ISO 9001 & 14001 CORPORATION

COVER – I

TECHNICAL BID DOCUMENTS / DETAILED TENDER CALL NOTICE FOR THE WORK

Name of the Work:Construction of Block level Stadium (without Indoor Hall), in Kodala Block under Ganjam District.

Estimated Cost Put To Tender-Rs.9.69Crores (Approx.)

CHIEF GENERAL MANAGER (CIVIL)
IDCO, BHUBANESWAR

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ErShantanu Kumar Naik
Chief General Manager(Civil)

File No- IDCO/HO/CIVIL/ T&E/ 5411/ 04/2026 - 25250 **Date: 25.08.2026**

Invitation for Bids

Bid Identification No. Civil/EST- 21/2026-27

The Chief General Manager (Civil) , IDCO , IDCO Towers, Janpath, Bhubaneswar invites **percentage rate bids** in double cover system in online mode only, for the following works.

Sl. No.	Name of Work	Value of work	Divisional Head With Headquarters	Tender Fee	Period of completion	Class of Bidder	EMD
1	2	3	4	5	6	7	8
1.	Construction of Block level Stadium (without Indoor Hall),in Kodala Block under Ganjam District.	Rs.11.38Crore	Divisional Head, IDCO, Berhampur Division, Berhampur	Rs.11,800.00 (On-Line)	09 (Nine) Calendar Months	' Special'& 'A' Class	Rs 11.38 lakhs (On-Line)

1. Bid documents consisting of Plans, Specifications, DTCN / BOQ and the set of terms and conditions of contract and other necessary documents etc can be seen / downloaded from the Government website: **www.tendersodisha.gov.in** during the period dated from 18.00 Hours of dt.**07.09.2026** to 15.00 Hours of dt.**22.09.2026**.
2. Online bids shall be received till 15.00 Hours of dt.**22.09.2026**.
3. Bidders are required to furnish Tender Fee & EMD/Bid security at column (5) & (8) in on-line mode only within the bid submission period. Scanned copy of Transaction receipt of Tender Fee/EMD shall have to be uploaded along with the Technical Bid failing which bid shall be summarily rejected. The bidders with pending or failure payment status shall not be able to submit their bid.
4. The technical bids will be opened at 16.00 Hours of **dt.22.09.2026**in the office of the Chief General Manager (Civil), IDCO, IDCO Towers, Janpath, Bhubaneswar. Bidders who participated in the bid can witness the opening of bids after logging on to the site through their DSC. If the office happens to be closed on the last date of opening of the bids as specified, the bids will be opening on the next working day at the same time and venue.
5. Other details can be seen in the bidding documents.
6. The authority will not be held responsible for any technical snag or network failure during online bidding.
7. The bidder must possess compatible Digital Signature Certificate (DSC) of Class – II or Class – III.
8. The authority reserves the right to reject any or all bids without assigning any reason thereof.
9. The addendum/Corrigendum if any will be hosted in the e-procurement website &www.idco.in website.

Sd/-
Chief General Manager
(Civil)IDCO, Bhubaneswar

Er. Shantanu Kumar Naik
Chief General Manager(Civil)

File No- IDCO/HO/CIVIL/ T&E/ 5411/ 04/2026 /26583 **Date: 07.09.2026**

1st Corrigendum to Tender Call Notice No- 25250Dt25.08.2026

The TCN invited for the work of "**Construction of Block level Stadium, (without Indoor Hall), Kodala Block under Ganjam District''** have been revised as follows.The other terms and conditions of earlier Tender Call Notice NO: **25250Dt.25.08.2026:**

Sl. No.	Items	As per TCN	To be read as
1	Availability of Tender (online)		
(i)	Start date	18.00 hr of dt. 07.09.2026	18.00 hr of dt. 22.09.2026
(ii)	End date	15.00 hr of dt. 22.09.2026	15.00 hr of dt.08.10.2026
(iii)	Opening date	16.00 hr of dt. 22.09.2026	16.00 hr of dt. 08.10.2026

Sd/-
Chief General Manager (Civil)

Odisha Industrial Infrastructure Development Corporation
(A Government of Odisha Undertaking)
IDCO, IDCO Towers, Janpath, Bhubaneswar – 751022, Odisha, INDIA
+91- 0674 - 2541525, 2540820 | Fax:2542956 / 2541982
cgmcivil2@idco.in | www.idco.in

Er. Shantanu Kumar Naik
Chief General Manger (Civil)

File No- IDCO/HO/CIVIL/ T&E/ 5411/ 04/2026/ 28036Date: 22.09.2026

2nd Corrigendum to Tender Call Notice No- 25250Dt.25.08.2026

The Tender date for the work of "**Construction of Block level Stadium, (without Indoor Hall), Kodala Block under Ganjam District"** has been modified as follows without any changesin the other terms & conditions of Notice no**. 25250Dt.25.08.2026**

Sl. No.	Items	As per 1st Corrigendum	To be read as
1	Availability of Tender (online)		
(i)	Start date	18.00 hr of dt. 22.09.2026	18.00 hr of dt. 01.10.2026
(ii)	End date	15.00 hr of dt. 08.10.2026	15.00 hr of dt.15.10.2026
(iii)	Opening date	16.00 hr of dt. 08.10.2026	16.00 hr of dt. 15.10.2026

Sd/-
Chief General Manager (Civil)

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cgmcivil2@idco.in | www.idco.in

Er. Shantanu Kumar Naik
Chief General Manger (Civil)

File No- IDCO/HO/CIVIL/ T&E/ 5411/ 04/2026 / 29242Date: 01.10.2026

3rdCorrigendum toTender Call Notice No- 25250Dt.25.08.2026

The Tender date for the work of "**Construction of Block level Stadium, (without Indoor Hall), Kodala Block under Ganjam District"** has been modified as follows without any changesin the other terms & conditions of Notice no**. 25250Dt.25.08.2026**

Sl. No.	Items	As per 2nd Corrigendum	To be read as
1	Availability of Tender (online)		
(i)	Start date	18.00 hr of dt. 01.10.2026	18.00 hr of dt. 08.10.2026
(ii)	End date	15.00 hr of dt. 15.10.2026	15.00 hr of dt.22.10.2026
(iii)	Opening date	16.00 hr of dt. 15.10.2026	16.00 hr of dt. 22.10.2026

Sd/-
Chief General Manager (Civil)

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cgmcivil2@idco.in | www.idco.in

Er. Shantanu Kumar Naik
Chief General Manger (Civil)

File No- IDCO/HO/CIVIL/ T&E/ 5411/ 04/2026 / 30022Date: 08.10.2026

4thCorrigendum toTender Call Notice No- 25250 Dt.25.08.2026

The Tender date for the work of "**Construction of Block level Stadium, (without Indoor Hall), Kodala Block under Ganjam District"** has been modified as follows without any changesin the other terms & conditions of Notice no**. 25250 Dt.25.08.2026**

Sl. No.	Items	As per 3rdCorrigendum	To be read as
1	Availability of Tender (online)		
(i)	Start date	18.00 hr of dt. 08.10.2026	18.00 hr of dt. 12.10.2026
(ii)	End date	15.00 hr of dt. 22.10.2026	15.00 hr of dt.27.10.2026
(iii)	Opening date	16.00 hr of dt. 22.10.2026	16.00 hr of dt. 27.10.2026

Sd/-
Chief General Manager (Civil)

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Er. Shantanu Kumar Naik
Chief General Manger (Civil)

File No- IDCO/HO/CIVIL/ T&E/ 5411/ 04/2026 /30362Date: 12.10.2026

5thCorrigendum toTender Call Notice No- 25250 Dt.25.08.2026

The Tender date for the work of "**Construction of Block level Stadium, (without Indoor Hall), Kodala Block under Ganjam District"** has been modified as follows without any changesin the other terms & conditions of Notice no**. 25250 Dt.25.08.2026**

Sl. No.	Items	As per 4thCorrigendum	To be read as
1	Availability of Tender (online)		
(i)	Start date	18.00 hr of dt. 12.10.2026	18.00 hr of dt. 15.10.2026
(ii)	End date	15.00 hr of dt. 27.10.2026	15.00 hr of dt.29.10.2026
(iii)	Opening date	16.00 hr of dt. 27.10.2026	16.00 hr of dt. 29.10.2026

Sd/-
Chief General Manager (Civil)

Odisha Industrial Infrastructure Development Corporation
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Er. Shantanu Kumar Naik
Chief General Manger (Civil)

File No- IDCO/HO/CIVIL/ T&E/ 5411/ 04/2026 /30777Date: 15.10.2026

6th Corrigendum toTender Call Notice No- 25250Dt.25.08.2026

The Tender date for the work of "**Construction of Block level Stadium, (without Indoor Hall), Kodala Block under Ganjam District"** has been modified as follows without any changesin the other terms & conditions of Notice no. **25250 Dt.25.08.2026**

Sl. No.	Items	As per Original Tender Call Notice No: 25250Dt. 25.08.2026	As per 5th Corrigendum Notice no:30362 Dt.12.10.2026	Revised/Read as
1.	Value of the work	Rs. 11.38 Crore (Approx.)		Rs.9.69 Crore (Approx.)
2.	EMD	Rs. 11.38 Lakhs		Rs. 9.69 Lakhs
3.	Availability of tender online	From 18.00Hours of Dt. 07.09.2026 to 15.00 Hours of Dt. 22.09.2026	From 18.00Hours of Dt. 15.10.2026 to 15.00 Hours of Dt. 29.10.2026	From 18.00 Hours of Dt. 16.10.2026 to 15.00 Hours of Dt. 30.10.2026
4.	Online bids shall be received	Till 15.00 Hours of Dt.22.09.2026	Till 15.00 Hours of Dt.29.10.2026	Till 15.00 Hours of Dt. 30.10.2026
5.	Technical Bids will be opened	At 16.00 Hours of Dt. 22.09.2026	At 16.00 Hours of Dt. 29.10.2026	At 16.00 Hours of Dt. 30.10.2026

Sd/-
Chief General Manager (Civil)

Odisha Industrial Infrastructure Development Corporation
(A Government of Odisha Undertaking)
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CHECKLIST TO BE ENSURED BY THE BIDDER

Sl. No	Particulars	Reference to DTCN Clause No.	Whether furnished		Reference to Page no.
			Yes	No	
01.	Tender fee Rs.10,000.00 + 18% GST (on-line) *(To be paid On-line)*	**No.4 & 5(i)**			
02.	Bid Security/EMD Rs 9.69 Lakhs @ 1% of the estimated cost put to tender (to be paid online / BG) (Scanned copy of financial instrument shall be furnished)	**No.5(i) & 20**			
	E.M.D. @ 1% in case of deploying machineries outside the state	**No.5(i) & 20**			
03	Additional Performance Security in case the bid price/rate is less than the estimated cost put to tender(to be submitted by the successful lowest(L1)bidder .	**No.62.2**			
04.	Copy of valid Registration Certificate	**No.5 (i) & 21**			
05.	Copy of GSTRegistration Certificate	**No.5 (i) & 21**			
06.	Copy of PAN Card	**No.5 (i) & 21**			
07	EPF Registration	**No.5 (i) & 21**			
08	EPF Latest Challan	**No.5 (i) & 21**			
09	Copy of Profit Loss Statement	**No.5 (i)**			
10.	No Relationship Certificate in Schedule – A	**No.35**			
11.	Works Experience: List of projects under execution / executed that are similar in nature to the work.	**Schedule-B& Schedule –D**			
12. (A)	Information regarding current litigation, debarring / expelling of the tender or abandonment of the work by the tenderer (Schedule-E)	**No.49**			
(B)	Affidavit (Schedule-F)(to be uploaded) (Duly notarized)	**No.49**			
13.	M.O.U. (Memorandum of Understanding duly notarized) with eligible registered electrical contractor having valid H.T. / L.T. license;	**No. 8(i)& Schedule - J**			
14.	Assessed Available Bid Capacity. (The 'Bid Capacity' as a qualifying criteria would be henceforth applied for all works above Rs.3.00 crore only) as per Circular no.11931 dt.07.06.2017.	**No. 113 (h)**			
15.	Similar nature of work. (Schedule- D)	**No. 113 (g)**			
16.	Qualification of Key personnel engaged. (Schedule (G)	**No. 64**			
17.	Work Programme.				
18.	Tools & Plants and machineries as per the requirement in Schedule-C (Minimum **80%** marks to be obtained). (Proof of ownership of Tools & Plants and machineries is to be furnished in shape of copy of invoices with GST No. / required sale deed in case of 2nd purchase / required lease deed with owner ship documents of the leaser duly notarized.(Tax paid invoices are only to be considered) The bidder may produce certificate in the prescribed performa on availability and quality of centering and shuttering materials of the Divisional Head/ equivalent and higher rank officers of Govt./ Govt. undertaking/ PSU issued within 90 days of last date of receipt of tender. Incomplete certificates are liable for rejection.	**No.7 & 113 (e) & Schedule-C**			

Performa for Centrering and Shuttering materials

Certified that M/s……..……..,……..……..…ClassContractor possess……..Sqm of steel shuttering plates and ……. Sqm of ply/ wooden shuttering plates and equivalent centering materials in good condition for use in building construction works. The shuttering materials are physically available at our worksite at …….. and we have no objection if shifted for other works.

Seal and Signature of issuing Authority

	List of plants and equipments	**Requirement**			
(i)	Water Tanker of 4000 ltr. Capacity wheel mounted/mounted over Truck/ Tractor	**2nos**			
(ii)	Truck/Tipper	**2nos**			
(iii)	Welding machine 450 Ampere or more	**1no**			
(iv)	Generator of 125.00 KVA Capacity or more	**1no**			
(v)	Batching Plant of minimum 15 cum/hour capacity	**1no**			
(vi)	Concrete pump with pumping accessories along with minimum 30 mt.pipe	**1 set**			
(vii)	Concrete mixer	**2nos**			
(viii)	Concrete vibrator : Needle type	**2nos**			
(ix)	Concrete vibrator : Screed type	**2nos**			
(x)	Concrete vibrator : Plate type	**2nos**			
(xi)	Complete staging, shuttering, centering arrangement . For steel shuttering-	**2000sqm**			
(xii)	Water Pump – 1 HP Capacity	**2nos**			
(xiii)	Cube Testing Machine	**1 no**			
(xiv)	Excavator	**1 no**			
(xiv)	Bar bending machine	**1 no**			
(xv)	Bar Cutting Machine	**1 no**			
	e-mail ID &				
	Contact no				

CONTRACT DATA

A. GENERAL INFORMATIONS

Sl No	Item	Details
1	Name of the Work	Construction of Block level Stadium (without Indoor Hall), Kodala Block under Ganjam District.
2.	Employer	Chief General Manager (Civil)
3.	Employer's Representative	Divisional Head, Berhampur Division,Berhampur.
4	**Estimated Cost (In.)**	Rs.9.69Crores(Approx.)

B. BID INFORMATION

5	Intended completion period/Time period assigned for Completion		**09(Nine) Calendar Months**
6	Last Date & time of submission of Bid		15.00 Hours of 30.10.2026
7	Tender Fee		
	i	Amount	Tender fee Rs.10,000.00 + 18% GST (on-line)
	ii		Instructions to be followed for online payment available in the e-procurement portal during the process of tender by the bidder.
8	Bid Security		
	i	Amount	9.69 Lakhs**(To be paid online/BG)**
	ii		Divisional Head, IDCO, Berhampur Division, Berhampur
	iii	Type of instrument	**As specified in the BID Document**
9	Additional Performance Security		(ClauseNo.62ofDTCN.) Additional Performance Security (As per Works Department OM No.173 dt.03.01.2026) shall be obtained from the bidder when the bid amount is less than estimated cost put to the tender.Insuchanevent,onlythesuccessfulbidderwhoha squotedlessbidprice/ratesthan theestimated costput to tendershallhavetofurnishtheAdditional PerformanceSecurityas perthefollowingrate.Additionalperformancesecurityshall betaken onan incrementalbasisfromtheselectedbidderforlowbidprices intheprojectworksasunder.
	i	Amount	(I) Where the bid price is below 0% but not below 10% of the project cost put to bid, no additionalperformanceguarantee/securityPercentageis required.
			(ii) Where the bid price is below 10% but not below 20% of the project cost put to bid, the additional performance

			guarantee/security percentage shall be incremented by 0.1% for every percentage of bid price below10% of the projectcost put to bid starting at11% with the additionalbidperformanceguaranteebeing0.1%andthisadditionalperformanceguaranteepercentageshallbeappliedonthebidprice.
			(iii)Where the bid price is 20% or more below of the project cost put to bid, the additional performance guarantee percentage shall be incremented by 0.2% for every percentage of bid price below 20% of the project cost put to bid in additional to 1% of the bid price and this additionalperformanceguaranteepercentageshall beappliedonthebidprice.
			(iv) The additional performance guarantee percentage shall be rounded off to the next lower percentage based on whether the decimal pointof the percentage of bid price is below 0.5% or next higherpercentagebasedonwhetherthedecimalpointofthepercentageof bidpriceis0.5% or more.
			(v)The additional performance security shall be treated as part of the performance security.
			(vi) Justification for abnormally low bids shall be scrutinized by the Departmental Technical Committee and recommended to the competent authority of the Administrative Department for theapproval of the Additional Performance Security (APS). Anabnormally low bid is one in which the Bid price, in combination with other elements of the Bid, appears so low that it raises material concerns as to the capability of the Bidder to perform the contract at the offered price. Procuring Entity may, in such cases, seek written clarifications from the Bidder, including detailed price analyses of its Bid price in relation to scope, schedule, resource mobilization, allocation of risks and responsibilities, and any other requirements of the bid document. If, after evaluating the price analyses, theprocuring entity determines that the Bidder has substantially failed to demonstrate its capability to deliver the contract at the offered price, the Procuring Entity may reject the Bid/Proposal. However, it would not be advisable to fix a normative percentage below the estimated cost,whichwouldautomaticallybeconsideredasanabnormallylowbid.
	ii	In favour of	Divisional Head, BerhampurDivision, Berhampur.
	iii	Type of instrument	**As specified in the BID Document**
10	The Financial years of last five years		2021-2022to 2025-2026
11	Bid validity period		**90 days**
12	Currency of Contract		Indian Rupees

13	Language of Contract	English

Instruction to Bidders (ITB)
e-procurement

1.1. The authority belonging to the major discipline is competent to invite tender of composite bids. He will also nominate the Divisional Head who will deal with all matters relating to the bids in the invitation of bids.

1.2. For composite tender, estimated cost of each component should be clearly indicated in addition to combined estimated cost put to tender. The eligibility of bidders will correspond to the combined estimated cost of different components put to tender.

1.3. The contractor shall comply with the provisions of the Apprentices Act 1961, and the rules /amendments issued there under from time to time. If he fails to do so, it will be considered a breach of the contract and the Chief General Manager / Divisional Head may at his discretion without prejudice to any other right or remedy available under law, cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation of the provisions of the said Act by him.

1.4. The contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Tender and of the rates and prices quoted in the Bill of Quantities, all of which shall, except in so far as it is otherwise provided in the Contract, cover all his obligations under the Contract (including those in respect of the supply of goods, materials, plant & services or of contingencies for which there is a Provisional Sum) and all matters and things necessary for the proper execution and completion of the work and the remedying of any defects therein.

1.5. The successful bidder shall complete the works by the intended completion date specified in the Contract data.

1.6. Throughout these bidding documents, the terms ‘’bid and tender‘’ EMD and Bid Security and their derivatives (bidder / tenderer, bidding / tendering, etc.) are synonymous.

1.7. In case the tender for composite work includes in addition to main work / building work all other ancillary works such as sanitary and water supply installations, drainage installation, electrical work, horticulture work, roads and paths and gate works in dams and canals etc. , the bidder apart from being a registered civil Contractor of appropriate class must associate himself with agencies of appropriate class those who is eligible to tender for sanitary and water supply drainage, electrical and horticulture works in the composite tender. Intending purchasers are not required to produce any documents viz. copy of Registration, GST Registration Certificate etc, at the time of purchase of tender document but will be required for verification purpose at later stage. Furnishing copy of such documents is mandatory along with the tender documents otherwise his/her bid shall be declared as non-responsive and thus liable for rejection. The L1 Bidder is required to attend the officer inviting the bid for verification of original documents within five days of opening the Price bid.

1.8. PARTICIPATING IN THE BID IN THE E-PROCUREMENT PORTAL: The Contractor/ Bidder intending to participate in the bid is required to register in the Portal with some information about the firm/Contractor. This is a onetime activity for registering in Portal. During registration, the contractor has to attach a Digital Signature Certificate (DSC) to

his / her unique user ID. The DSC used must be of appropriate class (Class II or

Class III) issued from a registered Certifying Authority such as n-Code, Sify, TCS, MTNL e-Mudra etc.

1.8.1. To log on to the portal the Contractor/Bidder is required to type his/her username and password. The system will again ask toselect the DSC and confirm it with the password of DSC. For each login, a user's DSC will be validated against its date of validity and also against the Certificate Revocation List (CRL) of respective CAs stored in system database. The system checks the unique ID, password and DSC combination and authenticates the login process for use of portal.

1.8.2. The tender documents uploaded by the Tender Inviting Officer in the website **www.tendersodisha.gov.in** will appear in the section of "Upcoming Tender" before the due date of tender sale. Once the due date has arrived, the tender will move to "Active Tender" Section of the *homepage*. Only a small notification will be published in the newspaper specifying the work details along with mention of the specific website for details. The publication of the tender will be for specific period of time till the last date of submission of bids as mentioned in the 'Invitation for Bid' after which the same will be removed from the list of Active tenders. Any bidder can view or down load the bid documents from the web site.

1.8.3. All bidders are to furnish Tender Fee in online mode (Instructions to be followed for online payment available in the e-procurement portal during the process of tender by the bidder). EMD is to be furnished online mode / BG.Non submission of EMD & tender fee of such party, Bid is liable to be rejected

1.8.4.

1.8.5. If the software application has the provision of payment of Tender Fee through payment gateways of *authorized* bankers by directly debiting the account of the bidders, bidders will be required to avail on-line payment.

1.8.6. The bidder intending to participate in the bid on-line shall furnish costs of bid in online mode (Instructions to be followed for online payment available in the e-Procurement portal during the processing of tender by the bidder)

1.9. ***DELETED***.

1.10. ***DELETED.***

1.11. In the case of any failure, malfunction, or breakdown of the electronic system used during the e-procurement process, the tender inviting officer shall not accept any responsibility for failures or breakdowns other than in those systems strictly within their own control.

1.12. Any third party/company/person under a service contract for operation of e-procurement system in the State or his/their subsidiaries or their parent companies shall be ineligible to participate in the procurement processes that are undertaken through the e-procurement system irrespective of who operates the system.

2. ELIGIBLE BIDDERS:

2.1. This Bid is open to allContractors of the class mentioned in the *Invitation for Bids* registered with the State Governments and Contractors of Equivalent Grade/ Class Registered with Central Government/ MES/ Railways/ IDCO venders for execution of civil works. The Bidders are required to enclose the proof of registration from the registering authority along with the Bid subject only to the registration in the portal using his/her DSC for on-line bids**.**In addition to the above IDCO Vendors of equivalent range are also eligible. The work experience, available technical personnel is to be furnished as per clause 112 of **DTCN**(enclosed).

Contractors not registered with Govt. of Odisha can participate in the e-procurement after necessary enrolment in the portal but have to subsequently register themselves

with the appropriate registering authority of the state Govt./IDCO before award of the work as per prevalent registration norms of the state.The agency that is not registered with the Government of Odisha shall deposit **1% of the EMD** with the Divisional Head at the time of signing the agreement. The amount shall be refunded upon submission of the registration certificate issued by the Government of Odisha.

2.2. All bidders *shall* provide a statement that the bidder is neither associated, nor has been associated, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the Project or being proposed as Project Manager for the

Contract. A firm that has been engaged by IDCO to provide consulting services for the preparation or supervision of the works, and any of its affiliates shall not be eligible to bid.

2.3. If the bidder has a relative employed as an Officer in the rank of Assistant Engineer/Under Secretary and above in the Government of Odisha in the concerned Department, he shall inform the same in **Schedule-I** of the bid document mentioning the exact details in a covering letter along with the tender, failing which his bid will not be considered. Also if the fact of relationship subsequently comes to light, his contract will be rescinded. The bid security or the performance security will be forfeited and he shall be liable to make good any loss or damage resulting from such cancellation. In case the bidder has no relationship with any of the officers mentioned above he shall have to furnish with his bid an undertaking to that effect.

2.4. He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any gazetted officer in the concerned Department. Any breach of this condition by the contractor would render him liable for penal action for suppression of facts.

2.5. **No Engineer of gazetted rank or other gazetted officer employed in Engineering or Administrative duties in an Engineering Department of Govt. of Odisha/IDCO is allowed to work for contractor for a period of two years after his retirement from IDCO service, without prior permission of Govt. of Odisha/IDCO in writing. Such a contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of Govt. of Odisha/IDCO as aforesaid before submission of the tender for engagement in the contractor's service.**

3. QUALIFICATION CRITERIA:

3.1. For submission of Bids through the E-Procurement Portal, the bidder shall up-load the scanned copy/copies of documents listed under clause 3.2 in prescribed format wherever warranted in support of eligibility criteria and qualification information. The L-1 bidder shall have to produce the original documents in support of the scanned copies and statements uploaded in the portal within 5 days of opening of price bid. **The Bids from Joint ventures are not acceptable**.

3.2. The bid shall include following information and documents.

(a) Copy of valid contractor's registration certificate, PAN card, GSTRegistration certificate should accompany the technical bid.

(b) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory.

(c) Major construction equipment to be deployed to carry out the Contract. The contractors are required to furnish evidence of ownership of principal machineries /equipments for only those machineries / equipments asked for in the tender documents.

(d) In case if contractor executing several works, he is required to furnish a time schedule for movement of equipment/machinery from different site to this work site when work is to be executed.

(e) The contractor shall furnish ownership documents for those machineries which he is planning to deploy for the tendered work.

(f) In case the contractor proposes to engage machineries and equipment as asked for in the tender document, owned or hired but deployed outside the state, he/she is required to furnish additional 1% EMD/Bid security.

(g) The contractor intending to use/lease equipment/machineries are required to furnish proof of ownership from the company/persons providing equipment/ lease deed and duration of such contract.

(h) Copy of sub-contract agreement with eligible Registered Electrical Contractors having valid L.T. / H.T. license (Associated with the sub-contractor).

(i) Details of work under progress as per tender documents.

(j) Details of works executed during the last five years and works in hand (list of on-going works as per bid documents).

(k) Copy of EPF Registration & Copy of latest Challan.

(l) Copy of GST Registration Certificate.

3.3. ***DELETED***

3.4. *The Bidders are subject to be disqualified if they have:*

a. Made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or

b. Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.; and/or

c. Participated in the previous bidding for the same work and had quoted unreasonable prices and could not furnish rational justification to the Engineer-in-Charge.

d. Indulged in unlawful & corrupt means in obtaining bids.

e. Been black listed/their registrations by the competent authority.

4. ONE BID PER BIDDER:

4.1. Each bidder shall submit only one bid for one package. A bid is said to be responsive if accompanied by Tender Fee and appropriate bid security. The system shall consider only the last bid submitted through the E-Procurement portal.

5. COST OF BIDDING:

5.1. The bidder shall bear all costs associated with the preparation and submission of his bid, and the Engineer-in-Charge will in no case be responsible and liable for those costs.

5.2. All the rates and prices in the bid shall cover all local taxes, Cess, ferry, tollage charges, royalties and any other charges but excluding GST.GST as applicable will be borne by IDCO

5.3. The rate of royalties and taxes prevailing on the date of measurement shall be considered while making deductions in the bills.

5.4. The successful bidder shall make his own arrangement for all materials unless otherwise specified in the conditions of contract.

6. SITE VISIT:

6.1. Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. A Bidder shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The Bidder shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract

documents. Submission of a bid by a bidder implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which tools and plant, etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of work.

6.2. The bidder, in preparing the bid, shall rely on site Investigation Reports referred to in the Contract Data, supplemented by any information available to the bidder.

6.3. The Officer inviting the bid / Engineer-in-Chargewillclarify queries on the Contract Data on requisition by the intending Bidder. The bidder may ask question in the e-procurement portal using his DSC; provided the questions are raised before the date mentioned in the home page under critical dates.

B. BIDDING DOCUMENTS

7. GENERAL INSTRUCTIONS:

7.1. The description of the work is as mentioned under Invitation for Bid.

7.2. The bids uploaded by the Tender Inviting Officer may consist of general arrangements drawings or typical sections of the project. Bidder may down load these drawings and take out the print for detail study. Any other drawings and documents pertaining to the works available with the officer inviting the Bid as well as in the office of the Divisional Head as mentioned in the contract data will be open for inspection during working hours on all working days by the bidders. The bidder is required to down-load all the documents including the drawings for preparation of his bid. It is not necessary on the part of the Bidder to up-load the drawings other Bid documents (after signing) while up-loading his bid. He is required to up load documents related to his qualification information and Bill of Quantities duly filled in. It is assumed that while participating in the bid, the bidder has referred to all the drawings and documents uploaded by the Officer Inviting the Bids. Seeking any revision of rates or backing out of the bid claiming for not having referred to any or all documents provided in the Bid document by the Officer Inviting the Bids will be construed as plea to disrupt the bidding process and in such cases the bid security shall be forfeited.

7.3. The bidder is expected to examine carefully all instructions, conditions of contract, contract data, forms, terms, and technical specifications, bill of quantities, forms, Annexes and drawings in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder's own risk.

8. CLARIFICATION OF BIDDING DOCUMENTS:

8.1. Bid documents consisting of drawings, plans, specifications, the schedule of quantities of the various items of work to be done and the set of terms & conditions of contract to be complied with by the contractor who intends to bid and other necessary Documents can be seen in the office of the officer inviting the Bid during office hours everyday except on Sundays & Public Holidays till last date of sale of tender paper.

8.2. No paper copy of the bid shall be sold.

8.3. The Contract Data to bid shall be filled and completed in the office of Officer inviting bid before issue of bid documents. If the documents are issued to the intending bidder without having been so filled in & completed, he shall request the officer inviting the bid to have this done before he completes and delivers his bid.

8.4. The bidder can seek clarification on the bidswhich he received earlier than 7 days prior to the deadline for submission of bids. The Employer's response will be forwarded through the e-mail- ID of the enquirer.

8.5. ***PRE-BID MEETING: DELETED***

9. AMENDMENT OF BIDDING DOCUMENTS:

9.1. Before the deadline for submission of bids, the officer inviting the Bid may modify the bidding documents by issuing addenda.

9.2. Any addendumthus issued shall be part of the bidding documents and shall be notified in the website **www.tendersodisha.gov.in /www.idco.in** notice board and will not be published in newspaper.

9.3. To give prospectivebidders reasonable time in which to take an addendum into account in preparing their bids, the Officer inviting the Bid may, at his discretion, extend as necessary the dead line for submission of bids.

C. PREPARATION OF BIDS

10. LANGUAGE OF THE BID:

10.1. All documents relating to the Bid shall be in the English / Hindi / Oriya language. Bids submitted in any other language shall be summarily rejected.

11. DOCUMENTS COMPRISING THE BID:

11.1. Following documents will be deemed to be part of the bid even if not submitted with the bid.

(i) Invitation for Bids (IFB)

(ii) Instructions to bidders (ITB)

(iii) Conditions of Contract

(iv) Contract Data

(v) Specifications

(vi) Drawings

11.2. All the volumes/documents shall be provided in the portal by the Officer inviting the bid. The bidder shall carefully go through the document and prepare the required documents and up load the scanned documents in Portable Document Format to the portal in the designated locations of Technical Bid. He will fill up the percentage rate in the BOQ down loaded for the work in designated Cell and up-load the same in designated locations of Financial Bid. Submission of document shall be effected by using DSC of appropriate class.

A. **"Tender Fee"** shall comprise

(i) Tender Fee(on-line)

(ii) Bid Security (online / BG)

B. **"Technical Bid"** shall comprise.

(i) Declaration under the Official Secret Act, 1923

(ii) Qualification Information and supporting documents,

(iii) Certificates, undertakings, affidavits,

C. **"Financial Bid "**shall comprise.

(i) Priced Bill of Quantities

12. PROPOSAL BY THE BIDDER:

12.1. **In the E-Procurement Portal,** an intelligent Bill of Quantity in Microsoft Excel format shall be made available to the bidder.

12.2. **Deleted**

12.3. In case of **percentage rate** tender, the bidder will only fill in the designated cell and activate "less" or "excess" to indicate how much his price offer is excess or less **(Up to two decimal Place)** than the estimated amount.

12.4. The bidder shall bid for the whole works as described in the Bill of Quantities.

12.5. Bidders shall submit offers that fully comply with the requirements of the bidding documents, Including the Conditions **of** Contract basic technical design as indicated in the drawing and specification. **Conditional offer or alternative offers will not be considered** in the process of bid evaluation.

12.6. All duties, taxes, excluding GST and other levies including Building and other Construction Workers Welfare Cess @ 1% payable by the contractor under the contract, or for any other cause shall be included in the rates, prices submitted by the bidder. GST, purchase tax, turnover tax or any other tax on material in respect of this contract shall be payable by the Contractor and IDCO/Government will not entertain any claim whatsoever in respect of the same.

12.7. In the case of any bid where unit rate of any item/items appear unrealistic, such bid will be considered as unbalanced and in case the bidder is unable to provide satisfactory explanation such a tender is liable to be disqualified and rejected.

12.8.

12.9. Bidders while quoting their offers shall consider the following as regards price adjustment towards **Cement,Steel**&**Bitumen** and escalation of **all components** of work as per Sub-Clause 31 of Condition of P-1 Contract.

12.10. Deleted.

12.11. Deleted.

12.12. Deleted.

12.13. Deleted

12.14. The contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Tender and of the rates and prices stated in the Bill of Quantities, all of which shall, except in so far as it is otherwise provided in the Contract, cover all his obligations under the Contract (including those in respect of the supply of goods, materials, plant & services or of contingencies for which there is a **Provisional** Sum) and all matters and things necessary for the proper execution and completion of the work and the remedying of any defects therein.

12.15. The **contractor shall** conform in all respects, by giving all notices and paying all fees, with the provisions of:

i) Any national or State Statue, Ordinance, or other Law, or any regulation, or bye-law of any local or other duly constituted authority in relation to the execution and completion of the works and remedying of any defects therein, and

ii) The rules and regulations of all public bodies and companies whose property rights are affected or may be affected in any way by the works.

12.16. *FOR **COMPOSITE** BIDS***: DELETED.**

13. CURRENCIES OF BID AND PAYMENT:

13.1. The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees. All payments shall be made in Indian Rupees.

14. VALIDITY:

14.1. Bids shall remain valid for a period not less than **90 days** or the period mentioned in the Contract Data, after the deadline date for submission of bid as specified in the notice inviting the Bids. A Bid valid for a shorter period shall be rejected by the Chief General Manager/ Engineer-in-charge as non-responsive.

14.2. In exceptional circumstances, prior to expiry of the original time limit, the Officer inviting the Bid may request the bidders to extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by cable or by e-mail.

14.3. **DELETED.**

15. BID SECURITY

15.1. The Bidder shall furnish, as part of his Bid, a Bid security for the amount mentioned under Contract Data in online mode as instructed for online payment available / in BG format. The bidder shall scan all the written pages of the bid security and upload the same to the system in the designated place.

The successful lowest bidder will produce the original of all scanned documents for verification within 5 days of opening of the tender (Price Bid). In the eventuality of failure on the part of the lowest successful bidder to produce the original documents, he will be debarred in future from participating in tender for three years and will be blacklisted by the competent authority. In such a situation, successful L-2 bidder will be required to produce his original documents for consideration of his/her tender at the negotiated rate equal to L-1 bidder.

15.1.1. **DELETED**

15.1.2. Fixed deposit receipt of any scheduled bank approved by the Reserve bank of India / Indian Post Office Time deposit/ National Savings Certificate / Kisan Vikas Patra /Bank Guarantee duly pledged in favour of the Divisional Officer from any scheduled Bank in India counter guaranteed by its local Branch at Berhampur/ e- Bank Guarantee executed on the National e-Governance Services limited (NeSL) Digital Document Execution portal towards E.M.D/ISD/ any other security deposit. If EMD/ISD/SD is furnished by any other mode other than the above prescribed mode, the tender of such party is liable to be rejected**.**

15.1.3. **DELETED**

15.1.4. **DELETED**

15.2. The Bid shall be declared non-responsive and shall be rejected if submitted without an acceptable Bid Security and not secured as indicated in Sub-Clauses 15.1.0

15.3. Combined bid security for more than one work is not acceptable.

15.4. All the participating bidders are to be furnish Tender Fee(online) , EMD through(Online/BG) mode.

15.5. Deleted.

15.6. The Bid Security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security and Additional Performance security if applicable.

15.7. The Bid Security may be forfeited

15.7.1. If the bidder withdraws the bid after opening of the bid but within the period of validity.

15.7.2. If the Bidder seeks any revision of rates or backs out of the bid claiming for not having referred to any or all documents provided in the Bid by the Officer Inviting the Bids

15.7.3. DELETED.

15.7.4. In the case of a successful bidder, if the bidder fails within the specified time limit to**.**

15.7.4.1. Sign the Agreement; or

15.7.4.2. Furnish the required Performance Security including additional performance security if any.

16. FORMAT AND SIGNING OF BID:

16.1. The bidder can download the tender of his choice and save it in his system and undertake the necessary preparatory work off-line and upload the completed tender at his convenience within the final date and time of submission. The bidder shall only submit single copy of the required documents and Price Bid in the portal. In the Financial bid, the bidder cannot leave any figure blank. He has to only write the figures, the words will be self-generated. The Bidders are advised to up-load the completed

Bid document well ahead of the last date & time of receipt to avoid any last moment problem of power failures etc.

16.2. The Bidder shall go through the Bid carefully and list the documents those are asked for submission. He shall prepare all documents including Tender Fee, Bid Security, Declaration form, price bid etc and store in the system.

16.3. The bidder shall log on to the portal with his DSC and move to the desired tender for up-loading the documents in appropriate place one by one simultaneously checking the documents. Once the Bidder makes sure that all the documents have been up-loaded in appropriate place, he clicks the submit button to submit the bid to the portal.

16.3.1. Tender cannot be pre-opened and cannot be submitted after due date and time. Therefore, only after satisfying that all the documents have been uploaded, the Bidder should activate submit button.

16.3.2. In the e-procurement process, each process is time stamped. The system can identify each individual who has entered into the portal for any bid and the time of entering into the portal.

16.3.3. The Bidder should ensure clarity of the document up-loaded by him to the portal, especially the scanned documents by taking out sample printing. Non-submission of legible documents may render the bid non-responsive. However, the Officer inviting the Bids if so desires , can ask for legible copies for clarification within a stipulated period of 7 days, provided such document in no way alters the Bidder's price bid. If the Bidder fails to submit Such documents with in the stipulated date, his bid shall be evaluated on it's own merit.

D. SUBMISSION OF BIDS

17. SECURITY OF BID SUBMISSION:

17.1. All bid data uploaded by the Bidder to the portal will be encrypted by the DSC of the opener(s). The system shall require all the mandatory forms and fields filled up by the contractor during the process of submission of the bid/tender.

17.2. The Bid shall be received in encrypted format by the system which can only be decrypted / opened by the authorized openers only on or after the due date and time.

18. DEADLINE FOR SUBMISSION OF THE BIDS :

18.1. The online bidding will remain active till the last date and time of the bid submission. Once the date and time (Server date and time) is over, the bidder will not be able to submit the bid. The date & time of bid submission shall remain unaltered even if the specified date for the submission of bids declared a holiday for the Officer inviting the Bid.

18.2. The officer inviting the bid may extend the deadline for submission of bids by issuing an amendment in accordance with Sub-Clause 9.3, in which case all rights and obligations of the officer inviting the bid and the bidders previously subject to the original deadline will then be subject to the new deadline.

19. LATE BIDS :

19.1. The system shall reject submission of any bid through portal after closure of the receipt time. For all purpose the server time displayed in the e-procurement portal shall be the time to be followed by the bidder and concerned officers.

20. MODIFICATION AND WITHDRAWAL OF BIDS :

20.1. In the E-Procurement Portal, it is allowed to modify the bid any number of times before the final date and time of submission. The bidder shall have to log on to the system and resubmit the documents as asked for by the system including the price bid. In doing so, the bids already submitted by the bidder will be removed automatically from the system and the latest bid only will be admitted. But the bidder should avoid modification of bid at the last moment to avoid system failure or

malfunction of internet or traffic jam or power failure. If the bidder fails to submit his modified bids within the designated time of receipt, the bid already in the system shall be taken for evaluation.

20.2. In the E-Procurement Portal, with-drawl of bid is allowed. But in such case he has to write a letter with appropriate reasons for his withdrawal addressed to the Officer inviting the bid and up load the scanned document to portal in the respective bid before the closure of receipt of the bid. The system shall not allow any withdrawal after expiry of the closure time of the bid.

E. OPENING AND EVALUATION

21. OPENING OF THE BID:

21.1. Bid opening dates are specified during tender creation or can be extended vide corrigendum. These dates are available in IFB , tender document as well as the home page of portal. Bid opening can be done by the authorized users which are defined during the tender publication / approval stage. The bids are encrypted using there public keys and can be decrypted only on or after the Bid Opening due date. The bid openers private key will be required to open the bids and all the openers have to log on to the portal during that time.

21.1.1. The bidders who participated in the on line bidding can witness opening of the bid from any system logging on to the portal with the DSC away from opening place. Contractors are not required to be present during the bid opening at the opening location if they so desire.

21.1.2. Each activity is date and time stamped with **user** details. For time stamping, server time is taken as the reference.

21.2. In the event of the specified date of bid opening being declared a holiday for the Officer inviting the Bid/Engineer-in-Charge, the bids will be opened at the appointed time on the next working day.

21.3. In case bids are invited for more than one package, the order for opening of the “Bid” shall be that in which they appear in the “Invitation for Bid”.

21.4. Deleted.

21.4.1. Combined bid security for more than one work is not acceptable. If the bid security furnished does not conform to the amount and validity period as specified in clause 15 and has not been furnished in the form specified in Clause 15, the bid will be declared non-responsive and rejected.

21.5. The Bid openers; who have been pre-defined shall log on to the portal with their respective DSC. Unless all the Officers who have been declared as Opening officers, log on the portal with their DSC the Tender cannot be opened.

21.5.1. Deleted.

21.5.2. Subject to confirmation of the bid security by the issuing institutions, the bids accompanied with appropriate Tender Fee and valid bid security will be taken up for evaluation with respect to the qualification Information and other information furnished in Part - I pursuant to Clause 3.

21.5.3. After receipt of confirmation of the bid security, the bidder will be asked in writing to clarify his technical bid, if necessary.

21.5.4. The bidders will respond in not more than 7 days of issue of the clarification letter, which will also indicate the date, time and venue of opening of the Financial Bid.

21.5.5. Immediately on receipt of these clarifications, the Evaluating Officers; predefined in the system for the bid, will finalize the list of responsive bidders. They will log on to the site with their DSC and record their comments on the Technical evaluation page in the system. The Officer Inviting the Bid if also the accepting authority, shall log on to the system with his digital signature and check the technical evaluation. He can either accept or pass on to the evaluating officers for re-evaluation. Upon acceptance of technical evaluation by the Accepting authority in the system, the system shall automatically generate letter to all the responsive bidders and the

system shall forward the letter to all the responsive bidder that their technical bid has been evaluated responsive with respect to the data/information furnished by him and the letter shall also intimate him the date & time of opening of financial bid. The system shall also inform the non-responsive bidders in their email ID that their bid has been found non-responsive.

21.6. The Technical evaluation of all the bids will be taken up as per the information furnished by the Bidders. If any of the information/ statements/documents/certificates furnished by the bidder is found to be false/fabricated/bogus, than his registration in the portal shall be blocked and the bidder is liable to be blacklisted as per OPWD codal procedure.

21.7. After **technical** evaluation of the bidders and selection of the qualified bidders, the financial bids of the technically qualified bidders shall be opened on the due date of opening. Members of the bid opening committee log on to the system in sequence and open the financial bids for the technically qualified bidders. The opening of financial bid by the opening officer using their DSC shall decrypt the financial bids.

21.7.1. Opening of price bid and evaluation of lowest bidder is subject to satisfaction of other qualification information asked for in the bid pursuant to Clause-3.

21.7.2. The Officer inviting Bid shall ensure that all the Bidders are individually intimated about the date, time & venue of opening of the financial bid along with the responsiveness of the Technical Bid.

21.7.3. The Financial Bid will be opened on the notified date & time in the presence of bidders or their authorized representative who wish to be present.

21.7.4. At the time of opening of “Financial Bid”, the names of the bidders whose bids were found responsive in accordance with Sub-Clause 24.1 will be announced. The bids of only those bidders will be opened. The remaining bids will be rejected.

21.7.5. The responsive bidders’ names, the bid prices, the item wise rates the total amount of each item, any discounts and withdrawals, and such other details as the officer inviting the tender may consider appropriate, will be announced by him or his authorized representatives at the opening.

21.7.6. Special conditions and/or rebate/discount offer if any uploaded to the system shall be declared and recorded first.

21.7.7. The Financial bid of the bidders shall be opened one by one by the designated officers. The system shall auto-generate the Comparative Statement.

21.7.8. The Bidder can witness the principal activities and view the documents/summary reports for that particular work by logging on to the portal with his DSC from anywhere.

22. PROCESS TO BE CONFIDENTIAL:

22.1. Information relating to the examination, clarification, evaluation, and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by a bidder to influence the officer inviting the bid, processing of bids or award decisions may result in the rejection of his bid.

23. CLARIFICATION OF BIDS:

23.1. To assist in the examination, evaluation, and comparison of bids, the officer inviting the bid may, at his discretion, ask any bidder for clarification of his rates including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable or by e-mail, but no change in the bid price or substance of the bid shall be sought, offered.

23.2. Subject to sub-clause 23.1, no bidder shall contact the officer inviting the bid on any matter relating to his bid from the time of the opening to the time the contract is awarded. If the bidder wishes to bring additional information to the notice of the officer inviting the bid, it should do so in writing.

24. EXAMINATION OF BIDS AND DETERMINATION OF RESPONSIVENESS:

24.1. During the detailed evaluation of "Technical Bids", the officer inviting the bid will determine whether each bid:-

24.1.1. Deleted.

24.1.2. Has submitted legible documents for evaluation

24.1.3. Meets the eligibility criteria defined in *Clause 3* and;

24.1.4. Is substantially responsive to the requirements of the bidding documents.

24.2. During the detailed evaluation of the "Financial Bid", the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e., priced bill of quantities, technical specifications and drawings.

24.3. A substantially responsive "Financial Bids" is one, which conforms to all the terms, conditions, and specifications of the bidding documents, without material deviation or reservation. A material deviation or reservation is one

24.3.1. Which affects in any substantial way the scope, quality, or performance of the works.

24.3.2. Which limits in any substantial way, inconsistent with the bidding documents, the right of the officer inviting the bid or the bidder's obligations under the contract or

24.3.3. Whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

24.4. If a "Financial Bid" is not substantially responsive, it will be rejected by the officer inviting the bid, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

24.5. On opening of the price bid the system shall arrange the financial bids in order of their value (L1 first, followed by L2, L3 ….) for subsequent evaluation. The evaluation status (Sheet) will be visible to all the participating bidders after opening on their respective logins. Each activity is recorded in the system with date and time stamping.

25. EVALUATION OF BIDS: DELETED

25.1. If the officer **inviting** the Bid in his opinion judges that the price quoted by the lowest qualified bidder is high or a special condition imposed by the bidder is to be withdrawn, the bidder shall be invited for negotiation by the officer inviting the Bid or by an officer authorised by him in writing. Negotiations of financial bid with only the lowest bidder shall be carried out, if necessary. Negotiation of bid will be carried out by manual way.

25.2. **DELETED.**

25.3. **DELETED**

25.4. **DELETED.**

25.5. **DELETED.**

F. AWARD OF CONTRACT

26. AWARD CRITERIA:

26.1. The officer inviting the bid will award the contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the lowest evaluated price.

26.2. On acceptance of the tender, the Contractor shall name in writing his accredited representative(s) who would be responsible for taking instructions from the Engineer-in-Charge.

26.3. Competent Authority of Orissa Industrial Infrastructure Development Corporation (IDCO) reserves to himself the right of accepting the whole or any part of the bid and the bidder shall be bound to perform the same at the rate quoted.

26.4. The successful bidder registered under other State Government / MES / Railways / CPWD/IDCO vendors in equivalent rank has to register under state PWD before signing of the agreement.

27. OPTIONS IF THE BIDDER BACKS OUT FROM BIDDING PROCESS :

27.1. In case the 1st lowest Bidder or even the next lowest Bidder withdraw in series one by one, thereby facilitating a particular Bidder for award, then they shall be penalized with adequate disincentives unless adequate justification for such back out is furnished. Appropriate action for blacklisting the bidder shall also be taken apart from dis-incentivizing the bidder**.**

27.2. The bidding process shall be deemed to be complete till the date of issue of letter of acceptance. If the bidder fails to sign the agreement within the stipulated period mentioned under clause 29.2, his bid security shall stand forfeited.

28. RIGHT TO ACCEPT OR REJECT ANY OR ALL BIDS :

28.1. The competent authority of IDCO does not bind him to accept the lowest or any other tender and reserves to him the authority to reject any or all the tenders received without assigning any reason.

28.2. All bids in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the bidder shall be summarily rejected.

29. NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT:

29.1. In the E-Procurement Portal, the system shall generate the template of award letter and the Officer Inviting the Bid shall mention the amount of Performance Security and additional security required to be furnished in the letter and intimate the bidders in his e-mail ID. The issue of the letter of acceptance shall be treated as closure of the Bid process and commencement of the contract.

29.2. The bidder shall within 15 days of issue of letter of acceptance, furnish the Performance security & additional Performance security (if any) in the prescribed form & the work programme& shall sign the agreement in prescribed format, failing which the Engineer-in-Charge shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the Bid Security absolutely**.** The agreement will incorporate all agreements between the officer inviting the bid and the successful bidder.

If L1 bidder does not turn up for agreement after finalization of the tender, then he shall be debarred form participation in bidding for three years and action will be taken to blacklist the contractor. In that case, the L2 bidder, if fulfils, other required criteria would be called for drawing agreement for execution of work subject to the condition

that L2 bidder negotiates at par with the rate quoted by the L1 bidder otherwise the tender will be cancelled. In case a contractor is black listed, it will be widely published and intimated to all departments of Government and also to Govt. of India agencies working in the state.

(Amendment to Para-3.5.14 Note-I of OPWD Code Vol.-I by inclusion).

29.2.1. Following documents shall form part of the agreement.

29.2.1.1. The notice inviting bid, all the documents including additional conditions, specifications and drawings, if any, forming the bid as issued at the time of invitation of bid and acceptance thereof together with any correspondence & documents leading thereto & required amount of performance security including additional performance security as per sub clause 29.2 hereof.

29.2.1.2. Standard Bid Document P.W.D. Form **P-1**

29.3. The letter to proceed with the work shall be issued by Engineer-in-charge only after signing of the agreement. The notification of award will constitute the formation of the contract subject only to the furnishing of performance security and additional performance security in accordance with the provisions of the agreement.

29.4. On acceptance of the composite bids by the competent authority the letter of award will be issued by the Engineer-in-Charge/Divisional Head on behalf of IDCO.

29.5. Upon signing of the agreement by the successful bidder, the Engineer-in-Charge will promptly notify the other bidders that their bids have been unsuccessful.

30. CORRUPT OR FRAUDULENT PRACTICES:

30.1. The Engineer-in-Charge will reject a proposal for award if he determines that the bidder recommended for award has been engaged in corrupt or fraudulent practices in competing for the contract in question. He will report to the Officer Inviting Bid / next higher authority.

30.2. Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable for rejection.

ProcedureforElectronicreceipt,accountingandreportingofCostof TenderPaperandEarnestMoneyDeposit

Onsubmissionofbids

1. The State Government have formulated rules and procedures for Electronic receipt, accountingandreporting of the receipt- of Cost of Tender Paper and Earnest Money Deposit on submission of bidsthrough thee-procurementportalofGovernmentofOdishai.e."https://tendersodisha.gov.in".

2. Electronic receipt of cost of tender paper has been successfully tested through SBI payment gateway.Now it has been decided to introduce electronic receipt of **Cost of Tender Paper and Earnest MoneyDeposit on submission of bids** through payment gateway of designated banks such as SBI/ICICIBank/HDFC Bank for all Government Departments, State PSUs. Statutory Corporations, AutonomousBodies and Local Bodies etc. in phases(ANNEXURE-I). The process outline as well as accounting andreporting structureareindicatedbelow :

a) It will be carried out through a single banking transaction by the bidder for multiple payments like **Cost ofTenderPaperandEarnestMoneyDepositonsubmission ofbids.**

b) Various payment modes like Internet banking/ NEFT/RTGS of Designated Banks and their AggregatorBanksaswellcanbeaccessedbytheintendingbidders.

c) Reporting andaccountingofthee-receiptswill bemadefromasingle source.

d) Credit of receipts into the Government accounts and to the designated Bank account of the participatingentitiesindicatedinPara-2abovewouldbefaster.

3. Only those bidders who successfully remit their **Cost of Tender Paper and Earnest Money Deposit onsubmission of bids would be eligible to** participate in the tender/bid process. The bidders with pendingorfailurepaymentstatusshallnotbeabletosubmittheirbid.Tenderinvitingauthority,StateProcurement Cell,NIC, thedesignated Banksshallnotbeheldresponsible for suchpendencyor failure.

4. Bankingarrangement:

a) DesignatedBanks(SBI/ICICIBank/HDFCBank)paymentgatewayarebeingintegratedwithe-ProcurementportalofGovernmentofOdisha(https://tendersodisha.gov.in)

b) The Designated Banks participating in **Electronic receipt, accounting and reporting of Cost of TenderPaper and Earnest Money Deposit on submission of bids** will nominate a Focal Point Branch called e-FPB, who is authorized to collect and collate all e-Receipts. Each such branch will act as the Receivingbranch and Focal Point Branch notwithstanding the fact that the bidder might have debited his account inanyofthebank'sbrancheswhilemakingpayment.

5. Proceduresofbidsubmission single electronicpaymentoftenderpapercostandEMDbybidder:

a) Log on to e-Procurement Portal: The bidders have to log onto **the** Odisha e-Procurement portal(https://tendersodisha.gov.in) usinghis/herdigitalsignaturecertificateandthensearchandthenselectthe required active tender from the "Search Active Tender" option. Now. submit button can be clickedagainsttheselectedtendersothatitcomestothe"MyTenders"section.

b) UploadingofPrequalification/Technical/Financialbid: Thebiddershavetouploadtherequiredqualifi

cation /Technical/Financial bid, as mentioned in the bidding document and in line with WorksDepartmentof officememorandumno.7885,dt.23.07.2013.

c) Electronic payment of tender paper cost and EMD: Then the bidders have to select and submit thebanknameasavailableinthepaymentoptions

i. A bidder shall make electronic payment using his/her internet banking enabled account with designatedBanksortheiraggregatorbanks.

ii. A bidder having account in other Banks can make payment using NEFT/RTGS facility of designatedBanks.

- OnlineNEFT/RTGSpaymentusinginternetbankingofthebankinwhichthebidderholdshisaccount, by adding the account numberasmentionedinthechallanas an interbankbeneficiary.

d) Bidsubmission: Onlyafterreceiptofintimationatthee-Procurementportalregardingsuccessfultransaction by bidder the system will activate the 'Freeze Bid Submission' button to conclude the bidsubmission process.

e) System generated acknowledgement receipt for successful bid submission: System will generatean acknowledgement receipt for successful bid submission. Thebidder should make a note of **'Bid** ID'generatedintheacknowledgementreceiptfortrackingtheirbidstatus.

6. *Settlementof CostofTenderPaper;*

a) Cost of Tender Paper: In respect of Government receipts on account of **Cost of Tender Paper,** the e-Procurement portal shall generate a MIS for the State Procurement Cell (SPC). The MIS will contain anabstract of the cost of tender paper collected with reference to **Bid Identification Number.** The StateProcurement Cell shall generate Bank-wise-head-wise challans separately for **Cost of Tender Paper** andinstruct the designated Banks to remit the money to the State Government account under different heads.In respect of the cost of tender paper received through the e-procurement portal, the remittance to theCyber Treasury account will be made to the Head of Account 0075-Misc, General Services-800-OtherReceipts-0097-Misc.Receipts-02237-CostofTenderPaper. IDCO Account No. 10835304369 (State Bank of India), IFSC : SBIN0007891.

b) For the time being, the State Procurement Cell (SPC) will use over the counter payment facility of theOdisha Treasury portal.Thereafter, remittancethroughNEFT&RTGSwillbefacilitated through theOdisha Treasury portal.

c) Similarly, in case of State PSUs, Statutory Corporations, Autonomous Bodies and Local Bodies etc., **Costof Tender Paper,** the e-Procurement portal shall generate a MIS for the State Procurement Cell (SPC).The MIS will contain an abstract of the cost of tender paper collected with reference to **Bid IdentificationNumber.**TheStateProcurementCellshallgenerateBank-wiselistofchallansandinstructthedesignated Banks to remit the money through the Odisha Treasury portal. The cost of tender papers willbecreditedtotheregisteredBankaccountoftheconcernedStatePSUs,StatutoryCorporations,AutonomousBodiesandLocalBodiesetc.

d) Bank will refund (in case the Tender Inviting Authority (TIA) issues such instructions) the tender fee, EMDto the bidder, in case the tender is cancelled before opening of Bid as per direction received from TIAthroughe-procurementsystem.

e) Back-end Transaction Matrix of Electronic receipt of Cost of Tender Paper and Earnest Money Deposit onsubmission ofbidsisenclosed intheAnnexure.

7. *SettlementofEarnestMoneyDepositonsubmissionof bids:*

a)

TheBankwillremittheEarnestMoneyDepositonsubmission/cancellationofbidstorespectivebidder saccounts as perdirection received fromTIA through e-procurement system.

8. *For featureofEMD :*

For feature ofEarnestMoneyDepositonsubmissionofbidofdefaultingbidderisoccasionedforvariousreasons.

a) In case the **EarnestMoney Deposit on submission of bid** is forfeited, the e-Procurement portal willdirecttheBanktotransfertheEMDvaluefromthePoolingAccountofSPCtotheregisteredaccountofthe tenderinvitingauthority.

b) The Tender inviting authorities of the Government Departments will deposit the forfeited **Earnest MoneyDeposit on submission of bid,** in the State Government Treasury under the appropriate head (8782-CashremittancesandAdjustmentsbetweentheofficersrenderingaccountstothesameAccountsOfficer-102-P.W.Remittances-1683-Remittances-91028-RemittancesintoTreasury)aftertakingtheamount as a revenue receipt in their Cash Book under the head 0075-Misc. General Services-00-101 —Unclaimed Deposits-0097-Misc, Receipts-02080-Misc. Deposits and submit the detail account to DAG(Puri)asadepositoftheDivision.

c) By clicking submit button, system will initiate the forfeiture of EMD. System will not allow the evaluator toedit the initiation after clicking the submit button. Forfeiture option can be carried out in phased mannerlike onebidderatatime.

9. Roleofthe Banks:

a) Make necessary provision / customizations at their end to enable the provision for online payments /refundsasperthisdocument.

b) Providenecessaryreal-timemessagetobiddersregardingsuccessfulorunsuccessfultransactionsduring online payment processes and redirect them to e-Procurement website with necessary transactionreferencedetailsenablingthemtosubmittheirbids.

c) ThebankshallensuretransferoffundsfromthepoolingaccounttotheGovernmentHead/currentaccountofPSUs/ULBswithinthenextbankworkingdayasperthedirectionsgeneratedfrome-Procurementportal.

d) Bank should provide timely reports and reference details to NIC enabling them to carry out their role asstatedbelow.

e) Refund of amount to bidders as per the XML file provided by e-Procurement system on the next bankworking day from the date of generation of the XML file and also provide a confirmation to NIC on thesame.

10. RoleofStateProcurementCell:

a) Communicate requirements of Government departments/ State PSUs/ Autonomous Bodies/ ULBs onlinepayment requirementsto National InformaticsCentre/the authorized Banksformapping/customization.

b) In every working day, the State Procurement Cell shall generate MIS from the e-Procurement portal toascertainthetenderpapercostreceivedinthee-Tenderingprocessseparatelybank-wisefortheGovernmentDepartmentandthePSUs/ULBs.TheSPCshallgeneratebank-wiseseparateonlinechallans from the Odisha Treasury portal and make the remittance through over the counter facility orNEFT/RTGS (as and when this functionality is available in Treasury portal) and issue instruction to thebankforremittanceofthereceiptto theStateGovernmentaccount.

c) The State Procurement Cell shall be responsible for providing challan details and MIS in respect of theremittancetowardstenderpapercosttotheTenderinvitingauthoritiesfortheirrecord.

d) State Procurement Cell shall monitor the progress of e-Tendering by different Government departments /State PSUs/ Autonomous Bodies / ULBs through an MIS. State Procurement Cell shall monitor and sendmonthlyprogressreportstotheGovernment.

e) The e-Procurement systemwill generate a consolidated refund & settlement XML file asan end oftheday activity.

f) e-procurement system will provide a web service for payment gateway (PG) provider to pull the encryptedrefundandsettlementdetailsinXMLfileagainstaday.

g) Similarly, payment gateway (PG) provider will provide a web service to pull the refund and settlementstatusagainstaday

h) e-procurementsystemwillupdatethestatus accordinglyforreconciliation report.

11. RoleofNational InformaticsCentre:

Customize e-Procurement software and web-pages of Government ofOdisha(https://tendersodisha.gov.in)to enabletheprovisionforelectronicpayment.

a) TheNIC, Odishawillmodify/ rectifytheerrorsinelectronicdatarelatingto theChart ofAccount.

b) NIC willprovide an interfaceto organisations todownloadtheelectronic receipt data.

c) Enable automatic generation of daily XML files from e-Procurement system and ensure delivery of thesametothe authorized Banksforenablingautomaticrefund/settlementoffunds.

d) NIC shall enable the e-Procurement portal to generate MIS as required for the State Procurement Cell inorder to make remittance of the tender paper cost to the State Government account using the OdishaTreasuryportal.

12. *RoleofCyberTreasury*:

a) The cost of the tender paper deposited by the SPC using the Odisha Treasury Portal which willbeaccounted for by the Cyber Treasury and it shall submit the accounts to A.G (O) as per the establishedprocess.

b) TheCyberTreasurywillprovideMISasrequiredtotheSPCforthepurposeofaccountingandreconciliationofthe electronicremittancesmadetotheState Governmentaccount.

13. *Redressalof Publicgrievances* :

a) The State Procurement Cell, Odisha, National Informatics Centre, Odisha and the e-FPB will have aneffectiveprocedurefor dealingwithpubliccomplaintfore-Receiptrelatedmatters.Incase,anymistakeisdetectedbyanyofthestakeholdersinreportingofreceiptoftenderpapercostandEMD,eithersuomoto or on being brought to its notice, the State Procurement Cell, Odisha, National InformaticsCentre, Odisha unit, Cyber Treasury and the bank will promptly take steps for rectification. The e-FocalPoint Branch of the participating Banks, National Informatics Centre, Odisha and the State ProcurementCell, Odisha will notify the contact number and address of the Help Desk for resolution of any disputeregardinge-Receipt.

14. *Applicabilityandmodificationofexistingrules/orders:*

The modalities prescribed in this Office Memorandum for downloading of tender paper, submission andrejection of bid, acceptance of Bids as well as refundand forfeiture of earnest deposit will be applicablefor electronic submission of bids through e-procurement portal. Existing provisions regulating cost oftender paper, earnest money deposit in OPWD Code and OGFR would stand modified to the extentprescribed.

15. These arrangements would be made effective after signing of MoU between the designated Banks and the StateProcurementCell,firmingupofBankingarrangementsandtechnicalintegrationbetweendesignatedBanka nde-ProcurementPortal.

ANNXURE-I

Back-end Transaction Matrix of Electronic receipt and remittance of Cost of Tender Paper and EarnestMoneyDepositonsubmission ofbids.

	CostofTenderPaperon submissionofbids	**Earnest Money Deposit onsubmissionofbids**
Governmemt Departments	I. Thepaymenttowardsthecostof Tender Paper, in case Government Departments shall be collected in Separate Pooling accounts opened in Focal Point Branch called e-FPB of respective designated banks[as stated in Para2] at Bhubaneswar on T+1_day.	I. In case of tenders ofGovernment Departments, amount towards Earnest Money Deposit on submission of bids shallbe collected in a pooling account opened for this purposeatFocalPointBranch called e-FPB of respective designated banks at Bhubaneswar and the banks will remit the amount to respective bidder's account with in two working days on receipt of instruction fromTIA through refund and settlement of e-procurement system
	II.Withreferencetothe Notice Inviting tender/Bid IdentificationNumber, the amounts to realized is tobe remitted to Government AccountUnder the Head of Account 0075-Misc.General Services-800-OtherReceipts-0097-Misc.Receipts-02237-Cost of Tender PaperThrough OdishaTreasuryPortalafteropeningofthebid	ii.In case of forfeiture of earnest Money deposit on submissionof bids, the e-ProcurementportalwilldirecttheBanktotransferthe EMD valuefromthe PoolingAccount of SPC to the registered accountofthetender invitingauthoritywithin two working daysofreceiptofinstruction fromTIA.

	CostofTenderPaperon submissionofbids	**Earnest Money Deposit onsubmissionofbids**
State PSUs Statutory Corporations, Autonomous Bodies and Local Bodies.	I. IncaseofStatePSUs,Statutory corporations,Autonomous bodies and Local Bodies etc.the amount towards **Cost of Tender Paper,** on submission of bids shall be collectedin separated pooling accounts opened in local Point Branch called e-FPB of respective designated Banks at Bhubaneswaron T+1days.	I.Amount towards EMD on submission of bids shall be collected in a separate pooling account of Focal Point Branch called e-FPB of respective designated banks atBhubaneswar and the banks will remitthe amount to respective bidder"s account on receipt of instruction from TIAthrough refund and settlement of e-procurementsystem with in two working days from receipt of such instruction.
	II. The Paper cost will be transferred to the respective current accounts ofConcerned State PSUs, StatutoryCorporation,AutonomousBodies and Local Bodies etc. after opening of bid.	II. Incase of forfeiture of Earnest Money deposit on submissionof bids, the e-Procurement portal will direct the Bank to transfer the EMD value fromthe Pooling Account of SPC to the registeredaccount of the tender inviting authority within two working days of receipt of Instruction from TIA.

DETAILED TENDER CALL NOTICE

1. Sealed **percentage rate** bids are invited **in double cover system** from the Class of eligible contractors registered as vendor of IDCO/the State Government and contractors of equivalent Grade / classregistered with Central Government / MES / Railways having registration for Civil, Electrical and P.H.works for execution of Civil / E.I. / P.H. works on production of definite proof from the appropriate authority in prescribed firm to be eventually drawn in P.W.D. FORM P-1 for the work**"Construction of Block level Stadium (without Indoor Hall), Kodala Block under Ganjam District."**Contractors not registered with Govt. of Odisha can participate in the e-procurement after necessary enrolment in the portal but have to subsequently register themselves with the appropriate registering authority of the state Govt. before award of the work as per prevalent registration norms of the state.

a) This tender is of composite nature and consisting of Civil, P.H & Electrical works.

b) This detailed Tender Call Notice along with the clauses mentioned herein shall form a part of the contract and agreement.

2. The Bid documents are available on official website of Government: *https://www.tendersorissa.gov.in* from **18.00Hrs of dt.16.10.2026to 15.00 Hrs of dt.30.10.2026.**The last date and time of submission of Bid is as per contract data.

3. The Technical Bid documents **(Cover–I)** will be opened by the assigned officer in the office of the officers inviting the bid at **16.00 Hours dt.30.10.2026**in the presence of the bidders or their authorized representatives who wish to attend. After evaluation of the documents contained in Cover-I, the Cover-II containing price bid/s of the technically responsive bidder/s will be opened. The date, time and place of opening the price bid will be intimated to the eligible qualified bidders through system generated E-mails.

4. The Tender fee of **Rs.11,800.00**will be submitted online only as per the Instructions available in the e-Procurement portal during the processing of tender by the bidder.

5. The bid is to be submitted in two covers.

i) **Cover-I** is to contain scanned copy of **Tender fee**, **EMD,**Registration Certificate, PAN, GST Registration Certificate, EPF Registration, EPF latest challanList of similar nature of works, affidavit, and all other documents required as per the relevant clauses of this DTCN.

ii) **Cover-II** is to contain the **PRICE BID** duly filled in and signed by the bidder and scanned copy of Additional Performance Security as per the relevant clauses of this DTCN.

6. Furnishing scanned legible copy of Original Registration certificate, GST Registration Certificate, PAN card,EPF Registration along with the Technical Bid is mandatory otherwise his/ her bid shall be declared as non-responsive and thus liable for rejection.

7. **(i) The Contractors are required to furnish scanned copy of evidence of ownership showing the possession of principal machineries/equipment as per Annexure-I in Schedule-C for which contractor shall have to secure minimum 80% of marks failing which the tender shall be liable for rejection.**

(ii) In case the contractor proposes to engage machineries and equipment as asked for in the tender document, owned or hired but deployed outside the State, he/she is required to furnish 1% EMD / Bid Security. The bid security shall stand forfeited in case the contractor fails to mobilize the machineries within a period as to be able to execute an item of work as per original programme which will be part of the agreement.

(iii) The contractor intending to hire/lease equipments/machineries are required to furnish proof of ownership from the company/ person providing equipments/ machineries on hire/lease along with contracts/ agreements/lease deed and duration of such contract. The contracts/agreements/lease deed should be on long term basis

for a minimum period of 12 (Twelve) monthsas mentioned in contract data from the last date of receipt of Bid documents.

8. The civil contractor in order to take part in the composite tender should enter into an M.O.U. (Memorandum of Understanding duly notarized) with eligible registered electrical contractor having valid H.T. / L.T. license; for execution of electrical installation and other electrical works and a copy of such M.O.U. should be attached with the tender as per the proforma at **Schedule- J** which shall form a part of tender. A copy of electrical license should also be enclosed with the tender papers, the original of which need to be furnished during verification. The above M.O.U. is not required in case of the civil contractor having valid registration in H.T. / L.T. electrical license with the same name & style.

9. (i)The contract will be drawn in PWD P-1 contract Form

The contract will be drawn & signed by **Divisional Head, IDCO, BerhampurDivision, Berhampur**.The Civil/Electrical/PH item of the work will be supervised &measured by **Divisional Head, IDCO, Berhampur Division, Berhampur**& Final payment will be released by the Officer of IDCO executing the agreement.

10. If an individual makes the application, the individual should sign (with DSC) above his full type written name and current address.

11. If the application is made by proprietary firm, it shall be signed (with DSC) by the proprietor & furnish full type written name and the full name of his firm with its current address in a forwarding letter.

12. If the application is made by a firm in partnership, it shall be signed (with DSC) by a partner holding power of attorney for the firm in which case a certified copy of the power of attorney shall accompany the application. A certified copy of the partnership deed and current address of all partners of the firm shall also accompany the application.

13. If the application is made by a limited company or a corporation, it shall be signed (with DSC) by a duly authorized person holding power of attorney for signing the application in which case a certified copy of the power of attorney shall accompany the application. Such limited company or corporation will be required to furnish satisfactory evidence of its existence along with the technical bid.

14. The tender should be strictly in accordance with the provisions as mentioned in the tender schedule. Any change in the wordings will not be accepted.

15. The work is to be completed in all respects within **09 (Nine)**calendar months from the date of issue of work order. Before acceptance of tender, the successful bidder will be required to submit a work programme and milestone basing on the financial achievement so as to complete the work within the stipulated time and in case of failure on the part of the agency to achieve the milestone liquidated damage will be imposed

(Amendment to Para-3.5.18 Note-VIII of OPWD Code Vol.-I).

16. All tenders received will remain valid for a period of **90 days** from the last date prescribed for receipt of tenders and validity of tenders can also be extended if agreed by the tenderers and the Department.

17. The tenderer shall carefully study the tentative drawings and specifications applicable to the contract and all the documents, which will form a part of the agreement to be entered in to, by the accepted tenderer and detailed specifications for Odisha, and other relevant specifications and drawings, which are available. Complaint at a future date that the tenderers have not seen plans and specifications cannot be entertained.

18. The drawings furnished with the tender are tentative and subject to revision or modification as tendered during the execution as per actual necessity and detail test conducted. But the tendered rates quoted by the tenderer will hold good in case of such modification of drawings during the time of execution and shall in no way invalidate the contract and no

extra monetary compensation will be entertained. The work shall however be executed as per final approved drawing to be issued by the Engineer-in-Charge as and when required.

19. By admission of a tender for the work, a tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the work, about the quality and availability of the required quantity of material including the wheat/ rice referred to above, medical aid, labour and food stuff etc., and that rates quoted by him in the tender will be adequate to complete the work according to the specifications attached there to and that he had taken in to account all conditions and difficulties that may be encountered during its progress and to have quoted rates including labour and materials with taxes, octroi, other duties, lead, lifts, loading and unloading, freight for all materials and all other charges necessary for the completion of the work, to the entire satisfaction of the Engineer-in Charge of the work and his authorized subordinates. After acceptance of the contract rate Government will not pay any extra charges for any reason in case the contractor claims later on to have misjudged as regard availability of materials, labour and other factors.

For the purpose of estimate, the approved quarry lead is to be provided judiciously. Engineers in charge would be responsible for ensuring the quality of the materials supplied. The contractors would, however, be responsible for procurement of material from authorized sources and voluntarily disclose the source of procurement for the purpose of billing. Besides, the bidder would be required to submit the details of quarry for procurement while submitting the bids.

(Amendment to Para-3.4.16 (a) (vii) of OPWD Code Vol.-I by substitution).

20. The bid must be accompanied by security amount along with tender in the form of Fixed Deposit Receipt of Nationalized /Scheduled Bank / Kissan Vikash Patra / Post Office Savings Bank Account/National Savings Certificate / Post Office Time Deposit Account pledged in favor of Divisional Head, IDCO, Berhampur Division, Berhampur payable at Berhampur/ Bank Guarantee in favour of the Divisional Head, IDCO, Berhampur Division, Berhampur payable at Berhampur from any Nationalized / Scheduled Bank in India Counter guaranteed by its local branch at Berhampur/ Insurance Surety Bond/ e-Bank Guarantee executed on the National e-Governance Services Limited (NeSL) Digital Document Execution Portal as per the terms and conditions laid down in OGFR and in no other form. Tenders not accompanied with E.M.D. as specified above will not be considered. No adjustment of E.M.D. from one work to another will be entertained. Bidders desirous to hire machineries or equipment from outside the state or owned but deployed outside the state are required to furnish additional one percent (1%) EMD / Bid Security. Tenders not accompanied with scanned copy of E.M.D. as specified above shall be declared as non-responsive and thus liable for rejection. No adjustment of E.M.D. from one work to another will be entertained. The bid security should remain valid for a minimum of 45(Forty-five) days beyond the bid validity period.

(N.B.:- Bank Draft / Pay orders or Bankers cheque from any Nationalized banks in favour of the officer inviting the bid shall not be considered as E.M.D).

21. The tender should be accompanied with the Scanned copies of the valid Registration certificate, GSTRegistration certificate and PAN card **EPF Registration, EPF latest Challan,** *which* are mandatory, otherwise his/her bid shall be declared as non-responsive and thus liable for rejection.

22. The tender containing extraneous conditions not covered by the tender notice are liable for rejection and quotations should be strictly in accordance with the items mentioned in the Tender Call Notices. Any change in the wording will not be accepted.

23. The department reserves the right of authority to reject any or all tenders received without assigning any reason whatsoever.

24. **The earnest mpney of the L-1 bidder will be retained and will be dealt with as per terms and condition of O.P.W.D. Code. The retention of E.M.D. with the Department will carry no interest.**

25. C.G.M. inviting tender will notify the Divisional Head about the acceptance of tender with a copy to the bidder / tenderer whose bid has been accepted of the award prior to expiration of the validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the conditions of Contract called the "Letter of Acceptance") will state the sum that the Engineer-in-charge 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 Price").

The Notification of award will constitute the formation of the contract, subject only to the furnishing of a performance security (Initial Security Deposit) in form of Deposit receipt of Schedule Bank / Kissan Vikash Patra / Post Office Savings Bank Account/National Savings Certificate / Post Office Time Deposit Account pledged in favour of **Divisional Head, IDCO, Division- Berhampur, payable at Berhampur**/ Bank Guarantee in favour of the **Divisional Head, IDCO, Division- Berhampur Division, Berhampur** from any Nationalized / Scheduled Bank in India Counter guaranteed by its local branch at Berhampurand in no other form, which shall be 2% of the value of the tendered amount (excluding 1% deposited towards hiring of equipment's / machineries from outside the state if any) and sign the agreement in the P.W.D. form No. P-1 (Schedule XLV No. 61) for the fulfillment of the contract in the office of the **Divisional Head, IDCO, Division- Berhampur & payable at Berhampur**oras directed. The security deposit together with the amount withheld according to the provision of P-1 agreement shall be retained as security for the due fulfillment of this contract and additional performance security in accordance with the provisions of the agreement.

The agreement will incorporate all agreements between the officer inviting the bid/ Engineer-in Charge and the successful bidder within 15 days following the notification of award along with the Letter of Acceptance. The successful bidder will sign the agreement and deliver it to the Engineer-in Charge. Following documents shall form part of the agreement.

a) The notice-inviting bid, all the documents including additional conditions, specifications and drawings, if any, forming the bid as issued at the time of invitation of bid and acceptance thereof together with any correspondence leading thereto & required amount of performance security including additional performance security.

b) Standard P.W.D. Form P-1 with latest amendments. Failure to enter into the required agreement and to make the security deposit as above shall be liable for penal action. No contract (tender) shall be finally accepted until the required amount of initial security money is deposited. The security will be refunded after 12 (Twelve) months of completion of the work and payment of the final bill and will not carry any interest. As concurred by the Law Department & Finance Department In their U.O.R. No 848 dtd.21.05.97 J.O.R.No.202 W.F.D. dtd.06.03.98 & as per works Department Office Memorandum No.5984 dt. 27.04.2021, the EMD will be forfeited & the panel action will be initiated, in case, where tenderers back out from the offer before acceptance of tender by the competent authority.

26. The contractor should be liable to fully indemnify the Department for payment of compensation under workmen compensation act. VIII of 1923 on account of the workmen employed by the contractor and full amount of compensation paid will be recovered from the contractor.

27. Tenderers are required to liable by fair wages clause as introduced by Govt. of Odisha, Works Department letter No.VII (R&B) 5225, dt.26.2.55 and No.II, M-56/61-28842 (5), dt.27.9.61.

28. The contractor shall bear cost of various incidentals, sundries and contingencies necessitated by work in full within the following or similar category.

a) Rent, royalties**(including additional charges with EMF & DMF as per Lr. no. 38234, dtd. 10.11.2022 of R & DM Deptt. & Lr. No. 1194 dt 02.02.2026 of the Additional Secretary to Govt. of Odisha,Steel& mines Department)**, cess and other charges of materials, Octroibut**excluding GST**. Ferry tolls, conveyance charges and other cost on account of land

buildings including temporary building required by the tenderer for collection of materials, storage, housing of staff or other purpose of the work are to be borne by the contractor at his own cost. No rent will be payable to Govt. for temporary occupation of land owned by govt. at the site of the work for bonafide use of the land for work and all such construction of temporary nature by the contractor shall be done after obtaining written permission from the Engineer-in-Charge of Civil portion of the work and all such construction shall have to be demolished and debris removed and ground made good and cleared after completion of the work at no extra cost.

b) Royalty **(incl. addl. Charges with EMF & DMF)**will be recovered from each bill as notified by Govt. from time to time unless R Forms are submitted. Refund of royalty at later date after passing of the bills cannot be entertained as the recovery of royalty is being credited to revenue.

c) Labour camps or huts necessary to a suitable scale including conservancy and sanitary arrangements therein to the satisfaction of the local labour laws and health authorities shall have to be provided by the Contractor.

d) Arrangement of suitable water supply including pipe water supply where available for the staff and labour as well as for the execution of the work is sole responsibility of the Contractor and no extra cost for carriage of water will be entertained.

e) All fees and dues levied by Municipal, Canal or Water Supply Authorities are to be borne by the Contractor.

f) Suitable safety equipments and dresses, gloves, life belts etc. for the labour engaged in risky operations are to be supplied by the contractor at his own cost.

g) Suitable fencing barriers, signals including paraffin and electric signals where necessary at work and approaches in order in project the public and employees from accident has to be provided by the Contractor at his own cost.

h) Compensation including cost of any legal suit for injury to persons or property arising out of execution of the work and also any sum, which may become payable due to operation of the workmen compensation act, shall have to be borne by the contractor.

i) The contractor has to arrange adequate lighting arrangements for the work wherever necessary at his own cost.

29. No payment will be made for layout, benchmark, level pillars, profiles and benching and leveling the ground required, which has to be carried out by the contractor at his own cost. The rates to be quoted should be for finished items of work inclusive of carriage of all materials and all incidental items of work.

30. After the work is finished all surplus materials should be removed from the site of work, preliminary work such as vats, mixing platforms, etc. should be dismantled and all materials removed from the site and premises left neat and his should be inclusive in the rates. No extra payment will be made to the Contractor in this account.

31. It should be understood clearly that no claim what-so-ever will be entertained to extra items of works quantity of any item besides estimate amount unless written order is obtained from the competent authority and rate settled before the extra items of work or extra quantity of any items of work is taken up.

32. The tenderers shall have to abide by the C.P.W.D. safety code rules introduced by the Govt.of India, Ministry of Works and Housing & Supply in their standing order No.44150, dt.25.11.57

33. No part of the contract shall be sublet without written permission of the officer inviting the bid or transfer to be made by the power of attorney authorizing others to receive payment on contractor's behalf.

34. Bid documents consisting of plans, specifications, the schedule of quantities and the set of terms and conditions of contract and other necessary documents can be seen in all the offices issuing the documents and office of the under signed during office hours every day except on Sundays and Public Holidays till last date of sale and receipt of tender papers. Interested bidders may obtain further information at the same address. But it must be clearly understood that tenders must be received in order and according to instructions in complete shape. Incomplete tender is liable for rejection.

35. No Relation certificate.

The contractor shall furnish a certificate along with the tender to the effect that he is not related to any officer in the rank of a Deputy Manager & above in IDCO. If the fact subsequently proved to be false, the contract is liable to be rescinded. The earnest money & the total security will be forfeited & he shall be liable of make good to damages the loss or damages resulting for such cancellations. The proforma for no relationship certificate is contained in a separate sheet vide **Schedule-A**.

36. Payment for Variation in Price:-(Vide Works Department Memorandum No.15847 Dt. 19.11.2019)Contract price shall be adjusted for increase or decrease in rates and price of Labour, materials, Fuels, & Lubricants and Plant & Machineries spare component in accordance with the following principles and procedures as per formula given below:-

36. **Price Adjustment**

36.1 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with the following principles and procedures and as per formula given in following Paras.

(a) The price adjustment shall apply for the work done from the start date given in the contract data up to end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.

(b) The price adjustment shall be determined during each month from the formula given in following Paras

(c) Following expressions and meanings are assigned to the work done during each month:

R= Total value of work done during the month. It would include the amount of secured advance granted, if any, during the month, less the amount of secured advance recovered, if any during the month. It will exclude value for works executed for extra items under variations.

36.2 To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

The formula (e) for adjustment of prices are:

36 (a) (i): Adjustment of Other Materials Component

Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen, pipe and POL procured by the contractor shall be paid in accordance with the following formula:

V_M = 0.85 X Pm/100 X R x $(M_1 - M_0)/M_0$

V_M = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local materials other than cement, steel, bitumen and POL.

M_0 = The all India wholesale price index (all commodities) on 28 days preceding the date of opening of Bids, as published by the Ministry of Commerce and Industry Government of India, New Delhi.

M_1= The all India wholesale price index (all commodities) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_m = Percentage of local material component (other than cement, steel, bitumen and POL) of the work.

36 (a) (ii): Adjustment for Cement Component

Price adjustment for increase or decrease in the cost of cement procured by the contractor shall be paid in accordance with the following formula:

$Vc = 0.85 \times Pc /100 \times R \times (C_1-C_0)/C_0$

Vc = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for cement

C_0 = The all India wholesale price index for Ordinary Portland Cement (OPC) on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

C_1= The all India wholesale price index for Ordinary Portland Cement (OPC) for the month under consideration as published by the Ministry of Commerce and Industry, Government o f India, New Delhi.

Pc = Percentage of Cement Component of the work.

36 (a) (iii): Adjustment for Steel Component

(iii) Price adjustment for increase or decrease in the cost of steel procured by the contractor shall be paid in accordance with the following formula:

$Vs = 0.85 \times Ps/100 \times R \times (S_1- S_0)/S_0$

Vs= Increase or decrease in the cost of work during the month under consideration due to changes in the rates for steel.

S_0 = The all India wholesale price index for steel (Mild Steel long products) on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

S_1= The all India wholesale price index for steel (Mild Steel long products) for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

Ps = Percentage of steel component of the work.

Note: For the application of this clause, index of (Mile Steel long products) has been chosen to represent steel group.

36 (a) (iv): Adjustment of Bitumen Component

Price adjustment for increase or decrease in the cost of bitumen shall be paid in accordance with the following formula:

$V_b = 0.85 \times P_b/100 \times R \times (B_1- B_0)/B_0$

V_b = Increase or decrease in the cost of work during the month under consideration due to changes in the rate for bitumen.

B_0 = The official retail price of bulk bitumen at the IOC / BPCL depot at nearest center on the day 28 days prior to date of opening of Bids.

B_1 = The official retail price of bulk bitumen at IOC / BPCL depot at nearest center for the 15th day of the month under consideration.

P_b = Percentage of bitumen component of the work.

36(a)(v): Adjustment towards differential cost of Pipes

Price adjustment for increase or decrease in the cost of pipe shall be paid in accordance with the following formula:

$V_{pi} = 0.85 \times P_{pi} /100 \times R \times (P_{i1}- P_{i0})/P_{i0}$

V_{pi} = Differential cost of pipe i.e. amount of increase or decrease in rupees to be paid or recovered during the month under consideration.

P_{pi} = Percentage of pipe component of the work.

P_{i1} = All India Whole sale price index of pipe for the period under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_{i0} = All India Whole sale price index of pipe on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

36(b): Adjustment of Labour Component

Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula:

$V_L = 0.85 \times P_1/100 \times R \times (L_1 - L_0)/L_0$

V_L = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local labour.

L_0= The minimum wages for unskilled labour as Notified by Government of Odisha as prevailed on the last stipulated date of receipt of tender including extension, if any.

L_1 = The minimum wages for unskilled labour as Notified by Government of Odisha as prevailed on the last date of the Month previous to the one under consideration.

P_1 = Percentage of labour component of the work.

36 (c): Adjustment of POL (fuel and lubricant) Component

(V) Price adjustment for increase or decrease in cost POL(fuel and lubricant) shall be paid in accordance with the following formula :

$V_f = 0.85 \times P_f/100 \times R \times (F_1 - F_0)/F_0$

V_f = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for fuel and lubricants.

F_0 = The official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC/BPCL/ HPCL at nearest center on the day 28 days prior to the date of opening of Bids.

F_1= The official retail price of HSD at the existing consumer pumps of IOC/ BPCL/ HPCL at nearest center for the 15th day of the month under consideration.

P_f = Percentage of fuel and lubricants component of the work.

Note : For the application of this clause, the price of High Speed Diesel oil has been chosen to represent fuel and lubricants group.

36 (d): Adjustment for Plant and Machinery Spares Component

(vi) Price adjustment for increase or decrease in the cost of plant and machinery spares procured by the
Contractor shall be paid in accordance with the following formula:

$V_p - 0.85 \times P_p/100 \times R \times (P_1 - P_0)/P_0$

V_p- Increase or decrease in the cost of work during the month under consideration due to changes in the rates for plant and machinery spares

P_0- The all India wholesale price index for manufacture of machinery for mining , quarrying and construction on 28 days preceding the date of opening of Bids as published by the Ministry of Commerce and Industry, , Government of India, New Delhi.

P_1- The all India wholesale price index for manufacture of machinery for mining, quarrying and construction for the month under consideration as published by the Ministry of Commerce and Industry, Government of India, New Delhi.

P_p- Percentage of plant and machinery spares component of the work.

Note: For the application of this clause, index of manufacturing of machinery for mining, quarrying and construction has been chosen to represent t he Plant and machinery Spares group.

Regarding wholesale price Index (WPI) for appropriate commodity for payment of price adjustment, due to change of base year of WPI from 1993-94 to 2004-05 & 2011-12, it is observed that, the commodity 'Bars and Rod', 'Cement', 'Heavy machinery and parts' included in the list of WPI 1993-94 series are not mentioned as such in the WPI 2004-05 & 2011-12 series . Therefore, the following items in the WPI 2004-05 & 2011-12 series shall be considered corresponding to items in WPI 1993-94 series:

Sl No.	Item in WPI 1993-94 series	Item in WPI 2004-05 series	Item in WPI 2011-12 series
1.	Cement	Grey cement	Ordinary Port Land Cement
2.	Bars & Rods	Rebars	Mild steel long products
3.	Heavy Machinery & Parts	Construction Machinery	Manufacture of machinery for mining quarrying & construction.

36(e): APPLICATION OF ESCALATION CLAUSE:

The contractor shall for the purpose of availing reimbursement/refund of differential cost of steel, bitumen, cement, pipe, POL and wages, keep such books of account and other documents as are necessary to show that the amount of increase claimed or reduction available and shall allow inspection of the same by a duly authorized representative of Government and further, shall at the request of the Engineer-in-Charge, furnish documents to be verified in such a manner as the Engineer-in-Charge may require any document and information kept. The contractor shall within a reasonable time of 15 days of his becoming aware of any alteration in the price of such material, wages of labour and /or price of P.O.L. give notice thereof to the Engineer-in-Charge stating that the same is given pursuant to this condition along with information relating to there to which he may be in a position to supply.

Percentage Table:-

S.L No	Category of Works		% Component (Cost wise)		
			Labour (P_1)	**POL (P_f)**	**Steel (Ps) + Cement (Pc) + Bitumen (Pb) + Pipes (Ppi) + Plant & machinery spare & component (Pp) + Other Materials**
1	R & B works (% of Component)	Road Works	5	5	90
		Bridge Works	5	5	90
		Building works	5	5	90
2.	Irrigation works (% of Component)	Structural work	5	5	90
		Earth, Canal & Embankment work	5	5	90
3.	P H Work	Structural work	5	5	90
		Pipeline work	5	5	Pipe – 70% * Machinery + Other materials – 20%
		Sewer line	5	5	Pipe – 70% * Machinery + Other materials – 20%

Note:- Further break up may be worked out considering the consumption of Cement, Steel, Bitumen, Pipe and Plant & Machinery spare component in the concerned works and shall be provided in the bid document in shape of "**Schedule of Adjustment Data"** as an "**Appendix to Bid"** (enclose herewith).

Appendix to Bid
Schedule of Adjustment Data

[For all works, adjustment factor for Labour and POL shall be considered @ 5% each, Steel, Cement, Pipes, Other materials and Machinery shall contribute to 90% of Price Adjustment and shall be calculated for each work separately during preparation of estimate, shall be approved by the authority during technical sanction as a "Schedule of Adjustment Data" and shall form part of the Bid Document]

Cl No. 92 of F2/P1 Contracts S.L No	Index Description	Source of Index	Base Value*	Base Date*	Weightage of Item**
92(a)(i)	Other Materials	All India Whole sale price index (all commodities) as published by the Economic Advisor to the Govt. of India, Ministry of Commerce and industry.			66.5%
92(a)(ii)	Cement	Whole sale price index for Cement (Ordinary Portland Cement) as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			10%
92 (a)(iii)	Steel	Whole sale price Index for Steel (Mild Steel-long Products) as published by the office of the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			13%
92(a)(iv)	Bitumen (VG-30)	Official retail price of bulk bitumen at the nearest IOC/HPCL depot			Not Required
92(a)(v)	Pipes	Whole sale price index for the type of Pipe under consideration, as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			Not Required
92 (b)	Labour	Minimum wage notified by the Labour& Employee's State Insurance Department of Government of Odisha, India			5 %
92 (c)	POL	Official retail price of HSD at nearest IOCL/HPCL/BPCL Consumer pump depot.			5 %
92 (d)	Plant & Machinery	Whole sale price index for Manufacture of Machinery for Mining, Quarrying and Construction as published by the office the Economic Advisor to the Govt. of India, Ministry of Commerce and Industry.			0.5 %
			Total		**100 %**

- Values to be filled up at the time of Drawl of Contract.
- Values to be filled up in the Bid Document.

37. For value of work more than Rs.10.00 crore, Secured Advance against material If requested by the Contractor, will be paid against the materials required for execution of the work during the next 3(Three) months and actually brought at site may be made by the Employer only in respect of such materials which confirm to the Specification and are neither dangerous nor hazardous to store nor are perishable or liable to deteriorate or waste with time. The amount of payments shall be least of the following

a.75% of the current market value (original Purchase Vouchers are to be produced)

b.75% of the estimated value during tender

c.75% of the Quoted Value

The Secured Advance so paid shall be recovered in the next three months of releasing the advance through the running account Bills.

38. All items of work as per schedule of quantities of this tender should confirm to Odisha Detailed Standard Specification. I.R.C. & I.S.I. Codes & Bridge code section I,II,III,IV&VII & latest design criteria for pre-stressed concrete bridge specially for Roads & Bridges issued by MoRT&H., Government of India, Compacting shall have to be carried out with help of mechanical vibrators from the range of I.S.:2505, I.S.:2006, I.S.:2514. I.S.:4656.

39. Centering & Shuttering shall be with suitable steel shutters in side of which shall be lined with suitable sheeting and made leak proof and watertight. All joints in formwork shall be properly sealed preferably with P.V.C. joints sealing tapes & compounds

40. Form work including complete false work shall be designed by the Contractor without any extra cost to employer and the Department will have the right to inspect the scaffolding, centering and shuttering made for the work and can reject partly of fully such structures, if found defective in their opinion. Any eventually such as loss of lives or properly due to failure of centering and shuttering shall be the responsibility of the Contractor regarding compensation of all claims thereof.

41. Cement shall be used by bags and weight of one bag of Cement should be 50 (fifty) Kg. net & the Engineer-in-Charge or his representative shall have the right to test the weight & quality from time to time.

42. The tenderers shall make all arrangements for proper storage of materials but no cost for raising shed for store and pay of security guard etc. will be borne by the Department. The department is not responsible for any theft or loss of materials at site. It is contractor's risk. Under any such plea, if the tenderer stops the work he shall have to pay the full penalty as per clauses of the contract.

43. Approach road to site of work for transport of materials to site of work is sole responsibility of the Contractor. Statutory traffic restriction in the town area for Transport of construction material to site of work is to be taken in to consideration before tendering and no consideration for extra time or compensation thereof shall be considered.

44. The contractor should at his own cost arrange necessary tools and plants required for efficient execution of work and the rates quoted should be inclusive of transportation, hire and running charges of such plant and cost of consumables.

45. The contractor shall properly co-ordinate with the execution of P.H. and Electrical works and take care of the safety of workers**.**

46. Deleted

47. No claim whatsoever will be entertained for supply of machineries. No extension of time will be granted to the contractor under this ground under any circumstances**.**

48. The tenderer should furnish along with their tender a list of works executed during the last five years duly certified by the concerned Engineer-in-charge/Divisional Head indicating the satisfactory completion of works as per the proforma enclosed in a separate sheet of **Schedule-D.**

49. The tenderer or any of its constituent partners of whose contract for any work has been rescinded or who has abandoned any work in the last five years prior to the date of Bid shall be debarred from qualification. The tenderer is to furnish an affidavitat the time of submission of tender paper about the authentication of tender documents. An affidavit to this effect is to be furnished in **Schedule-F** and information in **Schedule-E**

50. It should be clearly understood that :

a) The joints of the bars are to be provided with lapping, welds or bolts nuts as well be directed by the Engineer-in-charge.

b) Concrete test specimens 150mm × 150mm × 150mm in size (whether plain or reinforced concrete) for the testing shall be taken for each structural member by a representative of the contractor in the presence of authorised representative of Divisional Head. The contractor shall bear the cost so involved in testing. The test specimen in cube should be carried out in IDCO Laboratory/Any National Laboratory /Lab of Govt. Engineering College & Polytechnic in Orissa. Test should be carried out in accordance with the stipulation in Bridges code section-III.

c) Test specimens shall be formed carefully in accordance with the standard method of taking test specimen and no plea shall be entertained later on the grounds that the casting of the test specimen was faulty and that the result of the specimen did not give a correct indication of the actual quality of concrete.

d) Plain concrete and reinforced concrete specimens will be tested **in IDCO Laboratory/Any Government Laboratory /Lab of Govt. Engineering College & Polytechnic in Orissa/NABL accredited Laboratory as per direction of Engineer-in-charge.**Cost of testingof all specimens and samples will be borne by the Contractor.

51. The rates quoted should be inclusive of carriage of water required in connection with execution of the work. No claim for carriage of water whatsoever will be entertained.

52. The contractor shall employ one or more Engineering Graduate or Diploma holders as apprentice at his cost if the work as shown in the tender exceeds Rs.2,50,000.00. The apprentices will be selected by the **Chief General Manager (Civil)** The period of employment will commence within one month after the date of work order and would last till the date, when 90% of the work is completed. The fair wage to be paid to the apprentices should not be less than the emolument of personnel of equivalent qualification employed under Government. The number of apprentices to be employed should be fixed by the **Chief General Manager (Civil)** in the manner so that the total expenditure does not exceed one percent of the tendered cost of the work.

53. List of tool & plants in running condition in possession of contractor is to be furnished in a separate sheet of **Schedule-C.**

54. It is the responsibility of the contractor to procure and store explosive required for blasting operation. Department may render necessary possible help for procuring license.

55. For submission of a tender for the work, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the work about the quality and availability of the required quantity of materials, Medical aid, labour and Flood stuff etc. and that the rates quoted by him in the tender will be adequate to complete the work according to the specifications attached thereto and that he had taken in to account all conditions and difficulties that may be encountered during its progress and to have quoted labour rates and materials, Octoroi and other duties lead, lifts, loading and unloading freight for materials and all other charges necessary for the completion of the work to the entire satisfaction of the Engineer-in-charge of the work and his authorized subordinates. After acceptance of the contract rates Government will not pay any extra charges for any reason in case the contractor finds later on to have misjudged the conditions as regards the availability of materials, labour and other factors. The contractor will be responsible for any misuse, loss or damages due to any reasons whatsoever of any departmental material during the execution of work. In case of loss, damage or misuse, recovery at the rate at 5 times the cost of the materials will be deducted from the bills or his other dues.

56. The prevailing percentage of I.T. Department of the gross amount of the bill towards income tax will be deducted from the contractor's bill.
57. Prevailing rate of GSTas applicable would be paid extra**.**
58. **Prevailing rate of cess i.e. @ 1% on estimated cost put to tender as per the Building and Other Constructed Workers (RE&CS) Act. 1996 and Buildings and Other Construction Workers Welfare Cess Act. 1996 (vide resolution No.-12653, dt.15.12.2008 of Labour and Employment Department, Govt. of Odisha) will be deducted from each running bill of the contractor.**
59. It must be clearly understood that under no circumstances any interest is chargeable for the dues or additional dues if any payable for the work executed and final bill pending disposal due to any reason whatsoever.
60. No extra payment will be made for removing spreading and consolidating salvaged metals and materials.
61. Under section 12 of contractors labour (Regulation and Abolition) Act. 1970 the contractor who undertakes execution of work through labour should produce valid license from licensing authorities of labour Department.
62. **Performance Security / Additional Performance Security:**

62.1Amendment to Appendix – IX, Clause – 36 of OPWD Code Vol.-II by inclusion. Modification in DTCN Clause No.28 as per Works Department, Govt. of Odisha Office Memorandum No.173 dtd.03.01.2026 and Clarification vide Office Memorandum No.632 dtd.09.01.2026

Amendment of Codal and Contractual provisions of threshold negative bid caps of (14.99%) introduced in Appendix IX, Clause 36 of OPWD Code Volume-II is to be applicable as per the Works Department OM No.173 dtd. 03.0102026 (Decimal up to two numbers will be taken for all practical purpose) either at the estimated cost put to tender, the tender accepting authority will finalize the tender thorough a transparent lottery system where all bidders / their authorized representatives, the concerned officer inviting the bid & senior officer representative of Finance Dept, IDCO will remain present. (Amendment to Appendix-IX, Clause-36 of OPWD Code Vol.-II) (by inclusion vide O.M.No.173 dt.03.01.2026).

62.2 Additional Performance Security shall be obtained from the bidder when the bid amount is less than the estimated cost put to tender. In such an event, only the successful bidder who has quoted less bid price/rates than the estimated cost put to tender shall have to furnish the exact amount of differential cost i.e. estimated cost put to tender minus the quoted amount as Additional performance security (APS) in shape of Term Deposit Receipt pledged in favor of **Divisional Head, IDCO, BerhampurDivision, Berhampur, payable at Berhampur**/ Bank Guarantee in favor of the **Divisional Head, IDCO, Berhampur Division, Berhampur, payable at Berhampur**from any Nationalized / Scheduled Bank in India Counter guaranteed by its local branch at Berhampur/e-Bank Guarantee executed on the National e-Governance Services Limited (NeSL) Digital Document Execution Portal within seven days of Issue of Letter of Acceptance (LOA) by the Divisional Head (by e-mail) to the successful bidder otherwise the bid of the successful bidder shall be cancelled and the Earnest Money Deposit/Bid Security shall be forfeited. Further proceeding for blacklisting shall be initiated against the bidder.

- **If the rate quoted by the SC and ST Category Contractors comes to the rate quoted by the L1 bidder (decimal up to two numbers will be taken for all practical purposes) after availing 10% price preference as per Para 2 of Works Department Resolution No. 27748 dated. 11.10.1977, the tender shall be finalized by the tender accepting authority through a transparent lottery system along with other categories of contractors**.

The State Govt. is pleased to fix the following rate of Additional Performance Security. Vide Office Memorandum No. 173 dtd. 03.01.2026.

SL. No.	Range of Difference between the estimated cost put to tender & Bid Amount	Additional Performance Security to be deposited by the successful bidder
(i)	**below 0% but not below 10%**	No Additional Performance Security
(ii)	**below 10% but not below 20%**	additional performanceguarantee/security percentage shall be incremented by 0.1% for every percentage of bid price below 10% of theproject cost put to bid starting at 11% with the additional bid performance guarantee being 0.1% and thisadditional performance guarantee percentage shall be applied on the bid price ;
(iii)	**20% or more below**	the additional performance guaranteepercentage shall be incremented by 0.2% for every percentage of bid price below 20% of the project cost put tobid in additional to 1% of the bid price and this additional performance guarantee percentage shall be applied on the bid price.
(iv)		The additional performance guarantee percentage shall be rounded off to the next lower percentage based onwhether the decimal point of the percentage of bid price is below 0.5% or next higher percentage based onwhether the decimal point of the percentage of bid price is 0.5% or more.
(v)		The additional performance security shall be treated as part of the performance security.
(vi)		Justification for abnormally low bids shall be scrutinized by the Departmental Technical Committee andrecommended to the competent authority of the Administrative Department for the approval of the Additional Performance Security (APS). An abnormally low bid is one in which the Bid price, in combination with other elements of the Bid, appears so low that it raises material concerns as to the capability of the Bidder to performthe contract at the offered price. Procuring Entity may, in such cases, seek written clarifications from the Bidder, including detailed price analyses of its Bid price in relation to scope, schedule, resource mobilization, allocationof risks and responsibilities, and any other requirements of the bid document. If, after evaluating the price analyses, the procuring entity determines that the Bidder has substantially failed to demonstrate its capability to deliver the contract at the offered price, the Procuring Entity may reject the Bid/Proposal. However, it would not be advisable to fix a normative percentage below the estimated cost, which would automatically be consideredas an abnormally low bid.

If the contractor fails to complete the work, the amount so furnished as additional performance security will be forfeited in addition to the other penal clauses, if any to be imposed.

62.3 Divisional Head to release the APS after completion of work without waiting for approval of EOT and Deviation.

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Sample of all material - The contractor shall supply sample of all materials fully before procurement for the work for testing and acceptance as may be requiring by the concerned Engineer-in-Charge.

64. Super class contractor shall employ under himself two Graduate Engineer and two Diploma holders belonging to the State of Odisha. Special class contractor shall employ under him one graduate Engineer and two Diploma Holders belonging to the state of Odisha. Likewise 'A' class contractor shall employ under him one Graduate Engineer or two Diploma Holders belonging to state of Odisha. The contractor shall pay to the Engineering personnel monthly emoluments, which shall not be less than the emoluments of the personnel of equivalent qualification employed under the State Govt. of Odisha. The Chief General Manager (Civil) Odisha may however assist the contractor with names of such unemployed Graduate engineers and Diploma Holders if such help is sought for by the contractor. The names of such Engineering personnel appointed by the Contractors should be intimated to the tender receiving authority along with the tender as to who would be supervising the work. Each bill of the Super Class, Special Class or 'A' Class Contractor shall be accompanied by an employment Roll of the Engineering personnel together with a Certificate of the Graduate Engineer or Diploma Holder so employed by the contractor to the effect that the work

executed as per the bill has been supervised by him. (Vide Works Department No. Codes M-22/91-15384 dated 9.7.91). The required certificate is to be furnished in the tender documents vide **Schedule-G.**

65. Engineering personnel of the executing agency as mentioned below should be present at work site at the time of visit of Divisional Head/ Superintending Engineer/ Chief General Manager and above.In case the Project Manager is not available during such visit or during any review meeting at the Divisional or Head Office level, a **lump-sum amount of Rs.30,000.00** shall be deducted from the running bill for each such instance.

66. For effective site supervision, the agency shall deploy the following minimum personnel at site. In the event, any discrepancy found in deployment by Authority , suitable action shall be taken as per clause-65. The CVs of the following personnel shall be submitted along with the Bid for evaluation purpose. CVs not meeting the minimum qualification and eligibility criteria shall be rejected and consequently, the bid shall be liable for rejection. In case of replacement, the bidder shall submit the CV of a substitute personnel possessing qualification and experience for approval of the Authority.

Sl No.	Engineering Post	Qualification	Scope
	Project Manager (01)	**B Tech Civil with min. 7years' experience/**	**Overall Super Vision Work, Coordination with Authority & Contractor. He shall supervisethe works properly to ensure qualitative execution& timely completion.**
	Site Engineer (01) -Civil	**Diploma Civil with min. 5 years' experience**	**proper supervision of works to ensure qualitative execution. He shall maintain the Quality Control Register and the Site History Book .**
	Electrical Engineer	**Diploma electrical with 5 years' experience**	**proper supervision of works to ensure qualitative execution.**

67. All reinforced cement work should conform to Odisha Detailed specification and should be of proportion as per Contract Agreement having desired compressive strength (in work test) in 15 Cm cubes at 28days, after mixing and test conducted in accordance with IS 456 and IS 516.

68. Bailing out of water from the foundation, pipeline trenches S. Tanks/ Soak pits/ Sumps/ M.H. etc. either rainwater or sub-soil water if necessary should be borne by the contractor. No payment will be made for benchmarks. Level pillars, profiles and benching and leveling the ground wherever required. The rates quoted should be for finished items of works inclusive of these incidental items of work. It should be understood clearly that no claims whatsoever would be entertained.

69. The tenderer shall have to abide by the C.P.W.D. safety code rules introduced by the Government of India, Ministry of work Housing and Supply in their standing order No-44150 dtd.25.11.57.

70. The Contractor will have to submit to the **Divisional Head, IDCO, Division-Berhampur** monthly return of labour both skilled and unskilled employed by him on the work.

71. All fittings for doors and windows P.H. & Electrical works as supplied by the Contractor should be of best quality and conform to relevant I.S. specification and should be got approved by the Engineer-in-charge of the respective wing before they are used on the work.

72. After completion of the work the contractor shall arrange at his own cost all requisite equipment for testing buildings, if found necessary and bear the entire cost of such test, including the inspection of Electrical Inspectorate.

73. The Tenderer should furnish along with their tender **1**. A List of works, which are at present in their hand **(Schedule-B)**,2.List of T&P (**Schedule-C)** and **3**. List of work executed (**Schedule-D)** in the prescribed proforma(s) enclosed herewith in appropriate place of bid document.

74. All reinforced cement concrete works should be finished smooth Extra charges for plastering if required to any R.C.C. structures like roof slab, Columns, Chajjas, fins, parapets, shelves etc. shall not be paid.

75. DELETED.

76. The contractor has to arrange the samples of materials required for execution to be got tested and approved by the Department before taking up the work and during course of execution required from time to time. All such samples will be tested at any of the Departmental Control and Research Laboratories, at the cost of the Contractor with no extra cost to the Department.

77. If there is any damage to the work due to natural calamities like flood or cyclone or any other cause during the course of execution of work or up to 6 months after completion of work or if any, imperfection becomes apparent to the work within 6 months from the date of final certificate of completion of work the contractor shall make good of all such damages at his own cost with no extra cost to the Department. No claims, whatsoever, in this regard will be entertained.

78. The Fly Ash Bricks should be well burnt and of good qualities. The bricks should be approved by the Engineer-in-Charge before use in the work and should confirm to the minimum strength and other criteria as per National Building Code.

79. Under Section 1 of contract labour Regulation and Abolition Act 1970 the contractor who undertakes execution of work through labour should produce valid license from the licensing authority of labour Department.

80. Standard co-efficient for linear measurement will be adopted while calculating consumption of steel and no claim whatsoever regarding difference in co-efficient of steel will be entertained. The rates quoted shall be inclusive of any eventuality of difference for co-efficient for linear measurements.

81. Deleted

82. That for the purpose of jurisdiction in the event of disputes if any of the contract would be deemed to have been entered in to within the State of Odisha and it is agreed that neither party to the contract will be competent to bring a suit in regard to the matter by this contract at any place outside the State of Odisha.

83. SPECIAL CONDITIONS (PART OF THE CONTRACT)

(I) All materials before they are being used in the items of works as per this Schedule of quantities and also the finished items of work where tests are applicable shall have to be tested through the Engineer-in-charge of the respective wing at appropriate Laboratories according to the relevant I.S. specifications of the materials and the said items of works and the cost of all such tests shall have to be borne by the Contractor and the rates of the items of works should be inclusive of cost of such tests.

(II) The tests have to be planned & carried out such that the progress of work is not hampered

(III) The tests are mandatory as per the prescribed frequencies and I.S. specifications. However, these are not exhaustive and the Engineer-in-charge has the right to prescribe other required test if any as will be considered from time to time.

84. In case of ambiguity between clauses of this D.T.C.N. and the P-1 contract form, the relevant Clauses of the P-1 contract form shall prevail over the D.T.C.N. The clauses not covered under P-1 contract form shall be governed by the clauses of the D.T.C.N.

85. It must be definitely understood that the Government does not accept any responsibility for the correctness and completeness of the trial borings shown in the Cross Section.

86. Schedule of quantities is accompanied in Cover-II (Price Bid). It shall be definitely understood that the Government does not accept any responsibility for the correctness or completeness of this schedule and that this schedule is liable for alternation or omissions, deductions or alternations set forth in the conditions of the contract and such omissions, deductions, additions or alternations shall no way invalidate the contract and no extra monetary compensation, will be entertained.

87. In case of any complaint by the labour working about the nonpayment or less payment of his wages as per latest minimum Wages Act, the Engineer-in-Charge will have the right to investigate and if the contractor is found to be in default, he may recover such amount due from the contractor and pay such amount to the labour directly under intimation to the local labour office of the Govt. The contractor shall not employ child labour. The decision of the Engineer-in-Charge is final and binding on the contractor.

88. The contractor should arrange the materials like Steel, Cement, paint and bitumen etc. of approved quality and specification at his own cost for completion of the work with the time schedule. No extension of time will be granted on the application of the contractor due to delay in procurement of materials.

89. The bidder will be responsible for the loss or damage of any departmental materials during transit and in the execution of the work due to reasons what-so-ever and the cost of such materials will be recovered from the bills at stock issue rates or market rates whichever is higher.

90. If the contractor removes Government/ IDCO materials supplied to him from the site of work with a view to dispose of the same dishonesty, he shall be in addition to any other liability civil or criminal arising out of his contract be liable to pay a penalty equivalent to five times of the price of the materials according to the stock issue rate or market rate whichever is higher. The penalty so imposed shall be recovered at any time from any sum that may then or at any time thereafter become due to the contractor or from his security deposit or from the proceeds of sale thereof.

91. The selected contractor may take delivery of Departmental / IDCO Supply according to his need for the work issued by the Engineering- in-charge subject to the availability of the materials. The tenderer shall make all arrangement for proper storages of materials but no cost for raising shed for storage, pay of security guard etc. will be borne by the IDCO.TheIDCO is not responsible for considering the theft of materials at site. It is the contractor's risk. Under any such plea if the tenderer stops the work, he shall have to pay the full penalty as per clause of agreement.

92. The IDCO will have the right to supply at any time in the interest of work any IDCO materials to be used in the work and the contractor shall use such materials without any controversy or dispute on that account. The rate of issue of such materials will be at the stock issue rates inclusive of storage charges or rates fixed by the IDCO or current market rate whichever is higher.

93. All the materials which are to be supplied from IDCO STORE will be as per availability of stock and the contractor will have to bear the charges of straightening, cutting, jointing, welding etc. to required sizes in case of M.S. Rods or TOR Steel / M.S Angles, Tees and Joists etc. After the issue from the Idco store, the materials may be under the custody of the contractor and the contractor will be responsible for its safety and storage. Cut pieces of steel more than one meter in length will be returned by the contractor at the issuing stores without conveyance charges.

94. Though IDCO issue of cement and steel has indicated, it may not be taken as binding. The contractor must have to arrange by themselves cement, steel, bitumen and every sort of materials from approved manufacturer, get it tested in the approved Laboratory and approved by the Engineering-in-Charge before use. No extension of time or escalation of price on such account shall be entertained in future.

95. TOR rods, plates and structural members will be supplied in quantity, length and size available in the stock. For payment of reinforcement, the steel including plates etc. shall be measured in

length of different diameter, size and specification as actually used (including hooks and cranks) in the work correct to an inch or cm. And their weight calculated as per sectional weight prescribed by the Indian Standard Specification or as directed by the Engineer-in-Charge (Wastage of bars and unnecessary lapping will not be considered for measurement and payment).

96. Deleted

97. The contractor is required to pay royalty to Govt. as fixed from time of time and produce such documents in support of their payment to the concerned Divisional Head with their bills, falling which the amount towards royalties of different materials as utilized by them in the work will be recovered from their bills and deposited in the revenue of concerned department.

98. Trial Boring - The foundation level as indicated in the body of the departmental drawing is purely tentative and for the general guidance only. The Department has no responsibility for the suitability of actual strata at the foundation level. The contractor has to conduct his own boring before starting the work and get the samples tested at his own cost to ascertain the S.B.C. and credibility of the strata at founding level while quoting his rates for tender the contractor shall take in to account of the above aspects.

99. Any defects, shrinkage or other faults which may be noticed within 12 (Twelve) months from the completion of the work arising out of defective or improper materials or workmanship timing are upon the direction of the Engineer-in-Charge to be amended and made good by the contractor at his own cost unless the Engineer for reasons to be recorded in writing shall be decided that they ought to be paid for and in case of default Department may recover from the contractor the cost of making good the works. The contractor is also required to maintain the road/ building for 12 (Twelve) months from the date of successful completion of the work.

100. From the commencement of the works to the completion of the same, they are to be under the contractors charge. The contractor is to be held responsible to make good all injuries, damages and repairs occasioned or rendered necessary to the same by fire or other causes and they hold the Govt. of Odisha/IDCO harmless for any claims for injuries to person or structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the contractor or any one in his employment during the execution of the work. Also no claim shall be entertained for loss due to earthquake, flood, cyclone, epidemic, riot or any other calamity whether natural or incidental damages so caused will have to be made good by the contractor at his own cost.

101. Gradation of ingredients: The coarse and fine aggregate shall meet the grade requirement as per the latest provision of relevant. I.S. Code / I.R.C. code / MoRT&H specifications.

102. Where it will be found necessary by the IDCO the Engineer-in-Charge of the work shall issue an order book to the contractor to be kept at the site of the work with pages serially Numbered. Orders regarding the work whenever necessary are to be entered in this book by the IDCO. Officer-in-Charge with their dated signatures and duly noted by the contractor or his authorized agents with their dated signature. Orders entered in this book and noted by the contractor's agent shall be considered to have been duly given to the contractor for following the instructions of the IDCO. The order Book shall be the property of the IDCO. and shall not be removed from the site of work without written permission of the **Divisional Head** and to be submitted to the Engineer-in charge every month.

103. The contractor should attach the certificate in token of payment deposit with the registration authority as per recent circular of the Government/IDCO relating to his registration.

104. In case of any discrepancy in printing or omissions of statutory specifications or any other part or portion of the approved document during download of the bid document, the decision of the officer inviting the bid will be binding on the bidder.

105. The rates quoted by the contractor shall cover the latest approved rates of Labours, Materials, P.O.L. and Royalties. Arrangement of borrow areas i.e. Land, Approach Road to the building site etc. are the responsibility of the contractor.

106. The rate for each work of concrete items wherever dewatering is imperatively necessary the term dewatering shall mean the execution or operation of the items due to standing water as well as due to percolation of water. The quoted rates will be inclusive of this.

107. The contractor shall make requisition of claim book from the date of commencement of the work from the IDCO and shall maintain in proper IDCO form with pages serially numbered in order to record items of works are not covered by his contract and claimable as extra. Claims shall be entered regularly in this book under the dated signature of the contractor or his duly authorized agents at the end of each month. A certificate should be furnished along with the claim to the effect that he has no other claim beyond this claim up-to-date. If in any month there are no claims to record, a certificate to that effect should be furnished by the contractor in the claim book. Each claim must be defined and should be given as for as possible regarding the quantities as well as the total amount claimed. The claim book must be submitted by the contractor regularly by 10th and 16th days of each month for orders of the Engineer-in-Charge or competent authority. Claims not made in this manner or the claim book not maintained from the commencement of the work is liable to be summarily rejected. The claim book is the property of the IDCO and shall be surrendered by the contractor to the Engineer-in-charge after completion of the work or before recession of the contract by the IDCO whichever is earlier for record.

108. Number of tests as specified in I.R.C. / MoRT&H / I.S.I specification required for the construction of roads / bridges / buildings or any other structural works will be conducted in IDCO Laboratory/Any National Laboratory /Lab of Govt. Engineering College & Polytechnic in Orissa as to be decided by the Engineer-in-charge. Testing charges including expenditure for collection / transportation of samples /specimens etc. will be borne by the contractor. The collection of samples and testing are to be conducted for both prior to execution and during execution as may be directed by the Engineer-in-charge and on both the accounts the cost shall be borne by the contractor.

109. Even qualified criteria are met, the bidders can be disqualified for the following reasons, if enquired by the Department

(a) Making a false statement or declaration.
(b) Past record of poor performance.
(c) Past record of abandoning the work half way/ recession of contract.
(d) Past record of in-ordinate delay in completion of the work.
(e) Past history of litigation.

110. In case the 1st lowest tenderer or even the next lowest tenderers withdraw in series one by one, thereby facilitating a particular tender for award, then they shall be penalized with adequate disincentives imposing penal action as per Bid Security Declaration (Schedule-K) unless adequate justification for such back out is furnished. Appropriate action for black listing the tenderers shall also be taken apart from disincentives against thetenderer.The following documents which are not submitted with the Bid, will be deemed to be part of the Bid.

111.

Sl. No	Particulars
1	Notice Inviting tender
2	Instruction to the Bidders
3	Conditions of Contract.
4	Contract data
5	Specifications
6	Drawings

112. Deleted

113. ELIGIBILITY CRITERIA:

To be eligible for tender, applicants shall furnish the followings documents. Non-furnishing of the following particulars shall be treated as ineligible.

a. EMD : to be paid on-line / BG / FD as per the clause no. 20 Of DTCN

b. Tender Fee: to be paid on-line.as per the clause no. 04 Of DTCN

c. Scanned copy of valid Registration Certificate/IDCO Vendor Registration, GST Registration Certificate, PAN card, EPF Certificate, along with the tender documents and the L-I bidder has to furnish the Original Registration certificate, GST RegistrationCertificate and Pan card, EPF Certificate, EPF Latest Challan, for verification within (5) Five days of opening of Cover-II of the tender before Chief General Manger (Civil) Bhubaneswar as per Clause No-1, 5(i) and 21 of DTCN& 15.1 of ITB.

d. License criteria as per Clause No.8 of DTCN and Schedule-J need to be furnished.

e. Evidence of ownerships of machineries/ equipment's as per Clause No.7 of DTCN and need to be furnished by the bidder in Schedule-C.

f. Joint Ventures are not accepted.

g. The bidder should have successfully completed similar works of Govt./ Govt. undertaking or equivalent organizationsduring the last five financial years ending on the last date of month previous to the one in which tender invited, not less than the followings as noted below

(i) 01 (One) Similar Completed work costing not less than 80% of work value (i.e Rs. 7.75 Crores excluding GST) during the last five financial years.

OR,

(ii) 02 (Two) Similar Completed work costing not less than 50% of work value (i.e Rs. 4.84 Crores excluding GST) during the last five financial years.

OR,

(iii) 03 (Three) Similar Completed work costing not less than 40% of work value (i.e Rs. 3.86 Crore excluding GST) during the last five financial years.

Following enhancement factors will be used for the cost of works executed and the financial figures to a common base value for works completed in India.

Year before	Multiplying factor
One	1.10 (24-25)
Two	1.21 (23-24)
Three	1.33 (22-23)
Four	1.46 (21-22)
Five	1.61 (20-21)

Certificates on the above completed works should be furnished by the bidder duly signed by the concerned Officer not below the rank of Executive Engineer or Divisional Head or Equivalent as per Schedule D indicating the components of the work executed to satisfy that the work completed is similar to the work now tendered. Similar nature of works means Project comprising of "Construction of RCC frame structure with of Civil, Electrical, PH& completed in all respect under one agreement contract.

The bidder must have experience in Sports Infrastructure completed in all respect within Five Financial year (such as Athletic track / Football field / vally ball Court / Kabadi Court / Gym / Indoor Hall etc.) in India in the last 5 years, for any State / Central Govt. Department / PSU. Completion Certificates issued by the client must be furnished**. All equipments shall be from the reputed and established manufacturers, conforming to relavant S&Y Department specifications. "**

OR

1. The Bidder shall furnish a Memorandum of Understanding (MoU) with Firm having experience in execution of **Sports related Infrastructure.**

2. The **Firm** should have successfully completed at least 1 (one) **Sports related Infrastructure**such as **Athletic track / Football field / vally ball Court / Kabadi Court / Gym / Indoor Hall etc.)** in India in the last 5 years, for any State / Central Govt. Department / PSU. Completion Certificates issued by the client must be furnished.**All equipments shall be from the reputed and established manufacturers, conforming to relavant S&Y Department specifications.**
3. The Specialist Firm shall submit an affidavit confirming that none of them as been blacklisted by any State Government, Central Government, PSU, or Sports Authority of India.
4. A copy of Regristation Certificate of Firm must be furnished

h.BID CAPACITY - (Vide Works Department Office Memorandum No.6300 dtd.16.6.2011)

Applicants who meet the minimum qualification criteria will be qualified only if their available bid capacity at the expected time of bidding is more than the total estimated cost of the works. The available bid capacity will be calculated as under.

Assessed Available Bid Capacity = (A*N*2-B), where

A = Maximum value of works executed in any one year during the last five years (updated to the current price level) rate of inflation may be taken as 10% per year (escalation factor) which will taken into account the completed as well as works in progress.-

B = Value of **current price level** of the existing commitments and ongoing works to be completed during the next years (period of completion of works for which Bids are invited).

N = Number of years prescribed for completion of the work for which the Bids are invited.

If the qualifying work is completed in the 05 (five) year period specified above, even if it has been started earlier, the same will also be considered as meeting the qualifying requirements.

Note: In case of a Joint Venture the available Bid capacity will be applied for each partner to the extend of his proposed participation in the execution of the works.

The Statement showing the value of existing commitments and ongoing works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Divisional Head or Executive Engineer.

A bidder is liable to be disqualified, even though he meets the qualifying criteria, if he,

i) **Made misleading or false representations, statements and attachments submitted in proof of the qualification requirements, and/ or**

ii) **Record of poor performance such as abandoning the works, not properly completing the supply order, inordinate delays in completion or supply, litigation history with IDCO, or financial failures etc.**

iii) **If the Tenderer deliberately gives wrong information/ submit fake, false, fabricated, forged documents in his offer. IDCO reserves the right to reject such offer/ tender at any stage or to cancel the contract if awarded and forfeit the Security Deposit and any other money due.**

Escalation Factor: Following enhancement factors will be used for the cost of works executed and the financial figures to a common base value for works completed in India.

Year before	Multiplying factor
One	1.10
Two	1.21
Three	1.33
Four	1.46
Five	1.61

(Applicant should indicate actual figures of costs and amounts for the works executed by them without accounting for the above mentioned factors)

In case the financial figures and value of completed works are in foreign currency the above enhanced multiplying factors will be applied. Instead, current market exchange rate(State Bank of India BC selling rate as on the last date of submission of the bid) will be applied for the purpose of conversion of amount in foreign currency into Indian rupees.

The information on Bid Capacity as on the date of this bid is to be furnished as per the format in **Schedule-B.**

Total value of Civil Engineering construction work performed in the **last five years** are to be furnished for which **certificate from Chartered Accountant is to be furnished.**

2021-2022 ---------- 2022-2023---------- 2023-2024 ----------
2024-2025---------- 2025-2026----------

I. Non submission of required information in schedule B, C, D, E,F, J & L in complete shape shall be treated as non-responsive and the bid shall be summarily rejected.

II. The bidders to submit the CVs against the engineering personnles mentioned in the table at Sl No. 66 . Non-submission of CVs shall be considered for rejection of the bid.

114. Time Control :- (Vide Works Department Office Memorandum No.24716 dtd.24.12.2005 and No.8310 dtd.17.05.2006)

113.1.1 Progress of work and Re-scheduling programme.

i) The Divisional Head shall issue the letter of acceptance to the successful contractor. The issue of the letter of acceptance shall be treated as closure of the Bid process and commencement of the contract.

ii) Within 15 days of issue of the letter of acceptance, the contractor shall submit to the Divisional Head for approval a Programme showing the general methods, arrangements, and timing for all the activities in the Works along with monthly cash flow forecast.

iii) To ensure good progress during the execution of the work the contractors shall be bound in all cases in which the time allowed for any work exceeds one month to complete, 1/4th of the whole time allowed under the contract has elapsed, ½ of the whole of the work before ½ of the whole time allowed under the contract has elapsed, 3/4th of the whole of the work before 3/4th of the whole time allowed under the contract has elapsed.

iv) If at any time it should appear to the Divisional Head that the actual process of the work does not conform to the programme to which consent has been given the Contractor shall produce, at the request of the Divisional Head, a revised programme showing the modifications to such programme necessary to ensure completion of the works within the time for completion. If the contractor does not submit an updated Programme within this period, the Divisional Head may withhold the amount of 1% of the contract value from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted.

v) An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

vi) The Divisional Head's approval of the Programme shall not alter the Contractor's obligations. The Contractor may revise the Programme and submit it to the Divisional Head again at any time. A revised Programme is to show the effect of Variations and Compensation Events.

b) Extension of the Completion Date.

i) The time allowed for execution of the works as specified in the Contract data shall be the essence of the Contract. The execution of the works shall commence from the 15th day or such time period as mentioned in letter of Award after the date on which the Divisional Head issues written orders to commence the work or from the date of handing over of the site whichever is later. If the Contractor commits default in commencing the execution of the work as aforesaid, Government shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the earnest money & performance guarantee / Security deposit absolutely.

ii) The Contractor shall submit the Time & Progress Chart for each milestone Quarter wise indicating each month and get it approved by the IDCO. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the

works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Divisional Head and the Contractor within the limitations of time imposed in the contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds one month (save for special jobs for which a separate programme has been agreed upon) complete the work as per milestone given in contract data.

iii) In case of delay occurred due to any of the reasons mentioned below, the Contractor shall immediately give notice thereof in writing to the Divisional Head but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Divisional Head to proceed with the works.

(1) Force majeure, or

(2) Abnormally bad weather, or

(3) Serious loss or damage by fire, or

(4) Civil commotion, local commotion of workmen, strike or lockout affecting any of the trades employed on the work, or.

(5) Delay on the part of other contractors or tradesmen engaged by Divisional Head in executing work not forming part of the Contract.

(6) In case a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost, or

(7) Any other cause, which, in the absolute discretion of the authority mentioned, in Contract data is beyond the Contractors control.

iv) Request for reschedule and extension of time, to be eligible for consideration, shall be made by the Contractor in writing within fourteen (14) days of the happening of the event causing delay. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired.

v) In any such case a fair and reasonable extension of time for completion of work may be given. Such extension shall be communicated to the Contractor by the Divisional Head in writing, within 3 months of the date of receipt of such request. Non-application by the contractor for extension of time shall not be a bar for giving a fair and reasonable extension by the Divisional Head and this shall be binding on the contractor.

c) Compensation for Delay.

Time is the essence of the contract. If the contractor fails to maintain the required progress in terms of clause-2 of P-1 Contract or to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the Chief General Manager (Civil) on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as the Chief General Manager (Civil) (whose decision in writing shall be final and binding) may decide on the amount of tendered value of the work for every completed day / month (as applicable) that the progress remains below that specified in Clause-2 of P-1 Contract or that the work remains incomplete. This will also apply to items or group of items for which a separate period of completion has been specified. Compensation @ 1.5% per month of for delay of work, delay to be completed on per Day basis. Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 10% of the Tendered Value of work or to the Tendered Value of the item or group of items of work for which a separate period of completion is originally given. The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the Chief General Manager (Civil). In case, the contractor does not achieve a particular milestone mentioned in contract data, or the rescheduled milestone(s) in terms of Clause-2.5, the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of extension of time. Withholding of this amount on failure to achieve a milestone shall be automatic without any notice to the contractor. However, if the contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released. In case the contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However no interest whatsoever shall be payable on such withheld amount.

d) Bonus for early completion

For availing incentive clause in any project which is completed before the stipulated date of completion, subject to other stipulations it is mandatory on the part of the concerned Divisional Head to report the actual date of completion of the project as soon as possible through fax or e-mail so that the report is received within 7 days of such completion by the concerned Chief General Manager& the Administrative Department. The incentive for timely, completion should be on a graduated scale of one percent to 05 percent of the contract value. Assessment of incentives may be worked out for earlier completion of work in all respect in the following scale.

Before 30 % of contract period = 5 % of Contract Value

Before 20 to 30 % of contract period = 4 % of Contract Value

Before 10 to 20 % of contract period = 3 % of Contract Value

Before 5 to 10 % of contract period = 2 % of Contract Value

Before 5% of contract period = 1 % of Contract Value

(Amendment to Para-3.5.5 (V) of Note-III of OPWD Code Vol.-I by inclusion vide O.M. No.5288 dt.04.05.2016)

e) Management Meetings

i) Either the Divisional Head or the Contractor may require the other to attend a management meeting. The business of management meetings shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

ii) The Divisional Head shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken to be decided by the Divisional Head either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

Rescission of Contract (Amendment as per letter No.10639 dt.27.05.2005 of Works Department, Odisha):- To rescind the contract (of which rescission notice in writing to the contractor under the hand of theExecutive Engineer shall be conclusive evidence), 20% of the value of left over work will be realizedfrom the contractor as penalty.

115. Building and other Construction Workers Welfare Cess @ 1% of the estimated cost as per tender notification read with latest corrigendum if any will be proportionately deducted from the contractor's bill at the time of making payment of each bill.

116. The tenderers are required to go through each clause of P.W.D. Form P-1 carefully in addition to the clauses mentioned here in before tendering.

117. A Contractor may be black listed as per amendment made to Appendix XXXIV to OPWD Code Vol.-II on rules for black listing of Contractors vide letter no.3365 dt.01.03.2007 of Works Department, Odisha.

As per said amendment a Contractor may be blacklisted

a) Misbehavior/threatening of Departmental & supervisory officers during execution of work/tendering process.

b) Involvement in any sort of tender fixing.

c) Constant non-achievement of milestones on insufficient and imaginary grounds and non-adherence to quality specifications despite being pointed out.

d) Persistent and intentional violation of important conditions of contract.

e) Security consideration of the State i.e. any action that jeopardizes the security of the State.

f) Submission of false/ fabricated / forged documents for consideration of a tender.

118. The safety certificate of the E.I. work will be furnished by the agencies after getting necessary verification from the electrical inspector / equally competent authority responsible for the work prior to Energisation of the building.

119. Percentage rate contract (vide Works Department letter no.8310 dt.17.05.2006) In case of percentage rate tender:-

i) The Contractor has to mention percentage excess or less over the estimated cost (In figures as well as words) in the prescribed format appended to the tender document.

ii) DELETED

iii) Only percentage quoted shall be considered. Percentage quoted by the Contractor should be accurately filled-in figures and words, so that there is no discrepancy.

(1) If any discrepancy is found in the percentage quoted in words and figures, then the percentage quoted by the Contractor in words shall be taken as correct

(2) If any discrepancy is found in the percentage quoted in percentage excess/ less and the total amount quoted by the Contractor, then percentage will be taken as correct.

(3) The percentage quoted in the tender without mentioning excess or less and not supported with the corresponding amount will be treated as excess.

(4) The percentage quoted in the tender without mentioning excess / less supported with corresponding amount does not tally with either to percentage excess or less then it will be treated as percentage excess.

(5) The percentage quoted in the tender without mentioning excess / less supported with corresponding amount if tallied with the percentage then it will be treated as to which side the amount tallies.

(6) The Contractor will write percentage excess/ less up to two decimal points only.

(7) The tender shall be written legibly and free from erasures, over writings or corrections of figures. Corrections, over writings & interpolations where unavoidable should be made by making out, initialing, dating and rewriting.

iv) In the contract P1 time is the essence. The contractor is required to maintain a certain rate of progress specify in the contract.

v) The quantity mentioned can be increased or reduced to the extent of 10% for individual items subject to a maximum of 5% over the estimated cost. If it exceeds the limit stated above prior approval of competent authority is mandatory before making any payment.

vi) The period of completion is fixed and cannot be altered except in case of exceptional circumstances with due approval of next higher authority.

vii) Bills for percentage rate tenders shall be prepared at the estimated rates for individual items only and the percentage excess or less shall be added or subtracted from the gross amount of the bill.

120. Mobilisation Advance

For value of work more than Rs.10.00 crore, Mobilization Advance not exceeding 10% of the tender Value may be given if requested by contractor in writing within one month of order to commence the work. Such advance shall be in two installments. The second installments shall be released by the Engineer in charge only after the contractor furnishes proof of the satisfactory utilization of the earlier installment. Before any installment of advance is released the contractor shall execute a Bank Guarantee Bond from schedule bank for an amount equal to 110% of the amount of advance & valid for the contract period. This (Bank Guarantee from schedule Bank for the amount equal to 110% of the balance amount of advance) shall be kept renewed from time to time to cover the balance amount and likely period of complete recovered. The mobilization advance will bear simple interest of 10% per annum and shall be calculated from the date of payment to the date of recovery, both days inclusive on the outstanding amount of advance. Recovery of such sums advance shall be made by deduction from the contractors bill commencing after first 10% of the gross value of the work is executed & paid, on pro-rata **percentage** basis to the gross value of the work billed beyond 10% in such a way that the entire advance is recovered by the time 80% of the gross value of the contract is executed & paid.

120.INSURANCE AGAINST FIRE, ACCIDENT, DAMAGE AND THEFT:

a) The Contractor shall ensure that he and his sub-contractors use one safe and reliable equipment's. The Contractor shall be responsible for the safe custody and storage of all equipment's, materials, construction tools, tackles and machinery at the site, which are covered by this contract. All Contractors' equipment shall be at the sole risk of the Contractor. The Contractor shall take necessary insurance cover for all tools, tackles and other constructions equipment's and machinery and materials, owned hired or used by the Contractor for performance of the works but which does not form a part of the permanent work. The Contractor shall take necessary action to protect to protect all finished or partially finished construction and protect adjacent or adjoining properly, which might be damaged by

the process of construction or erection. All expenses incurred for ensuring the above shall be at the Contractor's account.

b) The Contractor shall at the time of signing the contract insure the works and keep them insured until the completion of the contract against loss or damage by fire, theft or other accident in an Office to be approved by IDCO, Bhubaneswar in the joint names of the owner and Contractor (the name of the former being placed first in the policy) for full amount of the contract and for any further sum called upon to do so by IDCO, the premium of such further sum being allowed to the Contractor as an authorized extra. Such policy shall cover the property of the IDCO only, fees for assessing the claim and in connection with the Service generally therein, and shall not cover any property of the Contractor or any sub-contractor or Employees. The Contractor shall deposit the policy and receipt for the premiums with the IDCO within Twenty-one days from the date of signing the contract unless otherwise instructed by IDCO. In default of the Contractor insuring as provided above, IDCO on his behalf may so insure and may deduct the premiums paid from any money due or which may become due to the Contractor. The Contractor shall as soon as the claim under policy is settled or the work reinstated by the Insurance Office, should they select to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire had not occurred and in all respects under the same conditions of the contract, the Contractor in case of rebuilding or reinstatement after fire, shall be entitled to such extension of time for completion as IDCO deems fit.

The amount so due as aforesaid shall be the total value of the works duly executed and of the contract materials and goods delivered upon the site for use in the works up to and including a date not more than seven days prior to the date of the said certificate less than amount to be retained by IDCO (as hereinafter provided) and less any installments paid under this article provided that such certificates shall only include the value of the said materials and goods as and from time as they are responsible, properly and not prematurely brought upon the site and then only if properly stored and/or protected against weather.

121. Restrictions on Public Procurement from bidders of certain countries

1. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.
2. "Bidder" (including the term "tenderer" 'consultant or 'service provider in certain contexts) means any person or firm or company 'including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated herein before, including any agency branch or office controlled by such person, participating in a procurement process.
3. "Bidder from a country which shares a land border with India" for the purpose of this order means.

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

The successful bidders shall not be allowed to subcontract works to any contractor from a country which shares a land border with India unless such contractors are registered with Competent Authority.
The bidders are required to submit undertaking to this effect in - From-8

(Total 121 clauses)

APPROVED

TECHNICAL SPECIFICATION

GENERAL:

All items of Works will be executed as per the specification mentioned in the respective items/ as per relevant IS codes with latest revision/ as directed by the Engineer-in-charge. The bidders are to submit all the sample of the materials to be used and get it approved before execution of the item of work.

TECHNICAL SPECIFICATION OF CIVIL PORTION OF WORK

Materials of following specification are to be used in work. The Tenderers are expected to possess and be well conversant with the following IS standard and code of practice.

1.	Cement	**Only Ordinary Portland Cement and Portland Slag cement are to be used. The grade of Portland Cement is to be decided by the Engineer-in-Charge. 53 grade Ordinary Portland Cement confirming to IS:12669 or Portland Slag Cement confirming to IS:455 is to be used in RCC works. For other work, the grade of Ordinary Portland Cement will be decided by the Engineer-in-Charge. Portland Slag Cement confirming to IS:455 can be used in any type of work.**
2.	Steel	I.S. 432 (Plain) and I.S.: 1786 (Tor) :Fe 500
3.	Vibrator	I.S. 7246
4.	Aggregate	I.S. 383, I.S. 515
5.	Water for mixing and curing	Shall be clean, free from injurious amount of oil, salt, acid, vegetable materials and other substances and harmful to concrete in conformity to I.S. 456 and I.S. 2025.
6.	Sand/ Fine Aggregate	I.S. 2116, 383
7.	Binding wire	I.S. 280 (galvanised minimum 1 mm)
8.	Rain water pipe	I.S. 2527
9.	Construction joints	I.S. 3414
10.	Steel Window Frame	I.S. 1038/83
11.	Steel Door Frame	I.S. 4351/75

12.	Fitting & Fixtures for joinery works	Conforming to I.S. 7452/82 strictly conform to I.S. specification and as per direction of Engineer-in-Charge.

Note : For road work (Approach Road) specification as per road and bridges (latest edition) published by I.R.C & M.O.S.T. shall be followed. In case of any doubt and absence of provision, regarding specification I.S. shall be referred (Indian standard).

LIST OF MAKES-CIVIL FINISHES

SL NO	DESCRIPTION	VENDOR				
1	CEMENT	DALMIA/KONARK	ULTRATECH		ACC	JSW
2	STEEL	SAIL	TATA TISCON		SHYAM STEEL	
3	VITRIFIED TILE	SOMANY / JOHNSON	KAJARIA	NITCO	OASIS	
4	CERAMIC TILE	SOMANY / JOHNSON	KAJARIA	NITCO	OASIS	
5	INTORLOCKING CONCRETE BLOCK	ULTRATECH	EUROCON		PAVIT	
6	WALL PUTTY	BIRLA	JK WALL PUTTY		DALMIA	
7	PLASTIC EMULSION PAINTS	ASIAN	ICI (DULUX)		BERGER	
8	WEATHER COAT PAINTS LOW VOC	ASIAN	ICI (DULUX)		BERGER	
9	ENAMEL PAINT	ASIAN	ICI (DULUX)		BERGER	
10	TEXTURE PAINT	ASIAN	ICI (DULUX)		BERGER	
11	EPOXY PAINT	ASIAN	ICI (DULUX)		BERGER	
12	WATER PROOFING	SIKA	FOSROC		PIDLITE/ICI/ MYK ARMNET	
13	MS/SS SECTION	SAIL	TATA TISCON			
14	UPVC WINDOW/DOOR	FENISTA	DUROPLAST		NCL VEKA LTD	
15	FLUSH DOOR	MERINO	CENTURY		SYLVAN	
16	LAMINATE	GREEN	CENTURY		MERINO	
17	LOCK/HANDLE / HARDWARE	DORMA	HAFFLLE			
18	GLASS	SAINT GOBAIN /	GOLD PLUS		ASAHI	
19	EPOXY GROUT	MYK	SIKA		ASIAN	
20	POLY CARBONET SHEET	DPI DAY LIGHTING	GE		TATA BLUESCOPE	
21	LAMINATED FLUSH DOOR	GUNTIER	MERINO		SONEAR	
22	GLASS REINFORCEMENT CONCRETE	UNISTONE	BIRLA		ULTRA TECH	
23	PVC FLOORING	CCL	GERFLOR			
24	HPL BOARD	MERINO	GREEN			
25	CEMENT FIBER BOARD	SHERA	EVEREST		BISON	
26	EXPANSION JOINT	FOSROC	MYK ARMNET		BASF	
27	Bolts, Screws (SS-316)	HILTI	FISCHER		QUIVALENT	
28	Tiles Adhesive and grout	FOSROC	ARDEX ENDURA		BASF	

ITEM OF WORK

1. Concrete shall be with conformity to I.S.456.
2. Foundation shall be with conformity to I.S.1080.
3. Stone masonry (R.R.) shall be with conformity to I.S.1597 (Part-I)
4. C.R. Masonry shall be with conformity to I.S.1597.
5. Brick masonry shall be with conformity to I.S.2212.
6. Cement plastering shall be with conformity to I.S.9103 & 6925.
7. Mortar shall be with conformity to I.S.2250
8. White and colour washing shall be with conformity to I.S.6278.
9. CC in foundation shall be with conformity to I.S.2571.
10. Anti-Termite Treatment shall be with conformity to I.S.6813. (Part – I & Part – II)
11. Painting to all surfaces shall be with conformity to I.S.2395 (Part – I & Part – II)
12. DPC shall be with conformity to I.S.3067
13. Tarfelt treatment shall be with conformity to I.S.1346
14. Mosaic flooring with conformity to I.S.2114
15. Steel painting shall be with conformity to I.S.1477 (Part – I & Part – II) I.S.1661
16. Flexible pavement shall be with conformity to IRC 37-2001

1.1 Scopeofwork:

The work contemplated under this contract includes general Construction work for theaforesaidproject,allasdetailedintheBillofQuantities,Specificationsanddrawingsandtocomplete the said work in every respect in accordance with this contract and with the directionsandtothe satisfactionoftheEngineer-in-charge.

Such other works which are not included in the Bill of quantities but required to be executed for successful completion of the project are generally intended to be executed through the same agency. The Engineer-in-Charge reserves the right to order additional works under the same Contract. The Engineer-in-charge also reserves the right to omit any item of work included in the Bill of quantities and award the same to any other contractor or not perform it at all at his discretion and the Contractor shall not have any claim because of the same.

The Contractor for this work shall be required to work in co-operation and co-ordination with other agencies on site and give them all reasonable assistance and help for the execution of the work in an efficient manner all as directed. The words “approved” or “as directed” shall be deemed to convey approval or the discretion of the Engineer-in-charge of the work.

1.2 IndianStandardSpecification:

The particular Specifications for the work are as detailed hereinafter. These specifications shall be read in conjunction with the relevant Indian Standard Specifications. The obtainable local practice as detailed in various regional handbooks of practice may be used subject to specific approval from the Engineer-in-charge. Where the specifications in any of the standards are at variance with the specifications detailed herein, the specifications herein shall govern.

1.3 QualityofMaterials&GeneralStandardsofwork:

The contractor under this contract commits himself to use materials conforming to relevant Indian Standards / Codes and assumes full responsibility for the quality of all materials incorporated or brought for incorporation in the work, the work shall be executed in accordance with acceptable engineering practice and as per direction of the Engineer-in-charge.

1.4 Scaffolding:

The contractor shall provide all scaffolding and ladders required for the proper execution of the work. The scaffolding should be of steel, stout, and strong to prevent any collapse or displacement. The contractor shall take proper measures for safety of workers working on scaffolding. All PPEs and safety equipment required for safe execution of all works as per IDCO safety standard is in the scope of the contractor.

The mode of measurements, wherever possible is specifically mentioned in these documents. Where it has not been mentioned, it shall be as per provision of the relevant Indian Standards. All the measuring tapes and other accessories necessary, shall be provided by the contractor.

The bidder along with his bid shall furnish a list of tools, plant and machinery which he intends to use on the works in Bid document. The list should indicate the exact type of machine, its capacity, year of manufacture, kind and capacity of propelling force, spare parts readily available and all other pertinent information. The contractor is obliged to use the machinery mentioned in his list if the Engineer-in-charge considers it necessary.

1.5 Surveyingandstaking:

It is the express responsibility of the contractor to bring to site all surveying instruments necessary for the marking out, fixation of levels, etc. and conduct these survey operations himself with utmost accuracy. The contractor shall put up stable benchmarks etc. as necessary for the work. Engineer-in-charge / his representative will be present when this work is being carried out and will inspect all these operations with the contractor's assistance. The contractor shall be entirely responsible for accurate setting out the work and he shall at his own expense make good any defects arising from errors in the line and levels.

1.6 Dewatering:

Dewatering of accumulated water in all locations on work site from whatever source of cause until the virtual completion of the entire work shall be done by the contractor at his own expenses and shall not be separately paid for. The rates quoted by the contractor shall be deemed to be inclusive of this.

1.7 Accesstosite,approachroadsandroadswithinthepremises:

The contractor shall at his own cost provide all approach roads required for the purpose of carrying out the work in the most expeditious and efficient manner and shall remove the temporary roads on completion. He shall acquaint himself thoroughly regarding condition and suitability of public roads leading up to the limits of the premises and will provide vehicles for transportation of materials that meet the requirements of these road conditions. It shall also be the responsibility of the contractor to maintain at his own cost the road until the construction iscompleted. The bidder is also to acquaint himself with local laws and bylaws and comply with all statutory laws, police and highway authority requirements.

1 SiteClearing:

The contractor shall clear the site for layout and the top soil to a depth of 300mm (if good quality top soil is available) shall be dressed and stacked at a point so as not to be disturbed and shall be used for landscape subsequently. The soil should be stacked so that in case of heavy rain it is not washed away.

2.1 Excavation:

Excavation for trenches over areas and for pits, etc. shall be done to widths, lines and levels as shown in drawings or to such lesser or greater widths, lines and levels as directed. The bottom and side of excavation, required levels, profile, etc. watered and thoroughly rammed. Where the contractor excavated below required level in good ground inadvertently or carelessness he shall make up the void in concrete M-10 at his own expense. During excavation, the contractor shall take necessary precaution to retain earth, so that the earth will not slide or fall down to avoid any accident and hamper the progress of work. He will take necessary steps to prevent the damage to adjacent structure or existing services. He shall repair and make good any such

damages at his own expense to the satisfaction of the owner. A suitable path for men and materials around the excavated pit shall be maintained throughout the work. Stacking or excavated earth from trenches, bids etc. shall be done away from the pit at a minimum distance equivalent to the depth of pit/trenches/foundation up to an initial lead and lift as directed by the Engineer-in-Charge.

2.2 Timbering & excavation (Shoring):

Where the soil is soft and sides of excavation needs supporting, suitably designed shoring, planking and strutting shall be provided. The rates for excavation shall be deemed to include all planking and strutting as necessary.

2.3 Refillingaroundfoundations:

Refilling around foundations shall be done with approved excavated materials. Refilling shall be done in layers not exceeding 150 mm thick, watered adequately and consolidated with pneumatic tampers or other suitable compactors. The finished surface of filling shall be slightly proud to bring it to finished level after watering and consolidation as directed.

All materials considered surplus shall be removed to destinations and disposed off as directed. The disposal of the materials can be in any of the following ways as directed by the Engineer-in-Charge of the work.

1. Fillinginlowlyingareas.

2. Fillinginatplacesoffillingsuchasunderfloors,inroadsetc.

3. Stackingofmaterialsinpre-designatedstackingyard.

4. Removalofmaterialsoutsideandfillingupoflow-lyingareas.

SandFilling:

Filling under floors or other places indicated shall be done with good quality sand conforming to zone 2 or 3 of I.S: 383. Filling shall be done in layers, each layer watered adequately and consolidated to specified density by suitable compacting equipment. Thickness of each layer shall not exceed 150 mm. The surface of the filling shall be finished to lines and levels as required. The filling shall be compacted in such a manner as to guarantee full stability.

2.4 Measurement:

Measurement for all excavation, filling, carting away and earthwork shall be in solid measure. The rates quoted by the bidders are thus for solid measure units. The following factors shall be applied to obtain quantities of solid measure.

The mode of measurement for various types of excavations shall be as under:

a. Incaseoftrenches,pitsandareas,measurementshallbeonthebasisofwidthoffoundations and the depth of bottom of foundation (bottom of bed concrete, if provided)formation.

b. In case of pipe trenches and drains, measurement of widthof trench shall be diameter ofthepipe plusanallowanceof500 mm.To allowforcollars, flangesetc.

c. Excavation in rock shall be measured up to levels indicated or required. No undulations asphysically appearing after excavations shall be taken into consideration while arriving atthequantities.Theratesquotedbythecontractorshallbedeemedtoincludeforthisandno extraisadmissible.

2.5 Sub-grade Conditions:

When no data is available of soil formation and depth of water table of proposed work site, the contractor should make his own arrangements of preliminary site investigation by actual inspection of the site and surrounding areas to assess the nature of soil and to foresee the difficulties that may arise during construction period. The contractor shall acquaint himself of the above before filling up of the bid.

No claimwhatsoeverwill be entertainedon any accountof conducting theseexploratory worksorlackof investigationonthepartof thecontractor.

3. Plain&ReinforcedConcrete,ControlledConcrete:

3.1 General:

Concrete and reinforced concrete work shall be carried generally in conformity with thelatestIndianStandardsIS:456andforprovisionsindicated here inbelow. All workistobecarried out with utmost precision and up to date scientific know how and the contractor shallemploythoroughlycompetentstafftoachieveacceptablestandardsconformingtotechnicalspecifications. Contractor shall establish a laboratory at the site for all types of tests pertaining toaggregates,cement,bricks, concrete,compactionetc.

3.2 Cement:

Portland slag cement (IS: 455) shall be used wherever so directed by the Engineer in Charge or asshown in drawings or Bill of Quantities. If directed, the contractor shall purchase cementas freshas possible after manufacture and where there is reason to believe the cement has been longstored, the Engineer-in-charge may demand a Laboratory Test Certificate regarding the characterofcementandthe contractorshallfurnishthe same atnoextra cost.TheEngineer-in-chargeshallrejectanycementthatinhisopiniondoesnotmeettherequired standards.

All bags and containers in which cement is packed shall be stored in a dry, weather tight,properlyventilatedstructurewithadequateprovisionforpreventionandabsorptionofmoisture.
The contractor shall at all times maintain for the inspection of the Engineer-in-Charge alog book indicating the receipt of cement, brand and agent from whom obtained and the age ofcement. Cement, which has caked or perished by being wet or otherwise, shall on no account beusedon thework.

Cement shall be consumed on the works in the same sequence as that of their receipt atsite. Cement reclaimed from cleaning of bags or from spillage from containers, or otherwise shallonno accountbeused.

PortlandSlagCementistocomplywiththerelevantIndianStandardSpecificationsIS

455.This standard stipulates that the slag constituent shall be not less than 25 per cent and notmorethan65percentofthePortlandSlagCement.

3.3 FineAggregate:

Fineaggregate shallconformtolatestIndianstandards(IS383).Sandshallbenaturalsand,crushed gravel sand or crushed stone sand but it must be a well-graded sand conforming to ISgrading and its FM be 2.4 to 3.2. Use of sea sand is prohibited.It shall be composed of hardsiliceous material and shall be clean and of sharp angular grit type. Sand shall be properly gradedminimizingallvoids.

Allowance for bulkingofwet sandshall be made.Bulkage limit is to be restricted to lessthan20%. Silt content in sand should not be more than 5%. Laboratory equipment such as measuringjarsetc.are tobe keptatsitefortimeto time checkingofbulkage andsiltcontent.

Sand shall be free from any harmful organic impurities. Quick colour test should be made at siteforthe consignmentofsandreceiver.Colourtestdetailsaregivenbelow:

ColourTestofSand:

The sand shall be tested with 3% solution of caustic soda (Sodium Hydroxide), which is called“Colour Test”.This is a reliable indicatorofthe presenceorotherwiseof anyorganicmatterinsandasunder.

i) Acolourlessliquidindicatescleansandfreefromorganicmatter.

ii) Astrawcolouredliquidindicates someorganicmatter but note enoughtobeseriouslyobjectionable;and

iii) Adarkcolourmeansthatthesandcontainsinjuriousamountoforganicmatterandshouldnotbeusedunlessitiswashedand aretestshowsthatit issatisfactory.

3.4 CoarseAggregate:

Coarseaggregateshallbeapprovedhardaggregateconformingtolatest IndianStandards(IS:383)detailsofwhich areas follows.

iv) Deleteriousmaterials : lessthan5%

v) Specificgravity : notlessthan2.6(2.6to3)

vi) Waterabsorptionvalue : about1%byweight

Aggregatecrushingvalue : forwearingsurfacelessthan30%
Forotherconcretesurfacelessthan45%

vii) Aggregateimpactvalue : forwearingsurfacelessthan30%
Forconcreteotherthanwearingsurfacelessthan45%

viii) Aggregateabrasionvalue : forwearingsurfacelessthan30%
Forconcreteotherthanwearingsurfacelessthan50%.

ix) Soundness(sodium Sulphatemethod) : lessthan12%Aggregate,Gradation,

storage,etc.

Aggregatesofvariousspecifiedsizesshallbestockpiledproperlyandseparately.

Aggregatesshallbecleanandshallnotcontainanyforeignmatter,silt,looseordestructivesubstances, harmfulchemicalsetc.

Aggregatesshallbestoredinproperbins,whichshallhavegooddrainagetopreventtheinclusionofforeignmatterandpreservethegradation.Sufficientlivestorageshallbemaintainedtopermitsegregationof successiveshipment,placingofconcreteattherequiredrateandsuchproceduresas inspectionand testing.

Ifdirected,theaggregateshallbewashedbeforeuse.Thegradingofaggregateforuseonworksshallbe aspertheIndianStandards(IS:456)

1. GradingofCoarseAggregateasperIS:456

SlNo.	ISsize	%Passingforgradedaggregateofnominalsize.			
		40mm	20mm	16mm	12.5
1	40mm	95-100	100	-	-
2	20mm	30-70	95-100	100	-
3	16mm	-	-	90-100	100
4	12.5mm	-	-	-	90-100
5	10mm	10-35	25-55	30-70	40-85
6	4.75mm	0-5	0-10	0-10	0-10
7	2.36mm	-	-	-	-

2. GradingofSingleSizeAggregateasperIS:456

SlNo.	ISsize	%Passingforsingleaggregateofnominalsize.				
		40mm	20mm	16mm	12.5mm	10.00mm
1	40mm	85-100	100	-	-	-
2	20mm	0-20	85-100	100	-	-
3	16mm	-	-	85-100	-100	-
4	12.5mm	-	-	-	85-100	100
5	10mm	0-5	0-20	0-30	0-45	85-100
6	4.75mm	-	0-5	0-5	0-10	0-20
7	2.36mm	-	-	-	-	0-5

Proper sieve analysis shall be carried out to determine the best gradation obtainable from theavailable aggregates.The sieveanalysisshallbe performed asperstandard practice andaslaidoutintherelevant Indianstandards.

3.5 Water:

Water for all concrete work shall be clean, free from deleterious matter such as oils, acids, alkalis,sugarandvegetablematter.PermissiblelimitsforsolidsshallconformtoIS456.Waterforconstruction shallbeprovidedbytheownerhowever,thecontractorhastoassesthewaterrequirementsandmakehisownarrangementtomeetitwithoutanyadditionalcost.Everyattempt shall be made to use water which is fit for drinking purposes. Water storage facilitiesprovidedbythecontractorshallbemaintainedproperlytoprecludecontaminationofwaterbyany of the harmful substances.The quantity of water to be added to concrete for mixing shall besuch as to afford workability consistent with strength requirements. Water cement ratio shall bemaintained constant as specified (0.45 for RCC and recorded in every batch of concrete. P.H. ofwatershallbeintherange6-9.

Thepermissiblelimits,asperIS456-areas following:

SL.NO.	Testedasper	PermissibleLimit(Max)
(i) Organic	IS 3025(part–18)	200mg/liter
(ii) Inorganic	IS3025(part18)	3000mg/liter
(iii)Sulphates(asSO3)	IS3025(part24)	400mg/liter
(iv)Chlorides(asCl)	IS3025(part32)	2000mg/literfor

Concrete not containingembeddedsteeland500mg/literforRCCwork.

(v) Suspendedmatter	IS3025(part–17)	2000mg/liter

The water cement ratio, being of paramount importance governing the durability of concrete, itshould be of the lowest feasible value.In the subject underreference, it should be 0.45for M30RCC and to achieve sufficient workability, it may be necessary to use suitable super-plasticizer intheconcretemixtoensureefficientplacementofconcrete.

3.6 Plasticizers:-

Thecommonlyavailableadmixtureswithgoodtohighplasticzingeffectsare:

- Modifiedligninsulphonates(MLS)
- Sulphonatedmelaminecondensates(SMF)

- Sulphonatednaphthalenecondensates(SNF)
- PolyCarboxylicethers(CE)

Typicalperformanceofwaterreducingadmixturesisoutlinedbelow:

Typeofsuper-plasticizer	Typicaldosagebycementweight	Waterreduction
MLS	0.2-0.8%	Upto10%
SMF	1.0-3.0%	Upto25%
SNF	0.8-2.0%	Upto25%
CE(PolyCarboxylicethers)	0.5-1.5%	Upto40%

The super-plasticizer basedon Poly CarboxylicEthers (CE) is provingmuchbetter thanothers.Thetypeanddosageof Super-plasticizertobeusedshallbesubjecttotheapprovaloftheEngineer-in-charge.Thedosageshallbearrivedatthroughlab.Tests/mixe designtestsasapprovedbytheEngineer-in-charge.

3.7 Typesofconcrete,strengthsetc.:

The Bill of quantities specifies various types of concrete. The strengths corresponding to thesetypes is aspertablebelow:

i. TypesofConcrete

Sl.No.	TypeofConcrete	28day CharacteristicDesignstrength N/mm2	28day Target DesignStrengthN/mm2.
1	M-15	15	15+1.65X3.5=20.8
2	M-20	20	20+1.65X4.0=26.6
3.	M-30	30	30+1.65X5.0=38.2

Note:The established valuesof standardDeviationsshallbeused.Whenadequatetestresults(30ormore)areavailableandthetargetstrengthsrevisedthereafter.Efforts shall be made to bring the standard Deviations up to date, preferably once amonth.

Even though the Bill of quantities specifies various types of concrete, it is possible that the typemay be altered to suit the site conditions. The compressive strength indicated above pertains tocompressive strength tests on “work test cubes 15 x 15 x 15 cm, after normal curing for 28 days.Thestrengthofpreliminarytest cubesshallbeas perIS :456.

Thetypeofconcreteforanyparticularsituationofworkshallbeasperdrawings.

Any construction in the coastal areas may be considered as exposed to “severe” environmentalcondition. In assessing the level of severity, it shall be prudent to adopt a realistic attitude and beeven somewhat conservative in respect of the extent of coastal zone for the ultimate durability ofthestructures.

Thus,besidesusing.PortlandSlagCement,thespecificrequirementon“durabilityaspects”,asper IndianStandardIS456,inrespectofthefollowingparameters,must bemet:-

- MinimumCementContent
- MaximumWater/Cementratio

- Covert toSteelReinforcement.

Alltheserequirementsarerelatedtothevarious‘environmentalexposureconditions.Thestandard IS 456 classifies the environment into 5 levels of severity, that is mild, moderate, severe,verysevere,andextreme.

Theparametersrelatingtominimumcementcontentandmaximumwater/cementratio,asperIS456, are summarizedbelowalong withthe minimum gradeof concrete:-

ExposureClassifi-cation	PlainConcrete			ReinforcedConcrete		
	Min. (*)Cementcontent)kg/m3	Max.watercementratio	Mini. (*)Gradeofconcrete	Min.(*)Cementcontent)kg/m3	Max.watercementratio	Min. Gradeofconcrete
Mild	220	0.60	-	300	0.55	M20
Moderate	240	0.60	M15	300	0.50	M25
Severe	250	0.50	M20	320	0.45	M30
VerySevere	260	0.45	M20	340	0.45	M35

Arrangementforslumpconetestshallbekeptatsitetoarriveatworkabilitywheneverthe Engineer-in-chargewantstocheckatsite.Arrangementforcompactingfactortestshallalsobe madetoTestsfordeterminationofstrengthofconcrete.

ii. StrengthofConcrete

As willbeapparent from the Bill of quantities, the strengthofconcrete specifiedis the criteriaandthecontractorshallmakeeveryefforttoobtainthestrengthbygoodquality.Control.Incaseofconcrete,whichdoesnotobtainthespecifiedstrengthat28days,suchworkshallbedemolished and reconstructed to obtain the requisite strengths, as directed by the Engineer-in-charge. It has also to be ensured that the concrete conforms to the durability requirements viz. allrequisite parameters concerningminimum cement content, maximum free watercement ratioandthespecifiedcovert tosteelaswellasgoodworkmanshiptoobtainfullcompactionofconcretewithnonhoney-combinginthefinishedconcreteetc.havetobemeticulouslyimplementedonthejobincludingfullyefficientcuringofconcretesurfaces.Todeterminewhether concrete in any particular part of the work is of the requisite strength or not, test cubes(works test cubes) shall be made from samples collected from the concrete being poured for theparticularpartanddeterminedasperacceptancecriteriadetailedhereinafter.Thesalientfeatures forthecollectionofsamples isasindicated below.

TestingofConcreteCubesfordeterminingCompressionstrength:

Quality

Asspecified,CompressionstrengthShallbeasspecifiedfortheparticulartypeofconcrete.

Criteriaforacceptanceofwork

Partorelementpfconcreteworkshallbedeemedtobeacceptable,providedthethreecubestestedfor 28daysstrengthconformtothefollowingasperIS456.

iii. Acceptancecriteriaofconcretecubes.(AsperIS456)

TheConcreteshallbedeemedtocomplywiththestrengthrequirementswhenboththefollowingconditionsaremet.

Themeanstrength–determinedfromanygroupof4non-overlappingconsecutivetest:

Anyindividualtestresultcomplies with the appropriatelimitsincolumn3ofthefollowingTable-A

TableA.CharacteristicCompressiveStrengthComplianceRequirement

Specified Grade	MeanoftheGroupof4Non-OverlappingConsecutiveTestResultsIn N/mm2	Individual TestResultsinN/mm2
1	2	3

M15 ≥fck+0.825Xestablished Standarded viation(roundedOfftonearest0.5N/mm2)
≥fck–3 N/mm2OR fck+3N/mm2

Whicheverisgreater

M20 ≥fck+0.825Xestablished standarded viation(roundedOfftonearest0.5N/mm2 ≥fck–
4 N /mm2OR fck+4N/ mm2

Whicheverisgreaterfck=28dayscharacteristiccompressivestrength

Intheabsenceofestablishedvalueofstandarddeviation,thefollowingvaluesofstandarddeviationsha llbeassumed,andattemptshouldbemadetoobtainresultsof30samplesasearlyaspossibletoestablis hthevalueofstandardsdeviationofthespecifiedgradeofconcrete.

AssumedStandardDeviation

GradeofConcrete	AssumedStandard Deviation (N/mm2)
M10&M15	3.5
M20&M25	4.0
M30,M35&Above	5.0

The above values correspond to the sitecontrol having proper storage ofcement' weigh batchingof all materials; controlled addition of water regular checking of all materials' aggregate gradingandmoisturecontent;andperiodicalcheckingofworkabilityandstrength.Wherethereisdev iationfromthe table,thevaluesgiveaboveshallbeincreasedby 1N/mm2.

Concrete shall be liable to be rejected if it is porous of honey combed, its placement has beeninterrupted without providing a proper construction joint, the reinforcement has been displacedbeyond thetolerance specifiedorthe construction tolerances have notbeenmet.The concreteshallbeacceptedonlyafterthecontractorcarriesoutsuitableremedialmeasuresto thefullsatisfactionoftheEngineer-in-charge.

In caseof doubtregarding the gradeof concrete used,either due to poor workmanship orbasedon resultsof cube strength tests,core tests shall be carriedout. The points from which coresareto be taken and the number of cores required shall be at the discretion of the Engineer-in-chargeand shall be representative of the whole of concrete concerned. In no case, however, shall fewerthan three cores be tested in accordance with IS – 516. Concrete in the member represented by acore test shall be consideredacceptable if the average equivalentcube strengthof the core isequaltoatleast85%ofthecubestrengthofthegradeofconcretespecifiedforthecorrespondingage andnoindividualcore hasstrengthless than75%.

QuantumofCubesandtestingasperIS456.

The minimum frequency of sampling of concrete of each grade shall be in accordance with thefollowing.

QuantityofConcrete	No.ofsamplesIn thework (m3)
1 - 5	1
6 - 15	2
16 - 30	3
31 - 50	4
51and above	4+oneadditionalsamplefor Eachadditional50m3orparthereof.

NOTE: At least one sample shall be taken from each shift. 3 test specimens shall be madefrom each sample for testing at 28 days. Additional 3 specimen cubes be cast todeterminethestrengthofconcreteat7days.

The direction of the Engineer-in-charge in this regard shall be final and binding.Batching andmakingof concrete:

All batching of aggregates and cement shall be by weight. All the necessary equipment such asweighingequipment, devicesfordeterminationofmoisture and bulkin sand, slump coneetc.shall be provided by the contractor. Concrete shall be machine mixed in appropriate mechanicalconcretemixturesuntilthereisauniformdistributionofmaterialsanduniformcolourandconsistenceisachievedandundernocircumstancesforlessthantwoandhalfminutes.

A wooden board approximately 30 cm. X 40 cm. Shall be put up at the concrete mixture on whichshall have been legibly written in English and the local language, the quality of concrete that isbeing mixed,theproportionsandotherrelevant data.

3.8 Cubes:

Thesizeofcubestobepreparedandtestedshallbe150X150X150mm(6”x6”x6”)

Cubeseachareintendedfortestingat7and28daysrespectivelyanddeterminingthestrength.

Cubestestedat7daysshouldgiveastrengthofnotlessthan70%ofthecorrespondingstrengthof structural members and also for works at various levels. It shall also be collected whenever theusualquality fora particular strength is suspect. Theacceptance criteriaof concrete cubes asgiven above and in ARE: 456 isto be followed.The test resultsof the sample shall be the averageof the strength of 3 specimens. The individual variation shall not be more than ± 15% of theaverage.Ifmore,thetestresultsofthesampleareinvalid.

3.9 PreparationandTestingofCubes:

Casting of cubes, preparation of moulds for the same, processing and curing the cubes and testingthesameshallbeasperdetailedinstructionlaiddownintherelevantIndianStandardasamended up todate.

3.10 Equipmentmodulestestingetc.

It is entire responsibility of the contractor to prepare and get the cubes tested and provide for allmaterials, labour, modules,equipment, faculty and charges for testingetc. The contractor’srateforconcrete work shall bedeemedto includefor theseandnoextra paymentwhatsoeverisadmissibleonthis account.

3.11 Slump:

The slump cone testsshallbe required to be performed to establishworkability and the sameshallbecarriedoutfreeofcost.SuitablePlasticizer/Superplasticizermayneedtobeused,as directed by the Engineer-in-charge, in M-20 M-30 & grade RCC to obtain the requisite workabilityof concreteatthespecifiedwatercement ratio.

3.12 FormWork:

Form work shall be properly designed and constructed such that it is rigid enough to remain freefrombulging,saggingorreplacementduringplacingofconcrete.Itshouldalsobesoconstructedas tofacilitateremovalofthesamewithoutdamagetoconcrete.Theformworkshallbeadequately watertight to prevent any loss of liquid and grout. All formwork shall be accuratelyerectedinregardtosize,levelsetc.Incaseoftimberform(onlyfortheslabs,beams,lintel,chajjas) work, the surface of forms in contact with concrete surface shall be wrought. The jointsbetween boards shall be close fitting and very thin for the concrete surfaces designed to haveexposed finish and not intended to be plastered. Surface of forms coming in contact with concreteshall be treated with approved emulsions or mineral oil.It shall be ensured that these emulsionsdonotstainordiscolourthe naturalcolourof concrete.

All formwork shall be removed as per latestIS 456.Form work shallbe removed without shockorvibration.Edgesofbeams andcolumnsifrequiredto havechamfersshall beobtainedbysuitably fixing triangular edge beads 20mm x 20mm to the forms. (No extra is admissible to thecontractor on account of these incidental and minor works for sizes up to and including 20mm x20mm). Likewise where drip notches are necessary they should be formed by suitably shapedfilletsnailedinforms.

Form work for all beams and other horizontal construction members shall be built to an upwardcamber of 1/300" ofthe span (in the center) to nullify the effects of opticalillusion. The camber shall be in addition to such camber as maybe required and shown in theStaticCalculations.

The tolerance on the shapes,lines and dimensions shown in the drawingsshallbe withinthelimitsgivenbelow:

i. Deviation from specified dimensions of cross-section of columns and beams :+12mm–6mm

ii. Deviationfromdimensionsoffootings
Dimensionsin plan: +50mm- 12

Eccentricity: 0.02 times the width of the of deviation but not more than

50mm.Thickness: ±0.05timesthespecifiedthickness.

iii. Plumb,specifiedBatter,thelines&surfaceofcolumnswallsetc.
±12mm(in3mofheight)

±18mm(in6mof height) &±30mm(in12mofheight)

After the forms havebeenerected to line and grade, the same shallbe meticulously inspected asto their adequacy. If the forms are not tight, there will be loss of mortar, which shall result inhoney-combing of concrete or a loss of water which shall cause sand streaking. If the inspectionreveals that the forms are not braced sufficiently to stay in alignment during concrete placement,concretingoperation shallnotbe commenced till the Contractor setsright the deficienciesandtheformsre-inspectedandfoundO.K.itshallalsobecheckedduringinspectionthattheformwork as erected conforms to the specified line, grade, alignment to the specified tolerancelimits.Fullyadequate rigidityofformsisofparamountimportancesince the tolerance limitsspecified are for the finished concrete and not for the forms. Consolidation of concrete by thevibrator requires that the forms be tight and strong. Stability is a very important consideration inthe form work and the Contractor shall be made to understand thatthe common deficienciesresultinginfailureofformwork.

(i) Inadequatecrossbracing: (ii)Inadequate horizontal bracing: (iii) failure to regulate the rateofplacementofconcreteintheformsand(iv)abnormalformdisplacementsduring&afterconcreteplacementduetoinadequateprovisionforlateral pressures.

The contractor should ensure that ready access is provided for proper placement of concrete,vibrationofconcrete,andforinspectionoftheseoperations.

HorizontalConstructionJoints:

A very common blemish on formed concrete surfaces in the off “set” often found at horizontalconstructionjointswhereformshavegivenway(vizyielded)afractionofcoupleofcentimet ersat the bottom of the new lift. These off –sets should be prevented by so setting the forms as to fitsnugly & tight againstthe top of concrete in the previous lift and then securing the forms so as toremain in tight contact during the concrete placement operation. The anchoring shall be done byusing an ample number of ties and bolts above and within a few centimeters of the constructionjoint. The ties in the top of previous lift cannot be relied on to prevent a slight spreading of theforms at the joint. Forms shall overlap the hardened concrete in the lift previously placed by notmore thanabout 50 mm, though 25 mmlap isconsideredsatisfactory. TheContractorshouldtake utmost care to ensure that the construction joints are smooth, free from sharp deviations,projectionsor edges.

Spallingfromthefaceofconcrete:

Occasionally, spalling may occur from the face of concrete when forms are removed. This is oftencausedby rough spotson the formswhere mortaradheresstrongly enough toovercomethetensile strength of green concrete. Such areas on the forms must be cleaned, polished and thecoveredwithformoilbythecontractor.Wirebrushingoftimberformsshallbedoneverycarefullyto removetheset-mortar.

FillingofBoltHoles

(she – Bolts) or Holes of ties / Rods. The holes left in the concrete surfaces by the She – bolts orrodsetc.shallbedulyreamed,cleared,cleanedandfilledwith– “drypackmortar”bytheContractorwithinareasonableperiodoftheremovalofformwork.Suchfillings hallbemadeflushwiththeconcretesurface.Noholesshallbeleftwithoutthedry –packmortarfilling.

InspectionofForms:

The Contractor shall inform the Engineer-in-charge well in time (well before commencement ofplacementofconcrete in the forms) to enable him or his representative to inspectthe formworkas to its adequacy, suitability, alignment, strength and overall fitness. However, such inspectionshall not relieve/ absolve the Contractor of his SOLE RESPONSIBILITY for the proper formwork,andsafetyofmen,materials,equipmentandtheconsequentresults/consequences.

Measurements:

Formwork shall be measured as the area (in square meters) of shuttering in contact with theconcrete including covers, angles, splays, miters, bevels, etc. for which no special rate shall beallowed.

- It shall be measured to the nearest centimeter and the area worked out correct to twodecimalplaces
- Nodeductionshallbemadeforopeningsupto0.4squaremeterinplan
- Areaofvoidsshalldeductfromthefaceareaofshuttering.
- No deductionsshallbemade fromformworkofmain beamswhere asecondary beamintersectsit.Formworkforsecondarybeamsshallbemeasureduptosides ofthemainbeams.
- Nodeductionshallbemadefromtheformworktocolumncasingsatintersectionof beams.
- Lappingofformworkwithpreviouslylaidoutconcretewillnotbemeasuredandwill notbe paidfor.

- Thequotedrateshallbeapplicableforallworkingconditionsandatallheightsanddepthso r lifts specified in the drawings.The rate shallinclude the cost of materials and labourforvariousoperationsinvolved including,butnotlimitedto thefollowing:
- Provisionof formwork,itserectionandtreatmentofthe concretesurface immediatelyafterremovaloftheformwork
- Holes to be made in the formwork for inserting electrical conduits, piping for

plumbingworks,etc

- Centering,bracing,tighteningwithboltsandnuts,staging,etc.
- Splayed edges, notchings, allowance for overlaps, centering, shuttering, strutting, bolting,nailing,welding, casingstrikingandremoval.
- Fillingtoformstopchamferededgesorsplayedexternalanglestofootings,beams,columns andthelike.
- Temporaryopeningsintheformsforpouringconcreteandremovingrubbish.
- Dressingwithoil/approvedemulsiontopreventadhesionofconcretewithshuttering.
- Rakingorcutting.
- Fixing inserts and openings at the correct line and level and at any stage to support thesameatthedirectedheight andplace.
- Platformsifanytocheckformswhileconcretingisinprogress.
- Fillingandmakingjointswatertighttothe satisfaction not theProjectManager/IDCO.
- Cleaningoftheshuttering.
- Cleaning the complete floor immediately on deshuttering complete to enable the start ofnextactivity.
- Cleaningandwashingofthecompletefloorduringandafterconcretingtoavoidanydamage to finished surface. It will be responsibility of the Contractor to protect and retain allfinishedsurfaces.

Should there be any laitance due to concreting of upper floors or other construction activitieswithin the said floor the Contractor shall be responsible to do all that is required to bring the finishbacktotheoriginalorasspecifiedintheTechnicalSpecification/directedbytheProjectManager/IDCO.

3.13 TransportingandPouringofConcrete:

No mixingof concreteshallbestartedunless thesituationwheretheyaretobepouredareprepared and kept ready. Concrete shall be poured immediately on preparation. Transporting ofconcrete shall be done as speedily as possible and also in a manner to prevent segregation ofaggregates. No re-tempered concrete shallbe allowed to be used on the works.No concrete shallbe allowed to fall from a height more than 1200 mm. Where the concrete is to be placed at moredepthitshouldbedonethroughchuteasdirectedbyEngineer-in-charge.

Liftofconcretingshallnormallybenotgreaterthan2000mminheight.

Before fresh concrete isplaced againstan already cast and hardened section, such surfaces shallberoughened,sweptclean,moistenedwithwaterandtreatedwithcementslurry.Concretejointscompound,Freshconcreteshallthenbepouredasrequired.Undernocircumstances,concrete mixed for more than 20 minutes shall be used where initial setting has commenced.Dewateringofexcavationsforconcretingwherenecessaryshallbecarriedoutbythecontractoras directed and the rates quoted by the contractor are deemed to be inclusive of such dewatering.Noconcretingshallbedoneinadverseweatherconditionwithoutproperprecautionsorapprovalfrom Engineer-in-charge.Nohand-mixingofconcreteshallbeallowed.Inanexceptional/unavoidablecircumstance,itshallbeallowedunderthespecification approvalofEngineer-in-charge and that too for a small or restricted quantity only , and in such a situation,10%morecementshallbeusedthanthatusedwhenconcreteingredientsaremachinemixed.

3.14 ConsolidationandprocessingofConcrete:

Concreteforallworksshallbecompactedbymeansofsuitablevibratingequipment.Sparevibratorsneedles which are in complete working condition shallalways be kept ready at sites tobeput into commission in case of failure ofthevibrators or needlesunder use.The vibratorsshall be operated by skilled personnel, thoroughly instructed as regards the mode, frequency,durationetc.regardingvibration.

3.15 Finishtoconcretesurfaces:

Finish to concrete surfaces at various situations shall be as per directions of engineer-in-charge.Where, form finish is specified, the final surface shall be smooth and even and no-undulations,ridges, spots etc. shall be permitted. They shall be laid to pattern as directed. In case surfacesintended and directedfor form finish, exhibit any of the defects above mentioned, the surfacesshall be rubbed with carborundum and finished as directed at the risk and cost of the contractor.The decisionas to the acceptabilityor otherwise of a surface will be notifiedby engineer-in-chargeandthecontractorwillimplementtheinstructionsaccordingly.Thehoney-combedconcreteshallbemeticulouslyrectifiedtothefullsatisfactionoftheengineer-in-charge.

3.16 ConcreteCoverforReinforcement:

Where not specifically indicated in the drawings, concrete cover for reinforcement shall be as perthe latest Indian Standards and as per directions at site from time to time. Proper concrete coverblocks to suite various covers as required shall be provided in adequatenumbers sufficientlyahead of thework.

In respect of the nominal cover to all steel reinforcements including links., IS 456-2000 is to bereferred

3.17 ConstructionJoints:

Construction joints in concrete work shall be provided as far as possible only at predeterminedplaces in consultationwithEngineer- in-charge.Jointsshall be provided asspecifiedin latestIndianstandardsorasdirectedbyEngineer-in-charge.

3.18 Curing:

Itisveryimportantthatallcementconcreteworkshallbecuredproperly.Allconcreteworkshall be kept continuously in a damp or wet condition by pouring or by covering with a layer ofmoist sack, canvas, hessian or similar material for a minimum period of 14 daysfrom the date ofconcretingasper IS456,prolongedcuring beyond even 14daysshallbe desirable (viz keepingthe concrete continuously wet). Since the Water –cement ratio of concrete shall be low (0.45 forRCC M30 grade concrete & 0.5 for M20 grade concrete as per IS 456:2000 Table 5), it is allthemore important toensure preventof moisture lossfrom the concrete through fool-proof andprolonged curing.Water used for curing shall also be free from any deleterious substances andshall generally be fit for drinking. The work shall be adequately protected from drying, winds anddirect sun rays.The contractor shouldarrange athis own cost a temporary water supplylinewithprovisionof suitable lines,pump etc. forcuringand constructionalpurpose to reachallheights.

The contractor shall not be allowed to commence the work of concrete placement until he makesall the curing arrangements to the full satisfaction of the engineer-in-charge (viz. water tanks,pumps, delivery lines, spray nozzles etc. as well as the requisite crew earmarked specifically forundertaking curing). Payment for the concrete placed shall be made only after its specified curinghasbeendonetothefullsatisfactionoftheengineer-in-charge.

3.19 MembraneCuring:

Curingconstitutesone ofthemostvitalrequirementforthestrength &durability ofconcrete.Anyslacknessincuringordoinginadequatecuringwilladverselyaffectthedurabilityofconcrete.Full-proofcuringbythecontractoris,therefore,a“must”.Incasethe Engineer-in-chargefindsthatthemoistcuring(viz.watercuring)bythecontractorisnotbeingefficientlydone (particularly on the under sides of slabs & beams etc.), he shall direct him to resort to thecuringbymembraneforming“curingcompound”.Thecuringcompoundshouldbewhitepigmented ofapprovedqualityconformingtoASTM-C-309-81Type-2.Thisshouldmeettherequirement of water retention test as per ASTM designation C-158-80. Loss of water in this testfor acceptable curing compound should not be more than 0.55kg/m2 of exposed surface in 72hours . The curing compound should also meet the day light reflectance test . Curing compound istobesprayedwithanozzle.Itshouldbeappliedassoonasthebleedingwaterdisappears,leaving a

dull appearance. This is when there is no free moisture on the surface. If applied tooearly, the free moisture will prevent the compound from forming a moisture-proof film. If appliedtoo late, some of the moisture will have already been lost that should have been retained for thehydration process. Proper time range will vary from about 30 minutes to 2 hours after placementofconcrete dependingupon humidityandtemperature.Uniform coverage of curing compoundon the concrete surface isvery importantand,accordingly, it shouldbe mechanically sprayedwithanozzle.Thedosageofcuringcompoundsprayedontheconcretesurfaceshouldnorm allybenotmorethan1literforabout3.75m2(sqm)concretesurfacearea.Thecontractorshallbe allowed to use the curing compoundonly upon his furnishing its test reports in respect of thewaterretentiontests&daylightreflectancetest.TheEngineermayalsogetthecuringcompound tested in a reputed laboratory for its suitability. Payment for the concrete placed shallbemadeonlyafterthecompletionofproperapplicationofmembrane-formingcuringcompound.

3.20 Openingandinserts:

All opening andinsertswhich are designatedin due time or as required for services, will beexactlyprovided by the contractor includingsupplyofmaterials. The contractor shouldalso fixthe anchors or such items in exact position and in perfect lines and levels, inserts apply to suchitems as timber, dowels, bolts, loop, brackets, suspension, irons,hooks , screws, plates, pipe, pipeof various types and diameter etc. Openings in concrete or masonry must be provided in exactlocation,tocorrectshape,sizeanddepthorslightlybigger,asshownindrawingsorasinstructed . It must be clearly understood that provisions of inserts and openings as contemplatedin this contract are to be carried out with “utmost precision” and any deviation of the same fromthat as shown in drawing or instructed have to be rectified by the contractor at his own cost andresponsibility.Thecontractorshouldmakeprovisionofopeningstodeepbeamsandtheirmemb ersatbottomoratlowerlevelasnecessary forcleaningpurposepriortoconcreting.

3.21 Steelreinforcement:

Allreinforcement for concrete workshallbeofFe500 conforming to IS 1786(latest revision).Theyshallbeoftestedquality.Reinforcementshallbefabricatedtoshapesanddimensions shown on the drawing and shall be placed where indicated on the drawings or required to carryout the intent of drawing and specifications or as directed by Engineer in charge. Before placing,reinforcementshallbethoroughlycleanedoflooserust,coatingetc.Whichwouldresultinred ucing or destroying the bond. Oiling the bars to clean them is strictly prohibited. Bending,straightening,cuttingetc.operationsshallbecarriedoutinamannernotinjurioustothemate rial. Assembly of reinforcement, placing of reinforcement, Tolerance for Cover, welding ofjointsetc.shallgenerally conformto theIndianStandardspecifications.IS456.

3.22 PlacingofReinforcement.

Beforethereinforcementisplaced,thesurfacesofbarsandthesurfacesofanymetalbarsupport s shall be cleaned of all rust, loose mill scale, dirt grease and any other objectionablematter.

i. All reinforcement bars shall be accurately placed in exact position shown in drawings andshall be securely held in position during placement of concrete by annealed binding wire,and by using stays, blocks, metal chairs, spacers or other approved devices at sufficientlycloseintervals(lessthan1000mminterval)soth atthe barsdonotsag.

ii. Wireforbindingreinforcementshallbesoftandofannealedmildsteelof16SWGandsh all conformto IS280

iii. The bars shall not be allowed to sag between the supports and also not allowed to bedisplacedduringconcreteplacement.Also,thecontractorhastoensurethatnodisturbance iscausedtothe reinforcementbarsalreadyplacedinconcrete.

iv. All devices used for positioning of bars shall be of non-corrodible material. Metal supportsshall not extend to the surface of concrete except where shown in the drawings. Pieces ofbrokenstoneorbrickorwoodenblockshallnotbeused.

v. The contractor must ensure that the CONCRETE COVER AS SPECIFIED IS METICULOUSLYPROVIDED.

vi. All bars protruding from concrete and to which other bars are to be spliced, and which arelikely to be exposed for a long period. SHALL BE PROTECTED BYA THICK COAT OF NEATCEMENT GROUT.

vii. Reinforcingbars of 25mm in diameterandlessmay be either lappedorbuttweldedwhicheverisconsideredmorepracticalbytheEngineer.

viii. Reinforcingbarsof28mmindiameterandlargermaybeconnectedbybuttweldingprovided that the lapped devices will be permitted if found to be more practical than buttwelding and furthermore that the lapping does not encroach on cover limitation or hinderconcreteorreinforcementplacement.Electricareweldingshall,preferably,beused.

ix. Tolerance for Cover. Unless specified otherwise, actual concrete cover should not deviatefrom therequired/specifiednominalcoverby+10 mm.

All reinforcement shall be bent cold. Unless otherwise directed, reinforcement shall not bespliced at points of maximum stresses. Engineer in charge shall be informed of the same beforesuchsplicingistakenup.LapsandsplicingshallconformtothelatestIndianStandards.

Reinforcementshallbeaccuratelytiedatallintersectionsandlapswith16SWGsoftdrawn binding wire,such that the reinforcement will givearigid structure. Binding wirewillnotbemeasuredoraccountedforseparately.Thecontractor'srateforreinforcementwillbe measuredandpaidforaccordingtobendinglistswithoutallowancesforcutting,wastage,binding wire etc. authorised laps, hooks, chairs, spacers etc.shallhowever be accounted for incase, the contractor or engineer desires to resort to weldingor swivel nuts,there shallhoweverbe made as if the laps have been provided and no extra claim whatsoever shall be admissible onthisaccount

Reinforcementshallbeassembledinplacewithproperconcretecoverblockstosuitevariouscover s asrequired.

3.23 Measurements:

Allmeasurementsshallbeasgivenbeloworwherenot givenas per latestIS:1200.

Concretewillbecompensatedforaccordingtoitsactualvolume. Thecomputationwillbebaseduponthe constructionplansonlyandnositemeasurementsshallbet akenforthispurpose.AllincidentalworkstatedintheTechnicalspecificationsandalso dewatering atthe time of concretingare deemed to have been includedfor in the unit prices quoted by the contractor. Opening with an area larger than 0.1sqm shall bedeductedfromconcretequantityandwhereopeningsaresmaller,theseshallnotbededucted.

Reinforcementsteelwillbecompensatedforaccordingtotheapprovedbendinglists without allowances for cutting, rolling margin and waste. Binding wire, cover blocks, chairs,spacers etc. will not be measured or paid for separately. The contractor shall prepare the BarBendingSchedulesandincorporatethesameon the reinforcementdrawingsasdirectedandsubmit ittoengineer inchargeforapproval.

Allopeningsandinserts which are indicated in drawings and asper requirements forservices shall be providedatexactpositionsand no paymentsshallbe made for providing orfixingthese.Onlysuchopeningsorinsertswhichhavenotbeenindicatedearlierorsuchadditional openings/inserts required specially due to changes made by engineer in charge shallbepaidfor.Exceptingfortheabove,allothermeasurementsshallbeasperstipulationsunderth elatestIndianStandardsModeofMeasurementsforBuilding works.

Informationoncementconcrete

SlNo	Gradedesignation	M30	M15	M20		
1.	TypeofMix (Designmixornominalmix)	DesignMix	Design mix	Design mix		
2.	Typeofcement	Slagcement(I.S :455)	Slagcement(I.S : 455)	Slagcement(I.S:455)		
3.	Maximumnominalsizeofaggregates(mm)	20	20	20		
4.	Minimum cementcontent(kg)/m3ofcement(fordesignmixcontent)	320	-	250		
5.	Maximumwatercementratio(fordesignmixconcrete)	0.45	-	0.50		
6.	Maximumquantityofwaterfor50Kg.Ofcement(Nominalmix)	-	-	32		
7.	Workability(slumpin mm)	100to150(water-freeunlined holes) 150to200(forconcretingby tremie)	75 to 100	50-75		
8	Exposurecondition	Severe	Severe	Severe		

2.DAMPPROOFCOURSE:

Theworkcoveredunderthisspecificationsconsistssupplyingandlayingasspecifiedthicknessintheapproveddrawingofplaincementconcrete(1:2:4)asdampproofcoursewithwaterproofingadmixturewiththisspecificationandapplicabledrawings.

4.1 Workmanship:

Surface to receive damp proof course shall be cleaned and carefully wiped to remove all dust,laitance etc. and shall be approved by the Engineer-in-charge Damp proof course shown shall becement concrete as per proportion indicated in the schedule or cement concrete in the ratio CC1:2:4.Approvedwaterproofing compound@2%byweightofcementorasdirectedbythemanufacturer shall be mixed in cement mortar for this concrete. The damp proof course shall belaid to the full width of the walls and the edges shall be straight, even and truly vertical. Woodenforms shall be used to obtain good edges. No masonry work shall be commenced on freshly laiddamp proof course unless it is cured for 48hoursofits layingby curingofdamp proofcourseshall be continued along with the masonry work. Specification for cement, sand, aggregate andwatershallbeasdescribedhereinbeforeforconcreteworks.

4.2 Modeofmeasurement:

The work shall be measured in sqm. area actually laid limited to sites as shown in drawing. Therateshall include costof allthematerials,labouretc.andscaffolding(ifany).

2 MASONRY:

5.1 Materials:

i. Brick:

(a) Fly ash bricks are to be used . The contractor has to arrange the same. The contractor maymanufacture the same at site by installing brick manufacturing plant. For this, fly ash shall beprovidedbytheownersatfreeofcostbutthetransportationofflyashfromplanttobrickmanufacturing site shall be doneby the contractor. The bricksshall be hard sound and well curedwith sharpedges and of uniformsizes &shapes.FlyashBricks shall beof goodstrengthandqualityand shallbefreefromcracks,stonefloats,orother suchdefects.

(b) Whenimmersedinwaterfor24hours,abrickshallnotabsorbmorewaterthan20%ofitsdry weight. All bricks shall be identical / equal to samples submitted and approved by Engineer-in-chargebeforethecommencementofthework.Crushingstrengthoftheclassbricksshallnotbelesstha n75kg./cm2.Metallicsoundofbrickisalsoacriteriafortheaboveclassandquality.

ii. Sand

ISgradationofsandformasonryandplasteringworkshouldbeasfollows:

Thesandshallbewellgradedsoastoimpartgoodworkabilityandgoodfinishing.Thegradationrequire mentofsand shall beasfollows:

Sandformasonrywork(AsperIS2116)

Sl.No.	ISSieve size	Percentageofpassingbyweight
1.	4.785mm	100
2.	2.36mm	90-100
3.	1.18mm	70-100
4.	600microns	40-100
5.	300microns	5-70
6.	150microns	0-15

SandforPlastering(AsperIS1542)

Sl.No.	ISSieve size	Percentageofpassingbyweight
1.	10mm	100
2.	4.75mm	95-100
3.	2.36mm	95-100
4.	1.18mm	90-100
5.	600microns	80-100
6.	300microns	20-65
7.	150microns	0-50

iii. Cement: As described under clause 1.3.2 of

technical specificationAdditives :

Additives, like integral water proofing compounds, shall be of the approved type from reputedmanufacturers. These shall be used strictly in accordance with the manufacture's instructions/specifications.Theadditivesshall confirmtoIS9103.

1.4.1.1 Samples:

Whendemandedbyengineer-in-charge,thecontractorshallproducesamplesofmaterials/carryout samplesof work for Engineer-in-charge.Allmaterials used as also works carried outshallconformtothequalityofapprovedsamplesProductionofthesesamplesshallbeatcontractorscost.

5.2 Brickmasonry:

Brick shall be soaked in clear water for at least six hours in a vat before use..Bricks shallbelaidinEnglishbondunlessspecifiedotherwise.Nohalforquarterbrickshallbeusedexceptasclosures.BrickMasonryshallbeaccuratelyraised toplumb.

Brick work shall be raised uniform all round and no part shall be raised more than 1 meter aboveanotheratanytime.Andtheworkshallbeproperlytoothedand rackedback.

In case of 115 mm thick brick walls, hoop iron reinforcement 25mmx 12 to 16 gauge or wirenettingreinforcementshallbeprovidedineveryfourthcourse.Thereinforcementshallbeproperly beddedinmortar,properlylaggedetc.allasdirected.

The contractor will have to build in holdfast and such other fittings in brick work without extracost.

Joints in brick work shallnot be more than 10 mm thick. Brick work shall notberaisedmorethan10to12coursesaday.Theworkshallbekeptwateredthriceadayfor10daysand afterwards twice a day for 3 weeks.All joints shall be thoroughly flushed with mortar at everycourse.Careshallbetakentoseethatbricksareproperlybeddedandallverticaljointscompletely filledtothefulldepth.Thejoiningofbrickworkshallbehauledouttoadepthnotless than 10 mm as the work proceeds. The surface of brick work shall be cleaned down andwateredproperly beforethemortarsets.

Construction joints are to be provided atan interval of 30m in case of boundarywallorwherethelengthofbrick wallislong.

The contractor shall also make or leave holes recesses as required and fill in the same at a laterdatewithleanconcreteofM5asdirectedwith noextracost.

5.3 Measurements:

i. General

Allthe ratesquotedby the contactor shallbe for a fully finished itemof work and shall includeforallmaterial,labour,miscellaneousworkslikestorage,loading/ unloading, scaffolding, hostinggear,wateringandcuring,royaltiesandalsoalltaxes,duties,overhead,profits,etc.

ii. Masonry

Accountsonmasonryshallbesettledonthebasisofcubicmeters or square meters as indicated in thebill of quantities. Quantitieswill bedecided on the basisof pertinentplants.Openings and recesseswhichexceeds 0.10 cum will be deducted from the quantities.Openingsleft initially on specific instructions or as required shall be closedata later date,if so instructedbyEngineer-in-charge, at noextra cost.Similarly, all openings, recesses, groovesetc, shallbeprovidedatnoextracost.Allmaterialssuppliedbyclientsshallbefixedinmasonryfreeofcharge .

3 Woodworkandjoinery:

6.1 Timber:

Unless otherwise specified all timber for frames of doors, should be best quality sal wood. Thetimber should be free from knots, shakes, fissure, flaws, sub-cracks & other defects. The surfaceshallbesmooth&freefromblemishes &discolorations.

Alltimber for carpentry and joineryin touch withmasonry or concrete shallbe paintedwithwoodpreservativebeforefixing.

Allfullyfabricatedtimbershallbeseasonedandchemicallytreated.Thepreparationoftimberfor joinery is to commence simultaneously with the beginning of the project work generally andshouldproceedcontinuouslyuntilallthewoodworkispreparedandfixed/stackedon/nearthesite asthecasemay be.

6.2 WorkmanshipandConstruction:

The workmanship shall be first class and to the approval of the Engineer-in-charge. Scantling andboardings shall be accurately sawn and shall be of required width and thickness. All carpenterswork shall be wrought except where otherwise described. The workmanship and joinery shall beaccuratelysetoutinstrictaccordancewiththedrawingandshallbeframedtogetherandsecurely fixed in approved manner and with properlymade joints.Allworkis tobe properlymade joints. All work is to be properly shouldered wedged, pinned, bradedetc. and properlygluedwithapprovedqualityadhesivetothesatisfactionoftheEngineer-in-charge.Door/windowframesshallhavecutrebates.Plantedrebatedshallnotbepermitted.Wheredoo rframesarefixedflushwithplastertowalls,woodencovermouldof40mmx12mmtobeprovided.

6.3 Doors,Frames:

The specification for frames of doors, are described here. The frames shall wrought, framed andfixed in position as per detailed drawing and as directed by theengineer in charge. Specifiedtimber shall be used, and it shall be sawn in the direction of the grains. Sawing shall be trulystraight and square. The scanting shall be planed smooth and accurate to the full dimensions,rebates, rounding and mouldings as shown in the drawings made, before assembling. Patching orplugging of any kind shall not be permitted except as provided. A tolerance of 2 / 3 mm shall beallowed in thefinishedcrosssectiondimensionsofdoorandwindowsframes.

Joints:

Theseshallbeofmortiseandtenontype,simple,neatandstrong.Mortiseandtenonjointsshallfitinfull yandaccuratelywithoutwedgingorfilling.Thejointsshallbeglued,framed,puttogetherandplanned withhardwoodorbamboopinsnotlessthan10mmdiameterafterthe frames areputtogetherinpositio nbymeansofapress.

6.4 Glueingofjoints:

Thecontactsurfaceoftenonandmortisejointsshallbetreatedbeforeputtingtogether with syntheticresinadhesiveofmake,approvedbytheengineer.

6.5 FixinginPosition:

Before the frames are fixed in position, these shall be inspected and passed by the engineer. Theframe shall be placed in proper position and secured to walls or columns as the case maybe withmetallic fastener,iron holdfastsasperdirectionoftheEngineer-in-charge.

Incase of door frames without sills the vertical members shall be embedded in the flooring to itsfull depth. When sills are provided,.these sills shall be embedded and sunk in the floor to its fulldepth. The door frames without sills while being placed in position, shall be suitably strutted andwedged in order to prevent warping during construction. the frames shall also be protected fromdamage,duringconstruction.

6.6 Measurement:

Wood work wrought and framedshallbe measured for finished dimensions.No allowance shallbe made for wastage and for dimensions supplied beyond those specified. Length of each peaceshall be measured over all nearest to one cm, so as to include projections for tenons, scarps ormeters,widthorthicknessshallbemeasuredtothenearestmm.In case ofmoldings,rounding,rebates,circularand varyingsection,the sectionalareaofthepieceshallbetakenastheareaoftheleastsquareoftherectanglefromwhichsucha sectioncanbe cut.

Rate:

The rate is to include the cost of all materials required and labour involved in all the operations,describedabove.

4 PaneledShutter:

7.1 General:

Solid wood panel for shutters shall be pattered and sized as specified. Where ever possible eachpanel shallbe ina singlewidthpiece. But wheretwo pieces wereused,widthofeach panelshouldnotbelessthan12.5cm.Whenmadefrommore thanonepiece,thepiecesshallbejointed with a continuous tongued and grooved joint and glued together and a reinforced withmetal dowels. Thegrainsof solid panel shallbe framed in to grooves to the full depthofthegrooves leaving in air space of 1.5 mm and the faces shall be closely fitted to the sides of thegrooves. Moldings to the edge of panel opening shall be scribed at the joints. Approved sampleshould bekeptatthesiteofficeasperdirectionof engineer.

7.2 Joinerywork:

Joinery work shall be started immediately, after the commencement of the buildings work. Allpieces shall be accurately cut and planed smooth to the full dimensions without any patching orplugging of any kind. Rebates rounding and moldings as shown in drawings shall be made beforeassembling.

The thickness of styles and rails shall be as specified for the shutters. All members ofthe door shutters shall be straight without any warp or bow and shall have smooth, well planedfacesat rightangles to eachother. The corners andedgesof planed faces shouldbeatrightanglestoeachother.

Thecornersandedgesofpanelsshallbefinishedasshownindrawings,and these shall have mitered joints with the styles. Styles and rails shall be properly and accuratelymortised and tenoned. Rails which are more than 180 mm in width shall have two tenons.

Stylesandendrailsofshuttersshallbemadeoutofonepieceonly.Thetenonsshallpassthroughstylesofatleast3/4thofthewidthofthestyle.Whenassemblingaleaf,stylesshallbeleftprojectingasahorn.Thestylesandrailsshallhave12mmgroveinpaneledportionforthepaneltofitin.

The depth of rebate in frames for hosing the shutters shall in all casesbe 1.25 mm and the rebateinshuttersforclosingindoubleshutterdoorsorwindowsshallnotbelessthan2cminthecaseof double leafed shutters, the meeting of the styles shall be rebated 20 mm. The rebate shall besplayed.

The joinery work shall be assembled and passedby the Engineer-in-charge and then the jointsshallbepressed,andsecuredbybamboopinsofabout6mmdiameter.Thehornsofstyles shallbe sawnoff.

7.3 Tolerance:

The finished work with a tolerance of + 1 mm in thickness + 2/3 mm in width of styles and railsshallbe accepted.

7.4 Groundingofjoints:

The contact surface of tenon and mortis joints shall be treated before putting together with bulktype synthetic resin adhesive of a make approved by the Engineer. Shutters shall not be painted,oiledorotherwisetreated,before thesearefixedinpositionandpassedbytheEngineer-in-charge.Mountingsandglazingbarsshallbestationedtothemaximumdepthof25mm,whicheverisless.Thicknessofeachtenonshall,beapproximatelyonethirdthefinishedthicknessofthemembersandthewidthofeachtenonshallnotexceedfivetimesitsthickness.

7.5 Beading:

Timber, plywood, hard board and particle board panels, shall be fixed only width grooves butadditional beading may not be provided either on one side or on both sides. In so far as glass isconcerned,beadingshallalwaysbeprovidedwithoutgrooves.Wherebeadingisprovidedwithoutgrooves,thebeadingshallbeonlyoneside,theothersidebeingsupportedbyrebatefromthestyles.Forexternaldoorsnandwindowsbeadingshallbe fixedon theoutside.

7.6 Fittings:

Detailsoffittingstobeprovidedaspertheschedule offittings.

7.7 Measurements:

Length and width of the shutters shall be measured to the nearest cm in closed positioncoveringtherebatesoftheframebutexcludingthegapbetweentheshutterandtheframe.Overlapof two shuttersshallnotbemeasured.Allwork shallbemeasurednetasfixed.

Noextrapaymentshallbemadeforshapejointsetc.

7.8 Rate:

Itincludesthecostofallmaterialsandlabour,allhardwarefittings,taxes,T&P,involvedinalltheoperationsdescribedabove.

CEMENTPLASTERING(Internal&External):

Thecementplastershallbe6mm,8mm,12mm,16mm18mmor20mmoranythicknessasspecifiedin theitem.

8.1 Scaffolding:

For all exposed brick work or tile work, double scaffolding having two sets of vertical supportsshall beprovided.Thesupports shallbe sound and strong, tied together with horizontalpiecesoverwhichscaffoldingplanksshallbefixed.Forallotherbrickworkinbuildings,single scaffolding shall be permitted. In such cases the inner end of the horizontal scaffolding pole shallrest in a hole provided only in the header course for the purpose. Only one header for

each poleshall be left out. Such holes for scaffolding shall, however, not be allowed in pillars / columns lessthan one meter width or immediately near the skew portion of arches. The holes left in masonryworksforscaffoldingpurposesshallbefilledwithleanconcreteandmadegoodbeforeplasteri ng.

8.2 Preparationofsurface:

Thejointsshallberakedoutproperly.Dustandloosemortarshallbebrushedout.Effl orescenceif any shall be removed by brushing and scarping. The surface shall then the thoroughly washedwithwater,cleanedandkeptwetbeforeplasteringiscommenced.

In case of concrete surface, if a chemical retarder has been applied to the formwork surface, thesurface shall be roughened by wire brushing and all the resulting dust and loose particles cleanedoffandcare shallbe takenthatnoneof theretardersisleftonthesurface.

8.3 ApplicationofPlaster:

Ceilingplastershallbecompletedbeforecommencementofwallplaster.

Plastering shall be started from the top and worked down towards the floor. All scaffolding poleholes shall be properly filled in advance of plastering as the scaffolding is being taken down. Toensureeventhicknessandtruesurface,plasterabout15cmx15cmshallbefirstapplied,horizontallyand vertically atnot more than 2m. intervals over theentire surface to serveasgauges. The surfaces of these gaugedareas shall be trulyon the plane of the finished plastersurface.Themortarshallthenbelaidonthewall,betweenthegaugeswithtrowel.Themortar shall be applied ina uniform surface slightly more than the specified thickness. This shallbebeaten with thin strips of bamboo about 1 meter long to ensure thorough filling of the joints, andthenbroughttoatruesurface,byworkingawoodenstraightedgereachingacrossthegauges,with small upward and side ways movements at a time. Primarily the surface shall be finished offtrue with trowel or wooden float according as a smooth or a sandy granular texture is required.Excessive trowel in or over working the float shallbe avoided.During this process, a solution oflikeputty shallbeappliedonthesurfacetomakethe laterworkable.

Allcorners,anglesandjunctionsshallbetrulyverticalorhorizontalasthecasemaybeandshallbecarefullyfin ished.Roundingorchamferingcorners,junctionsetc.whererequired shallbedone with out any extra payment. Such rounding or chamfering shall be carried out with propertemplatestothesizesrequired.

Insuspendingworkattheendoftheday,theplastersshallbeleftoutcleantolinebothhorizontally and vertically, when recommencing the plastering, the edge of the old work shall bescraped cleaned and wetted with lime putty before plaster is applied to the adjacent areas, toenable the two to properly joint together. Plastering work shall be closed at the end of the day onthebodyofwallandnotnearerthan15cmtoanycorners.Itsshallnotbeclosedonthebodyofthefeaturessuc hasplastersbandsandcornicesnor at the corners.Horizontaljointsinplasterworkshallnotalsooccuron theparapettopsand copings astheseinvariableleadtoleakage.

No portion of the surface shall be left out initially to be

patched up later on.

8.4 Finish:

Theplastershallbefinishedtoatrueandplumbsurfaceandtotheproperdegreeofsmoothnessas required. The works shall be tested frequently as the work proceeds with a true straight edgenot less than 2.5.m longand with plumb bobs. All horizontallinesand surfaces shallbetestedwith aleveland alljambswithaplumbbobastheworkproceeds.

8.5 Thickness:

The thickness of the plaster specified shall be measured exclusive of the thickness of the key i.e.grooves or open joints in brickwork. The average thickness of plaster shall not be less than thespecified thickness. The minimum thicknessofanyportion ofthe surface shall notbe less thanthe specifiedthickness by more than 3mm.The average thickness should be regulatedatthetimeofplasteringbykeepingsuitablethicknessofthegauges.Extrathicknessrequiredindubbin

g behind rounding of corners at junctions of wall or in plastering of masonry cornices etc.will beignored.

Curing shall be started 24 hrs after finishing the plaster. The plaster shall be kept wet for a periodof 7 days. During this period it shall be suitably protected from all damages at the contractor'sexpense by such means as the engineer may approve. The dates on which plastering is done shallbelegiblymarkedonthevarioussectionplasteredsothatcuringforthespecifiedperiodthereafter canbewatched.

Anycrackswhichappearinthesurfaceandallportions,whichsoundshollowwhentappedorare found to be soft or otherwise defective, shall be cut out in rectangular shape and re done asdirected bytheEngineer-in-charge.

5 CEMENTPLASTERWITHAFLOATINGCOATOFNEATCEMENT:

The cement plaster shall be 6mm, 8mm, 12mm,16mm , 18mm or20mm thick, finished with afloatingcoatof neatcement,as describedin theitem.

When the plaster has been brought to a true surface with the wooden straight edge, It shall beuniformly treated over its entire area with a paste of neat cement and rubbed smooth, so that thewhole surface is covered with neat cement slurry 1.5mm thick while the plaster surface is stillfresh. Smooth finishing shall be completed with trowel immediately and in no case later than halfan houraddingwatertotheplaster mix.

6 CEMENTCONCRETEFLOORING:

10.1 CementConcrete:

a) General:

Cement concrete of specified mix shall be used and it shall generally conform to the specifications described in plain concrete.

b) Sub-Grade:

Flooring shall be laid on concrete sub-grade where so provided. The sub-grade shall be providedwith the slopes required for the flooring. Flooring in verandhs, kitchens, baths, water closets andcourtyardsshallinvariablybeprovidedwithsuitableslopetodrainoffwashingandrainwater.

If the sub-grade consist of concrete, it shall be allowed to set for 7 days and the flooring shall belaidinthenext 3days.

If the sub-grade is of lean cement concrete, the flooring shall be commenced preferably within 48hrs of the laying of sub-grade. The surface of the sub-grade shall be roughened with steel wirebrushes without disturbing the concrete. Before laying the flooring the sub-grade shall be wettedand smeared with a coat of cement slurry at 2 Kg. of cement spread over an area of 1 sq. meter soastogetagoodbondbetweenthesub-gradeandconcretefloor.

If the cementconcrete flooring is to be laiddirectlyon the RCC slab,the surface of RCCslab shallbe cleaned and thelaitance shallbe removed and a coatofcementslurryat 2 kg of cementpersqmshallbeappliedsoasto geta goodbondbetweenRCCslaband concrete floor.

Thicknessoffloorshallbeasspecifiedinthedescriptionoftheitem.

c) Laying:

Panels:

Flooringofspecifiedthicknessshallbelaidinthepatternasgiveninthedrawingsorasdirectedbytheengineer .Thebordershallhavemeteredjointsatthecornersoftheroomsandintermediatejointsshallbeinthestraightl inewiththepanels.Thepanelshallbeofuniformsize.

The panel shall be bounded by wooden angle iron battens. The battens shall have the same depthas the concrete flooring. These shall be fixed in position, with their top at proper level, givingrequired slopes. The surface of the batten or flats, to come in contract with the concrete shall

besmearedwithsoap solution or non-stickingoil (formoilorraw linseedoil) before concreting.Theflooringsshallbuttagainstthemasonrywall,whichshallnot beplastered.

The concreting shall be done in the manner described in plane cement concrete. The battens usedfor shuttering, shall be removed on the next day of the laying of cement concrete. The ends thusexposed shall be repaired, if damaged, with cement mortar 1:2 (1 cement 2 coarse sand) andallowed to set for minimum period of 24 hour the alternate panels shall then be cleaned of dust,mortar droppings etc. and concrete laid. While laying concrete, care shall be taken to see that theedges of the previously laid panels are not damaged and fresh mortar is not splashed over them.Thejointsbetween thepanelsshould come outasfineandstraightlines.

d) Finishing:

The finishing of the surface shall follow immediatelyafter the occasion ofbeating. Thesurfaceshall beleft for some time,till moisture disappears from it. Excessive trawling shallbe avoided.Use of dry cement or cement and sand mixture sprinkle on the surface to stiffen the concrete orabsorbexcessivemoistureshallnotbepermitted.

Fresh quantity of cement shall be mixed with water to form a thick slurry and spread over offlooring while the concrete is still green. The cement slurry shall then be properly pressed andfinishedsmooth.

e) Curing:

The curing shall be done for a minimum period of ten days. Curing shall not be commenced untilthe top layer has hardened. Covering with empty cement gunnies shall be avoided as the color islikely tobebleachedwiththe remnantsofcementmatterfromthebags

f) Precautions:

Flooring in lavatories and bath rooms shall be laid after fixing of water closets and squatting pansand flooring traps. Traps shall be plugged, while laying the floors and opened after the floors arecuredandcleaned.AnydamagedonetoS.C.'ssquattingpansandfloortrapsduringtheexecutionofwork shall bemadegood.

Thefloorshallbeprotectedfromanydamageduringtheexecutionofwork.

g) Measurements:

Length andbreadth shallbe measured correct to a cmand its area as laid shallbe calculated insqmcorrecttotwoplacesofdecimal.Lengthandbreadthshallbemeasuredbeforelayingskirtingdadoorwall plaster.Nodeductionshallbemadenoranyextrapaidforanyopeninginthefloor of areaupto0.10m2.

h) Rate:

The rate shall include the cost of all materials ,labour, curing, royalties, taxes,T&P involved in theoperations described above including application of cement slurry on RCC and or on sub-gradeincluding roughening and cleaning the surface. Nothing extra shall be paid for laying the floor atdifferentlevelsin the same roomorcountyardandroundingofedgesofsunkfloors.

Incasetheflooringislaidinalternatepanels,itincludesthecostofshuttering.

10.2 Tile Flooring
a.Glazedceramictileflooring

b.Glazedceramictilefixing:

6mmthickglazedceramictilesofapprovedsizeandcolourupto2100mmheightfromfloorlevel of approved make confirming to IS : in Dado /Skirting in toilets. Ground Floor fixed in neatcement slurry after soaking the tiles in water over 12 mm thick cement plaster (1:3) with whitecementpointinginjoints,includingwashingandcleaningwithoxalicacidetc.complete.

10.3 Kotastoneflooring

Kota stone flooring with 25 mm thick kota stone dressed and polished tiles bottom coatedwith neatcement slurry and fixing in flooring on 25mm thickbedof cement mortar (1.3) mixandjointsfilledwithgreycementslurry,properlyleveled,washed,acidcleanedandpolished.

10.4 VitrifiedFlooring

Laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) withwater absorption less than 0.08% and conforming to IS : 15622, of approved make, in all coloursandshades,laidon25mmthickcementmortar1:4(1cement:4coarsesand),includinggrouting thejointswithgroutingmaterialandmatchingpigments.

10.5 PaverBlock

Laying 60mm thick factory made cement concrete interlocking paverblock of M -30 grade madebyblockmakingmachinewithstrongvibratorycompaction,ofapprovedsize,design&shape,laid in required colourandpatternoverandincluding50mmthick compactedbedofcoarsesand, filling thejointswith finesand.

WoodenFlooring:

The surface is to be prepared properly to attain a zero level finish with AS flooring. The woodenflooring shall be supplied and laid over a wooden framework and with proper cushion/ pads forthe high impactareas. The top surface shall be treatedwith high quality to reduce wearand tearofthe wooden flooring.Properwoodpreservatives shall be used to treat the woodbefore theyare laid. Laminated floorings are laid over a 4 mm layer of HDPE cushion. The pre-laminatedflooring shallbe laidover the cushion andhave an interlocking arrangement whichare tightly fittothesurfacewithoutanyshift.

DISMANTLING:

Alldismantlingwork shallbe carried outwithutmostcare for recovering theuseful materials.Due care is to be taken to avoid fugitive emission and falling of dismantled pieces / debris on thenear by structures / houses / roads. A temporary screen is to be erected around the structure /building to be dismantled. Necessary supports shall be provided to the structural members forsystematicdemolitionand toavoidcollapseofmembersofthebuilding.

Measurements:

Lengthandbreadthofsuperficialarea of the finished work shall be measured correct to acm.The area shallbe calculated in square meter correct to two placesof decimal. No deduction shallbemadenorextrapaidforvoidsnotexceeding0.20squaremeter.Deductionsforendsofdissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10squaremeter.

10.6 PRESTRESSEDCERAMICTILESINFLOORING

Pressed Ceramic Tiles: The tiles shallbe of approved make and shall generally conform to IS15622.Theyshallbeflat,andtruetoshapeandfreefromblisterscrazing,chips,welts,crawlingorotherimperfections detractingfromtheirappearance.ThetilesshallbeGroupBIbandthick7-8mm.

PreparationofSurfaceandLaying:

Base concrete or theRCCslab on whichthe tilesare to be laidshallbe cleaned, wettedandmopped. The bedding for the tile shall be with cement mortar 1:4 (1 cement: 4 coarse sand) or asspecified.Theaveragethicknessofthebeddingshallbe20mmorasspecifiedwhilethethicknessunderany portionofthe tilesshallnotbelessthan10mm.

Mortar shallbespread,tamped and corrected to proper levelsand allowed to harden sufficientlyto offer a fairly rigid cushion for the tiles to be set and to enable the mason to place wooden plank across sand squatonit.

Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at therateof3.3kgofcementpersquaremeteroveranareauptoonesquaremeter.Tilesshallbe soaked in water washed clean and shall be fixed in this grout one after another, each tile gentlybeing tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles.Thejointsshallbekeptasthinaspossibleandinstraightlinesortosuittherequiredpattern.

The surface ofthe flooring duringlaying shall be frequently checked with a straightedge about 2m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen andbalcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition torequiredslopetoavoidspreadofwater.Furthertiledropwillalsobeprovidednearfloortrap.

Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edgerubbed smooth to ensure straight and true joints. Tiles which are fixed in the floor adjoining thewallshallenternot lessthan10mm undertheplaster,skirtingordado.

Aftertileshavebeenlaidsurpluscementslurryshallbecleanedoff.

PointingandFinishing:
Thejointsshallbecleanedoffthegreycementslurrywithwire/coirbrushortroweltoadepthof2 mmto 3 mmandall dustand loose mortarremoved.Joints shall thenbe flushpointedwithwhite cement added with pigment if required to match the colour of tiles. Where spacer lug tilesareprovided,thehalfthedepthofjointshallbefilledwithpolysulphideorasspecifiedontopwith under filling with cement grout without the lugs remaining exposed. The floor shall then bekeptwetfor 7 days.After curing, the surfaceshall bewashedandfinishedclean. Thefinishedfloorshallnotsoundhollowwhentappedwithawooden mallet.

Measurements:
Length and breadth shall be measured correct to a cm before laying skirting, dado or wall plasterand the area calculated in square meter correct to two places of decimal. Where coves are used atthe junctions, the length and breadth shall be measured between the lower edges of the coves. Nodeduction shall be made nor extra paid for voids not exceeding 0.20 square meter. Deductions forendsofdissimilarmaterialsorotherarticlesembeddedshallnotbemadeforareasnotexceeding

0.10 square meter. Areas, where glazed tiles or different types of decorative tiles are used will bemeasured separately.

10.7 PRESSEDCERAMICTILESINSKIRTINGANDDADO:

The tiles shall be of approved make and shall generally conform to IS 15622. The tiles shall bepressed ceramic covered by a glaze thoroughly matured and fitted to the body. The tiles shall besound, true to shape, flat and free from flaws and other manufacturing defectsaffecting theirutility.

The top surface of the tiles shall be glazed. The underside of the tiles shall not have glaze on morethan 5% of the area in order that the tile may adhere properly to the base. The edges of the tilesshallbefreefromglaze,however,anyglazeifunavoidableshallbepermissibleononlyupto50percentof thesurfaceareaofedges.

Theglazeshallbefreefromwelts,chips,craze,specks,crawlingorotherimperfectionsdetractingfromtheappearancewhenviewedfromadistanceofonemeter.Theglazeshallbe either glossy or matt as specified. The glaze shall be white in colour except in the case of colouredtiles when colours shall be specified by the Engineer-in-Charge. There may be more than onecolouronatile.TilesshallbeGroupBIb.

PreparationofSurfaces
The joints shall be raked out to a depth of at least 15 mm in masonry walls. In case of concretewalls, the surface shall be hacked and roughened with wire brushes. The surface shall be cleanedthoroughly,washedwithwaterandkeptwet beforeskirtingiscommenced.

Laying:
12 mm thick plaster of cement mortar 1:3 (1 cement: 3 coarse sand) mix of as specified shall beappliedandallowedtoharden.Theplastershallberoughenedwithwirebrushesorbyscratching diagonalatclosedintervals.

The tiles should be soaked in water, washed clean, and a coat of cement slurry applied liberally atthe back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to properplaneandlines.Thetilesshallbesetintherequiredpatternandjointed.Thejointsshallbeasfine as possible. Top of skirting or dado shall be truly horizontal and joints truly vertical exceptwhere otherwise indicated. Odd size/cut size of tile shall be adjustedatbottom to take care ofslope of the flooring. Skirting and dado shall rest on the top of the flooring. Where full size tilescannot be fixed these shall be cut (sawn) to the required size and their edges rubbed smooth.Skirting/dadoshallnotprojectfromthefinished“surfaceofwall”bymorethanthetilethickness;undulationsif anyshallbeadjustedinwall.

CuringandFinishing:

Thejointsshallbecleanedoffthegreycementgroutwithwire/coirbrushortroweltoadepthof2 mmto 3 mmandall dustand loose mortarremoved.Joints shall thenbe flushpointedwithwhite cementadded withpigmentsifrequiredto matchthe colour oftiles.The work shall thenbe kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finishedworkshallnotsoundhollowwhentappedwithawoodenmallet.

Measurements:
Length shall be measured correct to a cm. Height shall be measured correct to a cm in the caseofdado and 5 mm in the case of riser and skirting. The area shall be calculated in square metre,correct totwo placesofdecimal. Length andheight shallbe measured along the finished face ofthe skirting ordado including curveswhere specials suchas coves, internaland external anglesand beads are used.Where cornices are used the area of dado shall be measured excluding thecornices. Nothing extra willbe paid for cutting (sawn) the tiles to sizes.Areas where coloured tilesordifferenttypesofdecorativetilesare usedwill be measured separatelyto be paidextraoverandabovethenormal ratefor whitetiles.

10.8 GraniteSlabs andGranitetileflooring:
The granite slabs shall be hard, sound, durable, and resistant to wear as per IS3376-1974 andIS14223 (part 1): 1995.The granite slabsshall be without any softveins,cracksor flaws andshallhaveauniform colour.Thicknessmentionedin BOQ.Theexposed surfaceofstone slabsshall be machine polished to a smooth even and true plan and the edges to be chiseled to half itsdepth,trueandsquaretoensureuniformwidthofjoint.Theedgesofstoneslabsshallbe machine cut square the required shape if necessary. The stone slab shall be of approved coloursandshades.Afewapprovedsamplesofstoneslabstobeusedshallbedepositedbythecontractorinthe officeofthe EIC.

MortarBedding:

Cement mortar shall be prepared in a mortar mill or pan. The amount of water added shall be theminimum necessary to give just sufficient plasticity for laying and satisfactory bedding. Care shallbe taken in preparing the mortar toensure that there areno hard lumps thatwouldinterferewiththeevenbeddingofthestone slabs.Before spreadingthemortarthe sub floororbasecleaned of all dirt, scum, loose materials and laitance if any by scrubbing with coir or steel wirebrush or by hacking if necessary, and then well wetted without forming any pools of water on thesurface. Before laying the mortar, the sub grade shall be got approved by the EIC. In case of R.C.C.floors, the top shall be left little rough. All points of level of the finished paving surface shall bemarked out. The mortar shall then be evenly and smoothly spread over the base by the use ofscreed battens, only over so much area, as will be covered with slabs within half an hour. Thethicknessofthemortarbeddingshallnotbelessthan20mmandnotlessthan10mm.Therequired slope shall be given to the bed. Unless otherwise specified, the proportion of mortarbedding shall be 1:4 (1 cement : 4 sand). Sand for mortar bedding shall be from approved source,andshallconformtoI.S.NO.2116-1965asapplicabletounreinforcedmasonrywork.

Laying,Curing,Polishing,FinishingandCleaning:

The stone slabs shall be laid on the neat cement float and shall be evenly and firmly bedded to therequiredlevelandslopeinthemortarbed.Thestoneslabsshallbelaidintheapprovedpatternin single or two-tone colour. Each stone slab shall be gently tapped with a wooden mallet till it isfirmly and properly bedded. There shall be no hollows left. If there is a hollow sound on gentletapping of the stone slabs, such stone slabs shall be removed and reset properly. The mason shallmake the joint of uniform thickness and straight lines. The thickness of joints shall not exceed1.5mm. The joints shallbe grouted withneatcementslurry. No border stone slabs shallbe lessthan 4" in width, unless otherwise approved by the Architect. When the bedding and joints of theflooring have been completely set, the surfaceshallbe machine polished to givea smooth,evenandtrueplanetothefloor and thoroughlycleaned.

Ratestoinclude:

Apartfromotherfactorsmentionedelsewhereinthiscontractthecontractor'sratequotedshallincludefor thefollowing:

- Cleaningthebaseandprovidingandlayingbeddingmortarandlevelling.
- Providingandfixingthestoneslabsinneatcementfloatonthebeddingmortar.
- Fillingjointsofstoneslabswithneatcementslurryofrequiredcolourtomatchthecolouroftheston eslabs.
- Chiselling,polishing,finishingandcleaning.
- Alllabour,materials,royalties,taxesandtoolsforcarryingouttheitemasspecifiedabove.

10.9 MARBLESTONEFLOORING

DressingofSlabs:

Every stone shall be cut to the required size and shape, fine chisel dressed on all sides to the fulldepth so thata straightedge laidalong the side of the stone shall be fully in contact with it. Thetop surface shall also be fine chisel dressed to remove all waviness. In case machine cut slabs areused, fine chisel dressing of machine cut surface need not be done provided a straight edge laidanywhere along the machine cut surfaces is in contact with every point on it. The sides and topsurface of slabs shall be machined rubbed or table rubbed with coarse sand before paving. Allanglesandedgesofthemarbleslabsshallbetrue,squareandfreefromchippingsandthesurfaceshallbe trueandplane

Thethicknessoftheslabsshallbe16mmasspecifiedinthedescriptionoftheitem.Toleranceof+3%shallbeallowedforthethickness.Inrespectoflengthandbreadthofslabsatoleranceof +2%shallbeallowed.

Laying:

Base concrete or the RCC slab on which the slabs are to be laid shall be cleaned, wetted andmopped.Thebeddingfortheslabsshallbewithcementmortar1:4(1cement:4coarsesand)oras given in thedescription ofthe item. The average thicknessof the bedding mortar undertheslabshallbe20mmandthe thicknessatanyplaceunderthe slabshallbenotlessthan12mm.

Theslabsshallbelaidinthefollowingmanner:

Mortar of the specified mix shall be spread under the area of each slab, roughly to the averagethicknessspecifiedin the item.The slab shallbe washedcleanbefore laying. Itshallbe laidontop, pressed, tapped with wooden mallet and brought to level with the adjoining slabs. It shall beliftedandlaidaside.Thetopsurfaceofthemortarshallthenbecorrectedbyaddingfreshmortarathollows.
The mortaris allowed to harden abitand cement slurry ofhoney like consistencyshall be spreadoverthe same atthe rate of4.4kgofcementpersqm. The edgesoftheslabalready paved shall be buttered with grey or white cement with or withoutadmixture of pigmenttomatch the shadeofthemarble slabsasgiven in thedescriptionof the item.

The slabto bepaved shallthen be loweredgentlyback in positionand tappedwith woodenmallet till it is properly bedded in level with and close to the adjoining slabs with as fine a joint aspossible. Subsequent slabs shall be laid in the same manner. After each slab has been laid, surpluscement on the surface of the slabs shall be cleaned off. The flooring shall be cured for a minimumperiod of seven days. The surface of the flooring as laid shall be true to levels, and, slopes asinstructed by the IDCO/Project manager. Joint thickness shall not be more than 1 mm.The slabsshallbematchedasshownindrawingsorasinstructedbytheIDCO/Projectmanager.

PolishingandFinishing:

After the tiles/Slabs are laid all joints shall be cleaned of the grey cement grout with a wire brushortroweltoadepthof5mmandalldustandloosemortarremovedandcleaned.Jointsshallthen be grouted with grey or white cement mixed with or without pigment to match the shape ofthe topping of the wearing layer of the tiles/slabs. The same cement slurry shall be applied to theentire surfaceofthe tilesin a thincoatwith a viewto protect the surface fromabrasive damageandfillthepinholes thatmay existonthesurface.

The floor shall then be kept wet for a minimum period of 7 days. The surface shall thereafter begrounded evenly with machine fitted with coarse grade grit block. Water shall be used profuselyduring grinding. Aftergrinding the surface shallbe thoroughlywashed to remove all grindingmud,cleaned andmopped.Itshallthenbecoveredwitha thincoatofgreyorwhite cement,mixedwithorwithoutpigmenttomatchthecolourofthetoppingofthewearingsurfaceinorder to fillanypin hole thatappear. The surface shallbe again cured. The secondgrinding shallthenbe carriedoutwithmachinefitted withfinegradegritblock.

Thefinalgrindingwithmachinefittedwiththefinestgradegritblocksshallbecarriedoutthedayafterthesecondgrindingbeforehandingoverthefloor

After the final polish, oxalic acid shall be dusted over the surface at the rate of 33 gm per squaremeter sprinkled withwater and rubbed .The following day the floor shall be wiped with a moistraganddried withasoftclothandfinishedclean.

Measurement:
Marble stone flooring with different kind of marble shall be measured separately and in squaremeter correct to two places of decimal. Length and breadth shall be measured correct to a cmbefore laying

skirting,dado orwall plaster.No deduction shallbe made norextra paid forvoidsnot exceeding 0.20 square metre. Deductions for ends of dissimilar materials or other articlesembedded shall not be made for areas not exceeding 0.10 square meter. Nothing extra shallbepaid for laying the floor at different levels in the same room. Steps and treads of stairs paved withmarble stone slabs shall also be measured under the item of Marble Stone flooring. Extra shall,however, be paid for such areas where the width of treads does not exceed 30 cm.The width oftreadsshallbemeasuredfromtheouteredgeofthenosing,aslaid,beforeprovidingtheriser

RatetoInclude:-

The rate shall include the cost of all materials and labour, royalites taxes and T&P.However, noextrashallbepaidformakingspecialtypeofpattern/design/flowersasperdrawings.

10.10 FACTORY MADE CEMENT CONCRETE INTERLOCKING PAVER BLOCK:

Base:

Interlocking paver block to be fixed on the bed 50 mm or specified otherwise thick of coarse sandof approved specification and filling the joints with the sand of approved type and quality or asspecifiedandas directedbyEngineer-in-charge.

InterlockingPaverBlock:

FactorymadeprecastpaverblockofM-30orotherwisespecifiedgradetobeused.Paverblockstobeofapprovedbrandandmanufacturerandofapproved quality.Minimumstrengthasprescribed by manufacturer and as per direction of Engineer-in-Charge for the grade specified tobetestedaspermethodmentionedinspecificationofsubheadcementconcreteofCPWDSpecification2009 Vol. I.

Measurement&Rates:

Area provided with paver block to be measured in sqm. correct upto two places of decimal. Therateincludethecostofthematerial,labour,royality,taxes&toolsetc.requiredinalltheoperationsdescribed above.

KERBSTONE(PRECAST):-

Laying:-

Trenches shall first be made along the edge of the wearing course of the road to receive the kerbstonesofcementconcreteofspecifiedgrade.Thebedofthetrenchesshallbecompactedmanuallywithsteelrammerstoafirmandeven surfaceandthenthe stonesshallbesetincement mortar ofspecifiedproportion.

The kerb stones with top 20 cm. wide shall be laid with their length running parallel to the roadedge, true in line and gradient at a distance of 30 cm. from the road edge to allow for the channeland shall project about12.5 cm. above the latter. The channelstoneswith top 30 cm. wide shallbe laid in position in chamber with finished road surface and with sufficient slope towardstheroadgullychamber.Thejointsofkerbandchannelstonesshallbestaggeredandshallbenotmore than 10 mm. Wherever specifiedalljoints shallbefilled withmortar 1:3 (1 cement: 3coarsesand)andpointedwithmortar1:2(1cement:2finesand)whichshallbecuredfor7days.

Thenecessarydrainageopeningsofspecifiedsizesshallbemadethroughthekerbasperdrawingsorasdirectedbytheengineer-in-Chargeforconnectingtostormwaterdrains.

Finishing:-

Berms and road edges shall be restored and all surplus earth including rubbish etc.disposedoffasdirectedbythe Engineer-in-charge.Nothingextra shallbepaidforthis.

Measurements:-

ItshallbemeasuredincubicmeterswithLengthofthefinishedwork(forspecified widthand height of stone)shall bemeasured in running meter along theedgeoftheroad correctto acm.

10.11 CHEQUEREDTILEFLOORING

The tiles shall be of nominal sizes such as 20 × 20 cm,25 × 25 cm and 30 × 30 cm or of standardsizes with equal sides. The size of tiles to be used shall be as shown in drawings or as required bythe Engineer-in-Charge. The center-to-centerdistance of chequersshallnotbe lessthan2.5 cmandnot morethan5cm.

Theoverallthicknessofthetilesshallbe20mm.Thegroovesinthechequersshallbeuniformand straight. The depth of the grooves shall not be less than 3 mm. The chequered tiles shall becement tiles, or terrazo tiles as specified in the description of the item. The thickness of the upperlayer,measuredfromthetopofthe chequersshallnotbe lessthan6mm.

Laying:

Base concrete or the RCC slab on which the slabs are to be laid shall be cleaned, wetted andmopped. The bedding for the slabs shallbe with cementmortar1:4 (1cement:4 coarse sand) oras given in thedescription ofthe item. The average thicknessof the bedding mortar undertheslabshallbe20mmandthe thicknessatanyplaceunderthe slabshallbenotlessthan12mm.

Theslabsshallbelaidinthefollowingmanner:

Mortar of the specified mix shall be spread under the area of each slab, roughly to the average thickness specified in the item. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped with wooden mallet and brought to level with the adjoining slabs. It shall be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows. The mortar is allowed to harden a bit and cement slurry of honey like consistency shall be spread over the same at the rate of 4.4 kg of cement per sqm. The edges of the slab already paved shall be buttered with grey or white cement with or without admixture of pigment to match the shade of the marble slabs as given in the description of the item.

The slabto bepaved shallthen be loweredgentlyback in positionand tapped withwoodenmallet till it is properly bedded in level with and close to the adjoining slabs with as fine a joint aspossible. Subsequent slabs shall be laid in the same manner. After each slab has been laid, surpluscement on the surface of the slabs shall be cleaned off. The flooring shall be cured for a minimumperiod of seven days. The surface of the flooring as laid shall be true to levels, and, slopes asinstructed by the IDCO/Project manager. Joint thickness shall not be more than 1 mm.The slabsshallbematchedasshownindrawingsorasinstructedbytheIDCO/Projectmanager

Measurements:

Flooring with tiles manufactured from ordinary grey cement without pigment and coloured terrazo tile flooring shall be measured separately according to para 11.6.5 of CPWD Vol 1 flooringshall be measured as laid in square meter correct to two places of decimal. For length and breadthdimensions correct to a cm before laying skirting, dado or wall plaster shall be taken. No deduction shallbe made nor extra paid for voids not exceeding 0.20 sqm. Deductions for ends of dissimilar materials orother articles embedded shall not be made for areas not exceeding 0.10 square meter. Nothing extrashall be paid for use of cut tiles nor for laying the floor at different levels in the same room or courtyard.

Flooring laid in floor borders and similar band shall be measured under the item ofterrazo tileflooring. Nothing extra shall be paid in respect of these and similar bands formed of half sizeormultipliesofhalfsizestandardtilesorotheruncuttiles.

Treads of stairs and steps paved with tiles without nosing, shall also be measured under flooring. Moulded nosing shall be paid in running meter except where otherwise stated, returnedmoulded ends and angles to mouldings shall be included in the description. Extra shall, however, bepaid for such areas where the width of treads does not exceed 30 cm.

10.12 PVCSHEETFLOORING:-

Flexible PVC sheet flooring in 2.0mm thickness in the size of 2mx20mtr , and will contain a selection of the following safety aggregates to impart enhance slip resistance: silicon carbide, colored quartz, natural recycled aggregates and aluminum oxide granules. Imported PVC Vinyl flooring with total weight 2700 g/m2 ,Abrasion resistance EN EN 13845- 50000 cycles, EN 649

Group P , Reaction to fire EN 13501-1 Class Bfl-S1, Sustainable wet slip resistance EN 13845 ESb & ESf , RRL Pendulum Test > 36, Water Tightness EN 13553 Annex A, static electrical charge < 2kv,impact sound reduction approx..,good resistance of scratch, slip, chemical and fire doesn't favor in growth of fungi & bacteria , Material should 100% recyclable and at least 25% recycled material. BRE Global Environmental A+ Rating' Equivalent to Polyflor Polysafe Hydro and complete as per the design & drawing and as per the direction of Engineer -in-charge.

7 WHITEWASHING

i. Materials:

White wash shall be prepared from 5 parts of stone lime and 1` part of shell lime . The lime shall be dissolved in a tub with sufficient quantity of water (about 4/5 liters / kg.). The lime and the shellis to be thoroughly mixed and stirred until it attains the consistency of thin cream. The wash shall be taken out in small quantities and strained through a clean course cloth. Clean gum dissolved in hot water shall then be added in suitable proportion of 2 kg. per m3. of lime to prevent the white wash coming of easily when rubbed. Indigo as necessary shall be mixed as per standard practice and as per the direction of Engineer-in-charge.

ii. PreparationofSurface:

The surface shall be prepared removing all mortar droppings and foreign matter and thoroughly-cleaned with hair or fiber brush or other mean as may be ordered by the Engineer-in-charge to produce an approved clean and an even surface. All loose pieces and scales shall be scrapped off and holes racks etc. stopped with mortar to match with the surrounding finish. The matter should be cured sufficiently.

iii. Applicationofwhitewash:

On the surface so prepared, the white wash shall be laid on with a brush, shall be from top downwards, another from bottom upwards over the first stroke and similarly one stroke from the right and another from the left over the first brush before it dries. This will form one coat. Each coat must be allowed to dry and shall be subject to inspection and approval before the next coat is applied. When dry, the surface shall show no signs of cracking. It shall present a smooth and uniform finish free from brush marks and it should not come off easily when rubbed with a finger, minimum 3 coats of white wash shall be applied or as directed by the Engineer-in-charge.

No portions in the surface shall be left out initially, to be patched up later on.For new work, the white washed surface shall present a smooth and uniform finish. Doors, windows, floors and other articles of furniture etc. shall be protected from being splashed upon. Splashing and droppings, if any, shall be removed and the surfaces cleaned. Apart from other factors, mentioned elsewhere in this contract, the rates for white wash shall include for the following:

- Alllabour,materials,taxes,equipmentrequiredforwhitewashing.
- Scaffoldingincludingerectionandremoval.
- Providingandpreparingthewhitewash
- Preparingthesurfaceforwhitewashincludingthescaffolding.

Applying the white wash in three coats minimum if a proper even surface is not obtained to thesatisfaction of the Engineer-in-charge, contractor shall carry out additional coats of white washtill approval,atcontractor'sexpense.

11.1 WeatherCoatCementPaint:

i. Materials:

Weather coat cement paint of approved brand and manufacturer shall be used. The primer whereusedasonnewworkshallbecementprimersuitableforweathercoatpaintingasdescribedintheitem.Th eseshallbeofthesamemanufacturerascementpaint.Thepaintshallbedilutedwith water or any other

prescribed thinner in a manner recommended by the manufacturer. Onlysufficientquantityof paintrequiredfor day'sworkshallbeprepared.

The paint and primer shall be brought by the contractor in sealed tins in sufficient quantities at atime tosuffice forafortnight'swork,andthesameshallbekeptinthejointcustodyofthecontractorandtheEngineer-in-charge. Theemptytins shallnotberemovedfrom the siteofwork,tillthis siteworkhasbeen completedandpassedbytheEngineer-in-charge.

ii. PreparationoftheSurface:

Fornewworkthesurfaceshallbethoroughlycleanedofdust,oldwhiteorcolourwashbywashingand scrubbing. The surfaceshall then beallowed to dryfor at least 48 hours.It shallthen be sand papered to give a smooth and even surface. An unevenness shall be made good byapplying putty, madeofplaster ofparismixedwithwateron the entire surface including fillinguptheundulationandthensandpapering thesameafteritisdry.

Pitting in plaster shall be made good with plaster of paris mixed with the colour to be used. Thesurfaceshallthenberubbeddownagainwithafinegradesandpaperandmadesmooth.Acoatof the distemper shall be applied over the patches. The patched surface shall be allowed to drythoroughly beforetheregularcoatofdistemperisapplied.

iii. Application:

a)PrimerCoat–

11.2 CEMENTPRIMER:

i. General

Cement primer coat is used as a base coat on wall finish of cement, lime or lime cement plastersurfacebeforeoilemulsiondistemperpaintsareappliedonthem.Thecementprimeriscomposed of a medium and pigment which are resistant to the alkalis present in the cement, limeor lime cement in wall finish and provides a barrier for the protection of subsequent coats of oildistemper paints.

Primer coat shall be preferablyapplied bybrushingandnot by spraying.Hurried priming shallbeavoidedparticularlyonabsorbentsurface.&newplasterpatches.

ii. PreparationoftheSurface:

Thesurfaceshallbethoroughlycleanedofdust,oldwhiteorcolourwashbywashingandscrubbing.Thesurface shallthenbesandpaperedtogiveasmoothandevensurface.Anyunevennessshallbemadegoodbyapplyingputty,madeofplasterofpartiesmixedwithwaterontheentiresurfaceincludingfillinguptheundulationandthensandpaperingthesameafteritis dry.

iii. Application:

The cement primer shall be applied with a brush on the clean dry and smooth surface. Horizontalstrokes shall be given first and vertical strokes shall be applied immediately after wards. Thisentire operation will constitute on coast. The surface shall be finished as uniformly as possibleleaving no brush marks. It shall be allowed for at least 48 hours, before oil emulsion paint isapplied.ThePrimercoatshallbecementprimer,asrequiredinthedescriptionoftheitem.

Note:

Ifthewallsurfaceplasterhasnotdriedcompletelycementprimershallbeappliedbeforepainting thewalls.

For new work,after the primer coat has dried for atleast 48 hours,the surface shall be lightlysandpaperedtomakeitsmoothforreceivingthedistemper,takingcarenottoruboutthepriming coat. All loose particles shall be dusted off after rubbing. One coat of distemper properlydilutedwith thinner.

Waterorotherliquid(asstipulatedbythemanufacturer)shallbeappliedwithbrushinhorizontalstokesfollowedimmediatelybyverticaloneswhichtogetherconstituteonecoat.

Thesubsequentcoatsshallbeappliedinthesameway.Twoormorecoatsofweathercoatpaintasarefoundnecessaryshallbe appliedover the primercoattoobtainan even shade.

A time interval of at least 24 hours shall be allowed between consecutive coats to permit of theproperdryingoftheproceedingcoat.

15 cm. double bristled distemper brushes shall be used. After each day's work, brushes shall bethoroughly washed in hotwater with soapsolution and hung down to dry. Oldbrushes,whicharedirtyand caked withdistempershallnotbeusedon thework.

iv. Measurements:

Thelengthandbreadthshallbemeasuredcorrecttoacm.Theareashallbecalculatedinsqm(correcttotwoplacesofdecimal),exceptotherwisestated.

Smallarticlesnotexceeding10sq.decimeter(0.1sqm)ofpaintedsurfaceswherenotinconjunctionwithsimilarpaintedwork shallbeenumerated.

Paintingupto10cminwidthoringirthandnotinconjunctionwithsimilarpaintedworkshallbegiveninrunningmeterand shallincludecuttingtolinewhereso required.

11.3 CEMENTPAINT:

Materials:

Thecementpaintshallbe(conformingtoIS:5400)ofapprovedbrandandmanufacture.

i. PreparationofSurface:

For new work, the surface shall be thoroughly cleaned of all mortar dropping, dirt, dust, leaned ofall dirt, dust, algae, oil etc. by brushing and washing. Pitting in plaster shall be made good and acoatofwaterproofcementpaintshallbeappliedoverpatchesafterwettingthemthoroughly.

ii. PreparationofMix:

Weather coatpaint shallbe mixed in such quantities as can be used upwithin an hour ofitsmixingasotherwisethemixture willsetandthicken,affectingflowandfinish.

Weather coatpaintshall be mixedwith water in two stages.The first stage shall comprise of 2partsofcementpaintandonepartofwaterstirredthoroughlyandallowedtostandfor5minutes.Care shallbe taken to addthecement paintgraduallyto the waterandnotvice versa.The second stageshallcompriseofaddingfurtheronepartofwaterto themixandstirringthoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturersinstructionsshallbefollowedmeticulously.

Thelidsofcementpaintdrumsshallbekepttightlyclosedwhennotinuse,asbyexposuretoatmospherethecementpaintrapidlybecomesairsetdueto itshydroscopic quality.

iii. Application:

The solution shall be applied on the clean and wetted surface with brushes or spraying machine.The solution shall be kept well stirred during the period of application. It shall be applied on thesurface,whichisontheshadysideofthebuildingsothatthedirectheatofthesunonthesurfaceis avoided. The method of application of cement paint shall be as per manufactures specification.Thecompletedsurfaceshallbewateredaftertheday'swork.

The second coat shall be applied after the first coat has been set for at least 24 hours. Beforeapplicationofthesecondorsubsequentcoats,thesurfaceofthepreviouscoatshallnotbewetted.

For new work, the surface shall be treated with three or more coatsofwaterproofcementpaintasfoundnecessarytogetauniformshade.

Watercementpaintshallnotbeappliedonsurfacealreadytreatedwithwhitewash,colourwash, distemper dry or oil bound, varnishes, paints etc. It shall not be applied on gypsum, woodandmetal surface.

iv. Measurements:

Thelengthandbreadthshallbemeasuredcorrecttoacm.Theareashallbecalculatedinsqm(correcttotwoplacesofdecimal),exceptotherwisestated.

Smallarticlesnotexceeding10sq.decimeter(0.1sqm)ofpaintedsurfaceswherenotinconjunctionwithsimilar paintedwork shallbeenumerated.

Paintingupto10cminwidthoringirthandnotinconjunctionwithsimilarpaintedworkshallbegiveninrunningmeterand shallincludecuttingtolinewhereso required.

11.4 WeatherCoatCementPaintingtooutsidewalls
PAINTING

i. Materials:

Paints, oil, varnishes etc. of approved brand and manufacturer shall be used ready mixed paint asreceivedfromthemanufacturerwithoutanyadmixtureshallbeused.

Ifforanyreasonthinningisnecessaryincaseofreadymixedpaint,thebrandofthinnerrecommendedbythemanufacturerorasinstructedbytheEngineer-in-chargeshallbe used.

Approved, paints, oil or varnishes shall be brought to the site of work by the Contractor in theiroriginal containers in sealed condition. The material shall be brought in at a time in adequatequantities to suffice for the whole workoratleasta fortnight's work. The materials shall be keptinthejointcustodyofthecontractorandtheEngineer-in-charge.Theemptiesshallnotberemoved from the site work, till the relevantitem of work has been completed and permissionobtainedfrom theEngineer-in-charge.

ii. CommencingWork:

Painting shall not be started until the Engineer-in-charge has inspected the items of work to bepainted, satisfied himselfabouttheir properqualityand given hisapproval to commence thepainting work. Painting of external surface should not be done in adverse weather condition likehail storm and duststorm.

Painting,exceptthepriming coat,shallgenerallybetakeninhandafterpracticallyfinishingallotherbuildingworks.

Theroomsshouldbethoroughlysweptoutandtheentirebuildingcleanedup,atleastonedayinadvanceof thepaint workbeing started.

PreparationofSurface:

The surface shall be thoroughly cleaned from dust & other foreign materials. All rust, dirt scales,smoke and grease shall be thoroughly removed before painting is started. The prepared surfaceshall have received the approvalof the Engineer-in-charge after inspection,before painting iscommenced.

iii. Application:

Beforepouringintosmallcontainersforuse,thepaintshallbethoroughlystirredinitscontainers,whenapplying also the paint shallbe continuously stirredin the smaller containerssothatitsconsistencyiskeptuniform.

The painting shall be laid on evenly and smoothly by means of crossing and laying off, the later inthe direction of the grain of wood. The crossing and laying off consists of covering the area overwith paint, brushing the surface hard for the first time cover and then brushing alternately inopposite direction, two or three times and then finallybrushing lightly in a directionat rightangles to the same. In this process, no brush mark shall be left after the laying off is finished. Thefullprocessofcrossingand layingoffwillconstituteonecoat.

The left over paint shall be put back into the stock tins. When not in use, the containers shall bekeptproperlyclosed.

No hair marks from the brushor clogging of paint putties in the cornersof panels, angles ofmouldingsetc.shallbelefton thework.

In painting doors and windows, the putty round the glass panes must also be painted, but caremust be taken to see that no paint stains etc. are left on the glass. Tops of shutters and surfaces insimilarhiddenlocationsshallnotbe leftoutinpainting.

In painting steel work, special care shall be taken while painting over bolts, nuts, rivets, overlapsetc.

The additional specifications for primer and other coats of paints shall be as according to thedetailedspecificationsundertherespectiveheadings.

iv. BrushandContainers:

Afterwork,thebrushesshallbecompletelycleanedofpaintandlinseedoilbyrinsingwithturpentine. A brush in which paint has dried up in ruined and shall on no account be used forpainting work. The containers when not in use shall be kept closed and free from air so that paintdoesnotthickenandalsoshallbekeptsafefromdust.Whenthepainthasbeenused,thecontainers shall be washed with turpentine and wiped dry with soft clean cloth. So that they areclean, and can beusedagain.

v. Measurements:

The length and breadth shallbe measured correct to a cm. The area shall be calculated in sq.meters (correct to two placesof decimal),exceptotherwise stated, small articlesnotexceeding10 sq. decimeters (0.1 Sqm.) of painted surfaces where not in conjunction with similar paintedworkshall beenumerated.

Painting up to15 cm in width or in girth and not in conjunction with similar painted work shall begivenin runningmeters.

11.5 Primingcoatonwood,Iron,orplasteredsurface:

Primer:

The primer for woodwork,ironwork orplastered surface shallbe asspecified in the descriptionof theitem.

Theprimershallbereadymixedprimerofapprovedbrandandmanufacturer.

i. Preparationofsurface.

a) WoodenSurface:

Thewoodworktobepaintedshallbedryandfreefrommoisture.

The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sandpaper and shall be well dusted Knot, if any shall be covered with preparation of red lead made bygrinding red lead in water and mixing with strong glue sized and used hot. Appropriate fillermaterialwithsameshadeaspaintshallbeusedwherespecified.

The surface treated for knotting shall be dry before painting is applied. After the priming coat isapplied the holes and indention on the surface shall be stopped with glazier putty or wood puttyrespectively. Stopping shallnot bedone beforethepriming coat is applied as the wood willabsorb theoilin thestoppingandthelateristhereforeliableto crack.

All rustandscales shall be removed by scrapingwith steel wirebrushes.Hard skin ofoxideformed on the surface of wrought iron during rolling which becomes loose by rusting, shall beremoved.

Alldustanddirtshallbethoroughlywipedawayfromthesurface.

Ifthesurfaceiswet,itshallbedriedbeforeprimingcoatisundertaken.

b) PlasteredSurface:

The surface shall ordinarily not be painted until it has dried completely. Trial patches of primershallbelaidatintervalsandwheredryingissatisfactorilycompleted,paintingshallthenbetaken in hand. Before primer is applied, holes and undulations, shall be filled up with plaster ofparis andrubbedsmooth.

ii. Applications:

The primer shall be applied with brushes, worked well into the surface and spread even and smooth. The painting shall be done by crossing and lying off as described in painting.

All other specifications described under painting shall hold good so far as they are applicable.

Paintingwithreadymixedpaint:

Ready mixed paintsofapproved brandandmanufacture and of the requiredshadesshallbeused.Theyshallconforminall respectsto therelevantIS specifications.

PaintingofNewSurface:

WoodWork – The surface shall be cleaned and all unevenness removed as specified in primingcoat on wood, iron & plastered surface, knots if visible, shall be covered with a preparation of redlead. Holes and indentations on the surface shall be filled in with glazier putty or wood putty andrubbedsmoothbeforepaintingisdone.Thesurfaceshouldthoroughlybedriedbeforepainting.

Iron and Steel work – The priming coat shall have dried up completely before painting is started.Rust and scaling shall be carefully removed by scraping or by brushing with still wire brushes. Alldust anddirtshallbecarefullyandthoroughlywipedaway.

Plastered Surface- The priming coat shall dried up completely before painting is started. All dustand dirt that has settled on the priming coat shall be thoroughly wiped away before painting isstarted.

The specifications described in painting shall hold good as far as applicable. The numberof coatstobeappliedwillbeasstipulatedintheitem.Thepaintedsurfaceshallpresentauniformappearanceandglossyfinish,freefromstreaks,blistersetc.

i. Preparationofsurface:

Painting shallbedoneonlywhen the surfaceis perfectlydry to permit ofgoodabsorption.Alldirt,dust or other foreign matter shall be removed from the surface to be painted. All roughnessshallbesandpaperedandcleaned.

ii. Application:

The preservative shall be applied liberally with a stout brush and not daubed with rags of cottonwaste. It shall be applied with a pencil brush at the joints of the wood work. The first coat shall beallowed at least 24 hours to soak in before the second (the final) coat is applied. The second coatshall be applied in the same manner as the first coat. The excess of preservative, which does notsoak intothewood,shallbewipedoff withacleandrypieceofcloth.

iii. Measurments:

The length and breadth shall be measured correct to a cm. The area shall be calculated in sqm (correct to two places of decimal), except otherwise stated.

Small articles not exceeding 10 sq. decimeter (0.1 sqm) of painted surfaces where not in conjunction with similar painted work shall be enumerated.

Painting upto 10 cm in width or in girth and not in conjunction with similar painted work shall be given in running meter and shall include cutting to line where so required.

PAINTING(Bothinterior&Exterior)withAcrylicemulsionpaint:

Paintingtwocoatstothewallsurfacebyusing100%premiumAcrylicemulsionpaintofapproved make or equivalentmake ofapproved shade to interiorwall surface overa coatofprimer with water bond cement primer after preparing the surface smooth by applying puttypunningwithSyntheticAcrylicwallputtyincludingfinishingthesurfacesmoothbysandpaperingin all heights including scaffolding charges with cost, conveyance, taxes of all materials,costofalllabours,etc.asrequiredfortheworkcompleteinallrespect.

i. Materials:

a. Paintstobeusedforinteriorwallshallbeof100%premiumAcrylicemulsionpaintofapproved make.

b. Paintstobeusedforexteriorwallshallbeof100%Acrylicemulsionpaint(1stquality).

Ifforanyreasonthinningisnecessaryincaseofreadymixedpaint,thebrandofthinnerrecommendedbythemanufacturerorasinstructedbytheEngineer-in-chargeshallbe used.

Approved, paints, oil or varnishes shall be brought to the site of work by the Contractor in theiroriginal containers in sealed condition. The material shall be brought in at a time in adequatequantities to suffice for the whole workoratleasta fortnight's work. The materials shall be keptinthejointcustodyofthecontractorandtheEngineer-in-charge.Theemptiesshallnotberemoved from the site work, till the relevant item of work has been completed and permissionobtainedfrom theEngineer-in-charge.

ii. CommencingWork:

Painting shall not be started until the Engineer-in-charge has inspected the items of work to bepainted, satisfied himselfabouttheir properqualityand given hisapproval to commence thepainting work. Painting of external surface should not be done in adverse weather condition likehail storm and duststorm.

Painting,exceptthepriming coat,shallgenerallybetakeninhandafterpractically finishingallotherbuilder's work.

Theroomsshouldbethoroughlysweptoutandtheentirebuildingcleanedup,atleastonedayinadvanceof thepaint workbeing started.

iii. PreparationofSurface:

The surface shall be thoroughly cleaned from dust & other foreign materials. . All rust, dirt scales,smoke and grease shall be thoroughly removed before painting is started. The prepared surfaceshall have received the approvalof the Engineer-in-charge after inspection,before painting iscommenced.

iv. Application:

Before pouring into small containers for use, the paint shall be thoroughly in its containers, whenapplyingalsothepaintshallbecontinuouslystirredinthesmallercontainerssothatitsconsistency is kept uniform.

.Scaffolding shall be stout and strong to prevent any collapse or displacement. Proper measuresfor safety of workmen working on scaffolding should be taken by the contractor reach heightsinconformity with approved standards. As the paintis tobe appliedover a coat of primer withwaterbond cement primer,the surfaceisto be prepared smoothbyapplyingputty, punningwith Synthetic Acrylic wall putty including finishing the surfaceby sand papering. The paintingshall be laid on evenly and smoothly by means of crossing and laying off, the later in the directionof the grain of wood. The crossing and laying off consists of covering the area over with paint,brushingthesurfacehardforthefirsttimecoverandthenbrushingalternatelyinoppositedirection, two or three times and then finally brushing lightly in a direction at right angles to thesame.Inthisprocess,nobrushmarkshallbeleftafterthelayingoffisfinished.Thefullprocessof crossingandlayingoffwillconstituteonecoat.

The left over paint shall be put back into the stock tins. When not in use, the containers shall bekeptproperlyclosed.

No hair marks from the brushor clogging of paint putties in the cornersof panels, anglesofmouldingsetc.shallbelefton thework.

Inpaintingnearertodoorsandwindows,theputtyroundtheglasspanesmustalsobepainted,but care must be taken to see that no paint stains etc. are left on the glass. Tops of shutters andsurfacesinsimilarhiddenlocationsshallnotbeleftoutinpainting.

The additional specifications for primer and other coats of paints shall be as according to thedetailedspecificationsundertherespectiveheadings.

v. BrushandContainers:

Afterwork,thebrushesshallbecompletelycleanedofpaintandlinseedoilbyrinsingwithturpentine. A brush in which paint has dried up in ruined and shall on no account be used forpainting work. The containers when not in use shall be kept closed and free from air so that paintdoesnotthickenandalsoshallbekeptsafefromdust.Whenthepainthasbeenused,thecontainers shall be washed with turpentine and wiped dry with soft clean cloth.so that they areclean, and can beusedagain.

vi. Measurements:

The length and breadth shallbe measured correct to a cm. The area shall be calculated in sq.meters (correct to two placesof decimal),exceptotherwise stated, small articlesnotexceeding10 sq. decimeters (0.1 Sqm.) of painted surfaces where not in conjunction with similar paintedworkshall beenumerated.

Painting up to15 cm in width or in girth and not in conjunction with similar painted work shall begivenin runningmeters.

PAINTINGWITHSYNTHETICENAMELPAINT:
Synthetic Enamel Paint (conforming to IS 2933) of approved brand and manufacture and of therequiredcolour shall be used for the top coatand an undercoat of ordinary Paintof shadetomatchthetopcoatasrecommendedbythesamemanufacturerasfarthetopcoatshallbeused.

i. Paintingonnewsurface:-
Wooden Surface: The wood work to be painted shall be dry and free from moisture. The surfaceshall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper andshall be well dusted. Knots, if any shall be covered with preparation of red lead made by grindingred lead in water and mixing with strong glue sized and used hot. Appropriate filler materialconforming to IS 345 with same shade as Paint shall be used where specified. The surface treatedfor knotting shallbe dry before Paintis applied. Afterobtainingapprovalof Engineer-in-Chargefor wood work, the priming coat shall be applied before the wood work is fixed in position. Afterthe primingcoatisapplied,theholesandindentationonthesurfaceshallbestoppedwithglazier'sputtyorwoodputty.

Stopping shall not be done before the priming coat is applied as the wood will absorb the oil instoppingand thelatteristhereforeliabletocrack.

ii. Iron & Steel Surface:

All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during rolling which becomes loose by rusting, shall be removed.

All dust and dirt shall be thoroughly wiped away from the surface. If the surface is wet, it shall be dried before priming coat is undertaken.

iii. Application:
The number of coats including the undercoat shall be as stipulated in the item. Under Coat: One coat of the specified ordinary Paint of shade suited to the shade of the top coat shall be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.

iv. Top Coat:
Top coats of synthetic enamel Paint of desired shade shall be applied after the undercoat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.

11.6 ExteriorwallPaint:

Thepaintshallbe(Texturedexteriorpaint/Acrylicsmoothexteriorpaint/premiumacrylicsmooth exteriorpaint)of approved brandand manufacture.Thispaintshallbe brought to thesite of work by the contractor in its original containers in sealed condition. The material shall bebrought in at a time in adequate quantities to suffice for the whole work or at least a fortnight'swork. Thematerialsshallbe keptin the jointcustody of the contractorandthe Engineer-in-Charge. The empty containers shall not be removed from the site of work till the relevant item ofworkhasbeencompletedandpermissionobtained fromtheEngineer-in-Charge.

i. PreparationofSurface:
For new work, the surface shall be thoroughly cleaned off all mortar dropping, dirt dust, algae,fungus or month, grease and other foreign matter of brushing and washing, in plaster shall

makegood,surfaceimperfectionssuchascracks,holesetc.Shouldberepairedusingwhitecement.Theprepa redsurfaceshallhavereceivedtheapprovaloftheEngineerinchargeafterin section beforepaintingis commenced.

ii. PaintingMaterials:

Paints, oils, varnishes etc. of approved brand and manufacture shall be used. Only ready mixedPaint (Exterior grade) as received from the manufacturer without any admixture shall be used. Ifforanyreason,thinningisnecessaryincaseofreadymixedPaint,thebrandofthinnerrecommendedbythe manufacturerorasinstructedby the Engineer-in-Charge shallbe used.Approved Paints, oil or varnishes shall be brought to the site of work by the contractor in theiroriginal containers in sealed condition. The material shall be brought in at a time in adequatequantities to suffice for the whole workoratleasta fortnight's work. The materials shall be keptinthejointcustodyofthecontractorandtheEngineer-in-Charge.Theemptiesshallnotberemoved from the site of work, till the relevant item of work has been completed and permissionobtainedfrom theEngineer-in-Charge.

iii. PreparationofSurface:

The surfaceshallbe thoroughlycleanedanddustedoff. All rust, dirt,scales,smoke splashes,mortardroppingsandgreaseshallbethoroughlyremovedbeforepaintingisstarted.Theprepared surfaceshallhavereceivedtheapprovaloftheEngineer-in-Chargeafterinspection,beforepaintingis commenced.

iv. Application:

Beforepouringintosmallercontainersforuse,thePaintshallbestirredthoroughlyinitscontainers, when applying also,thePaintshallbe continuouslystirredin the smaller containerssothatitsconsistencyiskeptuniform.

Thepaintingshallbelaidonevenlyandsmoothlybymeansofcrossingandlayingoff,thelatterin the directionof the grainsof wood. The crossingand layingoff consistsof covering theareaover with Paint, brushing the surface hard for the first time over and then brushing alternately inopposite direction, two or three times and then finallybrushing lightly in a directionat rightangles to the same. In this process, no brush marks shall be left after the laying off is finished. Thefullprocessofcrossingand layingoffwillconstituteonecoat.

v. Measurements:

The length and breadth shall be measured correct to a cm. The area shall be calculated in sqm (correct to two places of decimal), except otherwise stated.Small articles not exceeding 10 sq. decimeter (0.1 sqm) of painted surfaces where not in conjunction with similar painted work shall be enumerated.

Painting upto 10 cm in width or in girth and not in conjunction with similar painted work shall be given in running meter and shall include cutting to line where so required.

8 REINFORCEMENT GROUTING

Making drilled hole of required diameter of approved depth followed by proper cleaning and application of the specified chemical compound and there by fixing the Rebar into the chemical filled hole.

Rate: Rate shall include the cost of materials labour, royalties, taxes and T&P involved in all operations.

9 CORECUTTING

Core cutting of RCC Slab of required diameter and depth of the slab with the help of required machineries as specified and direction of IDCO/Project Manager specified as per BOQ.

Rates The rate includes the cost of material, taxes T&P and labour involved in all the operations.

10 UPVCwindows,ventilatorsand compositeunitsetc.

14.1 Two Track Two PANEL uPVC single glazed sliding windows with mosquito net

UPVC Sliding glazed uPVC Window made out of hollow multi-chambered uPVC sections having isolated drainage system with the design 2Track 2Panel System. The 2 track outer frame of the

window having over all size of 60 x 58 mm (without mosquito mesh) and 98 x 52 mm (with mosquito mesh) having internal wall thickness of 2.50 mm. The glass sashes / shutters shall be made out of uPVC sections with over all size of 42 x 70 mm with internal thickness of 2.50 mm. The mosquito mesh shutter (if applicable) having over all size of 25 x 52 mm with internal wall thickness of 2.50 mm. Reinforcement of galvanized mild steel with thick ness of 1.50 mm has to put through out the Frame, glass shutter and mesh shutter. Glass support beading make of uPVC sections will be fixed with EPDM gaskit to keep glass tight and unmoved. Single point locking system (called touch lock) made out of castedwith white powder coated and locking hook willmake of SS 304 grade material. Aluminumguide rail will be fixed on the Bottom part of frame onwhich theglass shutters will run. The roller will make of nylon an having capacity of 40 - 120 kgdepends on glass weight. Fine seal will be provided to protect the dust in between closing point &interlockingpointof glass & mesh shutters.Interlock make of the uPVC window shall be gotapprovedby the Engineer-in- charge before fixing. Glass thicknessand colour willbe change asperrequirement.

14.2 ThreeTrackThreePANELuPVCsingleglazedslidingwindowswithmosquitonet

UPVC Sliding glazed uPVC Window made outof hollow multi-chambered uPVC sections havingisolated drainage system with the design 3Track 3Panel System. The 3 track outer frame of thewindow having over all size of 137 x 52 mm (without mosquito mesh) and 178 x 52 mm (withmosquito mesh) having internal wall thickness of 3.00 mm. The glass sashes / shutters shall bemadeoutof uPVC sectionswith over all sizeof42 x 75 mm with internal thicknessof2.50mm.The mosquito mesh shutter (if applicable) having over all size of 42 x 75 mm with internal wallthickness of 2.50 mm. Reinforcement ofgalvanized mild steel with thick ness of 2.00 mm has to putthrough out the Frame,glass shutter and mesh shutter.Glass supportbeading make of uPVCsections will be fixed with EPDM gaskit to keep glass tight and unmoved. Single point lockingsystem (called touch lock) made out of casted with white powder coated and locking hook willmake of SS 304 grade material. Aluminumguide rail will be fixed on the Bottom part of frame onwhich theglass shutters will run. The roller will make of nylon an having capacity of 40 - 120 kgdepends on glass weight. Fine seal will be provided to protect the dust in between closing point &interlocking point of glass & mesh shutters. Interlock make of uPVC has to be fixed with bot theglasspanel.ThemodelandbrandoftheoftheuPVCwindowshallbegotapprovedbytheEngineer-in-chargebeforefixing.Glassthicknessandcolourwillbechangeasperrequirementandapprovedby theEICbeforefixing.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.Nod eductionshallbemadeforprovidingvenetianopeningandopeningforglazing.

14.3 UPVCOpenableCasementwindow:-

UPVCOpenableglazeduPVCWindowmadeoutofhollowmulti-chambereduPVCsectionshaving isolated drainage system with the design Casement (Outside open) The casement frame ofthe window having overall sizeof60 x52 mm having internalwall thicknessof 3.00 mm. TheglasspanelshallbemadeoutofUpvcsectionswithoverallsizeof52x78mmwithinternal thicknessof3.00mm.Reinforcementofgalvanizedmildsteelwiththicknessof1.50mmhastoput throughout the frame, glass panel. Glass support beading make of upvc sections will be fixedwith EPDM gaskit to keep glass tight. Single point locking system (called Cockspur) made out ofcasted with white powder coated and Friction and Stray Hinges will be made of SS 304 grademmaterial. Multipoint locking system (called Espag) made out of casted zamac with white powdercoated can be used if height goes beyond 4.50 feet.The model and brandof the upvc windowshall be approved by the Engineer - in- charge before fixing. Glass thickness and colour will bechangeasperrequirement.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.4 UPVCFixedWindow:-

UPVCOpenableglazeduPVCWindowmadeoutofhollowmulti-chambereduPVCsectionshaving isolated drainage system with the design Casement (Outside open coupled with fixed) Thewindow frame

havingoverall sizeof60 x 52 mm havinginternalwall thicknessof3.00mm.Therewillbenoadditionalglasspaneltothe,glasswillbefixedwiththeframeitself.Reinforcementofgalvanizedmildsteelwiththicknessof1.50mmwillhavethroughouttheframe. Glass supportbeading makingof Upvc sections willbe fixed with EPDM gaskit to keepglass tight. The model and brand of theuPvc window shall be approved by the Engineer - in-charge before fixing.Glass thicknessandcolour willbechangeasperrequirement.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.5 TwoTrackTwoPANELupvcslidingDoor:-

UPVCSliding glazed uPVCDoorsmade outofhollow multi-chambered uPVCsections havingisolated drainage system with the design 2Track 2Panel System. The 2 track outer frame of thewindow having over all size of 78 x 60 mm (without mosquito mesh) and 108 x 60 mm (withmosquito mesh) having internal wall thickness of 3.00. The glass sashes / shutters shall be madeout of Upvc sectionswith over all size of 52 x 93 mm with internal thickness of 3.00 mm. Themosquitomeshshutter(ifapplicable)havingoverallsizeof52 x70mmwithinternalwallthickness of 2.25 mm. Reinforcement ofgalvonised mild steel with thick ness of 2.00 mm has toput through out the Frame, glass shutter and mesh shutter. Glass support beading make of upvcsectionswill be fixedwithEPDM gaskitto keepglasstightandunmoved.Multipointlockingsystem (called Pop Up) made out of castedzamac with white powder coatedandlocking hookwill makeof SS 304grade material. Aluminumguiderail willbe fixedon the Bottompartofframeon whichtheglass shutterswillrun. Theroller will makeofnylon anhaving capacity of120 kg depends on glass weight. Fine seal will be provided to protect the dust in between closingpoint&interlockingpointofglass&meshshutters.InterlockmakeoftheuPVCwindowshallbegotapprovedbytheEngineer-in-chargebeforefixing.Glassthicknessandcolourwillbechangeasperrequirement.

Measurements: All work shall be measured net as fixed and area calculated in square meter to nearest two placesofdecimal.

14.6 ThreeTrackThreePANELupvcslidingDoor:-

UPVC Sliding glazed uPVC Window made outof hollow multi-chambered uPVC sections havingisolated drainage system with the design 3Track 3Panel System. The 3 track outer frame of thewindow having over all size of 137 x 52 mm (without mosquito mesh) and 178 x 52 mm (withmosquito mesh) having internal wall thickness of 3.00 mm. The glass sashes / shutters shall bemade out of Upvc sections with over all size of 52 x 93 mm with internal thickness of 2.50 mm.The mosquito mesh shutter (if applicable) having over all size of 52 x 93 mm with internal wallthickness of 3.00 mm. Reinforcement ofgalvonised mild steel with thick ness of 2.00 mm has toput through out the Frame, glass shutter and mesh shutter. Glass support beading make of upvcsections will be fixed with EPDM gaskit to keep glass tight and unmoved. Single point lockingsystem (called touch lock) made out of casted zamac with white powder coated and locking hookwill makeof SS 304grade material. Aluminumguiderail willbe fixedon the Bottompartofframeonwhichtheglassshutterswillrun.Therollerwillmakeofnylonanhavingcapacityof40 - 120kgdepends on glassweight.Finesealwillbeprovidedtoprotectthedustin between closing point & interlocking point of glass & mesh shutters. Interlock make of Upvc has to be fixedwith bot the glass panel. The modelandbrand of the ofthe uPVC window shallbe gotapprovedbytheEngineer-in-chargebeforefixing.Glassthicknessandcolourwillbechangeasperrequirement.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.7 UPVCCasementDoor:-

UPVC Openable glazed uPVC Door made outof hollow multi-chambered uPVC sections havingisolateddrainagesystemwiththedesignCasement(Outside/Insideopen)Thecasementframeof the window having over all size of 60 x 52 mm having internal wall thickness of 3.00 mm. Theglass panel shall be made out of Upvc sectionswith over all size of 60 x 104 mm with internalthicknessof3.00mm.Reinforcementofgalvonisedmildsteelwiththicknessof2.00mmhastoput throughout the frame, glass panel. Glass support beading make of upvc sections will be fixedwithEPDM gaskittokeepglasstight.Multipointlockingsystem(called Balcony Handle) madeout of casted zamac with white powder coated and 3 Dimensional Hinges will be made of SS 304grade

material. The model and brand of theuPvc window shall be approved by the Engineer - in-charge before fixing.Glass thicknessandcolour willbechangeasperrequirement.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.8 UPVCVentilatorwithExhaustProvision:-

UPVCVentilatorglazeduPVCLouversmadeoutofhollowmulti-chambereduPVCsectionshavingisolateddrainagesystemwiththedesignMovableLouverswithExhaustProvision.Theframeofthewindowhavingoverallsizeof45x45mmhavinginternalwallthicknessof2.25 mm.TheglassholdingmadeoutofAluminumsquaresectionswithwhitepowdercoatingwithoverallsizeof45x25withinternalwallthickness2.25mm.Reinforcementofgalvonisedmildsteelwiththicknessof1.20mmhasputthroughouttheframe.Glasswillbefrosted5mm.ThemodelandbrandoftheuPvcwindowshallbeapprovedbytheEngineer-in-chargebeforefixing.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.9 UPVCVentilator:

UPVCVentilatorglazeduPVCLouversmadeoutofhollowmulti-chambereduPVCsectionshaving isolated drainage system with the design Movable Louvers with Exhaust Provision. Theframeofthewindowhavingoverallsizeof45x45mmhavinginternalwallthicknessof2.25mm. The glass holding made out of Aluminumsquare sections with white powder coatingwithover all size of 45 x 25 with internal wall thickness 2.25 mm. Reinforcement of galvonised mildsteel with thickness of 1.20 mm has put throughout the frame. Glass will be frosted 5 mm. Themodel and brand of theuPvcwindow shallbeapprovedbythe Engineer -in-charge beforefixing.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.10 UPVCtophungwindow:

UPVCOpenableglazeduPVCWindowmadeoutofhollowmulti-chambereduPVCsectionshaving isolated drainage system with the design Casement (Outside open) The casement frame ofthe window having overall sizeof60x 52 mm having internalwall thicknessof 3.00 mm. Theglass panel shall be made out of Upvc sectionswith over all size of 52 x 78 mm with internalthicknessof3.00mm.Reinforcementofgalvonisedmildsteelwiththicknessof1.20mmhastoput throughout the frame, glass panel. Glass support beading make of upvc sections will be fixedwith EPDM gaskit to keep glass tight. Single point locking system (called Cockspur) made out ofcasted zamac with white powdercoatedandFriction and Stray Hinges willbe madeof SS 304grade material. Multipoint locking system (called Espag) made out of casted zamac with whitepowdercoatedcanbeusedifheightgoesbeyond4.50feet.ThemodelandbrandoftheuPvcwindow shall be approved by the Engineer - in- charge before fixing. Glass thickness andcolour will bechangeasperrequirement.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.11 Al.POWDERCOATEDDOOR:

AluminumpowdercoateddoorconfirmingtoISI.Includingcostofallgaskethardwarefittings.labours, transportation etc. All complete as per the specified in the Items and direction ofEngineer-in-charge,

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.12 FLUSHDOORSHUTTER

Flushdoorshuttersshallhaveasolidcoreandmaybeofthedecorativeornon-decorative(Paintable type as per IS 2202 (Part I). Nominal thickness of shutters may be 25, 30,32 or 35 mm.Thicknessandtypeofshutters shall beasspecifiedbyIDCO/Projectmanager.

Widthandheightoftheshuttersshallbeasshowninthedrawingsorasindicatedbytheengineer- in-Charge. All four edges of the shutters shall be square. The shutter shall be free fromtwist or warp in its plane. The moisture content in timbers used in the manufacture of flush doorshuttersshallbenotmorethan12 percentwhentestedaccordingtoIS 1708.

Core:

The core of the flush door shutters shall be a block board having wooden strips held in a frameconstructed of stiles and rails.Each stile and rail shall be a single piece without any joint. Thewidthof the stiles and rails including lipping,where provided shall not be less than 45 mm andnot more than 75 mm. The width of each wooden strip shall not exceed 30 mm. Stiles, rails andwooden stripsformingthe core of a shuttershall beofequaland uniform thickness.Woodenstripsshallbe paralleltothestiles.

Endjointsofthepiecesofwoodenstripsofsmalllengthsshallbestaggered.Inashutter,stilesand rails shall be of one species of timber. Wooden strips shall also be of one species only but itmayor maynotbeof the same species as thatof the stiles and rails.Any species of timber maybeusedforcoreofflushdoor.However,anynon-coniferous(Hardwood)timbershallbeusedfor stiles,railsandlipping.

FacePanel:

The face panelshallbe formedbygluing,bythehot-pressprocesson both facesofthe core,either laminate or cross-bands and face veneers. The thickness of the cross bands as such or inlaminateshallbebetween1.0mmand 3.0 mm.

Lipping:

Lipping, where specified, shall be provided internally on all edges of the shutters. Lipping shall bedone withbattensof firstclasshardwoodorasspecified of depthnotlessthan25mm.Fordoubleleavedshutters,depthofthelippingatmeetingofstilesshallbenotlessthan35mm.

Jointsshallnotbepermittedinthelipping.

Adhesive:

Adhesive used for bonding various components of flush door shutters namely, core, core frame,lipping, cross-bands, face veneers, plywood etc. and for bonding plywood shall conform to BWPtype,phenolformaldehydesyntheticresinadhesiveconformingto IS848.

Measurements:

Lengthandwidthoftheshuttersshallbemeasuredtothenearestcminclosedpositioncoveringthe rebatesoftheframesbutexcludingthegapbetweentheshutterandtheframe.Overlapoftwoshuttersshallnotbe measured.

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.Nodeductionshallbemadeforprovidingvenetianopeningandopeningforglazing.

Rates:

The rate includesthe costofmaterial and labour andallhardware fitting &fixturesinvolvedinalltheoperations.

TOUGHENEDGLASSDOORSHUTTER

Providing and fixing 12 mm thick frameless toughened etched glass door shutter of approvedbrand with machine polished edges, includingtop & bottom pivot & spring type fixing with anapproved make including 450mm Stainless steel handle & patch lock etc. for fixing required doorfittings, asapprovedbytheIDCO/Projectmanager.

Measurements:

Lengthandwidthoftheshuttersshallbemeasuredtothenearestcminclosed,Allworkshallbemeasurednetasfixedandareacalculatedinsquare metertonearesttwoplacesofdecimal.

Rates:

The rate includesthe costofmaterial and labour andallhardware fitting &fixturesinvolvedinalltheoperations.

14.13 FIREDOORWITHPANICBARSINGLESHUTTER(2hrs):

Fitting of 46 mm thick steel Check door of 120 minutes Fire rating confirming to BS ;476 Part-22and IS : 3614 Part-II Fabricated with 2 no's 1.6 mm thick galvanized steel sheet sandwichingwithproprietaryfireresistantinsulationmaterialsin-between.

Thedoorframeanddoorshutterarefinishedwithtwocoatfireretardantprimer.DoorSize:- 2100mmX975mm(SingleLeaf)TheprototypeCBRITestCertificateshallbeprovided.

Hardware'sof304 gradeSS ball bearing hingesofsize 4 X 3 X 3mm complete in allrespect asreqd.Visionpanelof120minutefireratedclearedwiredglassofthesize200mmx300mmx6mm of Pilkington make UL Listed complete in all respect asreqd.Marshall/Briton make DeadLock with Dead bolt only, SS finish with SUS201, back set 55mm, fire rated, square corner withstampingroseinSUS304with80mmsinglecylinder(cylxturn).

Marshall/dormaprimer/Britonmakepushbarpanicexitdevicetested

in accordance with CE-UL europeon standards,certification standards EN1125 powder coatedfinish Fire tested as per BS 476 standard for 120 minutes with 3 years warranty complete etc. asreqd. including all cost of labour, material, conveyance, loading, unloading, T&P etc. all completeasper directionsofEngineer-in-charge//Architect.

Measurements:

Lengthandwidthoftheshuttersshallbemeasuredtothenearestcminclosed,Allworkshallbemeasurednetasfixedandareacalculatedinsquare metertonearesttwoplacesofdecimal

14.14 M.S.SHEETSHUTTERS:

These shall be manufacturedasper drawingand specification.These shallbe fabricated frommildsteel sheetsandangleiron.

The doorsshallbeprovidedasdouble leafshuttersunlessotherwise specified .The shuttersshall be fabricated with frame of M.S. angle 40 x 40 x 6 mm @ 3.5 kg/ meter and two diagonalbraces of the same section as shown in Fig. 3 unless otherwise specified. The frame shall beriveted and/ or welded at the junctions. Wherever riveting shall be done 3.15 mm (10 G) thickgussetplate shallbe provided at the junction. M.S.sheetof 1 mm thicknessoras specified, shallbefixedto the framewithrivetsorwelds asapprovedbythe Engineer-in-charge.

Alternatively the diagonal bracing may be replaced byone horizontaland two cross flats 30 x 6mmunlessotherwisespecified.Theouterframeshallbeprovidedwithcleatsmadeofsection40x10mmandbentintheshapeofanglecleatswithonearm150mmlongandtheotherarm50mm longand fixedto the angle ironframe ofthe door with two 12 mm dia bolts and nuts. Fordoorsupto2.40mheight,twoanglescleatsperdoor shallbe provided.

The cleat shall have a vertical leg of 150 mm which shall be fixed with frame and horizontal leg ofabout50mmwhichshallbeprovidedwithaholeof24mmdiaandfixedintheprojectedpinofthepinclamp.

FittingsandFixtures:

Theshuttersshallbefixedtothewallmasonrywithfourpinclamps(pintles)wheretheheightoftheshutterisupto 2.4m.Eachpinclampshallconsistof50x6mmflatiron45cmlongbentandforkedatoneendandprovided with20mmdiameter M.S.pinon theother.The pinshallbefirmlyrivetedorweldedtothepinclamp,theotherendofwhichshallbeembeddedinmasonrybymeansofcementconcreteblock40x23x20cmof1:3:6mix(1cement:3coarsesand:6gradedstoneaggregate20mmnominalsize).Itshallbesoplacedthatbottompinshallfaceupwardsand"toppindownward"inorderthatthegatemaynotberemovedbyliftingoverpins.Onehookwitheye45cmlongof10mmdiametershallbeprovidedforeachshuttertokeepitfixedinopenposition.Thehookshallbefixedinwallmasonrywithwoodenblockandtheeye shallbefixedon6mmthickM.S.plateasstapleandfixedintheshutterframewithrivetorweld.Acementconcrete

block15x10x20cmin1:2:4(1cement:2coarsesand:4gradesstoneaggregateof20mmnominalsize)mixshall beembeddedinthefloororatjunctionoftwoshuttersso thatdoorshutteropenonlyontheoutsideandnotonthe inside.

The shutters shall also be provided with locking arrangement and two handles of the shape andpatternasapprovedbytheEngineer-in-charge.

Painting:

All the members of the door including angle iron shall be thoroughly cleaned off rust, scales, dustetc.andgivenaprimingcoatofapprovedsteelprimeri.e.RedOxide/ZincchromeprimerconfirmingtoIS20 74beforefixing them inposition.

Measurements:

Thewidthandheightofshuttersshallbemeasuredtothenearestcm.Theareashallbecalculated insquaremetrecorrecttotwoplacesofdecimal.

M.SGrill:

Welding : Welding shall generally be done by electric arc process as per IS 816 and IS 823. Theelectricarcmethodisusuallyadoptedandiseconomical.Whereelectricityforpublicisnotavailablegenerat orsshallbearrangedbythecontractorathisowncostunlessotherwisespecified.Gasweldingshallonly by resorted to usingoxyacetylene flame with specificapprovaloftheEngineer-in-charge.GasweldingshallnotbepermittedforstructuralsteelworkGaswelding required heating of the members tobe welded along with the welding rod and is likely tocreatetemperaturestressesintheweldedmembers.Precautionsshallthereforebetakentoavoid distortionofthemembersduetothesetemperaturestresses.

The work shall be done as shown in the shop drawings which should clearly indicate variousdetailsofthejointtobewelded,typeofwelds,shopandsiteweldsaswellasthetypesofelectrodes to be used. Symbol for welding on plans and shops drawings shall be according to IS813. As far as possible every efforts shall be made to limit the welding that must be done after thestructure iserected so as to avoid the improper welding that islikely to bedone due to heightsand difficult positions on scaffolding etc. apart from the aspect of economy. The maximum dia ofelectrodes for welding work shall be as per IS 814. Joint surfaces which are to be welded togethershall be freefrom loose mill scale, rust,paint, greaseor other foreign matter, whichadverselyaffectthe qualityof weld andworkmanship.

Erection : The specification shall be as described in 10.3.3 in CPWD Specs Vol 1 except that whileerectingaweldedstructureadequatemeansshallbeemployedfortemporaryfasteningthememberstog etherandbracingthe framework untilthe jointsare welded.Suchmeans shallconsists of applying of erection bolts, tack welding or other positive devices imparting sufficientstrengthandstiffnesstoresistalltemporaryloadsandlateralforcesincludingwind.Owingtothe small number of bolts ordinarily employed for joints which are to be welded, the temporarysupport of heavy girders carrying columns shall be specially attended. Different members whichshall be fillet welded, shall be brought into as close contact as possible. The gap due to faultyworkmanshipor incorrect fit if any shall notexceed. 1.5 mmifgap exceeds 1.5mmor moreoccurs locally the size of fillet weld shall be increased at such position by an amount equal to thewidthof thegap.

Painting : Before the member of the steel structures are placed in position or taken out of theworkshopthese shallbepaintedas specified inpara 10.2.2ofCPWDspecsvol.-1.

Measurements:

Theactualweightshallbemeasuredtothenearesttwoplaceofdecimal.

14.15 S.SRailing:

Fitting and fixing of stainless steelof 304 grade in hand railing of total height 0.9 m using 50mmdiaof 2mmthick circular pipewith Balustrade of size50mm diaandstainlesspipe bracingofsize 25mm x 2mm in 3 rows in staircase , balcony ,utility an etc. as per approved design andspecification , buffing, polishing etc. with cost ,conveyance, taxes of all materials,labours,T&P etc.completeinallrespectasper thedirectionofEngineer-in-charge.

14.16 ZLouvers:

Supply, Installation of Powder Coated Louvers with Outer frame as 25 mm x 50 mm x 1.5 mmtubular frame and Channel suitable to Louver Panels with Panel dimension as 56.5 mm withoutbend with wall

thickness as 2 mm with two nos of screws grooves. Outer frame shall be Cut intoRectangular or Square sizes or as per site requirements with mitered joints and CSK screws. Mainframes shall be fixed onto the Civil openings with HILTI make HFV anchor fasteners of M10x80.LouverPanelsshallbefixedontothemainframesbySSScrewsofPHM10x50ofOMNI/KUN/approve dequivalentscrews.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

14.17 AluminumDoorwithPowdercoated:

Frame :-Providing and fixing aluminumwork for doors, windows, ventilators and partitions withextrudedbuiltupstandardtubularsections/appropriateZsectionsandothersectionsofapproved make conforming to IS: 733 and IS: 1285, fixing with dash fasteners of required dia andsize,includingnecessaryfillingupthegapsatjunctions,i.e.attop,bottomandsideswithrequiredEPDMrub ber/neoprenegasketetc.Aluminumsectionsshallbesmooth,rustfree,straight, mitered and jointed mechanically wherever required including cleat angle, Aluminumsnapbeadingforglazing/paneling,C.P.brass/stainlesssteelscrews,

Shutter:-For shuttersofdoors,windows&ventilators including providing and fixing hinges/pivots and making provision for fixing of fittings wherever required including the cost of EPDMrubber/neoprenegasketrequired(Fittingsshallbepaidforseparately).

Allcompleteasperarchitecturaldrawingsandthe directionsof Engineer-in-charge.(Glazing,paneling anddashfastenersto bepaid forseparately) .

Powdercoatedaluminum(minimumthicknessofpowdercoating50micron)Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremeterstonearesttwoplacesofdecimal.

POLYCARBONATESHEETROOFING

Commencementofwork:

Polycarbonatesheetofapprovedcolourandapprovedmakespecifiedasbyl DCO/projectmanager is used on roof made out M.S sections/frame work with the help of necessary fitting andfixtures etc.allcomplete.

Rates:The rate includesthe costof materialand labourand allhardware fitting& fixtures,fabrication&paintinginvolved inall theoperations

14.18 ElasticSealant: -

A cross linking two component Polysulphide based elastic sealant (confirming to IS 12118 Part1&2-1987) for verticalandhorizontal expansion joints with a jointdepth 8-40 mm and protectthesurfacewithmaskingtape.Installthesealantintothejointwithouttrappingair.Tool-offwithaspatulatolightlyconcaveprofile.removemaskingtape.asperthemanufacturer'sspecifications and recommendations,Includingall costof labour, material, conveyance, taxes,T&Petc.allcompleteasperthedirectionofEngineer-in-charge.

14.19 CompressibleFillerBoard:

At all heights and depths DURABOARD HD-100 premoulded compressible filler board in blackcolour conforming to MORTH Specification (Clause 1015), having minimum density 95kg./ cum,Nonstandingwith lessthan1% waterabsorption .compression recoveryof93% minimuminthe jointwith 25mmthicknessasper manufactured specification including costandconveyanceof all materials, cutting and placing to the required size, labourcharges, sundries, wastage etc. atalllevelscompleteasperdrawingsandasdirection andsatisfactionofEngineer-in-charge.

14.20 G.ISheetRoofing:

The top surfaces of the purlins shall be uniform and plane. They shall be painted before fixing ontop.Embeddedportionsofwoodenpurlinsshallbecoaltarred withtwo coats.

i. Slope:
Roofshallnotbepitchedataflatterslopethan1verticalto5horizontal.Thenormalpitchadopted shallusuallybe1verticalto 3horizontal.

ii. LayingandFixing:
The sheets shall be laid and fixed in the manner described below, unless otherwise shown in theworking drawingsordirectedbytheEngineer-in-Charge.

The sheets shall be laid on the purlins to a true plane, with the lines of corrugations parallel ornormal tothe sidesofthe areato becovered unlessotherwiserequiredasin special shapedroofs.

The sheets shall be laid with a minimum lap of 15 cm at the ends and 2 ridges of corrugations ateachside.Theaboveminimumendlapof15cmshallapplytoslopesof1verticalto2horizontal and steeperslopes.Forflatterslopestheminimumpermissibleendlapshallbe20cm.Theminimum lap of sheets with ridge, hip and valley shall be 20 cm measuredat rightangles to theline of the ridge, hip and valley respectively. These sheets shall be cut to suit the dimensions orshapes of the roof, either along.their length or their width or in a slant across their lines ofcorrugations at hips and valleys. They shall be cut carefully with a straight edge chisel to give asmooth andstraight finish.

Lapping in C.G.S. sheets shall be painted with a coat of approved steel primer and two coats ofpaintingwithapprovedpaintsuitableforG.S.sheet,beforethesheetsarefixedinplace.

Sheets shall not generally be fixed into gables and parapets. They shall be bent up along their sideedges close to the wall and the junction shall be protected by suitable flashing or by a projectingdrip course, thelatertocoverthejunctionbyatleast7.5cm.

Thelayingoperationshallincludeallscaffoldingworkinvolved.

Sheets shall be fixed to the purlins or other roof members such as hip or valley rafters etc. Withgalvanized JorL hookboltsand nuts,8 mm diameter, withbitumen and G.I. limpetwashersorwith a limpet washer filled with white lead as directed by the Engineer-in-Charge. While J hooksare used for fixing sheets on angle iron purlins, and L hooks are used for fixing the sheet to R.S.joists, timber or precast concrete purlins. The length of the hook bolt shall be varied to suit theparticular requirements. The bolts shall be sufficiently long so that after fixing they project abovethetopofthenutsbynotlessthan10mm.ThegripofJorLhookboltonthesideofthepurlinshallnotbelessthan25mm.Thereshallbeaminimumofthreehookboltsplacedattheridgesof corrugations in each sheet on every purlin and their spacing shall not exceed 30 cm. Coachscrewsshallnotbeusedforfixingsheetstopurlins.

The galvanized coatingon Jor L hooks,andbolts shall be continuous andfree fromdefects suchas blisters, flux stains, drops, excessive projections or other imperfections which would impairserviceability.Whereslopesofroofsarelessthan21.5degrees(1verticalto2.5horizontal)sheets shall be joined together at the side laps by galvanized iron bolts and nuts 25 × 6 mm size,each boltprovided witha bitumenanda G.I. limpet washer ora G.I. limpet washerfilled withwhite lead. As the overlap at the sides extends to two corrugations, these bolts shall be placedzig-zag over the two Over lapping corrugations, so that the ends of the overlapping sheets shall bedrawn tightly to each other. The spacing of these seam bolts shall not exceed 60 cm along each ofthestaggeredrows.Holesforallboltsshallbedrilledandnotpunchedintheridgesofthecorrugationsfromtheunderside,whilethesheetsareontheground.

iii. WindTie:
Windties shallbe of40 x 6 mm flat iron section or ofother sizeas specified. These shallbe fixedat the eaves of the sheets. The fixing shall be done with the same hook bolts which secure thesheetstothepurlins.Thetiesshallbepaidforseparatelyunlessdescribedintheitemofroofing.

iv. Finish:
Theroofwhencompletedshallbetruetolines,andslopesandshallbeleakproof.

v. Measurements:
The length and breadth shall be measured correct to a cm. Area shall be worked out in sqm correct to two places of decimal. The superficial area of roof covering shall be measured on the flat without allowance for laps and corrugations. Portion of roof covering overlapping the ridge or hip etc. shall be included in the measurements of the roof.

Roof with curved sheets shall be measured and paid for separately. Measurements shall be taken on the flat and not girthed.

No deduction in measurement shall be made for opening upto 0.4 sqm and nothing extra shall be allowed for forming such openings. For any opening exceeding 0.4 sqm in area, deduction in measurements for the full opening shall be made and in such cases the labour involved in

making these openings shall be paid for separately. Cutting across corrugation shall be measured on the flat and not girthed. No additions shall be made for laps cut through.

vi. Rate:
TherateshallincludethecostofallthematerialsandlabourinvolvedinalltheoperationsdescribedaboveincludingacoatofapprovedsteelprimerandtwocoatsofapprovedsteelpaintonoverlappingofC.G.S.sheets.Thisincludesthecostofroofsheets,galvanizedironJorLhooks,boltsandnuts,
galvanizedironseamboltsandnuts,bituminousandgalvanizedironlimpetwashersetc.

14.21 HIGHPRESSURELAMINATE:

ProvidingandfixingofCladdingwithexternalwallwithsolidexteriorgradecompact
highpressurelaminatesasperEN438-6typeEDSandEGSmanufactureusing
speciallytreatedacrylicresinunderhighpressureandtemperatureandhardened
withelectronbeamcuringprovidingweatherresistanceand UVresistance.Thecost isinclusiveof Aluminumframeworkfor the same,fixingdetailswith Aluminum /MS cleatsandall necessaryarrangementinclusivecostofadhesive,allhardware,
materials,labour&T&Petc.completeasperthedirectionofEngineer-in-charge.

Measurements:

Allworkshallbemeasurednetasfixedandareacalculatedinsquaremetertonearesttwoplacesofdecimal.

TECHNICAL SPECIFICATIONS OF P.H. PORTION OF WORK

(Internal & External PH Engg. Works)

1.1 **GENERAL INSTRUCTIONS:** The detailed specifications given herein after are for the items that are required for the works described in the schedule of quantities attached herein, and shall be guidance for proper execution of work to the required standards. It may also be noted that the specifications are of generalized nature and these shall be read in conjunction with the description of item in schedule of quantities and drawings. The work also includes all minor details of construction which are obviously and fairly intended and which may not have been referred to in these documents but are essential for the entire completion in accordance with standard Engineering practice.

Unless specifically otherwise mentioned all the applicable latest codes and standards published by the Indian Standard Institution and all other standards shall govern in all respects of design, workmanship, quality and properties of materials and methods of testing, method of measurements etc. Wherever any reference to any Indian Standard Specification occurs in the documents relating to this contract, the same shall be inclusive of all amendments issued there to or revisions thereof, if any. In case there is no I.S.I specification for the particular work, such work shall be carried out in accordance with the instructions in all respects, and requirements of the Engineer-in-charge. The work shall be carried out in a manner complying in all respects with the requirements of relevant bye-laws of the Municipal Committee/Municipal Corporation/Development Authority/Improvement Trust etc. under the jurisdiction of which the work is to be executed or as directed by the Engineer-in-charge and, unless otherwise mentioned, nothing extra shall be paid on this account.

Samples of various materials, fittings etc proposed to be incorporated in the work shall be submitted by the contractor for approval of the Engineer-in-charge before order for bulk supply is placed.

The contractor shall take instructions from the Engineer-in-charge regarding collection and stacking of materials in any place. No excavated earth or building materials shall be stacked on areas where other buildings, roads, services, compound walls etc are to be constructed.

The contractor shall maintain in perfect condition all works executed till the completion of the entire work allotted to him. Where phased delivery is contemplated, this provision shall apply to each phase.

The contractor shall give a performance test of the entire installation(s) as per standard specifications before the work is finally accepted and nothing extra whatsoever shall be payable to the contractor for the test.

The contractor shall clear the site thoroughly of all debris, surplus excavated materials and rubbish etc. left out of his work and dress the site around the building to the satisfaction of the Engineer-in-charge before the work is considered as complete.

The Chief General Manager (Civil) Idco.shall be the sole deciding authority as to the meaning, interpretations and implications for various provisions of the specifications and his decision in writing shall be final and binding on all concerned.

In case any difference or discrepancy between the specifications and the description in the schedule of quantities, the schedule of quantities shall take precedence. In case of any difference or discrepancy between specifications and drawing, the specifications shall take precedence. In case any difference or discrepancy between the specifications for Civil works and specification for Public Health Engg. Works, specifications for Civil works shall take precedence.

1.2 LIST OF INDIAN STANDARDS

The following IS codes shall be referred in execution of PH Engineering works

Indian Standard	Reaffirmation	Subject
269-1989	Reaffirmed 2004	Specifications for 33 grade Ordinary Portland Cement
4985		PVC pipes for portable water supply
456-2000	--	Code of practice for Plain & Reinforced concrete
458-2003	--	Specifications for Concrete pipes
10124	--	Fabricated PVC fittings for Portable water supply
636-1988	Reaffirmed 2003	Firefighting hose, rubber lined or fabric reinforced rubber lined woven jacketed
638-1979	Reaffirmed 2003	Sheet rubber jointing & rubber insertion jointing
12235		Methods of tests for unplasticized PVC pipes for portable water supplies.
ASTM D-2467		SCH80 uPVC fittings
1068		Electroplated coatings for nickel and chromium on iron steel and brass fittings.
13592		Codes of Practice for uPVC SWR pipes.
771-1979(P-III)	Reaffirmed 2003	Specific requirements of urinals
771-1985(P-III)	Reaffirmed 2000	Specific requirements of urinals
5329		Code of practice for sanitary pipe work above ground for Building.
2556		Various sanitary appliances.
14735		uPVC SWR pipe fittings.
781		Sand cast brass screw down bib taps &stop taps for water services.
774-1984	Reaffirmed 2000	Flushing cistern for water closet & urinals

Indian Standard	Reaffirmation	Subject
775-1970	Reaffirmed 2000	Cast iron brackets and supports for wash basin and sink
5382		Rubber rings
1172 & 5329		Testing of Pipeline and fixtures of Plumbing of Building
781-1984	Reaffirmed 2001	Specifications for cast copper alloy screw down bib taps & stop cocks for water services
1742		Code of Practice for Building drainage.
783-1985	Reaffirmed 2001	Code of practice for laying concrete pipes
784-2001	Reaffirmed 2002	Pre-stressed concrete pipes
884-1985	Reaffirmed 2000	Fire aid hose reel for firefighting (for fixed installation)
901-1988	Reaffirmed 2003	Specification for couplings, double males & double female, instantaneous pattern for fire fighting
902-1992	--	Specification for suction hose couplings for firefighting purpose
903-1993	Reaffirmed 2003	Couplings for fire hose delivery, branch pipe, nozzles specification
904-1983	Reaffirmed 2000	Specification for 2 way & 3-way suction collecting heads for firefighting purposes
905-1980	Reaffirmed 2002	Specification for delivery breechings, dividing and collecting instantaneous pattern for fire fighting
906-1988	Reaffirmed 2000	Specification for revolving branch pipe for fire fighting
907-1984	Reaffirmed 2000	Specification for suction strainer, cylindrical type for fire fighting
908-1975	Reaffirmed 2000	Fire hydrants, stand post type
909-1992	Reaffirmed 2002	Specifications for underground fire hydrants sluice valve type
940-1989	--	Portable fire extinguisher, water type (Gas cartridge)
941-1985	Reaffirmed 2000	Specification for blower and exhauster for fire fighting
1172-1993	Reaffirmed 2002	Code of basic requirements for water supply, drainage and sanitation

Indian Standard	Reaffirmation	Subject
1200-1979(P-16)	Reaffirmed 2002	Method of measurements for laying of water and sewer lines including appurtenant items
1200-1981(P-19)	Reaffirmed 2002	Method of measurement for water supply, plumbing and drains
2963		Non Ferrous Waste fittings for Wash basin & Sink
3311		Waste coupling and its accessories for its wash basin.
1300-1994	Reaffirmed 2000	Phenolic moulding material specification
5434		Non ferrous alloy Bottle trap
1703-2000		Ball valve (horizontal plunger type) including floats for water supply
1711-1984	Reaffirmed 2000	Self-dosing taps
1726-1991	Reaffirmed 2003	Cast iron manhole covers and frames
1742-1983	Reaffirmed 2002	Code of practice for building drainage
1795-1982	Reaffirmed 2000	Pillar taps for water supply purpose
1979-1985	Reaffirmed 2002	Specification for high test line pipe
2065-1983	Reaffirmed 2001	Code of practice for water supply in buildings
2097-1983	Reaffirmed 2000	Specification for foam making branch pipe

Indian Standard	Reaffirmation	Subject
2104-1981	Reaffirmed 2003	Water meter boxes (domestic type)
2171-1999	--	Specification for portable fire extinguisher, dry powder
2190-1992	Reaffirmed 2002	Code of practice for selection, installation & maintenance of portable first aid fire extinguisher
2267-1995	Reaffirmed 2000	Polystyrene moulding and extension materials
2326-1987	Reaffirmed 2003	Automatic flushing cistern for urinals
2379-1990	Reaffirmed 2000	Color code for identification of pipe lines
2401-1973	Reaffirmed 2003	Code of practice for selection, installation & maintenance of domestic water meters
2470-1985 (P-I)	Reaffirmed 2001	Design criteria and construction
2527-1984	Reaffirmed 2000	Code of practice for fixing rain eater gutters and down pipe for roof drainage
2546-1974	Reaffirmed 2000	Specification for galvanized mild steel fire bucket
2548-1996(P-I)	Reaffirmed 2002	Plastic water closet seats and covers
2548-1996(P-II)	Reaffirmed 2002	Plastic water closet seats and covers
2556 (P I to XV)	--	Specification for vitreous (vitreous china) sanitary appliances
2556-1994 (P-I)	Reaffirmed 2004	General requirements
2556-1994 (P-II)	Reaffirmed 1999	Specific requirements of wash down water closets
2556-2004 (P-III)	--	Specific requirements of squatting pans
2556-2004 (P-IV)	--	Specific requirements of wash basins

Indian Standard	Reaffirmation	Subject
2556-1995 (P-VI)	Reaffirmed 2003	Specific requirements of urinals & partition plates
2556-1995(P-VII)	Reaffirmed 2003	Specific requirements of accessories for sanitary appliances
2556-1995(P-VIII)	Reaffirmed 1998	Specific requirements of pedestal close coupled & wash down and symphonic water closets
2643-1999	--	Type threads where pressure tight joints are not mase on the threads dimension, tolerances and designation
2692-1989	Reaffirmed 2003	Specifications for ferrules for water services
2871-1983	Reaffirmed 2000	Specification for branch pipe, universal, for firefighting purpose
2878-2004	--	Fire extinguisher, carbon dioxide type (portable and trolley mounted) specification
2951 (P I to II)	--	Recommendation for estimate of flow of liquids in closed conduits
2951-1965 (P-I)	Reaffirmed 2003	Head loss in straight pipes due to frictional resistance
2951-1965 (P-II)	Reaffirmed 2003	Head loss in valves & fittings
3076-1985	Reaffirmed 2003	Low density polyethylene pipes for portable water supply
ASTM D-2846		CPVC fittings
3311-1979	Reaffirmed 2003	Water plug & its accessories for sinks and wash basins
3328-1993	Reaffirmed 2003	Quality tolerance for water for swimming pools
3389-1994	Reaffirmed 2000	Urea formaldehyde moulding materials
ASTM D-2467		uPVC fittings SCH 80

Indian Standard	Reaffirmation	Subject
ASTM D - 2564		Solvent cement of uPVC
15778-2007 ASTM D 2846 class 1	--	SDR 11 CPVC pipe of Working Pressure 28.1 kg cm2 at 23 0 C & 7 kgcm2 at 82 Degree C.
3597-1998	--	Method of test for concrete pipes
3844-1989	Reaffirmed 2000	Code of practice for installation & maintenance of internal fire hydrants hose reels in premises
3950-1979	Reaffirmed 2003	Specification for surface boxes for sluice valve
3989-1984	Reaffirmed 2000	Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings & accessories
4038-1986	Reaffirmed 2000	Foot valves for water works purposes
4111 (P I to V)		Code of practice for ancillary structures in sewage system
4111-1986 (P-I)	Reaffirmed 2001	Manholes
4111-1986 (P-II)	Reaffirmed 2001	Flushing tanks
4111-1986 (P-III)	Reaffirmed 2001	Inverted siphon
4111-1986 (P-IV)	Reaffirmed 2001	Pumping stations & pumping mains (rising mains)
4111-1986 (P-V)	Reaffirmed 2004	Tidal out falls
4120-1967	Reaffirmed 2000	Tubs & baths
4127-1983	Reaffirmed 2001	Code of practice for laying of glazed stone ware pipes
4308-2003	--	Dry chemical powder for firefighting B & C class fires specification
4350-1967	Reaffirmed 2001	Specification for concrete porous pipes for under drainage
4733-1972	Reaffirmed 1992	Methods of sampling & test for sewage effluents
4736-1986	Reaffirmed 2001	Specification for hot dip zinc coating on mild steel tubes
4854 (P I to III)		Glossary terms for valves and their parts

Indian Standard	Reaffirmation	Subject
1854-1969 (P-I)	Reaffirmed 1999	Screw down stop, check & gate valves & their parts
4854-1968 (P-II)	Reaffirmed 1999	Plug valves & cocks & their parts
4854-1974 (P-III)	Reaffirmed 1999	Butterfly valves
4927-1992	Reaffirmed 2002	Unlined flax canvass hose for fire fighting
4947-1985	Reaffirmed 2000	Specification for gas cartridge for use in fire extinguishers
4984-1995	Reaffirmed 2002	Specification for HDPE pipes for water supply
4985-2000	--	Specification for unplasticised PVC pipes for potable water supplies
5290-1993	Reaffirmed 2003	Specification for landing valves
5312 (P-I)	--	Swing check type reflux (non return) valve
5312-1984 (P-I)	Reaffirmed 2000	Reflux (non-return) valves single door pattern
5329-1983	Reaffirmed 2001	Code of practice for sanitary pipe work above ground for building
5330-1984	Reaffirmed 2000	Criteria for design for anchor blocks for pen stocks with expansions joints
5382-1985	Reaffirmed 2003	Specification for rubber sealing rings for water, gas & sewer mains
5455-1969	Reaffirmed 2003	Cast iron steps for manholes
5600-2002	--	Specification for sewage and drainage pumps
5611-1987	Reaffirmed 2002	Code of practice for waste stabilization ponds (facultative type)
5714-1981	Reaffirmed 2002	Specifications for hydrant stand pipe for fire fighting
5822-1994	Reaffirmed 2004	Code of practice for laying of welded steel pipes for water supply
5961-1970	Reaffirmed 2003	Specifications for cast iron grating for drainage purpose
6234-2003	--	Portable fire extinguisher water type (stored pressure) specification
6279-1971	Reaffirmed 2001	Equipment for grit removal

Indian Standard	Reaffirmation	Subject
6280-1971	Reaffirmed 2001	Sewage screens
6295-1986	Reaffirmed 2001	Code of practice for water supply & drainage in high altitude &/or subzero region
6392-1971	Reaffirmed 1998	Steel pipe flanges
6411-1985	Reaffirmed 2000	Specification for gel coated glass fiber reinforced polyester resin bath tubs
6494-1988	Reaffirmed 2000	Code of practice for water proofing of underground water tanks
7231-1994	Reaffirmed 2004	Specifications for plastic flushing cisterns for w.c.& urinals
7558-1974	Reaffirmed 2001	Code of practice for domestic hot water installation
7634 (P I to III)		Code of practice for plastic pipe work for potable water supplies
7634-1975 (P-I)	Reaffirmed 2002	Choice of materials & general recommendations
7634-1975 (P-III)	--	Laying & jointing unplasticised PVC pipes
7740-1985	Reaffirmed 2001	Code of practice for road gullies
7834 (P I to VIII)		Injection moulded PVC socket fittings with solvent cement joints for water supplies
7834-1987 (P-I)	Reaffirmed 2003	General requirements
7834-1987 (P-II)	Reaffirmed 2003	Specific requirements for 45 elbows

Indian Standard	Reaffirmation	Subject
7834-1987 (P-III)	Reaffirmed 2003	Specific requirements for 90 elbows
7834-1987 (P-IV)	Reaffirmed 2003	Specific requirements for 90 tees
7834-1987 (P-V)	Reaffirmed 2003	Specific requirements for 45 tees
7834-1987 (P-VI)	Reaffirmed 2003	Specific requirements for sockets
7834-1987 (P-VII)	Reaffirmed 2003	Specific requirements for unions
7834-1987 (P-VIII)	Reaffirmed 2003	Specific requirements for caps
8008 (P I to VII)		Injection moulded HDPE fittings for potable water supplies
8008-2003 (P-I)	--	General requirements for fittings
8008-2003 (P-II)	Reaffirmed 1997	Specific requirements for 90 bends
8008-2003 (P-III)	--	Specific requirements for 90 tees
8008-2003 (P-IV)	--	Specific requirements for reducers
8008-2003 (P-V)	--	Specific requirements for ferrule reducers
8008-2003 (P-VI)	--	Specific requirements for pipe ends
8090-1976	Reaffirmed 2000	Coupling, branch pipe, nozzle used in hose reel tubing for fire fighting

Indian Standard	Reaffirmation	Subject
8413 (P-I)		Requirements for biological treatment equipment
8413-1977 (P-I)	Reaffirmed 2001	Trickling filter
8835-1978	Reaffirmed 1999	Guideline for planning and design of surface drains
8931-1993	Reaffirmed 2003	Specifications for copper alloys fancy single taps, combination tap assembly & stop valves for water services
9140-1996	Reaffirmed 2002	Method of sampling of vitreous & fire clay sanitary appliances
9338-1984	Reaffirmed 2000	Specification for cast iron screw down stop valves and stop & check valves for water works purpose
9668-1990	Reaffirmed 2000	Code of practice for provision and maintenance of water supplies for fire fighting
9739-1981	Reaffirmed 2003	Specifications for pressure reducing valves for domestic water supply system
9758-1981	Reaffirmed 2003	Flush valves and fittings for water closets & urinals
9762-1994	Reaffirmed 2004	Specifications for polyethylene floats for float valves
10221-1982	Reaffirmed 1997	Code of practice for coating and wrapping of underground MS steel pipeline
11108-1984	Reaffirmed 2000	Specification for portable fire extinguisher halon 1211 type
11606-1986	Reaffirmed 2000	Method of sampling of cast iron pipes and fittings
12183-1987(P-I)	Reaffirmed 2004	Code of practice for plumbing in multi storied buildings (for water supply)
12231-1987	Reaffirmed 2003	UPVC pipes for section & delivery lines of agricultural pumps

Indian Standard	Reaffirmation	Subject
12235-1986	Reaffirmed 1998	Method of test for UPVC pipe for potable water supply
12288-1987	Reaffirmed 2002	Code of practice for use and laying of ductile iron pipes
12469-1988	Reaffirmed 2002	Specifications for pumps
12592-2002	--	Precast concrete frame & cover (SFRC frame & cover)
12701-1996	Reaffirmed 2002	Specifications for rotational moulded polyethylene water storage tanks
12709-1994	Reaffirmed 2004	Glass fiber reinforce plastic (GRP) pipes, joints & fittings for use for potable water supply specification
12820-1989	Reaffirmed 1999	Dimensional requirements of rubber gaskets for mechanical joints & push in joints for use with cast iron pipes & fittings for carrying water, gas & sewage
13095-1991	Reaffirmed 2003	Butterfly valves for general purpose
13382-2004	--	Cast iron specials for mechanical & push on flexible joints for pressure pipelines for water, gas & sewage
13592-1992	Reaffirmed 2002	Specifications for PVC soil, waste & rain water (SWR) including ventilation pipes
13593-1992	Reaffirmed 2002	UPVC pipes fittings for use with section and delivery lines for agricultural pumps specification
13916-1994	Reaffirmed 2004	Code of practice for installation of GRP piping system
13983-1994	Reaffirmed 2004	Specifications for stainless steel kitchen sinks & drain boards for domestic purpose
14333-1996	Reaffirmed 2001	Specifications for HDPE pipes for sewerage system
14402-1996	Reaffirmed 2001	GRP pipes, joints & fittings specification
14735-1999	Reaffirmed 2004	UPVC injection moulded fittings for UPVC SWR pipes specification
14845-2000	Reaffirmed 2004	Resilient seated cast iron air relief valves for water works purposes specification
14846-2000		Specifications for sluice valve for water works purpose (50 to 1200mm size)
15265-2003		Specifications for flexible PVC pipes or polymer reinforcement thermoplastic hoses for suction and delivery lines for agricultural pumps

Indian Standard	Reaffirmation	Subject
15328-2003		UPVC non pressure pipes for use in underground drainage and sewerage system specification
15450-2004		Polyethylene/aluminum/polyethylene composite pressure pipes for hot and cold water supplies specification

1.3 MINIMUM WEIGHT OF MOST COMMONLY USED SANITARY APPLIANCES & WATER FITTINGS:

The minimum unit weight of each fitting shall not be less than as given in the following table and tolerance for weight shall be as per relevant IS codes.

Sl	Description of items	Nominal size / thickness	IS code	Minimum unit weight
1	Brass non fancy type bib tap please see table under relevant item for other sizes	15mm	781-1984	400 Grams
2	C.P brass fancy type bib tap	15mm	8931-1993	550 Grams
3	Brass non fancy types stop cock internally threaded	15mm	781-1984	330 Grams
4	Brass non fancy types stop cock externally threaded	15mm	781-1984	400 Grams
5	C.P brass fancy types stop cock	15mm	8931-1993	550 Grams
6	C.P brass concealed typed stop cock	15mm	8931-1993	750 Grams
7	C.P brass fancy pillar tap	15mm	1795-1982	650 Grams
8	C.P brass waste coupling	32mm	3311-1979	200 Grams
9	C.P brass waste coupling	40mm	3311-1979	250 Grams
10	C.I Nahani trap 165mm inlet	75mm outlet	1729-2002 /3989-1984	6.5 kg
11	C.I floor trap 100mm inlet	75mm outlet	1729-2002 /3989-1984	4.8 kg
12	C.I Nahani trap with 20mm water seal	65mm outlet	Non ISI	4.5 kg
13	Cast iron surface box for sluice valve rectangular shape		3950-1979	33 kg

3.0 SANITARY INSTALLATION

3.1 INDIAN WATER CLOSET

3.1.01 GENERAL: The item pertains for providing white or color glazed vitreous chinaware Indian water closet of size and color as specified in the schedule including fixing.

3.1.02 MATERIAL: Squatting pan (Orissa Pattern) is of white or color glazed vitreous china conforming to IS 2556 part III 2004. Pan shall have flushing rim and are inlet of self- draining type. It shall have weep holes at the following inlet to the pan. The flushing inlet shall be in front unless otherwise specified. The inside of the bottom of the pan shall have sufficient slope from the front to the outlet and surface shall be uniform and smooth to enable easy quick disposal while flushing. The exterior surface of the outlet below the flange shall be an unglazed surface which shall have groove at right angle to the axis of the outlet. In all the cases pan shall have be provided with 110mm P trap uPVCSWpipe(IS 14735.)

3.1.03 FIXING: The water closet pan shall be placed in position as shown in the drawing. The uPVC SW “P” trap shall be fixed on the floor with C,M.1:3,placing around the” P“ trap. Then IWC shall be supported on loose brick & then P.C.C.1:4:8 using hard Granite metal 4cm Nominal size shall be placed under the IWC & shall be perfectly compacted surround the below the IWC, complete or as directed by the Engineer-in-charge. The pan shall be fixed slightly lower than the floor level. If the pan or trap is damaged during handling or fixing, it shall be replaced by the contractor at his own cost. The pan, trap and uPVC,SW pipe shall be jointed with help of thermoplastic rubber co-moulded on high strength polyolefin EN 681-2 D.M. seal&lipring for P or S trap. The gap between WC and floor shall be finished with white/matching cement as directed.

3.1.04 PROTECTION AND FINAL CLEANING: The IWC shall be covered with husk and sand till all the civil and electrical works are completed and shall be removed and cleaned on completion of civil and electrical works prior to testing and handing over. However, the contractor should ensure that the outlet is plugged with gunny bags or similar materials to avoid the pipe getting blocked.

3.2 EXTENDED WALL MOUNTED EUROPEAN WATER CLOSET

3.2.01 GENERAL: The item pertains for providing white or color glazed vitreous chinaware European or Anglo Indian water closet with seat and cover of size and color as specified in the schedule including fixing.

3.2.02 MATERIAL: European type water closet shall be wash down pattern unless otherwise specified. Water closet shall be vitreous china conforming to IS 2556 (P-I & II). The closet shall be of one piece construction and shall have minimum two hole of 6.5mm diameter for fixing closet to floor. Closet shall have integral flushing rims of self -draining type. Each water closet shall have an integral trap with either P or S outlet with and trap shall be uniform and smooth in order to enable an efficient flush. Plastic seat and cover shall be of same color or as specified, they shall have conformity to IS 2548 part I & II.

3.2.03 FIXING: The water closet pan shall be placed in position as shown in the drawing. If the pan trap is damaged during handling or fixing, it shall be replaced by the contractor at his own cost. The pan,uPVC soil pipe shall be jointed of thermoplastic rubber co-moulded on high strength polyolefin EN 681-2 D.M. sea l&lipringfor P or S trap. The gap between WC and floor shall be finished with white / matching cement and sand as directed. Seat and cover shall be fixed to the pan by two corrosion resistance hinge with 65mm shank and threaded to within 25 mm from of flange. Seat shall be fixed in level by providing the washers of rubber with nonferrous or stainless steel washer to bolt.

3.3 WASH BASIN WITH HALF PEDESTAL

3.3.01 GENERAL: The item pertains for providing color or white glazed vitreous chinaware wash basin with half pedestal of size and color as specified in the schedule including fixing.

3.3.02 MATERIAL: Wash basins shall be of vitreous china conforming to IS 2556 (P-IV) or flat back or angle back as specified shall be of one piece construction including combined overflow, basin shall be provided with single or double

tap holes of size 28mm square or 30mm rounded. Each basin shall have circular waste hole or 5 sqcm slot type overflow. Pedestals for wash basin shall be exactly same

glazing that of basin. Pedestal shall be capable of supporting the basin and completely recessed at the back to accommodate supply and waste pipes and fittings. The basin shall be supported on pair of CI cantilever brackets conforming to IS 775. Use of MS angle or tee section as bracket is not permitted.

3.3.03 FIXING: The wash basin shall be fixed in position as indicated in the drawing. Basin shall be supported on a pair of CI brackets which is embedded in cement concrete (1:2:4) block 100x75x150mm.& rack bolts also. Oval shape or round shape wash basins are required to be fixed in RCC platform with stone tapping either fully sunk in stone top or flush with stone topping. The wall plaster on seat shall be cut to rest over the top edge of the basin so as not to leave any gap for water seepage through between wall plaster & skirting of basin. The gap between basin and wall shall be finished with white matching cement.

3.4 URINAL

3.4.01 GENERAL: The item pertains for providing color or white glazed vitreous chinaware urinal in single and size as specified in the schedule with necessary fittings and appliances including fixing.

3.4.02 MATERIAL

3.4.02.1 Bowl type (with flushing rim): Urinal basin shall be flat back or corner wall type lipped in front. The vitreous china conforming to IS 2556 (P-VI). Urinal shall have an integral flushing rim and inlet or supply horn for connecting flush pipe. Flushing rim and inlet shall be of the self draining type. At bottom of basin and outlet horn for connecting outlet shall be provided. The inside surface of the urinal shall be uniform and smooth throughout to ensure efficient flushing.

3.4.02.2 CP Brass flush pipe: The flushing arrangement to urinals for single shall be of CP brass with CP brass spreader of 15mm dia conforming to IS 407.

3.4.03 FIXING

3.4.03.1 CP Brass flushing arrangement: The flushing arrangement to urinal in single or range shall be of CP brass from 25mm dia to 15mm dia and CP brass spreader of 15mm size to each urinal including the cost of CP brass elbow, tees, coupling, crosses, clamps, clips, union CP brass check nut and screws etc.

3.5 FROST GLASS URINAL PARTITION.

3.5.01 GENERAL: The item pertains for providing Frost glass partition of size and color as specified in the schedule including fixing.

3.5.02 MATERIAL: The partition shall be Frost glass .Frosted glass is produced when a piece of clear glass is etched with acid or sandblased.The result is a piece of glass that is opaque but still translucent.The blurred glass alows light to pass through it but it prevents you from seeing what is on the other side.The beautiful frosty or cloudy surface adds an element of elegance and beauty to space.

3.5.03 FIXING: Partition shall be fixed vertically in position as indicated in the drawing at proper height 600 mm from FFL. The size of Frost glass shall be 800 mm x 400 mm as per IS : 2064.

3.6 DIVISION PLATE / PARTITION PLATE

3.6.01 GENERAL: The item pertains for providing white or color glazed vitreous chinaware division plate of size and color as specified in the schedule of size 800 x 400 mm including fixing.

3.6.02 MATERIAL: Division plate shall be white or color glazed of size as specified in the schedule and shall conform to IS 2556 (P-VI).

3.6.03 FIXING: Division plate shall be fixed vertically in position at proper height 600 mm from FFLwith expandable anchor fasteners, CP brass screws, wooden plugs etc.

3.7 HALF ROUND CHANNEL

3.7.01 GENERAL: The item pertains for providing color or white glazed vitreous chinaware half round channel of size and color as specified in the schedule including laying and fixing.

3.7.02 MATERIAL: The half round channel shall be of white or color glazed vitreous chinaware of size as mentioned in the schedule with or without dead end and shall conform to IS 2556 (P-VII)

3.7.03 FIXING: The channel shall be laid to the correct alignment to required slope. It shall be fixed on 80 mm thick bed of 1:2:4 cement concrete. The channel shall be used in standard length. Pieces are not allowed except where it is necessary to make up exact length. The joint and gap shall be finished with white / matching color cement.

uPVC SW FLOOR TRAP WITH STAINLESS STEEL HINGED GRATING.

3.8.01 GENERAL: The item pertains for providing uPVCSWR floor trap with stainless steel hinged grating of size as specified in the schedule including fixing.

3.8.02 MATERIAL: The trap shall be uPVC SWR of IS:14735 or as specified in the schedule with hinged shaped grating of stainless steel as specified.

3.8.03 FIXING: The uPVC SWR trap shall be laid to the correct alignment and to required slope. The trap shall be fixed on 80 mm thick bed of 1:2:4 cement concrete with DM Seal.

3.9 FLAP TYPETOILET PAPER HOLDER

3.9.01 GENERAL: The item includes providing CP on Brass flap type toilet paper holder of size 150 mm as mentioned in the schedule including fixing.

3.9.02 MATERIAL: The toilet paper roll holder shall be of CP brass as specified and of size 150 mm and design as approved by the Engineer-in-charge. Toilet paper roll holder shall conform as per IS standard and should have ISI mark.

3.9.03 FIXING: Toilet paper roll holder shall be fixed in position by means of CP brass covers and raw plug embedded in the wall. Flap type toilet paper roll holder shall be fixed into the wall with PVC inserter and steel Screw by means of drilling machine.

3.10 PVC WATER INLET CONNECTIONS

3.10.01 GENERAL: The item pertains to providing color or white PVC water inlet connection for cistern and wash basins.

3.10.02 MATERIALS: PVC water inlet connection shall conform to IS specification and shall be of standard pattern with nylon insulation of minimum 450mm long with CP brass check nut at both the end and shall be able to withstand the testing pressure of 1 MPa (10kg/sqcm)&it shall be 15mmx450 mm braided hose connection pipe with both side nuts and rubber washers etc complete as per direction of Engineer in-charge.

3.10.03 FIXING: The PVC water inlet connection shall be fixed in position as indicated in the drawing or as directed by the Engineer-in-charge.

3.11 CP SOAP DISH HOLDER

3.11.01 GENERAL: The item includes providing CP soap dish holder of size as mentioned in the schedule including fixing.

3.11.02 MATERIAL: Soap dish shall be of CP on brass specified and of size, design are approved by the Engineer-in-charge. Soap dish shall conform to relevant IS standard and should have ISI certification mark.

3.11.03 FIXING: Soap dish shall be fixed in position by means of CP brass covers and raw plug embedded in the wall.It shall be fixed with PVC inserter and steel screws.

3.12 BEVELLED EDGE GLASS MIRROR

3.12.01 GENERAL: The item providing bevelled or plain edges mirror with or without frame of size as mentioned in the schedule including fixing.

3.12.02 MATERIAL: The mirror shall be of superior sheet glass with edges rounded off or beveled, size 600x450mm unless specified in the schedule. It shall be free from flaws, specks or bubbles and thickness plated and should not be less than 50mm. The back of mirror shall be uniformly silver plated and should be free from silvering defects. Silvering shall now have a protective uniform covering of red lid paint, where beveled edge mirror is not available. Fancy looking mirrors with PVC beading/border or aluminium beading or stainless steel beading/border based on manufacturers specification, provided nothing extra shall be paid on this account. The backing of mirror shall be provided with 6mm thick marine plywood or environmentally friendly material other than asbestos sheet.

3.12.03 FIXING: Mirror shall be fixed in position with 6mm thick marine plywood backing. It shall be fixed by means of 4 nos CP brass screws & caps over rubber washers and raw plug or as per manufacturers specification unless specified otherwise the longer side shall be fixed horizontally.

3.13 GLASS SHELF

3.13.01 GENERAL: The item includes providing glass shelf of size 600 mm long as mentioned in the schedule including fixing.

3.13.02 MATERIAL: Glass shelf shall consist of an assembly of glass shelf frame of size 600x125mm or as specified in the schedule. It shall be with a pair of CP brass brackets fixed to the wall with CP screws and CP brass rails all round with guard bar of 6mm diameter fixed to the glass shelf frame with 5 numbers CP brass brackets. The glass shall not be less than 5mm thick. PVC stainless steel shelf or as per manufacturer‘s specification and size as specified in the schedule of work shall be provided.

3.13.03 FIXING: The complete accessories shall be fixed to proper line and level as indicated in drawing with 40mm long CP brass screws, wooden raw plug, drilling hole and making good the wall to original condition after fixing the glass shelf.**3.14 CP TOWEL RING**

3.14.01 GENERAL: The item includes providing CP towel ring of size as mentioned in the schedule including fixing.

3.14.02 MATERIAL: Towel rail shall be of CP brass with two CP brass bracket coated with chromium plating of thickness not less than grade No 2 of IS 4827. The size of rail shall be 600mm x 20mm dia unless otherwise specified in the schedule. Towel ring of CP brass with one CP brass bracket with thickness not less than grade no 2 of IS 4827. The diameter of the ring shall be 175mm unless otherwise specified in the schedule.

3.14.03 FIXING: The towel ring shall be fixed to proper line and level as indicated in drawing with CP brass screws, wooden rawal plug, drilling hole etc and making good the wall to original condition after fixing the towel ring.

3.15 BIB TAP, STOP COCK & ANGLE STOP COCKS

3.15.01 GENERAL: The item pertains to provide chromium plated brass bib tap and stop cock and angle stop cocks, free flanges (if joined to concealed pipe) including fixing.

3.15.02 MATERIAL: Bib cock (bib tap) is drawn off tap with a horizontal inlet and free out let and a stop cock is a valve with a suitable means of connections for insertion in a pipe line for controlling or stopping the flow. These shall be of size 15mm or as specified and shall be of screw down type. The closing device shall work by means of disc carrying a renewable nonmetallic washer with shuts against the water pressure on a seating right angle to the axis of the threaded

spindle which operates it. The handle shall be crutch, butterfly or fancy design type securely fixed to the spindle. The tap shall open anti clock wise direction. Brass bib taps and stop cocks and angle stop cocks shall conform to IS 781. They shall be polished bright. The minimum finished weight of different sizes of bib tap and stop cock shall be as per table given below. They shall be sound and free from taps, blow whole and fitting. Internal & external surface shall be clean, smooth and free from sand and neatly dressed. Taps shall be nickel chromium plated and thickness of coating shall not be less than service grade no 2 of IS 4827 and plating shall be capable of taking high polish which shall not be easily tarnished.

Minimum finished mass of bib taps & stop valves as per IS 781-1984

Size	Minimum finished mass			
	Bib taps	Stop valves		
		Internally threaded	Externally threaded	Mixed end
1	2	3	4	5
Mm	Kg	Kg	Kg	Kg
8	0.25	0.22	0.25	0.235
10	0.33	0.33	0.35	0.325
15	0.40	0.33	0.40	0.365
20	0.75	0.675	0.75	0.710
25	1.25	1.18	1.30	1.250
32		1.68	1.80	1.750
40		2.09	2.25	2.170
50		3.70	3.85	3.750

Every tap complete with its component shall with stand an internally applied hydraulic pressure of 2 MPa (20kg/sqcm) maintained for a period of 2 minutes during the period it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof without any extra cost from contractor.

3.15.03 FIXING: Bib tap stop cock shall be fixed to the pipe line with CP brass specials if required or as ordered by Engineer-in-charge. Jointing shall be done with tefflon tape etc. A few turns of tefflon tape shall be taken over the threaded ends to obtain complete water tightness.

3.16 AUTO CLOSING PILLAR COCK

3.16.01 GENERAL: The item pertains to provide chromium plated brass pillar tap including fixing.

3.16.02 MATERIAL: The pillar tap shall be 15mm nominal size or as specified in the schedule. Fancy type pillar tap shall be of CP brass approved quality and shall conform to IS 8931. Non fancy pillar tap shall be chromium plated brass and shall conform to IS 1795. Casting of pillar tap shall be sound and free from laps, blow hole and pitting. External and internal surface shall be clean, smooth and free from sand and be neatly dressed. All the parts fitted to pillar tap shall be axial, parallel and cylindrical with surfaces smoothly finished. The minimum of finish weight of pillar tap shall not be less than 650 grams (body weight 250 gms, washer plate loose valve 150 gms and back nut 40 gms. Thickness of CP coating

shall not be less than service grade no 2 of IS 4827 and plating should be capable of taking high polish which shall not easily tarnish or scale.

3.16.03 TESTING: The testing pressure on completion of the work the piping system can be pressurized to 125% of its designed working pressureie.28.1kg/cm^2 for SDR11 CPVC Pipe 20mm nominal dia,25mm nominal dia&32mm nominal dia respectively. However care must be taken to ensure the pressure does not exceed the working pressure of the lowest rated component in the system. The pressure test should not exceed one hour .Any leaking joints or pipe must be cut and replaced and the line recharged and retested using the same procedure. Without any additional requirement of make-up-water the test pressure should not fall more than 0.02 MPa (0.2Kg/sqcm) at the end of one hour test duration.

3.16.04 FIXING: Pillar tap shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer- in- charge. Jointing shall be done with Teflon tap. A few turns of tefflon tap shall be taken over the threaded ends to obtain complete with tightness.

3.17 AUTO CLOSING FLUSH COCK

3.17.01 GENERAL: The item pertains to provide chromium plated Auto closing flush cock with necessary accessories including fixing to concealed pipes with help of Teflon tape. (Free flanges if jointed to concealed pipes)

3.17.02 MATERIAL: The auto closing flush cock shall be nominal diameter as specified in the schedule of quantities. It shall be of CP brass approved and heavy quality and shall conform to IS. The auto closing flush cock shall have working pressure of 0.15 to 0.5 MPa. The value shall be tested to a hydraulic pressure of 2 MPa for 2 minutes.

3.17.03 FIXING: Auto closing flush cock shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with Teflon tape. A few turns of Teflon tape shall be taken over the threaded ends to obtain complete with tightness. Leaky joint shall be remade to make it leak proof.

3.18 WASTE COUPLING

3.18.01 GENERAL: The item pertains to provide chromium plated brass waste coupling i.e half thread and full thread for wash basin and urinal including fixing.

3.18.02 MATERIAL: Waste coupling shall conform to IS 3311. Waste fitting shall be of CP with thickness of CP coating not less than service grade no 2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect to IS 2963 and shall sound, free from laps below, holes and fittings and other manufacturing. External and internal surface shall be clean and smooth. They shall be neatly dressed. The waste fitting for wash basin shall be of nominal size of 32mm and for urinal shall be nominal size 40mm.

3.18.03 FIXING: Waste coupling shall be fixed to wash basin or urinal as ordered with necessary specials. Jointing shall be done with Teflon tape. A few turns of Teflon tape shall be taken over the threaded ends to obtain complete with tightness. Leaky joint shall be remade to make it leak proof.

3.19 BOTTLE TRAP

3.19.01 GENERAL: The item pertains to provide chromium plated brass bottle trap including fixing.

3.19.02 MATERIAL: Bottle trap shall be of CP with thickness of CP coating not less than service grade no 2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect of IS 2963 and shall be sound, free from laps, blow hole and pitting and other manufacturing defects. External and internal surface shall be clean and smooth. They shall be neatly dressed and be truly machined so that not smoothly moves on the body. The bottle trap for wash basin shall be of nominal size of 32mm and for sink shall be nominal size 40mm.

3.19.03 FIXING: Bottle trap shall be fixed to wash basin, sink or urinal as indicated in the drawing with necessary specials or as ordered by the Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of

fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete with tightness. Leaky joint shall be remade to make it leak proof.

3.20 COAT HOOK

3.20.01 GENERAL: The item pertains to provide chromium plated brass coat & hot hook including fixing.

3.20.02 MATERIAL: Coat hook shall be of three way type of approved and heavy quality. Coat & hat hook shall be CP coating shall not be less than service grade no 2 of IS 4827.

3.20.03 FIXING: The coat hook shall be fixed to proper line & level as indicated in drawing with CP brass screws.

3.21 FLUSHING CISTERN

`3.21.01 GENERAL: the item pertains to provide white or color PVC flushing cistern with all inside symphonic fitting including fixing.

3.21.02 MATERIAL: The flushing cistern shall be automatic or manually of rates high level or low level as specified for water closets and urinals.

Cistern shall be of PVC for automatic flushing cistern and plastic (IS 7231). Cistern shall be mosquito proof. All working parts shall be designed to operate smoothly and efficiently. The cistern shall have removable covers which shall fit closely on it and be screwed against top displacement where operating mechanism is attached to the cover. This may be made in two sections, but the section supporting the mechanism shall be securely fitted or screwed to the body. The outlet fitting of the cistern shall be securely connected to the cistern. The nominal internal diameter of the cistern outlet shall not be less than 32 mm and 38 mm for high level and low level respectively. Length of outlet cistern shall be 37+/-2 mm ball valve shall be screwed type 15 mm in diameter and shall confirm of IS 1703. The flat shall be made of polyethylene as specified in IS 9762. A high-level cistern is intended to operate with minimum height of 125 cm and a low- level cistern with maximum height of 30 cm between the top of the pan and under side of the cistern In case of low level cistern handle shall be of CP brass, in case of plastic cistern, operation of cistern shall be through push button at the top for dual system and beyond plastic handle. The discharge rate of the cistern as per IS 774 shall be 10+/- 5 liters 6 second and 5+/ -. 5 litres in 3 second for cistern capacity 10 litres and 5 litres respectively. Flush pipe shall be of class B GI pipe of 32 +/- mm diameter for high level. Polyethylene flush pipe shall be low density confirming to IS 3076 or high density confirming to IS 4984 of UPVC pipe confirming to IS 4965 of 40 mm outer diameter. Over flow pipe shall not be less than +/- 5 mm B diameter

3.21.03 FIXING: The chinaware flushing cistern shall be placed over a pair of CI brackets CP Brass flush pipe shall be fixed to cistern and WC pan using check nut, spun yam, cement mortar etc. The

cast iron flushing cistern shall be placed over a pair of CI or GI or PVC flush pipe of specified diameter shall be fixed to cistern and WC pan by using check nut, while zinc. Spun yam, cement mortar etc. The PVC flushing cistern shall be placed or fixed as recommended by the manufacturer, PVC flush pipe of specified diameter shall be fixed to cistern and WC pan by suing check nut, white zinc, spun yam, cement mortar etc.

3.22 BRACKET

3.22.01 GENERAL: The item pertains to provide a pair of bracket for wash basin, flushing cistern etc. including fixing.

3.22.02 FIXING: Brackets shall be imbedded into or fixing to the wall with plugs, screws, nails etc. hole shall be made in the wall, if they are not left for fixing the brackets and shall be made good after fixing, the gap shall be filled with 1:2 cement mortal and finishing shall be done with white/matching color cement.

4.0 WATER SUPPLY SYSTEM

4.1 Unplasticized Poly Vinyl Chloride , lead free (uPVC),SCH-80 Plastic PIPING WORK as per ASTM D 1785& Fittings asper ASTM D 2467 (exposed and External)

4.1.01 GENERAL: the item includes provision of uPVC ASTM D-1785, pipesSCH-80 with uPVC fitting of ASTM D-2467 specified nominal bore and class as mentioned in the schedule including laying, fixing, the uPVC pipes and fittings shall run on the surface of the walls or ceilings unless otherwise specified.

The system shall be highly resilient, tough and durable with high tensile strength and high impact strength. It shall be free from problems caused by scale formation, rusting, weathering and chemical action, and lasting for a life time. The PVC piping system shall be virtually immune to attack by bacteria, fungiandothermicroorganismsorinsects.

The system shall be non-conductive and immune to galvanic and electrolytic corrosion.ThePVC piping system shall be corrosion resistant to a great extent, so much that they can be buried in alkaline or acidic soils or installed in over-the- ground environments, with no paint or special coating.

The PVC piping system shall be inert to most chemicals and can resist attacks from most chemicals at moderate temperatures.

The interior walls of the pipes and fittings shall have a mirrorsmoothfinishensuringhighflowratesandlowfrictionallosses.

The PVC pipingssystemshall be free from rusting, pitting or scale formation so that here is no particle deposition and the inner bore of the pipe remains undiminished throughout the life of the system.

Jointing shall be done with the special solvent which ensures100% leak proof joints.

The system shall be UV stabilized which eliminates the adverse effect of sunlight and weather. The system can, therefore, be safely used for outdoor installations.

The PVC pipes shall be relatively more flexible and shall have adequate tensile strength and even burst strength to withstand the operating pressures encountered in most service conditions, with the acceptable range of temperature for the system. External shocks or impacts that could cause failure more rigid materials can be absorbed by the system, with little or no damage.

Pipes shallbeself-extinguishing andshall not support combustion. This eliminates the need for fire resistant coating.

4.1.02 MATERIAL: The pipes and fittings shall be of, SCH-80 as specified in the schedule they shall conform to ASTM-D 1785 & ASTM-D2467. All the pipes and fitting shall have ASTM certification mark. The specified nominal bore of the pipe shall refer to inside approximate bore according to the wall thickness i.e. 7.01mm&7.62mm of nominal pipe size 65mm& 80mm, corresponding to outside fixed diameter73.02mm &88.90mm with tolerance ±0.18 &±0.20 respectively. The pipe and fitting shall be smooth, sound free, form any imperfections and neatly dressed. The pipe and fitting shall be able to withstand a hydrostatic working pressure of (29.53kg/cm^2)for SCH 80 -65mm nominal size & test pressure of(26.01 kg/cm^2) for SCH 80- 80mm at 23^0 C & during testing the piping systems should be slowly filled with water,taking care to prevent surge and air entrapment. The velocity should not exceed one feet per second. The piping system can be pressurized to 125% of its designed working pressure.However care must be taken to ensure the pressure does not exceed the working pressure of the lowest rated component in the system. The pressure test should not exceed one hour .Any leaking joints or pipe must be cut and replaced and the line recharged and retested using the same procedure.

4.1.03 EXAMINING: Before laying the pipe line, it shall be first examined for damages and cracks, no cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

4.1.04 CLEANING: All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside and outside surfaces

4.1.05 LAYING: The plumbing contractor shall set the layout of the plumbing approved by the engineer in charge as may be required by the byelaws pipes shall be laid in plumb and in straight and parallel lines. When unavoidable, pipes may be buried for short distances provided additional protection is given against damage and where so required joints are not buried. where directed by the engineer in charge, Under the floors the pipe shall be laid in layer of sand filling as done under concrete floors.
Incase laying in trenches the pipes shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. All the pipes shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length. The entire length of pipe shall be evenly supported on bed of the trench throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipes during laying. At the end of the day's work the open end shall be suitable plugged

4.1.06 FIXING: The entire pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge. All pipes shall by fixed truly vertical and horizontal unless unavoidable. The pipe line shall be supported with U type anchor straps not less than 2mm thick and steel screws &pvc inserter grips not less than 40 mm long, wooden gut ties etc. keeping the pipe about 15mm clear of the wall.

Spacing between clamps for fixing internal piping shall be as given below

Pipe Dia	For Horizontal Runs	For Vertical Runs
20 mm	762 mm	762 mm
25 mm	914.40 mm	914.40 mm
32 mm	1066.80 mm	1066.80 mm
40 mm	1066.80 mm	1066.80 mm
50 mm	1066.80 mm	1066.80 mm
65mm	1219.20 mm	1219.20mm
80mm	1219.20mm	1219.20mm

No joints shall be located inside the wall if the pipe is required to be cut, the hums of the cut end shall be filled smooth and any obstruction in bore shall be entirely eliminated, down take line shall be provided with union soc with EPDM O-Ring seal of every floor for easy maintenance. Die cast union shall not be permitted in the shaft.

4.1.07. TRENCHES: The trench bottom shall be carefully examined for the presence of hard objects such as flints, rock projection or tree roots etc. Pipe shall be embedded in sand or soft soil, free from rock and gravel, back till 150mm above the pipe shall also be of fine sand or soft ail. Pipe shall not be painted. The width of trench shall not be less than outside diameter of pipe plus 300 mm in case of gravel soils. Pipe shall be laid at least 900 mm below the ground level (measured from the surface of the ground to the top of pipe)

Crossing Road or Drain: Where the line crosses a road or a drain, it shall be through CI or R.C.C. pipe.

Supports for Valve and Hydrant: Valve and hydrant tees shall be supported that the torque applied in operating a valve is not transmitted to the pipe line.

Inspection and Testing Solvent welded pipe shall not be pressure tested until at least 24 hours after the last solvent cemented joint has been done.

All control valves shall be positioned open for duration of the test and open end closed with water tight fittings. The testing pressure on completion of the work shall not be less than one and a half times the working pressure of the pipes..

Pressure shall be applied either by hand pump or power driven pump. Pressure gauges shall be correctly positioned and closely observed to ensure that at no time are the test pressure exceeded. The systems shall be slowly and carefully filled with water to avoid surge pressure or water hammer. Air vents shall be open at all high points so that air may be expelled from the system during filling.

When the system has been fully charged with water and air displaced from the line air vent shall be closed and the line initially inspected for seepage at joints and firmness of supports under load, Pressure may then be applied until the required test sure is reached.

Without any additional requirement of make-up-water the test pressure should not fall more than 0.2 kg/sq.cm. at the end of one hour test duration.

4.1.08 MAKING JOINT: The jointing of pipes and fittings generally shall be done with approved make cement solvent of ASTM D2564 including making surface rough. The pipe shall be cut to desired length. Care shall be taken that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

4.1.09 DETACHABLE JOINT: Detachable joints shall be made where pipes of deferent materials have to be jointed or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

4.1.10 DEWATERING: In case of underground pipes the contract rate shall include bailing or pumping out all the water till completion of work if accumulated during the progress of work either from seepage springs, rain or any other cause.

4.1.11 TESTING: Solvent welded pipe shall not be pressure tested until at least 24 hrs after the last solvent cemented joint has been done. All control valves shall be positioned open for the duration of the test and open end closed with water tight fittings. The testing pressure on completion of the work the piping system can be pressurized to 125% of its designed working pressureie.29.53kg/cm^2&26.01kg/cm^2 for 65mmnominaldia &80mm nominal diarespectively. However care must be taken to ensure the pressure does not exceed the working pressure of the lowest rated component in the system. The pressure test should not exceed one hour .Any leaking joints or pipe must be cut and replaced and the line recharged and retested using the same procedure.

Pressure gauges shall be correctly positioned and closely observed to ensure that at no time are the test pressure exceeded.

The systems shall be slowly and carefully filled with water to avoid surge pressure or water hammer. Air vents shall be open at all high points so that air may be expelled from the system during filling.

When the system has been fully charged with water and air displaced from the line air vent shall be closed and the line initially inspected for seepage at joints and firmness of supports under load. Pressure is reached. Without any additional requirement of make-up-water the test pressure should not fall more than 0.02 MPa (0.2Kg/sqcm) at the end of one hour test duration.

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4.2 CPVC PIPING WORK (concealed)

4.2.01 GENERAL: The item includes supplying of CPVC pipes with fittings of specified diameter including laying, fixing, cutting, joining, painting etc. for vent, over flow, waste water pipe line etc.

4.2.02 MATERIAL: The pipes & fittings shall conform to IS 15778-2007, as per ASTM- D2846 class-1 of SDR-11 ,CPVC pipes and fittings shall be free from cracks, flows and defects and shall be able to withstand a pressure 28.1kg/cm^2 at 23^{0}C & 7kg/cm^2 at 82^{0}C as mentioned in the schedule of quantities & the material is also certified by NSF for its safe use with portable water and thus completely safe for drinking water.

4.2.03 EXAMINING: Before laying the pipe line, it shall be first examined for damages and cracks, no cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

4.2.04 CHASES: Chases of size 75mm x 75 mm shall be cut in the wall, floor, slab wherever required or as directed by chases cutting machine. After testing the pipe line the chases shall be filled with cement mortal 1:3 and surface made good to its original condition.

4.2.05 LAYING: The plumbing contractor shall set the layout of the plumbing approved by the Engineer in charge. The entire pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge as may be required by the bye laws. All pipes and fittings, which are to be concealed, shall be properly embedded in the wall, flooring etc. Pipes shall be laid in plumb and in straight and parallel lines, after being treated, no molding or plaster design or any ornamental plaster work shall be done over the walls or flooring or ceiling where concealed pipes have been laid.

4.2.06 MAKING JOINT: The jointing of pipes and fittings generally shall be done with approved make cement solvent of ASTM F493 including making surface rough. The pipe shall be cut to desired length. Care shall be taken that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

4.2.07 TESTING: Solvent welded pipe shall not be pressure tested until at least 24 hrs after the last solvent cemented joint has been done. All control valves shall be positioned open for the duration of the test and open end closed with water tight fittings. The testing pressure on completion of the work the piping system can be pressurized to 125% of its designed working pressureie.28.1kg/cm^2 for SDR11 CPVCPipe20mmnominaldia,25mm nominal dia&32mm nominal diarespectively. However care must be taken to ensure the pressure does not exceed the working pressure of the lowest rated component in the system. The pressure test should not exceed one hour .Any leaking joints or pipe must be cut and replaced and the line recharged and retested using the same procedure.

Pressure gauges shall be correctly positioned and closely observed to ensure that at no time are the test pressure exceeded.

The systems shall be slowly and carefully filled with water to avoid surge pressure or water hammer. Air vents shall be open at all high points so that air may be expelled from the system during filling.

When the system has been fully charged with water and air displaced from the line air vent shall be closed and the line initially inspected for seepage at joints and firmness of supports under load. Pressure is reached. Without any additional requirement of make-up-water the test pressure should not fall more than 0.02 MPa (0.2Kg/sqcm) at the end of one hour test duration.

4.3 BALL VALVES WITH CTS SOCKET (COPPER TUBE SIZE) ASTM D 2846 & BALLVALVE SOC ASTM D 2467

4.3.01 GENERAL:All thermoplastic ball valves shall be Utility sealed unit type constructed from PVC Type I Cell Classification 12454 or CPVC Type IV Cell Classification 23447. All O-rings shall be EPDM. All valves shall have Safe-T-Shear® stem and double stop Polypropylene handle. All valves shall be listed by NSF® for use in potable water service. All valves shall be pressure rated at 28.1 kg/cm^{2}for water at 23^{0}C, as manufactured by Spears® Manufacturing Company .

4.3.02 MATARIAL: CPVC fittings ASTMD2846 &uPVC fittings ASTMD-2467 Ball valve Body- PVC, Seat- EPDM, Ball-PVC, Stem-PVC,O Ring-EPDM, Handle- ABS,Bolt- Zinc plated steel, Cap-ABS.

Diameter in mm	BALL VALVE (Kg)CPVC	BALL VALVE (Kg)uPVC
20	0.122	
25	0.168	
32	0.285	
40	0.426	
65	1.079	1.05
80	2.03	

4.3.03 FIXING: The valve shall be fixed in position in the pipeline as shown in the drawing or as directed with necessary solvent cement joint.

4.3.04 MAKING JOINT: The jointing of pipes and fittings generally shall be done with approved make cement solvent of ASTM D2564 for uPVC ball valve and ASTM F493 for CPVC ball valve, including making surface rough. The pipe shall be cut to desired length. Care shall be taken that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

4.3.05 TESTING: The joints shall be tested to a hydraulic pressure be pressurized to 125%rated working pressure along with the testing of pipe line.

a) Hydrostatic Tests

Hydrostatic Tests: The portions of the line shall be tested by subjecting to pressure test as the laying progresses before the entire line is completed. In this way any error of workmanship will be found immediately and can be corrected at a minimum cost. Usually the length of the section to be tested shall not exceed 500m.

Where any section of a main is provided with concrete thrust blocks or anchorages, the pressure test shall not be made until at least five days have elapsed after the concrete is cast. If rapid hardening cement has been used in these blocks or anchorages, test shall not be made until atleast two days have elapsed.

Prior to testing, enough back fill shall be placed over the pipe line excluding the joints to resist upward thrust. All thrust blocks forming part of the finished line shall have been sufficiently cured and no temporary bracing shall be used.

The section of the line to be tested shall be filled with water manually or by a low pressure pump. Air shall be vented from all high spots in the before making the pressure strength test because entrapped air gets compressed and causes difficulty in raising the required pressure for the pressure strength test.

The test pressure shall be gradually raised at the rate of approximately one Kg./sq. cm./min. The duration of the test period if not specified shall be sufficient to make a careful check on the pipe line section.

5 UPVC SWR PIPING WORK

5.1.01 GENERAL: The item includes supplying of UPVC soil waste and rain water (SWR) and ventilation pipes with fittings of specified diameter including laying, fixing, cutting, jointing painting if required etc.

5.1.02 MATERIAL: The pipe shall be conforming to IS 13592, Type-B, UPVC SWR and fittings conforming to IS 14735 shall be free from cracks, flaws and defects and shall be able to with stand a pressure as mentioned in the schedule of work. Rubber sealing rings DMSeal, conforming to IS 5382 with lubricant for sliding socket joints as mentioned in the schedule of work.

5.1.03 EXAMINING: Before laying the pipe line, it shall be first examined for damages and cracks no cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

5.1.04 CLEANING: All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone solid or dirt side and outside surfaces.

5.1.05 LAYING: The pipe shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. All the pipes shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length. The entire length of pipe shall be evenly supported on bed of the trench throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipe during laying. At the end of days work the open end shall be suitably plugged.

5.1.06 FIXING: The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge. The pipe shall be fixed with GI clamps not less than 2.0 mm thick of with suitable
UPVC clamps/clips. The damps/clips shall be fixed into the wall with GI nails not less than 40mm long and wooden gutties keeping the pipe about 15mm clear of the wall.

5.1.07 MAKING JOINT: The jointing of pipes and fitting generally shall be done with approved make cement solvent including making surface rough or rubber sealingDMSeal with lubricant for sliding socket joints. The pipe shall be out to desired length. Care shall be taken that that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

5.1.08 DETACHABLE JOINT: Detachable joints shall be made where pipes of different materials have to be joined or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

5.1.09 PAINTING: In case of underground piping, the pipe line shall be painted with two coats of approved oil paint of matching color over a coat of primer.

5.1.10 DEWATERING: In case of underground pipes, the contract rate shall include bailing out all the water till completion or work if accumulated during the progress of work either from seepage, springs, rain or any other cause.

5.1.11 TESTING: The joints shall be tested by either smoke test for vertical stacks or 2.5m head of water at the highest point of the section under test for horizontal drainage pipes. Smoke shall be pumped into the pipes at the lowest end from a smoke machine which consists of a below and burner. The material usually burnt is greasy cotton waste which gives out a clear pungent smoke which is easily detectable by sight as well as by smell, if there is leak at any point of the drain. The water head test shall be carried out by suitably plugging the lower end of the drain and the ends of the connection if any and filling the system with water.

6 uPVC PIPING WORK

6.1.01 GENERAL: The item includes supplying of uPVC pipes with fittings of specialized diameter including laying, fixing, cutting; jointing & painting etc for vent, over flow, waste water pipe line etc.

6.1.02 MATERIAL: The pipes and fittings shall conform to series IV of IS 4985, uPVC pipes and fittings shall be free from cracks, flaws and defects and shall be able to withstand pressure as mentioned in the schedule.

6.1.03 EXAMINING: Before laying the pipe line, it shall be first examined for damages and cracks no cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

6.1.04 CLEANING: All the pipe and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone soil ordinates and outside surfaces.

6.1.05 LAYING: The plumbing contractor shall set the layout of the plumbing approved by the engineer in charge as may be required by the byelaws pipes shall be laid in plumb and in straight and parallel lines. When unavoidable, pipes may be buried for short distances provided additional protection is given against damage and where so required joints are not buried. where directed by the engineer in charge, Under the floors the pipe shall be laid in layer of sand filling as done under concrete floors.

Incase laying in trenches the pipes shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. All the pipes shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length. The entire length of pipe shall be evenly supported on bed of the trench throughout. Care shall be taken to prevent any sand, earth or other materials from entering into the pipes during laying. At the end of the day's work the open end shall be suitable plugged

6.1.06 FIXING: The entire pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge. All pipes shall by fixed truly vertical and horizontal unless unavoidable. The pipe line shall be supported with U type anchor straps not less than 2mm thick and steel screws &pvc inserter grips not less than 40 mm long, wooden gut ties etc. keeping the pipe about 15mm clear of the wall.

6.1.08 MAKING JOINT: The jointing of pipes and fittings generally shall be done with approved make cement solvent including making surface rough. The pipe shall be cut to desired length. Care shall be taken that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

6.1.09 FIXING: The entire pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer in charge. All pipes shall by fixed truly vertical and horizontal unless unavoidable. The pipe line shall be supported with U type anchor straps not less than 2mm thick and steel screws&pvc inserter grips not less than 40 mm long, wooden gut ties etc. keeping the pipe about 15mm clear of the wall.

6.1.10 DETACHABLE JOINT: Detachable joints shall be made where pipes of different materials have to be jointed or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

6.1.11 TESTING: Solvent welded pipe shall not be pressure tested until at least 24 hrs after the last solvent cemented joint has been done. All control valves shall be positioned open for the duration of the test and open end closed with water tight fittings. The testing pressure on completion of the work the piping system can be pressurized to 125% of its designed working pressureie The systems shall be slowly and carefully filled with water to avoid surge pressure or water hammer. Air vents shall be open at all high points so that air may be expelled from the system during filling.

When the system has been fully charged with water and air displaced from the line air vent shall be closed and the line initially inspected for seepage at joints and firmness of supports under load. Pressure is reached. Without any additional requirement of make-up-water the test pressure should not fall more than 0.02 MPa (0.2Kg/sqcm) at the end of one hour test duration.

7 GULLY TRAP

7.1.01 GENERAL: The term includes provision of uPVC square gully trap with including construction of Gully Trap Chamber.

7.1.02 MATERIAL: The Gully Trap shall be of uPVC square type with 110 mm diameter outlet. Brick work, plastering, concreting shall be as per general specification under section- II.

7.1.03 CONSTRUCTION:

1. Internal dimension of the Gully trap chamber shall be (300x300x500)mm as specified in the schedule.
2. Foundation of 1:5:10 concrete shall be 100 mm thick, and shall have 100mm offset.
3. Brick masonry shall be of 250 mm thick in cement mortar 1:5 and masonry shall be plastered with 12mm thick plaster in 1: 3 cement mortars inside and outside surface with smooth finish.

7.1.04 RCC SLAB: RCC slab of 80mm thick cement concrete 1:2:4 shall be fixed with the cement mortar 1:3 at the top of Gully trap chamber,

7.1.05 DEWATERING: The contract rate shall include bailing or pumping out all the water till completion or work if accumulated during the progress of work either from seepage, springs rain or any other cause.

8 FLOOR TRAP

8.1.01 GENERAL: The item includes supplying uPVC floor trap with CP brass / stainless steel grating specified diameter with fittings and fixtures including fixing and jointing with the pipe line.

8.1.02 MATERIAL: 110 mm nominal outlet diauPVC trap ,IS14735 with an effective water seal of 50mm. Outlet dia floor 110mm top grating shall be of CP brass or stainless steel of heavy quality size and shape to suit the trap.

8.1.03 FIXING: uPVC floor trap with the bend and pipe piece shall be fixed in position over the bed of 1:2:4 cement concrete. The jointing trap and pipe shall be DMseal. The grating shall be fixed over the floor trap flush with the floor level and the gap finished with matching cement.

9 RAIN WATER GRATING

9.1.01 GENERAL: The item includes supplying of stainless grating of specified diameter including fixing and painting.

9.1.01 MATERIAL: The rain water grating shall be stainless with closed grained without any casting defects. The thickness should be uniform throughout, one shaped stainless grating

9.1.03 FIXING: Stainless rain water grating shall be fixed in position with 1:1 cement mortar.

.10. RCC PIPES AND MANE HOLES

10.1. Laying of RCC S/S pipes of class NP_3 / NP_2 in Sewerage System

RCC (Spun) non-pressure pipes of class NP_3 **/** NP_2 shall be socket and spigot end confirming to IS-458/ 2003 with ISI Mark.

Width of trench:

i. For all diameters up to an average depth of 120 cm width of the trench in cm dia of the pipe + 30 cm.

ii. For all diameters for depth above 120 cm width of the trench in CM= dia of the pipe + Cm.

iii. Not withstanding (a) and (b) above, the width of trench should not be less than 75 cm for depth exceeding 90 cm.

Dewatering of trenches if required shall be done by the contractor without any extra claim.

The laying , jointing , testing and commissioning of the R.C.C. pipe in sewer shall be strictly as per P.H. specification and approved by EIC.

Excavation and preparation of trench shall be as per latest IS specification.

Usage of anchor and thrust blocks shall be as per relevant IS-Specification.

Rubber gasket SBR/EPDM used with push on joints or mechanical joints shall conform to IS-5382 /1985 bearing ISI mark.

Back filling shall be as per relevant IS-specification

Flushing and disinfection of mains before commissioning shall be as per relevant IS specification.

No extra payment shall be made to the contractor on account of breakage of specials etc. during transportation, loading and unloading. The contractor shall replace those materials at his own cost. Similarly, any damage of RCC pipes/ PVC pipes due to mishandling by the contractor during transportation, loading and unloading shall have to be taken care of /replaced by the contractor.

Pipe & fittings if found to be defective during lowering shall have to be replaced immediately by the contractor at his own cost and no claim whatsoever shall be entertained on account of this.

Blasting for excavation shall be permitted only after the approval of competent authority is obtained by the contractor.

Thrust blocks shall be provided in the pipe line at required places by the contractor as per requirement in consultation with Engineer-in-charge and as per drawing approved by IDCO.

No section shall be accepted unless it withstands the test pressure. The contractor shall made all arrangement including labour, pumps , pressure gauge and equipmentsetc.for testing of the pipe line as per relevant IS specification.

The SBR / EPDM gasket shall conform to relevant IS: 5382 /1985 and shall be from reputed manufacturers with ISI mark on the body of the materials.

To avoid any complication during jointing & installation of the pipes and to ensure dimensional compatibility, the rubber gaskets are also be supplied by the pipe manufacture. Pipe manufacturer who does not produce gasket or fittings themselves, may procure and supply the same from their approved vendors so that the pipe suppliers will be responsible for quality of the related item as well as the dimensional compatibility required for the leak tightness of the pipe joints.

The tenderer shall clearly state the name of the manufacturers/make of all the materials in his offer.

10.2 SPECIFICATION FOR LAYING OF RCC S/S PIPES OF CLASS NP_3 / NP_2 IN SEWERS.

1. **Excavation in trench**:

   a. Depth of trench- It should be sufficient to provide a minimum cover of 90 cm of more according to the required gradient and alignment.

   b. Width of trench- (i) For all diameters up to an average depth of 120 cm outside diameter of pipe + 30 cm and (ii) for all diameters for depth above 120 cm outside diameter of pipe + 40 cm.

      However the total trench width should not be less than 75 cm for depth exceeding 90 cm.

2. **Cement concrete pedestal**:

RCC pipe will lay over the Cement concrete (1:2:4) pedestal of size not less than 600mmx250mmx450mm ht. including earth work excavation in all kinds of soil, back filling, PCC (1:3:6) with 40mm & down size h.g.c.b. metal with necessary form work required for the work. There are 2 (two) nos. (minimum) of pedestal will be constructed for each pipe length. The location of pedestal will be placed as per site requirement & direction of EIC.

Bed concrete

   a. Bedding- Where the pipes are laid on soft soil with maximum water table level, laying at the invert level of the pipe.

   b. Hunching- Where the pipes have to be laid on a soft soil with the maximum water table level rising above the invert level of pipe but below the top of the barrel.

   c. Surround or Encasing- The pipes shall be completely encased or surrounded with concrete in the following cases.

      i. Where the maximum water table level is likely to rise above the top of the barrel.
      ii. Where the sewers are to be laid adjacent to growing trees.
      iii. Where the depth of the pipe is less than 1.2 mtr under the road surface.
      iv. When the superimposed load exceeds 1600 kg per mtr length of pipes.

3. **Laying:**

The RCC pipes shall be laid with sockets facing up the gradient on desired bedding to proper gradient (IS: 4127-1967)

4. **Jointing:**
The RCC S/S pipes shall be push on joint with Rubber Gasket.

10.4 SPECIFICATION FOR CONSTRUCTION OF MANHOLE CHAMBERS:-

1. All manhole chambers shall be constructed with RCC M25 as per relevant IS specification and as per details out lined below.

The roof slab of all chambers shall be of RCC (M25) with reinforcement not less than 90 Kg. /cum with thickness not less than 150mm. The roof slab shall be cast-in-situ.

1. The base slab, side wall & roof slab of chamber shall be not less than 150mm,150mm & 125mm respectively having crushing strength 250Kg/cm^2 at 28 days conforming to IS456/200 & IS-3370.

3. The foundation and floor (continuation of foundation) of the manhole chamber shall be C.C.(1:3:6) of thickness not less than 100mm. There shall be a foundation offset of minimum 150mm on outside of base slab.

4. Both outside &Inside wall plaster of the walls shall be in cement mortar 1:3 and cement punning only on Inner wall and floor surface of proper plumb and smooth.

5. The manhole cover of the chamber shall be pre-cast factory made with frame as per IS-12592/2002 (SFRC Heavy duty) for clear opening of 560mm with 2 nos. of lifting hook on the cover slab.

6. Benching (1:2:4) with 12 mm size h.g.c.b. chips. The benching should have a fall towards the invert of about 1:10.

7. Manhole cover: - The size of man hole cover shall be such that there shall be a clear opening of at least 500 mm in diameter.

8. Size of manhole- The minimum internal sizes of different manholes should be as follows:

a. **Inner size of Rectangular Manhole:-**

i. 800mmx900mm x 900mm Depth
ii. 1200mmx900mmx900mm Depth

9. **Spacing of manholes :**

The maximum spacing of manholes in any sewer line should be as per site condition.

Manholes should also be built at every change of alignment gradient or diameter at head of all sewers and branches and at the junction of two or more sewer.
Paragraph 4.2.1.1 of manual on Sewerage and Treatment (2nd Edition) may be referred.

DEWATERING: The contract rate shall include baiting or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

10 **Precast Concrete Frame And Cover For Manholes**

10.1.01 GENERAL: The item includes supply LD/MD/HD/EHD factory made precast steel fiber reinforced concrete (SFRC) frame and cover as specified in schedule including fixing and placing.

10.2.02 MATERIAL: The precast frame and cover shall be of steel fiber reinforced concrete (SFRC) conforming to IS 12592 and shall be of approved make. The frame and cover shall be of LD/MD/HD/EHD grade, size and thickness as

mentioned in the description of the item. The defective frame and cover shall be replaced by the contractor at his own cost and charges.

10.3.03 FIXING: Frame shall be fixed in cement concrete 1:2:4 for bearing course & capping on the top of masonry wall of chamber or manhole and finishing shall be done in 1:2 cement plaster finished smooth with neat cement.

11 **Polypropylene Step Iron / Rungs:**

11.1.01 GENERAL: The item includes supplying of Polypropylene steps including fixing in two parallel lines of 300 mm spacing in vertical wall with center to center 375 mm staggered.

11.2.02 MATERIAL: The steps shall be of Polypropylene step iron and minimum 150mm wide.

11.3.03 FIXING: The steps shall be fixed in RCC wall with 1:2:3 cement concrete with 75mm cement concrete cover at all around the step. The first step shall be 450 mm below from top surface of structure and next shall be fixed 300mm centre to centre in two rows at 375mm distance or as shown in the drawing.

10.5 SPECIFICATION FOR CONSTRUCTION OF INSPECTION CHAMBERS:-

1. All inspection chambers shall be constructed with brick masonry (Fly Ash) as per relevant IS specification and as per details out lined below.
2. The roof slab of all chambers shall be of RCC (M20) with reinforcement not less than 90 Kg. /cum with thickness not less than 125mm. The roof slab shall be cast-in-situ.
3. All side walls of chamber shall be not less than 250mm thick brick masonry wall having crushing strength not less than 75Kg/cm^2.
4. The foundation and floor (continuation of foundation) of the inspection chamber shall be C.C.(1:3:6) of thickness not less than 100mm. There shall be a foundation offset of minimum 150mm on outside of base slab.
5. Both outside &Inside wall plaster of the walls shall be in cement mortar 1:3 and cement punning only on Inner wall and floor surface of proper plumb and smooth.
6. The cover of the chamber shall be pre-cast factory made with frame as per IS-12592/2002 (SFRC Medium duty) for clear opening of 500mm with 2 nos. of lifting hook on the cover slab.
7. Benching (1:2:4) with 12 mm size h.g.c.b. chips. The benching should have a fall towards the invert of about 1:10.
8. Chamber Cover: - The size of cover shall be such that there shall be a clear opening of at least 500 mm in diameter.
9. Size of inspection chamber- The minimum internal sizes of different inspection chamber should be as follows:
   a. **Inner size of Rectangular Inspection Chamber:-**

      iii. 900mmx800mm x 450mm Depth (Avg.)

10. **Construction of Inspection Chamber :**

    The spacing of the chamber in sewer line should be as per site condition.

    Chambers should also be built at every change of alignment gradient or diameter at head of all sewers and branches and at the junction of two or more sewer.
    Paragraph 4.2.1.1 of manual on Sewerage and Treatment (2nd Edition) may be referred.

11. SPECIFICATION FOR CONSTRUCTION OF RCC SEPTIC TANK:-

1. The number & capacity of Septic Tank are given in BOQ except safe bearing capacity of the soil, Ground levels, sub-soil water levels which to be ascertaining by the agency. The Septic Tank will construct as per IS: 2470 (Part-I)-1985. The septic tank will construct on item basis as per BOQ, however detail drawing and structural designed will be submitted & should be approved by IDCO before execution.
2. Any loose pocket patch below foundation shall be cleared and filled with P.C.C 1:3:6.
3. If the soil or subsoil water contains sulphate, the same shall be submitted and appropriate measures taken as per relevant spec. / codal requirements as specified by the Engineer-in-charge.
4. Foundation conc. In 1:3:6 mix (P.C.C) shall have coarse aggregate h.g.c.b. of size not more than 40mm.
5. RCC to be of grade M-30.
6. No concrete shall be cast at a temp. above 39ºC or below 10ºC unless special precautions relevant are codes are taken.
7. In two-way slabs place short span bars in bottom layer web reinforcement and anchorages.
8. Follow CPWD rules I.S- 456-2000 & IS- 13920 as to stirrups, columns ties and anchorages details of steel etc. must be carried out accordingly, unless otherwise shown.
9. Clear cover for main reinforcement is as follows:-
   a. In footing : 50mm
   b. In columns : 50mm
   c. In beams : 45mm
   d. In slabs : 45mm
10. All steel reinforcement shall be of high yield strength TMT bars confirming to IS: 1786 with minefield stress 0.2% proof stress of 415 N per Sq.mm (Grade Fe 415)
11. Provide normal laps of 50 dia in Grade M-25 Mix.
12. Distance of 1st stirrup from edge column line/beam shall be 50mm max.
13. All bricks in the masonry shall have characteristic compressive strength of 7.5N/sq mm unless otherwise specified and laid in 1:4 cement coarse sand.
14. All center line dimensions should be taken off Arch. Drawings.
15. Not more than 1/3 rd of total col. Bars shall be lapped at any section of column laps shall be staggered and avoided at the places of max. Stress a lap shall be considered staggered if the centre to centre distance of the lap is not less than 1.3 times the development length as mentioned elsewhere in these notes.
16. Lap in column should be provided in the middle half between two braces.
17. Lap should not be provided
    a. Within a joint
    b. Within a distance of 2d from joint face
    c. Within a quarter length of the member from the joint face
18. Not more than 50% of bars shall be spliced at one section.
19. Wherever necessary horizontal bars shall be left in the column for lintels and other similar members.
20. The disposition of hooks of similar col. times shall be vertically staggered and placed on opposite faces for alternate ties.

21. Only stirrups of column are to be continued through beam column junction.

22. During casting of beam if the work is stopped for duration longer than initial setting time of cement, then such discontinuity shall be threaded as construction joints.

23. Construction joint shall be made vertical by proper template with slots for accommodating reinforcement bars. The joint shall be treated in accordance with C.P.W.D specification.

24. Construction joint shall be planned at or near mid span but not outside the middle third of the span provided the beam does not carry any concentrated load. Incase beam carries concentrated load due to the reaction of the secondary beam, the construction joint in the main beam shall be off-set by a distance equal to twice the width of the secondary beam.

25. Construction joints shall not be provided in cantilever beams shall be cast monolithically with interior beam.

26. Drilling the holes of dia not less than 16 mm on inner wall and floor surface, spacing not less than 600mm C/C, grouting the holes by pressure grouting equipments using polymer modified cement.

27. Any vibratory equipment, if placed on the structure must be mounted on properly designed vibration isolators and seismic snobbery so as not to transmit any dynamic forces on the structure nor dismount in an earthquake.

28. Where there are two or more rows of reinforcement bar, the reinforcement bars shall be vertically in line and minimum vertical distance. Between the reinforcement bars shall be 15mm or 2/3 of the nominal size of the aggregate or the max. size of bar whichever is more.
29. The stirrups and column bars at splices shall be bent at a slope not steeper than 1.6 (max) to avoid extension bars.

30. The specification of the approved drawing should be strictly followed.

31. Excavation of foundation including dressing and leveling the bed in all kinds of soil/rock up to the required depth as per design including dewatering shoring and shuttering if necessary depositing the excavated materials 50 meters clear of site as per direction of Engineer-in-charge.

32. Cement concrete grade M-10 as per design of suitable thickness under R.C.C foundation with 40mm of downgraded size crusher broken hard granite metal as per relevant B.I.S.

33. Reinforced cement concrete grade M-25 as per design in all members of the supporting structures.
34. Reinforced cement concrete grade M-25 in all members in contact with water and members subject to condensation like roof slab etc.

35. The supporting structure may be either on a group of columns connected by rigid braces or a load bearing shaft subject to fulfillment of a architectural and economic requirements as indicated at Clause -2.4 IV or B.I.S.-3370.Part-II, 1965.
36. In case of roof slab having no slope, necessary protection measures shall be provided as pr clause 6.1 and 6.4 of B.I.S- 3370 (Part-II) 1965.

37. The Septic tank shall be ventilated by providing 110mmx1.80m ht. vent pipe with terminal guard- 2 nos. The opening of the ventilator shall be protected with mosquito proof wire net made of Stainless steel will be fixed on roof of the tank with C.C. Pedestal at suitable location as per direction of EIC.

38. SFRC (Medium Duty) man-hole covers with frame of clear opening size 500mm dia. Frame and cover-2 (Two) nos. will be fixed at suitable place in the roof of the tank & 1 (One) no. each for inlet and outlet chambers.

39. Providing, fitting & fixing of polypropylene steel reinforced manhole steps of approved quality & size in two parallel line of 300mm spacing in vertical walls with center to center 375mm (staggered) will be fixed in two locations inside septic tank & inlet and outlet chambers.

40. Providing, fitting & fixing of stone ware salt glazed Tee of size 150mm both inlet & outlet of the tank.

41. Cavity of the tank should be filled with excavated & selected earth, laying in layers not exceeding 23cm thick well watered& rammed etc. as per direction of EIC.

42. All R.C.C works shall be finished smooth, inside surface of walls and floors of the tank which shall be rendered with 12mm thick C.P. (1:3) with punning. All exposed surface of the concrete and plaster over masonry shall be given two or more coats of weather coat paint over a coat of primer of approved shade. All iron works of the tank shall be painted with two or more coats of approved anticorrosive paint (Epoxy) over a coat of primer of approved shade. All masonry works shall be plastered with 12mm thick C.P. in (1:4) cement mortar.

12. SPECIFICATION FOR CONSTRUCTION OF SOAK PIT:-

1. The number & size of Soak pit are given in BOQ except safe bearing capacity of the soil, Ground levels, sub- soil water levels which to be ascertaining by the agency. The Soak pit will construct as per approved PH specification & detail drawing and designed should be submitted & approved by IDCO before execution.

2. Foundation conc. In 1:3:6 mix (P.C.C) shall have coarse aggregate h.g.c.b. of size not more than 40mm.

3. RCC to be of grade M-20.

4. No concrete shall be cast at a temp. above 39ºC or below 10ºC unless special precautions relevant are codes are taken.

5. All steel reinforcement shall be of high yield strength TMT bars confirming to IS: 1786 with minefield stress 0.2% proof stress of 415 N per Sq.mm (Grade Fe 415)

6. Provide normal laps of 50mm dia in Grade M-20 Mix.

7. Distance of 1st stirrup from edge column line/beam shall be 50mm max.

8. All bricks in the masonry shall have characteristic compressive strength of 7.5N/sq mm unless otherwise specified and laid in 1:4 cement coarse sand.

9. All center line dimensions should be taken off Arch. Drawings.

10. Dry brick work of wall thickness 250mm will construct from invert level up to bottom & brick work in cement mortar (1:4) of wall thickness 250mm including Cement Plaster 1:4 of outer surface & cement plaster with punning on inner surface will be constructed from invert level to above G.L.

11. Both inner & outer peripheral cavity (width-450mm) of the Pit should be filled with 40mm & down size Hard granite hand broken graded metal from invert level up to bottom & rest outer cavity of the pit should be filled with excavated & selected earth, laying in layers not exceeding 23cm thick well watered& rammed etc. as per direction of EIC.

12. Providing, fitting & fixing of precast man hole cover with frame (SFRC medium duty) of clear opening 500mm dia on the roof slab of the pit at suitable location as per direction of EIC.

13 TERRACE WATER TANK

Water tanks at terrace shall be of RCC made over a staging on terrace slab.

14 GENERAL SPECIFICATIONS FOR WATER TANK

16.1.01 TESTING OF WATER TANK AND SEPTIC TANK: After construction of tank, it shall be tested for leak proofness. The tank shall be first filled with water up to the top of wall. The water level should not drop more than 50mm within 48 hours. If the drop of water level is found more than 50mm the defective and leakage point shall be rectified to the full satisfaction of the Engineer in charge.

16.1.02 CLEANING OF WATER TANK: The cleaning of the tank shall be done by manually or by hydrodynamic mechanism with low or high pressure as directed. Potable water approved disinfectant etc. shall be used for cleaning of water tank before use.

15 RCC CORE CUTTER & ITS APPLICATION

18.1.01 GENERAL: The RCC roof slab shall be cut with help of powerful drilling system for rig-based coring in diameters upto 200 mm with help of diamond drilling equipments.

Rig-based wet drilling in concrete for pipe penetrations in plumbing,heating and air conditioning installations stitch drilling for cable trays and ventilation ducts.Drilling blind holes for large-diameter anchors,reinforcing bars and the installations of railings and barriers.RCC roof slab can be drilled maximum depth upto 450 mm for passing the SWR pipes P traps,etc complete as per direction of Engineer in-charge.

16 CUTTING HOLES UP TO 30 CM X 30 CM ON WALLS INCLUDING MAKING GOOD THE SAME.

General :- Square holes of size as specified or as directed by the Engineer -in-charge shall be cut in the masonry for taking pipes . Any damage to the adjoining portion or to any other items shall be made good as directed by the Engineer-in-charge . All dismantled materials shall be removed from the site.

Masonry Works: Brick work etc., shall be made good by using the same class of brick, tile or stone masonry as was cut during the execution of the work. The mortar to be used shall be cement mortar (1:4) as directed by the Engineer-in-charge.

Finishing : Cement mortar in 1:4 shall be used for plastering or pointing as may be required. The surface shall be finished with two or more coats of white wash/colour wash/distemper/painting as required but where the surfaced is not to be white washed, colour washed, distempered or painted, it shall be finished smooth with a floating coat of neat cement or as required to match with the surrounding surface.

The specifications for brickwork, stonework and finishing etc. shall be the same as detailed under relevant sub-heads of State PWD specification.

16.1 CUTTING HOLES UPTO 15CM X 15CM IN RCC FLOORS INCLUDING MAKING GOOD THE SAME.

General : Square holes of size as specified shall be cut in R.C.C. floor and roofs chajjas for passing pipes etc. Any damage to the adjoining portion or to any other item shall be made good as directed by the Engineer-in-charge. All dismantled materials shall be removed from the site.

Cement Concrete : After insertion of pipes etc. the holes shall be repaired with cement concrete 1:2:4 and the surface finished to match the existing surface. The top and bottom shall be finished properly to make the joint leak-proof. The specifications for cement concrete work and finishing etc. shall be the same as detailed under relevant sub-heads of State PWD specification.

16.2 CUTTING CHASE IN MASONRY WALLS INCLUDING MAKING GOOD TO THEM .

Making Grooves : Grooves are made in the walls for housing CPVC,uPVC.pipes etc. These shall be up to 7.5 cm x 7.5 cm as directed by the Engineer-in-charge. These shall be provided in correct position as shown in the drawings or as directed by the Engineer-in-charge. No grooves be made if the stability of the building is in danger.

Any damage to the adjoining portion or to any other item shall be made good as directed by the Engineer-in-charge. All dismantled materials shall be removed from the site.chase on wall should be done by electric function carbide cutter with adequate depth as per specification shall be straight horizontally vertically as per direction of engineer in-charge.

Filling Grooves:

After CPVC,uPVC.pipes are fixed in grooves, the grooves shall be filled with cement concrete 1:2:4or cement mortar 1:4 as may be specified or otherwise directed by the Engineer-in-charge and

made flush with the masonry surface. The concrete surface shall be roughened with wire brushes to provide a key for plastering.

17 HANDICAPPED TOILET

20.1.01 GENERAL: The fixtures such as white glazed vitreous china water closet (European Patter) P or S type with cistern, seat cover wash hand basin of size 460x360 mm with one pair basin bolt one number hinged rail 760 mm long and four numbers grab rail 600 mm long each along with PVC wall inserter and brass screw for handicapped toilet shall be aligned and fixed as per IS codal Specification for each of the above mentioned fixtures for easy accessible of handicapped personnel etc as per direction of Engineer in-charge.

18 HEALTH FAUCET

21.1.01 GENERAL: The fixtures with one meter long easy flex tube in Chrome Finish and wall hook along with one end adjustable CP on brass revolving nut with washer for suitable to angular stop cock outlet thread and other end of the chrome finish flex tube shall be provided with faucet sprayer and it shall be fixed as per direction of Engineer in-charge.

19 CP ON BRASS SPREADER

22.1.01 GENERAL: The fixtures CP on brass spreader shall be fixed on the top of the flat back urinal with help of brass or steel screw and the inlet of the CP brass on spreader shall be joined to the Brass tube both side nut and washer of auto closing flush cock etc after direction of Engineer in-charge.

20 CP EXTENSION PIECE

23.1.01 GENERAL: The fixtures CP on Brass extension Piece of 15 mmx50 mm long shall be provided to the concealed CPVC pipe elbow to angle stop cock,bib cock, flush cock for adjustment of gap of plastering of wall etccomplte as per direction of Engineer in charge.

21 INBUILT RO PURIFIER WITH CHILLER

24.1.01 GENERAL: The fixtures chiller cum water dispenser with inbuilt RO purifier.It is ABS front cover and stainless steel body with elegant looks. Purification by RO+UF+TDS controller for commercial offices.A complete water Chilling capacity upto 25 ltr/hr& Purification capacity 20 ltr.

22 ANCHORING ARRANGEMENT FOR HANGING SWR PIPELINES WITH FITTINGS

25.1.01 GENERAL: For anchoring the hanging lines of SWR pipes and fittings such as P trap,bends,tees,elbows,offsets under the roof slab Flush anchor 12mm dia x 50 mm long ,anchor rod with both side thread 12mm x 1000mm long, anchor clamp and ring shall be fixed to the roof slab for fastening/hanging to maintain the gradient for free flow of sewerageetc all complete as per direction of Engineer in -charge.

23 SINKING OF BORE WELL.

23..1.01 GENERAL: Vertical Electro-sensitivity sounding test (V.E.S) shall be Performed to obtain adequate pervious zone as per the direction of Engineer in-charge.

23..1.02 TECHNICAL SPECIFICATION: Drilling of perfectly vertical borehole 250mm x 150mm diaupto 100mtr depth below ground level through consolidated and unconsolidated rock with DTH/combination drilling rig(1200 cfm/300 Psi) as required to suite the site condition with lowering of 200mm dia PVC schedule 80 pipes as per ASTM D-1785/2004 or housing/Casing treated with Socket with or without well screen as per the necessary for soft,medium,hard and boulder formation.PVC casing pipe if required to prevent collapse of overburden shall be provided by the contractor including lowering and withdrawing after the completion of tubewell and development of tubewell by the help of air & measurement of Discharge and drawdown of the tubewell. The tubewell should be covered to Prevent from dropping Foreign materials by Trespassers etc complete as per direction of Engineer in-charge.

24 BORE WELL (200mm/150mm dia).

24.1.0 GENERAL: Labour for drilling a perfectly vertical bore hole of specified dia (200mmx150mm) for a specified depth of 40 mtrs below the ground level through consolidated and unconsolidated rock with down the hole hammer drilling rigs or combination drilling rigs including use of own rigs with its accessories, T&P and consumables etc for lowering of 200mm dia PVC pipes for housing as per the direction of Engineer in charge etc complete as per direction of Engineer in-charge.

24.1.02 GENERAL: Lowering of 200mm dia PVC casing with or without slotted pipes as per the necessity from ground level and fitted and fixed up in perfectly vertical position, including cutting and threading pipe and slotted pipe and supplying and fixing all the jointing materials, T&P, etc complete as per direction of Engineer in-charge.

24.1.03 GENERAL: Cleaning and developing the borewell using compressor continously worked till clear and adequate discharge is obtained from the bore well including supply and use of all necessary equipment and cost of all laboursetc complete as per direction of Engineer in-charge.

25 GRAVITY SEWERAGE.

25.1.01 GENERAL: For gravity sewerage disposal earthwork shall be executed in all kinds of soil within 50mtr initial lead & 1.5mtr initial lift including dressing, levelling& breaking clods to maximum 5cm to 7cm & laying in layers not exceeding 0.3mtr depth & as per specification & Direction of Department.

25.1.02 Foundation trenches and plinth shall be filled with excavated & selected earth,Laying in layers not exceeding 23cm thick well watered& rammed etc complete including labour,T&P lead & lift cost &conveyance,loading,unloading etc. complete as per Specification & direction of Engineer in-charge.

25.1.03 Centrifugally cast (spun) RCC non pressure pipes of class NP2 with socket & spigot ends conforming to IS :458 with ISI mark shall be provided in standard length and required diameter i.e 200 mm Nominal bore and 250 mm nominal bore RCC S/S pipes suitable for push on joints including lowering the pipes in to trenches to required depth below G.L with proper alignment &gradient,testing ,commissioning (de-watering) if required including rubber gasket as per IS-5382/1985 with ISI mark with all taxes and duties etc all complete as per Specification & direction of Engineer in-charge.

25.1.04 Cement Concrete Pedestal shall be casted of C.C 1:2:4 with 12mm size hard granite crusher broken chips (hgcb) as shown in drawing for support of the RCC NP2 pipe of Nominal diai.e 200 mm & 250 mm RCC NP2 Pipe.

26 CENTRIFUGAL PUMPS & APPURANTENCES

26.1.01 GENERAL: Supply installation, testing and commissioning of Centrifugal Pump sets with delivery Piping arrangements for both drinking water & Flushing water application.

26.1.02 Centrifugal pump set (split casing) and capacity of each pump with total head 45 mtr and discharge 15m^3/hr shall be provided as per Engineer in-charge .

26.1.03 Induction motor of TEFC (Totally Enclosed, Fan Cooled) of three phase 50 Hz shall be coupled with a common base and electrical control panel suitable for the pump set shall be provided as per Engineer in-charge.

26.1.04 Base concrete shall be provided on the floor with grouting of Base bolt for fixing the pump and motor of required size over the base plate . The pump and motor shall be aligned properly, to run without vibration.

26.1.05 Butterfly valve, Non return valve (Pressure rating PN1.0) ,threaded or flanged short piece along with Piping arrangement shall be provided for both side suction and delivery of pumps .

26.1.06 In case of negative suction flanged end foot valve with strainer shall be provided

26.1.07 <u>TECHNICAL SPECIFICATION OF PUMP SETS</u>

<u>Location of Project: Clear Water Pump House</u>

(A) <u>Specification of pump set:</u>

i) <u>Pump:</u>

1. Type of pump set : Horizontal Split casing Centrifugal Pump
2. Pump model : To be furnished by the bidder

3.	Make	:WILO MATHER+PLATT/KIRLOSKAR BROTHERS/WPIL
4.	No. of pump	: 2 (two) (one working and one standby)
5.	Discharge	: 20.00 m^3/hr.
6.	Head	: 25.00 meter
7.	Efficiency	: Should not be less than – 60%
8.	Nominal speed (Full Load)	: To be furnished by the bidder
9.	Pump suction and delivery Nozzle dia	: To be specified by the bidder
10.	NPS Hr	: To be specified by the bidder
11.	Service	: Pump clear water from UGR
12.	RPM	: To be furnished by the bidder
13.	Specific gravity	: 1.00
14.	Ambient Temperature	: 35° C
15.	Duty	: Continuous
16.	Recommended motor K.W	: to be furnished by the Bidder
17.	Performance test	: As per IS- 5120

Material construction of Pump :

1.	Pump casing	: C.I. (IS:210 Gr FG260)
2.	Impeller	: CI-FG-210,
3.	Shaft	: SS 410
4.	Shaft sleeve	: SS 410
5.	Casing wearing	: CI-FG-210
6.	Gland	: CI confirming to IS-210/1978 of latest version
7.	Foundation bolts & nuts	: Carbon steel

The materials for construction of pump casing, impeller, pump shaft, shaft sleeve, base plate, casing ring have to meet the related IS- specification.

The duty parameters of pump set shall be on the best efficiency point of the performance curve of pump with clear indication to the above & the rated head, capacity, power input, NPSHr etc. must be enclosed. NPSHr should be as per IS-5120. No negative tolerance is acceptable. This is to make sure that no cavitations take place during operation of the pump. The grease nipple should be provided on both the points for future lubrication.

The pump should be supplied with accessories such as, common base plate, fabricated from MS channel, suitable cement concrete pump foundation and vibration damping arrangement with casting foot mounting all required, set of coupling with coupling bolts & nuts, rubber bush, companion pipe flanges, coupling guard, required nos of foundation bolts and nuts 100mm dia pressure gauge (0-7Kg/Cm^2) with control ball valves- 2 nos., 100mm dia vacuum gauge-2 nos. and any other materials required for the same. Since the area is quite prone to corrosion, rubber base paint or epoxy base anticorrosive paint to the pump should be preferred.

The characteristic curve of pump should be continuously raising type with decrease in flow and shutoff head shall be at least 120% of the total discharge head at design point and should operate between 70% to 150% of total discharge.

The bidder should furnish the following details & drawing for scrutiny along with offer.

(i) Make, MOC, model, size, capacity etc. including complete billing of materials.

(ii) Performance curve indicating range of impeller dia meter, discharge Vs Head, power input (K.W), Break horse power & Torque speed curve. Single line curve should also be furnished.

Pump shall be proven type, no new pump shall be acceptable. Pump manufacturers should have proven experience of supplying such pump for clear water application. For future maintenance of pump the bidders should supply a set of tools with box.

ii) <u>Motor:</u>

1.	Type	: Non-flame proof squirrel cage horizontal Induction motor (suitable for above pump)
2.	Recommended rating	: To be furnished by bidder
3.	Duty	: Continuous
4.	Voltage rating	: 415 V + 10%
5.	Frequency	: 50 Hz + 3%
6.	Mounting	: Horizontal
7.	Enclosure	: TEFC
8.	Synchronous speed	: To be furnished by bidder
9.	Insulation	: 'F' Class
10.	Protection	: IP-55
11.	RPM	: To be furnished by bidder
12.	Phase	: 3 (Three)
13.	Rated output in KW	: To be specified by the bidder
14.	Winding connection	: -do-
15.	Full load current	: -do-
16.	Starting current	: -do-
17.	No load current	: -do-
18.	Efficiency at:-	
	(i) 100% load with power factor	: -do-
	(ii) 75% load with power factor	: -do-
	(iii) 50% load with power factor	: -do-

The motor shall be horizontal shaft foot mounted TEFC, 3 phase squirrel cage induction motor. This should be manufactured as per the environment code of IP-55 as per IS-Specification. The dimensions, performance, output, protection and mounting should be as per IS- 1231 or 2223, 25, 123, 4961 & 2253 respectively.

The motor shall operate on a wide voltage from 320 to 440 Volt at the rated duty at frequency of 50 Hz + 3%. The supply voltage may be assumed as sinusoidal. The insulation system of motor should be Class 'F' and designed to operate with continuous running duty (S.I) suitable for 3 equally spaced cold starts per hour or at least one hot restart under the rated share of the overload eventualities as per the CEPHEEO manual on "water supply and treatment". The motor should also have common base plate with the respective pump to which it will be directly coupled. The pump and motor should be properly aligned to prevent wear and tear of coupling and facilitate easy operation and maintenance. The motor should have a moderate speed of 1440 to 1500 RPM having clockwise rotation when viewed from the drive end as per IS- 12065. The roller coupling assembly with the pump should constitute metallic ball & roller bearing mounted directly into the bore of end shields and properly lubricated. Grease nipple should be provided (both side) for future lubrication. Since the area is quite prone to corrosion, rubber base paint or epoxy base paint to motor should be preferred. The motor should be provided with space heater as per required specification. The motor should have in-built thermostats. The input, output & efficiency characteristics curve of motor proposed should also be furnished along with tender.

26.08SPECIFICATION OF DELIVERY AND SUCTION PIPE LINE,
R.C.C. FOUNDATION, VALVES AND SPECIALS ETC.

Specification for valves.

Sl No.	Specification of valves	Qnty.	Make	Remarks
1.	Suitable dia. double flanged Ductile Iron sluice valves (Rising spindle) with manual operation and hand wheel of PN-1.0 conforming to IS- 14846/2000 with ISI mark.	2 (Two)	IVC/KBL/Zoloto	Will be fixed at pump delivery line of approved size.
2.	Suitable dia. double flanged Ductile Iron non-return valve with by-pass arrangement, single door (Swing type), and mounting on horizontal pipe line of pressure ratting PN-1.0 conforming to IS-5312/1984 (Part-I) with ISI mark	2 + 1 = 3 (Three)	IVC/KBL/Zoloto	Will be fixed at pump delivery line of approved size & 1(One) no. of 100 mm dia will be fixed with common delivery line.
3.	Suitable Ductile Iron, foot valve with strainer and flange type end connection as per IS- 4038/1967 with ISI mark.	2 (Two)	IVC/KBL/Zoloto	Will be fixed with suction pipe end of approved size.
4.	Suitable dia. double flanged Ductile Iron butterfly valve wafer type (Wafer long) quarter turn worm gear box (manual) with hand wheel operation of PN-1.6 conforming to BS- 5155.	2 (Two)	IVC/KBL/Zoloto	Will be fixed with suction pipe line of approved size.

Technical specification and materials construction:

(A) Ductile Iron double flange sluice valve:

i.	Body, wedge (door) dome, bonnet gland, thrust bridge, valve stem cap/hand wheel	D.I IS-210 Gr. FG 200/260
ii.	Seat & door face ring wedge nut	S.S as per IS- 1570, IS-6603
iii.	Spindle	S.S as per IS-6603 Gr. 12 Cr-12
iv.	Gland packing	Graphite asbestos /greased hemp
v.	Gasket	Rubber IS- 638 type-B
vi.	Fasteners	Carbon steel
vii.	Hydrostatic test pressure (i) Body	15 Kg/Cm^2

	(ii) Seat leakage	10 Kg/Cm^2
viii.	Operation	Anti-clock wise
ix.	Flanges	Faced and drilled as per IS- 1538/1969
x.	Body painting	Epoxy coated

(B) **Ductile Iron Double flange Non-return valve:**

i.	Body, door & cover	D.I. IS-210 Gr. FG 200
ii.	Turning shaft/hinge pin	SS AISI- 410
iii.	Body seat, door face rings bearing block	SS AISI –410
iv.	Flow direction clearly embossed on valve body	
v.	Plug	SS AISI – 410
vi.	Fasteners	Carbon steel
vii.	Hydrostatic test pressure (iii) Body (iv) Seat leakage	 15 Kg/Cm^2 10 Kg/Cm^2
viii.	Flanges	Faced and drilled as per IS- 1538/ 1969
ix.	Body painting	Epoxy coated

(C) **Ductile Iron foot valve**:

i.	Body, Disc, flap and lift guide	Ductile Iron conforming to IS-210/ Gr. FG 200
ii.	Ring	SS AISI 410
iii.	End connection	Flanged type
iv.	Strainer	Cast iron conforming to IS-210/ Gr. FG 200
v.	Flanges	Faced and drilled to IS- 1538/1969
vi.	Body painting	Epoxy coated

26.09 Specification of delivery and suction pipe line with specials, constructionof RCC foundation etc.

Suction and delivery piping shall be provided for both the pumps and shall be of M.S. pipe (heavy duty) with required fittings suitable for drinking water application, pipe & fittings confirming to relevant IS- Specification with ISI mark. All M.S. Pipes & fittings Should be painted with 2 (two) or more coats of epoxy paint of approved shade.

The thickness of all MS flanges shall be of 12mm conforming to IS- 6392/1971. The wall thickness of the specials like Bend, taper, offset etc. wherever used should be 8mm wall thickness.

The pipe line shall be so laid that there shall be independent suction for two pumps and a common delivery including fixing of valves, specials, expansion joints, flange joints with required and approved sizes of jointing materials like nuts & bolts (made out of carbon steel), rubber gasket (made out of nitrile rubber of 6mm thick), paints etc. The delivery pipe line should extend up to 10.00 mtr beyond the common delivery point of pumps with flange end. Required no. of pipe supports should be provided both for suction and delivery pipe line of both the pumps. The pipe supports

should be made out of concrete (1:1½:3) pedestal of required height and approved design including grouting the same on the floor. Besides above, the scope of work comprises construction of required size and shape of RCC (M-25) pump foundation as per IS- specification, cutting holes in the 250mm thick Brick/ R.C.C wall and making good the damages and alignment of the pump sets inside pump house. Necessary earth work, back filling, de-watering (if required) shall also be taken up to complete the work in all respect.

26.10Specification of Control Panel:

The control panel should be fully automatic & shall be provided with IP-65 ingress protection suitable for operation of 2 (two) no.s centrifugal pump sets each of 5 HP (approx.) (One working & one standby).

The panel board shall be floor mounted type and fabricated with 2mm thick CRCA sheet. The board shall be painted with 2 coats of approved enamel industrial gray paint on exterior surface, 2 coats of white enamel paint on interior surface over 2 coats of zinc chromate primer. The board should be dust and vermin proof and of double door type having interlocking with the switchgear i.e., the door can be opened only after the switch is 'OFF' position. Ventilation louvers with fine wire mesh should be provided. The panel board should be provided with punch holes on the Top plate for glanding of incoming and outgoing cables. The board should be provided with at least 2 nos. of earthing stud with hexagonal G.I. nuts and bolts. One no. enamelled danger board and nomenclature plate should be fixed on the front of the panel board. Each detachable hinged door shall be earthed with 2.5 sqmm. PVC insulated multi stranded copper conductor wire of green colour. Adequate clearance shall be provided from the gland up to the spreader link of the MCCB (preferably 500 mm) for easy termination of 3.5 C × 35 sqmm. Armouredaluminium XLPE insulated cable.
The panel shall be incorporated with the following components;

Incoming:-

1 no. 100A, (I th 80 A) 3 Pole MCCB.

Bus bar:-

4 nos. 100 A, 25 x 3 mm Electrolytic Copper strips.

Outgoing:-

A. 2 nos. 16 A (11 – 16 A) 3P MPCB.
DOL 3 Phase starter suitable for 2 nos. centrifugal Pump sets.
1 no. 32 A 4P MCB

Instrument:-

A. 1 no. Voltmeter (0 – 500 V) digital multi function meter.
1 no.Ammtmeter (0 – 30 A) digital
Panel Complete duly factory wired.

Approved Makes:

Volt meter/ammeter	: AE/ IMP/ MECO
Selector Switch	: KAYCEE/ SLAZER
Contactor	: L&T/ SIEMENS/ BCH/ Telemecharique
CT	: Kappa
Starter	: L&T/ BCH/ Telemecharique/ SIEMENS
MCCB/MCB	: Legrand / L&T/ Schneider/ SIEMENS/ ABB/ Anchor/Panasonic/HAGER

Note: General arrangement drawing & SLD of the control panel should be submitted for approval before execution.

27.0 Under Ground Reservoir (UGR)

27.1TECHNICAL SPECIFICATION

1. Any loose pocket patch below foundation shall be cleared and filled with P.C.C 1:3:6.

2. If the soil or subsoil water contains sulphate, the same shall be submitted and appropriate measures taken as per relevant spec. / codal requirements as specified by the Engineer-in-charge.

3. Foundation conc. In 1:3:6 mix (P.C.C) shall have coarse aggregate h.g.c.b. of size not more than 40mm.

4. RCC to be of grade M-30.

5. No concrete shall be cast at a temp. above 39ºC or below 10ºC unless special precautions relevant are codes are taken.

6. In two-way slabs place short span bars in bottom layer web reinforcement and anchorages.

7. Follow CPWD rules I.S- 456-2000 & IS- 13920 as to stirrups, columns ties and anchorages details of steel etc. must be carried out accordingly, unless otherwise shown.

8. Clear cover for main reinforcement is as follows:-
   a. In footing : 50mm
   b. In columns : 50mm
   c. In beams : 45mm
   d. In slabs : 45mm

9. All steel reinforcement shall be of high yield strength TMT bars confirming to IS: 1786 with minefield stress 0.2% proof stress of 415 N per Sq.mm (Grade Fe 415)

10. Provide normal laps of 50 dia in Grade M-30 Mix.

11. Distance of 1st stirrup from edge column line/beam shall be 50mm max.

12. All bricks in the masonry shall have characteristic compressive strength of 7.5N/sq mm unless otherwise specified and laid in 1:4 cement coarse sand.

13. All center line dimensions should be taken off Arch. Drawings.
14. Not more than 1/3 rd of total col. Bars shall be lapped at any section of column laps shall be staggered and avoided at the places of max. Stress a lap shall be considered staggered if the centre to centre distance of the lap is not less than 1.3 times the development length as mentioned elsewhere in these notes.

15. Lap in column should be provided in the middle half between two braces.

16. Lap should not be provided

    a. Within a joint
    b. Within a distance of 2d from joint face
    c. Within a quarter length of the member from the joint face

17. Not more than 50% of bars shall be spliced at one section.

18. Wherever necessary horizontal bars shall be left in the column for lintels and other similar members.

19. The disposition of hooks of similar col. times shall be vertically staggered and placed on opposite faces for alternate ties.

20. Only stirrups of column are to be continued through beam column junction.

21. During casting of beam if the work is stopped for duration longer than initial setting time of cement, then such discontinuity shall be threaded as construction joints.

22. Construction joint shall be made vertical by proper template with slots for accommodating reinforcement bars. The joint shall be treated in accordance with C.P.W.D specification.

23. Construction joint shall be planned at or near mid span but not outside the middle third of the span provided the beam does not carry any concentrated load. Incase beam carries concentrated load due to the reaction of the secondary beam, the construction joint in the main beam shall be off-set by a distance equal to twice the width of the secondary beam.

24. Construction joints shall not be provided in cantilever beams shall be cast monolithically with interior beam.

25. Drilling the holes of dia not less than 16 mm on inner wall and floor surface, spacing not less than 600mm C/C, grouting the holes by pressure grouting equipments using polymer modified cement.

26. Any vibratory equipment, if placed on the structure must be mounted on properly designed vibration isolators and seismic snobbery so as not to transmit any dynamic forces on the structure nor dismount in an earthquake.

27. Where there are two or more rows of reinforcement bar, the reinforcement bars shall be vertically in line and minimum vertical distance. Between the reinforcement bars shall be 15mm or 2/3 of the nominal size of the aggregate or the max. size of bar whichever is more.

28. The stirrups and column bars at splices shall be bent at a slope not steeper than 1.6 (max) to avoid extension bars.

29. The specification of the approved drawing should be strictly followed.

30. Excavation of foundation including dressing and leveling the bed in all kinds of soil/rock up to the required depth as per design including dewatering shoring and shuttering if necessary depositing the excavated materials 50 meters clear of site as per direction of Engineer-in-charge.

31. Cement concrete grade M-10 as per design of suitable thickness under R.C.C foundation with 40mm of downgraded size crusher broken hard granite metal as per relevant B.I.S.

32. Reinforced cement concrete grade M-30 as per design in all members of the supporting structures.

33. Reinforced cement concrete grade M-30 in all members in contact with water and members subject to condensation like roof slab etc.

34. The supporting structure may be either on a group of columns connected by rigid braces or a load bearing shaft subject to fulfillment of a architectural and economic requirements as indicated at Clause –2.4 IV or B.I.S.-3370.Part-II, 1965.

35. In case of roof slab having no slope, necessary protection measures shall be provided as pr clause 6.1 and 6.4 of B.I.S- 3370 (Part-II) 1965.

36. The water tank shall be ventilated by providing ventilating windows/pipe on the roof. The opening of the ventilator shall be protected with mosquito proof wire net made of Stainless steel. Adequate ventilation area shall be provided in relation to the area of water face and aesthetic requirements.

37. The riser height and trade width of the stair case should be of 150 mm and 250 mm respectively or as per site condition/ direction of E.I.C.

The following appurtenances shall be provided

38. C.I. / M.S. lockable hinge type man-hole covers with frame of clear opening size 500mm dia and weight not less than 50 kg/ each. Frame and cover fixed at suitable place in the roof of the tank.

39. All R.C.C works shall be finished smooth, inside surface of walls and floors of the tank which shall be rendered with 12mm thick C.P. (1:3) with punning & apply 2 (two) or more coats with epoxy base water proofing food grade material over cement punning and external surface shall be with 12mm thick C.P. (1:4).

All exposed surface of the concrete and plaster over masonry shall be given two or more coats of weather coat paint over a coat of primer of approved shade. All iron works of the reservoir shall be painted with two or more coats of approved anticorrosive paint (Epoxy) over a coat of primer of approved shade. All masonry works shall be plastered with 12mm thick C.P. in (1:4) cement mortar.

27.2 GENERAL REQUIREMENTS FOR CONSTRUCTION OF R.C.C. UNDER GROUND RESERVOIR

1.0 The number & capacity of underground reservoir are given in BOQ except safe bearing capacity of the soil, Ground levels, sub- soil water levels which to be ascertaining by the agency. The under ground reservoir will construct as per approved design and should be got vetted by the execution agency, at its own cost, from any Govt. institute. The total height of UGR will as such, i.e. 2/3 height will above proposed ground level and 1/3 height will under the ground will be preferred.

2.0 **Detail Specification of R.C.C. Under Ground Reservoir** :

2.1 Excavation of foundation including dressing and leveling the bed in all kinds of soil/rock up to the required depth as per design including dewatering shoring and shuttering if necessary depositing the excavated materials 50 meters clear of site as per direction of Engineer-in-charge.

2.2 Cement concrete grade M-10 as per design of suitable thickness under R.C.C foundation with 40mm of downgraded size crusher broken hard granite metal as per relevant B.I.S.

2.3. Reinforced Cement concrete grade M-30 in all members in contact with water and members subject to consideration like roof slab etc.

2.4 In case of roof slab having no slope, necessary protection measures shall be provided as per clause 6.1 and 6.4 of B.I.S-3370 (Part II) 1965.

2.5 The water tank shall be provided with suitable ventilating arrangement with copper wire / stainless steel wire mosquito proof net of approve size and design.

2.6 The following appurtenances shall be provided.

2.6.1 One set of electronic water level indicator with remote indication with high level and low level alarm system shall be provided in reservoir to indicate the depth of water in meters and equivalent quantity of water in kiloliters. The instruments shall work with A.C. Power 230 volts back up with D.C. power supply.

2.6.2 C.I. lockable hinge type man-hole covers (water tight) of clear opening size 560 mm dia each 50 Kg. wt. with frame and cover fixed at suitable place on the roof slab of the tank. Minimum 1 (one) number shall be provided.

2.6.3 There shall be a suction chamber inside the UGR of minimum size 3.00m x1.5 m x 0.5 m depth, below the floor level of UGR, which will be placed at suitable location inside the reservoir as per site condition & direction of EIC.

2.6.4 There shall be 2 (two) nos. stainless steel Ladder made out of 50 mm dia pipe of Grade-410 with required anchors for the reservoir to facilitate access to both the reservoir and also 1 no. stainless steel ladder to facilitate access to roof of the reservoir at locations decided by the Engineer-in-charge. The stainless steel ladder with both side hand rail shall be made out of 40 mm dia S.S. pipe & riggers made out of 32 mm dia stainless steel pipe of 375 mm centre to centre both inner and outside the reservoir.

2.6.5 The tenderer has to be supply including erection, laying hoisting, fittings and fixing of C.I./ M.S pipes, specials and control valves of various size as detailed below including concrete bedding in RCC floor as well as wall of the Under Ground reservoir at ground level where ever necessary excavation of pipe line trenches, providing necessary support and staging, including supply of all jointing materials required for flange joint, lead joints or welding joints etc,. The required quantity of double flanged pipes, specials and valves with ISI mark will be supplied by the contractor's cost as per site condition and direction of EIC which should be included in the tender. The C.I. double flange pipes should be "B' class and wall thickness of M.S. pipes should be of 8mm.

For Feeder Line:
- 80mm dia puddle collar -2 nos.
- 80mm dia Bell month bend- 2nos.
- 80mm x 90^0dia double flanged bend- 2 nos.
- 80mm dia double flanged pipe- 2nos of suitable height (minimum 1.00 M below ground level) and extended up to 5 mtr. each from the outer edge of the UGR.
- 80mm dia duck foot bend- 2 nos.
- 80mm dia D.I sluice valve of PN-1.0 with hand wheel confirming to IS-14846/2000 with RCC M-25 valve chamber of inner size 1.00m X1.00m and height as per site condition and direction of EIC.

For Suction line:
- 80mm dia CI puddle collar-2nos.
- 200mm dia CI puddle collar-2nos

Over Flow:
- 100mm dia puddle collar-1 no.
- 100mm x 90^0dia Double flanged bend-1 no.
- 100mm dia M.S. grating-1 no.
- 100mm x 90^0 duck foot bend-1 no.
- 100mm dia double flange pipe of suitable length from over flow point to over flow chamber-1 set

2.6.6.a. The wall thickness of M.S pipes shall be Heavy duty and thickness of M.S. flange not less than the 20mm or as per the IS specification. Cast Iron pipes shall be of class "B" double flanged pipes and all specials and valves shall be C.I. / M.S. double flanged.

2.6.6.b. All R.C.C works shall be finished smooth and no plastering will be allowed except inside surface of walls and floors which shall be rendered with 20mm thick C.P. (1:3) with approved water proofing compound including cement punning with 2 coats of Epoxy Paint for skirting. Water Bar shall be provided where necessary. All exposed faces of the concrete and plaster over masonry shall be given two coats of

weather coat paint with primer of approved shade, with printing and writing of wall sign board consisting capacity of UGR, completion and commissioning date etc,. All iron works shall be painted with two coats of approved anti-corrosive paint (Epoxy) over a coat of primer. All masonry works shall be plastered with 12mm thick C.P. in (1.4) cement mortar. The overflow pipes shall be with required fittings shall be connected to the overflow chamber extended up to nearest drain or 5.00mtr. from the overflow chamber. Construction of 2 nos RCC over flow chamber of inner size 900mmx 900mm & depth as per site condition with cement plaster and punning. The outer cavity of UGR should be filled with sand There shall be 1000 mm width plinth protection with 250 mm thick Fly ash brick work in cement mortar 1:4 of minimum 300 mm height from proposed ground level and 450 mm below the existing ground level with necessary earth work in all kinds of soil / rock & back filling, P.C.C.1:3:6 with 40 mm size h.g.c.b. metal of 100 mm thick , 12 mm thick cement plaster both inner and outer of wall, filling the cavity with sand & top portion (i.e. from outer wall of UGR to Inner wall of plinth protection) with P.C.C. 1:3:6 of 100 mm thick & 40 mm thick cement concrete 1:2:4 over P.C.C. & making smooth etc. all complete as per direction of E.I.C.

Materials of following specification are to be used in the work. The tenderers are expectedtoposses and be well conversant with the following I.S. Standard and Code Practice.

1)	Cement	: as per IS: 269/1989 & 455/1989 (However the grade of cement to be selected by the Engineer-in-charge of work and sample cube test before commencement of work in each batch)
2).	Steel.	: I.S: 432/1982(part-1 & 2) and 1786/1985
3.)	Vibrator	: I.S: 7246/1974
4)	Aggregate	: I.S: 383/1970, IS: 515/1959
5.)	Water for mixing & curing	: Shall be clean, free from injurious amount of oil, salt, acid, vegetable materials and other substances harmful to concrete conforming to IS: 456/2000 and IS: 3023/1965
6.)	Sand/fine aggregate	: IS: 2116/1980
7.)	Binding Wire	: IS: 280/1978(galvanized minimum 1mm)
8)	Construction Joint	: IS: 3414/1968

NOTE;

1) In case of any doubt and absence of provision regarding specification I.S (Indian Standard) shall be referred. The latest version of the BIS code shall be followed.

Reference Text Books:

1. Concrete reservoir and tanks by G.P manning concrete publication Ltd., London.
2. Water towers Bunkers and silos by G.P manning concrete publications Ltd., London
3. Plain and reinforced concrete Vol. I and Vol. II by Jai Krishna and O.P Jain.

4. Reinforced concrete design by Mallick and Rangaswami
5. Design of R.C.C structures by P. Dayartanam
6. Any other Indian or Foreign publication in reputed journals by reputed authors.

28 PIPE COLOUR CODE

Sl no.	Pipe Lines	Ground / Base colour	First colour Band	Second colour Band
1	Drinking Water (All cold water line after filter)	Sea green	French Blue	Single red
2	Treated water(soft water)	Sea green	Light orange	
3	Domestic Hot water	Sea green	Light Grey	
4	Drainage	**Black**		

29 MOCKUP AND TRIAL ASSEMBLY .

The installation of the sanitary fixtures and fittings shall be as per the shop drawings approved by the Engineer-in-Charge. The tenderer shall have to assemble at least one set of each type of sanitary fixtures and fittings in order to determine precisely the required supply and disposal connections. Relevant instructions from manufacturers shall follow as applicable. This trial assembly shall be developed to determine the location of puncture holes, holding devices etc, which will be required for final installation of all sanitary fixtures and fittings. The above assembly shall be subjected to final approval by the Engineer-in-Charge. The fixtures in the trial assembly can be used for final installation without any additional payment for fixing or dismantling of the fixtures.

TECHNICALSPECIFICATIONFORELECTRICALINSTALLATIONWORK

1.1.0 GeneralRequirements

The installations shallgenerally be carried out in conformitywith the requirementsofIndian ElectricityAct,1910 asamended up to dateandIndian ElectricityRules, 1956 framedthere under, therelevantregulationsofthe ElectricSupply Authorityconcernedandalso withthe specifications laid down in the Indian Standard IS:732/1963 "Code of Practice (Revised) forElectrical Wiring Installations (System Voltage not exceeding 650V)". The work shall be executedasper National Electrical Code and if any itemis not covered there underor there isanydoubt,thespecification approvedbythe Engineer-in-charge willbe finalandbinding.

1.1.1 AmbientConditions

AllElectricalinstallationsandequipmentsshallbesuitabletoworkinfollowingambientconditions.

MaximumTemperature : 50DegreeCelsiusR

elativeHumidity : 100%

Inthevicinityof : ManoharpurCoalMines,Orissa.

1.1.2 SystemConditions

TheElectricalinstallationsandequipmentsshallbesuitableforoperationinfollowingsystemconditions.

Supplyvoltage	:	11KV/415Volts+/-10%
Supplyfrequency	:	50Hz+/-5%
NumberofPhases	:	Three

1.1.3 Materials:-

Allmaterials,fittings,appliancesusedinelectricalinstallationsshallconfirmtoIndianStandard Specifications wherever these exist. A list of approved materials is attached herewith.Materialsnotincludedinthelistaswellasanyparticularmakeshallbeapprovedbytheengineer-in-chargebeforeuse.Allrequiredmaterialscoveredunderthisspecificationexceptmentioned otherwise clearly, shall be supplied and installed by the contractor complete in allrespect.The materialsandaccessoriesrequiredfor completingthe work will form part ofthework althoughtheyhavenotbeenspecifiedseparately.

Selectionofmaterialsandinstallationworkshallbesuchastosimplifyoperation,inspection,maintenanceandtesting.Theworkshallincludeallreasonableprecautionsandprovisions forsafetyofoperationandmaintenancepersonnel.

1.1.4 Standard:-

(a) Unlessotherwisespecified,allmaterialscoveredunderthisspecificationshallbedesigned,manufactured,testedandinstalledinconformitywiththelatestIndianStandard Specifications. In case such Indian Standard Specifications are not publishedequivalentBritishStandardSpecificationsshallbefollowed.Allequipmentsshallconfirmto latestIndian ElectricityRules,PWD andLocal/Statelaws orbyelaws asregardstosafety,earthlingandotheressentialprovisionsspecifiedtherein.

(b) All equipments and materials selected shall also be supplied and installed taking intoconsideration the Factories Act, Fire Regulations and Local laws or byelaws. All lightfittings and equipments selected shall be of well tied out design. Allmaterials used inthe assembly of fittings and their accessories shall be of high quality and manufacturedinaccordancewith thebestmodernpractice.

(c) All the materials suppliedbythe contractoraccording to the contractconditions willbesubjecttoinspectionandapprovalbytheEngineer-in-chargeorauthorizedrepresentative from time to time. The contractor shall extend all required facilities forsuch inspection free of cost. At the time of inspection, the inspecting officer shall havefull liberty to reject any such material, which does not confirm to specifications or therequirements. No claim for any rejected materials shallbe entertained by the owner.Thecontractorshallremoveallrejectedmaterialsfromthesiteathisowncost.

(d) Nosurplusmaterialprocuredbythecontractorwillbeacceptedbytheowner.

(e) The contractor will be responsible for all liasioning activitieswith TPCODL or localauthoritiesduringtheexecutionofthecontract.Thecontractorshallgetelectricalinstallations inspected by the Electrical Inspector of the State Government and obtainthe statutory clearanceforenergization.The owner,on production ofdocumentaryevidences,willreimbursethenecessary statutoryfees. Thecontractor shallget thedrawings approved from appropriate authorities of TPCODL and obtain the necessarypermissions on behalf of IDCO. The contractor shall be responsible for handing over ofinstallations to TPCODL after energization. IDCO will extend all possible helps in

thisregardwhichiswithinthecapacityoftheOwner.

(f) The contractor shouldpossessvalidelectricalHT license and labor license issued bythe appropriate statutoryauthorityofthe State Governmentduringtheexecution ofthecontract.

1.1.5 InspectionandApproval

The contractor shall put up samples of all major items for inspection and testing by theEngineer-in-chargeforwhichthecontractorshallfurnishminimum10days'clearnoticeinadvance to enable them to depute their Inspecting Officer. Similar procedure shall be adopted fortheapprovalofSamplesofminor materials/accessoriestobeused forthework.

1.2.0 GENERALTECHNICALSPECIFICATIONOFMATERIALS

1.2.1 Switches&PlugSockets:-

Allswitches, 5A plug sockets,powerplug sockets,TVsocketsandTelephone sockets shallbeflushmountingtypewithISImarkofapprovedmake.Theswitchesandplugsocketsshallconfirmto IS:3854/1988,IS:1293/1988,IS:6538/1971 &IS:4615/1968.

1.2.2 FanRegulators&Dimmers:-

Electronic type fan regulators and light dimmers of approved make shall generally be used andshallbe of flushmounting type.

1.2.3 Wires:-

The wires used for internal electrical wiring shall be of single core PVC insulated sheathed/unsheathed 1100V grade stranded copper conductor wires (suitably color coded to distinguishdifferent phases and neutral) of approved make with ISI mark.The wires shall confirm to IS:694(Part-I & Part-II)/1964. The minimum cross sectional areaof conductors for the different usesshallbe as specifiedbelow.

(a)	Lightingpointwiring	:	1.5sqmmCopper.
(b)	Powerpointwiring	:	2.5sqmmCopper
(c)	SwitchBoardwiring	:	2.5sqmmCopper
(d)	Circuitwiring	:	2.5sqmmCopper
(e)	Sub-mainwiring	:	4.0sqmmcopper

1.2.4 Non-MetallicConduitandAccessories:-

Allnon –metalliconduitsshallconfirmtoIS:2509/1963andtheiraccessoriestoIS:3419/1965. The conduits may be either threaded type or plain type and shall be used with thecorrespondingaccessories.

1.2.5 SwitchBoxes:-

Metal boxes for switchboards shall be made of GI. sheet and round junction boxes shall bemade of cast iron. The minimum wall thickness of GI.boxes shall be 1.5mm (16swg) and cast ironboxesshallbe3mm.Fanhookboxesshallbemadeofm.s./GIsheetof1.5mmwallthicknesswith a

10mmround steelhook inside.Thesizeofthefanhookbox shallbe150mm dia and 65mmhigh. All GI boxes shall have not less than 4 screwed holes for fixing the top cover and a earthingstud. All metal boxes shall be provided with a cover of phenolic laminated sheet (Bakelite sheet),not less than 3mm thick fastened to the boxwith brass screws and cup washers.The coversshouldhave aminimum overlapof12.5mmonallsidesofthe boxforconcealedwiring. Theboxes shall be painted both inside and outside in case of m.s., with two coats of anticorrosiveprimer and two coats of enameled paint of approved shade. Adequate numbers of half punchedholes shallbeprovidedforconduitentry.

ThefollowingsizesofGIboardsshallnormallybeusedunlessotherwisespecified.

Switchboardsize		
Length	**Breadth**	**Height**
100mm	100mm	50mm
100mm	100mm	65mm
150mm	100mm	65mm
200mm	150mm	65mm
250mm	200mm	65mm
300mm	250mm	65mm
450mm	300mm	65mm

1.2.6 Angle/Batten/PendantHolder&CeilingRose:-

Brass or Bakelite type 5A, 250V, Angle Holders, Batten Holders, Pendant Holders & three wayceilingroseconfirmingtoIS:732(Part-2)/1982&IS:371/1979ofapprovedmakeanddesignwith ISImarkshallbeused.

1.2.7 DistributionBoards:-

All the L.T. Distribution Boards shall be suitable foroperation in 3 phase/ singlephase,415/240 Volts, 50Hz, neutral grounded at transformer system and a short circuit level of not lessthan 35MVA at 415 Volts. All Distribution Boards shall generally confirm to all relevant IndianStandardsamendeduptodate.

Distribution boards shall be of wall/ floor mounting type and totally enclosed having hinged doors, dust, damp and vermin proof construction. These should be made out of CRCA sheet steel and the enclosure should be acid treated for rust proofing, thoroughly cleaned, painted with two coats of anticorrosive primer and two coats of white enamel paint for interior and industrial grey enamel paint for exterior. All doors and covers shall be fully gasketed with neoprene PVC strips and shall be lockable. All the hinged doors shall be effectively earthed with flexible copper wires. Cadmium plated fixing screws shall enter holes tapped into an adequate thickness of metal or provided with hank nuts. Self-threading screws shall not be used.

The distribution boards shall be of adequate size with a provision of 25% spare space toaccommodate possible future additional switch-gears. Knock out holes of appropriate sizes andnumber shall be provided on detachable plates in the board in conformity with the location ofincomingandoutgoingcables/conduits.Noapparatusshallprojectbeyondandedgeofthepanel.No switch body shall be mounted within25mmofanyedge ofthe panelandnoholes,either than meant for fixing the panel shall be drilled within 13mm of the edge of the panel. Thevarious live parts shall be effectively screened by barriers of non-hygroscopic, non-inflammableinsulating materials or shall be so spaced that an arc can be maintained between such parts andearth. All items of switch-gears shall be readily accessible and all connections, including those toinstruments andapparatus,beeasilytraceable.

Thebusbarsandinterconnectionsshallbeofelectrolyticannealedcoppersuitableforcarrying full load current for phases & neutral bus bars and shall be extensible on either side. Themaximum current density shall be 1.25 Amp/sqmm for copper bus bars. The bus bars shall besupportedonSMC/DCM/Glassfibrereinforcedpolyester,non-breakablenon-hygroscopicinsulators at regular intervals to withstand the forces arising from short circuit in the system. Allbusbarsshallbeprovidedinaseparatechamberandproperlyventilated.Theminimumclearance between the phases shall be 25mm and between phase and earth shall be 20mm. Theinterconnection between busbars and switchgears of rating above 63A shall be through stripshaving125% ofthe switch-gear currentrating. Allbusbars shallbe suitably insulated by meansofheatresistantPVCsleevesorPVCinsulatingtapesandcolourcodedinphasesequenceofR-Y-B & N. The entire busbar shall be covered on the front with a Bakelite sheet barrier. In longersections of busbars, provision shall be made for thermal expansion by providing flexible jointsmade out of multi-foil thin copper/ aluminum foils. All joints shall be of clamped type as far aspossibleelseofboltedconstructionwithdoublecoverfish-plates.

All connections between pieces of apparatus or between apparatus and terminal on a boardshallbeneatlyarrangedinadefinitesequence,followingarrangementsoftheapparatusmounted there on, avoiding unnecessary crossings. Wire interconnections shall be colour codedand connected to terminals only by soldered lugs, crimped lugs without cutting away the strands.No interconnecting wires shall come in contact withthe live busbars other than the terminalpoints.Thearrangementofbusbarsshallconfirmto IS:375/1963.

An enamelled danger notice plate shall be provided on the boards connected to mediumvoltagesupply&above.

Adequate space shall be provided for accommodating various instruments. These shall beaccessible for testing and maintenance without any accidental contact with live parts of circuitbreakers,switch-gears,busbarsandinterconnections.Theindicatinglampsshallbeprovidedwith individual switch and fuses. The voltmeters shall be provided with fuses for each phase. Thecontrol wires shall be of 2.5sqmm copper for CT circuits and 1.5sqmm copper for the rest. ThecontrolwiresshallbeneatlybunchedtogetherinsidePVCtrunkingsecurelyfastentothecompartment properly marked with ferrules at the end. A separate tamper proof compartmentwith locking arrangements as per the requirements of the supply authority shall be provided forhousingoftheenergymeters.

(a) BranchDistributionBoards(BDB):-

The branch distribution boards shall be surface mounted or concealed type and made out of1.6mm (16 swg) CRCA sheet steel. At least one number hexagonal earthing stud for single phaseBDBsandtwonumbersearthingstudsforthreephaseBDBsshallbeprovided.Thecomponentsof the BDBs shall be mounted on a detachable 2mm thick CRCA sheet steel frame works for easymaintenance. The minimum size of wires to be used as interconnecting wires shall be 2.5 sqmmcopper. Each outgoing circuit of the BDB shall be provided with a fuse/ MCB on the phase or liveconductor. The earthed neutral conductor shall be connected to a common link and be capable ofbeingdisconnectedindividuallyfortestingpurpose.DoorinterlockingwithMCBsshallbeprovided such that doors shall open only with MCBs in OFF position. All the live parts inside theBDBshallbecoveredwithaBakelitesheetwithatleast3mmthick.

(b) MainDistributionBoardsandSubDistributionBoards:-

TheMainDistributionBoards(MDB)andSubDistributionBoards(SDB)shallbewallmounted or floor mounted type and made out of 2.0mm (14swg) CRCA sheet steel. In case of wallmounted boards the entire sheet steel enclosure shallbe mountedon a m.s.angle frame workwith adequate fixingarrangementforgrouting. In case of floor mountedboards theenclosureshall be fixed to a m.s. angle framework with m.s. base channels. All the incoming and outgoingswitch-gearsandbreakerotherthanMCBsshallbefixedinseparatecompartments.

All switch-gears above 63A rating and breakers shall be provided with door interlocks so asto open only in OFFposition.All MCCBs shall be provided with external operatinghandle.TheON, OFF, TRIP (where available), Rating marking and nomenclature plates shall be provided nearoperating handle. A continuous earth bus made out of Galvanised Iron or Aluminium strips ofadequate size shall provided at the bottom of panel for the entire length. Arrangement shall bemade at both the ends of earth bus for easy entry and termination of earthing lead from externalearth installations.

Cable compartments of adequate size shall be provided for easy termination of all incomingandoutgoing cablesenteringfrombottomortop.Propercablesupportsshallbe providedincablecompartments.Allincomingandoutgoingterminalsshallbebroughtouttoterminalblocksorto aextendedrigidstripdirectlyfromtheswitch-gear/breaker.Separatecablecompartmentsshallbeprovidedforincomingandoutgoingcables.Ventilationarrangementintheformoffinelydividedwiremeshshallbeprovidedatbothsidestowardsthe top.

1.2.8 MiniatureCircuitBreaker(MCB):-

Theminiaturecircuitbreakersofapprovedmakeshallbe ISImarkedandcapableofwithstandingminimum25000switchingoperationsandfullyautomaticwithprovisionofthermal and magnetic tripping arrangements. All MCBs shall be of minimum 9KA short circuitratingandconfirm toIS:8828/1993&BS:3871.

1.2.9 ChangeoverSwitches:-

Thechangeoverswitchesshallbeloadbreaktypeshavingthreedistinctpositionofoperation. The ON and OFF positions of the switch shall be clearly indicated. The door interlockwithdefeatmechanismshallbeprovidedforswitchunitsconfirmingIS:8623/1977.Thechangeoverswitchesshallconfirmto IS:4064/1978andIEC:408andbearISImark.

1.2.10 RewireableFuses

The re-wireable fuses (Kitkat) shall be semi-enclosed type consisting of a re-wireable fusecarrierandfusebaseandshallbemadeoutofeitherporcelainorBakelite.Thebreakingcapacityofthesefusesshallbe4000 Ampon400 Volt.TheseshallbearISImark.

1.2.11 EnergyMeters(KWHMeter)

The Energy Meters (KWH meter) shall be either whole current or CT operated type. Theseshall be duly tested and calibratedbythe supply authorityprior to fixingandnecessary testcertificateshallbefurnished.

1.2.12 LTPowerCables

The LT power cables shall be of PVC insulated and PVC sheathed, 1100 Volt grade, singlecore or multi core, GI wire / strip armoured, stranded aluminium conductor cables of approvedmake and should bear ISI mark. The armoured cables shall confirm to IS:1554(Part-I)/1976 andun-armoured cables to IS:694/1977**.**

1.2.13 CeilingFans

The AC ceiling fans shall be of approved make & brand and suitable for operation on 230V50Hz single-phase supply. The fans shall consist of all standard accessories such as 300mm longdown rod, canopies, shackle, 3or 4 fan blades, capacitors etc but excluding speedregulator. Thefan motor shall be of permanent capacitor run totally enclosed with double ball bearing and thewinding shall be made of super enameled copper wire with class-E insulation.These fans shallconfirm toIS:374/1979withamendmentnumber1,2 &3.

1.2.14 ExhaustFans

The exhaust fans shall be of approved make & brand and suitable for operation on single/three phase 230/ 415V 50Hz supply. The fans shall consist of all standard accessories such asimpeller blade, fixing frames, capacitors, anti vibrationpadsetc.Theexhaust fanmotor shallbeof permanent capacitor run, continuous rated, totally enclosed with double ball bearing and thewinding shallbe madeof superenamelled copperwirewith class-A/class-E insulation.Soundlevel of the exhaust fans shall not exceed 60db for domestic application and 65db for industrialapplication. Gravity louver shutters made out of aluminium sheets with a steel frame/ wire guardshall be provided with these fans. These shall have IP:44 degree of protection. The exhaust fansshallbearISI markandconfirm toIS:2312

1.3.0 INSTALLATION

1.3.1 PortionsofWiring

1.3.1.1 PointWiring

Point wiring shall consist of a switch on the board and wiring up to termination point viathecontrolswitchandneutral.Theseterminationpointscan be:

(a) A ceilingroseor connector in case of call bell or ceilingfanorexhaustfanpointwiring.The wiringfromceilingroseorconnectortoceilingfanorexhaustfan pointshallbeconsideredwith theinstallationoffans.

(b) Aceilingroseincaseofdirectlyfixedtypefluorescentfixtures,suspendedpendants.

(c) A back plate in case of suspended type fluorescent fixtures, suspended or stiff pendants,wallbrackets,bulkheads,spotlightsimilarfittings.

(d) Alampholderincaseofangleorbattenholders.

(e) Aconvenientwallplugincaseofplugonboardorseparateboardpoints.

Wiring for light points and fan points shall be carried out with minimum 1.5 sqmm copperstranded conductor wire.For the purposeofmeasurementthe pointsareclassifiedasbelowwhereverspecified.

(a)	**Shortpoints**	**:**	**Upto3.0mlong**
(b)	**Mediumpoints**	**:**	**3.0mto6.0mlong**
(c)	**Longpoints**	**:**	**6.0mto10.0mlong**
(d)	**Speciallongpoints**	**:**	**Above10.0mlong(Asspecified)**

Where classification ofpointsare notspecified, the point wiring shall mean wiring to thealltypespointsasdescribedaboveirrespectiveofthe lengthofthe point.

The wiringwhetherconcealedor surface shallbe easilyaccessible forinspection. PowerandHeatingsub-circuitsshallbekeptseparateanddistinctfromlightingandfansub-circuits.The balancing of circuits in three phase installations shall be arranged before hand. Circuits ofdifferent phases of a.c. system shall be kept minimum 2.0m apart or enclosed in earthed metalcasing.Medium voltage wiring and associated apparatus shall comply,in all respect,with therequirementsofrules50,51and 61ofIndianElectricity Rules,1956.

Thepositionofrunsofwiringandtheexactpositionofallpoints,switchboards,distribution boards shall be marked in the building for approval of Engineer-in-charge prior toexecution. The wiring shall be carried out in looping back system in which the phase conductorshall be looped at the switch box and that of neutral at the junction box and point terminals. In nocase,Jointshallbemadebareorbytwistingtheconductors.

Lightsandfansmaybewiredonacommoncircuit.Suchcircuitshallnothavemorethan atotalofeither10pointsor aloadof800watts.

Forthepurposeofdeterminingloadpercircuit,thefollowingratingforpointsshallbeassumed.

(a)	Lightpoints(Incandescent)	:	60
	watts(LEDtubelights)	:	
	25watts		
	(LEDlamps)	:	10watts
(b)	Ceilingfanpoints	:	80watts
(c)	Exhaustfanpoints	:	80watts
(d)	5Ampplugpoints	:	100watts
(e)	15Ampplugpoints	:	1000watts

Unlessandotherwisespecified,thefollowingminimummountingheightofthebottommostpartof the fittingsand fixturesfrom finishedfloorlevelshallbemaintained.

(a)	DistributionBoards		:2.130metre
(b)	Switchboard		:1.3000metre
(c)	5A&15Aplugsonseparateboard	:	0.300metre
(d)	Ceilingfan		:2.750 metre
(e)	Lightfitting		:2.600 metre
(f)	TVantennaandTelephoneoutlets	:	0.300

1.3.1.2 CircuitWiring

CircuitwiringshallmeanwiringfromBDB/SDBuptothejunctionboxesforswitchboardscontaining5A/15Aswitchesand plugs.Forthepurposeofmeasurement,incaseof

multiple switch boards under one circuit, the circuit wiring shall mean the sum of the length ofwiring from BDB/ SDB upto junction box of first switch board and junction box of first switchboard to the junction boxofnextswitch board and soon. The minimum size of conductor forcircuit wiring shall be 2.5 sqmm copper. A circuit shall not contain more than 2 number powerplugs. If not specified in point wiring to power plugs, the wiring to the same shall be treated ascircuitwiring.

1.3.1.3 Sub-mainWiring

Sub-main wiring shall mean wiring from Main switch/ Meter board upto BDB/ SDB. Theminimumsizeofwireshallbe4.0sqmmcopperor6.0sqmmCOPPER.Thereshallbenojointingof wires as far as practicable. PVC ferrules shall be provided at both the ends of the wire for easyidentification.

1.3.2 TypesofWiring

1.3.2.1 ConcealedNon-metallicConduitWiring

Theconcealednon-metallicconduitwiringshallbecompletedinthefollowingthreephases.

(a) Conduitlayinginroofbeforecasting.

(b) Conduitlayinginwalls&fixingofswitchboardbeforeplastering.

(c) Wiredrawinginsideconduit,fixingofswitch,socketaccessories,testingofinstallations complete.

Thesizeofconduitshallbe so chosenthatthewiresprovidedinside shallnotoccupymore than 50% of thecrosssectionalarea.The maximum permissiblenumberofsinglecorewires,whichcanbedrawninsidenon-metallicconduit,shallbeasperthe tablegivenbelow.

Sizeofwireinmm^2	**Sizeofconduitinmm (Maximumno.ofwirespermissible)**						**Remarks**
	16	**20**	**25**	**32**	**40**	**50**	
1.0mm^2	**5**	**7**	**13**	**-**	**-**	**-**	
1.5mm^2	**4**	**6**	**10**	**-**	**-**	**-**	
2.5mm^2	**3**	**5**	**10**	**-**	**-**	**-**	
4.0mm^2	**2**	**3**	**6**	**10**	**-**	**-**	
6.0mm^2	**-**	**2**	**5**	**9**	**-**	**-**	
10.0mm^2	**-**	**-**	**4**	**7**	**9**	**-**	
16.0mm^2	**-**	**-**	**2**	**4**	**5**	**-**	

25.0mm^2	-	-	-	2	4	6	
35.0mm^2	-	-	-	-	2	5	
50.0mm^2	-	-	-	-	2	3	

Adetailconduitroutelayoutavoidingunnecessarycrossingshallbepreparedbythecontractor andapproved from Engineer-in-charge prior to laying of conduit in roof slab. Theconduits and junction & fan hook boxes shall be rigidly tied to the reinforcement of the slab.Minimum75mm x75mmsize sheet metal inspection cum pull box shall be provided within 5metre run of conduit.Suitabletype expansion jointfittings shall be provided along the conduitrun crossing the expansion joint of the building.. Dummy or spare conduits shall be laid whereverrequiredasperdirectionof Engineer-in-charge.

Thedropsfromtheroofslabinwallsandcolumnsshallbemadeverticalasfaraspracticable.Horizontalrun of conduitonbrick orstone masonrywallsshallbeavoided. Theconduit and the switch boards shall be fixed in the wall by cutting chase and neatly finished withplastering after fixing. All curves in the conduit pipe shall be made by bending pipe with a longradiuswhichwillpermiteasydrawingofconductors.TheMSboxesshallbeprovidedwithtemporarycoverstosafeguardagainstfillingofcementmortaretcwithinthetenderedcost.

The wires shall be properly colour coded and carefully drawn inside the conduit throughuse of fish wire. All the metal boards shall be suitably earthed by earth continuity conductor.AllConductors shallbe providedwithcablesocketsatterminationpointsexpectatswitchboardlooping and joint boxes. Wires carrying current in a conduit shall be so bunched that the outgoingand the return wire are drawn into the same conduit. Wires of different phases from differentcircuitsshallnotruninoneconduit.Inthreephaseinstallation,plansshallbemadeforbalancingof loadsinallphasesbeforecommissioning.

1.3.3 CableLaying&Installation

The cables shall be of approved make and tested at factory in presence of Engineer-in-chargeorhisauthorisedrepresentative.Thecablesshallbedespatchedtotheworksitepackedon wooden drums with both ends properly sealed. Jointing of the cables in between the terminalpointsshallbeavoidedasfaraspossible.Forlongerlengthofcableexceedingthenormallengthof manufacture, cables may be joined by means of jointing kits only. The cables shall be tested forinsulation resistance by 500-volt insulation Megger for cables upto 1100 volt grade and by 2500volt insulation Megger for cables beyond 1100V grade prior to laying of the same. Cable loops forfuturerequirementshallbekeptatbothendsasperdirectionoftheEngineer-in-charge.

Onenumber6swgG.I.wireincaseofsinglephase230Va.c.systemandeither2numbers6swgG.I.wireor2numberssuitablesizeG.I.flatincaseofmultiphase400Vor

morea.c.systemshallrunallalongthetrenchortraywiththecablesasearthcontinuityconductor. The supply and laying of earth continuity conductor such as G.I. wire or flat has beenconsideredseparatelyinthescheduleofquantity.

Minimum bending radius for PVCinsulated armoured cables shall be 1200mm.At jointsand terminals, the individual cores of multi-core cable should never be bent so that radius ofbending islessthan12timestheoveralldiameterofthecable.

Wherevermorethanonecableshallexist,suitablemarkertagsinscribedwithcableidentification details shall be permanently attached to all cables in the man hole, pulpits, joints,openducts,underground cablesetcat suitableintervals.

The laying and installation of cable shall be carried out as per IS:1255/1983. The methodsofcable layingshallbeoffollowingtypesdependinguponthe requirements.

(a) Layingdirectlyunderground

(b) Layinginsideducts

(c) Layingonracksortraysinair

(d) Layingalongbuildingstructuralelements

1.3.3.1 LayingDirectlyUnderGround

Cabletrenchesshallbeexcavatedcuttingalltypesofsoilandrockuptoaminimumdepthof750mm forL.T.cables &1200mm for H.T.cables andofappropriatewidth (notlessthan350mm)toaccommodatethecablesandcableprotectingmaterialswithinthetenderedrate.

The sidesandbottom of the trench shall be dressed and filled with 75mm thicklayer offine sand. The cables shall then be laid withbrickson both side of each cable continuouslyalongthe length. Spacebetween the bricks shallbe filledwith fine sand upto 75mmabove the topofthe cable. The top layer bricks shall be placed side by side continuously as protective cover. Thehorizontaldistancebetweentheadjacentcablesshallbeminimum200mm.Theclearancebetweentheouter cableto thesidesofthetrenchshallbeatleast150mm.

In case of multiple tiers, same procedure shall be applied keeping a vertical clearance of300mm among the tiers and the top mostlayer shall be kept ata depth of 750mm for LT cablesand1200mmforH.T.cablesfrom finished ground level.

The trench shall then be filled up with the excavated materials free from stone or sharpedgeddebrisanddulycompacted.Acrownofearthneitherlessthan50mmnormorethan100mminthecentreand taperingtowardsthesidesofthetrenchshallbelefttoallowforsubsidence.

Cable route markers shall be installed at salient and strategically located points parallel toand 500mm or so away from the edge of the trench for easy identification of cable routes at amaximumintervalof 10 metreforstraightrun.

In locations such as road crossing, pipe line crossing, entry to buildings or poles in pavedarea etc, the cables shall be laid in pipes or closed ducts. Pipes provided for entry to building shallslope upward to prevententryof watertothe building.Stoneware,cast iron,NP-2 classRCCpipes or medium class M.S./G.I. pipe of appropriate diameter shall be laid during the constructionto avoiddamagelater on.

Incaseofstonewarepipes,a100mmthick1:3:6cementconcretecoveringshallbeprovided. In case of cast iron or RCC pipes no concrete covering is required. The collars in case ofRCCpipesshallbeembeddedby1:2:4cementconcrete.Topsurfaceofpipeshallbeataminimum depth of 1.0 metre. The minimum size of hume pipes shall not be less than 100mm indiameterforasinglecableandnotlessthan150mmformultiplecables.

The diameter of the cable protecting pipes shall be at least 1.5 times the outer diameter ofthecable.Inonepipe,singlecorecablesshallnotbelaidindividuallybutinstead,allthethree/fourcablesofthesamesy stem shallbe laid.

1.3.3.2 LayingalongBuildingStructuralElements

Cablescanbe routedinsidethebuildingsalongthestructuralelementssuchas walls,columns etc or inside trenches or hume pipes or G.I. pipes under floor. The cables shall be laid orfixedalongthewallorcolumnwiththehelpofM.S./G.I.flatclampsorsaddleswithanintervalnotexceeding0.5metre.T hecablesinsidebrickmasonrytrenchesshallbelaidonracksordirectlyabovethefloorofthetrenchandthetrenchshallb ecoveredwithm.s.chequredplates.In case of layinginside humepipes or G.I.pipes, man hole chamber with

RCC cover shallbeprovidedatsuitablelocationforeasymaintenance.Thecablesshallnotintersecteachotheralongits route.

1.3.4 JointingofCables

The quality of joints shall be such that it does not add any resistance to the circuit. Thematerials and techniques employed for jointing should give adequate mechanical and electricalprotection to the joints under all service conditions. The joints shall be resistant to all corrosionandchemicalreactions.The followingthreebasictypesof cablejointsshallbe used.

(a) Straightthroughjoints

(b) Teeorbranchjoints

(c) Terminationorsealingjoints

1.3.5 InstallationofDistributionBoards

All main switch-gears shall be installed in dry situation as near as possible to the point ofsupply. The neutral wires shall be continuous except at the linked switch-gear.Main distributionboardsshallbe installedin well-ventilatedroomsorcupboards accessible toonlyauthorizedpersons or recessed having locking arrangement. The distribution boards shall not be installed indamp situations, in the vicinity of storage batteries, places exposed to chemical fumes or whereinflammableorexplosivedust,vapourorgasislikelytobepresent.Theseboardsshallnotbe erected above gas stoves,sinks, inbathrooms,lavatories,toilets, kitchens,places exposedtoweatherorwithin2.5metreofa washingunitinthewashingroomsandwashbasins.

Fixing of distribution boards in places likely to be exposed to weather, drip or abnormalmoist atmosphere shall be avoided. Where it is unavoidable, outdoor distribution boards withoutercasingontheswitchboardsshallbeinstalledmakingitweatherproofandshallbeprovidedwith glandorbushingsor adapted to receive screwed conduit according to the mannerinwhich cablesarerun.

The indoordistributionboardsshallbe mounted concealedor semi-concealed or surfaceto the wall or on foundations above the floor. The panels shall be so mounted that it is accessiblefor fusereplacementandoperationofswitch-gears&breakers.

The topmost heightof the panel shall notbemore than 2metre from the floor level. Incase of Branch Distribution Boards shall generally be installed at a height of 2.13 metre fromfinished floor level. A minimum clearance of 1 metre shall be provided from the surface of dooropeningoftheboardsfor maintenance.

All distribution boards shall be marked lighting or power, voltage, number of phases ofsupply,circuitlist,currentratingofthecircuitandratingoffuseelement.Allwiringandterminationsshallbeprovided withcablelugsandneatlyarranged.

Adequate space shall be provided on bottom or top or back as required for easy cable andconduit entry. The cables shall be terminated at the distribution board with corresponding size ofbrass cable gland. Theglandsshallbe fixedtightly tothepanelwithoutallowinganygaporopening on the hole. The armours of the cable shall be suitably earthed. For conduit entry, PVCcouplings fornon-metallic flexible conduit and brass coupling for G.I. flexible conduit shallbeused.Noholesshallbekeptopenonanysideofdistributionboard.

Distributionboardsshallbeearthedattwopointsfromtwo separate&distinctearthelectrodes in caseof three phase boardsand one pointin caseof single phase boardseffectivelybymeansofG.I. wireorflatas specified.

1.3.6 InstallationofCeilingFans

Unless otherwise specified,the bottom most part of the ceiling fans shall normally be keptat a height of 2.75 metre above finished floor level. In no case, it shall be lower than 2.4 metreabovethe

finishedfloorlevel. Aminimum clearanceof300mm shallbe maintained fromtheceiling/beam to the plane of fan blades. The mounting height of all ceiling fans installed inside ahallor room shallbe same. The metal parts of the ceiling fans shall be effectivelyearthed. Thefansshallbeassembledand mountedasper themanufacturer'sinstructions.

The wiring to the ceiling fan from the nearest point shall be carried out with 3 core 1.5sqmm PVC insulated stranded copper conductor cords. The down rod & clamp shall be paintedwith enamel paint of approved shade without involving any extra cost. Round bakelite sheet shallbe provided onthefanhookboxes.

1.3.7 InstallationofExhaustFans

Exhaustfansshall be fitted bymeansof rag boltsembeddedin thewall.The requiredholesinthewallshallbemadeandfinishedneatlywithcementplasterandbroughttotheoriginal finishof the wallwithin the tenderedrates.Gravitylouvre shuttersof suitable size shallbe fixed on the outside wall covering the hole for the exhaust fan in order to restrict the inrush ofrainwater etc. A wire mesh shall be provided in place of gravity louvre shutters to restrictttheentry of birds where there is no chance of inrush of rainwater. All the metal parts of the exhaustfansshallbeeffectivelyearthed.Thefansshallbeassembledandmountedasperthemanufacturer's instructions. The wiring to the exhaust fan from the nearest point shall be carriedoutwith 3 core1.5sqmm PVCinsulated strandedcopperconductorcords.

1.3.8 InstallationofEarthing

The earthing installations shall generally conform to IS:3043/1966 and requirements ofIndianElectricityRules,1956.

All three-phase medium voltage equipments shall be earthed by two separate and distinctconnectionswithearththroughearth electrodes.Single phaseequipmentsshallbeearthed atleast at one point. In case of high & extra high voltages, the neutral point shall be earthed by notlessthantwoseparateanddistinctwitheartheach havingitsownelectrode.

Anearthingelectrodeshallnotbesituatedwithinadistanceof1.5metrefromthebuilding whose installation system is being earthed. The cross sectional area of earth continuityconductorinelectricalinstallationshallnowherebelessthan16swgcopperor14swgGIwire.The earth resistance for various installations shall be restricted within the following maximumpermissiblelimits.

NonindustrialBuildings : 5ohms

Earth continuity inside aninstallation : 1 ohm(From electrode to any point ininstallation)

Thefollowingtypesofearthinginstallationsshallingeneralbeprovided. (a) Pipe earthing

PipeEarthing

Pipeearthelectrodesshallbeofperforatedclass BG.I.pipeofspecifiedlengthanddiameter. Galvanising of pipes shall conform to relevant ISS. The G.I. pipe electrode shall be cuttaperedatthe bottomandprovided withholesof12mmdia drillednotlessthan75mm fromeachotherinzigzagmannerupto500mmfromthetopoftheelectrode.Apairof50mmx5mm

G.I. flat clamp with 2 nos 18mm dia drilled holes on either side shall be welded to the electrode atabout150mm belowthetopofthepipe.

The electrode shall be buried in the ground vertically with its top not less than 200mmbelow the ground level. The pipe earth electrode shall be surrounded by, either salt & charcoal inalternate layers or a homogeneous mixture of the both, for a radius of about 150mm and upto aheight of about 250mm below the top of the electrode. The balance portion of the excavated pitshallbefilledwithgoodquality soilandproperlycompacted.

A brick masonry chamber with hinged cast iron/ removable RCC inspection cover of size300mm x 300mm shall be constructed within the tendered rate. Watering arrangement shall bemadewithfunnelandwiremeshfixedbymeansofareducersocketonthetopoftheelectrode.

1.3.10 InstallationofEarthingLeads

The earthing lead connecting the earth electrode to the apparatus or installation directlyshall be of the same material as earth electrode. The earthing leads shall beeither wiresor stripsofadequatesizeasspecifiedandofeitherG.I.ortinnedcopper.TheG.I.leadsshallbeconnectedto the electrode by means of 16mm dia G.I. nut bolts with flat & spring washer and the tinnedcopperleadsshallbeconnectedtotheelectrodebymeansof16mmdiabrassnutboltswithflat& springwasher.

Allearthconnectionsshallbevisibleforinspection.Theearthingleadfromelectrodeonwardsshallbesuitablyprotectedfrommechanicalinjurybymeansof20mmdiaG.I.pipefor

G.I.wires.Theportionofthisprotectionpipewithingroundshallbeburiedatleast300mmdeepfromgroundlevel.(Subjectoincreaseuptoadepthof600mmin
roadcrossingsandpavements.)Theportionwithinthebuildingshallberecessedorclampedatnotmorethan500mmintervalinthewalls/columns/beamsetcandrecessedinthefloors.Jointsintheearthing lead from earth electrode to apparatus shall be avoided as far as practicable. However ifjoints are inevitable, same shall be done by welding or proper bolting in case of G.I. strips andbrazing or proper bolting in case of tinned copper strips. The welded joints in G.I. strips shall beappliedwithbituminouspaintandwrappedwithbituminoustape.

1.4.0 SPECIFIATIONSOFENERGYEFFICIENTLEDBASEDLUMINARIESUNIT

1.4.1 ELECTRONICCOMPONENTS

Theelectroniccomponentsusedshallbeasfollows:

- IC(IntegratedCircuit)shallbeofindustrialgrade.
- Theresistorsshallbepreferablymadeofceramicormetalfilmofadequaterating.
- The heavy components shall be property fixed. The solder connection should be withgood finish.
- The infrastructure for Quality Assurance facilities as called for in the Specification shallbe available for the manufacturing of this product. The compliance shall be indicatedclearly inthetenderitself.

1.4.2 CONSTRUCTION

- CRCAPowderCoated,extrudedaluminumandpressurediecastaluminum(sand/gravitycastingnotto beconsidered).AluminumgradeLM6063 orLM6asapplicable or above high conductivity heat sink material shall be used or housing ofluminaire.
- SuitablenumberofLEDLampsshallbeusedintheLuminariestoensuresuitablesystemoutputandpower consumption.

- Thecontrolgearshallbedesignedinsuchawaythattheallcriticalelectroniccomponentstemperaturerisei srestrictedto35to40DegCaboveambienttemperature.
- Control gear and LED shall have two separate physical compartments and shall haveseparateheatsink sothattheheat fromeithershouldnotaddtoother.
- The luminaries shall be such that the glare from individual LED is restricted and shallnotcauseinconveniencetotheuser.
- The fixture should be impact resistant with suitable protection by cover for driver andLED'sbasedonapplicationneed.
- Thefixtureshouldhavedesignedsuitableingressprotectionasperapplicationrequirements.

1.4.3 HIGHPOWERANDHIGHLUMENEFFICIENTLED'SSUITABLEFORFOLLOWINGFEATURESSHALLBEUSED:

- TheefficiencyoftheLEDlampsat85Cjunctiontemperatureshallbemorethan80%
- LEDJunctiontemperatureshouldnotcrossmorethan120Cforlongevityofluminaries.
- Solderpointtempshouldnoztcross75C.
- TheworkinglifeoftheLEDsatambienttemperatureofmorethan85DegCformaximumcurrentshallbemor ethan50,000hoursofaccumulativeoperationandshall be suitable for continuous operation of 12 hours per day these shall be supportedwiththesuitable sectionofthe LM80reportfrom themanufacturerofLED.
- Color temperature of the proposed white color LED shall be 4000K / 5700K / 6500KANSI RatedBinonly.
- LEDsusedintheproductsshallbetestedforphotobiologicalsafetyasperIEC/EN62471andthe testreportfromOEM shallbeattachedforthis.
- The output of LED shall be more than 110 lumen (+/-5%) per watt at maximum ratedoperatingcurrent.
- The color rendering index (CRI) shall be of-nominal 70 (or more) for R1 to R15 colourshadesasper CRIstandard.
- Variation in illumination level shall be + - 2% is allowed in input voltage range from150VAC to270VAC
- The illumination shall not have infra-red and ultra-violet emission. The test certificatefromtheinhouselaboratoryor OEMshallbesubmitted.
- ElectronicefficiencyofLEDdrivercircuitshallbemorethan85%

1.4.4 ELECTICAL/TECHNICALSPECIFICATIONS

- SupplyofLEDluminariescompletewithhousingandadheringtothefollowingspecificationsandlightingd esignrequirementswillbeaspertheactualapplication:
- LEDDrivershallbemadeupofICwithAPFCCircuithavingMultiStageIsolatedtopologywithConstantCurr entConstantVoltageDriving stage.
- The driver card shall cut off at 270 V and shall resume normal working when nominalvoltage is

applied again. This is to ensure protection of luminaries from neutral faultsanderrorinconnectionat sites.

- Efficiencyofdriverelectronicsshallbemorethan85%
- The LEDs should be driven at the suitable current and within the permissible limitsspecifiedbytheLED chip/lampmanufacturer.
- The fixture shall be designed so as to have lumen maintenance ofatleast70% attheendof50,000hours,
- Theluminariesshouldbeoperablewithautoadjustable150-270VsupplyVoltageusingthesamedriver.
- PowerFactoroftheelectronicdrivershouldbeatleast>0.95withTHD<10%.
- LEDDrivershallbemadeinIndiaforeasyavailabilityandservice.

CONFORMANCESTANDARDS:ProductCertificationshouldbeobtainedfromULlab.Thefollowingtest reportsshould beprovided:

LM-79	Luminariesefficiency(photometrydata)foranyonewattage shallbesubmittedfromthesamefamily

*LEDChipmanufacturer/Luminairedatawillberequiredforthiscertification

LM-80*	LEDchipdata				
EN62471	PhotobiologicalSafetyforHumans				
IP65	Luminaries	Ingress	Protection	for	Outdoor

	Luminaires
	CertificateofAssociationfromLEDManufacturer

1.5.0 TESTING

Before a completed installation or an addition to an existing installation is put into service,the following tests shall be carried out by the electrical contractor in presence of Engineer-in-charge.

(i) Polaritytest

(ii) Insulationresistancetest

(iii) Earthcontinuitytest

(iv) Earthelectroderesistancetest

1.5.1 PolarityTest

It shallbeensuredby thistestthatthe singlepole switcheshavebeen fittedon the liveside of the circuit they control. In a two-wire installation, test shall be made to verify that allswitches in every circuit have been

fitted to phase conductor or non-earthed conductor of thecircuit. In three or four-wire installation, test shall be performed to verify that every non-linkedsinglepoleofswitchisconnectedtooneofthephaseconductorofsupply.

1.5.2 InsulationResistanceTest

Theinsulationresistanceshallbemeasuredbyapplyingbetweenearthandwholesystemof conductors or any section thereof with all fuses in place and all switches closed and except inearth concentric wiring, all lamps in position or both poles of installation otherwise electricallyconnected together, a DC voltageofnotlessthantwicethe working voltage, provided that itdoesnotexceed500voltsformediumvoltagecircuit.Wherethesupplyisderivedfrom3wire

a.c. or d.c.orpolyphase a.c.system the neutralpole of which is connectedto earth directorthrough added resistance, the working voltage shall be deemed to be that which is maintainedbetweentheouter orphaseconductorandneutral.

The insulation resistance of an installation measured as above shall not be less than 50Mega-Ohms divided by the number of points of the circuit providedthat the whole installationshallbe requiredtohave insulationresistancegreaterthanoneMega-ohm.

Controlrheostats,heatingandpowerappliancesandelectricsignsmay,ifdesired,bedisconnectedfromthecir cuitduringthetest,butinthiscasetheinsulationresistancebetweenthe case of frameandall live partsofeach rheostat, appliancesand signs shall notbe less thanhalfaMega-ohm.

The insulation resistance shall also be measured between all conductors connected to onepole orphase conductorof the supplyand allconductors connected to the neutral or the otherpoleorphaseconductorofsupply.Suchtestshallbemadeafterremovingallmetallicconnectionsbetweentwopol esoftheinstallation.Theinsulationresistancebetweentheconductorsofinstallationshallnotbelessthanthatspecified above.

1.5.3 EarthContinuityTest

Theearthcontinuityconductorincludingmetalconduitsandmetallicenvelopeofcablesin all cases shall be tested for electric continuity and electrical resistance of the same alongwiththe earthing lead but excluding any added resistance of earth leakage circuit breaker measuredfrom the connection with the earth electrode to any point in the earth continuity conductor in thecompletedinstallationshallnotexceed1ohm.

1.5.4 EarthElectrodeResistanceTest

Theresistanceofeachearthelectrodeshallbetestedwithanearthtesterandthecombinedearthresistanceofthe earthgridofaninstallationshallbemaintainedasmentionedbelow.

DistributionSubstations	:	2ohms
IndustrialBuildings	:	4ohms
NonindustrialBuildings	:	5ohms
Earth continuity inside aninstallation	:	1ohm(Fromelectrodetoanypointininstallation)

1.5.5 The completed installation shall be taken over only if the results obtained from the abovetests are within the limits mentioned above and in accordance with I.E. Rules. On completion oftestingofinstallation,acertificateshallbefurnishedbythecontractorcountersignedbythecertified supervisor having a valid electricalsupervisory license issued by ElectricalLicensingBoard of the State Government under whose direct supervision the installation was carried out.Thiscertificateshallbeinaprescribedformobtainablefromlocalsupplyauthority.

1.6.0 SPECIALCONDITIONSOFCONTRACTFORELECTRICALINSTALLATION

1.6.1 Authorities

The contractor while executing the work shall obey to the provisions of the GovernmentActs relating to the work and the regulations and by-laws of statutory bodies or local authoritiesand supply authorities. The contractor shall undertake to provide all test certificates and makenecessaryarrangementsto obtainelectricsupply.

1.6.2 Drawings

The installationswork shall be carriedout asper the approved execution drawings.Priortolayingofconduitsorcables,thecontractorshallsubmitdrawingsforsameindicatingtheroute,conduit sizeandnumbers,locationof inspectionboxesetc.forapproval.

The contractor on completion of the installation shall submit the following drawings intracingpaper.

As built electrical layout drawings of each floor showing the position of points & outlets,typeoffittings&fixtures,locationofswitchboards&distributionboards,circuit&phaseindication, position of earth electrodes, cable & conduit routes, position of lightning terminals &conductorsetcneatlydrawn.

Asbuiltschematicsinglelinediagramoftheentireinstallationshowing

(i) alldistributionboardshavingdescriptionofcapacity,system&sourceofsupply,type&theirnumbers;

(ii) location,size,type,lengthofmainandsub-maincables/wires;

(iii) loaddetailsofeachcircuitorwaysofdistributionboardorswitchgear.

Thedrawingsshallfurnishtheidentificationdetailssuchasnameofwork,jobno.,accepted tender no.,date of completion, site location, name & address ofowner, name & addressofconsultant,signature&nameofcontractor,hisaddress,scaleofdrawing.

1.6.3 Commercial

Alltypesoflaborersreferredintheschedulesuchasmasons,electricians,wiremen, cable jointers, helpers, labor etc. are required to carry out electrical installationworktoabuildingwithallnecessarytoolsandplantswiththem.

Aftercompletionoftheinstallation,thecontractorshalltestthesameinthepresence of Engineer-in-charge for safety and durability as per IS specification and I.E.Rules.HeshallgettheelectricalinstallationinspectedbytheElectricalInspectingAuthority and obtain necessary inspection report and statutory clearance to energize theinstallation at his own cost. However, all fees for inspection prescribed by the statutoryauthoritypaidbythecontractorshallbereimbursedbytheowneronproductionofdocumentaryevidence.Thecontractorshallsubmitnecessarytestcertificatesasandwhenrequired.

After completion of testing, necessary statutory inspection by competent authorityand contract/ agreement with local supply authority, the contractor at his own cost shallarrangeforfinalcommissioningandenergizationofinstallationsbeforefinalhandingovertotheowner.

Rate quoted shall include all cost of labours with tools and plants, sundries andaccessories, transportation of materials from local store, insurance, storage and handling,providingwatchandwardtotheinstallationcarriedoutbyhimandmaterialsinhis custody, all Liasioning activities and expenses for maintaining the installation in properorder till final taking over. The contractor shall make good the damages caused during thecourse of work athisowncost.

Only materials of approved make shall be used. All other materials not included inthe list of approved materials shall be got approved from Engineer-in-charge. If required,the materials maybesentfor testing to anystandard testinglaboratory forconformingthe quality and specification as per ISS. The cost towards testing shall be borne by thecontractor.Nosurplusmaterialprocuredbythecontractorshallbeacceptedbytheowner.

The work shall be carried out in accordance with the specification of the schedulecompletewithcostofallmaterials(exceptotherwisementioned),alltypesoflabourinvolved, alltypesoftools&plantsrequired,sundriesandaccessoriesandasperthedrawing, designanddirectionofEngineer-in-charge.

The electrical installation work shall be carried out by a registered and licensedelectrical contractor duly authorized by the local Electrical Licensing Authority. The workshall be directly supervised by a Licensed Electrical Supervisor. Copy of valid license anddetailsofpreviouslyexecutedworksofthecontractorandhissupervisorshallbefurnished alongwiththetender.

1.7.0 TECHNICALSPECIFICATIONFOREXTERNALELECTRIFICATIONWORK

1.7.1 General

The scope includes supply, installation, testing commissioning of 33 KV air insulated switch yardandtransformers,Externallightingsystemetc.aspertheattachedSLDandaspertheinstructionsoftheEngineer-In-Charge.AllHTinstallationworkshallbecarriedoutbyacontractor having valid electrical HT license issued by competent authority. The Contractor shallalso depute adequate no skilled personnel having valid HT supervisor, Line Man &Wire Manlicenses.

1.7.2 Specificationforsteelmaterials

1.1. Scope:

Thisspecificationcoversthemanufacturing,testingbeforedispatch,fabricationandinstallationof…

- 100X50x6MMMSCHANNEL
- 75X40x6MMMSCHANNEL
- 50X50X6MMMSANGLE

Allsteelmaterialsshallbepaintedwithsuitablegradeofaluminiumpaint.

1.2.Standards:

ThesteelmaterialsshallcomplywiththerequirementsoflatestissueofIS–2062Gr–Aexceptwherespecified otherwise.

1.3.ClimaticConditions:

Theclimaticconditionsatsiteunderwhichthestoreshalloperatesatisfactory,areasfollows:

- Maximumtemperatureofairinshade.....45degreeC
- Maximumtemperatureofairinshade…….0degreeC
- Maximumtemperatureofairinshade.....50degreeC
- Maximumrainfallperannum..... 2000mm
- Maximumtemperatureofairinshade.....45degreeC
- Maximumambienttemperature 45degreeC
- Maximumhumidity 100%
- Av.No.ofthunderstormdaysperannum..... 70%
- Av.No.ofduststormperannum 20
- Av. Rainfallperannum 150mm

1.4.Tolerances:

- Dimensionsuptoandincluding50mm:+1mm;and
- Dimensionsgreaterthan50mm:+2%

1.5.Otherrequirements

- All steel members and other parts of fabricated material, as delivered, shall be free of warps,local deformations, unauthorized splices, or unauthorized bends. Bending of flat strap shall becarriedoutcold.Straighteningshallbecarriedoutbypressureandnotbyhammering.Straightnessisofparticular importanceifthealignmentofboltholesalongamemberisreferred to its edges. Holes and other provisions for field assembly shall be properly markedandcrossreferenced.Whererequired,eitherbynotationsonthedrawingsorbythenecessityofproperiden tificationandfittingforfieldassembly,theconnectionsshallbematch marked. A tolerance of not more than 1 mm shall be permitted in the distance betweenthecenterlinesofboltholes.
- The holes may be either drilled or punched and, unless otherwise stated, shall be not morethan2mmgreaterindiameterthanthebolts.Whenassemblingthecomponents,forcemaybe used to bring the bolt holes together (provided neither members nor holes are therebydistorted) but all force must be removed before the bolt is inserted. Otherwise strain shall bedeemed to be present and the structure may be rejected even though it may be, in all otherrespects,inconformitywiththespecification.
- Thebacksoftheinnerangleironsoflapjointsshallbechamferedandtheendsofthememberscutwherenecessarya ndsuchothermeasurestakenaswillensurethatallmemberscanbebolted togetherwithoutstrainordistortion.
- Similar parts shall be interchangeable. Shapes and plates shall be fabricated and assembled inthe shop to the greatest extent practicable. Shearing, flame cutting, and chipping shall be donecarefully, neatly, and accurately. Holes shall be cut, drilled, or punched at right angles to thesurfaceandshallnotbemadeorenlargedbyburning.
- Holes shall be clean-cut without torn or ragged edges, and burrs resulting from drilling

orreamingoperationsshallberemovedwiththepropertool.Shapesandplatesshallbefabricated to tolerances that will permit field erection within tolerances, except as otherwisespecified.

- Allfabricationshallbecarriedoutinaneatandworkmanlikemannersoastofacilitatecleaning,paintingandinspectionandtoavoid areas in whichwaterandother matter canlodge. Contact surfaces at all connections shall be free of loose scale, dirt, burrs, oil and otherforeignmaterialsthatmightpreventsolidseatingoftheparts.

1.7.3 SpecificationforRSJoistPoles

Description	Requirement
LengthofJoistinMtrwith+100mm/-0%Tolerance	13Mtr
Weightkg/mwith±2.5%Tolerance	34.6
SectionalArea(cm2)	44.1
Depth(D)ofSection(mm)with+3.0mm/-2.0mmTolerance asperIS 1852-1985	150.00
Width(B)ofFlange(mm)with±2.5mmTolerancefor150x150mmISHBIS1852-1985	150.00
ThicknessofFlange(Tf)(mm) with±1.5mmTolerance	9.00
Thicknessof Web(Tw) (mm)with±1.0mmTolerance	11.8
CornerRadiusoffilletorroot(R1)(mm)	8.00
CornerRadiusofTow(R2)(mm)	4.00
MomentofInertiaIxx(cm4) Iyy(cm4)	1640.00 495.00
FlangeSlope(a)inDegree	94.0
ToleranceinDimension	AsperIS:1852

1.7.3SpecificationforDISCinsulators

Sl No	Description	Specification
1	TypeofInsulator	DISCinsulator
2	Nominalsystemvoltage(KV)	11KV
3	Highestsystemvoltage	12KV
4	Minimumfailingload(KN)	70KN
5	Standardspecificationtowhichmaterialshallconfirm	AsperIS:731.(1971)3188:1980/IS:2486part-II
6	Dimensions(mm)	
	(a)Overallheight	145mm
	(b) Diameterofinsulator	255mm
7	Creepagedistance(mm)	320

8	Drypowerfrequency1minwithstandvoltage(KV)	70KV
9	Wetpowerfrequency1minwithstandvoltage(KV)	40KV
10	Powerfrequencypuncturewithstandvoltage (KV)	110KV
11	DryPowerfrequencyflashovervoltage(KV)	70KV
12	Wetpowerfrequencyflashovervoltage(KV)	45KV
13	Impulseflashovervoltage	
	(a)+ve(KV)	115KV
	(b)–ve(KV)	120KV
14	Visibledischargetestvoltage(KV)	40KV
15	FerrousPart	ZincGalvanized(B&S)
16	Dimensionofmetalpart	AsperIS:2486

1.7.4. PinInsulators

The minimum size of pin insulators with cordon x threads shall be 170mm diameter x 210mmlength for voltages up to 1100 Volts and 152mm diameter x 137mm with a minimum creep-agedistance of 350 mm for 33000 volts. These shall be mounted on metallic cross-arms with the helpofnonmagneticthreadedgalvanisedironpins.

1.7.5. StayInsulator

Thestayinsulatorsusedforstayinstallationandguywiresshallconfirmto IS:5300/1969.

1.7.6. LightningArrestor

Non-linearresistor type distribution class lightning arrestor with 33 KVRMS voltage ratingand10KAstanarddischargecurrentshallbeused.Thelightningarrestorshallconfirmto IS:3070(Part-I)/1974.

1.7.7. AirBreakSwitch

The Air Break Switch (A.B.Switch) shallbe three-insulator version, horizontally mounted type.The switchblades and spring-loaded contacts shall be made of silver-plated copper. The verticaloperatingshaftshallbeprovidedwithguideclampsatsuitableintervalsandpadlockingarrangement in both "ON" and "OFF" position. The A. B. switch shall confirm to IS: 1818/1972.Necessarytestreportshallbesupplied alongwiththeABswitch.

1.7.8. HornGapFuse

The Horn Gap Fuse (H.G. fuse) shall confirm to IS: 1818/1972. Rating of the HG fuse unit shallconfirm to as mentioned in the schedule of quantity. Galvanised channels shall be used as its basefor fixingon theDP/FPstructure.

1.7.9. TransformerPlinth:-

A transformer plinth of approved shape & size shall be constructed to place the transformer. Theplinth shall have a PCC base with brick wall foundation super structure on all sides, and perfectlycompacted sandinsidethe brick works,RCCslab grouted with mild steel channel to rest thetransformer,cementplasteringofexternalsurfacesandpaintedwithminimumtwocoatsofcement paints.

1.7.10. EARTHING

1.7.10.1. InstallationofEarthing

The earthing installations shall generally conform to IS: 3043/1966 and requirements of IndianElectricityRules,1956.

Allthree-phasemediumvoltageequipmentsshallbeearthedbytwoseparateanddistinctconnectionswith earththroughearthelectrodes.Single-phaseequipmentsshallbeearthed atleast at one point. In case of high & extra high voltages, the neutral point shall be earthed by notlessthantwoseparateanddistinctconnectionswitheartheachhavingitsownelectrode.

An earthingelectrodeshallnotbe situatedwithina distance of1.5-metresfrom the buildingwhoseinstallationsystemisbeingearthed.Thecrosssectionalareaofearthcontinuityconductorinelectricalin stallationshallnotbelessthan16swgcopperor14swgGIwire.Theearthresistanceforvariousinstallationsshallberestr ictedwithinthefollowingmaximumpermissiblelimits.

Thefollowingtypesofearthinginstallationsshallingeneralbeprovided.

(a) Pipeearthing

(b) Plateearthing

(a) PipeEarthing

Pipe earth electrodes shall be of perforated class B G.I. pipe of specified length and diameter.Galvanisingofpipes shall conform to relevantISS. The G.I. pipe electrode shall be cuttapered atthe bottom and provided with holes of 12-mm diameter drilled not less than 75mm from eachotherinzigzagmannerupto2000-mmfromthebottomoftheelectrode.Apairof40mmx5mm

G.I. flat clamp with 2 nos. 14 mm diameter drilled holes on either side shall be welded to theelectrode atabout 150mmbelow thetopofthepipe.

The electrode shallbe buriedin the ground verticallywith its top notless than 200-mmbelowthegroundlevel.Thepipeearthelectrodeshallbesurroundedby,eithersalt&charcoalinalternate layers or a homogeneous mixture of the both, for a radius of about 300-mm and up to aheightofabout2000-mmfromthethebottomoftheelectrode.Thebalanceportionoftheexcavatedpitshallbefilledwith goodqualityloose soilandproperlycompacted.

A brick masonry chamberwith hinged cast iron/ removableRCCinspection coverof size 300mmx 300mmshallbeconstructedwithinthe tenderedrate.Wateringarrangementshallbe madewithfunnelandwiremeshfixedbymeansofareducersocketonthetopoftheelectrode.

All earthing installation shall be made as per the drawing provided and as per the direction oftheEngineerincharge.

(b) PlateEarthing

Plate earthing shall be installed with either tinned copper or GI plates of specified size. A 1.5-metres long 25-mm x 5-mm strip of same material shall be brazed or bollted to the plate with 2nos. 12- mm diameterBrass/ GI Nut bolts with flatand spring washer drilled hole on the surfaceof theplateasper thedrawingprovided.

The electrode shall be buried in the ground with its face vertical and bottom of the plate not lessthan 3.0metresbelowgroundlevel.The earth plate shall be embeddedwith, eitheralternatelayers of 150-mm thick containing salt & charcoal or a homogeneous mixture of the both, up to300-mm above the top of theplate.The Electrodeof required size shall be broughtout through50 mm dia GI pipe upto the 200 mm below earth level for earth connection. A 20-mm diameterclassBGIpipeshallbeattachedtotheelectrodeforwateringarrangement.Thebalanceportionof the excavated pit shall be filled with good quality loose soil and properly compacted. A funnelwith wiremeshshallalsobeattachedonthetopofthepipe.

A brick masonry chamber with hinged cast iron/ removable RCC inspection cover of size not lessthan300mmx300mmshallbe constructedasper thedrawing provided.

All earthing installation shall be made as per the drawing provided and as per the direction of theEngineer incharge.

1.7.10.2. InstallationofEarthingLeads

The earthing lead connecting the earth electrode to the apparatus orinstallation directly shall beofthe same materialas earth electrode.The earthingleadsshallbeeitherwires orstripsofadequate sizeas specifiedandofeither GIor tinned copper. The GI leads shall be connected tothe electrode by means of 16mm diameter GI nut bolts with flat & spring washer and the tinnedcopper leads shallbe connected to the electrode by meansof 16-mm diameter brassnutboltswith flat & spring washer.

Allearth connections shallbe visible for inspection. Theearthing lead from electrode onwardsshall be suitably protected from mechanical injury by means of 20-mm diameter GI pipe for GIwires.Theportionof this protectionpipe within groundshallbeburied at least 300 mm deepfromgroundlevel.(Subjecttoincreaseuptoadepthof600-mminroadcrossingsandpavements.) The portion within the building shall be recessed or clamped at not more than 450-mm interval in the walls/columns/beams etcandrecessed in the floors.Joints in the earthingleadfromearthelectrodetoapparatusshallbeavoidedasfaraspracticable.Howeverifjointsare inevitable, same shall be done by welding or proper bolting in case of GI strips and brazing orproper bolting in case of tinned copper strips. The welded joints in GI strips shall be applied withbituminouspaintand wrapped withbituminoustape.

1.7.11. INSTALLATION

1.7.11.1. Clearance

Thefollowingspacingbetweenthecurrentcarryingbareconductorsshallbemaintained

SlNo	Description		Spacing
(a)	Between MV conductor andneutral/earth	:	300mm

(b)	BetweentwoMVconductors	:	300mm
(c)	Betweentwo33KVconductors	:	1250mm

Clearance of the lowest conductor above ground, clearance between conductors & trolley wires,clearance from buildings & structures shall be maintained as per rules 77, 78, 79 and 80 of IndianElectricityRules,1956.Thesupportheightshavebeendesignedtoprovidetheseclearances.However if atany point,the heightof the support become insufficient, arrangementsshallbemade by the contractor to raise the height of the support by external means as approved by theEngineer-in-chargewithoutclaimingforanyextracost.

1.7.11.2. Excavation

The excavation work shallbe taken up after the approved location of supports, stays etc,arepeggedaccurately. Every care shall be takento seethatpitsarenot over sized while digging sothat advantage could be taken of the bearing value of virgin ground. Suitable caution signs, redlights or other protective measures as decided by Engineer-in-charge shall be provided to warn/protectthepedestriansandcattle.

The depth of the pole pits shall be such that about 1/6th of the pole length shall be buried inground considering finished ground level. The planting depth in any case shall not be lower than1500mm.

1.7.11.3. InstallationofTransformer:

The installation shall confirm to IndianStandard Code of Practice IS:1886/1967 and meetwiththe approval of the Electrical Inspectorate and other statutory bodies. The transformer shall bepositionedwithacceptableclearanceallaround.

Visual inspection shall be conducted for mechanical damage to any part of parts, leaking tanks,tubesandbushings.Suitablestepsshallbetaken torectify thedefectsimmediately.

Before connecting the transformer to the supply, the tank must be earthed by two separate anddistinct connections through two separate copper leads of not less than 40 x 6mm cross sectioneach. All connections to the earthing system should be visible for inspection. Gas or water pipesshould notbeused forsuch earthconnection.

ThestarpointofLVwindingshallbeearthedbymeansoftwoseparateanddistinctearthconductorsofnot less than 40 x5 mm strips.Earth resistance shall notexceed3 ohms.TheContractorshalltakeadequate caretoachievethe requiredearthresistance.

1.7.12. TECHNICALSPECIFICATIONFORCABLINGWORKS

Thisspecificationcoversthe requirement,installation,jointingofpowercableforMV&HVapplications upto and including 33 kV. Work will be undertaken strictly as per this specificationmentioned below. IS-1225-1983 amended upto date shall be followed for cable work otherwisespecified. This specification covers the scope of work for both PVC insulated and XLPE insulatedcables.

1.7.12.1. Storage:

1. The cable drum shall be stored on well drained hard surface, so that the drums do not sinkintheground.Pavedsurfaceispreferredforlongtermstorage.
2. Drumshallbestoredontheirflangesnotonflats.
3. Protectionfromrainandsunispreferableforlongtermstorageandalsoventilationbetweencabledrums.
4. Duringstorageperiodicalrollingofdrumsoncein3monthsthrough90degreesshallbedone.

1.7.12.2. Handling:

1. Whencabledrumshavetomovedovershortdistancetheyshouldrolledinthedirectionofarrow marked.
2. Formanualtransportationoveralongdistancethedrumshouldbemountedonthecabledrum.
3. Forloadingandunloadingfromvehiclesacraneorsuitableliftandtackleshouldbeused.

1.7.12.3. Route:

1. Whiletheshortestpracticableroutesshouldbepreferredanditfollowsfixeddevelopments such as roads, foot path, etc. with proper offsets so that future maintenance,identification isrenderedeasy. Drawingshallbefollowed andwillbe issuedforcableroutes.
2. Cableroutesshallbeplannedawayfromdrainsandneartheproperty.To anyspecialrequirementthatmay havetobenecessarycomplied with.
3. Asfarpossiblethealignmentofcableroutesshallbedecidedaftertakingintoconsiderationthepresentandfuturerequirement.
4. Corrosivesoil,groundsurroundingsewageeffluentetc.shallbeavoidedfortheroute.
5. Routeofcableofdifferentvoltage.
6. Cablesof differentvoltageand alsopowerandcontrolcableshallbe keptindifferenttrenches withadequateseparation.
7. Wherecablescrossoneanotherthecableofhighervoltageshallbelaidatlowerlevel.

1.7.12.4. MethodofLaying:

Thecableshallbelaiddirectinground,pipe,closedoropenducts,cabletraysoronsurfaceofwalletc.

(a) Layingdirectinground:

1. Thismethodshallbeadoptedwherethecablerouteisthroughopenground,alongroads/lannersetc.
2. Widthoftrenchforlayingasinglecableshallbeminimum35cm.
3. Where more than one cable is to be laid in the same trench in horizontal formation thewidthof trench shallbe increased, such that inter axialspacingbetween the cables shallbe atleast20 cmotherwisespecified.
4. Depthofcable trench in a single tier formation is 75 cm for 1.1 kv and 1.2 m for cableabove 1.1kv
5. Whenmorethanonetierofcableisadoptedthedepthoftrenchincreasedby30cmforeachadditional tier tobeformed.
6. Excavationoftrenchshallbeexcavatedinreasonablestraightlines.Whereeverchangesindirectiona suitablecurvatureisadopted.
7. Wherethegradientsandchangesindepthareunavoidabletheseshallbegradual.
8. Thebottomofthetrenchshallbelevelandfreefromstones,bricksbatsetc.

(b) LayingofCableintrench:

1. Thetrenchshallbeprovidedwithlayerofclean,drysandcushionofnotlessthan8cmindepth.
2. Atthetimeissueofcableforlayingthecableshallbetestedforcontinuityandinsulationresistance.
3. Thecableshallbepulledoveronrollersinthetrenchsteadilyanduniformlywithoutjerksandstrains.Theentirecablelengthshallbeasfaraspossiblelaidofinonestretch.
4. Afterthecablehasbeenuncoileditshallbeliftedslightlyovertherollerbeginningfromoneendbyhelperstandingabout10 mapartanddrawnstraight.

1.7.12.5. SandCovering:

1. Cableslaidinasingletierformationshallhaveacoveringofdrysandofnotlessthan17cmabove thebasecushionofsandbefore theprotectivecover islaid.
2. Incaseofverticalmulti-tierformationafterthefirstcablehasbeenlaidasandcushionof30cmshallbeprovidedoverthebasecushionbeforethesecondtierislaidandeachofthesubsequenttieralsoshallhavesandcushionof30cm.

1.7.12.6. Extraloopcable:

1. At the time of original installation approximate 3 m of surplus cable shall be left on eachterminalendofthe cable andoneachsideofthe underground joint.The surpluscableshall be left in form of loop. Where there are long runs of cables such loose cables may beleftatsuitableintervalsas specified.

1.7.12.7. MechanicalProtectionovercovering:

1. Mechanicalprotectiontocableshallbelaidoverthecablestoprovidewarningtofutureexcavator.
2. Thecableshallbeprotectedbysecondclassbricksofnominalsizeandthebrickssshallbeplacedbreadth side.
3. Wherebricksarenotavailablethereisnoobjectiontouselocallyavailablematerialsuchastilesorslatesor stone/cement concreteslabs.

1.7.12.8. Backfilling

1. Thetrenchshallbethenbackfilledwithexcavatedearthfreefromstonesorsharpedged.
2. Unless wise specified a crown of earth not less than 50 mm and not exceeding 100 mm inthecenterandtamperingtowardsthesideofthetrenchshallbelefttoallowforsubsidence.Thecrownoftheearthhowevershouldnotexceed10cms.
3. Thetemporaryrestatementofroadwaysshouldbeinspectedatregularintervalsparticularlyduring wetweather.

1.7.12.9. RouteLocation

1. Routemarkersshallbe providedalongtherunsofcablesatlocationapprovedbytheEngineerinchargeandgenerallyatintervalsnotexceeding100m.

2. Routemarkersshallbemadeoutof100mmx5mmGI/aluminumplatewelded/boltedon35mmx35mmx6mmangleiron60cmlong.
3. CCmarkerof1:2:4concreteof20mmsizeshallbelaidflatandcenteredoverthecables.

1.7.12.10. Layinginpipes/closedducts

1. Inlocationsuchasroadcrossing,entryintobuildings,pavedareasetcshallbelaidinpipesorclosedducts,
2. Thesizeofpipesshallnotbelessthan10cmindiameterforsinglecableandnotlessthan15cmfor morethanonecable.
3. PipesofMVandHVcablesshallbeindependentones.

1.7.12.11. Roadcrossing:

1. Thetopsurfaceofpipesshallbeataminimumdepth1mfromthepavementlevelwhenlaidunderroads,pavement.
2. The pipe shall be laid preferable askew to reduce the angle of bend as the cable enters andleaves thecrossing.
3. When pipes are laid cutting an existing road, care shall be taken so that soil filled up afterlayingthepipesis rammed wellinlayerswith wateringas required toensurepropercompaction.Acrownofearthnotexceeding10cmshouldbe leftatthetop.

1.7.12.12. Cableentryintothebuilding:

1. Pipes for cable entriesto thebuilding shall be slope downwards fromthe building. Thepipeendshallbesealedtoavoidentryofwaterafterthecableislaid.
2. Cable –grip /drawwires,winches etc.maybeemployed for drawingcablesthroughpipes/closedducts.

1.7.12.13. Layinginopenducts

1. Openductswithsuitableremovablecoversaregenerallyprovidedinsubstation,switchrooms,plantrooms,and workshopsfortakingthecables.
2. Layingofcableswithdifferentvoltageratinginthesameductshallbeavoided.
3. Thecableshallbelaiddirectlyintheductsuchthatunnecessarycrossingofthecablesisavoided.
4. Wherespecifiedductsmaybefilledwithdrysandafterthecablesarelaidandcovered.

1.7.12.14. Layingonsurface:

Cablesmaybelaidinsurfacebyanyofthefollowingmethods

a) Directlyclampedbysaddlesorclamps.
b) Supportedoncradles
c) Laidontrough/trays,dulyclamped.

1.7.12.15. CablesinsideBuilding

Cables inside buildings shall be laid on the cable trays.All cables passing through walls shallrunthroughGIPipessleevesofadequatediameter50mmapartmaintainingtherelativepositionovertheentirelength.

1.7.12.16. CableTrays

LadderandperforatedtypeCableTraysshallbeofHotDipGalvanizedboltedtypeandfactoryfabricatedoutofCRCAsheetwithstandardaccessoriesliketee,bends,couplersetc.fordifferentloadsandnumberandsizeofcablesasgivenbelow:

- 1500 mm wide, Runners 25 x 100 x 25 x 3 mm, Rungs 2# 20 x 40 x 20 x 3 mm 250 mmC/C,Suspenders2Nos.40x40x5mmGIangle1500mmC/Cwithbasesupportof40x40 x 5mmGIangle.
- 1200 mm wide, Runners 25 x 100 x 25 x 3 mm, Rungs 2# 20 x 40 x 20 x 3 mm 250 mmC/C,Suspenders2Nos.40x40x5mmGIangle1500mmC/Cwithbasesupportof40x40 x 5mmGIangle.
- 1000 mm wide, Runners 25 x 100 x 25 x 3 mm, Rungs 2# 20 x 40 x 20 x 3 mm 250 mmC/C,Suspenders2Nos.40x40x5mmGIangle1500mmC/Cwithbasesupportof40x40 x 5mmGIangle.
- 750mmwide,Runners20x75x20x2.5mm,Rungs20x30x20x2.5mm250mm C/C,Suspenders2Nos.32x32x5mmGIangle1800mmC/Cwithbasesupportof40x40 x 5mmGIangle.
- 600 mm wide, Runners20 x 75 x 20 x 2.5 mm,Rungs 20 x 30 x 20x 2.5mm250 mmC/C,Suspenders2Nos.32x32x5mmGIangle1800mmC/Cwithbasesupportof40x40 x 5mmGIangle.
- 450 mm wide, Runners20 x 75 x 20 x 2.5 mm,Rungs 20 x 30 x 20x 2.5mm250 mmC/C,Suspenders2Nos.25x25x4mmGIangle1800mmC/Cwithbasesupportof40x40 x 5mmGIangle.

Note: Suitable lengthof10 mmDia. GI rodsuspendersat 1800mm interval shallbeincludedintheitem forperforatedtypecabletray.

Alternative to fabricated support of cable tray, Steel wire rope hangers shall be used tosuspend the cable trays. This hanger shall consist of a pre-formed wire rope sling with arange of end fixings to fit various substrates and service fixings. The end fixings and wiremust beof the samemanufacturer with several options available.The system shall besecured and tensioned with a hanger self locking grip at the other end. Once the grip islockedforsafetypurpose,unlockingshallonlybedonebyusingaseparatesettingkeyand shallnotbeanintegralpartoftheselflockinggrip.Onlywiresand/orsupportssuppliedand/orapprovedshallbeusedwiththesystem.

1.17.12.17. Jointing

1. Thereshallnotpreferablyjointsoncablesonnewerworks.However,ifrequired,jointingcanbedonewithpermissionoftheEngineer-incharge.
2. Beforelayingacable,properlocationfortheproposedcablejoints,ifanyshallbedecidedwhenthecableisactua

llylaid,thejointsaremadeinthemostsuitableplaces.

3. Jointsshallbestraggledby2mto3mwhenjointstobedonefortwoormorecableslaidtogether.
4. Jointpitsshallbeofsufficientdimensionastoalloweasyandcomfortableworking.Theside ofthepitshallbewellprotectedfromthelooseearth.
5. Thejointtypehasbeenspecifiedintheschedule.Itisnecessarytofollowthejointinginstructionsfurnishedbyth e manufacturerofcablejointing kit.
6. A caution notice board indicating "CAUTION- CABLE JOINTING WORK IN PROGRESS" shallbedisplayed towarnthepublicandtrafficwherenecessary.

1.17.12.18. TestingBeforeLaying,before/afterCovering

1. Allcablesbefore laying shallbe tested with a500V megger for cables of 1.1 kVgrade orwitha2500VMeggerforcablesofhighervoltage.Thecablecoreshallbetestedforcontinuity.
2. All cables shall be subjected to the above mentioned tests before covering the cable byprotective coveringand back filling.After layingand jointing the cable shall be subjectedto a 15 minute pressure test. DC pressure testing shall be done as per IS. in absence ofpressuretestingone-minutetestwith1000Vmeggerfor1.1kVgradecable/5000Vmeggerforabove1.1KVshallbedone.

1.17.13. CROSSOVERS/JUNCTIONBOXES

a) Cross Overs/Junction boxes shall be made of very high quality materials to withstandheavyloadandcorrosion.Materialshallbehigh-pressurediecastmaterialforstrength &durability.
b) The traplid shallbeself-adjustable toanyfloorfinishthicknessusingthelevelingscrews onallthefour corners.
c) The Trap cover shall be made of 2.5mm thick pre-galvanized steel plate to providerigidity& added strength.
d) The Trap covers shall have flexibility for quick mounting on to the base box requiringminimummaintenance.
e) TheTrapcovermusthave8mmrecessedforinstallationofcarpetandtiles.
f) The Flyover units, trap frame and traps shall be made of Electrostatic Polyester EpoxyCoating to provide excellent and enhanced protection on visible parts against chemicalorsalinecorrosion.
g) TheCrossOversshouldcarryfly-overmadeofElectrostaticPolyesterEpoxyCoatingfor cablespassagetoensuresegregationofservice
h) Crossovers shall be tested to a load bearing of 3.6 tons on the trap lid for heavy trafficareas
i) TheCrossOversshallhaveprovisiontoPower,Data&Telecomservices.
j) Thesystemmustaccommodatetorun MainsVoltage&ExtraLowVoltagecables.
k) Thetrapcoverscrewsmustbemadefrom StainlessSteelforextraprotection.
l) ThesystemmusthavePositiveDoubleEarthingconnections.
m) Earthwireconnectorshouldbeprovidedinalltheboxes,andcomplieswiththerequirementof currentIEEregulation.
n) Thecompletesystemmusthaveexcellentprotectionagainstrust.
o) Foursideblanksaremadewithremovableperforationstosuitductsinstallationofupto38-mmheight.
p) Theone-

piecebaseframedesignensuresminimumopeningstopreventconcreteseepageintotheboxduringcasti ngof concrete.

q) Standards&Approvals–Thesystemmustcomplywiththerelevantspecification&IEC61084standards.

1.17.14. VERTICALACCESSBOXES

a) Verticalaccessboxesshallbemadeofveryhighqualitymaterialstowithstandheavyloadandcorrosion.

b) Verticalaccessboxesshallfacilitatetheconnectivityoffloorracewaystotheequipmentsonthewalllikethedistr ibutionboards,sothatproductshouldbedesignedas“L”shaped

c) TheVerticalaccessboxesshouldhaveprovisiontocarry**Power,Data&Telecomservices**

d) Theverticalaccessboxesshouldhavetheductentryknockoutsofupto38mmandalsoprovision forcarryingtheconduitsto thewall

e) Theverticalaccessboxesshallbemadeofelectrostaticpolyesterepoxycoatingtopreventtherustaccumulati on.

1.17.15. TECHNICAL SPECIFICATION FOR LVFEEDER PILLARAND DISTRIBUTIONPANELS

1.17.15.1.DISTRIBUTIONPANELS/BOARS(CRCASHEET)

a) FeederPillar/MainDistributionPanels,Sub-DistributionPanelsandFinalDistributionshall be covered under this section.Panels/Boardsshall be suitable for operationon3Phase/singlephase,415/240volts,50cycles,4wiresystemwithneutralgroundedattransformer.All DistributionpanelsshallbeCPRItesteddesign andmanufacturedbyanapproved manufacturer. The Contractor shall submit the CPRI test certificate to the Owner**.**Distributionpanelsshallcomplywiththe latestRelevantIndianStandardsandElectricityRulesandRegulationsandshallbeasperlatesteditionofIS-8623.Panelsforoutdoorequipment shallbesuitablefor outdoordutyapplication.

b) Distribution panels shall be 2 mm thick sheet steel cabinet for indoor/outdoor installationotherwisespecified,deadfront,floormounting/wallmountingtypeandshallbeform4bconstruction.Th e Distribution panels shall be totally enclosed, completely dust and verminproofandshallbewithhingeddoorsandfoldedcovers,Neoprenegasket,padlockingarrangement and bolted back. All removable/ hinged doors and covers shall be grounded byflexiblestandardconnectors.Distributionpanelshallbesuitablefortheclimaticconditionsas specified in Special Conditions. Steel sheets used in the construction of Distribution panelsshall be 2 mm thick and shall be folded and braced as necessary to provide a rigid support forall components. Joints of any kind in sheet metal shall be seam welded, all welding, slag shallbe rounded off and welding pits wiped smooth with plumber metal. The general constructionshall confirm to IS-8623-1977 (Part-1) for factory built assembled switchgear &control gearfor voltageup to and including1100VAC.

c) All panels and covers shall be properly fitted and square with the frame, and holes in thepanelcorrectlypositioned.Fixingscrewsshallenterintoholestappedintoanadequatethickness of metal or provided with wing nuts.Self-threading screws shall not be used in theconstruction of Distribution panels.A base channel of 75 mm x 40 mm x 5 mm thick shall beprovided at the bottom for floor mounted panels.Minimum operating clearance of 275 mmshallbeprovidedbetweenthefloorofDistributionpanelsandthelowestoperatingheight.

d) Distributionpanelsshallbeofadequatesizewithaprovisionofspareswitchgearasindicatedontheline Diagram.Feedersshallbearrangedinmulti-tier.Knockoutholes ofappropriate size and number shallbeprovidedin the Distribution panelsinconformitywiththelocationofcable/conduitconnections.Removablesheetsteelplatesshallbeprovided atthetoptomakeholesforadditionalcable entryatsite ifrequired.

e) Every cabinet shall be provided with Trifoliate or engraved metal name plates.All panelsshall be provided with circuit diagram engraved on PVC sheet. All live accessible connectionsshall be shrouded and shall be finger touch proof and minimum clearance between phase andearth shall be 20 mm and phase to phase shall be 25 mm. Panels with ACB shall necessarilyhave front and rear access as per requirement whereas panels with all MCCB breaker may beprovided withonlyfrontaccesswithsufficientclearance.

f) Bus bar and interconnections shall be of high conductivity electrolytic grade aluminium /copperasindicatedinthebillofquantitiescomplyingwithrequirementofIS:5082–1981and of rectangular cross section suitable for carrying the rated full load current and shortcircuit current and shall be extendable on either side.Bus bars and interconnections shall beinsulated with heat shrinkable sleeve of 1.1 KV grade and shall be colour coded. Bus bars shallbesupportedon glassfiberreinforced thermosettingplasticinsulatedsupportsatregularintervals to withstandthe force arising fromin case of short circuit in the system. All busbars shall be provided in a separate chamber and all connections shall be done by bolting.Additionalcross sectional area to be added to the bus bar to compensate for the holes. Allconnectionsbetweenbusbarsandbreakersshallbethroughsolidcopper/aluminiumstripsof proper size to carry fullrated current and insulated with insulating sleeves. Maximumcurrent density for the bus bars shall be 1.0 A/sq.mm for aluminium and 1.6A/sq.mm forcopperbusbars.MaximumallowabletemperatureforthebusbartoberestrictedtO85degC.

g) Unlessotherwisespecified,inthecaseofexternalsurfaceofenclosuresofbusbarcompartmentwhichshallbe accessiblebutdonotneedtobetouchedduringnormaloperation,maximum temperature rise limitsof 25° Cabove ambient temperature shall bepermissibleformetalsurfaceandof15°Caboveambienttemperatureforinsulatingsurfaces.

h) All main distribution panels and sub distribution panels shall be provided with MCCB ofappropriatecapacityasperSingleLineDiagram.AllfinalDistributionboardsshallbeprovidedwithMiniatureCirc uitBreakers.FinalSinglePhaseDistributionboardsshallbeconnectedto theincomingsupplythroughdoublepole MCBunits&earthleakagecircuitbreakers.Allwiringforfinaldistributionboardsshallbeconcealedbehind5mmthic kBakelite sheet or M S sheet cover.All Distribution boards shall be completely factory wired,ready for connection.All the terminals shall be of proper current rating and sized to suitindividualfeederrequirements.Eachcircuitshallbeclearlynumberedfromlefttorightto correspondwithwiringdiagram.Alltheswitchesandcircuitsshallbedistinctlymarkedwithasmalldescriptionofthe serviceinstalled.

i) Continuousearthbussizedforprospectivefaultcurrentshallbeprovidedwitharrangement for connectingto stationearthat two points. Hingeddoors/ frames shallbeconnectedtoearththroughadequately sizedflexiblebraids.

2.1.

j) Cable compartment of adequate size shall be provided in the Distribution panels foreasyclampingofallincomingandoutgoingcablesenteringfromthetop/bottom.Adequate supportsshall beprovidedincablecompartmentto supportcables.

2. 1.17.15.2.SPECIFICATIONFORMIPOLYCARBONATEFeederPillar:

IP54 AC combiner Feeder Pillar shallbe made of high quality PolycarbonatePC- GFS (shockproof,rustfree,corrosionfree,acidandchemicalresistant,fireretardant,self-extinguishing,having high impact against mechanical load, made of halogen and silicon free recyclable material**conform to RoHS directive 2002/95/EC**, UV resistant according to IEC 61439-1, having highgrade internally embedded gasket made of Polyurethane (PUR). All left or right side enclosuresshould have pre-moulded knockouts for side cable entry or for future extension. Each enclosureshouldhavemultinoofself-threadedholestomountmountingplateorDinchanneloranyequipment.

Thefeederpillarsshouldhavefollowinginbuiltsafetyfeatures:

In this type of feeder pillars electrical functions are to be monitored must be visible. The entiresystemshouldhave de-touchable lid withpadlockingarrangementandincomershouldhavehingedtypelidanditcan becombinationoftransparentoropaquelid.Alllidsshouldhavetriangular type locking arrangement or should have Mipad lockingarrangement for **positiveisolation.** The bus bar system should have EMC compliant. To provide grounding / earthing inconnectionmetalplateshouldbeprovidedinsidepolycarbonateflangeforarmoredcable(SWA

– steelwiredarmoredcable)viaglandsinaccordancewithBritishStandard(IS:5039).

Thefeederpillarshouldhavefollowingtestcertificates.

In accordance with IEC 60 439-1 (IS8623)at ASTA (CPRI Bhopal Laboratory) and IEC 60 439-2forpowerswitchgearandcontrolgearassembly.Thepartymustbesubmittedroutinetestcertificate from manufacturer/principal company in accordance with IEC 60 439-1. The type testreportasperCPRI(inaccordance withIEC60439-1) shouldconsistwithfollowing:

- Degreeofprotectionofsystem
- TemperatureRiseLimit
- DielectricProperties
- ShortCircuitWithstandStrength
- Effectivenessofprotectivecircuit
- Clearanceandcreepagedistance
- MechanicalOperation

It Should withstand glow wire test at 9600C in accordance with IEC 60 695-2-11 UL subject 94,shouldbeflameretardantandself-extinguishinginnature.TheDegreeofprotectionagainstmechanicalloadIK08(5Joule)inaccordancewithaccordancewithENIEC62262.RatedinsulationvoltageshouldbeVACasperIEC60664.

2.1. 1.17.15.3.AirCircuitBreakers(ACB)

a) The ACB shall conform to the requirements of IEC 60947-2 / IS 13947-2 and shall be typetested & certified forcompliance to standards from–CPRI,ERDA/anyaccreditedinternationallab.The circuitbreaker shall be suitable for415V+ 10%,50Hz supply system.Air CircuitBreakers shall be with mouldedhousing flushfront,drawouttypeand shall be providedwith atrip free manualoperating mechanismor as indicated in drawingsand bill ofquantitieswithmechanical "ON""OFF""TRIP"indications.

b) The ACB shall be 4polewithmodular construction,draw out,manuallyor electricallyoperated version as specified.The circuit breakers shall befor continuous rating andserviceshort Circuit Breaking capacity (Ics) shall be as specified on the single line diagram and should beequaltotheUltimatebreakingcapacity(Icu)andshortcircuitwithstandvalues(Icw)for1sec.

c) Circuit breakers shall be designed to 'close' and `trip' without opening the circuit breakercompartment door.The operating handle and the mechanicaltrip push button shall be atthefront of the breakers panel. Inspection of main contacts should be possible without using anytools. The ACB shall be provided with a door interlock. i.e. door should not be open when circuitbreakerisclosedandbreakershouldnotbeclosedwhendoorisopen.

d) Allcurrentcarrying partsshallbe silver platedandsuitable arcing contacts withproper arc chutesshallbeprovidedto protect the main contacts. The ACB shall have doubleinsulation (Class-II) with moving and fixed contacts totally enclosed for enhanced safety and inaccessibilityto live parts.Allelectricalclosingbreakersshall be with electrical motorwoundstoredenergyspringclosingmechanismwithmechanicalindicatortoprovideON/OFFstatusoftheACB.

e) The auxiliary contacts blocks shall be so located as to be accessible from the front.Theauxiliary contacts in the trip circuits shall close before the main contacts have closed. All othercontactsshallclosesimultaneouslywiththemaincontacts.Theauxiliarycontactsinthetrip circuitsshallopenafterthemaincontactsopen.Minimum4NOand4NCauxiliarycontactsshallbe provided oneachbreaker.

f) Ratedinsulationvoltageshallbe1000voltsAC.

g) The cradleshallbesodesignedandconstructedastopermitsmoothwithdrawalandinsertion of the breaker into it.The movements shall be free from jerks, easy to operate and shallbeonsteelballs/rollersandnotonflatsurfaces.

h) Thereshallbe4distinctandseparatepositionofthecircuitbreakeronthecradle.

- RackingInterlockinConnected/Test/DisconnectedPosition.
- ServicePosition: MainIsolatingcontactsandcontrolcontactsofthebreaker areengaged.
- TestPosition: MainIsolatingcontactsareisolatedbutcontrolcontactsarestill engaged.
- IsolatedPosition: Bothmainisolatingandcontrolcontactsareisolated.

Thereshallbeprovisionforlockingthebreakerinanyoralloftheforstthreepositions.

i) Thefollowingsafetyfeaturesshallbeincorporated:

- WithdrawalorengagementofCircuitbreakershallnotbepossibleunlessitisinopencondition.

- OperationofCircuitbreakershallnotbepossibleunlessitisfullyinservice,testordrawnoutposition.
- Allmodulesshallbeprovidedwithsafetyshuttersoperatedautomaticallybymovementofthecarriageto coverexposedlivepartswhenthe moduleiswithdrawn.
- AllSwitchgearmodulefrontcoversshallhaveprovisionforlocking.
- Switchgearoperatinghandlesshallbeprovidedwitharrangementforlockingin'OFF'position.

j) Thebreakershouldbeequippedwithmicro-controllerbased,communicabletypereleasewithRS485portforcommunicationformeteringdata,faulthistory,dataloggerand maintenancerelateddatatoofferaccurateandversatileprotectionwithcompleteflexibility and shall offer complete over current protection to the electrical system in thefollowing four zones:

- Longtimeprotection.
- Shorttimeprotectionwithintentionaldelay.
- Instantaneousprotection.
- Groundfaultprotection.

k) Theprotectionreleaseshallgenerallyhavefollowingfeaturesandsetting

a. TrueRMSSensing

The release shall sample the current at the rate of 16 times per cycle to monitor theactual load current waveform flowing in the system and shall monitor the true RMSvalueoftheloadcurrent.Itshalltakeintoaccounttheeffectofharmonicsalso.

b. ThermalMemory

Whenthebreakershallrecloseaftertrippingonoverload,thenthethermalstresses caused by the overload if not dissipated completely, shall get stored in thememoryofthereleaseandthisthermalmemoryshallensurereducedtrippingtimeincaseofsubsequentoverloads.RealisticHot/Coldcurvesshalltakeintoaccounttheintegratedheatingeffectstooffercloserprotectiontothesystem.

c. Definedtime-currentcharacteristics

A variety of pick-up and time delay settings shall be available to define the currentthresholds and the delays to be set independently for different protection zonesthereby achievingaclose-to-idealprotectioncurve.

d. TripIndication

Individual fault indication for each type of fault should be provided by LEDs forfasterfault diagnosis.

e. Self-powered

The release shall draw its power from the main breaker CTs and shall require noexternalpowersupply for itsoperation.

f. ZoneSelectiveInterlocking

The ACB's shall be provided with Electrical and Mechanical interlock to ensure theoperation of DG and Main supply as and when desired as per the SLD available. Thereleaseshallbesuitableforcommunicationbetweenbreakerstoenablezoneselectiveinterlocking.Thisfeatureshallbeprovidedforbothshortcircuitandgroundfaultprotectionzonestoofferintelligentdiscriminationbetweenbreakers.

Thisfeatureenablesfasterclearanceoffaultconditions,therebyreducingthethermalanddynamicstressesproducedduringfaultconditionsandthusminimisesthedamagetothesystem.ToimplementZ

SImanufacturershouldsupply all related equipment like power supply, wiring etc. ZSI, wherever specified,shallbeusedforall incomeraswellasoutgoingACBs.

On-Linechangeofsettingsshouldbepossible.Itshouldbepossibletocarryouttesting ofreleasewithouttrippingthebreaker.

g. ThereleaseshallmeettheEMI/EMCrequirements.

h. Thetypicalsettingrangeofreleaseshallbegenerallyasfollows:

	SETTINGRANGEOFRELEASE	
Type of Protection	PICK-UPCURRENT	TIMEDELAY
LongTime	0.4to1.0timesI_n(I_r) Steps:0.4,0.5,0.55,0.60, 0.65,0.70,0.75,0.80,0.85, 0.90,0.95,1.00. OperatingLimit:1.05to 1.2timesI_r	0.5to30secat6I_r Steps 0.5,1, 2,4, 6, 8,12,18,24and30secs Tolerance : Correspondingto±10% ofcurrent.
ShortTime	2to10timesI_r Steps:2,3,4,5,6,7,8,9&10 Tolerance:±10%	20msto600ms Steps 20,60,100,160,200,260,300400,500and600ms Tolerance : ±10% or 20ms whichever is higher
Instantaneous	2to12timesI_n Steps:2,3,4,6,8,10,12 Tolerance:±10%	
GroundFault	0.2to0.6-timeI_n Steps:0.2,0.3,0.4,0.5,0.6 Tolerance:±10%	100msto400ms Steps : 100,200,300,400ms Tolerance:±10%or20 mswhicheverishigher.

I) AllincomerACBsshallhavefollowingadditionalprotectionsotherthanmentionedabove.

- Underandovervoltage
- Underandoverfrequency
- RestrictedEarthFaultprotection
- TripCircuitsupervisionwithPSclassCT's.
- Undercurrent,(forDGsetonly)
- Reversepower(forDGsetonly)
- Phasesequencereversal(forDGsetonly)
- Loadsheddingandreconnectionthruprogrammablecontacts.
- ReleaseshoulddisplaytheContactwearindication.

m) The release should provide local indication of actual %age loading at any instant.Therelease should be able to communicate on MODBUS RTU protocol using inbuilt RS485 port andshall be integral part of supply with trip unit. Parameters of the Protection Release should bechangeable from Release as well as thru communication network. Release should have graphicalLCDfordisplayofpowerparameters.Thereleaseofincomingbreakersshouldprovidecomprehensivemeteringwiththefollowingparameters

- Phasecurrents(running,average&max)–Allparametersinsinglewindow.
- Release should be able to capture short circuit current on which ACB has tripped. Thelastten tripsandalarms shallbe stored inmemory with the date &time stampingalong with type of fault and alarm. The sensing CT Should be Rogowsky type withmeasurement precisionof 1%.

- Releaseshouldbeself-powered.

- Release should have facility to select different type of IDMTL protection (DT, SIT, VIT,EIT,HVF)forbetterco-ordinationwithHTBreaker/Fuse.Phasevoltages(running,average&max)
- Energy&powerparameters(active,reactiveandapparent)
- PF
- Frequency
- MaximumDemand(KVA&KW)
- TotalHarmonicsdistortion

n) Measurements

- An ammeter with a digital display shall indicate the true rms values of the currents foreach phase. Release shall acknowledge the current& time delay settings done by useron theLCD display.
- ALEDbargraphshallsimultaneouslydisplaytheloadlevelonthethreephases.
- A maxi meter shall store in memory and display the maximum current value observedsincethelastreset.Thedatashallcontinuetobestoredanddisplayedevenafteropeningofthecircuitbreaker.

o) SafetyFeatures

- The safety shutter shall prevent inadvertent contact with isolating contacts when breaker is withdrawn from the Cradle.

- Itshallnotbepossibletointerchangetwocircuitbreakersoftwodifferentthermalratings.ForDraw-outbreakers,anarrangementshallbeprovidedtopreventratingmismatchbetweenbreakerandcradle.

- There shall be provision of positive earth connection between fixed and moving portion of the ACB either thru connector plug or sliding solid earth mechanism. Earthing bolts shall be provided on the cradle or body of fixed ACB.

- The incoming panel accommodating ACB shall be provided with indicating lamps for ON- OFF positions, digital voltmeter and ammeter of size not less than 96 mm x 96 mm, selector switches, MCB for protection circuit and measuring instrument circuits.

- It shall be possible to bolt the drawout frame not only in connected position but also in

- TEST and DISCONNECTED position to prevent dislocation due to vibration and shocks.

- Drawout breakers should not close unless in distinct Service/Test/Isolated positions.

- The insulation material used shall conform to Glow wire test as per IEC60695.
- The ACB shall provide in built electrical and mechanical anti-pumping.
- All EDO ACB`s Shall have Ready to Close Contact to ensure that the ACB gets a command only when it is ready to close for applications of Remote Control, AMF, Synchronization and Auto Source Change Over Systems.

1.8.0 LIGHTNINGPROTECTIONSYSTEM

1.8.1. ScopeofWork

The work to be done under this section comprises the supply and installation necessary for thecompleteinstallationofthelightningprotectionsystem.

ThelightningprotectionsystemshallbeinstalledinaccordancewithNZA/AS/1768:1991standardandadditionalrequirementsoflocalauthority.Thesystemshallconsistofairterminations,downconductors,jointsandbends,testingjoints, earthterminationsandearthelectrodes.The general arrangements shall be as indicated on the drawings. The coverage radiusshallbe109metersradius.

Advanced lightning protection system shall include components as follows: air termination (s),mechanicalsupport(s),lowimpedanceinsulateddownconductor(s),performancerecordingequipment, andalow impedancegroundingsystem.

Thelightningprotectionsystemshallcomprise:

- AirTerminations
- DownConductors
- JointsandBonds
- EarthTerminations

1.8.2. Standards

Completeinstallationshallbeengineeringandconstructedinaccordancewiththelatestrevisionof thefollowing:

- NZS/AS/1768-1991
- IEC61204

Thedetailsofthelightningprotectionsystemshallalsoconformtotherequirementsofallrelevant local codes, as applicable, together with the additional requirements referred to in thisspecificationanddrawings,whicheverismorestringentandacceptabletotheengineer.

1.8.3. AirTermination

Theairterminationshallresponddynamicallytotheappearanceofalightningdown-leader,shall be designed to trigger in relation to the optimum pre-determined conditions for upwardleader inception, the triggering conditions must dynamically adjust to reflect the down leaderintensity,buildingheightabovegroundandtheotherfactorsthateffecttheelectricfieldintensificationabovethea irterminal.

Theairterminalshallincorporateacurvedconductivesurfacespacedfromapermanentlygrounded centralfinial. During triggering of the air terminalthe curved conductive surface shallbe temporarily grounded, thereby producing a “snap” increase in electric field directly above theairterminal.

Theairterminationshallbedesignedwith arrange ofoptimalfinialtipradiitomatchthedifferent electric field conditions the terminal will be subjected to at various installation heightsabovethe groundplane,ordifferentpositionsonastructureforoptimumperformance.

Arcing at the finial tip is not to be continuous and shall only occur during the process of lightningleader approach. Arcing shall not occur solely due to electro-static field build-up created by thepresenceofcharged overhead thunderclouds.

Thematerialsoftheairterminalshallbenon-corrodinginhostileenvironments.Thecentergroundedelectrodetipshallbeatleast20mmdiameter,thecurvedconductivesurfaceshallbeofaconductivematerialofminimumthicknessforairterminationsasdefinedinIEC61024.

The size of the collection volume and attractive radius of the air termination shall be traceable toknown andacceptablelightningresearchandstatistics.

Theairterminalshallbeinstalledstrictlytothemanufacturer'sinstructions.

Theisolatingmaterialsupportingthecurvedconductivesurfacefromthecentergroundedelectrode is to be manufactured from a glass/mineralreinforcedpolypropylene.Thismaterialshall exhibit the followingproperties,highimpactstrength,UVstabilized,highelectricaldielectric, high comparative tracking index and operating heat capability up to 120°C continuous.Theprotectivezoneprovidedbytheairterminationshallbesuchthat it becomes the preferred strike point for all discharges exceeding a peak amplitude return strike current of X kAaccording to the statistical level Y per IEC61024. The design shall take account of upward leadercompetingprojectionsonthestructure.

StrikeCurrent(X)	LevelsofProtection(Y)	ExceedanceProbability
2.9kA	ProtectionLevelI–VeryHigh	99 %
5.4kA	ProtectionLevelII-High	97 %
10.1kA	Protection Level III – Medium	91 %
15.7kA	Protection Level IV – Standard	84 %

1.8.4. AirTerminationSupport

- The air terminal support shall consist of a minimum of 2m of insulating re -enforced fibreglass cylindrical mast. The conductor shallpass through the centreof the mast,with thehighvoltagetermination containedto theupper1mofthe mast.
- The support shall be securely bolted to other mast materials with guy wires used wherenecessary to enable the air termination and mast system to withstand maximum locallyrecordedwindvelocities.

1.8.5. Downconductor

- Thedownconductorshallconsistofaplasticfiller,copperconductor,innerinsulation,outer copper conductor,conductive sheath,allconcentricallyarranged.

- Thedownconductorshallhavealowcharacteristicimpedanceof4.5□ (Ohms)andamaximum inductanceof22 nH/m.
- Thedownconductorshallhavethecapacitanceequalto1100orgreaterthan1000pF/mandtheresistanceshallbeequalorlessthan0.5 (m□/m).
- Thedownconductorshallbetestedinalabtowithstandalightningimpulseratingof □250KVpeakvoltagebetweenthecore&screenbased1.2/50µs-waveshapeasdefinedunderANSIC62.41.
- Theouterdiameterofthedownconductorshallbelessthan37mm.
- Themainconductorshallbemadeofelectricalgradecopperof minimumcross sectional areaof50mm².
- In the final 3m to the ground and where it is exposed to human intervention, the downconductorshallbeplacedinaprotectivePVCpipeof3mmminimumwallthicknesssoasto avoid mechanicaldamageand increasehumansafety.
- The main copper conductor shall be capable of direct connection to the base of the airterminationbyuseofacompressioncoupling.
- The down conductor shall be installed in accordance with the manufacturer's instructionsand shallnotbesubjecttobendsoflessthan0.5metersradius.
- The downconductorafterrouting,mustbekept in constantphysical contact withthestructure via conductive clamps. The top 10% of the installed lengthfrom the terminalmust be anchored at least every 1 meter. The lower must be anchored at least every 2meters.
- The downconductor(s) shallbe complianttoUL-96:LightningProtection Components(Standardfor safety)

1.8.6. Performancerecordingequipment

- Eachprotection systemshallbe suppliedwith alightning event counter.Thelightningevent counter shall have a register that activates one count for every discharge where thepeak current exceeds 1500A. The test wave shape shall be the 8/20us standard as definedbyANSIC62.41
- The lightning event counter shall be robust, easy to install and housed in a IP67 ratedenclosure. The countershalloperate from theenergy of the lightning dischargeand notrelyonexternalorbatterypower tooperate.
- Thelightningeventcountershallbeinstalledtothemanufacturer'sinstructionsinareadily accessible manner so that readings can be taken at regular intervals. It shall bepositionedsuchthatitsoperatingtemperatureiswithintherange-10□Cto+50□C.

1.8.7. Grounding

- Thegroundingsystemreadingshallnotexceed10ohmsstaticimpedance.
- Grounding shallbeaffectedbycopperwireortapeburiedbelowthefrostline(ortoapproximately 600mm deep in non freezing locations) or by deep driven UL listed copperbonded steelcoregroundrodswithatleast10milcopper thickness.
- Bondingofthegroundingsystemtometallicpartsofthebuilding,thestructuralreinforcing steel of the building and to arriving services is recommended. The resistanceshallbemeasuredandthe10-

ohmrequirementsachievedbeforesuchbondingisaffected.

- Electrically conductive Ground Enhancing Materials may be used to achieve low groundresistanceprovidedthematerialsaremixedandstrictlyinaccordancewiththemanufacturer'sinstructions.

1.8.8. LightningandSurgeVoltageProtection

- This specification describes the electrical and mechanical requirements for a high energyTransientVoltageSurgeSuppressor(TVSS).ThespecifiedTVSS/SPDsystemshallbeconnected in parallel to the facility's electrical main incoming (main LT panel) as well asfinal distribution boards, shall provide effective high energy surge current diversion, andshall be suitable for application in ANSI/IEEE C62.41 Category A, B and C environments orIEC61643-1ClassI,II and III
- The specified system shall be designed, manufactured, tested and installed in compliancewith thefollowingcodesandstandards:
    - IEC61643-1:SurgeProtectiveDevicesconnectedtolowvoltagepowerdistribution systems.
    - Underwriters Laboratories: (UL 1449, 2nd edition) Standard for Transient VoltageSurge Suppressors. International Standards Organization (ISO) Company certifiedISO9001 for manufacturing, design and service and the applicable portions of theAmericanNationalStandardsInstituteandInstituteofElectricalandElectronicEngineersstandards(ANSI/IEEE1100,C62.11,C62.41,C62.45)

1.8.9. ElectricalRequirements

The single phase TVSS system shall be suitable for installations operating between 220VAC and240VAC.ThethreephaseTVSSsystemshallbesuitableforinstallationsoperatingbetween380VAC to 415VAC, Star (Y) Configuration: 3 Phase 4 Wire Plus Ground or Delta Configuration: 3phase4wireincludingGround.

ThemaximumcontinuousoperatingvoltageofthecompleteTVSS,aswellasallcomponentsinthe suppressionpathshallbe greaterthan 125% of the nominalsystemoperatingvoltage toensuretheabilityofthesystemtowithstandtemporaryRMSovervoltages(swellconditions).

Theoperatingfrequencyrangeofthesystemshallbe50or60Hz.

TheSPDshallprovideprotectioninallmodes(L-NorL-L,L-GandN-Gwhereapplicable)SurgeCurrent Capacity:

Location	Class	SurgeCurrent
MainServiceEntrance	ClassC	200/400KA
MainDistributionFeeders	ClassB	100/160KA
SubdistributionPanels	ClassA	50KA

The TVSS shall be able to carry the power short circuit current until it is interrupted by externalover-current disconnect or by the backup over current protection. The minimum Short CircuitWithstandoftheTVSS shallbeaccordingtothetablebelow:

Class	Minimum ShortCircuit WithstandCapability
ClassC	200KA
ClassB	35to65KA
ClassA	14KA

Allcomponents,includingsuppression,filtering,andmonitoringcomponents,shallbeindividually fused at the component level with the fuses rated so as not to impede maximumspecifiedsurgecurrentcapacity.Thefuseshallbecapableofopeninginlessthanonemillisecondandclearboth high and low impedancefaults.

TheTVSSshallabletoclampthevoltage:

120,120/208or120/240	400volts
208,240,277,230/400or277/480	800volts
346,or346/600	1200volts
480	1500volts
600	2000volts

Thetypicalresponsetimeofallsuppressioncomponentsshallbe<0.5ns.

Noise Attenuation: The filter shallprovide insertion loss witha maximum of 40dB to 50dB from10 kHz to 100 MHz with data obtained utilizing the 50-ohm Insertion Loss Methodology fromMIL-STD-220A.

1.9.0. TESTING

1.9.1. General

After the completion of the work, the contractor shall carry out the pre-commissioning as well ascommissioningchecksasgivenbelowontheentireinstallationandrecordsshallbemaintainedfor referenceofany statutoryauthorityand theOwner.

1.9.2. Pre-CommissioningChecks

Note - Pre- Commissioning checks are to be carried out by Electrical contractor in presence ofProjectManagementTeam.

1	FeederPillar\LTPanels\\APFCpanels	♦ Externalcablesareglandedproperly. ♦ Wiresareconnectedproperlyasperwiringdiagram. ♦ Correctcolourcodingandcorrectconnectionby propercopperlugsisdone.

		♦ Wiresaredressedandbunchedproperly. ♦ Connectionsareproperlytightened. ♦ Notmorethantwowiresareconnectedonanyonesideofterminal. ♦ TwoEarthingconnectionsaremadeproperly. ♦ FunctionalcheckisOK ♦ IRvaluesofthecircuitaremeasuredandrecorded. ♦ Checkpropermechanicaloperationsofcircuitbreakingdevicesincludingalignmentoftrolleyfor drawouttypedevice. ♦ Checkcontactalignment.Andpropersequenceofclosingandopeningofmainandarcingcontacts. ♦ Checkelectricalrelays,meters&controlsforcorrectwiring. ♦ Checkpolarityandconnectionsofallinstrument transformers.
2	Busducts\risingMains	♦ Visualnchecksforinstallation&support ♦ CheckInsulationresistancewith1000Vmegger ♦ CheckEarthcontinuity

3	LightingPoles	♦ Concretefoundationisfirmlysetandcured. ♦ Correctcolourcodingandcorrectconnectionbyproperco pperlugsis done. ♦ Connectionsareproperlytightened. ♦ Notmorethantwowiresareconnectedonanyonesideoft erminal. ♦ Earthingconnectionismadeproperly.
4	HT\LTCables	♦ Cableidentificationtagsareprovidedatbothends. ♦ Cableentryinallequipmentisthroughpropersizedgland s. ♦ Cableterminationismadebypropercrimpingtypelugs. ♦ Connectionsareproperlytightened. ♦ Notmorethantwoconductorsareconnectedonanyonesid eofterminal. ♦ IRvaluesofthecircuitaremeasuredandrecorded .
5	Earthing	♦ The resistance value of each earth electrode aremeasured andrecorded. ♦ Total resistance of earthing system should be asper the design value and in any case, shall not bemorethan3 OhmasperIS-3043. ♦ Continuity test for earth continuity conductorswith ELVtester.

1.10.0. SPECIFICATIONFORHIGHMASTLIGHTPOST/FITTINGS

• TypeofTowers	HighMastTowerwithtelescopiclights : cradle
• Materialofconstruction	GIPlates :
• RegionalbasicWindspeed • GustFactor	33m/sec(118km/hr)**b.**44m/sec : (158km/hr)**c.**50m/sec(180km/hr) 1.15/1.25 :
• Topographyconfiguration	1.0 :
• Meanprobabledesignlife	25years :
• HeightoftheTowers	12to40meters :
• HeightVariationfactor	AsperISCode 875:1987(Part3) :
• TerrainCategory	Asperthesiterequirement :
• Winches	Motoroperated/Manuallyoperated :
• NumberofLightsCradles • NumberofLights • AreaofCrossSectionofthe	One/Two AsperSCHEDULE As per design of the luminaries

1.10.1. SpecificationofFittings

The fittings shall be of high intensity, weather & dust proof LED Flood light with highly polishedstainlesssteelfacetedmirror reflector, castaluminum housing,toughenedfrontglass fitted tocast aluminum retaining ring by captive bolts screwed down to the flange of the aluminum body(within corporate steelinsertsatthreadedportions),G.S.lampholderwithlamplockingarrangement and GI Cradle with passivity bolts The light fitting would be complete with 230V,150/250W LEDLamp &itsDriverunitincastaluminumhousing.

The fittings shall be Highly polished stainless steel mirror faceted reflectors for assured lastingperformance.IdealforLEDlampsforitscapabilitytoreflectouthighheatalongwithlightensuring longer life for lamps. The faceted reflectors used ensure wide spread, high intensity andenergysaving.

Highly polished stainless steel mirror faceted reflectors shall be used for assured lasting performance. This is Ideal for LED lamps for its capability to reflect out high heat along with light ensuring longer life for lamps. The faceted reflectors used shall ensure wide spread, high intensity and energy saving.

The light fittings shall be such that Dust, moisture andvermin cannot enter the fitting.Even iftheseenterdueto loosetightening,thatwillhavenopermanenteffect onthe efficiencyof thereflectors becausesthesecanbewipedclean&shinning

ThelightfittingsshallhaveNeopreneRubberGasketstoensureIP67protectionmakingthefittings dust,moistureand verminproof.

The fittings shallbe provided with steel inserts at important threadedportions to preventwearofffor along time.

1.11.1. Specificationoftransformers

The scope covers design, supply, installation, testing at manufacturer's works and commissioningof11/0.433KV,50Hz,3phase,Oilcooled800KVAcopperwoundtransformersuitableforout door installation onplinth, with first fillingofoilandwithLVcable endbox, fittedwith offloadtapchangerandconfirmingtoIS-1180/2014.ThetransformershallbefittedwithOffloadtap changer of +5% to -10% in steps of 2.5%. The transformer shall be of ENERGY EFFICIENCYLEVEL-2class.

Theequipmentshallconforminallrespectstohighstandardsofengineering,designandworkmanshipandshall becapableofperformingincontinuouscommercialoperation,inamanneracceptabletotheOwner,whowillinte rpretthemeaningsofdrawingsandspecification and shallhave the power to rejectanyworkormaterial which, inhis judgment isnotinaccordancetherewith.Theofferedequipmentshallbecompletewithallcomponentsnecessary for their effective and trouble free operation. Such components shall be deemed to bewithin the scope of bidder's supply irrespective of whether those are specifically brought out in this pecification.

Thetransformerandaccessoriesshallbedesignedtofacilitateoperation,inspection,maintenance and repairs.The design shall incorporate every precaution and provision for thesafetyofequipmentaswellasstaffengagedinoperationandmaintenanceofequipment.Alloutdoor apparatus, including bushing insulators with their mountings, shall be designed so as toavoidanyaccumulationof water.

The transformers shallbe suitable for outdoor installation with three phase, 50 Hz, 33 kV systeminwhichtheneutraliseffectivelyearthedandtheyshouldbesuitableforservicewithfluctuationsinsuppl yvoltageup toplus12.5%tominus12.5%.

Sl.No.	Item	11kVDistributionTransformers
1	Systemvoltage(Max.)	12kV
2	RatedVoltage(HV)	11kV
3	RatedVoltage(LV)	433V
4	Frequency	50Hz+/-5%
5	No.ofPhases	Three
6	ConnectionHV	Delta
7	ConnectionLV	Star(Neutralbroughtout)
8	Vectorgroup	Dyn-11
9	Typeofcooling	ONAN

Audible sound levels (decibels) at rated voltage and frequency for liquid immersed distributiontransformersshallbeasperNEMAStandards.

The core shallbe stack/ wound typeofhighgrade Cold RolledGrain OrientedorAmorphousCore annealed steellamination having low lossand good grain properties, coatedwith hot oilproof insulation, bolted together and to the frames firmly to prevent vibration or noise. The coreshall be stress relieved by annealing under inert atmosphere if required. The complete design ofcoremustensurepermanencyofthecorelosswithcontinuousworkingofthetransformers.

The transformers core shall be suitable for over fluxing (due to combined effect of voltage andfrequency)upto12.5%withoutinjuriousheatingatfullloadconditionsandshallnotgetsaturated.

Increaseof12.5%ofratedvoltageshallnotincreasetheno-loadcurrentby6%offullloadcurrent.HVandLVwindings shallbewoundfromElectrolyticCopperconductor.

Tap changing shallbe carried out by means of an externally operated self-position switch andwhen the transformer is in de-energised condition. Switch position No.1 shall correspond to themaximum plus tapping. Each tap change shall result in variation of 2.5% in voltage. Arrangementforpadlockingshallbeprovided.Suitablealuminumanodizedplateshallbefixedfortapchanging switchtoknow thepositionnumberoftap.

TheinsulatingoilshallcomplywiththerequirementsofIS335.Useofrecycledoilisnotacceptable.Thespecificresistanceoftheoilshallnotbelessthan35X1012ohm-cmat27degrees Celsiuswhentestedasper IS 6103.

The maximum allowable losses at rated voltage and rated frequency at 75 degrees Celsius shallbeasperEnergyEfficiencyLevel-2specifiedinIS1180(Part-1):2014.

The percentage impedance of transformers at 75 degrees Celsius shall be as per IS 1180(Part-1):2014.

ElectricalgradeinsulationepoxydottedKraftPaper/NomexshallbeusedforinsulationAllspacers,axial wedges /runners used in windings shall be made of pre-compressed Pressboard-solid, conforming to type B 3.1 of IEC 641-3-2. In case of cross-over coil winding of HV all spacersshallbe properly sheared anddovetailpunchedtoensureproper locking.Allaxialwedges/runners shall be properly milled to dovetail shape so that they pass through the designed spacersfreely. Insulation shearing, cutting, milling and punching operations shall be carried out in such away,thatthereshouldnotbeanyburranddimensionalvariations.

Transformertankconstructionshallconforminallrespecttoclause15ofIS1180(Part-1):2014.Thecapacityofaconservatortankshallbedesignedkeepinginviewthetotalquantityofoilanditscontractionandexpansiondueto temperaturevariations.Thetotalvolumeofconservatorshallbesuchastocontain10%quantityoftheoil.Normally3%quantitytheoilshallbecontainedintheconservator.
Thecoverofmaintankshallbeprovidedwithanairreleaseplugtoenableairtrappedwithintobereleased,unlesstheconservatorissolocatedastoeliminatethepossibilityofairbeingtrappedwithinthemain tank.Theinsidediameterofthepipeconnectingtheconservatortothemaintankshouldbewithin20to50mmanditshouldbeprojectedintotheconservatorsothatitsendisapproximately20mmabovethebottomoftheconservatorsoastocreateasumpforcollectionofimpurities.Theminimum oil levelshouldbeabovethesump level.

Thebushingsshallconformtotherelevantstandardsspecifiedandshallbeofoutdoortype.

The bushing rodsand nuts shallbe made ofbrass material 12 mmdiameter forbothHTandLTbushings. 52 KV class bushings shall be provided for these transformers. Arcing horns shall beprovidedon HVbushings.

The phases-phase and phase-earth clearances in HV & LV side bushings and cable boxes shall besuitabletoterminatecablesasper sizesspecifiedinBoQandSLD.

DIESEL GENERATOR :- Supply of 1010 KVA open DG Set comprising of G5 developing 1180BHP Coupled to 1010 KVA, 415 V make alternator mounted on a common base frame, Fuel tank 990 Ltrs. (Outside Enclosure)) Batteries & Leads.) AVM Pads Silencer. First fill of lube oil. Std Manual panel Supply of Acoustic enclosure Supply of Load Side Terminal Box

LISTOFPREFERREDMAKEOFMATERIALS(ELECTRICAL)		
S. No.	**Material/Article**	**Manufacturers/Agencies/Brandmake**
1	Engine	AshokLeyland/Cummins/Caterpillar/KOEL /Mahindra
2	Alternator	Kirloskar/KEL/CromptonGreaves(AL.series)/KEC
3	Battery(LeadAcid/Mntc.Free)	AmaraRaja/Exide/CromptonGreaves/Prestolite/Pace Setter/Standard/
4	HVSwitchgear	ABB/Siemens/Schneider/ L&T
5	LTSwitchgear	L&T/SchneiderElectric/Siemens//Legrand/ABB
6	VaccumCircuitBreaker	ABB/Siemens/Schneider/ L&T
7	Transformer(Oilfilled/Drytype)	ABB/CromptonGreaves/ /Kirloskar/Siemens/Alstom/Uttam/OTPL
8	HTPanels	ABB/Siemens/Schneider/ L&T
9	AirCircuitBreaker	L&T/SchneiderElectric/Siemens/ABB
10	MCCB(Ics=Icu)	L&T(d sine)/Schneider(Compact NSX)/Siemens(Sentron-3 VL)/Legrand(DPX)/ABB(Elegance)
11	MV/LTPanels	ELECTRO ALLIED PRODUCTS/ A. C. Power System/ Green Galaxy/ CONTROL & SWITCHGEAR SCHEMATICS/ TRICOLITE/ ADLEC/Technocrat/Power Professional/Utkal Electrical/Power Tech
12	SDFunits	L&T/SchneiderElectric/Siemens/Legrand
13	PowerContactors	L&T/SchneiderElectric/Siemens/BCH/GE/PowerControls
14	ChangeOverSwitch	L&T/HPL/ Standard/Control&Switchgears
15	AirBrakeSwitch	National/Kiran/Pactil/Atlas/Powergridswitchgears
16	PinandDiscInsulator	Jayshree/WS/IEC/BHEL/BharatIndustries
17	11KVHornGapArrestor	Sahal/Pactil/GEC/SEW
18	LightningArrestor	Atlas/GE/Elaro/Lamco/International/Oblum/Elpro
19	DropoutFuses	National/Kiran/Pactil
20	GI/MSPipe(ISI Marked)	ATC /ATL/BST/GSI/ITC/ITS/IIA/JST/Jindal/TTA/ Tata/Zenith
21	APFCRelay	L&T/SchneiderElectric/NeptuneDucati/Syntron/Trinity Electronics
22	IDMT Relay	AVKC/SEGC
23	C.T./P.T.	AE/MP/Marshal/Pactil/Kappa/L&T/Ashmor/Waco/Meco/Gilbert/Trio/Indotech/Indocoil
24	SelectorSwitch	L&T/Kaycee/IMP/Vaishno/Seizer/rasscontrol
25	IndicatingLamp(LEDType)andPushBut	Vaishno/Siemens/L&T/AE/IMP/Rass
26	PowerCapacitors(MPP/APP)	Khatau/Junkar/L&T/EPCOS(Siemens)/ABB/Crompton/SchneiderElectric/NeptuneDucati
27	DigitalPanelMetersi/cMultiFunction Meter	Conzerv/SchneiderElectric/AE/Digitron/IMP/Meco/ Rishabh/Universal/HPL/L&T/ABB
28	Ammeter/Voltmeter	AE/Universal/Rishabh/Kaycee/Meco/Enercom

29	ColdshrinkHT/LTCableJointKit	Denson/3M(M-Seal)/ Raychem
30	RubberMatting(ISIMarked)	JyotiRubberUdyog/Raychem/Padmini/Dozz
31	AVM Pads	Dunlop/PolyBond
32	MCB/Isolator/RCBO/RCCB/ Distribution Board	L&T/SchneiderElectric/Siemens//Legrand/ABB (makesofDBsandcircuit breakersshallbesame)
33	TPNSwitches&HRCFuses	L&T/SchneiderElectric/Siemens//Legrand/ABB
34	PVCConduits(ISIMarked)Colour: Ivory/Grey	AKG/Polycab/AvonPlast/Precision/Norpack
35	SteelConduits(ISIMarked)	BEC/Bharat/Gupta/AKG/RMCON/SteelKrafts
36	ModularSwitchesandSockets	Legrand - Myrius/L&T Englaze /Anchor – Roma plus/ ABB - Ivie
37	CableTray	MEM/Bharti/Ratan/Slotco/Profab
38	CableGlands	MCI,Comet/Jainson/Dowells
39	Thimbles/Lugs	Jainson/Dowells/Ascon
40	1.1 KV/11KV grade Al. Condr., XLPE insulatedarmouredcables(ISIMarked	Finolex/Havells/Polycab//KEI/RR KABEL
41	FireSurvivalcable	Finolex/Havells/Polycab//KEI/Anchor/ RR KABEL
42	Wires (PVC insulated copper conductor cable FRLS - ISI marked)/Telephone Cables/Submersiblecables/Co-axial/TV cables	Finolex/Havells/Polycab//KEI/ Anchor/ RR KABEL
43	BLDC Type FansandExhaustfans(AllTypes)	Havells/Crompton/Orient/Bajaj/Usha/atomberg
44	Internal LEDLuminaries	Philips/Havells/Crompton/ Bajaj/ Wipro/ Panasonic
45	External LEDLuminaries	Philips/Havells/Crompton/ Bajaj/ Wipro/ Panasonic/ K-Lite/LT
46	LANCables	Panduit/Legrand/Schneider//Polycab
47	CentrifugalPump	BEPower/Beacon/Crompton/Kirloskar/KSB
48	SubmersiblePump	BEPower/Beacon/Crompton/Kirloskar/KSB
49	Motors	CromptonGreaves/SchneiderElectric/Kirloskar/Siemens
50	MotorStarter	L&T/Siemens/BCH/GEPowerControl/SchneiderElectric
51	FreshAirFans	Khaitan/Havells/Crompton/Orient/Bajaj/Usha/Polycab
52	SinglePhasePreventer/Overload Unit	L&T/Minilec/ Siemens
53	Timers	L&T/Minilec/Siemens/AE
54	GateValve/FootValve/NRV/ButterFly Valve	Advance/Audco/JohnsonControls/Zoloto/Annapurna/Fountain /Kirloskar/Leader/Sant/Trishul/Kartar/InterValve
55	Single/DoubleHeadedGMLandingValve	NewAge(Mumbai)/Safex/Ceasefire/Padmini/Lifeguard

56	HydrantValve	NewAge(Mumbai)/Safex/Ceasefire/Kalpana/L&Tvalves Ltd./Lifeguard
57	Sprinkler/HoseReel&HosePipe(ISI Marked)	Safex/Agni/Newage/Ceasefire/LifeGuard/Omex
58	FireExtinguisher(ISIMarked)	Minimax/Lifeguard/Safeguard/Safex/Omex
59	WaterPurifier	EurekaForbes/Kent/IonExchange/LG
60	InverterSystem	Sukam/Microtek/Luminous/Vertiv/Numeric
61	ElectricalWaterStorageHeater	Racold/Crompton/Havells/Bajaj/Polycab
62	VRF Unit	Daikin/ Carrier/ Mitsubishi/ Hitachi/ Toshiba
63	Cat-6 cable & components	Legrand/ Polycab/ Havells/ KEI/ Finolex/Systimax/Belden
64	CCTV Camera and accessories	Honeywell/ Pelco/ Bosch/Hikvision/ Panasonic
65	CCTV Rack	Valrack/Rittal/ APW
66	POE Switch	Cisco/Grandstream/Digisol
67	NVR	Honeywell/ Pelco/ Bosch/Hikvision/ Panasonic
68	Display	Samsung/LG/Sony
69	Optical Fiber	Belden / Legrand / Systimax
70	Street Light Poles	Valmont/ K-lite/BPP/ BAJAJ/ Passolite/ Homdec/ Utkars

LIST OF PREFERRED MAKE OF MATERIALS (ELECTRICAL)		
S.No.	**Material/Article**	**Manufacturers/Agencies/Brand/Make**
1	Engine	Ashok Leyland/Cummins/Caterpillar/KOEL/Mahindra
2	Alternator	Kirloskar/KEL/Crompton Greaves(AL.series)/KEC
3	Battery(Lead Acid/Mntc.Free)	AmaraRaja/Exide/CromptonGreaves/Prestolite/Pace Setter/Standard/
4	HV Switchgear	ABB/Siemens/Schneider/ L&T
5	LT Switchgear	L&T/Schneider Electric/Siemens//Legrand/ABB
6	Vacuum Circuit Breaker	ABB/Siemens/Schneider/ L&T
7	Transformer(Oil filled/Dry type)	ABB/Crompton Greaves/ /Kirloskar/Siemens/Alstom/Uttam/OTPL
8	HT Panels	ABB/Siemens/Schneider/ L&T
9	Air Circuit Breaker	L&T/Schneider Electric/Siemens/ABB
10	MCCB(Ics=Icu)	L&T(d sine)/Schneider(Compact NSX)/Siemens(Sentron-3 VL)/Legrand(DPX)/ABB(Elegance)
11	MV/LT Panels	ELECTRO ALLIED PRODUCTS/ A. C. Power System/ Green Galaxy/ CONTROL & SWITCHGEARSCHEMATICS/ TRICOLITE/ ADLEC/Technocrat/Power Professional/Utkal Electrical/Power Tech
12	SDF units	L&T/Schneider Electric/Siemens/Legrand
13	Power Contactors	L&T/Schneider Electric/Siemens/BCH/GE/Power Controls
14	Change Over Switch	L&T/HPL/ Standard/Control & Switchgears
15	Air Brake Switch	National/Kiran/Pactil/Atlas/Power grid switchgears
16	Pin and Disc Insulator	Jayshree/WS/IEC/BHEL/Bharat Industries
17	11KV Horn Gap Arrestor	Sahal/Pactil/GEC/SEW

18	Lightning Arrestor	Atlas/GE/Elaro/Lamco/International/Oblum/Elpro
19	Dropout Fuses	National/Kiran/Pactil
20	GI/MS Pipe(ISI Marked)	ATC /ATL/BST/GSI/ITC/ITS/IIA/JST/Jindal/TTA/ Tata/Zenith
21	APFC Relay	L&T/Schneider Electric/Neptune Ducati/Syntron/Trinity Electronics
22	IDMT Relay	AVKC/SEGC
23	C.T./P.T.	AE/MP/Marshal/Pactil/Kappa/L&T/Ashmor/Waco/Meco/Gilbert/Trio/Indotech/Indocoil
24	Selector Switch	L&T/Kaycee/IMP/Vaishno/Seizer/rasscontrol
25	Indicating Lamp(LED Type)and Push But	Vaishno/Siemens/L&T/AE/IMP/Rass
26	Power Capacitors(MPP/APP)	Khatau/Junkar/L&T/EPCOS(Siemens)/ABB/Crompton/ Schneiderelectric/NeptuneDucati
27	Digital Panel Meters i/c Multi Function Meter	Conzerv/SchneiderElectric/AE/Digitron/IMP/Meco/ Rishabh/Universal/HPL/L&T/ABB
28	Ammeter/Voltmeter	AE/Universal/Rishabh/Kaycee/Meco/Enercom
29	Cold shrink HT/LT Cable Join tKit	Denson/3M(M-Seal)/ Raychem
30	Rubber Matting(ISI Marked)	Jyoti Rubber Udyog/Raychem/Padmini/Dozz
31	AVM Pads	Dunlop/PolyBond
32	MCB/Isolator/RCBO/RCCB/ Distribution Board	L&T/Schneider Electric/Siemens//Legrand/ABB (makes of DBs and circuit breakers shall be same)
33	TPN Switches & HRC Fuses	L&T/Schneider Electric/Siemens//Legrand/ABB
34	PVC Conduits (ISI Marked) Colour: Ivory/Grey	AKG/Polycab/AvonPlast/Precision/Norpack
35	Steel Conduits(ISI Marked)	BEC/Bharat/Gupta/AKG/RMCON/SteelKrafts
36	Modular Switches and Sockets	Legrand - Myrius/L&T Englaze /Anchor– Roma plus/ ABB - Ivie
37	Cable Tray	MEM/Bharti/Ratan/Slotco/Profab
38	Cable Glands	MCI,Comet/Jainson/Dowells
39	Thimbles/Lugs	Jainson/Dowells/Ascon
40	1.1 KV/11KV grade Al. Condr., XLPE insulated armoured cables(ISI Marked	Finolex/Havells/Polycab//KEI/RR KABEL
41	Fire Survival cable	Finolex/Havells/Polycab//KEI/Anchor/ RR KABEL
42	Wires (PVC insulated copper conductor cable FRLS - ISI marked)/Telephone Cables/Submersible cables/Co-axial/TV cables	Finolex/Havells/Polycab//KEI/ Anchor/ RR KABEL
43	BLDC Type Fans and Exhaust fans(AllTypes)	Havells/Crompton/Orient/Bajaj/Usha/Atomberg
44	Internal LED Luminaries	Philips/Havells/Crompton/ Bajaj/ Wipro/ Panasonic

45	External LED Luminaries	Philips/Havells/Crompton/ Bajaj/ Wipro/ Panasonic/ K-Lite/LT
46	LANCables	Panduit/Legrand/Schneider//Polycab
47	Centrifugal Pump	BEPower/Beacon/Crompton/Kirloskar/KSB
48	SubmersiblePump	BEPower/Beacon/Crompton/Kirloskar/KSB
49	Motors	CromptonGreaves/SchneiderElectric/Kirloskar/Siemens
50	MotorStarter	L&T/Siemens/BCH/GEPowerControl/SchneiderElectric
51	FreshAirFans	Khaitan/Havells/Crompton/Orient/Bajaj/Usha/Polycab
52	SinglePhasePreventer/OverloadUnit	L&T/Minilec/ Siemens
53	Timers	L&T/Minilec/Siemens/AE
54	GateValve/FootValve/NRV/ButterFly Valve	Advance/Audco/JohnsonControls/Zoloto/Annapurna/Fountain /Kirloskar/Leader/Sant/Trishul/Kartar/InterValve
55	Single/Double Headed GM Landing Valve	NewAge(Mumbai)/Safex/Ceasefire/Padmini/Lifeguard
56	HydrantValve	NewAge(Mumbai)/Safex/Ceasefire/Kalpana/L&Tvalves Ltd./Lifeguard
57	Sprinkler/Hose Reel &Hose Pipe(ISI Marked)	Safex/Agni/Newage/Ceasefire/LifeGuard/Omex
58	Fire Extinguisher (ISIMarked)	Minimax/Lifeguard/Safeguard/Safex/Omex
59	Water Purifier	EurekaForbes/Kent/IonExchange/LG
60	Inverter System	Sukam/Microtek/Luminous/Vertiv/Numeric
61	Electrical WaterStorageHeater	Racold/Crompton/Havells/Bajaj/Polycab
62	VRF Unit	Daikin/ Carrier/ Mitsubishi/ Hitachi/ Toshiba
63	Cat-6 cable & components	Legrand/ Polycab/ Havells/ KEI/ Finolex/Systimax/Belden
64	CCTV Camera and accessories	Honeywell/ Pelco/ Bosch/Hikvision/ Panasonic
65	CCTV Rack	Valrack/Rittal/ APW
66	POE Switch	Cisco/Grandstream/Digisol
67	NVR	Honeywell/ Pelco/ Bosch/Hikvision/ Panasonic
68	Display	Samsung/LG/Sony
69	Optical Fiber	Belden / Legrand / Systimax
70	Street Light Poles	Valmont/ K-lite/BPP/ BAJAJ/ Passolite/ Homdec/ Utkarsh

N.B:

1. Any other reputed equivalent make may be considered with due approval, subject to fulfillment of required technical specification and relevant BIS/ISI marks.

2. In addition to above, Makes of materials mentioned in the BOQ items shall be followed.

3. Makes of any materials not specifically mentioned in the BOQ items shall be used after due approval from Engineer-in-charge.

Technical Specification and Scope of work for Fire Fighting and Life Safety System

Introduction: The specification covers fixed firefighting installation i.e. wet riser, yard hydrant and sprinkler system. The work is to be executed as per the provisions of National Building Code and the equipment should conform to relevant Indian standards. **The installation will be inspected by fire dept.The agency or his representative shall attend such inspection of the Fire Officer, extend all test facilities as are considered necessary, rectify and comply with all observations of the Fire Officer. In case the agency fails to attend the inspection and make desired facilities available during inspection, the Corporation reserves the right to provide the same at the risk and cost of the agency and impose penalty for the same.**

Wet Riser & Down Comer: The provision of down comer system, wet riser system and wet riser cum down comer system is to be provided as per the classification of buildings and requirements outlined in NBC with latest amended.

The operating pressure of individual hydrant including the hydrant at the terrace level shall be 3.5 Kg/ cm^2. The pipe line shall be designed with a maximum flow velocity of 2.5 m/sec and maximum friction loss of 5 mtr. per 100 mtr. run.

The discharge of main fire pump (Electrical & Diesel) shall be 2850 lpm. Discharge of pressurisation pump shall be in between 180 lpm to 300 lpm depending on the size of installation. The selection of discharge shall be done as per provisions of NBC. The head of fire pump shall be decided by taking into account head at the hydrant, height of terrace above pump level and friction losses. The head of pressurisation pump shall be decided by taking into account head at the hydrant, height of terrace above pump level.

The wet riser system shall be provided by keeping in view following considerations.

a) No corner of building farther than 30 m from the nearest riser.

b) Horizontal distance between two risers should not be more than 50 mtr.

c) Normally one riser is to be provided for every 1000 m^2 of plinth area or part thereof.

Main Electric Fire Pump: The main electric fire pump shall be direct driven suitable for operation on 415 Volt, 3 phase, 50 Hz electric supply. The operating speed shall not exceed 3000 RPM. The pump casing shall be designed to withstand 1.5 times of working pressure. The material of the shaft shall be stainless steel and impeller shall be bronze.

Diesel Fire Pump: The Diesel engine shall be water cooled type developing suitable HP at the specified operating conditions. The diesel engine shall be multi cylinder, multi stroke type and with electric starting arrangement. The engine shall be shall be directly coupled with the pump. The engine shall be suitable for cold starting for which suitable heaters shall be provided in lubricating oil. The diesel engine shall conform to BS 649/ IS 1601/ IS 1002 amended up to date. The fuel tank shall be of welded construction and capacity to run on full load up to 8 hrs. Necessary lub.oil and fuel filter should be provided. The complete unit shall be mounted on anti-vibration pads. 12/ 24 Volt starter motor with battery and battery charger with float and boost charger shall be provided.

Engine Instrumentation Panel: The engine instrumentation shall include a) Lub. oil pressure gauge b) Lub. oil temperature gauge c) Water temperature gauge d) Tachometer and e) Hour meter.

Engine Protection Devices: Engine protection and automatic shut off facility shall be provided for a) Low lub oil pressure b) High cooling water temperature c) High lub oil temperature d) Over speed e) Engine lock out if engine fails to start after three attempts.

Internal Hydrant: The internal hydrant shall constitute Single/ Double headed outlet, 20/30/40m long first aid hose reel, 15 m long 63 mm dia RRL hose pipe with male and female gun metal coupling on both sides and 63 mm dia branch pipe 20 mm nozzle

Yard Hydrant: Yard hydrants shall be provided around the building located at a distance not less than 2 mt and not more than 15mtr from the building. The yard hydrants shall be so located around the building so that it is possible to fight the fire on any face of the building. A distance of 45 mtr between the external hydrants will be adequate. The external hydrant shall be connected to the ring main and shall be provided with 63 mm single head landing valve, 80 mm dia butterfly valve, 63 mm dia RRL hose pipe with male and female coupling on both ends and 63 mm dia branch pipe with 20 mm nozzle.

Pipes and accessories: Heavy duty C class MS pipe conforming to IS 1239 shall be used for sizes up to 150 mm dia. For sizes above 150 mm , heavy class welded black steel pipe conforming to IS 3589 having wall thickness of 6.35 mm up to 350 mm dia shall be used. All valves and accessories shall be of pressure rating PN 1.6. Pipe supports in the pump room shall be floor mounted. All pipes laid inside the building shall be adequately supported from ceiling or walls by structural clamps fabricated from MS rods/ channels/ angles/ flats or by using anchor fasteners and fully threaded rod as per site condition.

In case of sprinkler system, supporting rod diameter shall be 8 mm for pipes up to 50 mm dia, 10 mm for pipes over 50 mm dia and up to 100 mm dia and 12 mm for pipes above 100 mm dia and up to 200 mm. All the clamps shall be made of GI sheet and threaded rods, anchor fastener and nuts and washers shall be galvanised. For pipes up to 50 mm dia socket welded fittings shall be used. For pipes of 65 mm dia and above butt welded fittings shall be used.

All pipes above ground and in exposed location shall be painted with one coat of red oxide primer and two or more coats of synthetic enamel paint (post-office red). Corrosion protection tapes shall be wrapped for pipes buried in ground. Corrosion protection tape shall comprise of coal tar/ asphalt component supported on fabric of organic or inorganic fibre and minimum 4 mm thick and conforming to requirement of IS 10221 or painted with 2 (two) or more coats of anti-corrosive epoxy paint of approved shade.

Other accessories for wet riser system: Fire brigade connection shall be provided for filling the fire sump as well as to fire fight by connecting fire brigade directly to the ring main. The fire brigade connection to the ring main shall be provided with butterfly valve for isolation. Air vessel shall be provided to counter water hammer effect.

Landing Valve: Single or double headed brass/ stainless steel landing valve capable of discharging 900 LPM (for single head) and 1800 LPM (for double head) at 7 Kg/sqcm and conforming to IS 5290 shall be used.

First Aid Hose Reel: It consists of 20 mm dia Thermoplastic (Textile Reinforced) Type 2 hose tubing wrapped around a reel with water inlet pipe, stop valve and brass branch pipe and shut off nozzle. The first aid hose reel shall be as per IS 884. Coupling, branch pipe and nozzle shall be as per IS 8090.

Hose Pipe and accessories: Hose pipe shall be rubber lined woven jacket and 63 mm dia. It shall conform to Type A (Reinforced rubber lined) of IS 636. The hose pipe shall be complete with male and female coupling and nozzle. Material of construction of coupling and nozzle shall be Copper/ Aluminium alloy or of stainless steel. The hose pipes and nozzle etc. are to be stored in metal box with glass cover. The metal box shall be fabricated out of 2 mm thick CRCA sheet and duly painted with 2 (two) or more coats of enamel paint of approved shade.

Water Motor Alarm: Water motor alarm shall be provided in wet riser and sprinkler piping coming out of the pump room for alarm in case of operation of system.

Pressure Testing: The piping shall be tested to hydrostatic test pressure of at least one and a half times the maximum operating pressure, but not less than 24 Kg/Cm^2.

Holiday Test: The pipes after coating (for pipes laid underground) shall be tested using efficient high voltage holiday detectors operating at a voltage high enough to jump an air gap the length of which is equal to the thickness of the coating to detect any holiday and removal of defect.

Specification of Analogue Addressable Fire Detection System

Introduction

- This specification covers in general the requirement of analogue addressable type fire alarm system and its associated accessories /components , which constitutes the fire alarm system
- The scope comprise of SITC OF ANALOGUE addressable fire alarm system in accordance with the specification drawing and schedule of quantities
- The analogue addressable fire alarm control panel (FACP) shall function as fully stand –alone panel. FCAP shall have its own microprocessor, software and memory.

Codes and Standards: The fire alarm system and the components shall conform to the latest applicable Indian or IES standards. Equipment complying with other standard such as UL/FM and VCD etc shall also be accepted if it is of reputed make. The equipment shall also meet the provisions of IS 2189 (2008): Code of practice for automatic fire alarm system.

Addressable manual call point: Each manual call point unit are constructed of durable materials, which is finished in red. The housing accommodates a “break glass with push button “ in depressed condition which, when operated, when the glass cover is broken the push button will be released by the spring action and will actuates an alarm at control panel through its switching contacts. In addition, there will be an LED indicator on the monitor module for visual indication to locate call point easily. Manual call point shall be placed on the exit route and in particular on the floor landing or staircase as per IS 2189:2008

Electronic Hooters & Hooter cum Strobe: The low intensity sounder shall be addressable electronic type and shall give continuous / intermittent audible alarm whenever any detector or manual call point operates. The sound output from the hooter should not be less than 85 DB at one meter. The number of hooter and their spacing shall be sufficient to produce the sound levels as specified in IS 2189:2008. The hooter or hooter cum strobe shall be programmed to get activated in the relevant of

alarm from single detector/device or a group of detector/device. The wall mounted hooter and hooter cum shall be suitable for indoor application. The strobe shall be of red colour and flash at 1 Hz over the strobe's entire operating voltage. The strobe level can be varied from 15 Cd to 110 Cd.

Short circuit isolator: The fault isolator detects and isolates short circuited segment. The device automatically detects return to normal condition of the loop and restores the isolated segment. One isolator is suggested for every 20 devices. The isolator gives visual indication of fault through LED indicator. It is however preferable to have devices with integral short circuit isolator.

Smoke Detectors: The detectors shall work on photo electric principal to measure smoke density. The detector shall have ability to set the sensitivity alarm verification of each of the individual detector in the loop. It shall be possible to automatically change the sensitivity of detector for the day and night periods. Detector will operate when the pre-test smoke obstruction level is reached in the photo electric fire sensing element or when the ambient temperature within the room will reach 135°F.The detector shall be completely solid state with LED indication. The smoke detector shall be addressable type. It shall withstand temp variation from 0°C to 49°C and RH (Non-Condensing) up to 93% not hampers its performance. One/ two visible LED on the detector shall blink and provide a 360° viewing angle. Make: Panasonic

Heat Detector: Addressable fixed temp heat detector are designed to operate when the temp of the detector exceeds the predetermined value. The heat detector (fixed temp) is designed to initiate an alarm at 135°F. Fixed temp heat detectors are to be installed in basement car parking, UPS room, battery and pantry area. The detector are suitable for a supply voltage of 24v and the fixed temp will type heat detector shall be UL listed. One/ two visible LED on the detector shall blink and provide a 360° field viewing angle. Make: Panasonic.

Multi-criteria Detector: Intelligent addressable Multicriteria detector works based on Dual-Ray technology with an infrared and a blue LED so that lightest smoke is detected fast and reliable along with a heat sensor including mounting base. (Detector should comply to Test Fire 1). Detetctor should have inbuilt isolators as per NFPA 72 style 7 wiring requirements and have an option of both soft & hard addressing. Detector should monitor Electromagnetic interference and report to the panel - current and average values. EMC safety for detector shall be 50 V/m. Shall be EN54/ VDs/ certification.(Detectors without Inbuilt Isolators may be considered with an additional Isolator Module per detector)

Beam Detector: Beam detector incuding mounting base along with Interface module to direct connnect to the loop , having a coverage area with a distance of min. 10 m and max. 100 m with extra width of up to 14 m ,havinh Protection category of IP 54 ,Operating temperature range: -20 C to +55 C, Response sensitivity of 40% VdS compliant, shall be Vds Approved/ UL FM.

Response Indicator: Response indicator shall be fabricated from aluminium casting. The response indicator shall glow clearly in case of detector to which it is connected give an alarm signal. The word "fire" shall be clearly written on the visible face of the box.

ANALOGUE ADDRESSABLE TYPE FIRE ALARM PANEL

The analogue addressable fire alarm panel shall be of required number of loops and shall be extendable type. It shall meet the necessary standards. The panel shall be microprocessor controlled with LED display. It shall be suitable for integration with BMS system and shall give potential free contacts for interlocking of AHUs of air-conditioning system.

- An analogue addressable fire alarm control panel (FACP) is provided to effect total control over the detection devices required in the building. The FACP is of the digital distributed processing real-time, and multi user type. The system is provided with addressable and analogue fire alarm initiating, annunciation and controlling devices. The analogue addressable system is such that smokes sensor, heat sensor, manual call point etc. Can be identified with the point address

- FACP operates on 230V AC supply & smoke detectors are powered using the FACP based smoke detection circuit. Devices receive power and communication from the same pair of conductor.
- Setting smoke detector sensitivity remotely possible from analogue addressable fire alarm system to either high sensitivity manually or pre-programmed sequence e.g. (Day/Night) period. The panel regularly supervises all the sensors and devices on the loop and initiates fire to trouble alarm whenever required.
- The heat detector is designed to intimate an alarm at 135 °F and to respond to an increase in excess of 15 °F per minute. Detectors shall be of self-locking, plug – in design for installation in pre – wired bases.
- The control panel shall be provided with operating power from 230 V, 50 Hz single phase A.C source. The power shall be converted into 24V DC for system operation by a power supply unit. The panel shall have a battery (SMF) back up of 24 hrs. in the event of failure of the operating supply. The power supply unit shall be provided with battery charger of required capacity

  The analogue addressable type fire alarm panel shall incorporate
- Visible indication pinpointing the location of individual fire sensor i.e. testing for zone or device location.
- Audible alarm for fire and faults. Providing fast information on point of fire / fault complete with hard printout of date time device number and device type and text location.
- Necessary power supplies unit for the fire alarm system.
- Monitoring all devices continuously of their operating state by a microprocessor within the main control panel.
- Controlling the operation / non-operation of their mechanical and electrical system
- Acknowledge , reset and test devices
- The complete circuitry shall be fail proof as required in IS : 2189-2008
- The panel shall have additional capacity to operate auxiliary equipment like fire damper, fire closer, ventilation and pressurizing fans, emergency light smoke exhausters etc.
- Any auxiliary relays , which are required for the scheme shall be include in the scope of supply
- The analogue addressable fire alarm system panel be free standing type , totally enclosed ,dust damp and vermin proof fabricated sheet of minimum 16 gauge thickness the panel shall be painted as per standard with colour as specified
- The panel shall be completely factory wired absolutely ready in all aspect for installation at site and termination of the external cables for which undrilled bottom gland plate shall be provided. The minimum size of the wire shall not be less than 1.5 mm^2 stranded copper wiring shall be of switch board type single core stranded annealed copper wire with PVC insulation
- All wiring to be hooked up with external cables shall be terminated in suitable terminals blocks complete with washer ,terminal screw etc. 10% spare terminal shall be provided on the terminal blocks . the wiring termination shall be done using ferrules having indelible marking .insulated sleeves shall be provided at termination to reduce the possibility of short circuit between various wires

- Neoprene or equivalent rubber gasket shall be provided at all opening
- All necessary relays contactors indicator alarm push buttons shall be housed in this panel
- A power unit shall be provided inside the indicating panel as follows
    - Silicon diode battery charger for operating on the auxiliary power available at the risk /building .The capacity of the charger shall be such that the same can boost charge the battery (within 8 hours) while supplying the rated load of the fire alarm system. Battery bank shall be of adequate capacity to supply fire alarm system power in quiescent condition fails a period of 24 hr. from the instant of charger on AC failure.
      Make: Panasonic.

CABLING

- PVC insulated ATC conductor unarmoured FRLS cable confirming Indian standards cables connected to the detectors shall be properly clamped to the ceiling. loop shall also be left where cables connect hooters panels etc. appropriate glands shall be provided where the cables enters the junction box
- The cables and wires shall be tagged for proper identification.

TECHNICAL SPECIFICATION OF FIRE PUMP SETS

1. Electrical Driven Main Fire Pump Set

(A) Pump Specification:

1.	Type of pump	: End Suction Back Pull out Centrifugal Pump.
2.	Pump model	: To be furnished by the bidder
3.	Make	: MATHER+PLATT/KIRLOSKAR BROTHERS/GRUNDFOS
4.	No.of pump	: 2 (Two)
5.	Discharge	: 2850.00 lpm.
6.	Head	: 70.00 meter
7.	Efficiency	: Should not be less than – 80%
8.	Nominal speed (Full Load)	: To be furnished by the bidder
9.	Pump suction and delivery Nozzle dia	: To be specified by the bidder
10.	NPS Hr.	: To be specified by the bidder
11.	Service	: Pump clear water from UGR
12.	RPM	: 3000
13.	Specific gravity	: 1.00
14.	Ambient Temperature	: 35^{o} C
15.	Duty	: Continuous
16.	Recommended motor K.W	: to be furnished by the Bidder
17.	Performance test	: As per IS- 5120

(B) **Material construction**:

1.	Pump casing	: CI-FG-260
2.	Impeller	: Bronze (LTB2)
3.	Shaft	: SS 410
4.	Shaft sleeve	: SS 410/ Bronze
5.	Casing wearing	: CI-FG-210
6.	Neck Ring	: Bronze (LTB5)

6. Gland : CI confirming to IS-210/1978 of latest version
7. Base Frame : M.S. /C.I.
8. Coupling guard : M.S fabricated
9. Foundation bolts & nuts : Carbon steel

The materials for construction of pump casing, impeller, pump shaft, shaft sleeve, base plate, casing ring have to meet the related IS- specification.

The duty parameters of pump set shall be on the best efficiency point of the performance curve of pump with clear indication to the above & the rated head, capacity, power input, NPSHr etc. must be enclosed. NPSHr should be as per IS-5120. No negative tolerance is acceptable. This is to make sure that no cavitation takes place during operation of the pump. The grease nipple should be provided on both the points for future lubrication.

The pump should be supplied with accessories such as, common base plate, fabricated from MS channel, suitable cement concrete pump foundation and vibration damping arrangement with casting foot mounting all required, set of coupling with coupling bolts & nuts, rubber bush, companion pipe flanges, coupling guard, required no of foundation bolts and nuts 150mm dia pressure gauge (S.S. body) (15Kg/Cm^2) with control ball valves- 1 no., 150mm dia vacuum gauge-1 no. and any other materials required for the same. Since the area is quite prone to corrosion, rubber base paint or epoxy base anticorrosive paint to the pump should be preferred.

The characteristic curve of pump should be continuously raising type with decrease in flow and shutoff head shall be at least 120% of the total discharge head at design point and should operate between 70% to 150% of total discharge.

The bidder should furnish the following details & drawing for scrutiny along with offer.

(i) Make, MOC, model, size, capacity etc. including complete billing of materials.

(ii) Performance curve indicating range of impeller dia meter, discharge Vs. Head, power input (K.W), Break horse power & Torque speed curve. Single line curve should also be furnished.

Pump shall be proven type; no new pump shall be acceptable. Pump manufacturers should have proven experience of supplying such pump for clear water application. For future maintenance of pump the bidders should supply a set of tools with box.

TECHNICAL SPECIFICATION OF MOTOR

(A) **Specification of Motor**:

1. Make : CGL/ABB/Marathon/KEC
2. No. of motor : 2 (Two)
3. Type : Non-flame proof squirrel cage horizontal Induction motor (suitable for above pump)
4. Pole : 2 (Two)
5. Recommended rating : To be furnished by bidder
6. Duty : Continuous
7. Voltage rating : 415 V ± 10%
8. Frequency : 50 Hz (+ 3% / - 5%)
9. Mounting : Horizontal
10. Enclosure : TEFC
11. Synchronous speed : To be furnished by bidder
12. Insulation : 'F' Class
13. Protection : IP-55
14. RPM : 3000
15. Phase : 3 (Three)

16. Rated output in KW : To be specified by the bidder
17. Winding connection : -do-
18. Full load current : -do-
19. Starting current : -do-
20. No load current : -do-
21. Efficiency at:-
    (i) 100% load with power factor : -do-
    (ii) 75% load with power factor : -do-
    (iii) 50% load with power factor : -do-

The motor shall be horizontal shaft foot mounted TEFC, 3 phase squirrel cage induction motor. This should be manufactured as per the environment code of IP-55 as per IS-Specification. The dimensions, performance, output, protection and mounting should be as per IS- 1231 or 2223, 25, 123, 4961 & 2253 respectively.

The motor shall operate on a wide voltage from 320 to 440 Volt at the rated duty at frequency of 50 Hz (+ 3% / -5%). The supply voltage may be assumed as sinusoidal. The insulation system of motor should be Class 'F' and designed to operate with continuous running duty (S.I) suitable for 3 equally spaced cold starts per hour or at least one hot restart under the rated share of the overload eventualities as per the CEPHEEO manual on "water supply and treatment". The motor should also have common base plate with the respective pump to which it will be directly coupled. The pump and motor should be properly aligned to prevent wear and tear of coupling and facilitate easy operation and maintenance.

The motor should have a moderate speed of 2900 to 3000 RPM having clockwise rotation when viewed from the drive end as per IS- 12065. The roller coupling assembly with the pump should constitute metallic ball & roller bearing mounted directly into the bore of end shields and properly lubricated. Grease nipple should be provided (both side) for future lubrication. Since the area is quite prone to corrosion, rubber base paint or epoxy base paint to motor should be preferred. The motor should be provided with space heater as per required specification. The motor should have in-built thermostats. The input, output & efficiency characteristics curve of motor proposed should also be furnished along with tender.

2. Electrical Driven Jockey Pump Set

A) <u>Pump Specification:</u>

1. Type of pump : End Suction Back Pull out Centrifugal Pump
2. Pump model : To be furnished by the bidder
3. Make : MATHER+PLATT/KIRLOSKAR BROTHERS/GRUNDFOS
4. No. of pump : 2 (Two)
5. Discharge : 180.00 lpm.
6. Head : 70.00 meter
7. Efficiency : To be furnished by the bidder
8. Nominal speed (Full Load) : To be furnished by the bidder
9. Pump suction and delivery Nozzle dia. : To be specified by the bidder
10. NPS Hr. : To be specified by the bidder
11. Service : Pump clear water from UGR
12. RPM : 3000
13. Specific gravity : 1.00
14. Ambient Temperature : 35^{o} C
15. Duty : Continuous
16. Recommended motor K.W : to be furnished by the Bidder
17. Performance test : As per IS- 5120

(B) **<u>Material construction</u>**:

1. Pump casing : CI-FG-260

2. Impeller : Bronze (LTB2)
3. Shaft : SS 410
4. Shaft sleeve : SS 410
5. Casing wearing : CI-FG-210
6. Neck Ring : Bronze (LTB5)
6. Gland : CI confirming to IS-210/1978 of latest version
7. Base Frame : M.S. /C.I.
8. Coupling guard : M.S fabricated
9. Foundation bolts & nuts : Carbon steel

The materials for construction of pump casing, impeller, pump shaft, shaft sleeve, base plate, casing ring have to meet the related IS- specification.

The duty parameters of pump set shall be on the best efficiency point of the performance curve of pump with clear indication to the above & the rated head, capacity, power input, NPSHr etc. must be enclosed. NPSHr should be as per IS-5120. No negative tolerance is acceptable. This is to make sure that no cavitation takes place during operation of the pump. The grease nipple should be provided on both the points for future lubrication.

The pump should be supplied with accessories such as, common base plate, fabricated from MS channel, suitable cement concrete pump foundation and vibration damping arrangement with casting foot mounting all required, set of coupling with coupling bolts & nuts, rubber bush, companion pipe flanges, coupling guard, required no of foundation bolts and nuts 150mm dia pressure gauge (S.S. body) (15Kg/Cm^2) with control ball valves- 1 no., 150mm dia vacuum gauge-1 no. and any other materials required for the same. Since the area is quite prone to corrosion, rubber base paint or epoxy base anticorrosive paint to the pump should be preferred.

The characteristic curve of pump should be continuously raising type with decrease in flow and shutoff head shall be at least 120% of the total discharge head at design point and should operate between 70% to 150% of total discharge.

The bidder should furnish the following details & drawing for scrutiny along with offer.

(i) Make, MOC, model, size, capacity etc. including complete billing of materials.

(ii) Performance curve indicating range of impeller dia meter, discharge Vs. Head, power input (K.W), Break horse power & Torque speed curve. Single line curve should also be furnished.

Pump shall be proven type; no new pump shall be acceptable. Pump manufacturers should have proven experience of supplying such pump for clear water application. For future maintenance of pump the bidders should supply a set of tools with box.

TECHNICAL SPECIFICATION OF MOTOR

(A) **Specification of Motor**:

1. Make : CGL/ABB/Marathon/KEC
2. No. of motor : 2 (Two)
3. Type : Non-flame proof squirrel cage Induction motor (suitable for above pump)
4. Pole : 2 (Two)
5. Recommended rating : To be furnished by bidder
6. Duty : Continuous
7. Voltage rating : 415 V ± 10%
8. Frequency : 50 Hz (+ 3% / -5%)
9. Mounting : Horizontal
10. Enclosure : TEFC
11. Synchronous speed : To be furnished by bidder
12. Insulation : 'F' Class

13.	Protection		: IP-55
14.	RPM		: 3000
15.	Phase		: 3 (Three)
16.	Rated output in KW		: To be specified by the bidder
17.	Winding connection		: -do-
18.	Full load current	:	-do-
19.	Starting current	:	-do-
20.	No load current	:	-do-
21.	Efficiency at:-		
	(i) 100% load with power factor	:	-do-
	(ii) 75% load with power factor	:	-do-
	(iii) 50% load with power factor	:	-do-

The motor shall be horizontal shaft foot mounted TEFC, 3 phase squirrel cage induction motor. This should be manufactured as per the environment code of IP-55 as per IS-Specification. The dimensions, performance, output, protection and mounting should be as per IS- 1231 or 2223, 25, 123, 4961 & 2253 respectively.

The motor shall operate on a wide voltage from 320 to 440 Volt at the rated duty at frequency of 50 Hz (+ 3% / - 5%). The supply voltage may be assumed as sinusoidal. The insulation system of motor should be Class 'F' and designed to operate with continuous running duty (S.I) suitable for 3 equally spaced cold starts per hour or at least one hot restart under the rated share of the overload eventualities as per the CEPHEEO manual on "water supply and treatment". The motor should also have common base plate with the respective pump to which it will be directly coupled. The pump and motor should be properly aligned to prevent wear and tear of coupling and facilitate easy operation and maintenance.

The motor should have a moderate speed of 2900 to 3000 RPM having clockwise rotation when viewed from the drive end as per IS- 12065. The roller coupling assembly with the pump should constitute metallic ball & roller bearing mounted directly into the bore of end shields and properly lubricated. Grease nipple should be provided (both side) for future lubrication. Since the area is quite prone to corrosion, rubber base paint or epoxy base paint to motor should be preferred. The motor should be provided with space heater as per required specification. The motor should have in-built thermostats. The input, output & efficiency characteristics curve of motor proposed should also be furnished along with tender.

3. Diesel Engine Driven Fire Pump Set (Standby)

A) <u>Pump (suitable for Diesel Engine) Specification:</u>

1.	Type of pump	: End Suction Back Pull out Centrifugal Pump
2.	Pump model	: To be furnished by the bidder
3.	Make	: MATHER+PLATT/KIRLOSKAR BROTHERS/GRUNDFOS
4.	No. of pump	: 1 (One)
5.	Discharge	: 2850 lpm.
6.	Head	: 70.00 meter
7.	Efficiency	: Should not be less than – 75%
8.	Nominal speed (Full Load)	: To be furnished by the bidder
9.	Pump suction and delivery Nozzle dia	: To be specified by the bidder
10.	NPS Hr	: To be specified by the bidder
11.	Service	: Pump clear water from UGR
12.	RPM	: 1500
13.	Specific gravity	: 1.00
14.	Ambient Temperature	: 35° C
15.	Duty	: Continuous
16.	Recommended motor K.W	: to be furnished by the Bidder
17.	Performance test	: As per IS- 5120

(B) **<u>Material construction</u>**:

1. Pump casing : CI-FG-260
2. Impeller : Bronze (LTB2)
3. Shaft : SS 410
4. Shaft sleeve : SS 410
5. Casing wearing : CI-FG-210
6. Neck Ring : Bronze (LTB5)
6. Gland : CI confirming to IS-210/1978 of latest version
7. Base Frame : M.S. /C.I.
8. Coupling guard : M.S fabricated
9. Foundation bolts & nuts : Carbon steel

The materials for construction of pump casing, impeller, pump shaft, shaft sleeve, base plate, casing ring have to meet the related IS- specification.

The duty parameters of pump set shall be on the best efficiency point of the performance curve of pump with clear indication to the above & the rated head, capacity, power input, NPSHr etc. must be enclosed. NPSHr should be as per IS-5120. No negative tolerance is acceptable. This is to make sure that no cavitation takes place during operation of the pump. The grease nipple should be provided on both the points for future lubrication.

The pump should be supplied with accessories such as, common base plate, fabricated from MS channel, suitable cement concrete pump foundation and vibration damping arrangement with casting foot mounting all required, set of coupling with coupling bolts & nuts, rubber bush, companion pipe flanges, coupling guard, required nos of foundation bolts and nuts 150mm dia pressure gauge (S.S. body) (15Kg/Cm^2) with control ball valves- 1 no., 150mm dia vacuum gauge-1 no. and any other materials required for the same. Since the area is quite prone to corrosion, rubber base paint or epoxy base anticorrosive paint to the pump should be preferred.

The characteristic curve of pump should be continuously raising type with decrease in flow and shutoff head shall be at least 120% of the total discharge head at design point and should operate between 70% to 150% of total discharge.

The bidder should furnish the following details & drawing for scrutiny along with offer.

(i) Make, MOC, model, size, capacity etc. including complete billing of materials.

(ii) Performance curve indicating range of impeller dia meter, discharge Vs. Head, power input (K.W), Break horse power & Torque speed curve. Single line curve should also be furnished.

Pump shall be proven type, no new pump shall be acceptable. Pump manufacturers should have proven experience of supplying such pump for clear water application. For future maintenance of pump the bidders should supply a set of tools with box.

TECHNICAL SPECIFICATION OF DIESEL ENGINE

(A) **Specification of Engine**:

1. Make : Kirloskar Brothers/Voltas/CGL
2. No. of Engine : 1 (One) (Suitable for above Pump)
3. Type : Multi cylinder 4-stroke
4. Operation : Self Start
5. Cooling : Radiator Cooled Engine
6. Fuel Tank Capacity : M.S. fabricated wall/floor mounted 200 litter capacity
7. Battery : Exide/Amco
8. Battery charger : Reputed & approved make.
9. Auto Control Panel : Reputed & approved make.

The Diesel engine shall be horizontal shaft foot mounted. This should be manufactured as per the environment code as per IS-Specification. The dimensions, performance, output, protection and mounting should be as per IS specification.

The Diesel engine should also have common base plate with the respective pump to which it will be directly coupled. The pump and engine should be properly aligned to prevent wear and tear of

coupling and facilitate easy operation and maintenance. The engine should have a moderate speed of 2000 RPM having clockwise rotation when viewed from the drive end as per IS specification. The roller coupling assembly with the pump should constitute metallic ball & roller bearing mounted directly into the bore of end shields and properly lubricated. Grease nipple should be provided (both side) for future lubrication. Since the area is quite prone to corrosion, rubber base paint or epoxy base paint to motor should be preferred. The input, output & efficiency characteristics curve of engine proposed should also be furnished along with tender.

SPECIFICATION OF COMMON DELIVERY AND SUCTION PIPE LINE,

R.C.C. FOUNDATION, VALVES AND SPECIALS ETC.

Specification for valves.

Sl No.	Specification of valves	Qnty.	Make	Remarks
1.	Suitable dia. double flanged Ductile Iron sluice valves (Rising spindle) with manual operation and hand wheel of PN-1.6 conforming to IS- 14846/2000 with ISI mark.	As per BOQ	IVC/KBL/Zoloto	Will be fixed at pump delivery line of approved size.
2.	Suitable dia. double flanged Ductile Iron non-return valve with by-pass arrangement, single door (Swing type), and mounting on horizontal pipe line of pressure ratting PN-1.6 conforming to IS-5312/1984 (Part-I) with ISI mark	As per BOQ	IVC/KBL/Zoloto	Will be fixed at pump delivery line of approved size & 2(Two) no. of 150 mm dia will be fixed with common delivery line.
3.	Suitable Ductile Iron, foot valve with strainer and flange type end connection as per IS- 4038/1967 with ISI mark.	As per BOQ	IVC/KBL/Zoloto	Will be fixed with suction pipe end of approved size.
4.	Suitable dia. double flanged Ductile Iron butterfly valve wafer type (Wafer long) quarter turn worm gear box (manual) with hand wheel operation of PN-1.6 conforming to BS- 5155.	As per BOQ	IVC/KBL/Zoloto	Will be fixed with individual suction pipe line and 2(Two) Nos 200mm dia will fix with common Suction header.

Technical specification and materials construction:

(A) Ductile Iron double flange sluice valve:

i.	Body, wedge (door) dome, bonnet gland, thrust bridge, valve stem cap/hand wheel	D.I IS-210 Gr. FG 200/260
ii.	Seat & door face ring wedge nut	S.S as per IS- 1570, IS-6603
iii.	Spindle	S.S as per IS-6603 Gr. 12 Cr-12
iv.	Gland packing	Graphite asbestos /greased hemp
v.	Gasket	Rubber IS- 638 type-B
vi.	Fasteners	Carbon steel
vii.	Hydrostatic test pressure (i) Body (ii) Seat leakage	 24 Kg/Cm^2 16 Kg/Cm^2
viii.	Operation	Anti-clock wise
ix.	Flanges	Faced and drilled as per IS- 1538/1969
x.	Body painting	Epoxy coated

(B) Ductile Iron Double flange Non-return valve:

i.	Body, door & cover	D.I. IS-210 Gr. FG 200
ii.	Turning shaft/hinge pin	SS AISI- 410
iii.	Body seat, door face rings bearing block	SS AISI –410
iv.	Flow direction clearly embossed on valve body	
v.	Plug	SS AISI – 410
vi.	Fasteners	Carbon steel
vii.	Hydrostatic test pressure (iii) Body (iv) Seat leakage	 24 Kg/Cm^2 16 Kg/Cm^2
viii.	Flanges	Faced and drilled as per IS- 1538/ 1969
ix.	Body painting	Epoxy coated

(C) **Ductile Iron foot valve**:

i.	Body, Disc, flap and lift guide	Ductile Iron conforming to IS-210/ Gr. FG 200
ii.	Ring	SS AISI 410
iii.	End connection	Flanged type
iv.	Strainer	Cast iron conforming to IS-210/ Gr. FG 200
v.	Flanges	Faced and drilled to IS- 1538/1969
vi.	Body painting	Epoxy coated

Specification of delivery and suction pipe line with specials, construction Of RCC foundation etc.

The common header both for Suction and delivery piping arrangements for all pumps shall be of 200 mm dia. M.S ERW pipe of minimum 8mm wall thickness. The independent suction and delivery piping arrangement for all pump sets shall be of 150 and 80 mm dia. M.S.ERW (heavy duty) pipe as per specification, which will connect to the common header, all pipes should painted with 2(two) or more coats epoxy base anticorrosive paints suitable for firefighting application, pipe line confirming to relevant IS- Specification The electric welding joint should be as per IS- 816 after 'V' grove cutting and electrode conforming to IS- 814.

The thickness of all MS flanges shall be of 22/24mm conforming to IS- 6392/1971. The wall thickness of the specials like Bend, taper, offset etc. wherever used should be 8mm wall thickness.

The pipe line shall be so laid that there shall be independent/common suction header for all pumps and a common delivery including fixing of valves, specials, expansion joints, flange joints with required and approved sizes of jointing materials like nuts & bolts (made out of carbon steel), rubber gasket (made out of nitrile rubber of 6mm thick), paints etc. The delivery pipe line should be connected to existing system as per direction of EIC. Required no. of pipe supports should be provided both for suction and delivery pipe line of all pump sets. The pipe supports should be made out of concrete (1:1½:3) pedestal of required height and approved design including grouting the same on the floor. Besides above, the scope of work comprises construction of required size and shape of RCC (M-25)pump foundation as per IS- specification, cutting holes in the 250mm thick Brick/ R.C.C wall and making good the damages and alignment of the pump sets inside pump house. Necessary earth work, back filling, de-watering (if required) shall also be taken up to complete the work in all respect.

(A) Specification of control panel :

The control panel should be fully automatic & shall be provided with IP-65 ingress protection suitable for operation of 2 sets of 75 HP (Approx.) for Electrical Motor Driven Main Pump & 2 sets of 10 H.P. (Approx.) Electrical Motor Driven Jockey pump sets.

The panel board shall be floor mounted type and fabricated with 2mm thick CRCA sheet. The board shall be powder coated after treatment in 7 (Seven) tank process. The board should be dust and vermin proof and of double door type having interlocking with the switchgear i.e., the door can be opened only after the switch is 'OFF' position. Ventilation louvers with fine wire mesh should be provided. The panel board should be provided with punch holes on the Top plate for glanding of incoming and outgoing cables. The board should be provided with at least 2 nos. of earthing stud with hexagonal G.I. nuts and bolts. One no. enamelled danger board and nomenclature plate should be fixed on the front of the panel board. Each detachable hinged door shall be earthed with 2.5 sqmm. PVC insulated multi stranded copper conductor wire of green colour. Adequate clearance shall be provided from the gland up to the spreader link of the MCCB (preferably 500 mm) for easy termination of1R x 3.5 C × 240 sqmm. Armouredaluminium XLPE insulated cable. The provision of earth electrodes and the type of earthing shall be done for the system as per direction of EIC/IE Rule.

The panel shall be incorporated with the following components;

Incoming:-

1 no. 630A 50 kA TP MCCB.

1 no. Over Load , Short Circuit, Earth Fault release, Digital Multi-Function meter with Control MCB , 1 set of ON/OFF indication lamp, 3 Nos. Phase Indication Lamp, 3 Nos. 630/5A metering CTs of 15VA , Class 1.0.

Bus bar:-

4 nos. 800 A Electrolytic Copper strips. (@ 1.25 A/mm^2)

Outgoing:-

A. 2 nos. 250A 36 kA TPN MCCB.

2nos. Star-Delta starter suitable for 2 nos. 75HP (Approx.) centrifugal Main Pump sets.

2 nos. Over Load release, ON/OFF push button, ON/OFF indication lamp, Digital Ammeter with 3 Nos. 250/5A metering CTs of 15VA, Class 1.0.

B. 2 nos. 63A 25 kA TPN MCCB.

2nos. Star-Delta starter suitable for 2 nos. 10HP (Approx.) centrifugal Jockey Pump sets.

2 nos. Over Load release, ON/OFF push button, ON/OFF indication lamp, Digital Ammeter with 3 Nos. metering 63/5A CTs 15VA, Class 1.0.

C. 1Set- Relay, Auto and Manual Selector Switch, Battery Charger, Annunciation Panel, Control wiring of pressure switches, flow switched and starters etc. as required for auto & manual operation of Jockey pumps sets, Main Electric Pumps sets & Diesel Engine Pump sets as per direction of EIC.

Panel Complete duly factory wired.

Approved Makes:

Multi-function meter/Volt meter/ammeter	: AE/ IMP/ MECO/ L&T
Selector Switch	: KAYCEE/ SLAZER
Contactor	: L&T/ SIEMENS/ BCH/ Telemecharique
CT	: Kappa
Starter	: L&T/ BCH/ Telemecharique/ SIEMENS
MCCB/MCB	: Legrand/ L&T/ Schneider/ SIEMENS/ ABB/ HAGER Anchor/Panasonic

Note: General arrangement drawing & SLD of the control panel should be submitted for approval before execution.

LIST OF APPROVED MAKES FOR FIRE FIGHTING, FIRE ALAM 7 PA SYSTEM WORKS

S.N.	ITEM	MAKE
1	M. S Pipe IS:1239/IS:3589 with ISI mark	TATA / Jindal/ Prakash Surya
2	Orifice Plate	Minimax /Newage / Safex
3	Ball Valve	Zoloto / Sant / Leader /Advance
4	Butterfly Valve	Zoloto / Sant / Leader /Advance
5	Non-Return Valve	Sant / Zoloto /Advance
6	Forged Fittings	SS / VS/ True Forge
7	ERW / butt Welded Fittings	MEC (Jainsons) / Unik
8	Groove Fittings	Victaulic / Jainson / New
9	Air Pressure Valve	Minimax/ Newage /Sant / Leader
10	C.I. Double flanged sluice valves	Zoloto / Sant / Leader
11	C.I. Double flanged Non-return valves	Zoloto / Sant / Leader
12	Foot valve with Strainer	Zoloto / Sant / Leader
13	Pot Strainer / Y Strainer	Zoloto / Sant / Leader
14	Suction & Delivery Header	TATA / Jindal Hissar/ Apollo
15	Installation Control Valve Assembly	HD (UL Listed) / Viking (UL Listed)

16	Air Cushion Tank	Site fabricated with MS Pipe
17	Rubber Expansion Joint	Resistoflex/ Easyflex/ Diamond/ Dunlop
18	Landing Valve	Minimax /Newage / Safex
19	CP Hose	Minimax /Newage / Safex
20	RRL Hose	Minimax /Newage / Safex
21	Branch Pipe	Minimax /Newage / Safex
22	Fire Brigade 2 Way Inlet	Minimax /Newage / Safex
23	Fire Brigade 4 Way Inlet	Minimax /Newage / Safex
24	Fire Brigade Suction Hose Coupling	Minimax /Newage / Safex
25	Fire Hose Cabinet Internal	Minimax /Newage / Safex
26	Fire Hose Cabinet External	Minimax /Newage / Safex
27	Standard Fire Man Axe	Minimax /Newage / Safex
28	Pressure Gauge	H.Guru / Feibig / Warree/H.D/BRC
29	Flow Indicating Switches	Honeywell / Tyco / System Sensor
30	Pressure Switches	Danfoss / Indfoss /Feibig
31	Sprinklers	Tyco / HD / Viking/ Sant
32	Flexible Hose Pipe	Minimax / Sant/ Newage / HD
33	Fire Sealant	Wurth/Fischer / 3M India
34	Inspection & Testing Assembly	Minimax /Newage / Sant
35	Fire PUMPS	KSB / Mather & Platt / Xylem
36	Motors for Fire Pumps	Kirloskar / CGL/ ABB/Wilo
37	Diesel Engine	KOIL/GCL/Mahindra
38	Deluge Valve	Safex / Tyco / HD
39	Anti Vibration Pad	Cori Dunlop / Diamond Pipe Support /Easyflex / Flexionics Resistoflex
40	Pipe Protection Pypcoat wrapping	IWL / Shalimar
41	Detectors & Devices – Intelligent multi criteria detector, smoke, heat &duct detectors, control &monitor module, fault isolator, hooters etc. Addressable Main Fire Alarm Panel with Digital Voice Evacuation System , All's shall complay to UL Listed	Honeywell/ Ravel/
42	Public Address & Back ground music system, All's shall complay to UL Listed	Honeywell / Bosch / LDA audiotech
43	Survival Armoured Cable,	Finolex/ Polycab/
44	Fire Extinguiser	Minimax / Safex / Cease Fire/ Supremex

Tenderer(s) is/are required to submit the information in the following Schedules

Annexure: I

(List of Plants & Equipments to be deployed on contract work)

Sl. No	Type of Equipments	No. of machines required	Marks
1	Water Tanker of 4000 ltr. Capacity wheel mounted/mounted over Truck/ Tractor	**2nos**	10
2	Truck/Tipper	**2nos**	10
3	Welding machine 450 Ampere or more	**1no**	5
4	Generator of 125.00 KVA Capacity or more	**1no**	5
5	Batching Plant of minimum 15 cum/hour capacity	**1no**	10
6	Concrete pump with pumping accessories along with minimum 30 mt.pipe	**1 set**	5
7	Concrete mixer	**2nos**	5
8	Concrete vibrator : Needle type	**2nos**	3
9	Concrete vibrator : Screed type	**2nos**	4
10	Concrete vibrator : Plate type	**2nos**	3
11	Complete staging, shuttering, centering arrangement . For steel shuttering-	**2000sqm**	20
12	Water Pump – 1 HP Capacity	**2nos**	5
13.	Cube Testing Machine	**1 no**	5
14.	Excavator	**1 no**	5
15.	Bar bending machine	**1 no**	3
16.	Bar Cutting Machine	**1 no**	2
	Minimum Qualifying marks –80%	**Total =**	**100**

Tenderer(s) is/are required to submit the information in the following Schedules

SCHEDULE - A

CERTIFICATE OF NO RELATIONSHIP

I/We hereby certify that I/We* am/are* **related / not related**(*) to any officer of IDCO of the rank of Deputy Manager & above I/We* am/are* aware that, if the facts subsequently proved to be false, my/our* contract will be rescinded with forfeiture of E.M.D and security deposit and I/We* shall be liable to make good the loss or damage resulting from such cancellation.

(*) - Strike out which is not applicable

Signature of the Tenderer

Date:-

SCHEDULE - B

EXISTING COMMITMENTS AND ON-GOING WORKS :

Description of works	Place & State	Contract No.	Name & Address of Employer	Value of Contract (`. In lakh)	Stipulated Period of Completion		Value of works* remaining to be completed (`. In lakh)	Anticipated date of completion
1	2	3	4	5	6		7	8
					Date of commencement	Stipulated date of completion		

***** The above information is to be certified by the Engineer in Charge / Employer not below the rank of Executive Engineer or equivalent. In case of there is no existing commitment and ongoing works, the bidder
shall declare as nil in schedule B. All column of the Schedule B are to be filled up. Incomplete & uncertified
Schedule'B' will not be accepted under any circumstances.

Signature of the Tenderer
Date……..

SCHEUDLE – C

CERTIFICATE OF TOOLS AND PLANTS

I/We hereby certify that the following tools and plants, machineries and vehicles are in my /our possession and in working order.

Sl. No	Type of Equipment's	No. of machines required	No. of machines owned/ leased/ hired
1	Water Tanker of 4000 ltr. Capacity wheel mounted/mounted over Truck/ Tractor	**2nos**	
2	Truck/Tipper	**2nos**	
3	Welding machine 450 Ampere or more	**1no**	
4	Generator of 125.00 KVA Capacity or more	**1no**	
5	Batching Plant of minimum 15 cum/hour capacity	**1no**	
6	Concrete pump with pumping accessories along with minimum 30 mt.pipe	**1 set**	
7	Concrete mixer	**2nos**	
8	Concrete vibrator : Needle type	**2nos**	
9	Concrete vibrator : Screed type	**2nos**	
10	Concrete vibrator : Plate type	**2nos**	
11	Complete staging, shuttering, centering arrangement . For steel shuttering-	**2000sqm**	
12	Water Pump – 1 HP Capacity	**2nos**	
13.	Cube Testing Machine	**1 no**	
14.	Excavator	**1 no**	
15.	Bar bending machine	**1 no**	
16.	Bar Cutting Machine	**1 no**	

I/We also note that, non-submission of this certificate will render my/our tender liable for rejection.

Signature of the Tenderer
Date.

SCHEUDLE – D

WORK EXPERIENCE

LIST OF SIMILAR NATURE OF PROJECTS EXECUTED

Name of Employer	Name of location and name of work	Contract price in Indian Rupees/ Agreement no.	Major Items of works	Stipulated date of commencement / completion of the work as per Agreement	Actual date of completion of the work	Value of work actually executed during last 5 financial years						Reasons for delay in starting/ completion, if any
						Financial year					Value	
1	2	3	4	5	6	7					8	9
						2021-22	2022-23	2023-24	2024-25	2025-26		

Signature of the Engineer-in-Charge/ Employer
-Seal-

Note: The above information is to be certified by the Engineer in Charge / Employer not below the rank of Executive Engineer. Column '7' & '8' are to be filled up for the last 5 (Five) financial years. Incomplete & uncertified Schedule-D will not be accepted under any circumstances, which may lead to rejection of the bid.

Signature of the Tenderer
Date.

SCHEDULE – E

INFORMATION REGARDING CURRENT LITIGATION, DEBARRING EXPELLING OF TENDERER OR ABANDONMENT OF WORK BY THE TENDERER

1.	a)	Is the tenderer currently involved in any litigation relating to the works.	Yes / No
	b)	If yes: give details:	
2.		Has the tenderer or any of its constituent partners been debarred/ expelled by any agency in India during the last 5 years.	Yes / No
3.	a)	Has the tenderer or any of its constituent partners failed to perform on any contract work in India during the last 5 years.	Yes / No
	b)	If yes, give details:	

Note:

If any information in this schedule is found to be incorrect or concealed, qualification application will summarily be rejected.

Signature of Tenderer

SCHEDULE – F

AFFIDAVIT
(Need to be notarized)

1. The undersigned do hereby certify that all the statements made in the required attachments are true and correct.
2. The undersigned also hereby certifies that neither my / our firm / company / individuals _____ nor any of its constituent partners have abandoned any road/ bridge/Irrigation /Buildings or other project work in India nor any contract awarded to us for such works have been rescinded during the last five years prior to the date of this bid.
3. The undersigned hereby authorise(s) and request(s) any bank, person, firm or Corporation to furnish pertinent information as deemed necessary and as requested by the Department to verify this statement or regarding my (our) competency and general reputation.
4. The undersigned understands and agrees that further qualifying information may be requested and agree to furnish any such information at the request of the Department.
5. In case any of the information furnished found to be false or untrue or misleading or misrepresenting, I am aware that I may be held liable for it as per the tender clauses.
   The undersigned hereby confirms that our firm has not been blacklisted/ debarred/ penalized by Govt. agency or public sector undertaking or judicial authority.

(Signature of Tenderer)
Title of Officer
Name of Firm
Date:

SCHEDULE - G

CERTIFICATE OF EMPLOYMENT OF UNEMPLOYED GRADUATE ENGINEER / DIPLOMA HOLDERS
(For Super Class / Special Class / 'A' Class Contractors only)

I / We hereby certify that at present, the following Engineering personnel are working with me / in our firm / company and their bio-data are furnished below.

Sl. No.	Name of Engineering personnel appointed for supervising contractor's work with address	Qualification	Date of Appointment	Monthly emolument	Whether full time engagement and continuous	If they are superannuated / retired / dismissed or removed personnel from state Govt./ Central Govt. / Public Sector Undertaking / private Companies and s or any one ineligible for Government service
1	2	3	4	5	6	7

Signature of the Tenderer.
Date:-

SCHEDULE – H

UNDER TAKING

This is to certify that

1. My firm has neither been associated, directly or indirectly, with the Consultant or with any other entity that has prepared the design, specifications, and other documents for the Project nor has any person associated with been proposed as Project Manager for the Contract.

2. My firm has not engaged any agency and any of its affiliates engaged by the Engineer-in-Charge to provide consulting services for the preparation or supervision of this work.

3. My firm has not engaged any Engineer of gazetted rank employed in Engineering or Administrative duties in an Engineering Department of the Government of Odisha or other gazetted officer retired from Government service during last two years without prior permission of the Government of Odisha in writing on or before submission of this tender. I am aware that my contract is liable to be cancelled if either I or any of my employees is found any time to be such a person who had not obtained the permission of the Government of Odisha as aforesaid.

Signature of the Tenderer.
Date:-

Note: i. Strike out whichever is not applicable
ii. In case any person is under his employment with due permission from Government, the same may be cited in a separate letter.

Performa for Centering and Shuttering materials

Certified that M/S ……., ……..

Class contractor possess …… sqm of steel shuttering plates and …….. sqm of ply / wooden shuttering plllaaates and equivalent centering materials in good conditions for use in building construction works. The shuttering materials are physically available at our worksite at ……. And we have no objection if shifted for other works.

Seal and Signature of issuing Authority

SCHEDULE – I

RELATIONSHIP DECLARATION

To,
The Chief General Manager (Civil),

Subject: Construction of Block level Stadium (without Indoor Hall), Kodala Block under Ganjam District.
Reference : Civil/ EST/21/2026-27

Sir,

Pursuant to clause 2 of the ITB, it is to inform that I have relative(s) employed as an Officer in the rank of an Assistant Engineer and Above from Govt. of Odisha / Deputy Manager and Above of IDCO. His (Their) details are as follows.

Relationship:

Name:

Designation

Office

Address

Pursuant to clause 2 of the ITB, I am to submit herewith the names of persons who are working under my firm having near relatives to any officer in the rank of an Assistant Engineer and Above from Govt. of Odisha / Deputy Manager and Above of IDCO.

Sl No	Name of the my employee and his designation in the firm	Presently working at	Details of his relatives working in the Department
			Relationship Name: Designation Office Address
			Relationship Name: Designation Office Address

I am also duty bound to inform the relationship of any subsequent employment with any officer in the rank of an Assistant Engineer and Above from Govt. of Odisha / Deputy Manager and Above of IDCO. I **am awarethat a**ny breach of this condition would render my firm liable for penal action for suppression of facts.

Yours Sincerely

Signature of the Tenderer.
Date:-

(**Note:-** The bidders who have No Relation to any officer of IDCO of the rank of Deputy Manager and Above / Assistant Engineer and Above from Govt. of Odisha and furnished Schedule – 'A' are not required to furnish Schedule – 'I')

SCHEDULE – J

MEMORANDUM OF UNDERSTANDING
(Duly Notarised)

First Party I Sri/Smt.……, Aged …. Years, S/O- ……..……., At / P.O. / Dist-…….…… (hereinafter called the First Part)

AND

Second Party I Sri/Smt.……, Aged …. Years, S/O- ……..……., At / P.O. / Dist-…….…. (hereinafter called the Second Part) having H.T. / L.T. license registration No……. valid upto ……...

AND WHEREAS the First Party of 1st part is the managing partner of ……

AND WHEREAS the First Party willing to appoint the Second Party to execute the E.I. portion for the tender work, "……."

AND WHEREAS the Second Party accepted the offer of First Party.

NOW THIS DEED OF AGREEMENT WITNESSES AS FOLLOWS;

1) That, the Second Party shall do all E.I. works, if the tender is awarded to First Party.
2) That, the Second Party shall fulfill all the E.I. works as per the tender schedule by instruction of Divisional Head.
3) That, the First Party shall receive payment, signing the bill the document for the concerned work.
4) That, the Second Party shall abide the rules, regulations and specification of E.I. works of above said matter.

In witness where of both the party have signed in presence of

WITNESS

W_1 -

W_2 -

SCHEDULE – L

MEMORANDUM OF UNDERSTANDING

(Duly Notarized)

First Party I Sri/Smt. _____, Aged ___ Years, S/O / D/O _____, At / P.O. / Dist.- _____ (hereinafter called the **First Party / Bidder**)

AND

Second Party I Sri/Smt. _____, Aged ___ Years, S/O / D/O _____, At / P.O. / Dist.- _____ (hereinafter called the **Second Party**) having experience in execution of **Sports related Infrastructure.**

AND WHEREAS the First Party of the 1st part is the bidder intending to participate in IDCO tenders for Block level stadium works.

AND WHEREAS the First Party is willing to appoint the Second Party to execute, the Sports related infrastructure, if awarded, **on subcontract basis**.

AND WHEREAS the Second Party has successfully completed at least **one (01) Sports related infrastructure** in India during the last **five (05) years** for a State / Central Government / PSUs and has agreed to associate with the First Party.

NOW THIS DEED OF AGREEMENT WITNESSES AS FOLLOWS;

1. That, the Second Party shall execute the complete **sports related infrastructure** under subcontract, if the tender is awarded to the First Party.
2. That, the Second Party shall fulfil the sports related infrastructure works strictly as per the **tender conditions, specifications and instructions** of the Engineer-in-Charge / Divisional Head.
3. That, execution shall conform to relevant **S&YS Department specifications**, and product datasheets shall be submitted.
4. That, the Second Party shall abide by all rules, regulations and specifications of sports related infrastructure and shall submit **non-blacklisting affidavit**.

In witness whereof both the parties have signed in presence of

WITNESS

W1 – _____

W2 – _____

FORM '8'

UNDERTAKING

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

Signature of the Tenderer