficient to enable the underwater concrete to be completed uninterrupted within the stipulated time. Necessary stand-by equipment should be available for emergency situation.

The top section of the tremie shall have a hopper large enough to hold one full batch of the mix or the entire contents of the transporting bucket as the case may be. The tremie pipe shall not be less than 200mm in diameter and shall be large enough to allow a free flow of concrete and strong enough to withstand the external pressure of the water in which it is suspended, even if a partial vacuum develops inside the pipe preferable, flanged steel pipe of adequate strength for the job shall be used. A separate lifting device shall be provided for each tremie pipe with its hopper at the upper end. Unless the lower and of the pipe is equipped with an approved automatic check valve, the upper end of the pipe shall be plugged with a wadding of gunny sacking or other approved material before delivering the concrete to the tremie pipe through the hopper, so that when the concrete is forced down from the hopper

to the pipe, it will force the plug (and along with it any water the pipe) down the pipe and out of the bottom end, thus establishing a continuous stream of concrete. It will be necessary to raise slowly the tremie in order to allow a uniform flow of concrete, but it shall not be emptied so that water is not allowed to enter above the concrete in the pipe. At all times after placing of concrete is started and until all the required quantity has been placed, the lower end of the tremie pipe shall be kept below the surface of the plastic concrete. This will cause the concrete. to build up from below instead of flowing out over the surface and thus avoid formation of layers of laitance, If the charge in the tremie is lost-while depositing the tremie shall be rapped above the concrete surface and unless sealed by a check value, it shall be re plugged at the top end, as at the beginning, before refilling for depositing further concrete.

5.28.23: Cold Weather Concreting:

Where concrete is to be deposited at or near freezing temperature, precautions shall be taken to ensure that at the time of placing, it has temperature of not less than 5 degrees Celsius and that the temperature of the conception shall be maintained above degree Celsius until it has thoroughly hardened. When necessary, concrete ingredients shall be heated before mixing but cement not be heated artificially other than by the heat transmitted to it from other ingredients of the concrete. Stockpiled aggregate may beheaded by the use of dry heat or steam. Aggregates shall not be heated directly by gas or on sheet metal over fire. In general the temperature of aggregates or water shall not exceed 65 degrees Celsius. Salt or other chemicals shall not be used for the prevention of freezing. No frozen material or materials containing ice shall be used. All concrete damaged by frost shall be removed. It is recommended that concrete damaged by frost shall be removed, It is recommended that concrete exposed to freezing weather shall have entrained air and the water content of the mix shall not exceed 30 liters per 50 kg of cement.

5.28.24 Hot weather conditions:

When depositing concrete in very hot water precautions shall be taken so that the temperature of wet concrete does not exceed 40 degrees Celsius while placing. This shall be achieved by stacking aggregate under the shade and keeping them. moist, using cold water, reducing the time between mixing and placing to the minimum, cooling form work by sprinkling water, starting curing before concrete dries out and restricting concreting as for as possible to early morning and late evenings. When ice is used to cool mixing water, it will be considered apart of the water in design mix. Under no circumstances shall be mixing operation be considered complete until all ice in the mixing drum has melted.

The contractor will be required to state his methodology for the Engineer's approval when temperatures of concrete are likely to exceed 40 degrees Celsius during the work.

5.28.25 INSPECTION AND TESTING OF STRUCTURES:

Immediately after stripping the form work, all concrete shall be carefully inspected and

any defective work or small defects either removed or made good before concrete has thoroughly hardened. In case of doubt regarding grades of concrete used, either due to poor workmanship or based on results of CUBE STRENGTH TESTS. Compressive strength tests on concrete structural elements shall be done as specified in clause: 16.3 - for core test and as specified in clause 16.5 -for tests on the part of the structures.

5.28.26 FINISHING:

General:

Immediately after removal of forms exposed bars or bolts if any, shall be cut inside the concrete member to a depth at least 50mm below the surface of the concrete and the resulting holes filled with cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depression honey comb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water, and carefully pointed and rendered i.e. with mortar of cement and fine aggregate mixed in the proportion used in the grade of concrete that is being finished and of as dry a consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure through filling in all voids. Surfaces which have been pointed shall be kept moist for a period of 24 hours. Special pre-packed proprietary mortars shall be used where appropriate or where specified in the drawing.

All construction and expansion of joints in the complete work shall be left carefully tooled and free from any mortar and concrete. Expansion joint filler shall be left exposed for its full length with clean and true edges.

Immediately on removal of forms the concrete work will be examined by the Engineer before any defects are made good.

a) The work that has sagged or contains honeycombing to a extent detrimental to structural safety or architectural appearance will be rejected. defined as concrete surface irregular

b) Surface defect of a minor nature shall be made good as directed by the Engineer-in-charge.

5.28.27 Concrete Surface Irregularities:

a) General: Bulges depressions and offsets are ties Concrete surface irregularities are classified as 'abrupt' or 'gradual' and are measured relative to the actual concrete surface.

b) Abrupt surface irregularities: Abrupt surface irregularities are defined here in as offsets such as those caused by misplaced or loose forms, loose knots in form timber, or other similar forming faults. Abrupt surface irregularities are measured using a short straightedge, at least 150 cm long, held firmly against by direct measurement.

c) Gradual surface irregularities are defined herein as, bulges ad depressions resulting in gradual changes on the concrete surface. Gradual surface irregularities are measured using a template conforming to the design profile of the concrete surface being examined. Templates for measuring gradual surface irregularities shall be provided by the

contractor. Templates 'shall be at least2.5m. length. The magnitude of gradual surface irregularities is defined herein as a measure of the rate of change in slope of the concrete surface.

d) The magnitude of gradual surface irregularities on concrete surface shall be checked by the contractor to ensure that the surfaces are with in specified tolerances. The Engineer will also make checks of hardened concrete surface as deemed necessary to ensure compliance with these specifications. Templates for these surface shall be furnished by the contractor free of charge and shall be available for use by the contractor free of charge and shall be available for use by the Engineer at all times.

5.28.28 Repair of concrete: General:

a) Repair of concrete shall be performed by skilled workers and in the presence of an Engineer-in-charge. Repairs and correction of all imperfections on formed concrete shall be completed as soon as practicable after removal of forms and within 25 hours after removal of forms. Concrete that is damaged from any cause and concrete that is honey combed, fractured or otherwise defective and concrete, which because of excessive surface depressions, must be excavated and built up to bring the surface to the prescribed lines, shall be removed and replaced by dry pack mortar or concrete as hereinafter specified. Where bulges and abrupt irregularities protrude outside the limits specified the protrusions shall be reduced by bush hammering and grinding so that the surfaces are within the specified limits.

b) Before repair is to commence, the methods proposed for the repair shall be approved by the Engineer. Routine curing should be interrupted only in the area of repair operations.

Methods of Repairs:

For new works four methods are used as under:

a) Dry Pack method: This methods should be used for holes having a depth nearly equal to, or greater than the least surface dimensions; for cone bolt, the bolt and grout insert holes, and narrow bolts cut for the repair of crakes. Dry pack should not be used for relatively shallow depressions where lateral restraint cannot be obtained; for filling in back of considerable lengths of exposed reinforcement; nor for filling holes which extended entirely through the wall, beam etc.

b) i. Concrete Replacement method : Concrete repairs made by bonding concrete to repair area (without use of an epoxy bonding agent or mortar grout applied on the prepared surface) should be made when the depth of the area exceeds 15cm and the repair will ,be of appreciable continuous area, as determined by the Engineer.

Concrete repairs should also be used for holes extending entirely through concrete sections, for holes in which no reinforcement is encountered and which are greater in area than 900Sq.cms, and deeper than 10cms., and in reinforced concrete for holes greater than

1400 Sq.cms. The Engineer may also permit Epoxy bonded concrete repair as an alternative to concrete repair.

ii. Mortar Replacement method: Portland cement mortar may be used for repairing defects on surface not prominently exposed where the defects are too wide for a dry pack filling, the defects are too shallow for concrete filling and where they are not deeper than the far side of the reinforcement, that is nearest the surface.

iii. Epoxy Method: A thermo setting plastic known as epoxy can be used as a bonding medium whenever long time curing of conventional concrete cannot be assured. Epoxies can be used to bond new concrete or mortar to old concrete when ever the depth of repair is between about 3.75cm and 15cm. Also epoxy mortars of fine sand as well as plain epoxy are suitable for concrete repair work and should be used whenever every thin patch is to placed or immediate reuse of the area is require or where moist curing cannot be effectively accomplished. Preparation for epoxy bonded repairs should in general be identical to that for other concrete repairs except that every effort should be made to provide surfaces thoroughly dry. Drying of the immediate surface for at least 24 hours and warming to temperature between 18° to 27°C are essential for proper application of epoxy bonded repairs. Preparation for the use of epoxy mortars should include through cleaning and drying of the areas to be repaired. A wash of dilute (1 : 4) muriatic acid rinsing with clean water and subsequent drying is desirable, where feasible. If acid wash is not feasible, preparation may be accomplished as for other concrete repairs with final cleanup being by means of sandblasts method, followed by air water jet washing and through drying. Epoxy repairs shall be carried out only by trained personnel.

c) Removal of Concrete: All concrete of questionable quality should be removed. It is better to remove too much concrete than too little because affected concrete generally continues to disintegrate and while the work is being done it costs but little more to excavate to ample depth. Moistening, cleaning, surface drying and complete curing are of utmost importance when making repairs which must be thoroughly bond, watertight and permanent. Surfaces within trimmed holes should be kept continuously wet for several hours, preferably overnight prior to placing new concrete. Immediately, before placement of the filling, the holes should be cleaned so as to leave a surface completely free from shipping dust dried growth and all other foreign materials. Final cleaning of the surfaces to which the new concrete is to be bonded should be done by wet sand blasting followed by washing with air water jet for through cleaning and drying with an air jet. Care should be taken to remove any loose materials embedded in the

surface by chisels during the trimming and to eliminate all shiny spots indicating free surface moisture. Cleaning of the steel if necessary should be accomplished by sandblasting. The prepared surface shall be approved by the Engineer.

(d) Dry pack of concrete: For this method of repair, the holes should be sharp and square at the surface edges, but the corners within the holes should be rounded. Especially when water

tightness is required. The interior surfaces of holes left by cone bolts, the bolts etc. should be roughened to develop and effective bond. Other holes should be under cut slightly in several places. Holes for dry pack should have a minimum depth of 25mm.

(e)<u>Concrete Replacement:</u> i) Holes should have minimum depth of200mm in new concrete and the minimum area of repair should be 500 Sq.cms for reinforced and 1000 Sq.cms for unreinforced concrete.

ii) Reinforcement bars should not be left partially embedded. There should be a clearance of at least 25mm around each exposed bar.

iii) The top edge of the face of the structure should be cut to a fairly horizontal line. If the shape of the defect makes it advisable the top of the cut may be stepped down and continued on a horizontal line. The top of the hole should be cut 1 to 3 upward slope from the back towards the face of the wall or beam. It may be necessary to fill the hole from both sides in which case the slope of the top of the cut should be modified accordingly.

iv) The bottom and sides of the holes should be cut sharp and approximately square with the face of the wall when the hole goes entirely through concrete section. Spalls or feather edges shall be avoided by having chippers worked from both faces. All interior corners should be rounded to maximum radius of 25mm.

f) <u>Mortar Replacement :</u>When mortar gun is used with this method comparatively shallow holes should be flared outwardly at about 1 to 1 slope to avoid inclusion of rebound. Corners within the holes should be rounded. Shallow imperfections in new concrete may be repaired by mortar replacement if the work is done promptly after removal of the forms and while the concrete is still green for instance when it is considered necessary to repair the peeled areas resulting from surface material sticking to steel forms the surfaces may be filled using mortar gun without further trimming or cutting. Whenever hand placed mortar replacement is used edges of chipped out areas should be squared with the surface leaving no feather edges.

Best results with replacement mortar are obtained when the mortar is pneumatically applied using a small mortar gun. After the areas to be repaired have been cleaned and surface dried the mortar shall be applied immediately. No initial application of cement, cement grout etc., is to be made. The six proportion shall be 1 part cement to 4 parts natural sand by dry volume or weight. Well graded sand passing No. 16 screen shall give best results. Cement and sand shall be mixed with water to approximately the same consistency as for dry pack repair.

For repairs of more than (2.5 Cm) depth the mortar shall be applied in layers not more than about 20mm thick to avoid nagging and loss of bond. After completion of each layer a time of about 30 minutes shall be allowed before the next layer is placed. This time shall be

so adjusted that the mortar of the previous layer does not get dry.

g) Use of Dry pack Mortar : The Surface after preparing should be thoroughly brushed with a stiff mortar or grout barely wet enough to thoroughly wet the surface after which the dry pack material should be immediately packed into place before the bonding grout has dried. The mix of bonding grout shall be 1 to 1 cement and fine sand mixed to a consistency like thick cream. Under no circumstances should bonding coat be wet enough or applied heavily enough to make the dry pack material more than very slightly rubbery. Dry pack is usually a mix (by dry volume or weight) of one part of cement to 11/2 part of sand.

Protection of works: The contractor shall protect all concrete against damage until final acceptance by Engineer-in-Charge. The fresh concrete shall be protected from defacements and damage due to construction operations, rain, sun and winds. The contractor shall provide protection to prevent erosion to fresh concrete whenever precipitation either periodic or sustaining is imminent or occurring. All fresh concrete surfaces shall be protected from contamination and from foot traffic until the concrete has hardened.

5.29 Replacement of unsatisfactory concrete: Immediately after the shuttering is removed, the surface of the concrete shall be very carefully gone over and all defective areas called to the attention of Engineer-in-charge. If reinforcement is exposed or the honey combing occurs the work may be rejected. Rejected concrete shall be removed and replaced by the contractor. Superficial honey combed surfaces and rough patches if permitted by the Engineer-in-charge shall be made good and finished neatly as per specifications and as directed.

5.30 Curing of concrete:. Rigid supervision shall be maintained for curing the concrete after laying for complete hydration and hardening to take place. The set concrete shall be cured by ponding with clean water. All exposed faces of concrete shall be kept continuously moist for a minimum period of 28 days by spraying water or by covering with gunny bags which shall be constantly sprinkled with water. The curing operation should be done by using stirrup pump, or by any other methods given code IS 456-1984. For curing floors, flat roofs, concrete pavements and other level surfaces the ponding method of curing shall be adopted.

5.31 CENTERING (FORM WORK) AND SHUTTERING

5.31.1 Formwork: Form work shall be as specified in the standard specification in BOQ used. Forms with surface dents, bulges, undulations or holes shall not be used on the work and shall be removed from the site.

5.31.2 Form work shall be substantially and rigidly constructed and shall be true to the dimensions described. Form work shall be constructed to confine and shape the concrete to the required shape, lines and dimensions described. Liners and cores shall be provided where necessary and shall be duet space and securely fixed.

5.31.3 Shuttering shall be erected true to line and securely braced, cross braced, strutted and supported to prevent deformation under the weight of pressured wet concrete and constructional loads, wind pressure and other forces.

5.31.4 The surfaces of the forms shall be clean and free encrustation of mortar, grout or other foreign materials.

5.31.5 The variation in thickness of RCC roof slab due to varying spans or special covering materials should not effect the general roof bed which should be uniform, unless otherwise shown in drawing or as instructed.

5.31.6 All joints shall be sufficiently tight to prevent leakage of cement slurry. All faulty joints shall be adequately caulked.

5.32.1 **Mould Oil**: Before laying the reinforcement, all faces of shuttering and moulds in contact with wet concrete shall be treated with a coat of oil to prevent adherence to concrete. Release agent should be applied so as to provide thin uniform to the forms without coating the reinforcement.

5.32.2 The mould oil (The de-bonding agent) to be applied shall be standard shuttering oil, engine oil or filtered waste oil (Carbon particles and impurities should not be present).

5.32.3 Plumb and string lines in sufficient numbers shall be installed before and maintained during concrete placement. During concrete placement the contractor shall continuously monitor plumb, string line and form positions.

5.32.4 In case of columns, retaining walls and vertical structural components suitable arrangement shall be made for securing the form to the already poured concrete.

5.33 Reinforcement for RCC works:

5.33.1 Unless shown otherwise in the drawings, the reinforcement to be used shall be of High Yield Strength Deformed (H.Y.S.D.) bars of grade Fe-500 grade conforming to IS 1786-1985.

5.33.2 Reinforcement shall be steel and shall be free from corrosion, oil, grease, paint or dirt at the time of fixing in position and subsequent concreting.

5.33.3 Reinforcing steel bars shall conform accurately to the sizes, dimensions and shapes given as per designs and drawings. Bars shall be bent cold to the specified shape and dimensions and the bars shall be hooked or bent accurately and placed in exact position as per designs and drawings. Bars having kinks or bends other than those required by design shall not be used.

5.33.4 Bars of full length shall be used. Reinforcement shall be lap jointed or spliced only if unavoidable. The overlaps shall be staggered for different bars and located at points, along the span where neither shear nor bending moment is maximum. Not more than 33% of the bars as specified in drawing shall be lapped at one section.

5.33.5 The reinforcement shall be securely held in position and bound together tight by annealed binding wire, and by using stays, blocks or metal chairs, spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals.

5.33.6 Bars shall not be allowed to sag between supports. Layers of bars shall be separated by spacer bars, pre-cast blocks or other approved devices. Binders, stirrups, links should be securely wired to the main ring.

5.34.1 **Binding Wire:** Wire for binding reinforcement shall be soft and annealed mild steel of 16 SWG and shall conform to IS:280-2006. Binding wire shall have tensile strength of not less than 5600 Kg/Cm^2 and a yield point of less than 3850 Kg/Cm^2.

5.34.2 Proper cover shall be maintained between the reinforcement and the shuttering as per approved drawings and IS codes.

5.34.3 The contractor shall ensure that the bars are not displaced during concreting or any other operation over the work. The contractor shall also ensure that there is no disturbance is caused to the reinforcing bars in concrete that has already been placed.

5.34.4 All bars protruding from concrete and to which other bars are to be spliced and which are likely to be exposed for an indefinite period shall be protected by a thick coat of neat cement grout.

5.35 Measurement and payment

a) Measurement:

Measurement for payment for the reinforcing bars will be made only on the calculated weight of the bars placed in concrete, in accordance with the drawings or as directed by the engineer. The calculated weight for reinforcing bars shall be determined as follows:

A. Reinforcement shall be measured in length separately for different diameters as actually used in the work including the lengths of hooks at ends, excluding spacer bars, reinforcement chairs and overlaps.

B. From the length measured, weight of reinforcing bars shall be calculated on the basis of weights specified in the table in this section.

C. Wastage and annealed steel wire for binding shall not be measured as the cost of these items were already included in the unit rate for reinforcement.

Payment rate

The unit rate in the bill of quantities for reinforcement includes all wastages such as overlaps , couplings, welded joints, chairs, spacer bars including cost and conveyance of steel from stock yard etc.

Labor charges for fabrication of steel includes cutting, bending to required sizes and shapes placing in position with cover blocks of approved size and tying with binding wire of 20 SWG, forming grills for reinforcement work as per approved designs and drawings, lifting charges of steel , placing in position, tying including cost of binding wire , all tools etc.,

5.36 Cover Blocks

a) Before concreting, cover blocks shall be fixed in all R.C.C works to separate the reinforcement from the shuttering so that when the concrete is set the reinforcement is well within the concrete section at a distance from the outer surface, with specified cover to reinforcement.

b) Use of stone chips as cover for the reinforcement will not be accepted. Only cement mortar cover blocks of required thickness to maintain the specified cover shall be used.

c) Normally a bottom cover of 12mm to 15mm is sufficient for slabs. For columns the cover should be about 40mm, and for beams it is 25mm.

d) Cover blocks shall be reasonably good for using in appropriate grade of R.C.C. work. The mortar for preparing cover blocks shall at least be of proportion 1:2. Cover blocks shall be prepared on a clean and level platform by spreading the mortar in the moulds of required size and depth. When the mortar is still green strands of tying wire shall be inserted into each block. This wire is useful for tying the block to the reinforcement. After 24 hours the blocks shall be removed from the mould and cured for about seven days.

e) A properly made cover block does not get crushed when the reinforcement is tied over it and during the concreting work.

5.37 Reinforcement chairs

a) When the reinforcement is tied there is a need to separate bottom steel from the top steel and to maintain correct effective depth.

b) For ensuring separation to top and bottom steel and to ensure that the reinforcement work does not get disturbed due to the load or movement of workers when concrete is being laid, reinforcement spacers or chairs shall be fixed.

c) Use of large sized stones or bricks to separate top and bottom steel will not be allowed.

d) Reinforcement chairs shall be of slightly lesser size so as to accommodate the chair underneath the top steel and after allowing for the required covers to the top and bottom steel.

e) The chair shall be minimum 450mm long and should have legs bent in opposite directions to ensure stability,

f) The chairs shall be placed on a cover block so that the legs do not stick out once the shuttering is removed.

5.38 **Form work**: The form work shall conform to the shape, lines and dimensions as shown on the plans and be so constructed as to remain sufficient rigid during the placing and compaction of the concrete and shall be sufficiently water tight to prevent loss of cement slurry from the concrete, The form work shall be made leak proof by Providing Kraft paper.

Form work or centering shall be constructed of steel and adequately designed to support the full weight of wet concrete without deflection and retain its form during laying, ramming, vibrating and setting of concrete.

All rubbish, particularly chippings, shavings and sawdust, shall be removed from the interiors of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly wetted (in case of timber) or treated by coating with non staining mineral oil or other approved by coating with a non staining mineral oil or other approved material. Care shall be taken that such approved composition is kept out of contact with the reinforcement.

The forms shall be removed after expiry of the following periods in the normal circumstances and when O.P.C is used for making concrete.

i) Walls, columns and vertical faces of all structural members: 24 to 48 Hrs. or asdirected by the Engineer-in-Charge.
ii) in Slabs (props left under) …… 3days
iii) Beam soffits (props left under) …… 7 days
iv) Removal of props under slabs

1) spanning up to 4.5 meter …… 7 days
2) spanning over 4. 5 meter …… 14 days
v) Removal of props under beams and arches.

1) spanning up to 6.0 meter …… 14 days

2) spanning over 6. 0 meter …… 21 days

However the above periods may be increased or decreased at the discretion of the Engineer - in - charge.

All form work shall be removed without shock or vibration and shall be eased off carefully in order to allow the structure to take up load gradually. Forms shall not be disturbed until concrete has adequately hardened to take the superimposed load coming on to it and in no circumstances shall forms be struck until the concrete reaches a strength of at least twice the stress to which the concrete may be subjected to at the time of striking.

After removal of form work, in any case no concrete work shall be finished, plastered or made good in any form unless and until the Engineer-in-charge, inspect and certify the surface for such finishing, plastering or making good.

The number of props left under the concrete element, their sizes and dispositions shall be such that they shall be able to safely carry the full dead load and live load likely to occur during further construction.

The contractor shall be liable for damage and injury caused by removing the forms or props before the concrete has gained sufficient strength.

Cover requirements:

Unless otherwise specified in drawings and directed by the Engineer, the cover requirements for cast - in - situ structural members shall be as follows:

a) At each end of reinforcing bar not less than 25 mm nor less than twice the diameter of such rod or bar.

b) For a longitudinal reinforcing bar in a vertical member or a column not less than 40mm nor less than the diameter of bar. In the less of columns of minimum dimension of200 mm or under whose reinforcing bars do not exceed 12 mm the cover of 25 mm shall be used.

c) For longitudinal reinforcing bar in a beam, not less than 25 mm, nor less than the diameter of such bar.

d) For RCC. members immersed in sea water, the cover shall be 50mm more than specified in (a), (b) and (c) above.

e) For footing, resting directly on soil the minimum clear cover shall be 50 mm and in the case of concrete in contact with earth faces contaminated with chemicals it shall be 75 mm.

f) Lesser thickness than those specified above shall be permissible for pre cast construction with the permission of the Engineer.

g) For water retaining structures, the cover requirements are

i) for liquid faces ….. minimum 25 mm or the dia. of bar which ever is greater.

ii) for the faces away from the liquid …… The cover as specified above in (a) to **(f)** with respect to structural member.

All reinforcement shall be placed and maintained in position as shown in the drawings as directed by the Engineer - in - charge adopting chairs and cover blocks within the tolerance limits specified in clause: 11. 3 of IS : 456 - 1978.

The bars shall be supported held in position by suitable means until concrete is poured. Anyone of the following devices shall be used for the purpose. (i) Providing steel reinforcement supports/spacers, (ii) providing of mortar supports/spacers and (iii.) providing plastic supports/spacers.

The steel support/spacers shall be used for slabs except in case of form finished surfaces. The mortar units can be used for slabs, beams and columns as well as plastered or form finished surfaces.

Use of pebbles, broken stone, metal pipe, brick, wooden blocks, etc., as devices for positioning reinforcement will not be permitted.

Suitable shape and size of cement mortar cover block with proportion of (1:1) shall be used on the work as per the drawing and as directed and approved by the Engineer-in-charge.

5.39 Conditions on RCC slabs/Roof Slabs

5.39.1 The R.C.C. slab laid should be leak proof. After observing for two rainy seasons as defect liability period if the roof or floor is found to be perfectly leak proof and no moisture or dampness is seen underneath at ceiling of the slab, the contractor can ask for refund of E.M.D. or F.S.D. from the department. If there are any defects noticed after laying of roof they must be attended to by the contractor at his own cost. Further the contractor must arrange to get the structure treated as per clause 21 of ISI code No.456/2000 at his own cost on the instructions of the department.

When R.C.C. slab is laid, the contractor shall carry out the following tests at his own cost to prove that the slab is impervious.

a) After the centering is removed and curing period is over the slabs shall be put to test by stagnating water of 15 cms depth for one week and watched carefully to test the leakages if any.

b) If there are any leakages, the contractor shall immediately rectify the same at his own cost and again test the same to see that there are no leakages. No payment will be made to the contractor on this account either for testing or for rectifications thus carried out.

c) The officer observing the leakage test shall issue a certificate to this effect before final bill is made.

5.39.2 The variation thickness of R.C.C. roof slab due to varying spans, or special covering materials should not effect the general roof bed which should be uniform unless otherwise shown in drawings or instructed.

5.39.3 For all slabs to be laid MS hooks to be provided as directed by the department for fixing fans and lights etc., G.I. pipes or PVC pipes has to be provided as directed by the department in the masonry walls or concrete at the specified places for making electrical wiring.

TABLE – IV

For Vibrated Reinforced Concrete Items (V.R.C.C.)

Characteristic Strength of Cube at the age of 28 days of curing

M-25	1:1:2	25 N/mm^2	=	250 Kgs / cm^2
M-20	1:1½:3	20 N/mm^2	=	200 Kgs / cm^2
M-15	1:2:4	15 N/mm^2	=	150 Kgs / cm^2

5.40 Cement plastering in two coats CM 1:6 & CM 1:4 (APSS 901, 903 & 904)

5.40.1 The surface shall be prepared by roughening of the back ground and raking the joints. The surface of the wall shall be kept wet for 2 hours before plastering.

5.40.2 Guides: Patches of 15cm X 15cm of required thickness at not more than 2 meters intervals horizontally and vertically shall be applied over the entire surface truly in the plane and truly plumb to serve as guides.

5.40.3 Plaster shall be started from the top and worked down towards plinth. The work shall be tested frequently with a plumb bob and straight edge.

5.40.4 The Mortar in 1:6 proportion shall be dashed and pressed over the surface and then brought to smooth and uniform surface by means of float and trowel. The plaster shall be well pressed into the joints.

5.40.5 After the first coat the surface is left rough to receive the second coat. The final coat shall be applied a day or two after the first coat put on has set, but the first coat shall not be allowed to dry. The final coat shall consist of 1 part of cement to 4 parts of fine sieved sand and shall be applied as in the first coat and brought to a uniform surface and then finished with a sponge to give granular appearance.

5.40.6 All corners, junctions and arises shall be brought truly to a line, level and plumb.

5.40.7 The finished surface shall be watered for a period of atleast 10 days.

5.40.8 Theoretical requirement of cement for plastering should be as follows: Cement bags of 50 kgs.

a. 12 mm plastering in C.M. (1:3) 1.44 bags per 10 Sqm.
b. 12 mm plastering C.M. (1:4) 1.08 bags per 10 Sqm.
c. 12 mm plastering in C.M. (1:5) 0.86 bags per 10 Sqm.
d. 12 mm plastering in C.M. (1:6) 0.72 bags per 10 Sqm.
e. 20 mm plastering in C.M. (1:3) 2.02 bags per 10 Sqm.
f. 20 mm plastering in C.M.(1:4) 1.51 bags per 10 Sqm
g. 20 mm plastering in C.M.(1:5) 1.21 bags per 10 Sqm
h. 20 mm plastering in C.M.(1:6) 1.01 bags per 10 Sqm

5.41 Water proof plaster over the roof

5.41.1 On the clean wet surface of the concrete slab, before it has set, a layer of cement plaster shall be laid to give an average depth of 20mm over the concrete.

5.41.2 The Mortar to be used shall be of CM 1:3 proportion mixed thoroughly with a standard water proofing material with water repelling properties to ensure non-absorption.

5.41.3 Gauges should be put on the floor about ten feet apart to ensure even thickness.

5.41.4 Plastering must be done in squares or strips to avoid cracks. After the floor has been completed, it shall be covered with two inches of grass; sand or saw-dust and kept wet for three weeks.

5.41.5 Providing Chemical Water proof treatment 100mm thick with Brick bat coba & chemical cement mortars to exposed RCC roof slab surfaces to required slopes mixed with water proofing chemical compound, laid over roof slab and brickbat coba treatment in chemical cement mortar 120/100 mm thick at the centre and 80/60 mm thick at the edges finished smooth with a floating coat of chemical mixed cement mortar as per the manufacturer specification including cost and conveyance of all materials like sand, chemical water proofing compound, water etc., to site, including seigniorage charges and operational, incidental, and labor charges for mixing mortar, laying, lift charges, rendering smooth curing including rounding off junctions of wall and slab etc., complete for finished item of work.

5.42 Pointing: (APSS - 906)

5.42.1 Cement mortar for pointing shall conform to SS: 115 and shall be of 1:3 proportion.

5.42.2 The joints in the masonry shall be raked out to a depth not less than the width of the joint, when the mortar is green. Joints are to be brushed clean of dust and loose particles with a stiff brush. The area shall then be washed and the joints thoroughly wetted before pointing is commenced.

5.42.3 The mortar shall be pressed into the raked out joints according to the type of joint required. The mortar shall not be spread over the corners, edges or surface of the masonry. The pointing shall then be finished with proper tool. The superfluous mortar shall be cut off from the edges of the line and the surface of the masonry shall be cleaned of all mortar.

5.42.4 Pointing could be either flush pointing, or groove pointing.

5.43 Notes on pointing:

i) Flush pointing with a groove or a line appears neat and does not spoil the look of the stone or brick masonry.

ii) As far as possible a minimum amount of mortar shall be used to avoid wastage.

iii) The edges shall be neatly trimmed with a trowel and a straight edge.

iv) While mortar is green a groove shall be formed by running a tool along the center lines of the joints. This operation shall be continued till a smooth and hard surface is obtained.

v) Even the vertical joints shall be finished in a similar fashion.

vi) Even when the job is done carefully, there is always an amount of superfluous mortar sticking to the masonry. This should be wiped off with a wet cloth.

vii) After the work is set and dry i.e., after one or two days the stones shall be cleaned with a strong acid so as to remove the cement stains.

viii) After cleaning with acid the stones shall be cleaned with soap water to ensure natural colour of the stones.

ix) If care is taken as shown above the pointing work will look attractive and neat, and the natural appearance of the stone masonry is retained.

5.44 Flooring: (APSS 701 & 702)

5.44.1 Granite Flooring:

Flooring shall be with high polished colour granite stone slabs 18 to 20 mm thick of size not less than 2.40 mts length, laid over existing RCC slab or CC bed.

All the stones in one room shall be preferably of same width and shade. The width of all the slabs in one row must be uniform with longitudinal joints parallel to each other.

The joint width shall be kept minimum and the sides of the slab shall be chisel dressed to ensure a correct joint.

5.44.2 Granolithic concrete flooring (APSS No. 701 & 710)

The mix proportions for the Granolithic concrete floor topping shall be (1:2:4) (Cement: F.A.: C.A) by volume. The minimum amount of water which will give necessary workability for adequate compaction shall be added. The grading of the course aggregate for Granolithic concrete shall be from 6mm to 12mm. The finished thickness of flooring shall be 50mm thick or as specified in the approved drawings and the panels into which the floor is divided for laying the Granolithic concrete shall not have any panel dimensions in excess of 5.0m.

5.45 Joinery:

For all wood/iron/ Aluminium work a sample of each item i.e., frame with shutters complete should be prepared and got approved by the Engineer-in-Charge before they are manufactured in full quantities and fixed in position.

The furniture and fixtures and wind appliances for wood work should be of best quality available in the market, and should be got approved by the Engineer-in-Charge before fixing.

5.46 Door Frame:

Wooden Doors & Windows:

The wood shall be of Best Sal wood//1st class teak wood/2nd class Teak wood as specified in Bill of quantities for frames and shutters.

The wood shall be well seasoned, uniformly coloured and shall be free from knots, cracks, shakes, splits, cross grains etc.

The wood shall be durable and of reasonably straight grains.

Moisture content of the wood used shall be as near as possible to the following values:

Recommended **values** of **moisture content** in timber at the time of assembly or framing.

Type of work	**Coastal area**	**Inland area**
Frames of windows	16 to 18%	14 to 15%
Shutters of windows etc.	15 to 16%	12 to 14%

Construction and fixing

Frames shall have dovetail, tenon or mortise joints.

Before fixing in position, the frames shall be inspected and passed by the Engineer-in-charge. A coat of primer shall be applied before the frames are fixed in position. All portions of untreated timber abutting against masonry or concrete shall be painted with boiling coal tar or approved preservative, before placed in position.

The frames shall be erected in position and held plumb with strong supports from both sides.

Hold fasts shall be embedded in C.C. beds as specified.

Frames shall have dovetail, tenon or mortise joints.

Frames without sills shall be provided with temporary wooden bracings between the styles at sill level which can be withdrawn after the frame is firmly set.

5.47 **Steel Door frames:**

M.S. Hollow door frames manufactured by cold roll formed process steel sheet 1.25mm thick bright **CRCA** confirming to IS 4351-1976 with 105 x 60mm size.

5.48 **Fabrication:**The steel door frames shall be got fabricated in an approved workshop as approved by the Engineer.

5.49 **Mortar Guards:** Mortar guards as instructed by the Engineer-in-charge shall be provided. These shall be welded to the frame at the head of the frame for double shutter doors to make provision for bolts.

5.50 **Lock-Strike Plate:**There shall be an adjustable lock- strike plate of steel complete with mortar guard to make provision for locks or latches complying with the relevant Indian Standards. Lock-strike plate shall be of galvanised mild steel and fixed at 95cm from the head of the frame.

5.51 **Shock Absorbers :** For side hung door there shall not be less than three buffers or rubber or other suitable material inserted in holes in the rebate and one shall be located on the centre line of the lock strike plate and the other two at least 45cm above and below the centre line of the lock strike plate. For double shutter doors, there shall be two buffers of rubber or similar suitable material inserted in holes in the rebate in the lock jamb only at the head and spaced 15cm at either side of the centre line of the door.

5.52 **Finish:** The surface of door frame shall be thoroughly cleaned, free of rust, mill-scale dirt, oil etc. either by mechanical means, for example, sand or shot blasting or by chemical means such as picking. After pretreatment of the surface one coat of approved primer i.e. red oxide zinc chrome primer conforming to Ito 2074:79 and two coats of paints as directed by the Engineer-in-charge shall be applied to the exposed surface.

5.53 **Fixing:** frames shall be fixed up right in plumb. To avoid sag or bow in width during fixing or during construction phase, temporary struts across the width preventing sides bulging inward may be provided. Wall shall be built solid on each side and grouted at each course to ensure solid contact with frame leaving no voids behind the frame. The Hollow frame section shall be filled with CC (1:2:4) using 20mm grade HBG metal. Three lugs shall be provided on each jamb with spacing not more than 75 cm. The temporary struts should not be removed till the masonry behind the frame is set. In case screwed base tie is provided, this should be left in position till the flooring is laid when it can be removed. After pretreatment of the surface, one coat of steel primer and two coats, of paint, as directed by the Engineer-in-charge shall be applied to the exposed surface.

5.54 **Flush shutters for doors:**

5.54.1 **Flush shutters (Double/Single) :**should be factory made ISI marked confirming to IS 2202-1991 (part-I), 35mm thick with bond wood solid block board type core having cross bonds and face veneers hot pressed bonded with water proof phenol formaldehyde synthetic resin, with lipping on all sides.

5.55 **Construction:** The block board core shall confirm to the requirements specified in clause 7.1.1 of **IS** 2202 (Part I) : 1991. The frame constructed of stiles and rails shall be provided for holding the core. The width of the frame including internal lipping shall not be less than 45 mm and not more than 75 mm.

5.56.1 **Plywood:** used in flush door shutter shall confirm to IS 710: 1976 with surface requirements confirming to type AB of IS 303: 1989.

5.56.2 Cross-bands used in flush door shutter shall confirm to the requirements laid down in IS 710:1976.

5.57.1 **Face Veneers:** used in flush door shutters shall confirm to the requirements laid down for veneer for BWP grade plywood in IS 710:1976.

5.57.2 All Plywood, cross – boards and veneer used shall be treated in accordance with clause 6.1.5.1. of IS 2202 (Part I) : 1991.

5.57.3 Adhesive used for bonding plywood or cross bond and face veneer to core shall be phenol formal dehyde synthetic resin adhesive confirming to BWP grade specified in IS 949:1974.

5.57.4 Internal lipping shall be of Teak wood and shall have a total depth not less than 25mm. It may be provided separately, when it is of species different from that of backing or as one piece with the style, designated as frame-cum-lipping, when internal lipping and backing are of the same species.

5.57.5 External lipping shall be of teak wood and shall be solid and shall measure at least 6mm on the face of the door. It shall be provided all round the shutter in case of single shutter and on three sides in case of double shutter.

5.57.6 In case of double leaved shutters, the sheeting of the stiles shall be rebated by 8mm to 10mm. The rebating shall be either splayed or square type as per clause 7.7 of IS 2202 (Part – I) : 1991. The depth of lipping at the meeting of stiles shall not be less than 30mm.

5.57.7 Shutter shall be shop prepared for taking mortise locks or latches as may be ordered.

5.57.8 Workmanship and the finish of the face panels shall be in conformity with those specified in IS 303:1989

5.58 Tests: Knife test, glue Adhesion test, End Immersion test, slamming test shall be carried out as per clause 10 of IS 2202 (Part – I) 1991. The sampling and criteria for conformity, making etc. shall also be as per IS 2202 (Part – I) : 1991.

5.59 Windows

5.59.1 Seccolar Systems

a. Windows / Ventilator

Windows / Ventilators fabricated from pre painted Steel Sections, made out of cold rolled steel as per ISD 513 of 0.6mm thick 'D' quality, galvanized as per IS 277 with sinc of 120 gm/sq.mtr. Primer Coat of Epoxy Primer of 7 microns thick, finish paint with a modified polyster paint of thickness between 13 – 20 microns, and back coat with Alkyd/Polyster of 7-12 microns. The size of profiles is approximately 56 x 46mm for internal shutter frames and 46 x 52mm for External shutter frames. Shutter in fitted with 4mm thick plain/pinheaded glass fixed with EPDM gaskets in the groove provided in the profile.

b. Doors

Doors fabricated from Pre-Painted Steel Sections, made out of Cold Rolled Steel as per IS 513 of 0.6mm thick 'D' quality, galvanized as per IS 277 with zinc of 120gm/se.mtr. Primer Coat of Epoxy Primer of 7 microns thick, finish paint with a modified polyster paint of thickness between 13-20 microns, and back coat with Alkyd/Polyster of 7-12 microns. The size of profiles is approximately 46 x 46mm for Internal Shutter frames and 46 x 52mm for External Shutter frames, middle and bottom jambs of size 23 x 130mm and panels filled with Glass/Board.

5.60 ALLUMINUM DOORS, WINDOW & VENTILATORS:

(i) Aluminium doors, windows and ventilators: All extruded aluminium section to be used for fabrication shall be hollow aluminium alloy extrusions confirming to designation 63400 of IS: 1285. Aluminium Doors, Windows and Ventilators shall confirm to IS 1948:1961

(ii) All extruded aluminium sections and fixtures shall be coated with natural colour anodic coating in accordance with IS 1868.

(iii) The mortice locks shall be provided in accordance with IS 2209.

(iv) The floors springs (hydraulically regulated) shall be in accordance with IS 6315:1992.

5.61 **Q.C. Clearance**: The doors & windows (both frames & shutters) and ventilators should be got cleared by the Engineer / Quality Control agency authorised by the Engineer-in-Chief. The tests will be conducted at the manufacturer's place and Q.C. clearance certificate will be issued for the lot before supply to site for use in construction. All the arrangements for testing at the manufacturer's place should be made by the contractor at his cost. No door, window or ventilator should be fixed without clearance of Engineer/ Q.C. agency. The contractor should inform the Engineer/Q.C. agency for testing and clearing at least 7 days in advance.

6.0 ADDITIONAL SPECIFICATIONS:

6.1 Anti Termite Treatment

If the site is infected with white ants, all the ant hills shall be dug out completely and queen ants destroyed. Anti-termite treatment, before construction in foundation and basement where required shall be done as per I.S. code 6313 Part II 2001.

Chemicals used, the relevant I.S. specifications for the same and their usual concentrations as water emulsions for soil treatment shall be as given in table 201.9 of S.S. 201 APSS.

6.2 Structural Glazing:

The structural glazing shall be made up of electro colour anodized (having 15 micron anodic coating) aluminium structural sections of not less than 101.5 x 57 x 2 mm box sections for all mullions and not less than 63 x 57 x 2 mm box section for all transoms of structural glazing system and sub frame of 26.5 x 20 x 1.8 mm size. The members shall be fixed in grid pattern mechanically joined with Aluminium cleats and GI metal screws. The frame shall be fixed to the beam / slab/ soffit with GI brackets and fasteners. Glazed panels shall be made using 5 mm thick heat strengthened reflective glass of St.Gobain / Glaverbel / Equivalent make fixed to the sub frame with 6 x 12mm spacer tapes of Norton make or equivalent and structural silicone bonding using G.E. SILICONE (SSG 4000) or DOW CORNING (795). The gaps between glazed panels shall be sealed with suitable Bakor rod and Silicon weather sealant of GE / DOW CORNING are to be applied to provide water tightness of glazing frame. Necessary masking tapes are to be used to prevent spreading of sealant over glass panels.

6.3 ACP Cladding:

a) Providing, Designing, cutting, bending and fixing aluminium composite cladding 4mm thick of approved make (Alucopanel, alucobonel, Reynobond, Lennox Durabuid) on external facade of size as shown with water tight system either curved or straight on concrete/ masonry surfaces skin material 0.25 mm thick aluminium sheet (300 5 H6) cover material natural polyethylene aluminium cladding panel to be of approved colour / shade fixed with extruded aluminium basis frame (50x25x1.5mm) angle cleats, weather sealants, rivets, GI brackets all as approved, using suitable chemical/ anchor bolts on structural steel work including necessary accessories complete in all respects, where level difference is shown dummy structural steel backup frame shall be provided including the finished surface shall be protected with 80 microns self adhesive peel off film with two layers of white and black tested to withstand at least 6months exposure to local weather condition, without loosing the original peel off characteristic or causing stains or other damages with silicon sealant of Dow Corning 789 or Wacker EL 305 or GE etc., including all scaffolding and labor charges etc., complete for finished item of work

b) Providing, Designing, cutting, bending and fixing aluminium composite panel cladding of approved make (Alstrong legame, Reynobond, Alpolic, Alcomat) on external facade of size as shown with water tight system either curved or straight on concrete/ masonry surfaces the panel should be of 4 mm thick with combination of aluminium skin material of 0.5 mm thick aluminium sheet of alloy grade 3105 H 14 cover material natural polyethylene aluminium cladding panel coated on external side with PVDF (Poly Vinyledene Fluoride) of KYNAR PVDF coating containing 70% KYNAR 500 resins for anti-fungal & anti bacterial properties and the central core should be with opaque/ white polyethylene virgin grade, UV stabilized with a combination of 70% LDPE grade 22 FA 002 and 30% HDPE grade E5201and the core should be bonded to the aluminium skin on both sides with DUPONT adhesive film of 30 to 50 μ to be of approved colour / shade fixed with extruded aluminium basis frame (50x25x1.5mm) angle cleats, weather sealants, rivets, GI brackets all as approved, using suitable chemical/ anchor bolts on structural steel work including necessary accessories complete in all respects,

the surface protection with 80 microns self adhesive peel off film with two layers of white and black tested to withstand at least 6 months exposure to local weather condition, without loosing the original peel off characteristic or causing stains or other damages with silicon sealant of Sil Proof NB/ Wacker EL 305 or Dow Corning 789 or Wacker EL 305 or GE etc., including all scaffolding and labor charges etc., excluding cost of structural steel backup frame complete for finished item of work

6.4 Aluminium Louvers:

Supply and fixing of powder coated (approved shade) Aluminium Louvers, using 63 x 37 x 1.5mm, Aluminium box section for main frame, the aluminum louver blades of size 103 x 50 x 1.5 mm thick shall be fixed to the main frame using G.I sheet metal screw as shown in the drawing. The spacing between the each louver blade shall be 75 mm.

6.5 Blasting Operations

Blasting operations when considered necessary shall be resorted to only with written permission of the Engineer-in-charge. Where blasting is resorted to only small charges shall be used. Prior inspection shall be carried out for the safety and stability of the public property. Blasting operations in the proximity of overhead power lines, communication lines, or other structures shall not be carried until the operator or the owner of both of such lines have been notified and precautionary measures deemed necessary shall be taken as per the procedure laid down in S.S. No. 203 APSS and code 4081-1986 shall be followed.

Excavation in Hard rock by chiseling:

This includes rock which is easily excavated by blasting, but due to close proximity of structures or any other reason that the Engineer-in-charge may consider, will have to be excavated by chiseling.

The contractor may resort to any of the following methods to excavated rock by chiseling:

(i) Wedging by means of crowbars, pick axes or pneumatic drills

(ii) Heating and quenching

(iii) Controlled blasting with a small charge just sufficient to make a crackin rock which will be subsequently removed by wedging.

No extra payment shall be made for removal of rock by chiseling and controlled blasting.

6.6 a) Expansion Joints

GENERAL

a) The expansions joints shall be designed and duly got approved by the Engineer. It shall cater for expected movement and rotation of the structure at the joints and provide smooth riding surface. It shall also be easy for inspection, maintenance and replacement.

b) Expansion joints shall be robust durable water-tight and replaceable. Fabricated expansion joints shall be prohibited. Expansion joints shall be obtained by the Engineer either directly or through the Contractor from approved manufacturers and be *of* proven type.

Structures in which marked changes in plan dimension take place abruptly shall be provided with expansion joint at the section where such changes occur. Expansion joint shall be so provided that the necessary movement occurs with a minimum resistance at the joint. The structures adjacent should preferably supported on separate columns of walls but not necessarily on separate foundations reinforcement shall not extend across an expansion joint and the break between the sections shall be complete. The details as to the length of a structure where expansion joints have to be provided can be determined after taking into consideration various factors such as temperature exposure to weather etc. For the purpose of general guidance however it is recommended that structure exceeding 45M in level to shall be decided by one or more expansion joints (SS No. 403.8 & IS 456).

This work shall consist of fabrication and placing of expansion joints as indicated on the drawing and conforming to these specifications or as directed by the Engineer.

The expansion joint shall:

a) Withstand the imposed load including the impact load from live load and sources. .

b) Allow expansion and contraction movement due to temperature. Creep shrinkage, pre stressing and structural deformations.

c) Permit relative rotation in elevation and plan due to the causes as noted above.

d)BE WATER PROOF bridge deck expansion joint seals play critical role in preventing the degradation of the structural components of the bridge system. Without effective joint seals. water passes through the bridge deck and works harmfully to corrode steel components and causes deterioration of the concrete. Rain water gathers various corroding additives from the atmosphere and also from the carriageway.

e) Construction Joints

Vertical joints in floor and roof slabs shall be provided in the case of long building of more than 30M in length specially when the width or depth of such buildings are less than 15M and when narrow corridors connect blocks of relatively greater width. The most suitable position for such vertical joints where the corridors take off from inner blocks. On soils such as black cotton, such joints are more essential shall be invariably provided at the places shown in the drawing or as directed by the Engineer-in-charge. Construction joints when necessary shall be located as follows.

In the main beam over the centre of support. No vertical joint shall be permitted in case of main beams. In other cases, they shall be provided if necessary, in the following location.

i) In subsidiary beams at mid span.

ii) In the case of slabs the joints wherever possible shall be parallel to main reinforcement. In the case of one-way reinforced slabs and over the centre of supporting beams or walls in other cases. In general, the joints shall not be provided in locations of considerable shear or under concentrated loads.

Suitable water stops as specified shall be provided in the case of water retain structures (SS No. 403.7).

6.7 Bearings of R.C.C slabs & beams

a) Where supports are not monolithic with the beam or slab the bearing surface shall be plastered with cement mortar 1:3 with the craft paper laid over the plaster, before laying the concrete.

b) The vertical face of the masonry rebate at bearings shall be plastered smooth with CM 1:3. For beams the craft paper shall be continued to the sides by folding the paper neatly to the plastered vertical face of the masonry opening.

6.8 Load testing of structures

Load testing of structures shall conform to SS No. 403 APSS. Load tests on completed structures shall be made of required by the specifications or condition of contract or by the Engineer-in-Charge in the event of reasonable doubt as to the adequacy of the strength of the structure. Such tests shall be carried out after expiry of 56 days of effective hardening of the concrete test loading of structures, allowable deflections, recovery of deflection etc., shall be as per clause 17.6 of IS: 456-2000.

7.0 Safety specification:

7.0.1 All the necessary safety appliances as per IS: 4130 shall be issued to the workers and their use explained. It shall be ensured that the workers are using all the safety appliances while at work.

7.0.2 Walkways and passageways shall be provided for the use of the workman who shall be instructed to use them and all such walkways and passageways shall be kept adequately lighted, free from debris and other materials.

7.0.3 During night, red lights shall be placed on or about all the barricades.

7.0.4 All the roads and open area adjacent to the work site shall either be closed or suitably protected.

7.0.5 All nails in any kind of lumber shall be withdrawn, hammered or bent over as soon as such lumber is removed from the structure and placed in pipes for future cleaning or burning.

7.0.6 No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electricity charged.

7.0.7 Where in any work of demolition it is imperative, because of danger existing to ensure that no unauthorized person shall enter the site of demolition outside working hours, a watchman should be employed. In addition to watching the site, he shall also be responsible for maintaining all notices, lights and barricades.

7.0.8 On every demolition job, danger signs shall be conspicuously posted all-round the structure and all door openings giving access to structure shall be barricaded or marked except during the movement of actual workmen or equipment. However, provision shall be made for at least two independent exits for escape of workmen during any emergency.

7.0.9 The removal of a member may weaken the side wall of an adjoining structure and to prevent possible damage, these walls shall be supported until such time as permanent protection is provided. In case any danger is anticipated to the adjoining structure the same shall be got vacated to avoid any danger to human life.

7.0.10 The power on all electrical service lines shall be shut off and all such lines cut or disconnected at or outside the property line, before the demolition work is started. Prior to cutting of such lines the necessary approval shall be obtained from the electrical authorities concerned for demolition work itself.

7.0.11 All gas, water, steam and other service lines shall be shut off and capped or otherwise controlled at or outside the building line, before demolition work is started.

7.0.12 All the mains and meters of the building shall be removed or protected from damage.

7.0.13 If a structure to be demolished has been partially wrecked by fire, explosion or other catastrophe, the walls and damaged roofs shall be shored or braced suitably.

7.0.14 All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris

SCHEDULE – "D"

MATERIALS AND WORKMANSHIP

1.1. GENERAL

1.1.1 **a)** No Material shall be used for construction in any work until notice has been given by the Executive Engineer that the test results are satisfactory. No oral instruction should be followed.

b) Recommendation of stacking and storage of construction materials at site shall be in accordance with IS: 4082 - 1977.

c) To be of the best Quality: All materials, articles, and workmanship shall be the best of their respective kinds for the class of work described in the contract specifications and schedule. The word 'best' as used in the specifications shall mean, that in the opinion of the Executive Engineer there is no superior quality of material or finish of articles on the market and that there is no better class of workmanship available for the nature of the particular item described in the contract schedule. The contractor shall upon the request of the Executive Engineer, furnish him with the vouchers to prove that the materials are such as are specified.

1.1.2 The tenderer has to do his own testing of materials and satisfy himself procure the required construction materials of approved quality including the earth for formation of embankment and water from quarries/sources of his choice. All such quarries / sources of materials required for the work shall be got approved by the Engineer -in - charge in writing well before their use on the work. The materials as per standards of relevant I.S.I. codes only will be accepted.

1.2. Samples:

1.2.1 The representative samples of all materials should be procured by the contractor and arrange to send them to the Engineer - in -charge for conducting pre-construction tests and approval duly informing the source of materials from where he has collected the samples.

1.2.2 The raw and processed samples should be supplied at the contractor's expense to the Engineer - in -charge within 14 days after signing of the agreement. For testing of samples maximum of 60 days time will be required. Each sample shall approximately consist of 100 kgs. of materials, or as directed by the Engineer - in - charge.

1.2.3 If the contractor desires to change the sour of materials, he shall supply the raw and processed representative samples at his own expense to the Engineer - in - charge at least 60 days before its use for pre construction tests and approval.

1.2.4 In addition to pre - construction tests and approval of quarries, the Engineer may test the aggregate for their suitability during their processing. The contractor shall provide such' facilities as may be necessary for contractor shall provide such facilities as may be necessary for procuring at no extra cost representative samples at the aggregate processing plant and at the batching plant. Final acceptance of the materials will be based on the acceptable test results of samples taken from the construction site only.

1.2.5 The contractor has to bear the cost of raw and processed representative samples, laboratory tests and filed tests. The contractor has to arrange the required men and material for collecting the samples and bear the cost thereon required for transporting them to the laboratory also. The contractor should quote his rates for finished item of work for the items of works of Schedule 'A' keeping in view the cost of pre and processed samples to be submitted to the Engineer and also the rate of progress and the time required for conducting laboratory tests. No extension of time will be granted for any delay occurred in collecting the samples and conducting pre - construction tests in the laboratory and getting approval.

1.3. Procurement:

1.3.1 The rates quoted for all items shall include cost and conveyance of all materials with all leads.

1.3.2 It will be the tenderer's responsibility to satisfy him self that sufficient quantities of construction materials required for the works shall exist in the borrow areas or quarry sites. The Dept. does not accept any responsibility either in handing over the quarries or procuring the materials or any other facilities. The tenderer will not be entitled for any extra rate or claim for the misjudgment on his part for quantity and quality of materials available in the quarries.

1.3.3 Failure by the tenderer to have done all the things, which in accordance with this condition, he is deemed to have done, shall not relieve the successful tenderer of the responsibility for satisfactory completing the works as required at the rates quoted by him.

1.3.4 The contractor shall make his own enquiries degrading the availability of other materials and make his own arrangements for procuring them.

1.3.5 The materials for embankment construction shall be obtained and got approved by the Engineer- in - charge. The responsibility for arranging and obtaining the land for borrowing or exploitation in any other way shall rest with the contractor, who shall ensure smooth and uninterrupted supply of materials for the quantity required in construction during the construction period. No separate cost will be paid.

1.3.6 Similarly, the supply of aggregates for construction shall be of approved quality approved by the Executive Engineer. Responsibility for arranging uninterrupted supply of materials from the source shall be that of the contractor. No separate cost will be paid.

1.3.7 The contractor has to open and develop the quarry for the stone and aggregate required. All incidentals such as removal of over burden, stripping etc., in the quarry should be done by the contractor. The contractor shall make his arrangements for maintaining the approach roads to quarry for conveying the materials to site of work.

1.3.8 The contractors have to make their own arrangements for storage and conveyance of water and storage at work site for construction purpose, no extra payment will be made to the contractor over and above their tender rates for water lead for storage arrangements.

1.3.9 The tenderer should inspect the site and check-up the possible water source for carrying out the entire work throughout the year in monsoon and non-monsoon seasons irrespective of the quantum of rainfall and quote their rates accordingly. No subsequent claims for extra. water lead will be entertained under any circumstances.

1.3.10 The materials and labor utilized in the execution of work by the contractor shall not be less than that given in the AP.P.W.D. standard data for the relevant item.

1.3.11. Lay-out of material stacks: The contractor shall deposit materials for the purpose of the work on such parts only of the ground as may be approved by the Engineer-in-charge. He shall submit, for the approval of the Executive Engineer, before starting work, a detailed site survey clearly indicating positions and areas where materials shall be stacked and sheds built.

1.4. DEFECTIVE MATERIAL:

1.4.1 All materials which the Executive Engineer/his representative has determined as not conforming to the requirements of the contract will be rejected whether in place or not. They shall be removed immediately from the site as directed. Materials, which have been found defective, and which have been subsequently corrected, shall not be used in the work unless approval accorded in writing by the Engineer-in-charge. Upon failure of the contractor to comply with any order of the Engineer-in-charge, given under this clause, the Engineer -in-charge shall have authority to cause the removal of rejected material and to deduct the removal cost thereof from any money due to the contractor.

1.4.2 The rejected rubble and spoils should be dumped far away from work spot as directed by the Engineer-in-charge. The muck, boulders etc., fallen on the approach roads, ramps, etc. below the place should be removed by the contractor immediately after blasting at the contractor's cost. In case the above materials are not cleared within 24 hours of issue, of departmental instructions, the same will be removed by the Dept. and the cost thereof will be recovered from the Contractor's bills.

1.4.3. The Dept. will not be liable for any compensation due to breakdown in. machinery, water supply or electricity or dealer in supply of materials and for damage due to rains and floods.

1.4.4. The Executive Engineer shall have power to reject at any stage, any work which he considers to be defective in quality of material or workmanship and he shall not be debarred from rejecting wrought materials by reason of his having previously passed them in an unworked condition. Any portion of the work or materials rejected or pronounced to be infer; or not in accordance with the drawings and specifications shall be taken down and removed from the work-site at the contractor's expense, within 24 hours after written instructions to that effect have been given by the Executive Engineer. Replacement shall at once be made in accordance with the specifications and drawings, at the Contractor's expense.

1.4.5. In case of default on the part of the Contractor to carry out such orders the Executive Engineer shall have power to employ and pay other persons to carry out the orders at the contractor's risk and all expenses consequent thereon and incidental thereto shall be borne by the contractor.

1.4.6 Executive Engineer's decision: To prevent dispute and litigation, it shall be accepted as an inseparable part of the contract that in matters regarding materials, workmanship, removal of improper work, interpretation of the contract drawings and contract specifications, mode of procedure and the carrying out of the work, the decision of the Executive Engineer shall be final and binding on the Contractor and in any technical question which may arise touching the

contract, the Executive Engineer's decision shall be final and conclusive. In the case of any difference between Executive Engineer and Contractor on matters regarding materials, workmanship, removal of improper work, interpretation of contract drawings and contract specifications, mode of procedure and the carrying out of the work the contractor shall have a right of appeal to the next higher Authority viz., the Managing Director of the circle, and the decision of the latter shall be final and conclusive.

TEST INSPECTION AND REJECTION OF DEFECTIVE MATERIAL AND WORK:
1.5. LABORATORY SET UP :

1.5.1. For the works costing Rs.50.00 Lakhs and above the contractor shall setup a laboratory and equip the same with adequate equipment and personnel in order to carry out all require tests and Quality Control work as per specification s or as directed by the Engineer. The internal layout of the laboratory shall be as given in the drawing and list of equipment shall be got approved from the Engineer in advance.

1.5.2. "The cost of laboratory building including services, essential supplies like. water, electricity, sanitary and their maintenance and cost of all equipment, tools, materials, labor and incidentals to perform tests and other operations of quality control according to the specifications requirement shall be deemed to be incidental to the work and no extra payment shall be made for the same."

Laboratory Equipment *(with NABL Accreditation):*
The following items of laboratory equipment shall be provided in the field laboratory.

(i) Over - Electrically operated, thermostatically controlled, range upto 200° C sensitivity 10C	1 No.
(ii) P1atform balance 300 kg capacity	1 No.
iii) Balance 20 kg capacity - self indicating type	1 No.
(iv) Electronic Balance 5 kg capacity accuracy 0.5 gm.	2 Nos.
v) Water bath-electrically operated and thermostatically controlled with adjustable shelves, sensitivity 1°C	1 No.
(vi) Thermometers: Mercury-in-glass thermometer range 0^0 to 250^0 C Mercury-in-steel thermometer with 30 cm stem. range upto 300° C	3 Nos.
(vii) Kerosene or gas stove or electric hot plate	1 No.

(viii) Glass wares spatulas, wire gauzes.

As required steel scales measuring tape, casseroles.
Karahis enameled trays of assorted sizes.
pestle mortar, porcelain dishes gunny bags.
plastic bags chemicals digging tools like
pickaxes, shovels etc.

(ix) Set of IS sieves with lid and pan :

450 mm diameter: 63 mm, 53 mm, 37.5 mm, 26.5 mm. 13.2 mm, 9.5mm, 6.7 mm and 4.75 mm size	1 set
200 mm diameter:	2 Sets.

2.36 mm, 2.0 mm, 1.18 mm, 600 micron, 425 micron, 300 micron, 150 micron, and 75 micron

(x) Water testing kit 1 Set.

(xi) First aid box 1 set.

5.3.2 For soils and aggregates

(i)	Riffle Box	1 No.
(ii)	Atterberg Limits (liquid and plastic limits) determination apparatus	1 Set.
(iii)	Compaction Test Equipment both 2.5 Kg. and 4.5 Kg rammers (Light and heavy comp active efforts)	1 Set.
(iv)	Dry Bulk Density Test apparatus (sand pouring cylinder, tray, can etc.,) complete	1 Set.
(v)	Speedy Moisture master complete with chemicals	1 Set.
(vi)	Post hole Auger with extensions	1 Set.
(vii)	Core cutter apparatus 10 Cm. dia, 10/15 Cm. height, complete with dolly, rammer etc.,	1 Set.
(viii)	Aggregate Impact value test apparatus / Los Angeles, Abrasion Test apparatus.	1 Set.
(ix)	Flakiness and Elongation Test Gauges	1 Set.
(x)	Standard measures of 30, 15 and 3 litres capacity along with standard tamping rod.	1 Set.
(xi)	California Bearing Ratio test apparatus	1 Set.
(xii)	Unconfined compression test apparatus	1 Set.

1.5.3.4. <u>For cement and cement concrete</u>

(i)	Vicat apparatus for testing setting times	1 Set
(ii)	Slump testing apparatus	4 Sets.
(iii)	Compression and Flexural strength testing machine of 200 tonne capacity with additional dial for flexural testing.	1 No.
(iv)	Needle Vibrator	2 Nos.
(v)	Air meter	1 No.
(vi)	Vibrating hammer for vibrating dry mix as for Dry, Lean Cement concrete sub-base.	1 No.

Note :- The items and their numbers listed above in this clause shall be decided by the Engineer as per requirements of the project and modified accordingly.

1.6 STANDARD TESTS AND QUALITY:

1.6.1 The day to day and periodical tests to be carried out on materials, finished or otherwise shall be specified by the Engineer-in-charge from time and the contractor shall allow all facilities and co-operation towards collection of samples and cores etc., The contractor shall however make good at his cost, materials, mixes and cores with similar or other materials as may be directed and the satisfaction of the Engineer-in-charge.

1.6.2 An authorized representative 'of the contractor shall remain present at the time when the samples or cores etc., are taken shall authenticate the fact if so required. Should the contractor's agent, fail to be present as aforesaid the samples or cores etc., taken by the Engineer-in.-charge, or his representatives shall be considered to be authentic. The contract or to however will be informed of the details of such samples and cores etc., having been taken.

1.6.3 The material, mixes and cores etc., shall be tested day to day periodically at the laboratory available at the site or at other laboratory or place that the Executive Engineer may direct and the results given thereby shall be considered correct authentic by the contractor. It shall then be the contractor's responsibility to execute work to the standard based on the laboratory designs and tests.

1.6.4 The contractor shall provide proper facilities at all times, for the testing of materials, and inspection of work by the Engineer-in-charge, and the Engineer-in-charge shall accordingly also have access at .all times to the place of storage or manufacture where materials are being made for use under the contract to determine that manufacture is proceeding in according with the drawings and specifications.

1.6.5 The contractor shall, upon demand, also forward for the Executive Engineer's inspection, test certificates supplied by the vendors, when he is purchasing consignments of cement, steel and other materials in respect of which such certificates are usually available.

DRILLING AND GROUTING:

General:

The specifications provide for drilling of "A" and "B" holes and grouting of "A" and "B" holes with cement slurry for foundation treatment.

8.1. A LIST OF IS CODES APPLICABLE IS FURNISHED BELOW:

01	IS 6066-1984	Recommendations of pressure grouting of ROCK FOUNDATIONS in river valley projects.
02	IS 5441-1986	Portable pneumatic drilling machine
03	IS 2529-1973	Code of practice for in-situ permeability tests

8.2 a) Drilling and grouting shall include drilling holes, washing of holes, washing of seams, fixing of grout pipes of packers for stage-wise grouting, grouting with cement grout and back filling of holes.

b) The purpose of grouting is to consolidate the foundations and to reduce seepage through the foundations and uplift pressures under the structure. The Programme of grouting prescribed herein, consists first of a low pressure shallow grouting for consolidating and improving the stability of the upper portion of foundation rock followed by a high pressure curtain grouting to create a tight a tight curtain which will cut off any paths of percolation.

c) Drilling and grouting of foundations is inclusive of washing and testing of permeability. The curtain grout holes for foundations treatment will be drilled to a depth and spacing of holes as shown on the drawings of or as directed to geologist of Geological survey of India and holes shall be drilled and grouted after the completion of excavation and prior to placing masonry or' concrete. But if grouting to be done after construction of masonry or concrete for 3.0-meter height 65 MM/O.M.S. Black Steel Pipes should be left in masonry or concrete. The pipes will be procured by the contractor and the contractor shall fix the pipes vertically in position and see that no damage occurs to them while laying masonry. In case the verticals is maintained for pipes before drilling and grouting operations are taken up, drilling through masonry shall be done by the Contractor.

8.3. EQUIPMENT:

a) Drilling Equipment: Grout holes will be drilled with standard core drilling equipment. Plug or non-coring bit may also be used. Where consolidation or blanket grouting is to be done from the foundation surface, in rock which does not produce mud slurries, percussion, drilling in lieu of rotary drilling may be used for shallow holes.

1) Creations pneumatic or electrical driven diamond drill machine and its equipment.

2) Deep hole jack hammer with 80'.0'' drill capacity and its equipment.

or pipe of not less than 40mm in diameter and return line not less than 40mm in diameter. Wherever practicable the grout plant shall be placed as near the hole as possible and along pipe lines avoided especially during hot weather. The flow of grout into the holes at a constant speed of the pump shall be controlled by the return valve on the header, by passing and returning to the agitation all grout, not accepted by the hole at the desired pressure. As the grout hole approaches refusal, or when the valves on the holes are closed for any reason, the pump shall continue in full operation, circulation the grout through the line to prevent setting or clogging. Both the pump and the pipe line shall be flushed periodically with clear water during grouting operations, especially when using thick grout. Deposits of grout in the pump mixer and agitator not removed by flushing shall be cleaned out, once a week, by scraping and chipping. Upon the completion of any continuous operation or at such time as found necessary, the pump grout lines heads, cap and mechanical expander shall be dismantled, thoroughly cleaned with water and blown out with air.

e) The mixer shall be provided with an accurate meter, for controlling and measuring the amount of mixing water in the grout. Specially equipped pressure gauges shall be provided with diaphragms or by filling a shot gauge tube in the form of a "Pigtail" with semi fluid water proof grease and oil or other devices to prevent the entrance of grout in the gauge. The combined ranges of the high pressure gauge shall be 0.035 Kg/Sq.CM/.500 PSI and for low pressure gauges shall be 0.0175kg/Sq:CM/O.250 P-I one of the pressure gauges shall be mounted so that it will measure directly the pressure on the hole and shall preferably be mounted directly on the vertical pipe of the head connected to the grout cap or expanding packer the other gauge shall be mounted on the supply line at the pump.

8.4 DRILLING GROUT HOLES AT FOUNDATIONS:

a) Low pressure Grouting: The procedure for grouting of the foundation will be subject to modification as determined in the field, but in general, will consist of.

1. Drilling the holes of diameter 75 MM to 50 MM to the required depth at a time except in the cases where shattered rock on crushed zone is met with in such cases descending stage of drilling and grouting to be done. After completion of drilling, the hole is to be protected by capping till the grouting is completed.

2. Plain washing of holes is to be done using G.I. Pipes or drill rods, with air and water lowering the pipes or rods to full depth

3. Washing of seams is to be done by fixing grout pipes or mechanical expanding packers, in stages starting from bottom zone.

4. The holes are to be washed after seam washing of each zone is to be completed, and then seam washing of next higher zone is to be taken up.

5. After completion of washing of seams, the holes are to be flushed with air and water and grouting to be started for bottom zones first by using expanding packers. First grouting of all bottom zones in a region are to be completed before taking up grouting of next higher zones.

6. During grouting of any hole, if interconnection is found in neighboring holes, the same are to be plugged till the grouting of the hole in operation is completed and then the inter-connected holes are to be drilled again and washed to full depth or required depth with water.

7. Grouting is to be continued till the zone of the hole refuses to take grout which can be found by measuring at the grout agitator or sump.

8. Once grouting of holes in a region is completed the holes are to be kept plugged for48 hours and then blown with air and then back filled to the top with some kind of mortar that .is being using in that, region for construction of masonry.

a) High Pressure Grouting: The holes for the high pressure grouting the foundation of the structure shall and be drilled from the foundation to a depth and spacing of holes as shown on the drawings are approximate and subject to revisions at the time of drilling, testing, and grouting. The diameter of any grout hole shall not be less then 50 MM core recover will not be required. Grout holes shall be drilled to varying depth and at carrying inclination, not to exceed 30 degrees from that vertical. The exact depth direction and interval between holes will be determined in the field from the conditions encountered, and as directed by the geologist of Geological Survey of India, drilling of any grout holes to a total depth greater than 60mm is not anticipated, however holes to greater depths may have to be drilled if found necessary during execution whenever, the drill water is lost or artesian flow encountered, the drilling operations or not to be stopped, hut continued taking precautionary steps. Upon completion of drilling of a hole, it shall be temporarily capped or otherwise protected from entry of foreign material until grouting operations requires it to be opened.

8.5 PIPES FOR FOUNDATION GROUTING:

a) Low pressure grout holes: 65 mm or 75 mm diameter steel pipe of length 0.6m into masonry in the drilled holes to a depth 0.3 m into masonry or concrete from surface by reaming the hole with 80 mm or 100 mm bit to facilitate the easy washing of holes and prevent the drilling from re-entry into the holes; the cost of these pipes and fixing them should be included in the unit rates for drilling and grouting and no separate payment will be made.

b) High pressure grout holes: Standard 65 mm black steel pipe shall be used whenever embedded pipe specified for grout holes and also in foundation work over springs, crevices, seems, and other spots disclosing foundation defects and elsewhere if required. Pipes and fittings that are embedded in masonry or concrete shall be thoroughly cleaned and shall be held firmly in position and protected from damaged while masonry or concrete is being laid around them. The pipes for the high pressure grout holes shall be over 0.9 mts long from the foundation level so that where drilling is done later on, difficulties inclination may be avoided. The above pipe shall be' procured by the contractor at his own cost. The contractor has to embed these pipes without extra cost do the department.

9. PROVIDING WEEP HOLES:

Providing weep holes as shown on the drawings and providing filters and jali as per, the drawings including cost of materials and labor complete.

9.1 General:

a) Rectangular weep holes: Weep holes of the size 75mm wide and 150mm high or of circular pipe size of 10mm diameter as shown on the drawings shall be provided and they shall extend through the full width of the masonry with a slope a about 1 vertical to 20 horizontal towards _e draining face to drain moisture from the back filling. The spacing of holes shall be as per the drawings, 'in either direction staggered. The sides and bottom of weep holes in the interior shall be made up in the stones/concrete having fairly plain surface and channel so formed slab bed over with stones/concrete lintels not less than 150 mm on each side.

In stone masonry, generally the height of weep holes shall be the same as the height of the course in which they are formed as directed by the Engineer.

Filters behind weep holes with jali shall be provided to the dimensions and grades as shown on the drawings.

b) In case of pipes, where the length of pipe falls short of the required length, it shall be joined with necessary collars in CM 1:3 or as directed by the Engineer to form a continuous hole in the body of wall.

c) Defective work shall not be paid. The interior of the weep holes shall be free from. all sand, mortar, stone pieces, dirt and other foreign matter. Care shall be taken to prevent entrance of any foreign matter into the weep holes during progress of the work.

TECHNICAL SPECIFICATIONS
SANITARY AND WATER SUPPLY

STANDARD SPECIFICATION FOR BUILDING WORK (AS PER A.P.S.S.)

All the items of work shall be executed as per the Standard Specifications laid down in APSS, the relevant I.S Codes of the Special Specification as indicated in Schedule - 'A' of the tender

Sl. No.	Name of the specification	Specification No.of.APSS
13.	**SANITORY WORKS AND ROOF PLUMBING**	
13.01	Stoneware pipes and fittings	1301
13.02	Cast iron pipes & special castings for water & Sewage	1302
13.03	Galvanised mild Steel Pipes & Fittings	1303
13.04	Concrete & pre-stressed Concrete Pipes & Collars	1304
13.05	Asbestos Cement Pressure Pipes & Fittings	1305
13.06	Unplasticised (Rigid) PVC pipes and fittings for potable water supplies	1306
13.07	Polyethylene pipes and fittings for potable water supplies	1307
13.08	Cast iron manhole covers & frames intended for use in drainage works	1308
13.09	C.I. Surface boxes for sluice valves, fire hydrants and air valves	1309
13.10	C.I. Grating for drainage works	1310
13.11	Sheet metal rain Water Pipes, gutters, fitting & accessories	1311
13.12	C.I. Rain water pipes and fittings	1312
13.13	Asbestos cement rain water pipes, gutters and fittings (spigot and socket type)	1313
13.14	Asbestos cement soil, waste and ventilating pipes and fittings	1314
13.15	C.I. Soil, waste and ventilating pipes & fittings	1315
13.16	Handling, transport and custody of pipes, fittings valves etc.	1316
13.17	Trench work excavation and back filling	1317
13.18	Laying and Jointing of glazed stoneware pipes and fittings	1318
13.19	Laying & Jointing of C.I. pipes, fittings & fixing accessories	1319
13.20	Laying & Jointing of Galvanised mild steel pipes & fittings	1320
13.21	Laying & jointing of cement pipes	1321
13.22	Laying & jointing of AC pressure pipes & fittings	1322
13.23	Laying & jointing of Un plasticized (Rigid) PVC pipes and fittings for potable water supplies	1323
13.24	Disinfection of water mains before commissioning	1324
13.25	Construction of manholes, flush tanks & other masonry works on sewers	1325
13.26	Fixing and Plumbing of sanitary fittings	1326
13.27	House Drains Connection – Construction	1327
13.28	fixing of rain water gutters & down take pipes for roof drainage	1328

DRAINAGE, SEWERAGE,WATER SUPPLY, PLUMBING ETC.

1.0 DRAINAGE, SEWERAGE, WATER SUPPLY, PLUMBING ETC.

1. 1 General

1.2 All water supply, drainage and sanitary work shall be executed by a licensed or authorized plumbing supervisor or licensed or authorized plumber and shall be in accordance with the requirements of relevant bye-laws of-municipal or otherauthoritiesin whose jurisdiction the work is being carried out.

1.3 All items such as earthwork excavation, concrete, brick work, stone work, painting, etc., relevant specifications for those shall apply unless otherwise specified.

1.4 Unless otherwise specified, all exposed work such as cisterns, brackets etc., shall be painted with synthetic enamel paint of approved colour in two coats over a priming coat.

1.5 The diameter of pipes and fittings wherever mentioned shall mean the internal diameter of nominal bore unless otherwise specified.

1.6 The job shall include the cost of making necessary chases, grooves, holes etc, in walls, floors and in other places and also making good or completion of the works. ANY DAMAGE caused to floors, walls etc., during the execution of the sanitary and plumbing works shall be made good by the Contractor at his own cost to the satisfaction of the Engineer-in-charge.

1.7 All the water supply and sanitary connections are to be tested against leakage and satisfactory performance based on standard tests before they are fixed.

Codes and Standards

SCHEDULE -C

LIST OF SPECIFICATIONS FOR THE VARIOUS ITEMS OF WORKS SUPPLEMENTING THOSE DESCRIBED IN SCHEDULE 'A' BY S.S. NUMBERS

GENERAL SPECIFICATIONS

Sl.No.	Description	IS.No. and as amended from time to time
A)	**LIST OF INDIAN STANDARDS**	
I.	**PIPES & FITTINGS FOR SANITARY, PLUMBING, DRAINAGE**	
1	Lead Pipe	IS 404:1993
2	Lead sheet	IS 405:1992
3	Pre-cast Concrete pipes with or without reinforcement – Specifications	IS 458:2003
4	Specification for Salt-glazed stone ware pipe and fittings	IS 651:1992
5	Method of test for concrete pipes.	IS 3597:1998
6	Specification for Caulking lead.	IS 782:1978
7	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage.	IS 1536:2001
8	Vertically cast iron pressure pipes for water, gas and sewage.	IS 1537:1976
9	Cast iron fittings for pressure pipes for water, gas and sewage	IS 1538:1993
10	Specifications for Centrifugally Cast (Spun) Ductile Iron Pipes for Water, Gas and Sewage	IS 8329:2000
11	Specification for high density polyethylene pipes for potable water supplies.	IS 4984:1995
12	Mild steel tubes and tubulars.	IS 1239
13	Specification for Chemically resistant salt-glazed stone ware pipe and fittings.	IS 3006:1979
II	**WATER SUPPLY FITTINGS**	
1	Specification for Pillar taps for water supply purpose	IS 1795:1982
2	Specification for Plug cocks for water supply	IS 3004:1979
3	Washers for use with fittings for cold water services.	IS 4346:1982
4	Specification for Self closing taps for water supply	IS 1711:1984
5	Specification for cast copper alloy screw down bib taps and stop valves for water services.	IS 781:1984
6	Water meter boxes domestic type.	IS 2104:1981

Sl.No.		Description	IS.No. and as amended from time to time
	7	Water fittings - Copper alloy float valves (horizontal plunger type) - Specification	IS 1703:2000
	8	Specification for copper alloy gate, globe and check valves for water works purposes .	IS 778-1984
III	**SANITARY FITTINGS**		
	1	Vitreous sanitary appliances (Vitreous china)	IS:2556
	2	Specification for Glazed fire clay sanitary appliances.	IS 771: 1979
	3	Flushing cistern for water closets and urinals.	IS 774:2004
	4	Brackets and supports for wash basins and sinks	IS 775:1970
	5	Wooden water closet seats and covers.	IS 776:1962
	6	Plastic seats and covers for water closets	IS 2548:1996
	7	Waste plug and its accessories for sinks and wash basins.	IS 3311:1979
	8	Non ferrous waste fittings for wash basin and sink.	IS 2963:1979
IV	**LAYING OF PIPES**		
	1	Code of practice for water supply in buildings.	IS 2065:1983
	2	Code of practice for building drainage.	IS 1742:1983
	3	Code of practice for laying of cast iron pipes.	IS 3114:1994
	4	Code of practice for laying of glazed stone-ware pipes.	IS 4127:1983
	5	Laying and jointing of polyethylene pipes and PVC pipes parts- I to III	IS 7634:
	6	Laying of D.I pipes	IS 3114: 11500
	7	Code of practice for laying concrete pipes.	IS 783 :1985
	8	Code of practice for Design and Installation of Natural Gas Pipelines	IS 15663-2006
V	**ROOF DRAINAGE SYSTEM**		
	1	Cast iron rain water pipes and fittings.	IS:1230:1979
	2	Specification for Asbestos cement building pipes, gutters and fittings (spigot and socket type)	IS 1626:1994
	3	Cast iron/Ductile iron drainage pipes and fittings	IS 1729:2002
	3	Specification for Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.	IS 3989:1984
	4	Code of practice for fixing rainwater gutters and down pipes for drainage.	IS 2527:1984

Sl.No.	Description	IS.No. and as amended from time to time
5	Code of practice for building drainage.	IS 1742:1983
VI	**TANKS/ MANHOLE COVERS / MISC.**	
1	Rectangular pressed steel tanks.	IS 804 :1967
2	Code of practice for design and construction of septic tank	IS 2470:1985
3	Specifications for Cast iron manhole covers and frames	IS 1726:1991

Note:- The above I.S specifications mean latest over and above with amendments if any.

1.2 **Materials:** Materials, fittings and appliances for sanitary and plumbing work, used in the work shall be as specified in the Bill of quantities. The contractor shall submit to the Engineer-in-charge, samples of all materials, fittings and appliances for approval well in advance before starting the work. All materials, fittings and appliances used in the work shall confirm to the approved samples.

1.2.1 **Galvanised pipes and fittings**: -Galvanised steel pipe, fittings and accessories shall be of tested quality and shall confirm to IS: 1239 - (Part-I) 1968.

1.2.2 **Lead Pipe**:- Lead pipes shall confirm to IS:404 Weight and thickness of pipes shall be indicated in the drawings or in the Bill of quantities.

1.2.3 **Lead sheets**: Sheet lead for finishing shall weight at least 30 Kgs. per sq.m. unless specified otherwise and shall confirm IS:405.Bottle trap shall be of approved quality heavy brass chromium plated trap and made particularly smooth on the inside and shall have minimum 50 mm water seal and cleaning screw at bottom.

1.2.4 **Lead trap**; Lead traps shall be of the same weight and thickness for lead pipes. Lead traps wherever provided hall have minimum 50 mm water seal and cleaning screw at bottom. Traps shall be connected to wasted pipes with brass cap and lining of required sizes and wiped solder joints.

1.2.5 **High density polythelene pipes and fittings**: High density polyethylene pipes and fittings shall be of tested quality and shall confirm to IS:4984-1972 and IS: 8008

1.2.6 **Cast iron pipes and accessories**: Cast iron pipes with sockets spigots ends shall confirm to IS:1230 and IS:1729.

1.2.7 **IS:8008 :** Specification for injection moulded HDPE (Part I to IV) fittings for potable water supplies.

1.2.8 **Manhole covers**: Manhole covers shall confirm to IS: 1726.

1.2.9 **Concrete pipes**: Concrete pipes shall be non-pressure type and shall confirm to IS:458 and the type of joints shall be as indicated in the drawings.

1.2.10 **Salt-glazed stoneware pipe**: Salt glazed pipe shall conform to IS:651 and IS:4006.

1.2.11 **Sanitary appliances and non-ferrous fittings**: All sanitary appliances and non-ferrous fittings shall be of tested quality and shall confirm to the relevant Indian Standards.

1.3 Joints

1.03.1 **Cast iron Pipes**: The type of jointing for CI pipes confirming to IS: 1729 shall be socket and spigot either with molten lead wool and gasket confirming to IS:782.

If the joints used are spigot and socket types, the spigot shall be careful centered in the socket by one or more pieces of clean white hemp/spun yarn with about 25mm overlap; sufficient yarn only shall be forced into the socket to leave a correct depth for lead caulking. The pipe shall then be examined again for line and level and the proper depth of each joint shall be tested before running the molten lead. For pouring of molten lead of ring of hemp rope shall be wrapped round the pipe at the end of the socket and the joint shall be covered with stiff damp clay. The rope shall then be removed carefully leaving V shaped large hole at the top of the joint to pour the molten lead. Lead shall be poured in one operation only. After a section of convenient length of pipe has been laid, lead shall be caulked sufficiently with caulking tools and hand hammer till the excess lead is removed and the joint shall be made neat and clean.

The type of jointing CI pipes conforming to IS: 1230 shall be socket and spigot with cement and sand. mortar (1 : 1) and gasket yarn.

The spigot shall be carefully inserted and centered in the socket by and or more pieces of thick clean hemp/spun yarn and shall be forced into the socket to leave a correct depth of 30 mm around for cement mortar. The pipe shall then be examined again for line and level and the proper depth of each joint shall be tested before inserting the cement mortar. The joints shall then be adequately carefully filled with stiff cement and sand mortar (1: 1) and the joints shall be levelled to the edge of the socket. Each joint shall be adequately cured by covering with wet clothes and pouring water at frequent intervals.

The parking ring or washer for the flanged joints shall be rubbed for the full diameter of the flange with proper pipe hole and the holes cut out suitably. The packing shall be smeared with graphite paste or a mixture of red lead and white lead and shall be introduced between the flanges of both the pipes and nuts tight in opposite pairs keeping the longitudinal axes adjoining pipe lines in exactly the same straight line. Lead washers shall be provided along with bolt, to prevent any leakage through bolt holes.

1.03.2 **Stoneware pipes:** The type of jointing for stoneware pipes shall be socket and spigot as indicated on the drawings. The inside of the socket shall be first painted with a layer of cement mortar (1 :2) and a gasket of yarn dipped in cement slurry shall be inserted in the socket of the pipe with in wooden caulking tool and wooden mallet in such a way that the gasket shall fully encircle the spigot with a slight overlap. When the spigot end received the gasket, it shall be wrapped round with two or three turns of treated spun yarn its end before being inserted into the sockets. The rest of the joint shall be then completely filled with cement sand mortar (1 : 1) having very little water and the joint shall be leveled to form a smooth splayed; filled at the angle of 45 degree. All excess of cement mortar left inside the pipe joint shall be neatly cleaned off and the joint shall be adequately cured by covering with gunny bags and pouring water at frequent intervals. In jointing stoneware pipes, care shall be taken that the pipes and kept concentric and the socket especially on the underside, shall be completely filled with cement mortar. Where settlement of earth is envisaged, the joint shall be made with bitumenastic filler or any other materials as approved by the Engineer-in-charge.

1.03.3 **Concrete Pipes:** The type of jointing for concrete pipes shall be with loose concrete collars and the joints shall be packed from other side with spun yarn dipped in cement slurry as specified for jointing stoneware pipes; stiff cement mortar (1: 1) shall be filled from both sides and splayed at an angle of 45 degree on both side, the joints shall be adequately cured as specified for joints in stoneware pipes.

1.04. Laying of pipes :

1.04.1 **Cast iron pipes:** The laying of cast iron pipe lines shall commence only after the bottom of the trench at various points have been levelled and aligned in accordance with the drawings. The sides of the trenches shall be vertical as far as possible and the width of the bottom shall be 300 mm wider than the diameter of the pipe. Where joints are made, the trench shall be widened suitable to provide room for caulking joints. Shorting and Timbering shall not be used without prior approval of the Engineer. For pipes buried in the ground, the Contractor shall take care to maintain always the minimum cushion of earth over the pipes as indicated in the drawings. All pipes, Water mains, cables etc met within the course of excavation shall be carefully protected and supported. All pipes and fittings shall be sounded with a light hammer and checked properly to detect any crack or blow holes before laying. The excavated materials shall be thrown on one side of the trench and the pipes stacked on the other side.

The inside of the socket and the outside of spigot shall be thoroughly cleaned of all foreign matter before laying. The pipes shall be laid with their socket ends facing the directions of the flow. The pipes shall then be lowered in the trenches by a method as approved by the Engineer. The pipes shall then be jointed by caulking as specified in clause 8.01.15. After each section of the pipeline has been laid it shall be tested for water tightness before back filling the trench. On successful completion of testing, the trench shall be backfilled with the excavated earth in layer of200 mm and shall be watered and rammed. Any subsidence accruing in the line of branches after backfilling shall be repaired by the contractor at his own cost. Where the pipe lines cross roads, the sides of the trenches shall be suitably shored.

1.04.2 **Concrete pipes:** The laying of concrete pipelines shall conform to clause 9 of IS:783. Pipes shall be laid true to line and grade. Laying of pipes shall always proceed upgrade of a slope.

1.04.3 **Stoneware pipes:** The laying of stoneware pipeline shall commence only after the bottom of the trench at various points have been levelled as shown in the drawings. The centre line of the trench shall be first marked out on the ground and shall be excavated correct to depth, slope and width at all points. The pipes shall be carefully laid to the alignment, levels and gradients as shown on the drawings. The trench shall be excavated wide enough under the sockets to allow hands to pass for making joints. The pipes between manholes shall be laid truly in straight lines and without any vertical or horizontal deviations on a bed of concrete as shown in the drawings. While laying pipes, portion of concrete under each socket shall be dug and taken off so that the barrel of the pipe gets full support on the concrete bed. Pipes shall be launched with concrete tangentially up to the crown of the diameter of the pipe as shown on the drawing. When it crosses under a road, the pipes shall be fully encased in concrete as shown on drawings. The contractor shall take precautions to maintain always a minimum cushion of earth over the pipes as indicated in the drawings. All pipes shall be carefully examined with a light hammer for soundness before laying. After each section of the pipeline has been laid, the joints hall be allowed to sit properly and shall be inspected and carried out only after approval of the Engineer. After testing, the trench shall be back filled with selected earth in layers of 200 mm and shall be watered and thoroughly rammed all pipes, water mains, cables etc. met within the course of excavation shall be carefully protected and supported.

When the pipelines cross roads, the trenches shall have vertical sides with suitable shoring. Any subsidence in the line of trenches after backfilling shall be repaired by the contractor at his own cost.

1.04.4 Cast iron rain water pipes:

Cast iron rainwater pipes shall confirm to IS:1230 and IS: 1729 and shall be installed as shown in the drawings. Cast iron rainwater pipes fixed exposed to external walls shall confirm to IS: 1230 and shall be blocked out at least 20 mm from the plastered surface by means of cast iron bobbing. The rain water pipes at the roof level shall be fitted with a cast iron band with a masonry bell mouth of suitable size fitted with a cast iron grating. The bottom of the down pipe shall be fitted with a shoe fixed 150mm above ground / apron level of the building as shown on the drawings. The sockets spigots of pipes and fittings shall be joined as specified in clause 8.01.15.

Cast iron rainwater pipes embedded in concrete or masonry shall confirm to IS: 1729 and shall be securely fixed to wall with wooden plugs and nails. Joints of the sockets and spigots of pipes and fittings shall be as specified in clause 8.01.15.

1.05 Inspection pits and trap pits:

Construction of pits shall commence only after the pipes have been laid in position to true line and levels as shown on the drawings to the satisfaction of the Engineer.

Inspection Pits: Inspection pits shall be constructed as indicated in the drawings/bill of quantities. Unless otherwise specified, all inspection pits shall be constructed with rubble masonry in cement mortar (1 :4). Half round channels of size suitable for the inlet and outlet pipe diameter shall be formed on the floor of the pit with M-10. The floor on the pit shall be hunched towards the channel as shown in the drawings. Inside pits shall be finished with cement sand plaster as specified in the specification and finished smooth with cement punning. Care shall be taken to avoid invert level after finishing and shall be as shown in drawings and/or as directed by the Engineer.

Inspection/master trap pits: The pits for the glazed stoneware master trap shall be constructed as indicated in the drawings/bill of quantities. The construction and finishing of the pit shall be hunched towards the interception/master trap pits. Gully trap pits shall be constructed as indicated in the drawings/bills of quantities. The construction and finishing of the pit shall be as described in specification for inspection pit. The cast iron grating shall be set flush with the finished ground/ apron level.

1.06 Testing of Cast Iron Soil and Waste Pipelines:

On completion of laying the cast iron soil waste and ventilation pipeline shall be tested by the contractor at his own cost and to detect leakage and any other defects in the pipe line.

Test shall be conducted using proper apparatus with attachments for smoke making machine for applying smoke to the pipelines under pressure, jute cotton waste or brown paper soaked in creosote oil shall be used and fixed to obtain dense and pungent smoke. While conducting smoke test top of soil waste and ventilation pipes shall be kept open till smoke starts coming out of openings. The

opening shall then be surely plugged with expanding rubber, traps and other openings for connecting sanitary fixtures shall be sealed with water or other approved plugs. The entire pipeline shall be tested in suitable sections as directed by the Engineer. The entire length of the pipelines including all joints under test shall be closely observed for any sign of smoke leakage. All leakage and defects shall be rectified by the contractor to the satisfaction of the Engineer.

1.07 Testing of underground Sewer lines:

The drainage system shall be tested in accordance with the provisions of IS: 1742. All defects and deficiencies detected during the watch shall be promptly rectified by the contractor to the satisfaction of the Engineer.

2.0 WATER SUPPLY:

2.01 Jointing and laying of galvanised steel water supply pipes:

2.01.1 Screwed galvanized steel pipes, conforming is IS: 1239 shall be jointed with screwed socket joints and screwed fittings of the same materials as that of the pipes. Any burrs remaining on the pipes and after the threads are cut shall be removed. An approved jointing compound together with a grummet of a few stands of fine yarn shall be used for jointing pipes and fittings. Any pipe threads exposed after jointing shall be painted with white synthetic enamel paint and in the case of underground piping, thickly coated with approved bituminous compound to prevent corrosion.

2.01.2 The depth at which the underground water supply pipe is to be laid shall be as shown in the drawings. The service pipe passing into or beneath the building shall be laid at least 200mm below the ground floor level and accommodate in a previously laid sleeve in the structure where it enters the building. The space between the sleeve and the pipe as its entry into the exit from the building shall be filled with bituminous materials for a minimum of 150mm at both ends. Piping shall not be buried in walls or floors as far as possible. However, when unavoidable, piping shall be buried for the shortest distance necessary and adequate protection shall be provided against damage.

2.01.3 Galvanized steel piping shall be secured by iron or steel clamps and hooks when fixed on walls. All pipe work shall be completely water tight and the joints shall be such that there are no projections of jointing materials or the like in the interior of pipes. Before the pipeline is commissioned, all piping and fittings shall be flushed clean

2.01.4 **Testing:** After the laying and fixing of all galvanized steel water supply pipes and fittings are completed the line shall be slowly and carefully charged with water to a test pressure of 5 Kg. per Sq.cm. or the specified working pressure plus 50% as may be prescribed by the Engineer. Care shall be taken that air in pipelines is completely exhausted while filling the pipelines with water. This pressure shall be maintained for at least one hour, unless otherwise specified. The pipes and fittings shall be inspected for any leakage of water. Defects in pipes and fittings, if detected, shall be remedied by the Contractor at his own cost.

2.02 **Jointing and laying of high density polythelene water supply pipes:**
All higher density polyethylene pipes shall have screwed ends and shall be jointed with screwed fittings of the same materials of the pipes. Any burrs remaining on the pipe ends after cutting threads shall be removed if necessary and approved jointing compound with a few strands of fine yarn may be used for jointing pipes and fittings. All exposed high-density polyethylene pipes shall be installed with PVC saddles Screwed on 25mm thick wooden blocks securely fixed on walls, at suitable intervals, not exceeding 1m. Pipes wherever installed on wall, clamps shall be fixed as in the case of galvanized steel pipes.

2.03 **Jointing of lead pipes:** Jointing in lead pipes shall be wiped solder joints. Joints shall be wiped in a continuous circular motion in one direction so as to leave a neatly formed elliptical shaped joints free from tears, burns, dropping etc. All exposed lead pipes, exceeding 25mm in diameter shall be secured to walls by iron clips or lead ears. The spacing of the clips shall not exceed 900mm.

2.04 **Storage water tanks:** All tanks for storage of water shall be as indicated in the drawings and bill of quantities and shall be completely and properly covered with dust, light and mosquito proof cover of approved type as shown on the drawings or as described in the bill of quantities. They shall be fitted with a ball valve of approved type, securely fixed to the tank independent of the inlet pipe. A mosquito proof overflow pipe shall be fixed to the tank with the pipe invert about 25mm above the top of water line.

Approved type of stop valve shall be provided for every outlet pipe. All outlet and inlet pipes shall be fixed as shown in the drawings. Support of the tanks shall be 'as indicated in drawings. Inside surface of galvanised steel tanks shall be painted with anti-corrosive drinking water paints as indicated in bill of quantities.

2.05 **Cleaning and disinfection:** All storage tanks water supply fittings and pipes before being put into commission, shall be disinfected with liquid chlorine by the Contractor as his own cost.

3.0 **INSTALLATION OF SANITARY APPLIANCES:**
All sanitary appliances shall be fixed in position rigidly on floor and walls as indicated in the drawings/ bill of quantities or as directed by the Engineer.

3.1 **Water closet-Squatting type:** Squatting type water closet shall be fitted with specified trap and shall be jointed with gasket yarn and cement mortar. Rim of the pan shall be levelled properly and set flush with the finished floor. The pan shall be connected to flushing cistern of capacity as indicated in the bill of quantities. The flushing cistern shall be supported on pair of CI cantilever brackets firmly embedded in the wall in cement mortar (1:4) or screwed to wall suitable plugs. Heights of the bracket from the top of pan shall be as shown in the drawings. The flush pipe from the cistern shall be 32 mm of specified tested quality and connected to the pan inlet by means of hemp and putty joint.

3.2 **Water closet-pedestal type:** Pedestal type water closet shall be rigidly fixed on the finished floor by means of 75mm long brass screw with suitable plugs. The flushing cistern shall be porcelain or PVC or cast-iron low-level push down cistern of capacity as indicated in the bill of quantities. The cistern shall be supported on pair of cast iron or rolled steel cantilever brackets firmly fixed on wall with brass screws and suitable plugs. The flush pipe from the cistern shall be 40mm dia chromium plated. Brass bend fitted to the closet by means of rubber adopter. The closet shall be provided with double plastic seat cover confirming to IS: 2548 and chromium plated hinges.

3.3 **Urinals:** Flat back type urinals shall be firmly fitted. on finished wall by means of 50mm long brass screws and suitable plugs. Height of the lip from the standing point shall be as shown in the drawings. Urinals shall be fitted with specified type of automatic flushing cistern of capacity as described in the bill of quantities and as shown on the drawings. Flushing pipes shall be of galvanized steel pipes of required sizes and connected to the Urinal with 15mm dia. PVC connector fitted with brass cap and lining at one end. The joint to the inlet of urinal shall be neatly finished with putty joints.

SENSOR FITTED URINALS

Flat back urinals shall be fitted with sensors for automatic flushing shall be firmly fitted on finished wall by means of 50mm long brass screws and suitable plugs. height of the lip from the standing point shall be as shown in the drawings.

The arrangement of waste pipes and discharge to the floor trap shall be as shown on the drawings or as directed by Engineer. For single urinal, the discharge may be direct to the floor trap through a 40mm dia waste pipe. For range of urinals the discharge may be collected to the common discharge pipe by 40mm dia pipe shall be led to the 100mm SWG half round channel laid on the floor leading to the floor trap.

3.4 **Wash hand basin**

Wash hand basin shall be fitted in position to true level on a pair of cast iron brackets rigidly fixed on wall with 50mm long brass screws and suitable plugs. The type of waste pipes and their connection shall be as shown on the drawings or as directed by the Engineer.

3.5 **Porcelain sink** of size as indicated in the bill of quantities shall be levelled properly and fitted in position on a pair of cast iron cantilever brackets firmly embedded in the wall in cement mortar (1 :4) The sink shall be fitted with chromium plated brass waste fittings of standard size. The type of waste pipes and their connections shall be as shown on drawings. or as directed by the Engineer.

3.6 **Other miscellaneous fittings** (e.g. Mirror, towel rails, soap cases etc.)
All such fittings shall be of type and sizes prescribed in the bill of quantities and shall be fitted in position true to line, level, and plane as shown on the drawings or as directed by the Engineer.

SPECIAL CONDITIONS FOR FIRE PROTECTION & FIRE FIGHTING SYSTEM

1) It is the complete responsibility of the agency to obtain the approval to drawings pertaining to the fire fighting and protection system from the concerned fire services authorities as per section 13(1) of A.P Services Act 1999

2) The agency should be aware of the rules and regulations of A.P Services Act 1999

3) It is the complete responsibility of the agency to comply with the Municipal corporation Building Bye Laws 1981 provision No 12 in pursuance of Sub section (1) of section 455 of the act and to should intimate the DG Fire Services on completion of the building and before Occupation and arrange for inspection for issue of No-Objection certificate.

4) It is the complete responsibility of the agency to comply with the clause 13.1 of part-II of National Building Code under which the agency has to carry out the work based on the approved Drawings and specifications of the work.

5) It is the complete responsibility of the agency to comply with the provisions under clause 9.3 of part-II of NBC and to engage Licenses fire Engineer/Sub agency for supervision of the work right from commencement to till completion of the work.

6) It is the complete responsibility of the agency to comply with regulation No 06 of Multi Storied Regulations 1981 and to maintain the specifications standard and code of Practice recommended in the NBC

7) It is the complete responsibility of the agency to comply with regulation No 5(2) of Multi Storied Building Regulations 1981 and to arrange the inspection of CE/HUDA and DFO/HYD to ensure that the construction of multi Storied Building is undertaken as per approved plans and fire precautionary and fire protection measures as suggested by the authorities are implemented.

8) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain open space at least 13mts around the complex.

9) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain means of Escape as NBC in the complex.

10) It is the complete responsibility of the agency to provide basement ventilations as per 12.9 of part-III and C.1.6 of NBC part-IV of India

11) It is the complete responsibility of the agency to comply with regulations of NBC and to provide smoking venting facilities for space use of exists as per clause 3.4.12 of NBC

12) It is the complete responsibility of the agency to comply with regulations of NBC and to provide illumination of means of exit in stair case and corridors as per C.4 of NBC part IV

13) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain compartmentation in cellar as per C.9 of NBC Part-IV.

14) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain compartmentation to the building so that fire/smoke remain confined to the area where fire accident has occurred and does not spread to the remaining part of the building as per clause 9 of the NBC 2005 Part-IV, Annexure-C

15) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain openings in separating walls and floors attention to limit the fire spreading with fire resisting assemble as per clause 3.4.8 of NBC 2005 part-IV.

16) It is the complete responsibility of the agency to comply with regulations of NBC and to provide a passage/escape path of the occupants

17) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain the limitations of the damaged to the buildings and its contents as per (Clause 3.4.11.1)

18) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain pressurization of stair cases as per clause 4.10 Part-IV of NBC

19) It is the complete responsibility of the agency to comply with regulations of NBC and to provide fire doors with 2 hours resistance at appropriate places along with escape route and particularly at the entrance to the lift lobby and stair case to prevent spread of fire and smoke (Clause 4.29) part-IV of NBC 2005

20) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain smoke venting facilities for safe use of exists as per clause 4.29 of NBC Part-IV of 2005

21) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain flame retardant materials for all interior decoration and upholstery to prevent generation of toxic smoke/flames and the surface shall comply clause 3.4.15 Part-IV of NBC 2005.

22) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain 2 Nos fire lift complying clause C1.5Q of annexure-IV of NBC 2005.

23) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain basement ventilation as per clause C1.6 of annexure-C of NBC 2005.

24) It is the complete responsibility of the agency to comply with regulations of NBC and to maintain illumination means of exit in stair case and corridors as per clause C.1.4 of Annexure –C of part-IV of NBC 2005.

5.1 SPECIAL CONDITION (FOR STAINLESS STEEL WORKS)

"Metal Arc welding / Tungsten Arc welding (MIG/TIG Process) is required to be used for SS 316 grade. E 310 (IS Specification) Electrodes are required to be used. For obtaining Lacquer finishing the process to be followed is cleaning, grinding, buffing, pickling, passivation of welding surface wherever required using good quality chemicals approved by department for glossy finish, following standard procedures using required tools and methods as covered under Salem Steel users guide and relevant BIS procedures as applicable.

Welds made with Type 316 electrodes may occasionally display poor corrosion resistance in the "as-welded" condition. In such cases, corrosion resistance of the weld metal may be restored by the following heat treatments:

1) For types 316 base metal, full anneal at 1950-2050^{o}F

Where post weld heat treatment is not possible, other filler metals may be specially selected to meet the requirements of the application for corrosion resistance.

Dos and Don'ts in welding and finishing of Stainless Steel joints:

- Oxy-Acetylene / Oxy-Hydrogen process is not practicable while cutting and sizing.
- After cutting and sizing of joints discoloration of cut edges are to be removed by grinding or passivation.
- Metal Arc welding / Tungsten Arc welding is required to be used. E310 (IS Specification) Electrodes are required to be used for SS 316 grade.
- Post welding cleaning: All discoloration, weld spatter, flux / scale are to be removed.
- Use stainless steel wire brush exclusively for cleaning.
- Follow the polishing lines when using abrasive cleaners.
- Do not use an ordinary steel scrapper or knife to remove dirt. This causes rust. Use plastic or stainless steel tools.
- Only dedicated grinding wheels and discs are to be used.
- For chemical cleaning, pickling formulations based on nitric acid and hydrofluoric acid are to be used.
- Do not use Hydrochloric acid.
- For passivation, use nitric acid.
- Thorough washing is to be done with water immediately after pickling / passivation.

5.2 SPECIAL CONDITIONS FOR WHITE WASHING, COLOUR WASHING ANDPAINTING WORKS.

1. The contactor has to collect all the total quantity of materials required for the work.
2. All the materials collected should be invariably checked by the Quality Control Engineers and Executive Engineers after recording the measurements by the field Engineers in the M.Books, before commencement of the actual work.
3. The field Engineers should obtain a certificate of verification from the Quality Control staff.
4. The field Engineers should mark with paint as "TUDA" on the bags or tins/ Buckets / Containers in which the contractors collect materials for the work.
5. After completion of the work, all stains fallen on floors, glass doors, windows and lights should be cleaned before making payment to the contractor. A certificate to that effect shall be appended in M-Book.
6. The necessary Quality Control checks should be conducted by the Executive Engineer and field staff to ensure quality of work before making payment to the contractor.
7. The contractor has to supply all the quantity as per the agreement. If the required quantity is more than that proposed in the agreement, the contractor has to bear that expenditure. If the required quantity is less than proposed in the estimate, the quantity of paints will not be returned to the contractor and the same will be accounted to TUDA by returning the same to the DPW Stores, TUDA duly specifying the rate. If the area of the painting varies with respect to the area provided in the estimate, the variation in quantities will also be accordingly computed and accounted**.**

5.3 List of approved firms

ANNEXURE-III

	List of approved firms in TUDA	
S.No.	**Description**	**Name of the Firm/Trade Name**
I	**a) Steel Reinforcement**	SAIL TATA, JSW Neosteel, VSP
	b) Cement	Priya cement, India cements, Andhra cements, Penna cements, Zuari cement, C.C.I cement, Ramco cements, Ultratech cement, Birla cements (Main producers), Bharathi Cement.
II	**A) Glazed Ceramic tiles(Walls):IS:13753-1993**	Jhonson, Asian, Regency, Makson, Gold coin, Deco Gold, Somany, Nitco, Orient Bell, Oasis, Kajaria
	B) Ceramic tiles -- Floors:IS:13755-1993	Naveen, Regency, Jhonson, Asian, Somany, City tiles, Swastik, Orient Bell, Kajaria, Bandhan
	C) Anti skid tiles –Floor	Naveen, Regency, Jhonson, Asian, OrientBell, Kajaria, Bandhan
	D)Vitrified Tiles:	Marbito, Regency, Asian Granito (Rustic Restile), Murudeshwar (Naveen), Decolite (Granolite), Johnson Ltd (Marbonite), Bell Granito (Marbogranite), Somany, City tiles, Nitco, Orient Bell, Kajaria, Aparna Tiles (VITERO Brand), Bandhan
III	**Water Proof Cement Paints.**	
	Name of the Manufacturer	Brand name
1	Berger Paints	Duro Cem Extra
2	Shalimar	Maha Cem Coat
3	Snow Cem paints Pvt. Ltd.,	Snow Cem
4	Apollo Paints	Arocem Double plus
IV	**Synthetic Enamel Paints: Gr.I**	
1	Berger	Luxol Hi-gloss enamel
2	Asian paints	Apcolite premium Gloss enamel whites
3	Kansai Nerolac	Nerolac synthetic enamel
4	Shalimar	Superlac HI-gloss
5	Addisons	Addisons Duraflex Synthatic enamel
6	Nippon	Bodelac synthetic enamel
V	**MATT FINISH**	
1	Kansai Nerolac	Suraksha plus matt finish
2	Berger	Walmasta matt finish
3	Appolo	Arotex Matt finish
4	Nippon	Shogun-Matt finish
5	Asian	ACE

S.No.	Description	Name of the Firm/Trade Name
VI	**ACRYLIC EMULSION EXTERIOR GRADE (Anti fungus)**	
1	Kansai Nerolac	Nerolac Excel
2	Asian paints	Apex
3	Berger	Weather coat smooth
4	Apollo	Aropex premium +AVX-2
5	Nippon	Sumo Xtra
6	Jotun Paints	Jotashield Colour Last
VII	Gold Paint	Nippon (Real gold), Asian (Apex Ultima Gold-N)
VIII	**Acrylic Emulsion Interior Grade (Premium Interior)**	
1	Nippon	Matex Gold
2	Berger	Rangoli Total care
3	Asian paints	Apcolite Premium emulsion
4	Kansai Nerolac	Beauty Gold
5	Apollo	ezykleen
6	Jotun Paints	Fenomastic Hygiene
IX	Wall Putty	Birla white wall care putty, JK Cement wall maxx, Asian suprime putty, Berger paint (Bison wall putty)
	WATER SUPPLY ITEMS	
X	CP Fittings- Taps, Faucets & Accessories	Leader, Zoloto, Ark, Parryware, Hindware, Prayag, H&R Johnson
XI	**HARDWARE FITTINGS (Aluminium Anodized)**	
1	Yesses Anodizing Ind. Pvt. Ltd.	Jyoti
XII	**SANITARY WARE:**	Hindware, Parryware, CERA, Prayag
XIII	**Plain and Pre laminated particle boards of ISI make**	NOVAPAN, ECO, BISON
XIV	**Water storage tank**	Infra, Sintex, Aqua Tech, Nandi, Sudhakar, Prince
XV	**Flush door shutters**	Kutty, Global, Green ply, Century ply wood, Kalpataru, Nagarjuna Doors
XVI	**PVC/UPVC/HDPE/CPVC**	Kisan, UPI Polymers, Prince, Sudhakar, Supreme, Ajay, Aerocon, Finolex, Astral, Ashirvad Sentini, TruFlo (by Hindware), Apolllo, Sujala pipes (nandi make), Finolex, Prayag
XVII	**PVC Doors**	Rajshri, Sintex
XVIII	**Structural steel**	TATA, JSW, SAIL
XIX	**Galvalume sheets**	TATA Blue scope/JSW (Coils rolls)

S.No.	Description	Name of the Firm/Trade Name
XX	Double skin fire rated glass reinforced gypsum (GRC) plaster board:	GYPROC, USG BORAL & KNAUFF
XXI	AAC Blocks	BILTech, Aerocon, JK Lakshmi, Renacon, Magicrete, HIL, BIRLA
XXII	DOORS/ Windows hard ware	Dorma, Godrej, Hafele, Ozone, Hettich
XXIII	Plasticizer, Super Plasticizer, Admixtures, Other construction chemicals	Fosroc, Pidilite, CICO, SIKA, BASF, MKY Schomburg
XXIV	Waterproofing Compound	Penetron, Krytron, Pidilite, MYK Armnet, Fosroc, Asian Paints, Sikka, Soperma
XXV	Waterproofing Treatment	FAB, Chemicals, Armstrong & BASF
NOTE	1. The Brands shown are for guidance only. However, the material shall be invariably got tested prior to using in the works as directed by engineer-in-charge and ensure the ISI standards. 2. Preference shall be given to ISI mark wherever applicable. 3. All Building Materials conforming to ISI Standards, shall be used in all CIVIL, Water Supply & Sanitary Fittings and Electrical Works. 4.Not only limiting to the Brand / Manufacturer / Supplier for Materials/Products mentioned below, Material / Product conforming to the Specification and Standards of ISI from any Brand / Manufacturer, shall also be allowed in all CIVIL, Water Supply & Sanitary Fittings and Electrical Works too.	

LIST OF BRANDS OF ELECTRICAL MATERIALS TO BE USED IN TUDA WORKS

LIST OF BRANDS OF ELECTRICAL MATERIALS			
Sl.No	Item		Makes
1	PVC pipes	**:**	**Makes:** Precision/Universal& Marudhar/ VIP / GoldMedal / Million plast / GM / Sudhakar /Polycab/Anchor/ Polyline/ Orbit/AKG.
2	PVC Casing and caping	**:**	**Makes:**Precision/VIP / Modi/ GoldMedal / Million plast / GM / Sudhakar / Polyline/Orbit/Anchor
3	PVC Flexible Couplings	**:**	**Makes:**Precision/VIP / Modi/ GoldMedal / Million plast / GM / Sudhakar / Polyline/Orbit/Anchor
4	PVC wires	**:**	Finolex / RR kabel / Havells /KEI/ Polycab/Gloster/Goldmedal
5	Hot dip galvaized metal boxes.	**:**	**Make:**Legrand Mosaic / North West / M.K. / G.M /L&T / Indo Simon/Salzer /GM Four-Five / Legrand Arteor/ Schneider Zen celo/ MK Blenge / Toyoma / Vimal / Anchor Roma / Clipsal / Record / Havells / ABB / Indo Asian / Siemen Delta Vega / Spectra Mettalic / Wave - Pointer/ Fortune Art /Feno Switch / Legrand Myrius / Cabtree Thames Platinum / Million Logus / Gold Medal Curve / CPL / Great white Myrah (TUDA approved brands)
6	Metal Plug board	**:**	2 Pin Legrand / L&T / GE / Siemen / Schneider / ABB 3 Pin Legrand-DX3 / Schneider-Acti9/Hager-Novello+/ Siemens-5SX4/ Havells STADx /L&T-NewRange /Indo Asian-Opti pro/ HPL (Techno)
7	FRLS copper round cables.	**:**	Finolex / RR kabel / Havells /KEI/ Polycab/ Gloster/ Goldmedal/ GM
8	Flat copper cable	**:**	V-Guard / Million / Vihan/Vimal /Finecab/ CRI/ Lubi/Unicab/Hitech/ Spykaar/ Airson/Ollvin/ Laser/ Beljin/Rhino

Sl.No	Item		Makes
9	Moudular switches and Accessories	**:**	Legrand Arteor / Schneider Zen celo/ Crabtree Murano or Ducor /L&T-englaze/GM-(Four-Five)/ Goldmedal(GIFA)
10	Holders	**:**	Anchor / Record / Leader
11	SP/DP/TP/FP MCBs and DB`s	**:**	Legrand-DX3 / Schneider-Acti9/Hager-Novello+/ Siemens-5SX4/ Havells STADx /L&T-NewRange /Indo Asian-Opti pro/ HPL (Techno)
12	Copper Lugs(Pin/ring type)	**:**	Dowels/Jainson/Comet
13	MCCB`s	**:**	L&T- D shine / Schneider-NS NSX/Legrand -DP X3/ Siemens-3VL / Hager-h3/C&S -Winbreak2/HPL-Techno.
14	ACB`s	**:**	Siemens-3WLETU45B / L&T-U Power Omega(MTX3.5 EC) / Schneider -Master pact NW 6.0P /Legrand-DMX3/C&S Winmaster-2)/HPL-Techno
15	Key card switch with monoblic 2 module	**:**	Legrand Arteor/Havells/Schneider/ anchor roma or equivalent
16	48" Ceiling Fans	**:**	Atomberg(Gorilla GV2)/ Halonix(Plasma) /Havells(Efficiencia)/ Crompton greaves/Orient
17	56" Ceiling Fans	**:**	Atomberg(Gorilla GV2)/ Halonix(Plasma) /Havells(Efficiencia)/ Crompton greaves/Orient
18	Wall mounted Fan/ Pedastal fan.	**:**	**Makes:** Crompton High Flow / Bajaj Elite / Havells Swing Premia gold / Orient Wall 45/Halonix Krypton / G.M. (Bolt)
19	Exahust fan	**:**	Crompton / Bajaj Bahar WG / Havells Ventil Air-DS / Orient hill air/Halonix /Polycab/ G.M. (Xenix)
20	Cabin Fans	**:**	Crompton / Havells ciera / Orient AP12./Halonix.
21	Thermo Plastic Junction box	**:**	Hensel/Sadhrish
22	Auto transfer switch	**:**	Socomec /Hager /ABB/ HPL/ L&T/Havells

Sl.No	Item		Makes
23	Automatic Street Light Control System	**:**	Swadeep Nature Switch / Lightmate/ GL/Bajaj
24	Voltage Surge Protector	**:**	Legrand / Siemens / G.E / L&T / Hager/Havells
25	LT XLPE Aluminium UG cable	**:**	Universal /Torrent / Unicab / Havells / KEI / Gloster / Polycab
26	11KV HT XLPE UG Cable	**:**	Nicco / Finolex / Polycab / Gloster / Havells / Universal /KEI/ Powerplast / Paragon / Unicab / Suncab / Torrent / CCI
27	Heat shrinkable Joint kit	**:**	Raychem /M seal/ Denson/ Multy/ Transeal-Hongshang
28	Brass Glands	**:**	Dowels/ Comet/ SMI
29	Hot-dip galvanized Octogonal Pole, SP, DP arm brackets	**:**	Bajaj/Valmont/Laasma /Transrail/ Utkarsh/ Skipper
30	Polygon High Mast	**:**	Bajaj / Valmont/Laasma /Transrail/ Utkarsh/ Skipper
31	Current Transformer	**:**	Kappa/ L&T/ Seimens/ C&S/ Schneider
32	Selector switch	**:**	L&T /C&S/ SALZER/ HPL
33	Electronic energy Meter	**:**	CONZERVE / ELMEASURE / MECO / HPL / HAVELLS/L&T
34	Rotary switches	**:**	L&T (SALZER)/ABB/Schneider/ Seimens/ C&S/HPL
35	Capacitor	**:**	Seimens/ABB/Schneider/L&T/C&S/HPL/ Havells
36	Relays	**:**	Seimens/ABB/Schneider/L&T/C&S/HPL/ Havells
37	HDPE Duct	**:**	DURA LINE (Dura Guard)
38	Push button	**:**	Seimens/ ABB/ Schneider/ L&T/ C&S/HPL
39	Transformer	**:**	Schneider/ Kirloskar/ Voltamp/ Esennar/ Toshiba/ KPEL/ Powertech
40	MS Pipes	**:**	Jindal / Hissar / Tata pipes/Prakash Surya

Sl.No	Item		Makes
41	Conduit Pipes	**:**	Precision/ VIP / GoldMedal / Million plast / Sudhakar / Polyline /Anchor/Beljin.
42	DG set (62.5 KVA)	**:**	a) Engine Makes:Cummins/Koel Green/ Sterling/ mahindra/Elmot Power Gen. b) Alternator Make:Stamford/ Kirloskar/ CromptonGreaves /Leroysomer
43	DG set (160 KVA & 250 KVA)	**:**	a) **Engine Makes:**Caterpillar/Cummins/ Koel Green/Mahindra/Elmot power Gen b)**Alternator Make:**Leroy somer/ Crompton Greaves/Stamford
44	Telephone (EPABX) system	**:**	NEC/ Alcatel /Avaya/Siemens
45	On line UPS system	**:**	Numeric/APC/Consul Neowatt/ Sakshham /Emerson
46	SMF battery	**:**	Quanta / Racket / Exide
47	AC unit	**:**	Mitsubishi / O General / Toshiba / Blue star CAFU-OATU series / Hitachi / Daikin
48	Stabilizer	**:**	V-Guard / Real Guard / Uni Stab / ITL
49	Power factor panel	**:**	L&T/Seimens/Epcos /Schneider/ ABB/ Neptune
50	VCB Panel	**:**	ABB/Schneider/Seimens/Kirloskar/Amara Raja/Megawin/L&T
51	UTP cable/STP cable	**:**	Systimax /AMP/ Panduit/ Siemond/ Molex/Legrand
52	Single Mode LC Pigtails LSZH	**:**	Systimax/Legrand/Molex/Krone /AMP
53	Glass Fiber Optic Cable	**:**	Systimax /Legrand/ Molex/ Panduit/ Siemond/ AMP
54	Wall /Floor mounted Communication rack	**:**	APW/HCL/Valrack/Netrack
55	Layer2, Catalyst 2960 Plus 24 port	**:**	CISCO WS - C2960+24TC-L or equivalent in JUNIPER/ EXTREME
56	WIFI Acess point	**:**	Cisco Aironet 1815i or equivalent in Ruckus/Aruba
57	MDF loaded with 2/10 modular	**:**	krone or its equivalent

Sl.No	Item		Makes
58	Cable for telephone	**:**	Finolex / Delton / Surabi / Polycab
59	RG-6/RG-11 co axial cable	**:**	Finolex / RR Kabel/ Havells/ Polycab/ Gloster
60	Copper tube	**:**	Totaline /Nippon /Mandev
61	Nitrile Insulation	**:**	Kflex/ Totaline /Armaflex
62	Water Heater	**:**	CROMPTON-Solarium Neo,VENUS - Lyra, HAVELLS - puro,USHA - Misty, SPHEREHOT - Ovlano PGL-I,AO SMITH - HSE SDS

LIST OF APPROVED MAKES OF THE MATERIALS TO BE USED FOR FIRE PROTECTION SYSTEM

S.No.	Materials	I.S. No	Brand
1	M.S.Pipes	1239/3589	TATA, JINDAL, HISSAR
2	Gunmetal Valves (Full way check and globe Valves)	778	LEADER ZOLOTO
3	C.I. double flanged sluice valves & Check Valves	780	UPADIAYA KARTAR KIRLOSKAR AUDCO AJANTA
4	Slim Seal Butterfly	ISI	KARTAR KIRLOSKAR AUDCO INTERVALVE ADVANCE
5	Slim Seal flap type Non Return Valves	5312	AUDCO KIRLOSKAR KARTAR INTERVALVE
6	Fire Hydrant Valves with GM / SS Coupling	5290	WINCO NEWAGE PADMINI ESSEL
7	Fire Hose Pipes C.P. Hose GM / SS Coupling R.R.L Hose GM / SS Coupling	8423 636(Type A)	WINCO NEWAGE PADMINI ESSEL CRC
8	Fire Aid Fire Hose Reels (Drum & bracket)	884	EVER SAFE FCE NEWAGE SRI
9	Sprinkler Heads		Viking / H.D / Tyco / Newage
10	Horizontal Centrifugal Pumps	1520	Kirloskar, Mather Platt
11	Electrical Motors	325	KIRLOSKAR, CROMPTION.ABB
12	Electrical Switch Gear & Starter MCCB		Siemens/ L & T / schnedier
13	Cables for fire fighting		CCI / Polycab / Asian (RPG) Gloster /Universal / Nicco

S.No.	Materials	I.S. No	Brand
14	Flow meter		SWITZER / SYSTEM SENSOR
15	Suction Strainer		ADCO DURGA SANT ZOLOTO
16	Vibration Eliminator Connectors		Resistoflex / Kanwal / D. Wren
17	Single Phasing Preventor (Pipe protection)		Minilec
18	Pipe Coat material(Protection)		PYPKOTE
19	Flow Switches		Switzer / System Sensor
20	Diesel Engine	10000/ TAC Approved	Kirloskar/ Ashok Leyland / Cummins
21	Main Control Panel (Powder Coated)		ENRON / SR ELECTRICAL / SRI INDUSTRIES
22	Fire Bridge Inlet	904	PADMINI / NEWAGE
23	Rubber Hose Inlet	5132	PADMINI / NEWAGE
24	Hose Coupling branch Pipe and nozzle GM / SS	903	NEWAGE / ESSEL / WINCO
25	Pressure Switches	TAC	INDFOSS DANFOSS SWITZER
26	Pressure Gauge	3624(CL-I)	H.GURU/FIEBIG
27	Battery		EXIDE/ AMARON PRESTOLITE
28	Fire Extinguishers		SAFEX / KANEX / NITHIN / FIREFITE
29	Paint		J & N / ASIAN / NEROLAC / BERGER
30	Annunciator Panel for Sprinkler) system	2189	PCD/SAFEWAY/AGNI(INDIA)
31	Alarm Valve & Hydraulic Alarm motor with covering		HD / NEWAGE / TYCO
32	Contactor		L&T/ SIEMENS/ MG Schinder
33	Thimbles/Ferrules (tinned Copper)		Dowel

S.No.	Materials	I.S. No	Brand
34	Cable Glands		Commex / Power / Gripwell / Dowel
35	Power Capacitor		L&T/ NEPTUNE
36	Measuring Meter(Digital)		L&T/ MG Schinder/ ICON / SELECTORN
37	M.S.Conduit		Steel Craft / GUPTA
38	Dash Fastner		Hilti/ Fisher
39	Paint Primer		Asian/ Jenson Nicholson
40	Weld Electrodes		Advani/ Esab/ Weldex / Mangalam
41	Pipe Supports		Chilly/ GMGR / APPROVED MAKES
42	Indication Lamps(LED)		L.T./ SIEMENS / MG Schinder / Ideal / Raas Controls

6 DRAWINGS:

6.1 Drawings:

6.1.1 The plans enclosed with the tender are liable to the altered during execution of work as per necessity of site conditions. The premium quoted by the contractor for various items shall hold good for execution of work even with altered plans.

6.1.2 One set of drawings, on the basis of which actual execution of the work is to proceed shall be furnished free of cost to the contractor by the Superintending Engineer / Executive Engineer progressively according to the work program submitted by the contractor and accepted by the Superintending Engineer / Executive Engineer. Drawings for any particular activity shall be issued to the contractor at least 30 days in advance of the scheduled date of the start of the activity. However, no extra claims by the contractor toward any delay in issue of drawing or issue of any revision / change to the drawings issued earlier shall be admissible. The Superintending Engineer shall intimate the contractor 7 days in advance regarding any delay to issue of drawings, for any particular stage of works. If work gets affected due to delay to issue of drawings, for any particular stage of work the contractor shall be granted extension of time in terms of condition of the contract.

6.1.3 Signed drawings above shall not be deemed to be an order for work unless they entered in the agreement or schedule of drawings under proper alterations of the contractor and Executive Engineer or unless they have been sent of the contractor by the Executive Engineer with a covering letter confirming that the drawing in and authority for work in contract.

6.2 DISCREPANCIES:

6.2.1 In case of discrepancies between documents the following order of procedure shall apply:-

Between the written description of written dimensions in the drawings and the corresponding one in the specifications, the latter shall apply.

Figured dimensions shall supersede scaled dimensions. The drawings on a larger scale shall take precedence over those on a smaller scale.

Drawings issued as construction drawings from time to time shall supersede tender drawings and also the correspondence drawings previously issued.

Note: The contractor should not execute any component of work without obtaining the working drawings. Any work done without drawings shall be at the contractor's responsibility only. Acceptance for such work will be at the discretion of the Executive Engineer.

6.3 SECRECY CLAUSE:

The drawings and specifications made available to the tenderer shall exclusively be used on the work and they are retained from passing on each plan to any unauthorized hand either in parts or in full under the provisions of Section-3 and 5 of the official secrets Act 1923. Any violation in this regard will entail suitable action under appropriate clause or official secret Act 1923.

7 FORMATS OF SECURITIES

1. PROFORMA

BANK GUARANTEE *FOR* EARNEST MONEY DEPOSIT (At the time of tendering)

WHEREAS …….. (Name of the Contractor) (here in after called "the Tenderer") has submitted his tender response to NIT No……. dated:…… for the work " …… ……..." (Name of work) (hereinafter called "the tender").

KNOWN ALL MEN by these present that we ……..…… ……. (Name and ADDRESS of Bank) ……. (hereinafter called "the Bank" are bound unto …… / (Vice Chairman, TUDAs, Tirupati.) in the sum of * …… …….. for which payment will and truly to be made to the said Department, the Bank binds itself, his successors and assigns by these presents.

SEALED with the Common Seal of the Bank this …….. day of ……..200……

THE CONDITIONS of this obligation are:-

(1) If after Tender opening the tenderer withdraws or modifies his Bid during the period of bid validity specified in the Form of Tender.

(2) If the Tenderer having been notified of the acceptance of his bid by the Department during the period of validity.

(a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Tenderers, if required; or

(b) fails or refuses to furnish the balance EMD and additional performance Security in accordance with the instructions of Tenderers.

We undertake to pay to the Department up to the above amount upon receipt of his first written demand, without the Department having to substantiate his demand, provided that in his demand the Department will note the amount claimed by him is due to him owning to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date** …… after the dead line for submission of Tenders as such deadline is stated in the Instructions to Tenders or as it may be extended by the Department, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE……. SIGNATURE OF THE BANK ……..

WITNESS…….. SEAL……..

(Signature, Name and Address)

***** The Tenderer should insert the amount of the EMD in words and figures denominated in Indian Rupee. This figure should be the same as shown in the NIT.

****** 6 months for the deadline date for submission of Tender. Date should be inserted by the Department before the Tender documents are issued.

2.PROFORMA

BANK GUARANTEE FOR TOTAL "E.M.D." (At the time of agreement)

_____(name &ADDRESS of Department)_____

WHEREAS_____
_____
_____ _____ _____(name and address of Contractor) (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated: _____ to execute the work of _____ [name of work];

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a Schedule bank for the sum specified therein as balance EMD / EMD for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ [amount of guarantee] _____ [in words], such sum being payable and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid upto …….. i.e., until 28 days from the date of expiry of the Defects Liability period.

Signature & seal of the Guarantor_____

Name of Bank_____

ADDRESS_____

Date_____

3. PROFORMA

BANK GUARANTEE FOR ADDITIONAL FURTHER SECURITY

_____ (name and address of Department)
_____

WHEREAS _____ (name and address of Contractor) (hereinafter called

"the Contractor") has undertaken, in pursuance of Contract No. _____ dated: _____ to execute _____ [name of Contract and brief description of works] (hereinafter called "the Contractor");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a Schedule bank for the sum specified therein as Additional further security bank guarantee for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of *Rs.*_____ [amount of guarantee] _____ [in words], such sum being payable and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid upto and until 28 days from the date completion.

Signature & seal of the Guarantor_____

Name of Bank_____

ADDRESS_____

Date_____

4. PROFORMA

FORM OF SOLVENCY CERTIFICATE BY BANKS

I, _____ Managing Director / Manager / General Manager / Agent of _____ Bank Limited do hereby certify that a _____ _____ *[here the Names and addresses of the contractor]* to be solvent to the extent of Rs._____ [Rupees _____ _____] as disclosed by the information and record which are available with the aforesaid bank.

For the _____ Bank

Date:
Place: Signature of Bank Manager

[Authorised to Sign]

5. PROFOMA

FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT FACILITIES (CLAUSE 8 (III) OF TENDER NOTICE)

(FROM NATIONALISED BANKS / SCHEDULED BANKS)

BANK CERTIFICATE

This is to certify that M/s. …….....…… is a reputed company with a good financial standing. If the contract for the work namely ……....…… is awarded to the above firm, we shall be able to provide over draft/credit facilities to the extent of Rs.…… to meet their working capital requirements for executing the above contract.

For the _____ Bank

Date:
Place: Signature of Bank Manager

[Authorised to Sign]

BILL OF QUANTITIES AND

PRICE BID

(Schedule – A)

8. BILL OF QUANTITIES

8. Bill of Quantities

8.1 The Bill of Quantities shall be read in conjunction with the instructions to Tenderers, General and Special conditions of Contract Technical Specifications and Drawings.

8.2 The quantities given in the Bill of Quantities are estimated and provisional and are given to provide common basis for tendering. The quantities here given are those upon which the lump sum tender cost of the work is based but they are subject to alterations, omissions, deductions or additions as provided for in the conditions of this contract and do not necessarily show the actual quantities of work to be done. The basis of payment will be actual quantities of work ordered and carried out as measured by the Contractor and verified by the Engineer and valued at the estimate rate plus or minus tender percentage quoted in the Bill of Quantities where applicable, and otherwise at such rates and prices as the Engineer-in-Charge may fix within the terms of Contract.

8.3 The estimate rates in the Bill of Quantities shall, except in so-far as it is otherwise provided under the Contract include cost of all constructional material, labor, machinery, transportation, erection, maintenance, profit, taxes and duties together with all general risks, liabilities and obligations set out or implied in the Contract.

8.4 The plans enclosed with the tender are liable to be altered during execution of work as per necessity of site conditions. The Tender percentage quoted by the tenderer shall hold good for execution of work even with altered plans.

8.5 The whole cost of complying with the provisions of the Contract shall be included in the estimated rates for items provided in the Bill of Quantities and where no items are provided in the Bill of Quantities, their cost shall be deemed to be distributed among the estimate rates entered for the related items of work.

8.6 General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering estimate rate against each item in the Bill of Quantities.

8.7 The method of measurements of completed work for payment shall be in accordance with the relevant B.I.S. Codes & A. P. S. Specifications.

8.8 All items of work are to be executed as per the drawings / specifications supplied with the contract documents.

a. If there is any contradiction between the drawings and the text of the specifications, the later shall prevail.

8.9 The Tenderer should inspect and select the quarries of his choice before he quotes the tender percentage in the Schedule of Bill of Quantities and satisfy himself about the availability of required quantum of materials.

8.10 Diversion drains should be excavated before completion of the embankments and the useful soils should be used in the nearby embankments.

8.11 The actual mix proportion by weight to be adopted during execution will be got designed in the laboratories to suit the grade of concrete and mortar to be used. It will be the responsibility of the contractor to manufacture concrete and mortar of required strength.

8.12 The quantum of measurement for all items of earthwork involving conveyance manually or by machinery shall be as assessed by level measurement. The measurements for the embankment will be for the consolidated banks only.

8.13 Wherever bailing out of water is involved either for excavation or for foundations or for constructions, the percentage quoted shall take into account the dewatering charges necessary. No separate payment will be made for dewatering.

8.14 Wherever embankment work is involved, useful soils approved by the Engineer-in-Charge from the cutting reaches and diversion drains shall be taken and used for forming nearby embankments soils used for constructions will be at free of cost.

8.15 The quoted tender percentage shall also include the work of any kind necessary for the due and satisfactory construction, completion and maintenance of the works according to the drawings and these specifications and further drawings and orders that may be issued by the Engineer-in-Charge from time to time. The quoted tender percentage shall include compliance by the Contractor with all the general conditions of contract, whether specifically mentioned or not in the various clauses of these specifications, all materials, machinery, plant, equipment, tools, fuel, water, strutting, timbering, transport, offices, stores, workshop staff, labor and the provision of proper and sufficient protective works, diversions, temporary fencing and lighting. It shall also include safety of workers, first aid equipment's suitable accommodation for the staff and workmen, with adequate sanitary arrangements, the effecting and maintenance of all insurances, the payment of all wages, salaries, fees, royalties / Taxes, duties or other charges arising out of the execution of works and the regular clearance of rubbish, reinstatement and clearing-up of the site as may be required on completion of works safety of the public and protection of the works and adjoining land. The work of Building in quality control / assurance shall be deemed to be covered in the quoted percentage.

8.16 a) It is the responsibility of the contractor to protect property and material of the employer in the works contract till commissioning/ completion and handing over of the project works, including Defect Liability Period and for that purpose shall take all necessary care including by insurance if chosen to insure, at his own risk and insurance charges are not reimbursable.

b)It is the responsibility of the contractor to procure the equipment and material to the site and execute the contract works of the project till commissioning/ completion and handing over of the project works, including Defect Liability Period and for that purpose shall take all necessary care including by insurance if chosen to insure, at his own risk and insurance charges are not reimbursable.

c)The Contractor is not entitled for any claim from employer for above insurance coverages or for any loss from non-Insurance.

d) The contractor is not exempted from the statutory compulsory insurance liability of the persons employed or deployed by him in execution of works and insurance policy shall also include the name of the employer for whom he executes the works.

e)If there is any claim by any workmen from the employer besides the contractor, the employer is entitled to retain or withhold out of payments due to the contractor, the amounts equal to the aforesaid and the amount will be released only after the claim is satisfactorily settled by the contractor and the employer reserves the right to pay the amount so withheld directly to the workmen, in the event of contractor fails to satisfactorily settle the claim made by any workmen.

8.17 The Contractor shall ensure that, the quoted tender percentage shall cover all stages of work such as setting out, selection of materials, selection of construction methods, selection of equipment and plant, deployment of personnel and supervisory staff, quality control testing etc. The work quality assurance shall be deemed to be covered in the tender percentage.

a) The special attention of the tenderer is drawn to the conditions in the tender notices wherein reference has been made to the Andhra Pradesh Standard Specifications [APSS] and the Standard preliminary specifications containing therein. These preliminary specifications shall apply to the agreement to be entered into between the contractor and the Government of Andhra Pradesh and shall form an in-separable condition of the contract along with the estimate. All these documents taken together shall be deemed to form one contract and shall be complimentary to another.

b) The tenderer shall examine, closely the A.P.S.S. / MORTH and also the standard preliminary specifications contained therein and sign the Superintending Engineer's office copy of the APSS / MORTH and its addenda volume in token of such study before submitting his overall tender percentage which shall be for finished work in-situ. He shall also carefully study the drawings and additional specifications and all the documents, which form part of the agreement to be entered into by the successful tenderer. The APSS / MORTH and other documents connected with contract such as estimate plans, specifications, can be seen on all working days in the office of the Executive Engineer, TUDA, Tirupati.

8.18 The tenderers attention is directed to requirements for materials under the clause 'materials and workmanship' in the preliminary specifications of APSS. Materials conforming to the Bureau of Indian Standards specifications, APSS etc., shall be used on the work and the tenderers shall quote his overall tender percentage accordingly.

8.19 The tenderer has to do his own testing of materials and satisfy himself that they conform to the specifications of respective I.S.I. Codes before tendering.

8.20 The contractor shall himself procure the required construction materials of approved quality including the earth for formation of embankment and water from quarries / sources of his choice. All such quarries / sources of materials required for the work shall be got approved by the Engineer-in-Charge in writing well before their use of the work.

8.21 The contractor shall himself procure the steel, cement, Bitumen, sand, metal, soils, etc., and such other materials required for the work well in advance. The contractor has to bear the cost of materials for conveyance. The department will not take any responsibility for fluctuations in market in cost of the materials, transportation and for loss of materials etc.

8.22 Inspection of site and quarries by the tenderer: Every tenderer is expected before quoting his overall tender percentage, to inspect the site of proposed work. He should also inspect the quarries and satisfy himself about the quality, and availability of materials. The best class of materials to be obtained from quarries, or other sources shall be used on the work. In every case the materials must comply with the relevant standard specifications. Samples of materials as called for in the standard specifications or in this tender notice, or as required by the Executive Engineer, in any case, shall be submitted for the Executive Engineer's approval before the supply to site of work is begun.

8.23 The tenderer's particular attention is drawn to the sections and clauses in the A.P. standard specification dealing with

a) Test, inspection and rejection of defective materials and work.
b) Carriage
c) Construction plant
d) Water and lighting
e) Cleaning up during the progress and for delivery.
f) Accidents
g) Delays
h) Particulars of payments.

8.24 The contractor should closely peruse all the specification clauses, which govern the overall tender percentage he is tendering.

8.25 The defect liability period of contract is 60 months for RCC frame work & its components and 24 months for balance components and the quoted rate shall include the cost associated in rectification of defects during this period, which include materials, labor etc., complete.

8.26 The estimate rates for items shown in the Schedule "A" include all construction materials. No escalation in rates will be paid unless specified in the tender document. The tenderer has to quote an overall tender percentage considering all the aspects of the tender to complete the finished item of work as per the

APSS / MORTH / B.I.S. specifications, the special specifications appended, Drawings etc.

8.27 If there is any contradiction between APSS / MORTH and B.I.S. specifications, listed and detailed technical specifications, the latter shall prevail.

8.28 In case of a job for which specifications are not available with the Schedule or in APSS / MORTH or B.I.S. code and are required to be prescribed, such work shall be carried out in accordance with the written instructions of the Engineer-in-charge.

8.29 The contractor should use the excavated useful soils and stone for construction purpose. Soils used for construction either for homogeneous section in hearting or in casing zone based on the suitability will be at free of cost and the cost of stone used for construction purpose will be recovered from the contractor's bill.

a. The contractor should quote his tender percentage keeping in view of the above aspects.

8.30 Additions and alternations by the Tenderer in the Schedule of quantities will disqualify the tender.

8.31 In the case of discrepancies between the written description of the item in the Schedule "A" and the detailed description in the specification of the same item, the latter shall be adopted.

8.32 The Unit rates noted below are those governing payment of extras or deductions for omissions according to the conditions or the contract as set-forth in the preliminary specifications of the A.P. standard specifications and other conditions of specification of this contract.

8.33 It is to be expressly understood that the measured work is to be taken according to the actual quantities when in place and finished according to the drawings or as may be ordered from time to time by the Executive Engineer and the cost calculated by measurement or weight at their respective rates without any additional charge for any necessary or contingent works connected works connected herewith. The Percentage Excess or less on ECV quoted are for works in situ and complete in every respect.

8.34 For all items of work in excess of the quantities indicated the rates payable for such excess quantities will be tendered rates i.e., estimate rates plus or minus tender percentage.

8.35 For all items of work, intermediate payment will be made provisionally as per relevant clause. Full-accepted agreement rates will be paid only after all the items of works are completed.

8.36 The contractor is bound to execute all supplemental works that are found essential incidental and inevitable during execution of main work.

8.37 The payment of rates for supplement items of work will be regulated as under.

1) Supplemental items directly deductible from similar items in the original agreement.

The rates shall be derived by adding to or subtracting from the agreement rate of such similar item the cost of the difference in the quantity of materials labor between the new items and similar items in the agreement worked out with reference to the schedule of rates adopted in the sanctioned estimate with which the tenders are compared.

2a) similar items but the rates of which cannot be directly deducted from the original agreement.

2b) purely new items which do not correspond to any item in the agreement.

3. The rate of all such items shall be estimated rates plus or minus overall tender percentage.

8.38 **<u>Entrustment of Additional Items.</u>**

a) Where ever additional items not contingent on the main work and outside the scope of original agreement are to be entrusted to the original contractor dispensing with tenders and if the value of such items exceeds the limits upto which the officer is empowered to entrust works initially to contractor without calling for tenders approval of next higher authority shall be obtained. Entrustment of all such items on nomination shall be rates not exceeding the estimate rates.

b) Entrustment of supplement items contingent on the main work will be authorized by the officers upto the monetary limits upto which they themselves are competent to accept items in the original agreement so long as the total amounts upto which they are competent to accept in an original agreement rates for such items shall be worked in accordance with the procedure prescribed in GO Ms.No.1493 PWD, dated: 25.10.1971 and as amended in Govt. Memo number 544 cod 72-22 Dt: 6.7.1973.

c) Entrustment of either the additional supplemental items shall be further subject to the provisions under para 176(b) of APWD Code Viz., the items shall not be ordered by an officer on his own responsibility if the revised estimate or deviation statement providing for the same requires the sanction of higher authority.

<u>Note:</u> It may be noted that the term estimate rate used above means the rate in the sanctioned estimate with which the tender's compared or if no such rate is available in the estimate the rate derived will be with reference to the schedule of rates adopted in the sanctioned estimate with which tenders are compared.

8.39 Special Conditions of Contract:

i. Employer`s right to withhold final payment/s in any contingency: In case of any claim by any workman or others pending in any court of law or tribunal involving the employer also with the contractor/ sub-contractor, the employer is entitled to retain amount in relation to the claim from final bill of contractor till the claim is cleared.

ii. The contract Works shall include any work which is necessary to satisfy the Employer's Requirements, or is implied by the Contract, and all works which (although not mentioned in the Contract) are necessary for stability or for the completion, or safe and proper operation, of the Works.

iii. The Contractor shall be responsible for the adequacy, stability and safety of all Site operations, of all methods of construction and of all the Works.

iv. The Contractor shall, whenever required by the Employer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Employer.

v. The Contractor shall also to submit quality assurance plan within no time from the Contract commencement date for approval of Employer. The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Employer or his representative shall be entitled to audit any aspect of the system.

vi. Details of all procedures and compliance documents shall be submitted to the Employer for information before each design and execution stage is commenced. When any documents of a technical nature are issued to the Employer, evidence of prior approval by the Contractor himself shall be apparent on the document.

vii. The Contractor shall submit the Quality Management Plan for the Contract work. Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

viii. In addition to that, the employer shall conduct either through their employees or through an independent agency the required quality checks with reference to specifications including in quantity, physically rather superficially, also by counter verification of the quality control checks in the labs established by the contractor in respect of each and every item of the works, so that the pay and accounts officer can trust the certifications in making payments.

ix. The contractor who has to engage the full time key personnel in the works-shall instruct atleast 1/3rdamong them to work in quality control area exclusively, that to in coordination with the field engineers andquality control wing of the employer for ensuring qualitative and quantitative performance by checks andbalances.

x. The Contractor shall not deposit materials at any site, which will cause inconvenience to public. The Engineer-in-Charge may direct the Contractor to remove such materials or may undertake the job at the cost of the Contractor. The Contractor shall dispose of the pollutants

and waste if any time to time during the execution of the contract works as per PCB norms with prior permission of the Employer or as and when required by the Employer.

xi. The Contractor shall protect adjoining sites against structural, decorative and other damages that could be caused by the execution of the works and make good at his cost any such damages.

xii. One copy of the plans, drawings, specifications, bill of quantities and any other supplementary data complete with all the latest revisions thereto if any, shall be kept by the Contractor on the Site and the same shall at all reasonable time be available for inspection and use by the Engineer-in-Charge any other Officers of the Employer. Likewise, an order book shall be kept at the site of the Work. As far as possible, all orders regarding the Work are to be entered in this book. All entries shall be signed and dated by the Department Officer direct charge of the Work and by the Contractor or by his representative. In important cases, the Engineer-in-Charge or the Employer will countersign the entries, which have been made. The order book shall not be removed from the Site, except with the written permission of the Engineer-in-Charge.

xiii. Further a complete set of Indian Standard specifications referred to in "Technical Specifications" and A.P.S.S. and APWD Code shall be kept at Site for reference.

xiv. The contractor once entered contract agreement, cannot withdraw, nor ask for novation, alteration or tinker with any of the contract terms and conditions, but for withdrawal if at all with mutual consent and that too with six months advance intimation to the client if at all willing, to make substitute arrangements, otherwise from default in performance makes liable for forfeiture of any amounts due and also the performance security, with all other consequences under the contract. It is the duty of the contractor to secure skilled and unskilled staff as per the pattern of strength, so also to provide the site office with facilities and the vehicles required to be provided for the officers of the employer as mentioned, if choose to bid.

xv. With regards to payment schedule, the payments will always be proportionate to the corresponding work.

xvi. The departmental Engineering officials reserves the right to verify during execution, either by themselves or through an agency, whether the design parameter sare economical or not and if any changes are to be incorporated, the contractor is bound to implement the same, to ensure that work is executed economically.

Note: It is made clear that the General Conditions of the Contract are to be read as subject to the Special Conditions of the Contract. In case of inconsistency or irreconcilability between the General Conditions of the Contract and the Special Conditions of the Contract, the Special Conditions shall prevail over the general conditions.

SCHEDULE –A BILL OF QUANTITIES

NAMEOFWORK:

Sl. No	Approximate quantity in figures/words	Description of work	Unit in figures/ words	Estimate rate in figures/words	Amount in Rs.
		Schedule - A			

NIT.No……./DM/TUDA/TPT/2022-23

PRICE BID

Name of work:-"CONSTRUCTION OF TUDA TOWERS AT NORTH- WEST CORNER OF ANNAMAIAH CIRCLE ABUTTING RC ROAD AND AIR BY-PASS ROAD IN TIRUPATI, TIRUPATI DISTRICT, ANDHRA PRADESH"

Estimated contractvalue **Rs. 210,94,27,091.40**

In Words **(RUPEES TWO HUNDRED AND TEN CROES NINETY FOUR LAKHS TWENTY SEVEN THOUSAND NINETY ONE AND PAISE FOURTY ONLY)**

For SCHEDULE-A i.e., A BILL OF QUANTITIES, I, Sri / Smt./M/s. …….. do hereby express my willingness to execute the aforesaid work as per the conditions, standards, specifications, rules, regulations, etc., stipulated in the tender documents.

a) at an overall tender percentage of (+) ……..…….. (in figures) EXCESS OVER the estimated value.

OR

b) at an overall tender percentage of (-) ……..…….. (in figures) MINUS LESS THAN the estimated value.

OR

c) at estimate value.

Note: - 1. The percentage quoted shall be up to a maximum of two decimals.
2.The percentage for percentage wise tender amount shall not be more than 5% as per GO.MS.No.133, I & CAD, DATED20-11-2004)

SIGNATURE, NAME OF THE TENDERER / AUTHORISED SIGNATORY

BILL OF QUANTITIES

PART-II (Reimbursable provisions)

Name of work: "CONSTRUCTION OF TUDA TOWERS AT NORTH- WEST CORNER OF ANNAMAIAH CIRCLE ABUTTING RC ROAD AND AIR BY-PASS ROAD IN TIRUPATI, TIRUPATI DISTRICT, ANDHRA PRADESH"

GST	: As Specified in Clause 4.102
Seigniorage Charges	: As per clause 4.100
NAC	: @0.10%

NOTE:

1) The rates mentioned in Bill of Quantities are including all taxes, overhead charges and contractors profit but excluding GST, seigniorage charges and NAC

2) As the overhead charges includes engaging technical persons by the contractor, no reimbursement for the personnel will be made separately.

3) If the contractor fails to employ technical persons, the work will be suspended or department will engage technical persons and recover the cost thereof from the contractor.

4) The Seigniorage charges are not included in the data part of estimate. The same is provided an L.S Provision in the general abstract of estimate and this component of seigniorage charges is shown in part -II. The Seigniorage charges shall be added in each bill of the contractor and the same will be recovered and paid to the Government.