



**COCHIN PORT AUTHORITY
COCHIN-682009, KERALA, INDIA**

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**TENDER DOCUMENT FOR ANNUAL CIVIL MAINTENANCE
CONTRACT (ACMC) FOR THE YEAR 2023-24.**

TECHNICAL BID (e-Tendering Mode)

Website: www.tenderwizard.com/CPT

**CHIEF ENGINEER'S OFFICE
COCHIN PORT AUTHORITY
COCHIN-682009**

TENDER No.T6/T-1981/2023-C

PRICE: Rs.2,240/- (Rs.2,000 /-+12% GST)

COCHIN PORT AUTHORITY

**TENDER FOR ‘ANNUAL CIVIL MAINTENANCE CONTRACT (ACMC)
FOR THE YEAR 2023-24
(Tender No.T6/T-1981/2023-C)**

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SIGNATURE OF TENDERER

COCHIN PORT AUTHORITY



Chief Engineer's Office
Cochin Port Authority
W/Island , Cochin – 682009, KERALA
Tele: 91-0484-2666414/0484-258-2400
website: www.cochinport.gov.in

Tender No. T6/T-1981/2023-C

Date :20/01/2023

NOTICE INVITING TENDER

Electronic Tenders (**e-tenders**) on percentage basis are invited by Cochin Port Authority on behalf of GoI from reputed contractors in Single Stage Two Cover bidding procedure [Technical Bid and Financial Bid], meeting the Minimum Eligibility Criteria specified below for the work of “**Annual Civil Maintenance Contract (ACMC) for the year 2023-24**”.

1. *Minimum Eligibility Criteria:*

a) **Experience**

The tenderers should have experience of having successfully completed during the last 7 (seven) years ending **31st December, 2022**, at least either:

i) Three Similar Works each costing not less than **Rs.40.00 lakhs**

(OR)

ii) Two Similar Works each costing not less than **Rs.50.00lakhs**

(OR)

iii) One Similar Work costing not less than **Rs.80.00 lakhs**

b) **Financial Turnover**

Average Financial Turnover of the tenderer over the last three financial years ending 31st March 2022 [2019- '20, 2020- '21 & 2021- '22] shall not be less than **Rs.30.00 lakhs**.

Explanatory Notes to a) & b) :

(a) Similar work(s) means “**Construction/ Maintenance of Townships and OR Construction/ Maintenance of Wharves and OR Construction/ Maintenance of Port Structures and OR Civil Construction/Repair/ Maintenance Works**”. The experience certificate of works executed in private sectors/ organisations shall be considered for qualification, only on submission of TDS certificate along with work order and completion certificate.

(b) Copy of completion certificates of each work issued by the owner/ responsible officer of the owner under whom he has executed such contract shall be attached. The certificate shall contain details of work

involved specifying the nature of work, the completion cost of the work, date of commencement & date of completion of the work.

- (c) The works reckoned for the above purpose are those executed by the tenderers as prime Contractor or proportionately as member of joint venture or Sub Contractor. The Sub-Contractor shall be an authorized and approved Sub-Contractor by the Employer of the work(s) against which the tenderer has claimed his experience. The tenderer shall attach attested copy(s) of approval issued by the Employer(s) authorizing as a Sub-Contractor; in proof of the claim of the tenderer as a sub-Contractor. The tenderer is also obliged to produce the original of the certified copy(s) on request by the department.
- (d) Following enhancement factors will be used for the costs of works executed for bringing the financial figures to a common base value in respect of the works completed in the past years.

Table 1

Year before	Multiplying factor
One year	1.07
Two years	1.14
Three years	1.21
Four years	1.28
Five years	1.35
Six years	1.42

(e) **Financial Turnover:**

In proof of Financial Turnover Audited Annual Accounts Statements or IT returns duly acknowledged by the Income Tax department along with Computation Statement signed by the Auditor/ Chartered Accountant, for the last three years shall be produced by the tenderer..

2. **Other Eligibility Considerations**

2.1 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

- i) made misleading or false representations in the forms, 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 contract, inordinate delays in completion, litigation history, or financial failures, black listing/ debarring by Govt. departments etc.

2.2 **The bidders having EPF/ ESI registration certificates only shall be considered for qualification in the tenderers, if applicable, as per EPF /ESI Acts. In case, the Tenderer does not have the required number of employees which makes such registration mandatory, an Undertaking as per Annexure I to the effect shall be furnished.**

3. **Pertinent information to the tender is given in the following Tables:**

- i) **Schedule of different activities till submission of the bid are detailed as under:**

Table 2

Sl. No.	Particulars	Date and Time
1	Tender e- publication date	24 -01-2023
2	Download period of Bid Documents	24-01-2023 to 13-02-2023
3	Date of Pre-Bid meeting	Not Applicable
4	Last date for seeking clarification	06-02-2023
5	Last date and time of submission of Bid	13-02-2023 up to 14.30 hrs
6	Date and time of opening the Bid	13-02-2023 after 15.00 hrs

ii) Bid information :**Table 3**

i)	Estimated Amount put to Tender	: Rs.1,00,00,000/-
ii)	Earnest Money Deposit	:Rs.1,00,000/- furnished through Demand Draft or Banker's Cheque drawn in favour of Financial Adviser & Chief Accounts Officer, CoPA from any Nationalised Bank/ Scheduled Bank in India.
iii)	Cost of Bid document	Rs.2240/- (Rs.2000 /-+12% GST) (Non refundable) furnished either through Demand Draft/ Banker's Cheque drawn in favour of the Financial Adviser & Chief Accounts Officer, CoPA from any Nationalized Bank/ Scheduled Bank in India, being the cost of single copy of the tender document
iv)	Validity period of Tender	120 days from the Last Date of Submission of Bid.
v)	Time for Completion	1 Year

4. This work essentially comprises of the following:
- Labour Oriented Maintenance nature works.
 - Repair/ maintenance works involving labour & materials.
 - Road work.
 - Supply of materials
 - Supply of Skilled and Unskilled labours
5. Tender documents can be downloaded from the e-Tendering portal www.tenderwizard.com/CPT on the dates specified in Table 2 given above by making online requisition. Bid document will also be available in Cochin Port website (www.cochinport.gov.in) as well as Govt. tender website, www.eprocure.gov.in, which can be downloaded for submission. The cost of bid document shall be furnished in the form of Demand Draft/ Banker's Cheque drawn in favour of FA & CAO, CoPA. The bidder shall submit the Originals of (i) DD / Bankers Cheque towards the cost of tender and EMD and (ii) Power of Attorney in favour of signatory(s) to the tender, with letter of submission in a sealed cover to the **Suptdg. Engineer(CM), Cochin Port**

Authority, W/Island, Cochin-682009, Kerala, within 3 (Three) working days from the date of opening. Non submission of original financial documents towards cost of tender document and EMD within 3 (Three) working days from the date of opening, will make the tender liable for rejection.

6. The bidders need to obtain the one time User ID & password for log-in to in e-Tendering system from the service provider **KEONICS** by paying registration amount of **Rs.1124/-** by online Payment using Credit/Debit Card/Net banking or DD in favour of “KSEDCL, Bangalore”.
7. The intending bidder must have valid Class-II or III digital signature certificate to submit the bid. For further details and to obtain the digital signature, please contact e-Tender Help Desk No.080-40482000 / 9746118529 / 9605557738.
8. Tenders shall be submitted “**online**” strictly in accordance with the Instructions to Tenderers and Terms & Conditions given in the tender document.
9. The bidder is responsible to download Addenda/ Amendments/ Errata/ Replies to the queries of the bidders etc., if any, issued by the Employer, from the website before submission of the bid. **Any shortfall in uploading the said Addenda/ Amendments/ Errata/ Replies to the queries of Tenderer etc. duly signed along with the downloaded documents while uploading the Tender will render the Tender incomplete and incomplete Tender Documents may be rejected.**
10. All Bids are to be submitted **online only** on the website www.tenderwizard.com/ COPT. No Bids shall be accepted off-line (Hard copy).
11. Original DD / Bankers Cheque towards the cost of tender and EMD, shall be submitted in a sealed cover to the **Suptdg. Engineer (CM), COCHIN PORT AUTHORITY, W/Island, Cochin-682009, KERALA, and these original documents shall be reached to the employer within 3 (THREE) working days from the Bid Due date. Non submission of original financial instruments towards the cost of tender document, EMD, within the above period leads to disqualification of Bids.**
12. The intending bidder must have valid Class-II or III digital signature certificate to submit the bid. **For further details, please contact e-Tender Help Desk No. 080-40482000/ 9746118529/9605557738.**
13. **EARNEST MONEY TO BE DEPOSITED**
 - 13.1 Each tender should be accompanied by an Earnest Money amounting to **Rs.1,00,000/-**.
 - 13.2 The Earnest Money can be deposited through Demand Draft or Banker’s Cheque or Pay Order from a Scheduled Bank in India, drawn in favour of Financial Adviser & Chief Accounts Officer, COCHIN PORT AUTHORITY. The original DD/ Banker’s Cheque/ Pay Order shall be submitted to the SE(CM), COCHIN PORT AUTHORITY, Cochin-9, **within 3 (THREE) working days from the Bid Due date.** Scanned copy of the DD/ Banker’s Cheque/ Pay Order shall be attached with the tender submitted “online”. The Earnest Money deposited will not carry any interest.
 - 13.3 EMD shall be refunded to the Contractor on acceptance of Performance Security and entering into agreement.

14. Cochin Port Authority will not be held responsible for any technical snag or net work failure during online bidding. It is the bidder's responsibility to comply with the system requirements i.e. hardware, software and internet connectivity at bidder's premises, to access the e-Tender portal. Under any circumstances, Cochin Port Authority shall not be liable to the bidders for any direct/indirect loss or damages incurred by them arising out of incorrect use of the e-Tender system or internet connectivity failures.
15. The Bidder shall submit Originals of: (i) DD / Banker's Cheque towards the cost of Tender document and EMD; and (ii) Power of Attorney along with letter of submission in a sealed cover **to the Suptdg. Engineer(CM), Cochin Port Authority, W/Island, Cochin – 682009, KERALA, , within 3 (THREE) working days from the Bid Due date. Non submission of original financial document towards cost of Tender document and EMD etc as above will be liable for rejection.**

16 Securities:

- 16.1 Security Deposit (SD) shall be 3% of the Contract value or value of the work done whichever is higher and it shall consist of the following:

a) **Performance Security** 3% of contract value payable on award of the work.

B) **Retention Money:** NIL

In case, where the value of work done exceeds Contract value, Additional Security Deposit @ 3% of the excess amount will be deducted from the RA Bills. While making payment, which will be released along with the Performance Security only

The total amount thus deposited towards SD will be retained as security for the due and proper fulfillment of the Contract and will not carry any interest. Such deposit shall be forfeited on failure to perform or non-fulfillment by the Contractor of the terms and conditions of the Contract.

- 16.2 **Performance Security:** The Performance Security retained till end of Defect Liability period (1 year from the date of completion of work) shall be 3% of Contract Value or Cost of Work Done, whichever is higher. So, initially 3% of the Contract value shall be furnished as Performance Security.

In case, whether the value of work done exceeds Contract value, Additional Security Deposit @ 3% of the excess amount will be deducted from the RA Bills, while making payment, which will be released along with the Performance Security only.

- 16.3 The Security Deposit/ Performance Security @ 3% of the value of the contract awarded, shall be furnished by the Contractor to the Employer, not later than **14 days** from the date of letter of acceptance or such extension of that period as may be permitted by the Engineer in writing, and shall be furnished in one of the following forms:

- i) Banker's Cheque/Demand Draft/Pay Order of a Scheduled Bank.
- ii) An irrevocable Bank Guarantee(BG) enforceable and encashable at Cochin, drawn from any Scheduled Bank operating in India as per the prescribed proforma.

- 16.4 The Security Deposit/ Performance Security retained till end of Defects Liability Period (**1 year from the date of completion**) shall be 3% of Contract Value or Cost of Work Done, whichever is higher. So, initially 3% of the Contract value shall be furnished as Performance Security. **The BG furnished towards the Performance Security shall be valid until a date 30 days from the day of expiry of the Defect Liability Period stipulated as per the terms of the Contract.**
- 16.5 Unless Performance Security is furnished within the period as specified above or such extension of that period as may be permitted by the Engineer in writing, tenderer will be suspended and shall not be eligible to participate in the tenders invited by COCHIN PORT AUTHORITY for a period of **Two Years from the date of such suspension order.**
- 16.6 **Retention Money:** NIL. In case, where the value of work done exceeds Contract value, Additional Security Deposit @ 3% of the excess amount will be deducted from the RA Bills. While making payment, which will be released along with the Performance Security only.
- 16.7 **The Performance Security retained till end of Defect Liability Period (1 Year from the date of completion) shall be 3% of Contract Value or Cost of Work Done, whichever is higher.**
- 16.8 If the Cost of Work done exceeds the Contract Value, the total amount retained as Security Deposit considering the Performance Security initially submitted together with the Additional Security Deposit recovered from the running account bills, shall amount to 3% of the Cost of Work done.
- 17 In the event of the tenderer, after the issue of the communication of acceptance of offer by the Board, failing /refusing to execute the agreement as hereinafter provided, the tenderer shall be deemed to have abandoned the Contract and such an act shall amount to and be construed as the Contractor's calculated and willful breach of the Contract, the cost and consequence of which shall be to the sole account of the tenderer and upon such an event, the Board shall have full right to claim damages therefore either together with or in addition to the forfeiture of Earnest Money Deposit.
- 19 **Signing of Agreement:**
- 19.1 The successful tenderer will be required to execute within **21 days** from the date of receipt of work order, an agreement at his expense on proper value Kerala State Stamp Paper in the prescribed departmental form, consisting of:
- a) The Tender Notice, all the documents including additional conditions/specifications and drawings, if any, forming the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading there to, and
 - b) General Conditions of Contract-2016 (GCC), for the due and proper fulfillment of the Contract.
- 19.2 The Contractor shall make 10 copies of the Agreement and submit to CoPT within 7 days following the date of signing of Agreement.
- 20 Till signing of agreement the tender together with the acceptance letter shall constitute a binding Contract between the Contractor and Cochin Port.
- 1.21 Failure to comply with conditions **3ii(iv), 16 and 19** above will entail forfeiture

- of the Earnest Money.
16. **MSME Bidders who are registered with District Industries Centre (DIC) or Khadi and Village Industries Commission (KVIC) or Khadi and Village Industries Board (KVIB) or Coir Board or National Small Industries Corporation (NSIC) or directorate of Handicrafts and Handlooms or Udyog Aadhaar Memorandum or any other body specified by Ministry of MSME for similar nature of Works shall be eligible for issue of Bid Document free of cost and exemption from payment for issue of tender document & payment of EMD. They are required to submit documentary proof of such registration along with the offer, as detailed in Instructions to Bidders, for claiming the available exemptions and a scanned copy of Exemption Certificate duly notarized shall be uploaded in the e-Tender Portal. If the Registration Certificate does not pertain to the Category of 'Similar Works' mentioned above, the Tender will be rejected.**
 17. The undersigned reserves the right to reject/cancel/postpone any one or all tenders at any stage of the tender, which shall be binding on all bidders.
 18. Tenders which do not fulfill all or any of the above conditions or which contain any other condition of any sort including conditional rebates or are incomplete in any respect is liable for rejection. Such tenders shall be entered in the tender opening register but their rates shall neither be read out nor entered in the register. Only remark mentioning the reason of rejection in brief shall be appended against such entry.
 19. Canvassing in connection with tender is strictly prohibited and tenders submitted by the Contractors who resort to canvassing will be liable to rejection.
 20. **Taxes and Duties:**
 - 20.1 Deductions towards statutory taxes as per the rules, prevailing in force at the time of payment of bills shall be made while releasing the bill amount.
 - 20.2. GST for the work will be paid extra by the Port. The GST applicable as per law can be billed on the Port Authority, which will be paid to the Contractor by the Board along with the bills, for which the Contractor holds valid GST Registration number and the GST is being collected. The following are also to be considered while claiming payment towards GST:
 - i. Invoice in specific format should be provided by the Contractor for every payment.
 - ii. GST Registration Number of Cochin Port Authority and the Contractor is to be clearly mentioned with all the bills.
 - iii. Invoice should be attached along with the running bills.
 - iv. The Contractor shall comply all the GST regulations, viz.; timely uploading of invoices and issue of debit/ credit notes.
 - 20.3. Any stipulation by a tenderer that taxes and duties deductible from these bills should be borne by the Port Authority will result in the summary rejection of his /their tender.
 21. Cess as per Building and other Construction Workers Welfare Cess Act (Act 28 of 1996) at the rate of one percent or at the rates prevailing in force at the time of payment of bills, of the cost of construction should be borne by the

Contractor and the same will be deducted from Contractor's bills while making payment or when crediting amount to Contractor's account.

22 This Tender Notice shall form part of the Contract.

Sd/-

Suptdg. Engineer(CM)

COCHIN PORT AUTHORITY

FOR AND ON BEHALF OF THE BOARD OF MAJOUR PORT AUTHORITY

FOR COCHIN PORT

2. TENDER FOR WORKS

To

**The Board of
Major Port Authority
for Cochin Port
Through
The Chief Engineer
Cochin Port Authority, Cochin-9**

I/We hereby tender for the execution of the work specified in the underwritten memorandum within the time specified in such memorandum at the rates specified in the schedule attached hereto and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in 'clause 16' of the General Conditions of Contract and with such materials as are provided for, by and in all other respects in accordance with such conditions so far as applicable.

MEMORANDUM

- a) General description of work : **Annual Civil Maintenance Contract (ACMC) for the year 2023-24**
- b) Estimated cost : **Rs.1,00,00,000/-**
- c) Earnest Money : **Rs.1,00,000/-**
- d) Security Deposit : 3% of the value of the Contract awarded or value of the work done whichever is higher. (Performance Security @ 3%)
- e) Percentage, if any, to be deducted from the bills : In case, Where the value of work done exceeds Contract value, Additional Security Deposit @ 3% of the excess amount will be deducted from the RA Bills, while making payment, which will be released along with the Performance Security only.
- f) Time allowed for commencement of work from the date of receipt of work order : **7 days**
- g) Time allowed for the work from the date of commencement of work : **1 Year**
- h) Schedule, specifications, conditions, drawings etc. : As per "Contents" sheet attached.

Should this tender be accepted, I/We hereby agree to abide by and fulfill all the terms and provisions of the said conditions of Contract annexed here to so far as applicable or in default thereof forfeit and pay to the Board the sum of money mentioned in the said conditions and to execute an agreement with the Board in the prescribed form or in default thereof to forfeit the Earnest Money deposited by me/us. The sum of Rs..... has been deposited with Financial Adviser and Chief Accounts

Officer of the Port Authority as Earnest Money: (a) the full value of which is to be absolutely forfeited to the Board in office without prejudice to any other rights or remedies of the said Board in office should I/We fail to commence the work specified in the Contract Data or should I/We not deposit the full amount of Performance Security specified in the Contract Data in accordance with clause 52 of the said conditions of Contract otherwise the said sum of Rs. shall be retained by the Board as on account of such security deposit as aforesaid; or (b) the full value of which shall be retained by the Board on account of the security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, upto maximum of the percentage mentioned in Contract Data and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 40.3 of the Conditions of Contract.

Dated the day of 2023

Signature of the Tenderer

Address :

Witness :

Address :

Occupation :

ACCEPTANCE

The above tender is hereby accepted by me for and on behalf of the Board.

Dated theday of2023.

Dated.....

Chief Engineer

COCHIN PORT AUTHORITY

3. CONTRACT DATA

Items marked “N/A” do not apply in this Contract.

Sl. No.	Description	Reference Clause No. in GCC																
1	<i>The following documents are also part of the Contract</i>																	
	The Schedule of other Contractors	(8.2)																
	The Schedule of Key personnel – As per Tender	(9)																
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Qualification of Staff</th> <th style="text-align: center;">No.</th> <th style="text-align: center;">Min. Experience (Years)</th> <th style="text-align: center;">Rate of recovery in case of non-compliance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Graduate Engineer</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">Rs.15,000/- p.m</td> </tr> <tr> <td style="text-align: center;">or</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Diploma Engineer</td> <td style="text-align: center;">1</td> <td style="text-align: center;">5</td> <td style="text-align: center;">Rs.15,000/- p.m</td> </tr> </tbody> </table>	Qualification of Staff	No.	Min. Experience (Years)	Rate of recovery in case of non-compliance	Graduate Engineer	1	2	Rs.15,000/- p.m	or				Diploma Engineer	1	5	Rs.15,000/- p.m	
Qualification of Staff	No.	Min. Experience (Years)	Rate of recovery in case of non-compliance															
Graduate Engineer	1	2	Rs.15,000/- p.m															
or																		
Diploma Engineer	1	5	Rs.15,000/- p.m															
2	The Employer is:	(1)																
	The Board of Major Port Authority for Cochin Port, COCHIN PORT AUTHORITY, Cochin -9.																	
	Name of Authorized Representative:																	
	Name : Dr. M. Beena, Chairperson, Cochin Port Authority, Cochin -9.																	
3	The Engineer is																	
	Name : Shri. Paritosh Bala, Chief Engineer, Cochin Port Authority, Cochin-9.																	
	Name of Nominee/Engineer-in-Charge: Name: Sri. Sathyan.A.G, Suptdg. Engineer(CM)																	
4	Name of Contract- Annual Civil Maintenance Contract (ACMC) for the year 2023-24. Tender No. T6/T-1981/2023-C	(1)																
5	10 copies of Contract Agreement shall be furnished by the Contractor	(7.1)																

Sl. No.	Description	Reference Clause No. in GCC	
6	Tender document and other data are available at Cochin Port web site, Government of India CPP Portal and e – tendering portal. www.cochinport.gov.in www.eprocure.gov.in www.tenderwizard.com/CPT	(7.2)	
7	The Intended completion date for the whole of the Work is 1 year with the following milestones:	(17,28)	
8	Milestone dates:		
	Physical works to be completed		Period from the date of receipt of LoA to proceed with the work
	1 year		7 days
9	The following shall form part of the Contract Document: (1) Agreement (2) Letter of Acceptance (3) Bill of quantities (4) Contractor’s Bid (5) Correspondence exchanged after the opening of the Bid and before the issue of Letter of Acceptance by which the Condition of Contract are amended, varied or modified in any way by mutual consent (to be enumerated). (6) Contract Data (7) General Conditions of Contract (8) General Description and Special Conditions of Contract (9) Technical Specifications (10) Drawings if any and (11) Any other documents listed in the Contract Data as forming part of the Contract.	(2.3)	
10	The Contractor shall submit a Program for the Works within 21 days of date of the Letter of Acceptance.	(27)	
11	The site possession date The site will be handed over within 7 days after issue of LoA.	(21)	
12	The start date shall be 7 days from the date of receipt of the Letter of Acceptance (LoA) by the Contractor.	(1)	
13	The site is located in W/Island.		

Sl. No.	Description	Reference Clause No. in GCC
14	The Defects Liability Period: One year from the date of completion of the work.	(36)
15	The minimum insurance cover for physical property, injury and death is Rs.10 lakhs (Rupees Ten lakhs) per occurrence with the number of occurrences unlimited. After each occurrence, Contractor will pay additional premium necessary to make insurance valid always. Also refer Clause 4 of Special Conditions of Contract – Section III of this tender document.	(13)
16	The following events shall also be Compensation Events: NIL	(44)
17	The period between Programme updates shall be 30 days.	(27)
18	The amount to be withheld for late submission of an updated programme shall be ----- NA	(27)
19	The language of the Contract documents is English.	(3)
20	The law, which applies to the Contract, is the law of Union of India.	(3)
21	The currency of the Contract is Indian Rupees.	(46)
22	The proportion of payments retained (Retention Money) shall be 3% from each bill subject to a maximum of 3% of the contract price. - NA	(48)
23	The maximum amount of Liquidated Damages for the whole of the works is 10% of the Contract Price.	(49)
24	The amounts of the advance payments :	(51)
	The advance payments as applicable to the contract are: NA	
25	Repayment of advance payment for mobilization: NA	(51)
26	Repayment of advance payment for Construction and equipment: NA	(51)
27	Repayment of Secured Advance	(51)
28	The date by which “as-built” drawings are required is within 90 days of issue of certificate of completion of whole or section of the work, as the case may be: NA	(58)
29	The amount to be withheld for failing to supply “as built” drawings and/or operating and maintenance manuals by the date required is ----- NA	(58)
30	Schedule of Rates Applicable: CPWD DSR 2018 + 55% Cost Index x 0.8768 for deducting GST.	

Sl. No.	Description	Reference Clause No. in GCC
31	Base Rate for materials to be considered for price variation NA	(47)
32	Permissible wastage on theoretical quantities of (a) Cement : (+) 2% (b) Steel Reinforcement and structural steel sections for each diameter, section and category : (+) 5.99 % (c) Bitumen/Bitumen emulsion : (+) 2.5%	(47)

4. INSTRUCTIONS TO TENDERERS

- 4.1 Electronic Tenders (e-tenders) on percentage basis under “Two Cover system” are invited for “**Annual Civil Maintenance Contract (ACMC) for the year 2023-24**”.
- 4.2 The tenderer shall submit the tender Cover-A (Hard Copy of EMD & Cost of Tender form) **within 3 (THREE) working days from the Bid Due date**. All the Technical Bid documents & Price Bid shall be submitted “**online**”.
- 4.3 The Tender Document will be available as three separate files in the e-tendering Portal:
- i. A. Technical Bid Documents (as per Sl. No 1 to 7 of the Contents sheet)
 - ii. B. Price Bid: Schedule of quantities of Work- Schedule-A and
 - iii. C. General Conditions of Contract-2016
- 4.4 The tenderer shall upload the documents indicated in 4.3 (i) & (iii) above and also the Schedule of Quantities(Percentage) [as per Cl.4.3(ii), duly filled in, “**online**”.

4.5 SUBMISSION OF TENDERS

- 4.5.1 The Cover A shall contain – hard copy of EMD & Cost of Tender form as mentioned in Table 3 of Tender Notice shall be submitted **within 3 (THREE) working days from the Bid Due date**.

4.5.2 Technical Bid (Online mode)

Technical Bid shall contain all technical and commercial details except Schedule of Quantities. It shall consist scanned/ soft copies of the following documents.

- a) A covering letter from the tenderer enlisting the enclosures/ attachments.
 - b) Original Tender Document (Technical Bid) except Schedule of Quantities.
 - c) Copy of the documents in proof of fulfillment of the Minimum Qualification Criteria.
 - d) Copy of PAN Card, ESI/EPF & GST Registration documents.
 - e) Copy of Authorisation documents of Signatory of the bid in case of Registered Partnership firm / Limited company
 - f) Partnership deed or Memorandum and Article of Association of the company and registration certificate of the company as the case may be.
 - g) Any other relevant document.
- 4.5.2.3 Scanned copies of all documents as per Clause 4.5.2, EMD and Cost of Tender Form shall be submitted as “Technical Bid”.
- 4.5.2.4 Departmental Tender Document (except Schedule of Quantities), along with scanned copies of Cost of Tender form, EMD and other documents as per Clause 4.5.2 shall be submitted ‘**online**’ before 14.30 hrs of opening date of the Tender. **In no case shall filled in Price Bid - Schedule of Quantities be submitted in hard copy, as it shall result in rejection of the tender.**
- #### 4.5.3 Price Bid:
- 4.5.3.1 Price Bid shall contain only the “Schedule of Quantities”, which shall be **submitted only in e-tendering mode**.

4.5.3.2 Tenderer should ensure that his tendered percentage as per ‘Price Bid’ is not mentioned anywhere in any other documents, directly or indirectly. If any such mention is made, the tender will become invalid and shall become liable for rejection.

4.6 Minimum Eligibility Criteria:

a) Experience

The tenderers should have experience of having successfully completed during the last 7 (seven) years ending **31st December, 2022**, at least either:

- i) Three Similar Works each costing not less than **Rs.40.00 lakhs**
(OR)
- ii) Two Similar Works each costing not less than **Rs.50.00lakhs**
(OR)
- iii) One Similar Work costing not less than **Rs.80.00 lakhs**

b) Financial Turnover

Average Financial Turnover of the tenderer over the last three financial years ending 31st March 2022 [2019- ‘20, 2020- ‘21& 2021- ‘22] shall not be less than **Rs.30.00 lakhs**.

Explanatory Notes to a) & b) :

- i. Similar work(s) means “***Construction/ Maintenance of Townships and OR Construction/ Maintenance of Wharves and OR Construction/ Maintenance of Port Structures and OR Civil Construction/Repair/ Maintenance Works***”. The experience certificate of works executed in private sectors/ organisations shall be considered for qualification, only on submission of TDS certificate along with work order and completion certificate.
- ii. Copy of completion certificates of each work issued by the owner/ responsible officer of the owner under whom he has executed such contract shall be attached. The certificate shall contain details of work involved specifying the nature of work, the completion cost of the work, date of commencement & date of completion of the work.
- iii. The works reckoned for the above purpose are those executed by the tenderers as prime Contractor or proportionately as member of joint venture or Sub Contractor. The Sub-Contractor shall be an authorized and approved Sub-Contractor by the Employer of the work(s) against which the tenderer has claimed his experience. The tenderer shall attach attested copy(s) of approval issued by the Employer(s) authorizing as a Sub-Contractor; in proof of the claim of the tenderer as a sub-Contractor. The tenderer is also obliged to produce the original of the certified copy(s) on request by the department.
- iv. Following enhancement factors will be used for the costs of works executed for bringing the financial figures to a common base value in respect of the works completed in the past years.

Table 1

Year before	Multiplying factor
One year	1.07

Two years	1.14
Three years	1.21
Four years	1.28
Five years	1.35
Six years	1.42

v. **Financial Turnover:**

In proof of Financial Turnover Audited Annual Accounts Statements or IT returns duly acknowledged by the Income Tax department along with Computation Statement signed by the Auditor/ Chartered Accountant, for the last three years shall be produced by the tenderer..

c) **Other Eligibility Considerations**

4.6.1 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures, black listing/ debarring by Govt. departments etc.

d) **The bidders having EPF/ ESI registration certificates only shall be considered for qualification in the tenderers, if applicable, as per EPF /ESI Acts. In case, the Tenderer does not have the required number of employees which makes such registration mandatory, an Undertaking as per Annexure I to the effect shall be furnished.**

4.7. OPENING AND EVALUATION OF TENDERS

4.7.1 Technical Bids of the tenders received shall be opened at 15.00 hrs. on **13/02/2023**, the last date fixed for receiving the bid, in the SE's chamber in the presence of the tenderers or their representatives as may be present.

4.7.2 After opening the Technical Bid documents, it shall be thoroughly checked for completeness with respect to the details stipulated to be submitted as Technical Bid by the tenderer. The Price Bid of those tenderers satisfying the tender requirements shall only be opened. The Price Bid of those tenderers who are found responsive and satisfactory on evaluation of Technical Bid documents, will be opened after bringing all tenderers to the same footing and giving notice to the short listed tenderers, on a date to be decided and intimated later.

4.8 GENERAL INSTRUCTIONS TO TENDERERS

4.8.1 The submission of a tender by the tenderer implies that he has read the whole tender Documents including GCC-2016.

4.8.2 The tenderer is advised to visit and examine the site of work and its Surroundings, discuss with connected agencies and collect all necessary information on his own responsibility for preparing the tender.

4.8.3 The tenderer is expected to examine the Tender Documents including all conditions, specifications, forms etc and also conditions in the G.C.C. Failure to furnish the information required in the Tender Documents/ G.C.C. or

- submission of a tender not conforming to the requirements in every respect, is likely to result in the rejection of the tender.
- 4.8.4 The tenderer shall quote for the work on percentage basis. The departmental rate for each item of work is given in the Schedule of Quantities. The tenderer shall fill the percentage above or below the Departmental rate, in the column provided for the purpose in the Schedule.
- 4.8.5 In case of discrepancy between the specifications and the drawings, the following order of preference shall be observed:
- a. Conditions & Specifications of tender
 - b. Drawings.
 - c. B.I.S Specifications.
 - d. Sound Engineering Practice.
- 4.8.6. If there are varying or conflicting provisions made in any document forming part of the Contract, the Chief Engineer, Cochin Port Authority, Cochin-682009 shall be the deciding authority with regard to the intention of the document which will be binding on the tenderer/ Contractor.
- 4.8.7 Any error in description, any omissions there shall not vitiate the Contract or release the Contractor from the execution of whole or any part of the works comprised therein according to specifications or from any of his obligation under the Contract.
- 4.8.8 The Chief Engineer, Cochin Port Authority shall have the right to omit or Suspend certain items of work or revise or amend the Tender. Documents at any time prior to the due date of submission of the tender. Such revisions or amendments or extensions if any, shall be communicated to all the bidders who have downloaded the Tender Documents, in the form of an addendum by telefax /e- mail / writing. In order to afford the Bidders with reasonable time to take addendum into account, or for any other reason, the Port Authority may, at its discretion, extend the due date for submission of tender.
- 4.8.9 All payments due to the Contractor under this Contract will be made in Indian Rupees only.
- 4.8.10 Tenders received after the date specified for submission shall not be opened.
- 4.8.11 The Bank Guarantees (BGs) to be furnished by the Contractors in connection with the tender shall be sent to by the Chief Engineer, Cochin Port Authority directly by the issuing bank under registered post with AD. The Contractor shall take the responsibility of sending BGs directly to the Port Authority by the issuing bank.

SIGNATURE OF TENDERER.

5. GENERAL DESCRIPTION AND SPECIAL CONDITIONS OF CONTRACT

5.1 SCOPE OF WORK

- 5.1.1 The scope of this contract covers the following:
Part-A Labour oriented miscellaneous civil works- Rs.15 lakhs.
Part-B Material & labour involved miscellaneous nature work-Rs.55 lakhs.
Part-C Road repair works- Rs.20 lakhs.
Part-D Supply of building construction materials-Rs.5 lakhs.
Part-E Supply of skilled/ unskilled labours-Rs.5 lakh.
- 5.1.2 The contract is for Civil Maintenance works / supply to be carried out in all areas under the jurisdiction of Cochin Port.
- 5.1.3 It shall include works/ supply at all the areas under the jurisdiction of Cochin Port Authority, Ernakulam Wharf & CFS area on W/Island including, Fishing Harbour Project area, South End Reclamation area, Port Quarters at Fort Cochin, Fort Cochin Wharf, Bolghatty, Puthuvypeen, Vallarpadam and OTB at Ernakulam.
- 5.1.4 The rate of items of work/ supply plus or minus percentage quoted shall be inclusive of all leads and lifts of every nature and no extra claim will be entertained on this account.

5.2 Work orders of repair works will be issued from time to time as required by the Engineer-in-Charge or his authorised subordinate at the accepted tender percentage over/ below the Port's rates.

5.3 The work shall be meticulously planned in consultation with the departmental supervisory staff and nearby users, so that minimum inconvenience is caused to the functions of the wharf.

5.4 MATERIALS / FACILITIES TO BE PROVIDED BY DEPARTMENT

5.4.1 CONTRACTOR'S WORK AREA

Space will be made available to the Contractor free of rent for storing materials and equipments etc., adjacent to the work site for the duration of the Contract. After the work is over, Contractor shall at his cost, reinstate the area by clearing the temporary works, debris etc. as decided by the Engineer's Nominee.

5.5 CONTRACTOR'S RESPONSIBILITY

- 5.5.1 The tenderer shall visit the area before tendering. It will be deemed that the tenderer has visited the site and studied the site conditions before submitting the tender. The tenderer should get himself acquainted with the nature and extent of the work. No claim whatsoever will be entertained on the plea of ignorance of difficulties involved in execution of work or carriage of materials etc.
- 5.5.2 All materials, plants and equipments, required for the work shall be provided by the Contractor at his own cost, and shall conform to relevant I.S. Specification unless otherwise specified.
- 5.5.3 Samples of all materials, to be incorporated in the work shall be got approved by the Engineer's Nominee before procurement.
- 5.5.4 The Contractor shall thoroughly study the specifications and errors / omissions/ modifications if any shall be brought to the notice of the Engineer – in-Charge

- well in advance so that a final decision in the matter could be given in time.
- 5.5.5 All labour, skilled or unskilled shall be provided by the Contractor. Settling any dispute with the labour will be Contractor's responsibility. Insurance as per Indian Workmen's Compensation Act for the Contractors' workmen and Public Liability Policy shall be provided by the Contractor at his own cost.
- 5.5.6 The Contractor shall be solely responsible for any damage or injury to the persons or things caused or suffered during the execution of the work and shall be made good or compensated at his own cost.
- 5.5.7 The Contractor shall take all care and precautionary measures for avoiding any kind of damage/accidents in the work site due to any of his reasons. The Contractor shall indemnify the Port against any compensation whatsoever payable to the workmen for accident or loss arising out of and in the course of their employment under this Contract.
- 5.5.8 The work shall be arranged by the Contractor without causing any damage to Port structures. Any damage or accident caused by the Contractor's operation shall be compensated / made good at Contractor's risk and cost to the satisfaction of the Engineer's Nominee of the works, failing which department will do the rectification work and the cost incurred will be recovered from his bill or from security deposit.
- 5.5.9 **The Contractor shall not construct any structure, even of temporary nature, for any purpose at site, except with the written permission of the Engineer's Nominee of the work and any construction so put up shall be removed by the Contractor whenever the Engineer's Nominee calls upon the Contractor to do so.**
- 5.5.10 **The Contractor shall remove all temporary works, clear and make good the site, at his cost to the satisfaction of the Engineer's Nominee before the site is returned to the Port Authority. All materials shall be disposed to any place as pointed out by the Engineer's Nominee of the work and site shall be cleared in every respect at no extra cost after completion of work.**
- 5.5.11 The Contractor shall remove all materials brought to work site / stacked at the work site or anywhere else within the Port area and clear the site at his cost to the full satisfaction of the Engineer's Nominee before the site is returned to the Port Authority. All such materials including debris, tools & plants etc. shall be disposed off to any place as pointed out by the Engineer's Nominee or be taken away from the location and shall be cleared in every respect and to reinstate to its original condition at no extra cost to the Port Authority immediately after completion of the work. In case, any such material is found left in the work site or anywhere in the Port area, rent for the storage space occupied by the Contractor, either for stacking the materials /debris or for areas used for such purpose but not cleared thereafter, will be recovered as per the prevailing Scale of Rate of Cochin Port Authority, for the rent applicable for open storage space for commercial purpose, for the period for which the area had been occupied by the Contractor. In addition to the above, in case the Port requires the area immediately for its use, Port will repossess the land after restoring it to its original condition, material will be confiscated and disposed off at the risk and cost of the Contractor, after issuing two notices giving 15 days' time each for

removing the material. All expenses incurred in this shall be recovered by disposing off the material if any confiscated. If any balance amount still remains to be realized that will be recovered from the Contractor by appropriate means.

- 5.5.12 The Contractor shall observe all safety regulations during the execution of the work. Safety measures, precautions, warning signals etc. shall be taken/provided at the Contractor's cost, as directed by the Engineer-in-Charge of the work. The Contractor shall provide all necessary personnel protection equipments such as helmet, lifeguard, goggles, boots, safety belts etc. to the workmen at his own cost and it shall be the Contractor's responsibility to ensure that they use it while on the work site.
- 5.5.13 The Contractor shall ensure that no labourers with criminal background are engaged for the work.
- 5.5.14 The contractor shall take all precautions for not to damage any cables, pipelines etc. passing through the area of work.
- 5.5.15 **The Contractor shall comply with all the provisions of the Indian Workmen's Compensations Act, Public Liability Policy, Provident Fund Regulations, Employees Provident Fund and ESI Act etc. amended from time to time and rules framed there under and other laws affecting the Contract labour that may be brought in to force from time to time.**
- 5.5.16 **The bidders having EPF/ ESI registration certificates only shall be considered for qualification in the tenderers, if applicable, as per EPF /ESI Acts. In case, the Tenderer does not have the required number of employees which makes such registration mandatory, an Undertaking as per Annexure I to the effect shall be furnished.**
- 5.5.17 The Contractor shall provide, at every work place, at which 20 or more women workers are ordinarily employed, crèches of reasonable size and with adequate facility for the use of their children under the age of six years at his risk and cost.
- 5.5.18 The Contractor shall also be responsible for arranging and carrying out works as mentioned in Clauses 5.1.
- 5.5.19 **Defect Liability period of the work is one year from the date of completion of the work.**

5.6 POWER

- 5.6.1 Electric power required for the work can be supplied by the department from the nearest existing line of the Port Authority at prevailing rates. The cost of drawing temporary lines/ cables/ providing switches and making connection and metering arrangements etc, shall be borne by the Contractor. If there is any disruption in the power supply due to supply failure/ restrictions imposed by the Kerala State Electricity Board, the department shall not be held responsible and the Contractor has to make suitable alternative arrangements at their cost.

5.7 WORKMANSHIP

- 5.7.1 All the works shall be done strictly according to relevant B.I.S. specifications unless otherwise specified. Whenever special conditions and other specifications deviate from the B.I.S. the former shall prevail.
- 5.7.2 The whole work shall be completed in a diligent manner within the Contract

period and defect or imperfection if any, observed during the Defect Liability Period/ guarantee period the same shall be rectified at Contractor's cost to the full satisfaction of the Engineer's Nominee within the time allowed.

5.7.3 Precautions shall be taken for not to damage cables/ pipe lines etc.

5.7.4 The work shall be arranged in the order of preference and as directed by the Engineer's Nominee of work.

5.8 TEMPORARY WORKS

5.8.1 All scaffolding, staging, bracing and other temporary works required for proper execution of the works, shall be provided by the Contractor at his own cost, unless stated otherwise and that should be inclusive of all materials, labour, supervision and other facilities. The layout and details of such temporary works shall have prior approval of the Engineer's Nominee, but the Contractor shall be responsible for proper strength and safety of the same. All temporary works shall be so constructed as not to interfere with any permanent work or with the work of other agencies. If it is necessary to remove any of the temporary works at any time to facilitate execution of works or work by other agencies, such removal and re erection, if required, shall be carried out by the Contractor at the direction of Engineer's Nominee without any delay and any extra cost on this account shall be borne by the Contractor.

5.8.2 On completion of the works, temporary works if any provided by the Contractor shall be removed from the site and the area shall be reinstated to the original condition at his own risk and cost.

5.9 TIME FOR COMPLETION

5.9.1 The time allowed for carrying out the work as mentioned in the memorandum/ individual work order shall be strictly observed by the Contractor. The work shall throughout the time period be proceeded with diligence, time being deemed to be the essence of the Contract. The number of days lost due to heavy rain shall be certified by the Engineer's Nominee. The Contract period shall be extended for such certified days also without imposing compensation for delayed performance.

5.9.2 The whole work shall be completed in accordance with the provisions under Contract Data/ Work Order or such extended time as may be allowed as per clause 29 of G.C.C.

5.10 MATERIALS

5.10.1 Materials supplied by the contractor shall be of good quality conforming to relevant Indian Standard Specifications. Work should be done strictly in accordance with the Indian Standard Specifications and CPWD specifications.

5.10.2 All items of work covered under CPWD – DSR-2018 other than those specified under Schedule of items of this tender, if required, shall be executed by the contractor at the percentage quoted above or below than rates for schedule irrespective of parts.

5.10.3 For items of works for which specification are not provided in this tender document, the same shall be executed based on CPWD specification.

5.10.4 Contractor has to make his own arrangements for the supply of all materials required for the work under respective items.

5.10.5 Measurement of quantities of work done will be made in accordance with

relevant I.S.S. unless otherwise specified.

- 5.10.6 Only potable water shall be used for carrying out the work entrusted under this contract. Water connection for the labour employed by the contractor and for the use on the works can be had from a convenient point where supply is available. ***If the contractor wants specific water connection to suit his convenience of the work near the work site, he will be allowed to take connection from the existing water supply line at his own cost. The water connection taken for the work will not be metered. 1% of the cost of the work will be charged towards the cost of the water consumed for the work and labour irrespective of whether the contractor uses the water or not.*** Where the work is to be done in the place where Port's water supply lines are not available, the contractor has to make his own arrangements for the water required for the work and labour. If the contractor intends to set up a yard for the purpose of executing the work under the contract and water required at this place, the contractor shall provide water from outside at his own cost. Sea or well water can be used for consolidation works. The contractor should arrange the same at no extra cost to the department. The recovery at 1% on the value of the work towards the cost of the water will not be applied in this case.
- 5.10.7 Royalty or siege, moorage charges as fixed from time to time duties, GST, tolls etc. on all materials quarried or otherwise purchased shall be borne by contractor and are expected to be included in his rates quoted. The percentage quoted shall be firm and shall not be subject to exchange variations, labour conditions, fluctuations in railway freight, any taxation policy of the State or Central Government etc and no claim on this account will be entertained.
- 5.10.8 Land required for the erection of workshed office etc. shall be given free of rent. Any temporary shed erected shall be removed immediately after the completion of work and the site cleared off to the original condition to the entire satisfaction of the Engineer-in-charge or his authorised subordinate, failing which they shall be caused to be removed by the Department and charges if any, incurred including centage charges shall be recovered from the sales of materials or from the contractor's bill or any other amount due to him. If the Department required the site occupied by the contractor for departmental use he should shift to an alternative site and no compensation will be paid. The temporary shed shall be constructed with non-inflammable materials like A.C sheet, G.I sheet etc.
- 5.10.9 All claims of the Port against the Contractor whether arising out of this contract or any other transaction or claim what so ever will be recovered from the amount due to the Contractor on account of this contract.
- 5.10.10 A work order book is to be maintained by the Contractor at the site of works/any orders or instructions issued by the Engineer-in-charge or his authorised subordinate shall be entered in the book and shall be deemed to have been legally issued. The Contractor shall sign each entry in token of having seen the orders/ instructions. The work order book shall be returned to the Engineer-in-charge in good condition after the completion of work.
- 5.10.11 The Contractor shall erect an office room at his own cost at a suitable location as decided by the Engineer-in-charge. The Contractor's representative

shall be available at this room for receiving instructions from the Department on during all days during the working hours of the Port. The Contractor should have avail Port's telephone connection from the Port Telephone Exchange with call facility limited under Port's Telephone Exchange area only, with his own cost and arrangements like telephone sets, installation etc. at this office room.

5.10.12 **This contract shall remain in force for a period of one year from the date of issue of work order.** Any work order placed till the last date of the contract period should be executed by the same contractor, at his tendered rates within a reasonable time fixed for the same and no extra claim will be entertained on this account.

5.10.13 For consolidating cement concrete mechanical vibrator or other suitable machinery may be used unless otherwise permitted by the Engineer-in-charge.

5.10.14 All fittings for doors, windows, sanitary fittings etc. shall be got approved by the Engineer-in-charge before fixing, failing which the contractor may be asked to remove the same and refix with such other material as may be directed by the Engineer-in-charge.

5.10.15 The surplus materials, debris etc. to be transported shall be stacked up to the proper shape and slope to the approved template for measuring before transporting and levelled at unloading place as required at Contractor's own cost.

5.10.16 Each work shall be completed in the stipulated time fixed by the Engineer-in-Charge or his authorised subordinate at the time of issuing the work order. The discretions of the Engineer-in-charge or his authorised subordinate regarding the time limit is final. If the work is not carried out in the stipulated time, action according to general conditions of contract will be taken for the particular work order.

5.10.17 The rate of random rubble masonry work should include cost of dressing the stone as required and no extra will be paid for using dressed stones in masonry pillars, pilasters etc.

5.10.18 The measurement for rolling shutters will be taken only for clear opening. No extra payment will be made for the accessories like drum etc.

5.10.19 The Contractor should note that the rate for items, which do not find place in his contract, will be decided by the Engineer-in-charge based on the rates for similar items or by adding up the rates for relevant items in the contract. No claim on this account will be entertained by the Department.

5.10.20 The contractor should note that either the tor steel or mild steel or combination of both shall be based on the work as desired by the Engineer-in-charge and no claim what so ever on this account will be entertained by the Department.

5.10.21 All laps, bends, hooks, chairs etc. in the reinforcement will be measured and paid for.

5.10.22 All the steel materials and cement shall be stored sufficiently above ground level by providing proper dunnage below.

5.10.23 Great care shall be taken by the Contractor to prevent displacement or bending of the members of reinforcement. Any displacement shall be adjusted and fixed in position before commencement of concreting at no extra cost to

the Department.

- 5.10.24 All conversions from metric units to British units and vice versa will be as per I.S.No.786 latest edition.
- 5.10.25 The Contractor shall keep the site clean, free from all rubbish offensive matter and other materials not approved by the Engineer-in-charge.
- 5.10.26 The percentage above/ below the rates quoted by the Contractor should be inclusive of all labour and materials etc. unless otherwise specified.
- 5.10.27 All rules and regulations governing the Cochin Port Authority shall be applicable.
- 5.10.28 The site for the work will be handed over to the Contractor as soon as the work order is given. In the case the entire site is not handed over the Contractor, he should programme his work in such a way as not to hamper the progress in any way. No claim for the delay in handing over of the site will be entertained.
- 5.10.29 For all R.C.C. works, the decking shall be of steel or other suitable centering materials approved by the Engineer-in-charge.
- 5.10.30 All reinforcement shall be cleaned off all loose scales, rusts etc. before in cooperating in the work. Binding wire required for the work shall be procured by the Contractor at his own cost.
- 5.10.31 Required number of wooden gutties and pipes will be supplied by the Department and the Contractor has to fix them in places shown for electrical wiring etc.
- 5.10.32 Necessary holes are to be left in masonry for G.I. pipes etc. for water supply, sanitary and electrical connections.
- 5.10.33 Clear cover of R.C.C. work as specified in drawing supplied to the Contractor or as directed by the Engineer-in-charge shall be clearly maintained by using dense cement mortar 1:1/2 mix spacer blocks and no separate payment will be made for spacer blocks.
- 5.10.34 Where welding is needed, electric arc welding or gas welding conforming to I.S.406 of 1964 can be permitted at the discretion of the Engineer-in-charge and shall be done by the Contractor with no extra cost to department.
- 5.10.35 Concrete for R.C.C. works necessarily be machine mixed and consolidated with mechanical devices such as vibrator etc. unless specifically allowed otherwise by the Engineer-in-charge.
- 5.10.36 No claim for the increase in rates of materials during the currency of contract will be entertained by the Department.
- 5.10.37 The Contractor has to obtain necessary passes for himself, his staff and vehicles (to transport the materials) to enter into the security area, for executing the works.
- 5.10.38 The General Conditions of Contract and the drawing and schedule of quantities are to be read in conjunction with these special conditions and specifications and the matter referred to, shown or described in any of the former are not necessarily repeated in the latter.

All materials and workmanship shall conform to appropriate Indian Standard Specifications published by the Indian Standard Institute where they have been

formulated or to the specifications even the CPWD Specifications and specification attached here to.

- 5.10.39 The rates quoted for all concrete work must also include provision of holes etc. required for being handled by equipments, machineries etc. and for fixing fixtures like bolts etc.
- 5.10.40 For all reinforced concrete works included in the contract detailed drawings, showing the reinforcement and other details will be made available to the Contractor at the time of construction and the work will have to be done according to these drawings.
- 5.10.41 Bolts, nuts, washers and rivets etc, required for complete erection of form work centering etc. will have to be supplied by the Contractor at his own cost unless other wise specified.
- 5.10.42 Great care shall be taken by the Contractor to prevent displacement or bending of the members of the reinforcement adjusted and fixed in position before the commencement of concrete. Contractor should clean the reinforcements by wire broom etc. and remove all the rusts and dirt before tying in position.
- 5.10.43 Cover as specified in the drawing shall be clearly maintained by using cement mortar blocks unless otherwise directed.
- 5.10.44 Concrete shall not be laid unless the steel grills kept in position are approved.
- 5.10.45 The cement supplied by the Contractor shall be stored in a dry place over dunnage and properly covered at his own cost and he will be held entirely responsible for any loss or damage.
- 5.10.46 Only clean, fresh water as approved by the Engineer-in-Charge shall be used in washing metal, mixing and curing concrete. Sufficient storage facilities for the water shall be arranged by the Contractor for the continuous supply of water to the works at his own cost.
- 5.10.47 The coarse aggregate shall be of hard blue granite quality and the fine aggregate shall be of good clean sharp river sand.
- 5.10.48 Sufficient stocks of aggregates shall be kept at the site to ensure continuity of the work. Different types and sizes of aggregate shall be stored separately and in such a way as to eliminate any contamination by dirt or earth or other impurities.
- 5.10.49 Concrete mixes specified in schedule are nominal mixes and the quantity of the cement used in each grade of concrete should not be less than those given below:

<u>No</u>	<u>GRADE OF MIX</u>	<u>QUANTITY OF CEMENT PER CUBIC METRE</u>
1:1 ½: 3	(1cement: 1 ½ sand: 3, 20 mm granite metal	400 kg.
1:3:6	(1cement: 3 sand: 6, 40 mm granite metal)	220 kg.

1:2:4	(1cement: 2 sand: 4, 20 mm granite metal)	320 kg.
1:4:8	(1cement: 4 sand: 8, 40 mm granite metal)	170 kg.
(1:3:6) with 20 mm size graded metal		220 kg.
Mix higher than 1:1 ½:3 if required, proportion shall be designed for the same as per IS 456 & IS 10261		

5.10.50 The concrete shall be mixed in the standard mechanical mixers of sufficient capacity. The mixing, transporting, placing in position and vibrating and curing shall conform to I.S.No.456 of 1964.

5.10.51 Unless otherwise approved to all concrete works must be vibrated with suitable vibrator and only experienced and skilled workmen shall be allowed to handle the vibrating machinery. Care must be taken to avoid segregation by excessive vibration.

5.10.52 No concreting will be allowed during period of rain unless permitted by the Engineer-in-charge.

5.10.53 Construction joints in concrete shall be in position approved by the Engineer-in-charge. At the construction joints, where the first poured concrete has set hard and skin or laitance shall be removed and the surface roughened by hacking with hammer, and through wire brushing. It shall then be thoroughly washed and when the surface is still moist, it will be covered with a layer of 1:1 cement mortar of not less than 3mm thick which must be vigorously stippled into the surface by means of suitable stiff brush, the depositing of fresh concrete following on closely. Care should be taken as not to damage the laid concrete.

5.10.54 Care must be taken not to disturb the concrete by direct or indirect loading, striking of forms or other wise until it has hardened sufficiently. Normally bottom shuttering shall not be stripped earlier than 14 days and the side shuttering not earlier than one day unless other wise approved by the Engineer-in-charge.

5.10.55 The form work shall conform to the shape, line and dimension as shown in the plans and be so constructed as to remain sufficiently tight to prevent loss of liquid from the concrete. All form work and supports shall be designed by the Contractor and must be approved by the Engineer-in-charge. All rubbish particularly chipping shaving saw dust loose metal or concrete shall be removed from the interior of form work before the concrete is placed and the formwork in contact with the concrete shall be cleaned and an approved form oil applied thoroughly. Care should be taken that the form oil is out of contact with the reinforcement. Concreting shall be start only after the formwork is checked and approved.

5.10.56 **CURING**

Unless otherwise specified all concrete and masonry & plastering should be kept wet and properly cured with fresh water for not less than 14 days and 7 days respectively after its construction at the Contractor's cost. If curing is not done properly the Department will be at liberty to engage labour for curing and

the expenditure incurred will be recovered from the Contractor's bills. The decision of the Engineer-in-charge will be final on this.

5.10.57 SURFACE TREATMENT

All concrete surface must be reasonably smooth and true and impressions, fins, etc. that may occur from the formwork shall be removed and treated with cement mortar 1:1 ½ mix. A final cement wash is to be given in the exposed surface without extra payment whenever so ordered to be done by the Engineer-in-charge.

5.11 WORKING TIME

The normal working time of the Port Authority is from 8 a.m. to 4.00 p.m. on all weekdays. If the Contractor wishes to carry out the work beyond normal working hours and or on holidays, he should get specific approval from the Engineer's Nominee for the same. Necessary supervision will be arranged by the department and the expenditure to be incurred in this connection will be borne by the department.

5.12 RATES FOR VARIOUS ITEMS

The rate specified for each item shall be all inclusive value of the finished work, income tax and other taxes but excluding Service Tax.

5.13 ALTERATIONS / ADDITIONS / OMISSIONS

The quantities given in the bill of quantities (Schedule of items) are only approximate and payment will be made as per actual quantity of work done and rate specified.

5.14 MEASUREMENT

The quantities shall, unless otherwise stated, be measured in accordance with I.S.1200.

5.15 For levying compensation as per Clause-49 of General Conditions of Contract (GCC), the Employer is not required to have documentary evidence to quantify or prove the losses suffered by the Employer due to delay in completion of work by the Contractor, as per conditions.

5.16 Clause-25 of GCC- 'Settlement of Disputes and Arbitration' is not applicable in this Contract.

5.17 Clause-26 of GCC- 'Computerised Measurement Book' is modified to the extent as detailed below.

Measurements of Work Done:

Executive Engineer (hereinafter called the Engineer's Nominee) shall, except as otherwise provided, ascertain and determine by measurement the value in accordance with the Contract of work done.

All measurement of all items having financial value shall be entered in Measurement Book and/or level field book so that a complete record is obtained of all works performed under the Contract.

All measurements and levels shall be taken jointly by the Engineer's Nominee or his authorised representative and by the Contractor or his authorised representative from time to time during the progress of the work and such measurements shall be signed and dated by the Engineer's Nominee and the Contractor or their representatives in token of their acceptance. If the

Contractor objects to any of the measurements recorded, a note shall be made to that effect with reason and signed by both the parties.

If for any reason the Contractor or his authorised representative is not available and the work of recording measurements is suspended by the Engineer's Nominee or his representative, the Engineer's Nominee and the Department shall not entertain any claim from Contractor for any loss or damages on this account. If the Contractor or his authorised representative does not remain present at the time of such measurements after the Contractor or his authorised representative has been given a notice in writing three (3) days in advance or fails to countersign or to record objection within a week from the date of the measurement, then such measurements recorded in his absence by the Engineer's Nominee or his representative shall be deemed to be accepted by the Contractor.

The Contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for measurements and recording levels.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications notwithstanding any provision in the relevant Standard Method of measurement or any general or local custom. In the case of items which are not covered by specifications, measurements shall be taken in accordance with the relevant standard method of measurement issued by the Bureau of Indian Standards and if for any item no such standard is available then a mutually agreed method shall be followed.

The Contractor shall give not less than seven days' notice to the Engineer's Nominee or his authorised representative in charge of the work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of the Engineer's Nominee or his authorised representative in charge of the work who shall within the aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of measurements without such notice having been given or the Engineer's Nominee's consent being obtained in writing the same shall be uncovered at the Contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Engineer's Nominee or his authorised representative may cause either themselves or through another officer of the department to check the measurements recorded jointly or otherwise as aforesaid and all provisions stipulated herein above shall be applicable to such checking of measurements or levels.

It is also a term of this Contract that recording of measurements of any item of work in the measurement book and/or its payment in the interim, on account or final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the Contractor from

liabilities from any over measurement or defects noticed till completion of the defects liability period.

5.18 Clause 45 and Clause 80 of GCC shall be modified as below;

Clause 45-Rates for items to be inclusive of Taxes The rate quoted by the Contractor shall be inclusive of the cost of provision of plant and equipment, materials, labour, execution, supervision, maintenance, overheads and profits and every incidental and contingent cost and charges whatsoever excluding Goods and Service Tax (GST). GST as may be applicable from time to time shall be shown separately in the invoice. The Employer will perform such duties in regard to the deduction of such taxes at sources as per applicable law. Any new Taxes, levies, duties imposed after signing the Contract shall be reimbursed by the Employer on production of documentary evidence. The invoice to be submitted by the Contractor should include the GST Registration Number of the Contractor as well as the Employer.

Clause 80-Taxes and Duties Income Tax The Contractor and his staff shall be responsible for payment of all personal income taxes to the concerned authorities as per the law in force from time to time. Deduction of Income Tax shall be made by the Employer from each certificate of payment to the Contractor at the rate of 2% plus surcharge or such other rates as may be specified by the Central Government from time to time, on the gross amount of the Contractor's bill for payment. The Contractor shall comply all the GST Regulations viz. timely uploading of bills, issue of debit/ credit notes etc.

5.19 Sub clause 43.2 under Clause 43:Payments,..... in GCC 2016 stands amended as given below:

43.2 Payment of bills for Civil Works shall be regulated as detailed hereunder:

43.2.1 Any Interim/Final bill which is incomplete in any respect shall be returned to the Contractor within 5 days of date of submission of bill to the Engineer or his Nominee.

43.2.2 Interim bills shall be paid within 21 days of date of submission of bills in full shape, by the Contractor, as detailed below.

43.2.3 Clarifications/corrections if any required on an Interim bill submitted, shall be sought from the Contractor within 4 days of submission of the bill and also, all such clarifications/corrections required shall be sought at one go except in exceptional circumstances. The Contractor shall submit the clarifications including carrying out corrections in the bill, if required, within 4 days thereafter. The clarified / corrected bill shall be verified and forwarded to Finance Department within the next 4 days. Clarifications if any required by the Finance Department shall be sought within 3 days and the Engineer/Nominee shall clear it on top priority within the next 3 days and, finally, the bill shall be paid to the Contractor within 3 days thereafter, i.e., within a total 21 days of date of submission of bills in full shape, as indicated above.

43.2.4 However, on request by the Contractor, 75% of the bill amount shall be paid within 7 days of submission of the bill. Balance amount of the verified bill shall be paid within 21 days of the submission of the bill, on

completion of all contractual requirements as brought out at sub clause 43.2.3. above.

- 43.2.5 Final bill shall be paid within 3 months of issue of Taking Over Certificate by the Engineer / Nominee, as detailed below.
- 43.2.6 The Contractor shall submit the Final bill to the Engineer / Nominee within 20 days of issue of Taking Over Certificate by the Engineer / Nominee. The bill shall be checked and all clarifications/corrections required on the bill submitted, shall be sought from the Contractor within 15 days thereafter. The Contractor shall submit the clarifications including carrying out corrections in the bill, if required, within the next 10 days. The clarified / corrected bill shall be verified and forwarded to Finance Department within the next 15 days. Thereafter, clarifications if any required by the Finance Department shall be sought within 10 days and the Engineer/Nominee shall clear it on top priority within the next 10 days and, finally, the bill shall be paid to the Contractor within 10 days thereafter, i.e., within a total 3 months of issue of Taking Over Certificate by the Engineer / Nominee, as indicated above.
- 43.2.7 However, on request by the Contractor, 50% of the final bill amount shall be paid within 7 days of submission of the bill, which will be adjusted against the final bill payment, on completion of all contractual requirements as brought out at sub clause 43.2.6. above.

SIGNATURE OF TENDERER

6.SPECIFICATIONS FOR MATERIALS TO BE USED ON THE WORKS

6.1 GENERAL

- 6.1.1 Except where otherwise specified or authorised by the Chief Engineer or the Engineer- in- charge materials supplied and works executed by the contractor must conform to the latest edition of the Indian Standard Specification and the code of practice published by the Indian Standard Institution. Samples of the materials to be supplied by the contractor shall be shown to the Chief Engineer or his representative sufficiently in advance for the approval for its quality for use on work.
- 6.1.2 All materials supplied shall be stored appropriately to prevent deteriorations or damage from any cause what so ever and to the entire satisfaction of the Chief Engineer or the Engineer- in- charge.
- 6.1.3 The materials required for the work shall be brought to the site and stacked at the places shown by the Engineer-in-Charge and the same shall be got approved for use in work sufficiently advance so that the progress of the work is not affected by the supply of materials.**
- 6.1.4 Payment for the materials supplied, shall be given only after they are used on the work.**
- 6.1.5 Tolls are payable by the Contractor as per rules for vehicles using the Port's road for supplying the materials.**

6.2 AGGREGATES FOR CONCRETE

- 6.2.1 Aggregates (fine and coarse) for concrete shall comply with the requirements of I.S. 383 – ‘Specifications for coarse and fine aggregate from natural sources for concrete. Aggregate shall be obtained from sources approved by the Engineer-in-Charge. Aggregates, which are not perfectly clean, shall be washed in clean water to the entire satisfaction of the Engineer-in-Charge.
- 6.2.2 The fine aggregate shall be clean, hard, durable, uncoated, dry and free from injurious, soft or flaky pieces and organic or other deleterious substances.
- 6.2.3 Each type of aggregate shall be stored separately for the approval of Engineer-in-Charge. Wet aggregate delivered at the site shall be kept in storage for at least 24 hours to ensure adequate drainage before being used for concreting.
- 6.2.4 Contractor shall maintain at site at all times such quantities of each type of aggregate as are considered by the Engineer-in-Charge to be sufficient to ensure continuity of work.

6.3 CEMENT

- 6.3.1 Quality of cement used for the work shall be 43 grade ordinary Portland cement conforming to IS: 8112 or 53 grade ordinary Portland cement conforming to IS: 12269 or Pozzolona cement conforming to IS: 1489 unless otherwise approved by the Engineer-in-Charge.
- 6.3.2 The cement required for the work will have to be procured by the contractor and shall comply with the relevant IS. As far as possible, cement shall be procured from government agencies. The cement shall, if required by the Chief Engineer / Engineer-in-Charge, be tested and analyzed by an independent

analyst at the Contractor's cost and result produced to the Engineer-in-Charge.

- 6.3.3 Supply of cement shall be taken in 50kg bags bearing manufacture's name and ISI marking. Samples of cement arranged by the contractor shall be taken by the Engineer-in-Charge and got tested in accordance with provisions of relevant B.I.S codes. In case, test results indicate that the cement arranged by the Contractor does not conform to the relevant B.I.S codes, the same shall stand rejected and shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer-in-Charge to do so.
- 6.3.4 A cement godown/store of adequate capacity as directed by the Engineer-in-Charge shall be constructed by the contractors at the site of the work for which no extra payment shall be made. Double lock provision shall be made to the door of the cement godown. The key of one lock shall remain with the Engineer-in-Charge or his authorized representative and the key of the other lock shall remain with the contractor. The contractor shall be responsible for the watch and ward and safety of the cement godown. The contractor shall facilitate the inspection of the cement godown by the Engineer-in-Charge.
- 6.3.5 The cement brought to the site and cement remaining unused after completion of work shall not be removed from the site without written permission from /of the Engineer-in-Charge.
- 6.3.6 The cement shall be stored in a weather proof building with facilities for inspection.
- 6.3.7 The contractor shall maintain a cement register showing dates of receipt and issue, quantities used daily and balance which shall be accessible to the Engineer-in-Charge.

6.4 STEEL REINFORCEMENT

- 6.4.1 The reinforcement steel used for the work shall be HYSD bars conforming to IS: 1786 (Grade Fe 415) and the same will have to be procured by the contractor.
- 6.4.2 As far as possible, the reinforcement steel required for the work shall be procured from Steel Authority of India or Rashtriya Ispat Nigam Ltd. in case steel is not available from the above sources, the contractor shall obtain specific approval from the Engineer-in-Charge well in advance for purchase of steel from other sources.
- 6.4.3 The contractor shall have to obtain and furnish test certificates to the Engineer-in-Charge in respect of all supplies of steel brought by him to the site of work. Samples shall also be taken and got tested by the Engineer-in-Charge as per provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the Contractor does not conform to BIS codes, the same shall stand rejected and shall be removed from the site of work by the Contractor at his cost within a week's time of written orders from the Engineer-in-Charge to do so.
- 6.4.4 The steel reinforcement shall be stored by the contractor at site of work in such a way as to prevent distortion and corrosion and nothing extra shall be paid on

this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.

- 6.4.5 Steel brought to site and steel remaining unused shall not be removed from site without the written permission of the Engineer-in-Charge.

6.5 WATER

- 6.5.1 Clean fresh water free from oils, acids, alkalies, salt, sugar, organic materials or other harmful materials shall be used for washing aggregates, mixing and curing of concrete. The water used shall comply with clause 5.4 of IS: 456-2000. Potable water is generally considered good for mixing concrete.

- 6.5.2 Samples of water arranged by the contractor shall be taken by the Engineer in Charge and got tested in accordance with the provisions of relevant BIS codes. In case test results indicate that the water arranged by the contractor does not conform to the relevant BIS codes, the same shall not be used for any works. The cost of tests shall be borne by the contractor.

6.6 BRICKS

- 6.6.1 Bricks used in the masonry may be Common Burnt Clay Bricks shall conform to IS:1077 and shall be hand moulded or machine moulded. They shall be free from nodules of free lime, visible cracks, flaws warpage and organic matter, have a frog 100 mm in length 40 mm in width and 10 mm to 20 mm deep on one of its flat sides. Bricks made by extrusion process and. Each brick shall be marked (in the frog where provided) with the manufacturer's identification mark or initials.
- 6.6.2 Bricks shall have a minimum compressive strength to 50kg/sq.cm and shall not absorb water more than 20% of its dry weight, when soaked in cold water for 24 hours. The tolerance limit shall be 8 % for absorption.
- 6.6.3 In the case where locally available bricks do not meet standard, contractor shall carryout all the tests specified above on the bricks and submit the test report to the Engineer-in-charge, who will take a final decision on the use of the bricks, which shall be binding.

6.7 GLAZED TILES

- 6.7.1 The tiles shall be of approved make and shall generally conform to IS 15622. They shall be flat, and true to shape and free from blisters crazing, chips, welts, crawling or other imperfections detracting from their appearance. The tiles shall be tested as per IS 13630. Classification and Characteristics of pressed ceramic tiles shall be as per IS 13712. The tiles shall be square or rectangular of nominal size. Table 1,3,5, and 7 of IS 15622 give the modular preferred sizes and table 2,4,6 and 8 give the most common non modular sizes. Thickness shall be specified by the manufacturer. It includes the profiles on the visible face and on the rear side. Manufacturer/ supplier and party shall choose the work size of tiles in order to allow a nominal joint width upto 2mm for unrectified floor tiles and upto 1mm for rectified floor tiles. The joint in case of spacer lug tile shall be as per spacer. The tiles shall conform to table10 of IS 15622 with water absorption 3 to 6% (Group BII). The top surface of the tiles shall be glazed. Glaze shall be either glossy or matt as specified. The underside of the tiles shall

not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be preferably free from glaze. However, any glaze if unavoidable, shall be permissible on only upto 50 per cent of the surface area of the edges.

- 6.7.2 Glazed tiles shall be first quality Johnson make or equal make and shall generally conform to I.S. Specification. They shall be flat, true to shape and free from cracks, crazing spots, clipped edges and corners. The glazing shall be uniform shade. The tiles shall be of size not less than 300mm x 200mm. It shall have thickness not less than 4mm.

6.8 VITRIFIED FLOORING / SKIRTING TILES

- 6.8.1 Tiles shall be of approved premium quality, Johnson or Khajaria or Asian or Somany or Orient Bell make and of approved colour and shade. The tiles shall be generally conforming to IS:13756/ IS:15622 with water absorption less than 0.08% and having modulus of rupture greater than 500kg/sq.cm & modulus hardness 8.0. The tiles shall be flat, true to shape and free from cracks, crazing spots, clipped edged and corners. The tiles shall be of minimum 600mm x 600mm size and shall have minimum thickness of 10mm.
- 6.8.2 The top surface of the tiles shall be glossy/ mat finish / antiskid as specified in the Schedule of quantities and as approved by the Engineer-in-Charge. The underside of the tiles shall be completely free from glazing in order to adhere properly to the base.
- 6.8.3 Manufactures test Certificate for water absorption, breaking strength, abrasion resistance and crazing has to be produced by the contractor.

6.9 WOOD

- 6.9.1 The timber shall be free from decay, fungal growth, boxed heart, pitch pockets or streaks on the exposed edges, splits and cracks. The timber shall be graded as first grade and second grade on the basis of the permissible defects in the timber as given in Appendix 'A' of Chapter 9.0 of CPWD Specification. For both the grades, knots should be avoided over a specified limit.
- 6.9.2 Timber used shall be of good quality well seasoned wood. It shall have uniformly coloured and reasonably straight grains and shall be free from dead knots, cracks and shakes, sapwood and defects of any kind. The species of wood shall be as specified in the schedule of items /drawing.

6.10 ALUMINIUM SECTIONS

- 6.10.1 Aluminium sections used for fixed/openable windows, ventilators, partitions, frame work & doors etc. shall be suitable for use to meet architectural designs to relevant works and shall be subject to approval of the Engineer-in-Charge for technical, structural, functional and visual considerations. The aluminium extruded sections shall conform to IS 733 and IS 1285 for chemical composition and mechanical properties. The stainless steel screws shall be of grade AISI 304. The permissible dimensional tolerances of the extruded sections shall be as per IS 6477 and shall be such as not to impair the proper and smooth functioning/operation and appearance of door and windows. Aluminium glazed doors, windows etc. shall be of sizes, sections and details as shown in the drawings. The details shown in the drawings may be varied

slightly to suit the standards adopted by the manufacturers of the aluminium work, with the approval of Engineer-in-Charge. Before proceeding with any fabrication work, the contractor shall prepare and submit, complete fabrication and installation drawings for each type of glazing doors, windows, ventilators and partition etc. for the approval of the Engineer-in-Charge. If the sections are varied, the contractor shall obtain prior approval of Engineer-in-Charge and nothing extra shall be paid on this account.

6.10.2 Anodising

6.10.2.1 Standard aluminium extrusion sections are manufactured in various sizes and shapes in wide range of solid and hollow profiles with different functional shapes for architectural, structural glazing, curtain walls, doors, window & ventilators and various other purposes. The anodizing of these products is required to be done before the fabrication work by anodizing/electro coating plants which ensures uniform coating in uniform colour and shades. The extrusions are anodized up to 30 micron in different colours. The anodized extrusions are tested regularly under strict quality control adhering to Indian Standard.

6.10.2.2 Aluminum sections used shall be of extruded tube and hollow sections of aluminum alloy of INDAL or approved equivalent. Anodizing shall be of 15 microns.

6.11 PARTICLE BOARD

6.11.1 Pre-laminated Particle Board

A particle board laminated on both surfaces by synthetic resin impregnated base papers under heat and pressure. Pre-laminated particle boards shall conforming to IS 3087 Types-II,

6.11.2 Particle board used shall be 12mm thick melanine faced flat pressed three layers. Stamped IS: 3087 Type II on the edges and surface lamination conforming IS: 12823.

6.12 CERAMIC FLOOR TILES

6.12.1 Ceramic floor tiles of first quality Johnson/ Khajaria/ Nitco make or equivalent and shall be conforming to IS specification. They shall be flat, true to shape, free from cracks, craxing spots, clipped edges and corners. The glazing shall be uniform shade. The tiles shall be of size and thickness as specified.

SIGNATURE OF TENDERER

7. DETAILED SPECIFICATIONS FOR ITEMS OF WORKS

7.1 GENERAL

Except where otherwise specified or authorized by the Engineer-in-Charge, all items of works executed by the contractor shall conform to the latest edition of the Bureau of Indian Standard Specifications and code of practices published by the B.I.S. Where no such specifications or code of practice exists the latest B.S.S. codes of practice or any other equivalent / standard code of practice shall also be considered for adoption. The tenderer while indicating any such specifications shall enclose the full set of the publication so referred and not in extracts. Photostats / Xerox copies in duplicate shall be forwarded which shall not be returned to the contractor. In absence of any specification, the department deserves the right to adopt trade specifications and/or sound engineering practices for the specialized work as may be decided by the Engineer-in-Charge which shall be final, conclusive and binding on the contractor.

7.2 DISMANTLING/ DEMOLISHING WORKS

7.2.1 The tenderer shall inspect the site and carry out the required investigation by himself about the present position and condition of the existing structures and assess the difficulties and the work involved in its dismantling and removal. It will be deemed that the tenderer has satisfied himself the condition of the structure and the nature of the work involved for the dismantling and removal and estimated its cost accordingly and port will be in no way responsible for the lack of such knowledge and also consequences thereof to the tenderer. The dismantling shall be done carefully without causing any damage to the remaining portions / structure.

7.2.2 Cement concrete, existing damaged ceiling, brick masonry work, tile work in floors & roofs etc. are to be dismantled as per the direction of Engineer-in-charge. All the dismantled usable materials shall be stacked at the area pointed out by the Engineer-in-charge and all unusable materials shall be disposed by the contractor.

7.2.3 All the dismantling works shall be done carefully without causing any damage to the adjacent portion/ existing structure. The unserviceable dismantled/ cut materials shall be disposed off within 6kms of the work site and levelled as directed by the Engineer-in-Charge.

7.3 EARTHWORK EXCAVATION

7.3.1 Contractor shall be responsible for the true and proper setting out of the work in relation to original points, lines and levels of reference and for corrections of the level dimension and alignment of all parts of work.

7.3.2 All excavations shall be carried out to give exact length, width and depth as per profiles indicated in the drawings or as directed by the Engineer-in-Charge. The phasing and method of excavation shall be to the approval of Engineer-in-Charge. The contractor shall provide suitable arrangements to prevent water from any source entering into excavated pits at his cost.

7.3.3 Necessary shoring and timbering shall be provided as per IS:3764 for preventing slipping of the soil in trenches and for protecting the safety and

stability of the existing structures. Dewatering, if required shall also be carried out to keep the excavated surface dry for construction. The cost for pumping or bailing out water by using pump set will be paid separately. Excavation taken wider or deeper than required shall be filled back with crusher run screening or selected materials approved by the Engineer-in-Charge, thoroughly compacted in layers of thickness not more than 20 cm or as decided by the Engineer-in-Charge.

7.4 CEMENT CONCRETE

7.4.1 General

The concrete used for all Works, concreting procedure etc. shall be in accordance with IS:456–2000.

7.4.2 Concrete Mix

Mix used for the work shall be of 1:2:4 (1 Cement: 2 Coarse Sand: 4 Graded stone Aggregate) otherwise specified. .

7.4.3 Nominal Mix

For nominal mix concrete, proportion of fine aggregate to coarse aggregate shall be 1:2 by volume. The minimum cement content per cubic metre of nominal mix concrete shall be as given below. Water cement ratio not exceeding 0.50.

<u>No</u>	<u>GRADE OF MIX</u>	<u>QUANTITY OF CEMENT PER CUBIC METRE</u>
1:1 ½: 3	(1cement: 1 ½ sand: 3, 20 mm granite metal)	400 kg.
1:3:6	(1cement: 3 sand: 6, 40 mm granite metal)	220 kg.
1:3:6	(1cement: 3 sand: 6, 20 mm granite metal)	220 kg.
1:2:4	(1cement: 2 sand: 4, 20 mm granite metal)	320 kg.
1:4:8	(1cement: 4 sand: 8, 40 mm granite metal)	170 kg.
Mix higher than 1:1 ½:3 if required, proportion shall be designed for the same as per IS 456 & IS 10261		

7.4.4 Size of Coarse Aggregate

For all concrete, plain or reinforced of M20 and higher grades, 20 mm size graded aggregate conforming to IS:383 shall be used unless otherwise specified. If 20 mm graded aggregates as per IS:383 are not readily available, graded 20 mm aggregate shall be obtained by blending 20 mm and 12.5/ 10 mm aggregates in the proportion arrived based on the combined sieving of aggregates.

7.4.5 Mixing of Concrete

7.4.5.1 Concrete shall be mixed in a drum or pan type batch mixer, the type and capacity of which is to be approved by the Engineer-in-Charge. Time

allowed for mixing, after all ingredients have been placed in the mixers shall not be less than two minutes. If there is segregation after unloading from the mixer, the concrete should be remixed.

- 7.4.5.2 Ready mix concrete from outside source shall be allowed for use on the work subject to the conditions that: (i) written permission shall be obtained from the Engineer-in-Charge, (ii) all quality control measures as stipulated by the Engineer-in-Charge are strictly adhered to by the Contractor at his cost, (iii) all design mix calculations as per Clause 2.3.4 of Tender Document shall be submitted by the contractor for approval of the Engineer-in-Charge & approval obtained; and (iv) all expenses towards conveyance and incidentals of providing departmental supervision at the mixing plant shall be borne by the Contractor.

7.4.6 Form Work

- 7.4.6.1 The steel/ marine plywood formwork shall be used for concrete work. The form work shall be designed and constructed to the shape, lines and dimensions shown in the drawings within the tolerance limit and specified in clause 11.1 of IS:456-2000. Joints of the form works shall be made water tight by providing suitable beadings / gasket as approved by the Engineer-in-Charge. All rubbish, particularly chippings, shall be removed from the interior of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition. Care shall be taken that such approved composition is kept out of contact with the reinforcement.
- 7.4.6.2 Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes that may leak suitably plugged and joints examined and when necessary, repaired and the inside retreated to prevent adhesion, to the satisfaction of Engineer. Warped timber shall be resized. Contractor shall equip himself with enough shuttering material to complete the job in the stipulated time.
- 7.4.6.3 Forms for sloped surfaces shall be built so that the formwork can be placed board -by- board immediately ahead of concrete placement so as to enable ready access for placement, vibration inspection and repair of the concrete. The formwork shall also be built so that the boards can be removed one by one from the bottom up as soon as the concrete has attained sufficient stiffness to prevent sagging. Surfaces of construction joints and finished surfaces with slopes steeper than 4 horizontal: 1 vertical shall be formed as required herein.
- 7.4.6.4 For forms for curved surfaces, the Contractor shall interpolate intermediate sections as necessary and shall construct the forms so that the curvature will be continuous between sections. Where necessary to meet requirements for curvature, the form timber shall be built up of laminated splines cut to make tight, smooth form surfaces. After the forms have been constructed, all surface imperfections shall be corrected and all surface irregularities at matching faces of form material shall be dressed to the specified curvature.
- 7.4.6.5 Care shall be taken to see that the faces of formwork coming in contact

with concrete are perfectly cleaned and two coats of mould oil or any other approved material applied before fixing reinforcement and placing concrete. Such coating shall be insoluble in water, non-staining and not injurious to the concrete. It shall not become flaky or be removed by rain or wash water. Reinforcement and/or other items to be cast in the concrete shall not be placed until coating of the forms is complete; adjoining concrete surface shall also be protected against contamination from the coating material.

7.4.7 Transporting, placing, compacting and curing of concrete

7.4.7.1 Transporting, placing, compacting and curing of concrete shall be as per clause 13 of IS:456-2000.

7.4.7.2 Concrete shall be transported from the mixer to the Worksite as rapidly as possible which will prevent the segregation or loss of any ingredient, and for maintaining the Workability.

7.4.7.3 The concrete shall be placed and compacted before setting commences and should not be subsequently disturbed. Care should be taken to avoid displacement of reinforcement or movement of formwork.

7.4.7.4 All concrete shall be vibrated unless otherwise specified or approved by the Engineer-in-Charge and such vibrating shall be as required by the Engineer-in-Charge. The mechanical vibrators complying with IS:2505, IS:2506 or IS:4656 shall be used for compacting concrete. All vibrations shall be carried out to a plan approved by the Engineer-in-Charge. No Workman shall be allowed to operate the vibrator without having received instructions and training in its use. Care must be taken to avoid segregation and excessive vibration.

7.4.7.5 Concreting shall be carried out continuously upto construction joints, the positions and arrangement of which shall be as directed by the Engineer-in-Charge. When the Work has to be resumed the construction joints shall be prepared in accordance with clause 13.4 of IS:456-2000.

7.4.7.6 Unless otherwise specified, all concrete shall be kept continuously in a damp condition by ponding or by covering with a layer of sacking, canvas, hessian or similar materials with fresh water for not less than 7 days after laying the concrete. If curing is not done properly the department will be at liberty to engage labour for curing and the expenditure incurred will be recovered from the Contractor's bill. The decision of the Engineer-in-Charge will be final on this.

7.4.7.7 Stripping time for the formwork shall be as stipulated in clause 11.3 of IS:456-2000. Any impression, fins etc. that may occur from the formwork shall be removed and treated with cement mortar 1:1.5 (1 cement: 1.5 sand).

7.4.7.8 Contractor shall arrange to fix any fixtures wherever necessary while doing concreting Work without any extra cost. Cost of fixtures will be paid separately, if it is provided by the Contractor.

7.4.8 The unit rate quoted by the tenderer shall be for the finished Work and deemed to include cost of all materials and labour, provision of holes, recess, other

contingent items etc. required for the completion of Work but excluding shuttering as specified in the schedule etc.

7.5 BRICK MASONRY

- 7.5.1 Brick masonry shall conform to IS: 2212. All bricks shall be thoroughly soaked in water for at least 6 hours before use. Brickwork shall not be raised more than 14 courses per day.
- 7.5.2 The grade of mortar shall be as specified in the Schedule of Quantities.
- 7.5.3 Joints shall be restricted to a thickness of 10mm unless otherwise required and shall be squarely raked to a depth of 12mm while the mortar is still wet and brushed.
- 7.5.4 Curing shall be done for 7 days.
- 7.5.5 Payment for brick masonry shall be made on cubic metre basis irrespective of thickness. The rate shall include all labour and materials including scaffolding.

7.6 CEMENT PLASTERING

- 7.6.1 Cement plastering shall be with the grade of mortar and of thickness specified in the schedule. The surface to be plastered shall be thoroughly cleaned and kept wet for 4 hours before plastering.
- 7.6.2 All the corners shall be rounded off to a radius of 25 mm unless otherwise specified.
- 7.6.3 Where smooth finishing is specified in the schedule the plastering shall be floated over with neat cement slurry using 2.2 kg of cement per square metre immediately after the final coat of plastering and rate quoted for plastering shall include cost of this finishing work.
- 7.6.4 The plastered surface on which glazed tiles or other similar type of finishing are to be provided subsequently shall not be finished smooth but shall be scarified for forming a base for providing the final surface finish as required.
- 7.6.5 The surface shall be cured for 7 days.
- 7.6.6 The rate shall include all labour and materials including scaffolding, plastering of jambs, sills, soffits or opening, providing grooves at edge of sunshade, curing etc. required for completion of work. Measurement of the work under this head shall be made on the basis of the area of work done

7.7 WATER THINNABLE PRIMER COAT

- 7.7.1 Primer coat shall be preferably applied by brushing and not by spraying.
- 7.7.2 **Preparation of the Surface**

The surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying Putty made of Plaster of Paris mixed with water, on the entire surface including filling up the undulations and then sand papering the same after it is dry.

7.7.3 Application

The water thinnable primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours, before emulsion Paint is

applied.

7.7.4 Measurements of the work under this head shall be made on the basis of the area work done and the rate quoted shall include the cost of labour, materials scaffoldings etc. required for the completion of the work.

7.8 **REPAIRS TO PLASTER**

7.8.1 The work includes cutting the patch and preparing the wall surface.

7.8.2 **Scaffolding**

Scaffolding as required for the proper execution of the work shall be erected. If work can be done safely with the ladder or jhoola these will be permitted in place of scaffolding.

7.8.3 **Cutting**

The mortar of the patch, where the existing plaster has cracked, crumbled or sounds hollow when gently tapped on the surface, shall be removed. The patch shall be cut out to a square or rectangular shape at position marked on the wall as directed by the Engineer-in-Charge or his authorized representative. The edges shall be slightly under cut to provide a neat joint.

7.8.4 **Preparation of Surface**

The masonry joints which become exposed after removal of old plaster shall be raked out to a minimum depth of 10 mm in the case of brick work and 20 mm in the case of stone work. The raking shall be carried out uniformly with a raking tool and not with a basuli, and loose mortar dusted off. The surface shall then be thoroughly washed with water, and kept wet till plastering is commenced. In case of concrete surfaces, the same shall be thoroughly scrubbed with wire brushes after the plaster had been cut out and pock marked.

7.8.5 **Application of Plaster**

Cement plastering shall be with the grade of mortar and of thickness specified in the schedule. For external work and under coat work, the fine aggregate shall conform to grading IV. For finishing coat work the fine aggregate conforming to grading zone V shall be used.

7.8.6 Ceiling plaster shall be completed before commencement of wall plaster. Plastering shall be started from the top and worked down towards the floor. All putlog holes shall be properly filled in advance of the plastering as the scaffolding is being taken down. To ensure even thickness and a true surface, plaster about 15 × 15 cm shall be first applied, horizontally and vertically, at not more than 2 metres intervals over the entire surface to serve as gauges. The surfaces of these gauged areas shall be truly in the plane of the finished plaster surface. The mortar shall then be laid on the wall, between the gauges with trowel. The mortar shall be applied in a uniform surface slightly more than the specified thickness. This shall be brought to a true surface, by working a wooden straight edge reaching across the gauges, with small upward and side ways movements at a time. Finally the surface shall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive troweling or over working the float shall be avoided. All the corners shall be rounded off to a radius of 25 mm unless otherwise specified.

- 7.8.7 Where smooth finishing is specified in the schedule the plastering shall be floated over with neat cement slurry using 2.2 kg of cement per square metre immediately after the final coat of plastering and rate quoted for plastering shall include cost of this finishing work.
- 7.8.8 When suspending work at the end of the day, the plaster shall be left, cut clean to line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scrapped cleaned and wetted with cement slurry before plaster is applied to the adjacent areas, to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of wall and not nearer than 15 cm to any corners or arrises. It shall not be closed on the body of the features such as plasters, bands and cornices, nor at the corners of arrises. Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakages. The plastering and finishing shall be completed within half an hour of adding water to the dry mortar. No portion of the surface shall be left out initially to be patched up later on. The plastering and finishing shall be completed within half an hour of adding water to the dry mortar.
- 7.8.9 The plastered surface on which glazed tiles or other similar type of finishing are to be provided subsequently shall not be finished smooth but shall be scarified for forming a base for providing the final surface finish as required.
- 7.8.10 The surface shall be finished even and flush and matching with the old surrounding plaster. All roundings necessary at junctions of walls, ceilings etc. shall be carried out in a tidy manner..All dismantled mortar & rubbish etc. shall be disposed off within 24 hours from its dismantling promptly as directed by the Engineer-in-Charge.
- 7.8.11 **Curing**
Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered. The plaster shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages at the contractor's expense by such means as the Engineer-in-Charge may approve. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched.
- 7.8.12 **Finish**
The plaster shall be finished to a true and plumb surface and to the proper degree of smoothness as required. The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds.
- 7.8.13 **Precaution**
Any cracks which appear in the surface and all portions which sound hollow when tapped, or are found to be soft or otherwise defective, shall be cut out in rectangular shape and redone as directed by the Engineer-in-Charge.
(i) When ceiling plaster is done, it shall be finished to chamfered edge at an angle at its junction with a suitable tool when plaster is being done. Similarly when the wall plaster is being done, it shall be kept separate from the ceiling

plaster by a thin straight groove not deeper than 6 mm drawn with any suitable method with the wall while the plaster is green.(ii) To prevent surface cracks appearing between junctions of column/beam and walls, 150 mm wide chicken wire mesh should be fixed with U nails 150 mm centre to centre before plastering the junction. The plastering of walls and beam/column in one vertical plane should be carried out in one go. For providing and fixing chicken wire mesh with U nails payment shall be made separately.

7.8.14 The rate shall include all labour and materials including scaffolding, plastering of jambs, sills, soffits or opening, providing grooves at edge of sunshade, curing etc. complete. required for completion of work including lead as described in the item for disposal of old dismantled plaster /material. Measurement of the work under this head shall be made on the basis of the area of work done.

7.8.15 Protective Measure

Doors, windows, floors, articles of furniture etc. and such other parts of the building shall be protected from being splashed upon. Splashing and droppings, if any, shall be removed by the contractor at his own cost and the surface cleaned. Damages, if any, to furniture or fittings and fixtures shall be recoverable from the contractor.

7.8.16 Measurements

Length and breadth shall be measured correct to a cm. The area shall be calculated in square metre correct to two places of decimal. Patches below 0.05 square metre in area shall not be measured for payment. Pre-measurements of the patches to be plastered shall be recorded after the old plaster has been cut and wall surface prepared.

7.8.17 Rate

The rate shall include the cost of all labour and materials involved in all the operations described above.

7.9 SCRAPPING & CLEANING OLD PAINTED SURFACE

7.9.1 All loose particles and scales shall be scrapped off and holes in plaster as well as patches of less than 50 cm area shall be filled up with mortar of same mix. The surface shall then be cleaned with water jetting if required and allowed to dry for at least 48 hours before painting.

7.9.2 Whenever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed.

7.10 PAINTING-GENERAL

7.10.1 Commencing Work

Painting shall not be started until the Engineer-in-Charge has inspected the items to be used, satisfied himself about their proper quality and given his approval to commence the painting work with the approved materials. Painting of external surface shall not be done in adverse weather condition like hail storm and dust storm. Painting, except the priming coat, shall generally be taken in hand after practically finishing all other building works. The rooms should be thoroughly swept out and the entire building cleaned up, at least one day in advance of the Paint work being started.

7.10.2 Preparation of Surface

The surface shall be thoroughly cleaned and dusted off. All rust, dirt, scales, smoke splashes, mortar droppings and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Engineer-in-Charge after inspection, before painting is commenced.

7.10.3 Application

7.10.3.1 Before pouring into smaller containers for use, the Paint shall be stirred thoroughly in its containers, when applying also, the Paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform.

7.10.3.2 The painting shall be laid on evenly and smoothly by means of crossing and laying off, the latter in the direction of the grains of wood. The crossing and laying off consists of covering the area over with Paint, brushing the surface hard for the first time over and then brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat.

7.10.3.3 No left over Paint shall be put back into the stock tins. When not in use, the containers shall be kept properly closed.

7.10.3.4 No hair marks from the brush or clogging of Paint puddles in the corners of panels, angles of mouldings etc. shall be left on the work.

7.10.3.5 In painting doors and windows, the putty round the glass panes must also be painted but care must be taken to see that no Paint stains etc. are left on the glass. Tops of shutters and surfaces in similar hidden locations shall not be left out in painting. However, bottom edge of the shutters where the painting is not practically possible, need not be done nor any deduction on this account will be done but two coats of primer of approved make shall be done on the bottom edge before fixing the shutters.

7.10.3.6 On painting steel work, special care shall be taken while painting over bolts, nuts, rivets overlaps etc.

7.10.3.7 The additional specifications for primer and other coats of Paints shall be as according to the detailed specifications under the respective headings.

7.10.3.8 Brushes and Containers

After work, the brushes shall be completely cleaned of Paint and linseed oil by rinsing with turpentine. A brush in which Paint has dried up is ruined and shall on no account be used for painting work. The containers when not in use, shall be kept closed and free from air so that Paint does not thicken and also shall be kept safe from dust. When the Paint has been used, the containers shall be washed with turpentine and wiped dry with soft clean cloth, so that they are clean, and can be used again.

7.11 CEMENT PRIMER COAT

7.11.1 Cement primer coat is used as a base coat on wall finish of cement plaster before Paints are applied on them. The cement primer is composed of a

medium and pigment which are resistant to the alkalis present in the cement in wall finish and provides a barrier for the protection of subsequent coats of Paints.

7.11.2 Primer coat shall be preferably applied by brushing and not by spraying. Hurried priming shall be avoided particularly on absorbent surfaces. New plaster patches in old work should also be treated with cement primer before applying Paints etc.

7.11.3 Preparation of the Surface

The surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

7.11.4 Application

The cement primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours, before oil emulsion Paint is applied.

7.12 EXTERIOR PAINTING ON WALL

7.12.1 This paint shall be brought to the site of work by the Contractor in its original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the Contractor and the Engineer-in-Charge. The empty containers shall not be removed from the site of work till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge.

7.12.2 Preparation of Surface

For new work, the surface shall be thoroughly cleaned off all mortar dropping, dirt dust, algae, fungus or moth, grease and other foreign matter of brushing and washing, pitting in plaster shall make good, surface imperfections such as cracks, holes etc. should be repaired using white cement. The prepared surface shall have received the approval of the Engineer-in-Charge after inspection before painting is commenced.

7.12.3 Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its container, when applying also the paint shall be continuously stirred in smaller containers so that its consistency is kept uniform. Dilution ratio of paint with potable water can be altered taking into consideration the nature of surface climate and as per the recommended dilution given by manufacturer. In all cases, the manufacturer's instructions & directions of the Engineer-in-Charge shall be followed meticulously. The lids of paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere, the paint may thicken and also dust may accumulate.

7.12.4 Paint shall be applied with a brush on the cleaned and smooth surface. Horizontal strokes shall be given, First and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks.

7.12.5 The specifications in respect of scaffolding, protective measures, measurements and rate shall be as described under 2.4 above.

7.13 WALL PAINTING WITH PREMIUM ACRYLIC INTERIOR EMULSION PAINT

7.13.1 The wall surface shall be prepared as specified in Clause 15.5.2 above.

7.13.2 Application: The number of coats shall be as stipulated in the item. The Paint will be applied in the usual manner with brush, spray or roller. The Paint dries by evaporation of the water content and as soon as the water has evaporated the film gets hard and the next coat can be applied. The time of drying varies from one hour on absorbent surfaces to 2 to 3 hours on non-absorbent surfaces. The thinning of emulsion is to be done with water and not with turpentine. Thinning with water will be particularly required for the under coat which is applied on the absorbent surface. The quantity of water to be added shall be as per manufacturer's instructions. The surface on finishing shall present a flat velvety smooth finish. If necessary more coats will be applied till the surface presents a uniform appearance.

7.13.3 Precautions

(a) Old brushes if they are to be used with emulsion Paints, should be completely dried of turpentine or oil Paints by washing in warm soap water. Brushes should be quickly washed in water immediately after use and kept immersed in water during break periods to prevent the Paint from hardening on the brush. (b) In the preparation of wall for plastic emulsion painting, no oil base putties shall be used in filling cracks, holes etc. (c) Splashes on floors etc. shall be cleaned out without delay as they will be difficult to remove after hardening. (d) Washing of surfaces treated with emulsion Paints shall not be done within 3 to 4 weeks of application.

7.13.4 Measurements

The length and breadth shall be measured correct to a cm. Measurements of the work under this head shall be made on the basis of the area of work done and the rate quoted shall include the cost of labour, materials scaffoldings etc. required for the completion of the work.

7.14 APPLYING SYNTHETIC ENAMEL PAINT

7.14.1 The surface shall be thoroughly cleaned off all dirt, rust, dust, grease etc. with wire brush, sand paper etc., and be made perfectly clean and dry while painting.

7.14.2 The number of coats shall be as per schedule. Successive coats shall be applied only on the next day after rubbing with the finest grade of wet abrasive paper and dusting of the loose particles. The primers and paints used shall be of approved quality.

7.14.3 Measurements of the work under this head shall be made on the basis of the area of work done and rate quoted shall include the cost of surface preparation,

materials, labour, scaffolding etc. required for the completion of works as detailed above.

7.15 PROVIDING AND LAYING OF PIPES FOR SEWAGE LINE

7.15.1 Transporting laying and joining of pipes

Transporting, laying and joining of PVC pipes shall be done in accordance with IS.7634. Pipes fittings shall be transported from the stacking place to the work site with sufficient care to avoid damage to them.

7.15.2 Other materials to be made available by the Contractor.

All materials required for joining and laying pipes including lead spun yarn, solvent cement etc shall be brought by the Contractor at his own cost.

7.15.3 Joining of PVC pipes

Joining of PVC pipes shall be done in accordance with IS:7634. Solvent welded joint shall be used for joining of PVC pipes .Solvent welded joint shall be achieved by Non-heat application method .Solvent cement used for the joint shall conform to the details given under Para2.2.3 of IS.7635.

7.15.4 Payment

Payment shall be made on running meters basis measured center line length including all the fittings, valves bolts nuts etc. No separate payment shall be made for fixing fittings, valves etc for completing the works to the full satisfaction .The rate quoted shall include the cost of materials like lead spun yarn, solvent cement/ bolts/ nuts etc to be made available by the Contractor for joining pipes, providing suitable connections to the existing delivery line and providing the line as aforesaid.

7.16 PROVIDING AND LAYING WATER SUPPLY LINES FOR EXTERNAL WORKS

7.16.1 General

All the pipes of different diameters shall be conforming to BIS specifications. The rate quoted shall include cost of all specials like bends, tees, reducers etc., cost of burying or fixing on walls using all fittings as the case may be etc. complete, but excluding cost of taps, valves etc.

7.16.2 Trenching for laying pipe lines

Forming trenches for laying pipes shall be in accordance with IS:3114. Trenching for laying to depth of 500 to 900mm and width as required at site including removal of all obstructions met while excavating, shoring and bailing out of water, if necessary. The width of the trench shall be as small as possible but shall provide sufficient space for jointing the pipes and for providing concrete encasement wherever required.

7.16.3 Transporting, laying, jointing and testing of pipes

Transporting, laying, jointing and testing of PVC pipes shall be done in accordance with IS:7634 (Part-III)

7.16.4 Transporting

Pipes, fittings and valves etc. shall be transported from the stacking place to the worksite with sufficient care to avoid damage to them.

7.16.5 Other materials to be made available by the contractor

All other materials except those supplied under specific items in the schedule, required for jointing and laying pipes and fixing valves, including rubber

gasket, lead, spun yarn, solvent cement etc. shall be brought by the contractor at his own cost.

7.16.6 **Jointing of PVC pipes**

Jointing of PVC pipes shall be done in accordance with IS:7634 (Part III), solvent welded joint shall be used for jointing of PVC pipes. Solvent welded joint shall be achieved by non-heat application method. Solvent cement used for the joint shall conform to the details given under Para 2.2.3 of IS:7634 (Part III).

7.16.7 **Testing of pipelines for leakage test**

The leakage test shall be conducted at a test pressure of 10 kg./cm². No pipe installation shall be accepted until the leakage per hour in cubic centimeter is less than the quantity (Q) determined by the formula

$$Q = \frac{N \times D \times \sqrt{P}}{3.3}$$

Where Q = Allowable leakage in cm³ / hour,

N = No. of joints in the length of the pipeline tested,

D = Diameter of pipe in mm, and

P = Test pressure during the leakage test in kg/cm².

7.16.8 **Fixing of valves and fittings**

Fixing of valves and fittings shall form part of laying the pipeline as directed by the Engineer-in-Charge.

7.16.9 **Payment**

Payment shall be done on running meter basis measured center line length including all the fittings, valves, bolts, nuts etc. No separate payment shall be made for fixing fittings, valves etc. for completing the work to the full satisfaction. The rate quoted shall include the cost of all specials like bends, 'tee's, reducers etc. and materials like rubber gasket, lead, spun yarn, solvent cement, bolts, nuts etc. to be made available by the contractor for jointing pipes, providing suitable connections to the existing delivery line and testing the line as aforesaid.

7.16.10 **Back filling**

The soil under the pipe shall be solidly tampered to provide a firm and continuous support for the pipelines. If it is desired to observe the joints or couplings during testing they shall be kept exposed as directed by the Engineer-in-Charge, and the exposed parts shall be backfilled after the test to the satisfaction of the Engineer-in-Charge. This shall be continued till the ground surface in the general area.

Surplus excavated material shall be cleared from the site and disposed off within a lead of 100m as directed by the Engineer-in-Charge.

7.17 **PROVIDING AND WATER SUPPLY LINES FOR INTERNAL WORKS**

7.17.1 The pipes shall be laid and properly clamped to wooden plugs embedded on the wall. Alternatively, plastic or aluminum clamps of suitable design with steel screws shall be used. Horizontal pipes shall be supported with clamps at spacing not more than 1m center to center. For vertical pipes spacing may be

increased by 50%. The pipes shall be aligned properly before fixing them on wooden plugs with clamps. Even if the wooden plugs are fixed using a plump line the pipe shall also be checked for alignment before clamping.

7.17.2 Connection to bib tap/stop valve shall be done by means of G.I adapter of approved quality and make.

7.17.3 Payment

Payment shall be done on running meter basis measured centerline length including all the fittings, valves, bolts, nuts, etc. No separate payment shall be made for fixing fittings valves etc. for completing the work to the full satisfaction. The rate quoted shall include the cost of fittings like tees, bends reducer etc. and materials like solvent cement / bolts/nuts/rubble gasket etc, to be made available by the Contractor for jointing pipes etc. and cost incurred for cutting the existing walls slabs, sunshade etc, and making good the same using concrete, mortar paint etc, as per the direction of Engineer-in-charge.

7.18 SUPPLYING AND FIXING ROLLING SHUTTERS

7.18.1 Rolling shutters shall conform to IS 6248. These shall include necessary locking arrangement and handles etc. These shall be suitable for fixing in the position as specified i.e. outside or inside on or below lintel or between jambs of the opening. The door shall be either push and pull type or operated with mechanical device supplied by the firm. Shutters upto 10 sq. metre shall be of push and pull type and shutters with an area of over 10 sq. metre shall generally be provided with reduction gear operated by mechanical device with chain or handle, if bearings are specified for each of operation, these shall be paid for separately.

7.18.2 Shutter : The shutter be built up of inter locking lath section formed from cold rolled steel strips. The thickness of the sheets from which the lath sections have been rolled shall be not less than 1.25 mm. The lath section shall be rolled so as to have interlocking curls at both edges and a deep corrugation at the centre with a bridge depth of not less than 12 mm to provide sufficient curtain of stiffness for resisting manual pressures and normal wind pressure. Each lath section shall be continuous single piece without any welded joint. When interlocked, the lath sections shall have a distance of 75 mm rolling centers. Each alternate lath section shall be fitted with malleable cast iron or mild steel clips securely riveted at either ends, thus locking in the lath section at both ends preventing lateral movement of the individual lath sections. The clips shall be so designed as to fit the contour of the lath sections.

7.18.3 Spring : The spring shall be of coiled type. The spring shall be manufactured from high tensile spring steel wire or strips of adequate strength conforming to IS 4454- Part I.

7.18.4 Roller and Brackets : The suspension shaft of the roller shall be made of steel pipe conforming to heavy duty as per IS 1161. The suspension shaft clamped to the brackets shall be fitted with rotatable cast iron pulleys to which the shutter is attached. The pulleys and pipe shaft shall connected by means of pretensioned helical springs to counter balance the weight of the shutter and to keep the shutter in equilibrium in any partly open position.

7.18.5 When the width of the opening is greater than 3.5 mtr. The cast iron pulleys shall be interconnected with a cage formed out of mild steel flats of at least 32 x 6 mm and mild steel dummy rings made of similar flats to distribute the torque uniformly. Self aligning two row ball bearing with special cast iron casings shall be provided at the extreme pulley and caging rings shall have a minimum spacing of 15mm and at least 4 number flats running throughout length of roller shall be provided.

7.18.6 Guide Channel : The width of guide channel shall be 25 mm the minimum depth of guide channels shall be as follows:

Clear width of shutters	Depth of guide channel
Upto 3.5 m	1 65 mm
3.5 m upto 8 m	75 mm
8 m and above	100 mm

7.18.7 The gap between the two legs of the guide channels shall be sufficient to allow the free movement of the shutter and at the same time close enough to prevent rattling of the shutter due to wind.

7.18.8 Each guide channel shall be provided with a minimum of three fixing cleats or supports for attachment to the wall or column by means of bolts or screws. The spacing of cleats shall not exceed 0.75 m. Alternatively, the guide channels may also be provided with suitable dowels, hooks or pins for embedding in the walls.

7.18.9 The guide channels shall be attached to the jambs, plumb and true either in the overlapping fashion or embedded in grooves, depending on the method of fixing.

7.18.10 **Cover** : Top cover shall be of mild steel sheets not less than 1.25 mm thick and stiffened with angle or flat stiffeners at top and bottom edges to retain shape.

7.18.11 Lock plates with sliding bolts, handles and anchoring rods shall be as per IS 6248.

7.18.12 **Fixing**

7.18.12.1 The arrangement for fixing in different situations in the opening shall be as per IS 6248.

7.18.12.2 Brackets shall be fixed on the lintel or under the lintel as specified with rawl. Plugs and screws bolts etc. The shaft along with the spring shall then be fixed on the brackets.

7.18.12.3 The lath portion (shutter) shall be laid on ground and the side guide channels shall be bound with ropes etc. The shutter shall then be placed in position and top fixed with pipe shaft with bolts and nuts. The side guide channels and cover frames shall then be fixed to the walls through the plate welded to the guides. These plates and bracket shall be fixed by means of steel screws bolts, and rawl plugs concealed in plaster to make their location invisible. Fixing shall be done accurately in a workmen like manner that the operation of the shutter is easy and smooth.

7.18.13 **Measurements**

7.18.13.1 Clear width and clear height of the opening for rolling shutter shall be measured correct to a mm. The clear distance between the two jambs of

the opening shall be clear width and the clear distance between the sill and the soffit (bottom of lintel) of the opening shall be the clear height. The area shall be calculated in square metres correct to two places of decimal.

7.18.14 **Rate**

7.18.14.1 The rate shall include the cost of materials and labour involved in all the operations described above including cost of top cover and spring except ball bearing and mechanical device of chain and crank operation, which shall be paid for separately.

7.19 **STEEL FABRICATION WORK**

7.19.1 The steel sections as specified shall be cut square accurately to correct lengths. The cut edges should be dressed to a neat and workmanship finish and be free from distortion where parts are to be in contact metal to metal. All materials shall be straight and if necessary, before being worked shall be straightened and/ or flattened and shall be free from twists.

7.19.2 The component parts shall be assembled and aligned in such a manner that they are neither twisted nor otherwise damaged and shall be so prepared that the specified camber, if any, is provided. Proper clamps, clips, jigs and other fasteners (bolts & welds) shall be placed in a balance pattern to avoid any distortion in the members and to ensure their correct positioning.

7.19.3 Welded connections shall be provided for joints except for the joints specially provided for erection purposes. For joints provided for erection purposes bolted connections shall be used.

7.19.4 All bolts shall be provided with washers of sufficient thickness. The threaded portion of each bolt shall project through the nuts at least one thread.

7.19.5 Welding shall be done in accordance with the specifications laid down in IS 816 and as per detailed working drawing or as directed by the Engineer in charge. Welding edges and the adjacent areas of the members (extending up to 20mm) shall be thoroughly cleaned of all oil, grease, scale and rust and made completely dry. Gaps between the members to be welded shall be kept free from all foreign matters. The welding procedure adopted and consumables used shall be got specifically approved by the Engineer-in-charge. Excessive convexity, shrinkage, cracks, under cutting, improperly fitted / misaligned parts, members distorted by the heat of welding etc. due to faulty welds shall be corrected- whole or portion- as directed by the Engineer-in-charge.

7.19.6 The steel sections as specified shall be straightened and cut square to correct lengths. The steel work shall be hoisted and placed in position carefully without any damage to itself and other structures and injury to workmen.

7.19.7 The suitability and capacity of all plants and equipments used for the work shall be to the complete satisfaction of the Engineer-in-charge.

7.19.8 Proper safety arrangements shall be provided for working and inspection at no extra cost wherever required.

7.19.9 If the fabrication is done outside the worksite premises the structural and fabrication should be subject to the inspection by the departmental officials. Suitable transport facilities shall be provided for the inspection staff.

- 7.19.10 The electrodes required for the welding work shall be got approved before use. The electrodes should be stored properly without exposing them to atmospheric action. Proper protection should be given for site fabrication. The welding must be carried out under a covered roof.
- 7.19.11 The contractor should possess plant and equipments, derricks. Lifting tackles, wire ropes, chain pulleys, jacks, welding sets etc. that may be required for fabrication and erection. The equipment being used shall be kept in good condition throughout.
- 7.19.12 Fabrication and erection of steel work shall be in accordance with the provision of IS 800.
- 7.19.13 All damages to steel works caused during the transit or otherwise at the time of fabrication or erection and after erection shall be made good at no extra cost.
- 7.19.14 All steel work shall be provided with one coat of iron primer Red Oxide/ Zinc Chromate paint. Before applying primer, all rust & scale shall be removed by scrapping or brushing with steel wire brushes. All dust & dirt shall be thoroughly wiped away from the surface. If the surface is wet, it shall be dried before priming coat is applied.
- 7.19.15 After completion of the required fabrication of members, the surface shall be well cleaned with wire brush and sandpapering as directed by the Engineer-in-charge and one coat of Zinc Chromate primer shall be applied. Before application of the primer coat all the welded joints shall be got inspected and approved by the Engineer in charge. All painting work shall be done after the erection of steel members in position. Any damage to the painted surface during the course of erection shall be rectified as directed by the Engineer In charge after fixing the members in position. The fasteners like bolts, nuts etc. used during erection shall also be painted with a coat of primer and two coats of bituminastic paint
- 7.19.16 Sequence of erection of grillage/ angle members shall be so arranged that the structural stability is fully ensured.
- 7.19.17 Prior to the positioning of the members all laitance and loose materials shall be removed by wire brushing and chipping and bearing surfaces cleaned as directed by the Engineer in charge.
- 7.19.18 The rates given shall be for the finished items of work including fabricating, erecting and alignment with appropriate materials, all connections, welding, rectification wherever necessary, transporting and handling charges, all accessories, equipments, scaffolding, all lifts etc. including cost of all labour, and materials.
- 7.19.19 The finished work including erection shall be measured in Kilogram inclusive of the weight of posts, members, M.S plate stiffeners, M.S base plates, bolts, nuts, washers but no allowance shall be made for the welded material. The measurement for plates used on the work shall be made for the actual quantity used in work. The rate quoted per Kilogram shall be inclusive of cost of all materials & labour applying iron primer, erection in position, scaffolding, all transportation, lifts etc.

7.20 **WOOD WORK**

- 7.20.1 Workmanship for the woodwork shall be good and conforming to the satisfaction of the Engineer-in-Charge.
- 7.20.2 Scantlings shall be accurately planed smooth to the full dimensions and rebates, roundings, mouldings etc. as per drawings. Patching or plugging is not allowed.
- 7.20.3 Joints shall be simple, neat, and strong without wedging / filling and pinned with teak/bamboo pins.
- 7.20.4 All wood works shall be brought to the site and approved by the Engineer-in-Charge before it is painted or oiled. The wood works brought to the site after applying painting, but without obtaining prior approval from the Engineer-in-charge shall be rejected. All concealed timber surfaces and portions of timber butting against wall and lintel shall receive one coat of primer and 2 coats of coal tar or bituminous paint.
- 7.20.5 Frame shall be fixed to walls using M.S clamps as per schedule of fittings. The M.S clamps shall receive two coats of coal tar or bituminous paint before its embedment in concrete. In case of door frames without sills, vertical members shall be buried in the floor at least 40 mm deep.
- 7.20.6 Door frames wherever M.S clamps could not be provided, have to be fixed by using M.S corkscrew of 12mm x 100mm by drilling, plugging etc. No extra payment shall be made for this work.
- 7.20.7 Glazing shall be with good quality glass of thickness specified in the drawing. The glass panes shall be fixed by teak wood beading. A thin layer of approved quality readymade putty shall be applied between glass panes and sash bar / frames and glass panes and beading.
- 7.20.8 Fittings specified in the schedule shall be of approved quality / type. All fixtures / fittings shall be got approved by the Engineer-in-Charge before its use on work.

7.21 **COLLAPSIBLE STEEL SHUTTERS**

- 7.21.1 These shall be of approved manufacture and shall be fabricated from the mild steel sections.
- 7.21.2 The gates shall consist of double or single collapsible gate depending on the size of the opening. These shall consist of vertical double channels each 20 x 10 x 2 mm. at 10 cm. centre to centre braced with flat iron diagonals 20 x 5 mm and top and bottom rails of T- iron 40 x 40 x 6 mm @ 3.5 kg/m with 40 mm dia. ball bearings in every fourth double channel, unless otherwise specified. Wherever collapsible gate is not provided within the opening and fixed along the outer wall surface, T- iron at the top may be replaced by flat iron 40 x 10 mm. The collapsible gate shall be provided with necessary bolts and nuts, locking arrangement, stoppers and handles. Any special fittings like spring, catches and locks, shall be so specified in the description of item where so required. The gate shall open and close smoothly and easily.
- 7.21.3 **Fixing**
T- iron rails shall be fixed to the floor and to the Lintel at top by means of anchor bolts embedded in cement concrete of floor and lintel. The anchor bolts shall be placed approximately at 45 cm centres alternatively in the two flanges of the T- iron. The bottom runner (T- iron) shall be embedded in the floor and proper groove shall be formed along the runner for the purpose. The collapsible

shutter shall be fixed at sides by fixing the end double channel with T-iron rails and also by hold- fasts bolted to the end double channel and fixed in masonry of the side walls on the other side. In case the collapsible shutter is not required to reach the lintel, beam or slab level, a Tee-section suitably designed may be fixed at the top, embedded in masonry and provided with necessary clamps and roller arrangement at the top. All the adjoining work damaged in fixing of gate shall be made good to match the existing work, without any extra cost.

7.21.4 Painting

All the members of the collapsible gate including T-iron shall be thoroughly cleaned off rust, scales, dust etc. and given a priming coat of approved steel primer conforming to IS 2074 before fixing them in position.

7.21.5 Measurements

The height and breadth shall be measured correct to a cm. The height of the gate shall be measured as the length of the double channels and breadth from outside to outside of the end fixed double channels in open position, of the gate. The area shall be calculated in square metres, correct to two places of decimal.

7.21.6 Rate

The rate shall include the cost of materials and labour involved in all the operations described above.

7.22 FIBRE GLASS REINFORCED PLASTIC (FRP) DOOR FRAMES

7.22.1 Door Frames shall be three legged of cross section 90 mm x 45 mm having single rebate of size 32 mm x 15 mm to receive shutter of 30 mm thickness. The frame shall be made of laminate of thickness of 2 mm and shall be filled with wooden blocks of exterior grade MDF or seasoned and treated hard wood inside the laminate in all the three legs of the frame. The frame to be moulded by either hand lay up or resin transfer moulding process. The process shall consist of laying gelcoat at 1000 gms./m² and laid over with layer of FRP Mat (CSM mat) gelcoat and FRP (CSM Mat) are defined in IS 14856. The CSM mat shall be bonded with Isophatholic resin in the ratio not less than 1:2 (One part of Mat to two parts of Isopathlic resin and fillers & additives) by weight. The edge shall be sealed with gelcoat and FRP mat to obtain smooth finish. Sufficient roving shall be laid in the corner to have smooth curve while laying the CSM mat.

7.22.2 FRP door shall be manufactured as per specifications laid down in IS 14856, nomenclature of items & direction of Engineer-in-Charge.

7.22.3 Tolerance

Tolerance of size of frame to be + 2 mm and on size of rebate to be + 1 mm.

7.22.4 Finish

The surface of the moulded frame shall be free from any visible defects such as small pores, crazing, blistering, wrinkling, impurities, defective impregnation, colour blots and aggregate defects, as mentioned in IS 14856. Scattered pin holes duly repaired and finished by applying resin and not noticeable shall be acceptable. Frame laminate shall be flat and shall have smooth and level surface. Laminate shall be finished in colour & shade as approved by Engineer-in-Charge.

7.22.5 **Fixing of Frame**

The frames are to be fixed in prepared openings in the walls. All civil work and tiling should be completed before the fixing of the frames. The frames are to be fixed directly on the plastered wall. In case tiling is to be done in the place the frames are to be fitted, a 50 mm strip should be left untiled at the location where the frames are to be fitted. The frames are erected in the prepared opening such that the vertical members of the door frame are embedded 50 mm in the floor. The frame shall be fitted truly in plumb. A minimum of three anchor bolts or screws of size 65/100 shall be used to fix each vertical member. One bolt shall be fixed at 200 mm from the top member and one bolt shall be fixed at 200 mm from the floor. The third anchor bolt shall be fixed in the center. The top horizontal member shall be fixed using two 65/100 size anchor bolts or screws at a distance of 200 mm from both the corners.

7.22.6 **Measurements**

The outer length of the vertical and horizontal members of door frame shall be measured in running metres including embedded length in floor corrected upto a cm.

7.22.7 **Rate**

The rate includes the cost of the materials and labour involved in all the operations described above. The cost of anchor bolts or screws for joining the frame is included in the rate. Any other hardware, which may be required, shall be paid for separately

7.23 **FIBRE GLASS REINFORCED PLASTIC (F.R.P.) SHUTTERS**

7.23.1 F.R.P. Shutters shall be manufactured conforming to the specifications as per IS 14856 and nomenclature of item & direction of Engineer-in-Charge.

7.23.2 Blocks of any seasoned hardwood of bulk density not less than 450 kg./m³ at 12 per cent moisture content or any other material of sufficient thickness and length shall be provided inside the shutter at suitable place to hold fittings and fixtures such as aldrops, tower bolt, handle, sliding door bolt, mortice lock etc. Blocks for hinges shall be provided at three locations, unless otherwise specified by the purchaser. One at the centre and other two at 200 mm from the top and the bottom of the shutter. Blocks shall be provided at predetermined places in the shutter so as to fix hinges mortice locks, tower bolts, aldrops, door closures, etc. The finished surface shall be buffed and polished with wax.

7.23.3 **Location of Fittings and Accessories**

The lock rail of door shutters shall be so placed that its centre line is at a height 850 + 5 mm from the bottom of the shutter. Door shutter shall be fixed to the frame with three hinges, unless otherwise specified by the purchaser, of the type specified. These locations shall be, one at centre and other two at 200 mm from the top and the bottom of the shutter, where blocks have already been provided and suitable indication by depressing the profile has been made. Screws for fixing the hinges shall be screwed in with screwdrivers & not hammered. The length of screw should be 8/30 mm. The hinges used shall be stainless steel or aluminum.

7.23.4 **Finish**

The surface of the moulded frame shall be free from any visible defects such as small pores, crazing, blistering, wrinkling, impurities, defective impregnation, colour blots and aggregate defects, as mentioned in IS 14856. Scattered pin holes duly repaired and finished by applying resin and not noticeable shall be acceptable. Frame laminate shall be flat and shall have smooth and level surface. Laminate shall be finished in colour & shade as approved by Engineer-in-Charge.

7.23.5 **Fixing of Shutters**

Door shutter shall be side hung on three bolt hinges of size 100 mm, one at the centre and the other two at 200 mm from the top and bottom of the shutter. The flat of the hinges shall be neatly counter sunk in to the recesses cut out to the exact dimensions of the hinge flap. The door shall be drilled on the thickness to fit hinges. Screws for fixing the hinges shall be screwed in with screwdrivers and not hammered. The length of the screws should be 8 mm/30 mm. The hinges used should be of stainless steel.

7.23.6 **Tolerance**

The tolerance on the width and the height of the door shall be + 5 mm and the tolerance on the nominal thickness of the door shall be + 2 mm.

7.23.7 **Fittings**

Fittings shall be provided as per schedule of fittings decided by Engineer-in-Charge. In moisture prone areas M.S. fittings and screws should not be used. Hardware such as handles, tower bolt, stopper, buffer etc. should be directly screwed (not pre-drilled) and fitted on the door.

7.23.8 **Measurements**

Length and width of the shutters shall be measured to the nearest cm in closed position covering the rebates of the frames but excluding the gap between the shutter and the frame. Area is calculated to the nearest 0.01 sqm.

7.23.9 **Rate**

The specified rate include the cost of the door shutter and labour involved in fixing of the shutter including fittings & fixtures on the door shutter, hinges & screws as provided

7.24 **PROVIDING AND FIXING WASH HAND BASIN**

7.24.1 Washbasin shall be fixed over on galvanized iron rag bolt, embedded in M-15 grade cement concrete in wall. Each basin shall be provided with 32mm dia chromium plated (CP) waste coupling and a 32mm dia PVC waste pipe and one number **approved** quality CP pillar tap. The cast iron brackets shall be painted with one coat of primer and two coats of synthetic enamel paint. The work shall be carried out as per the directions of the Engineer-in-charge. Water connections shall be done under separate item.

7.24.2 Measurement of the work under this head shall be made on the basis of the area of work done and rate shown in the schedule shall include the cost of all labour, materials, etc. including mortar bed, required for completion of work.

7.25 **PROVIDING AND FIXING STEEL KITCHEN SINK**

7.25.1 Steel kitchen sink shall made of approved good quality & guage mat finished Stainless Steel.

- 7.25.2 Sink shall have single/ double washing chamber as directed by the Engineer-in-charge and as per the site requirement with good approved quality double taps.
- 7.25.3 Size of steel kitchen sinks shall be not less than 114cm x 50cm. Depth of sink shall be not less than 25cm.
- 7.25.4 Steel Kitchen sink shall have vegetable washing stand, waste bowl with cap, knife holder and other required accessories connected with kitchen sink etc.

7.26 PROVIDING FLOORING WITH CERAMIC TILES

- 7.26.1 The tiles shall be set in cement mortar 1:4 (1 cement : 4 sand) of average 20mm thick laid to required level/ slope. Before laying cement mortar, the concrete surface shall be scrubbed with wire brush, all loose particles, foreign matters etc. shall be removed and the surface shall be made clean. Any undulations in the concrete shall be chipped off or made good with additional concrete of the same grade used for the under layer. If the surface where flooring is to be laid is an existing old one, the surface shall be chipped well before laying the cement mortar. The surface thus prepared shall be wetted and smeared with a coat of cement slurry using cement at the rate of 2.2 kg/m² of area just before the application of the mortar, so as to get good bond between base course concrete and plastering. For fixing tiles to mortar, neat cement slurry of honey like consistency using cement at the rate of 3.3 kg./m² shall be smeared on top of mortar bed. The joints between the tiles shall be uniform and of minimum thickness.
- 7.26.2 For fixing tiles to the cement mortar, neat cement slurry of honey like consistency using cement at the rate of 3.30 kg/m² shall be smeared on top of the mortar bed. The joints between the tiles shall be uniform and minimum thickness.
- 7.26.3 After laying the tiles, the surplus cement grout along the joints shall be cleaned off. The day after the tiles are laid, all joints shall be cleaned with wire brush to a depth of 5mm and pointed with coloured tile jointing powder.
- 7.26.4 When the floor is ready to use, the same shall be washed clean and dried with soft cloth or linen. If any tile is disturbed or damaged, it shall be re-fitted or replaced and properly jointed and pointed.
- 7.26.5 Measurement of the work under this head shall be made on the basis of the area of work done and rate quoted shall include the cost of all labour, materials, scaffolding etc. required for completion of the work. The payment for levelling the floor with cement mortar will be made separately.

8.SPECIFICATIONS AND CONDITIONS OF ROAD WORK

8.1 SPECIFICATIONS

8.1.1 GENERAL

Except where otherwise specified or authorized by the Engineer-in-Charge, all items of works executed by the contractor shall conform to the latest edition of the Bureau of Indian Standard Specifications and code of practices published by the B.I.S. Where no such specifications or code of practice exists the latest B.S.S. codes of practice or any other equivalent / standard code of practice shall also be considered for adoption. The tenderer while indicating any such specifications shall enclose the full set of the publication so referred and not in extracts. Photostats / Xerox copies in duplicate shall be forwarded which shall not be returned to the contractor. In absence of any specification, the department deserves the right to adopt trade specifications and/or sound engineering practices for the specialized work as may be decided by the Engineer-in-Charge which shall be final, conclusive and binding on the contractor.

8.1.2 GRANITE METAL

The aggregate shall be broken stone chippings. They shall be clean, hard, tough, durable of fairly cubical in shape and free from soft or disintegrated places, organic and other deleterious matter and adherent coatings and should contain no appreciable amount of dust. The 20mm chipping shall pass through 25mm square mesh and retain in 12mm square mesh grading. The 10mm chipping shall pass through 12mm square mesh and retain on 6mm square mesh.

8.1.3 SAND

Sand supplied shall be of good river sand/crusher run screening of standard grading for fine aggregate.

8.1.4 CRUSHER RUN SCREENING

Crusher run screening shall pass 100% through 2.36 mm sieve and 10 to 20 % by weight pass through 75 micron sieve. The same shall be clean, hard, durable, uncoated, dry and free from injurious soft or flaky piece and organic or other deleterious substances.

8.1.5 The materials required for the work shall be brought to the site and stacked at the places as shown by the Engineer-in-charge and the same shall be got approved and measured for use in work sufficiently in advance so that the progress of the work is not affected by the supply of materials. The stacks shall be according to standard templates. The templates shall be supplied by the Contractor at his expenses and made to dimensions as ordered by the Engineer-in-charge. The sand stack shall be measured only after 48 hours of stacking.

8.1.6 Tolls are payable by the Contractor as per Rules for the craft using the Port's Wharves and for vehicles using the Port's road for supplying the materials.

8.1.7 The tendered rate shall include all charges and duties except GST.

8.2 **QUANTITIES OF MATERIALS TO BE USED FOR VARIOUS WORKS**

The quantities of materials to be used for various items of works shall be as given below.

a)	For 200mm thick rubble soling		
	For 10m ²		
	Rubble (20-40 dm ³)	:	1.80m ³
	Crusher run screening	:	0.60m ³
b)	For Bitumen premix 80mm		
	For 1m ³		
	40mm graded granite metal	:	1m ³
	Bitumen VG 30	:	0.048 Tonne
d)	For Bitumen premix 50mm		
	For 1m ³		
	20mm graded granite metal	:	1m ³
	Bitumen VG 30	:	0.048 Tonne
e)	BUSG Bottom layer		
	For 1m ³		
	40mm graded granite metal	:	1m ³
	Bitumen VG30	:	0.03 Tonne
d)	BUSG Top layer		
	For 1m ³		
	40mm graded granite metal	:	1m ³
	20mm graded granite metal	:	0.26m ³
	Bitumen VG30	:	0.03 Tonne
e)	Close graded Premix 25mm thick		
	For 10m ²		
	12mm graded granite metal	:	0.225m ³
	6mm graded granite metal	:	0.113m ³
	Crusher run screening	:	0.063
	Bitumen VG30	:	0.024 Tonne
f)	For tack coat using Bitumen VG30 Grade		
i	on WBM surface		
	Quantity for one sq.metre		
	Bitumen VG 30	:	0.75 kg.
ii	On Bituminous surface		
	Quantity for one sq.metre		
	Bitumen VG 30	:	0.50 kg.
g)	For tack coat using Bitumen Emulsion		
i	on WBM/ WMM surface		

	Quantity for one sq.metre		
	Bitumen Emulsion	:	0.40 kg.
ii	On Bituminous surface		
	Quantity for one sq.metre		
	Bitumen Emulsion	:	0.25 kg.
h)	2.50cm Premix Carpet		
	Quantity for 100 m2		
	12.5mm to 13.6mm metal	:	2.25 m ³
	10mm to 11.2mm metal	:	1.12 m ³
	Bitumen VG 30 Gade	:	180.00 kg
i)	Seal coat		
	Quantity for 100 m2		
	6mm metal	:	0.90 m ³
	Bitumen VG 30 Gade	:	98.00 kg
j)	Bituminous Concrete- For 1m3		
	Bitumen VG 30 grade Minimum bitumen content		5% by weight of total mix
	Aggregates and filler		As per mix design
k)	Bituminous Macadam		
	Qty for 1m3		
	Bitumen VG-30		73 kg
	25mm to 10mm metal		0.57m3
	10mm to 5mm		0.57m3
	5mm below		0.28m3
	Total		1.42m3

8.3 SPECIFICATION FOR WORKS

8.3.1 DETAILED SPECIFICATION FOR GRANITE ROUGH STONE SOLING

8.3.1.1. The materials required for the work shall be brought to the site and stacked at the places shown by the Engineer-in-charge and the same shall be got approved for the use in work sufficiently in advance so that the progress of work is not affected by the supply of materials.

- i) Tolls are payable by the Contractor as per Rules for the craft using the Port's Wharves and for vehicles using the Port's road for supplying the materials.
- ii) The tendered rate shall include sales tax/VAT and all other taxes.

8.3.1.2. Granite rough stone for 200mm soling

It shall be hard, durable and generally free from flat, elongated, soft and disintegrated particles. Each stone shall not be more than 28 dm³ or less than 7dm³ in volume.

8.3.1.3. MEASUREMENT AND PAYMENT FOR RUBBLE SUPPLY BY WEIGHING.

- a. Measurement and payment for rubble supplied shall be made on the basis of weight of the rubble supplied.
- b. Quantity of rubble in each lorry load shall be found out by weighing each lorry in both loaded and empty condition in the presence of the Engineer-in-charge or his authorised representative.
- c. The approved weigh bridges on W /Island shall alone be used for the purpose of weighing loaded or empty lorries.
- d. Weighing charges of loaded or empty lorries and other charges like tolls etc. shall be borne by the Contractor at his own cost and risk.
- e. The Contractor shall arrange conveyance for departmental personals for witnessing the lorry weighments. No extra payment of this account shall be entertained by the Department. The quoted rate shall include all of the above charges.
- f. Immediately after weighments, the weights shall be recorded in the register maintained in the format approved by the Engineer-in-charge and each entry in the register shall be attested by the initials of the Engineer-in-charge or his authorised representative and the Contractor or his authorised representative.
- g. Weighing slips issued by the weigh bridge office in original together with a photocopy of the same for weighment of each lorry in loaded and empty condition containing the particulars like lorry number, date and time of weighment etc. duly signed by the Contractor or his authorised representative shall be submitted to the Engineer-in-charge on completion of each day's supply for arranging accounting for payment. Department is not in any way responsible for the delay in payment on negligence of the Contractor to submit the above document in the time or loss of the same at his end.
- h. The volume of one tonne rubble of 100 mm size is taken as 0.566 m³

8.3.1.4 The stacks for various types of granite metal, sand and laterite gravel shall be according to standard templates. The template shall be supplied by the Contractor at his expenses and made to the dimensions as ordered by the Engineer-in-charge. The sand stack shall be measured only after 48 hours of stacking.

8.3.1.5 SPECIFICATIONS FOR PROVIDING 200 MM THICK GRANITE ROUGH STONE SOLING

- a. All vegetation growth shall be removed and the ground levelled to prepare the sub-grade to required level and camber as directed by the Engineer-in-

charge. Any ruts or soft yielding places that have appeared during the preparation of sub- grade shall be corrected and rolled with a 3 tonne capacity hand roller.

- b. Conveying rubble already supplied and stacked to the prepared sub-grade, hand packing the stones to a uniform depth of 200 mm / 100mm as closely as possible by edging to the required camber of the road surface, dressing the projections are necessary with a hammer to obtain a close fit using 185 dm³ per square metre of 200 mm soling and 92.50 dm³ per square metre of 100 mm soling.
- c. The hand packed rough stone shall then be blinded with sand. The sand required for blinding should be brought from out side Willingdon Island and no extra payment will be made towards the cost of sand used for blinding.
- d. After blinding with sand, water shall be pumped profusely and rolled with a 8-10 tonne power roller two times or till a hard smooth finished surface is obtained. The rolling shall begin from the edges with roller running forward and backward until the edges have been compacted. The roller shall then progress gradually from edges towards center uniformly lapping each proceeding rear when tract from one half width.
- e. **Measurement**

Measurement for the finished work including the preparation of the sub-grade shall be made for the area on which the work is done. The rate quoted shall include cost of all labour, materials etc. required for the work.

8.3.2 DETAILED SPECIFICATION FOR BUILT- UP- SPRAY GROUT (BUSG) BASE COURSE

8.3.2.1 AGGREGATES FOR BUILT-UP-SPRAY-GROUT(BUSG) BASE COURSE

- i. Aggregates for Built-up-spray-grout base course shall consist of crushed, granite stone. It shall be clean, strong, durable, of fairly cubical shape and free of disintegrated pieces, organic or other deleterious matter and adherent coatings. The aggregates shall preferably be hydrophobic and of low porosity. The coarse and key aggregates for built-up spray-grout shall conform to the grading given below:

Sieve Designation	Percentage by weight passing the sieve	
	Coarse aggregate	Key aggregate
50 mm	100	
25 mm	35 – 70	

20 mm	----	100
12.50 mm	0 – 15	35 – 70
4.75 mm	----	0 – 15
2.36 mm	0 - 5	0 – 5

8.3.2.2 Built-up-spray grout (BUSG) base course

- a. Built-up-spray grout base course is of two layers (Bottom layer and Top layer), composite construction of compacted crushed coarse aggregates with application of bituminous binder after each layer and key aggregates on the top of the top layer, in conformity with the lines, grades and cross sections as directed by the Engineer-in-Charge. This base course is proposed for raising the existing road level. In case it is found necessary to increase the road level only by thickness equal to the top layer it shall be done by applying only the top layer. Further the required raising of road shall be done by providing multiple bottom layers of BUSG finally covered by the top layer. Built-up-spray grout shall not be constructed during rainy weather, when the base is damp or wet or when the atmospheric temperature in shade is 16⁰C.or below.
- b. Bottom layer of BUSG shall be formed as here under. The coarse aggregates in a dry and clean form shall be spread uniformly and evenly at the rate of 0.5 m³ per 10 m²area. The surface of the layer shall be carefully checked with templates and all high and low spots remedied by removing or adding aggregate as may be required. Immediately after spreading aggregates, the entire surface shall be rolled with a 8-10 tonne smooth wheeled roller. The binder shall be heated to the temperature approved by the Engineer-in-Charge. and sprayed on aggregate layer prepared as above at the rate of 15 kg./10m² in a uniform manner with the help of mechanical sprayers. The first bottom layer of BUSG shall be applied immediately after the application of tack coat.
- c. The top layer BUSG shall be formed as hereunder. Immediately after the first application of binder for the bottom layer, the top layer of coarse aggregate shall be spread uniformly and evenly at the rate of 0.50 m³ per 10 m² area. The surface of the layer shall be carefully checked with templates and all high and low spots remedied by removing or adding aggregates as may be required. Immediately after spreading aggregates, the entire surface shall be rolled with a 8-10 tonne smooth wheeled roller. The binder shall be heated to the temperature appropriate to the grade of bitumen as approved by the Engineer-in-Charge and sprayed on aggregate layer prepared as above at the rate of 15 kg./10m² in a uniform manner with the help of mechanical sprayer. Immediately after the application of the binder, key aggregates in a clean and dry state shall be spread uniformly at the rate of 0.13 m³/10m², so as to cover the surface completely. The entire surface shall then be rolled with a 8-10 tonne smooth wheeled roller. While rolling is in progress, additional key aggregates, where required, shall be spread by hand. Rolling shall continue until the entire coarse is thoroughly completed and the key aggregates are firmly in position.

- d. Measurement for bottom layer and top layer of BUSG shall be made under separate heads and paid for accordingly. Measurement for bottom layer and top layer shall be made on the basis of volume of coarse aggregate used on the work. The rate quoted shall include cost of all materials, labour, hire charges for plants equipments etc.

8.3.3 APPLYING TACK COAT INCLUDING PREPARATION OF BASE

- a. The existing surface shall be made free from dust and caked mud. All ruts in potholes shall be picked and all loose and disintegrated materials shall be removed using compressed air. Over the surface thus prepared bitumen mexphalt 60/70 or 80/100 grade heated to temperature appropriate to the grade of bitumen shall be sprayed at the rate of 5-kg/10 m²/ 2.5-kg/10 m² using sprayers. For uniform distribution of bitumen the surface shall be brushed evenly. Tack coat shall be applied just ahead of the on coming bituminous construction. Measurement of the finished work under this head shall be made on the basis of the area of the work and rate quoted shall include the cost of labour, materials, plants, equipments etc. required for the surface preparation and tack coat.

8.3.4 PROVIDING CLOSE GRADED PREMIX SURFACING 25 MM THICK

- a. The coarse and fine aggregates to be used for the work shall be mixed with bitumen in the mixing plant in required temperature and transported to the work spot in suitable method as approved by the Engineer in charge. The mix shall be laid and leveled and consolidated to a thickness of 25 mm by rolling using power roller of 8 T to 10T capacity. The rolling shall start immediately after laying the premix. A smooth wheeled roller of 8-10 T capacity shall be used for rolling. Rolling shall commence at the edges and progress towards the center longitudinally except in the case of super elevated and unidirectional cambered sections where rolling shall be carried out from the lower edge towards the higher edge parallel to the center line of the road. After one pass of the roller over the whole area, depressions or uncovered spots should be corrected by adding premix material. Rolling shall be continued until the entire surface is rolled to maximum compaction and all the roller marks eliminated. While rolling wheels of the roller shall be get moist to prevent the mix from adhering to wheels.

8.3.5 TACK COAT OF HOT STRAIGHT RUN BITUMEN

- a. The rate of application of binder which shall be as specified and which shall conform to 16.1.5 of CPWD specification shall depend on the surface on which the premix carpet is to be laid.

(i) 0.75 kg/sqm on W.B.M. surface.

(ii) 0.50 kg/sqm on existing black topped surface.

ii. Materials

Bitumen : This shall be straight-run bitumen of penetration value 80/100 conforming to IS 73 specifications.

iii. Preparation of Surface

iv. Cleaning

Prior to the application of bitumen, all vegetation, loose sealing compound, caked mud, animal dung, dust, dirt and foreign material shall be removed from the entire surface of the pavement and from existing dummy, construction and expansion joints (wherever existing) by means of mechanical sweepers and blowers, otherwise with steel wire brushes, small picks, brooms or other implements as approved by the Engineer-in-Charge. The material so removed shall be disposed off as directed by the Engineer-in-Charge.

v. Weather and Seasonal Limitations

The tack coat shall not be applied nor any bitumen work done during rainy weather or when the surface is damp or wet or when the atmospheric temperature in the shade is not more than 16° C.

vi. Application of Tack Coat

Heating : Bitumen shall be heated in a boiler to a temperature of 165 deg. C to 175 deg. C and maintained at that temperature. Temperature shall be checked at regular intervals with the help of a thermometer.

Application of Bitumen : Hot bitumen shall be applied evenly to the clean, dry surface by means of a pressure sprayer at specified rate. Even and uniform distribution of bitumen shall be ensured. Bitumen shall be applied longitudinally along the length of the pavement and never across it. Excessive deposits of bitumen caused by stopping or starting of the sprayer or through leakage or any other reason shall be suitably rectified.

vii. Measurements

Length and breadth shall be measured correct to a cm, along the surface of pavement. Area shall be worked out in sqm correct to two places of decimal.

viii. Rate

Rate shall include the cost of all materials and labour involved in all the operations described above.

8.3.6 TACK COAT WITH BITUMEN EMULSION

- a. Specification of item C.6 to be followed except Bitumen emulsion (Rapid Setting) of specified grade and consistency to be used at room temperature instead of hot straight run bitumen at following rate.

1. on w.b.m @ 0.4kg/sqm.
2. on bituminous surface @ 0.25 kg/sqm.

8.3.7 PREMIX CARPET WITH HOT BITUMEN

a. This type of treatment is normally applied on roads where the motor traffic is of medium intensity, but bullock cart traffic is fairly heavy. This treatment is suitable for district roads and for internal and service road in colonies. The consolidated thickness of this type of treatment shall be 2 cm or 2.5 cm as specified. This treatment consists of applying a tack coat on the prepared base followed immediately by spreading aggregates precoated with specified binder to camber and consolidated. Premix carpet shall not be laid during rainy weather or when the base course is damp or wet or, when the atmospheric temperature in the shade is not more than 16°C.

b. Preparation of Surface

Repairs : Pot holes or patches and ruts in the water bound macadam base or surface course which is to be surface treated, shall be repaired by removal of all loose and defective material by cutting in rectangular patches and replacement with suitable material. For the purpose of repairs the area of pot holes shall be taken upto 0.75 sqm and depth upto 5 cm. All pot holes, patches and ruts upto 2.5 cm deep shall be repaired and brought to level with premix and properly consolidated while those of depths greater than 2.5 cm shall be repaired with similar specifications as adopted originally.

Cleaning : Prior to the application of the binder, all dust, dirt, caked mud, animal dung, loose and foreign material etc. shall be removed 30 cm on either side, beyond the full width to be treated, by means of mechanical sweepers and blowers, if available or otherwise with wire brushes, small picks, brooms etc. The material so removed shall be disposed off as directed by the Engineer-in-Charge. For a water bound macadam surface, the interstices between the road metal shall be exposed upto a depth of about 10 mm by means of wire brushes. The surface shall then be brushed with soft brooms to remove all loose aggregate. Finally the traces of fine dust which get accumulated while brushing shall be thoroughly removed from the surface by blowing with gunny bags.

The prepared surface shall be closed to traffic and maintained fully clean till the binder is applied.

c. Materials

Grading of stone chipping shall be as per Table 16.17. Binder shall be as specified and shall conform to Table 16.7. Quantities of materials shall be as given in Table 16.18. A proper record shall be kept to ensure that the daily out turn of work is correlated with the quantity of bitumen used as per proforma given in Appendix 'A' of CPWD Specification.

Table 16.18

Consolidated thickness of	Binder Hot Bitumen	Stone chippings in Cubic Metre/ 100 Square metre
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premix carpet		13.2mm	11.2mm
2.50cm	52 Kg/m ³ of 13.20mm size & 56 Kg/m ³ of 11.20mm	2.25	1.12

d. Tack Coat

i. The rate of application of binder which shall be as specified and which shall conform to 16.1.5 of CPWD specification shall depend on the surface on which the premix carpet is to be laid.

(i) 0.75 kg/sqm on W.B.M. surface.

(ii) 0.50 kg/sqm on existing black topped surface.

ii. Materials

Bitumen : This shall be straight-run bitumen of penetration value 80/100 conforming to IS 73 specifications.

iii. Preparation of Surface

iv. Cleaning

Prior to the application of bitumen, all vegetation, loose sealing compound, caked mud, animal dung, dust, dirt and foreign material shall be removed from the entire surface of the pavement and from existing dummy, construction and expansion joints (wherever existing) by means of mechanical sweepers and blowers, otherwise with steel wire brushes, small picks, brooms or other implements as approved by the Engineer-in-Charge. The material so removed shall be disposed off as directed by the Engineer-in-Charge.

v. Weather and Seasonal Limitations

The tack coat shall not be applied nor any bitumen work done during rainy weather or when the surface is damp or wet or when the atmospheric temperature in the shade is not more than 16o C.

vi. Application of Tack Coat

Heating : Bitumen shall be heated in a boiler to a temperature of 165 deg. C to 175 deg. C and maintained at that temperature. Temperature shall be checked at regular intervals with the help of a thermometer.

Application of Bitumen : Hot bitumen shall be applied evenly to the clean, dry surface by means of a pressure sprayer at specified rate. Even and uniform distribution of bitumen shall be ensured. Bitumen shall be applied longitudinally along the length of the pavement and never across it. Excessive deposits of bitumen caused by stopping or starting of the sprayer or through leakage or any other reason shall be suitably rectified.

e. Preparation of Premix

The aggregate shall be dry and suitably heated to temperature as directed by Engineer-in-Charge before these are placed in the mixer to facilitate mixing

with the binder. Mixers of approved type shall be employed for mixing the aggregates with the bituminous binder. The binder shall be heated to the temperature appropriate to the grade of bitumen approved by the Engineer-in-Charge, in boilers of suitable design avoiding local overheating and ensuring a continuous supply. The aggregates shall be dry and suitably heated to a temperature as directed by Engineer-in-Charge before these are placed in the mixer. After about 15 seconds of dry mixing, the heated binder shall be distributed over the aggregates at the rate specified. The mixing of binder with chippings shall be continued until the chippings are thoroughly coated with the binder. The mix shall be immediately transported from the mixer to the point of use in suitable vehicles or wheel barrows. The vehicles employed for transport shall be cleaned and be covered over in transit if so directed.

f. Spreading and Rolling

The premixed material shall be spread on the road surface with rakes to the required thickness and camber or distributed evenly with the help of a drag spreader, without undue loss of time. The camber shall be checked by means of camber boards and inequalities evened out. As soon as sufficient length of bituminous material has been laid, rolling shall commence with 6 to 9 tonne power rollers, preferably of smooth wheel tandem type, or other approved plant. Rolling shall begin at the edges and progress towards the centre longitudinally. Except on the super elevated portions rolling shall progress from the lower to upper edge, parallel to the centre line of the pavement. The consolidated thickness shall not at any place be less than the specified thickness by more than 25%. However, the average thickness shall not be less than that specified in the item. When the roller has passed over the whole area once, any high spots or depressions which become apparent shall be corrected by removing or adding premixed materials. Rolling shall then be continued until the entire surface has been rolled to compaction and all the roller marks eliminated. In each pass of the roller, preceding track shall be overlapped uniformly by at least 1/3 width. The roller wheels shall be kept damp to prevent the premix from adhering to the wheels and being picked up. In no case shall fuel/lubricating oil be used for this purpose. Rollers shall not stand on newly laid material as it may get deformed thereby. The edges along and transverse of the carpet, laid and compacted earlier shall be cut to their full depth so as to expose fresh surface which shall be painted with a thin surface coat of appropriate binder before the new mix is placed against it. Further, the prepared finished surface shall be protected from traffic for 24 hours or such period as may be directed by the Engineer-in-Charge.

g. Surface Finishing

The surface regularity both in longitudinal and transverse directions shall be within the tolerances specified in Table 16.19.

Table 16.19.

<i>Longitudinal profile Max. permissible undulation when</i>	<i>Cross profile Max. permissible variation from specified profile when measured</i>
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<i>measured with 3 M straight edge</i>	<i>with a camber template</i>
10 mm	6 mm

The longitudinal profile shall be checked during rolling with a three metres long straight edge and graduated wedge at the middle of each traffic lane along the road. Similarly the transverse profile shall be checked with adjustable templates at intervals of 10 metres.

h. Rectification

Where the surface irregularity fall outside the specified tolerances the contractor shall be liable to rectify it to the satisfaction of Engineer-in-Charge by adding fresh material and recompacting to specifications where the surface is low. Where the surface is high the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications.

vii. Measurements

The length and width of the finished work shall be measured correct to a cm along the finished surface of the road. The area shall be calculated in square metre, correct to two places of decimal. For record purposes, the measurement for binder and stone chippings shall be taken as specified in 16.4.2.2 and 16.4.3.2 of CPWD specification before they are actually used on the work. Premeasurements of the materials taken for record purposes shall simply serve as a guide and shall not form the basis for payment.

viii. Rate

The rate shall include the cost of materials and labour involved in all the operations described above for the particular item.

8.3.8 WET MIX MACADAM BASE (WMM)

a. MATERIALS FOR WET MIX MACADAM

Aggregates: Coarse aggregate shall be crushed stone.

The aggregates shall conform to the physical requirements set forth in Table 400.10 of MORT&H's Specification for Road and Bridge works.

Grading requirements: The aggregates shall conform to the grading given in Table 6.2 below:

TABLE 6.2

(Table 400.11 of MORT&H 'specification)

Grading Requirements of aggregates for Wet Mix Macadam

IS Sieve Designation	Percent by weight passing the IS sieve
53.00mm	100
45.00mm	95-100
26.50mm	-

22.40mm	60-80
11.20mm	40-60
4.75mm	25-40
2.36mm	15-30
0.600mm	8-22
0.075mm	0-8

Materials finer than 425 micron shall have Plasticity Index (PI) not exceeding 6. The final gradation approved within these limits shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa.

- b. The work consists of providing, laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass for 150mm thick in two layers over granite rough stone soling or on a prepared sub- grade to lines and grades as per drawings and directions of the Engineer-in-Charge.

c. Construction operations

(i) Preparation of base

The surface of the sub-base to receive the Wet Mix Macadam course shall be prepared to the specified lines and camber and made free of dust and other extraneous material. Any ruts or soft yielding places shall be corrected in an approved manner and rolled until firm surface is obtained, if necessary by sprinkling water. Any sub-base irregularities, where predominant, shall be made good by providing appropriate type of profile corrective course (leveling course) as per Clause 501 of MORT&H's Specification for Road and Bridge works or as directed by the Engineer-in-Charge.

(ii) Provision of lateral confinement of aggregates

While constructing Wet Mix Macadam, arrangement shall be made for the lateral confinement of wet mix. This shall be done by laying materials in adjoining shoulders along with that of Wet Mix Macadam layer and following the sequence of operations described in Clause 407.4.1 of MORT&H's Specification for Road and Bridge works or as directed by the Engineer-in-Charge.

(iii) Preparation of mix

(a) Wet Mix Macadam shall be prepared using appropriate methods which shall ensure production of mix of proper and uniform quality as directed by the Engineer in charge.

(b) Optimum moisture for mixing shall be determined in accordance with IS: 2720 (Part-8) after replacing the aggregate fraction retained on 22.4mm sieve with material of 4.75mm to 22.4mm size. While adding water, due allowance should be made for evaporation losses. However, at the time of compaction, water in the wet mix should not vary from the optimum value by more than agreed limits. The mixed material should be uniformly wet and no segregation should be permitted.

(iv) Spreading of mix

- (a) Immediately after mixing, the aggregates shall be spread uniformly and evenly upon the prepared sub base in required quantities. In no case should these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed stretch be permitted.
 - (b) The first layer of mix shall be spread by suitable means so as to get a uniform and level surface as directed by the Engineer-In-Charge. The second layer of mix shall be spread either by a paver finisher or motor grader. For portions where mechanical means cannot be used, manual means as approved by the Engineer –in-charge shall be used.
 - (c) The surface of the aggregate shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregate as may be required. The layer shall be tested by depth blocks during construction. No segregation of larger and fine particles should be allowed. The aggregate as spread should be of uniform gradation with no pockets of fine materials.
- (v) Compaction**
- (a) After the mix has been laid to the required thickness, grade and camber, the same shall be uniformly compacted, to the full depth with suitable roller. If the thickness of single compacted layer does not exceed 100mm, a smooth wheel roller of 80 to 100 kN weight may be used. For a compacted single layer upto 200 mm, the compaction shall be done with the help of vibratory roller of minimum static weight of 80 to 100 kN or equivalent capacity roller. The speed of the roller shall not exceed 5 km/hr.
 - (b) In the portions having unidirectional super elevation, rolling shall commence from the lower edge and progress gradually towards the upper edge. Thereafter, roller should progress parallel to the centre line of the road, uniformly over-lapping each preceding track by at least one-third width until the entire surface has been rolled. Alternate trips of the roller shall be terminated in stops at least 1m away from any preceding stop.
 - (c) In portions in camber, rolling should begin at the edge with the roller running forward and backward until the edges have been firmly compacted. The roller shall then progress gradually towards the center parallel to the centre line of the road uniformly overlapping each of the preceding track by at least one- third width until the entire surface has been rolled.
 - (d) Any displacement occurring as a result of reversing of the direction of a roller or from any other cause shall be corrected at once as specified and/or removed and made good.
 - (e) Along forms, kerbs, walls or other places not accessible to the roller the mixture shall be thoroughly compacted with mechanical tampers or a plate compactor. Skin patching of an area without scarifying the surface to permit proper bonding of the added materials shall not be permitted.
 - (f) Rolling should not be done when the sub grade is soft or yielding or when it causes a wave-like motion in the sub grade. If irregularities develop during rolling which exceed 12mm when tested with a 3 metre straight edge, the surface be loosened and premixed material added or removed as required before rolling again so as to achieve a uniform surface conforming to the

desired grade and camber. In no case should the use of unmixed material be permitted to make up the depressions.

- (g) Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry density for the material as determined by the method outlined in IS: 2720 (Part-8)
 - (h) After completion, the surface of any finished layer shall be well closed, free from movement under compaction equipment or any compaction planes, ridges, cracks and loose material. All loose, segregated or otherwise defective areas be made good to the full thickness of the layer and re-compacted.
- (vi) **Setting and drying**
After final compaction of wet mix macadam course, the surface shall be allowed to dry for 24 hours.

d. Surface evenness

The surface finish of construction shall conform to the requirements of Clause 902 of MORT&H's Specification for Road and Bridge works or as directed by the Engineer-in-Charge.

e. Quality control

For control on the quality of materials and works carried out, relevant provisions of Section 900 of MORT&H's Specification for Road and Bridge works shall apply or as directed by the Engineer-in-Charge.

f. Measurement for payment

Wet Mix Macadam course shall be measured as finished work in cubic metres.

g. Rate

The contract unit rate for WMM shall be payment in full for carrying out the required operations including full compensation for making arrangements for traffic, furnishing all materials to be incorporated in the work including all royalties, fees, rents wherever necessary and all leads and lifts, all labour, tool, equipment and incidentals to complete the work to specifications, carrying out the required tests for quality control etc.

8.3.9 PROVIDING BITUMIN PREMIX FOR POT HOLE FILLING

a. CONSTRUCTION OPERATIONS

Laying shall be suspended while free standing water is present on the surface to be covered, or during rain, fog and dust storms. After rain, the bituminous surface, prime or tack coat, shall be blown off with a high pressure air jet to remove excess moisture, or the surface let to dry before laying shall start. Laying of bituminous mixtures shall not be carried out when the air temperature at the surface on which it is to be laid is below 10°C or when the wind speed at any temperature exceeds 40 km per hour at 2m height unless specially approved by the Engineer-in-Charge.

b. BITUMEN PREMIX

Over the surface prepared as per clause 'a' above, bitumen premix shall be laid and compacted to the required compaction as per clause 'c' mentioned here under.

c. PREPARATION AND TRANSPORTATION OF THE MIX

i. MIXING

Bitumen premix shall be prepared in a hot mix plant of adequate capacity and capable of producing a mix of proper and uniform quality with thoroughly coated aggregates. The temperature of bitumen at the time of mixing shall be in the range of 150°C -165 °C and of aggregate in the range of 125°C -150 °C.

ii. TRANSPORTING

Bituminous mix shall be transported in clean insulated vehicles, and unless otherwise agreed by the Engineer-in-charge, & shall be covered while in transit or awaiting tipping. Subject to the approval of the Engineer-in-charge a thin coating of diesel or lubricating oil may be applied to the interior of the vehicle to prevent sticking and to facilitate discharge of the material.

iii. SPREADING & ROLLING

Immediately after applying tack coat as above, bituminous mix shall be spread in layers of average thickness of 80mm/50mm over the surface where ever necessary for filling up the pot holes, easening the undulations on the existing surface and making up the surface to the required level and camber. Immediately after spreading the mix, rolling shall be done with 8 to 10 tonne power road roller as directed by the Engineer-in-charge of the work. The roller shall be kept damp to prevent the mix from adhering to the wheels and being picked up.

iv. MEASUREMENT FOR PAYMENT

Measurements for the finished work under this head shall be made on the basis of volume of coarse aggregate used for the work and shall include the cost of bitumen, labour, plants and equipments .

8.4 MATERIALS FOR BITUMINOUS CONCRETE

Coarse aggregates

The coarse aggregates shall consist of crushed rock, crushed granite or other hard material retained on the 2.36 mm sieve. They shall be clean, hard, durable, of cubical shape, dry, free from dust and soft or friable matter, organic or other deleterious matter. The aggregate shall satisfy the physical requirements set forth in Table 500-16 of MORT & H’s specification for Road and Bridge works.

Fine aggregates

Fine aggregates shall consist of crushed or naturally occurring material, or a combination of the two, passing 2.36 mm sieve and retained on 75 micron sieve. They shall be clean, hard, durable, dry and free from dust, soft or friable matter, organic or other deleterious matter.

Filler

Filler shall consist of finely divided mineral matter such as rock dust, hydrated lime or cement approved by the Engineer-in-Charge. The filler shall be graded within the limits indicated in **Table 500-9** of MORT&H’s Specification for Road & Bridge works below.

**TABLE 6.3
(TABLE 500-9 of MORT &H’s specification)**

IS Sieve (mm)	Cumulative percent passing by weight
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0.6	100
0.3	95-100
0.075	85-100

The filler shall be free from organic impurities and have a Plasticity Index not greater than 4. The Plasticity Index requirement shall not apply if filler is cement or lime.

Combined grading

The combined grading of the coarse and fine aggregate and added filler shall fall within the limits shown in Table 500-17 of MORT&H's Specification for Road & Bridge work below.

Table 500-17

Nominal aggregate size	13.2 mm
IS Sieve (mm)	Cumulative % by weight of total aggregate passing
19	100
13.2	90-100
9.5	70-88
4.75	53-71
2.36	42-58
1.18	34-48
0.6	26-38
0.3	18-28
0.15	12-20
0.075	4-10
Bitumen content % by mass of total mix	Min.5.4
Bitumen grade	VG 30 grade

BITUMINOUS CONCRETE WEARING COURSE

The work consists of (i) providing 25mm thick Bituminous Concrete Wearing Course on the already prepared surface.

Mix design

The mix for bituminous concrete shall be design mix. The mix shall meet the following requirements set out in Table 500-11 of MORT & H's Specification for Road and Bridge works below.

Table-2 (Table 500 -11) Requirements for Bituminous Concrete

Compaction level	75 Blows on each face of the specimen
------------------	---------------------------------------

Minimum stability (KN at 60°C)	9
Marshal flow(mm)	2-4
Marshal Quotient (stability/ flow)	2-5
Percent air voids	3-5
Percent voids filled with bitumen (VFB)	65-75
Coating of aggregate particle	95% Minimum
Tensile strength ratio	80% Minimum
% Voids in Mineral Aggregate(VMA)	Minimum Percent Voids in mineral aggregate(VMA) are set out in Table 500-13

Job Mix Formula

The contractor shall inform the Engineer-in-Charge in writing, at least 7 days before the start of the work, of the job mix formula proposed for use in the works, and shall give the following details:

- i. Source and location of all materials.
- ii. Proportions of all materials expressed as follows each is applicable
 - a. Binder type, and percentage by weight of total mixture.
 - b. Coarse aggregates/fine aggregate/ mineral filler as percentage by weight of total aggregate including mineral filler.
- iii. A single definite percentage passing each sieve for the mixed aggregate.
- iv. The individual grading of the individual aggregate fractions, and the proportion of each in the combined grade.
- v. The results of tests enumerated in Table 500-11 as obtained by the Contractors.
- vi. Where the mixer is a batch mixer, the individual weights of each type of aggregate, and the binder per batch.
- vii. Test results of physical characteristics of aggregates to be used.
- viii. Mixing temperature and compacting temperature.

While establishing the job mix formula, the contractor shall ensure that it is based on a correct and truly representative sample of the materials that will actually be used in the work and that the mixture and its different ingredients satisfy the physical and strength requirements of these specifications.

Approval of the job mix formula shall be based on independent testing by the Engineer-in-Charge for which samples of all ingredients of the mix shall be furnished by the Contractor as required by the Engineer-in-Charge.

The approved job mix formula shall remain effective unless and until a revised

job mix formula is approved. Should a change in the source of materials be proposed, a new job mix formula shall be forwarded to the Engineer-in-Charge for approval before the placing of the material.

Plant Trials- Permissible Variation in Job Mix Formula

Once the laboratory job mix formula is approved, the Contractor shall carry out plant trials at the mixer to establish that the plant can be set up to produce a uniform mix conforming to the approved job mix formula. The permissible variations of the individual percentages of the various ingredients in the actual mix from the job mix formula to be used shall be within the limits as specified in Table 500-18 of MORT& H’s Specification for Road and Bridge works below.

These variations are intended to apply to individual specimens taken for the quality control test in accordance with Section 900 of MORT&H’s specification for Road and Bridge works.

Table -3

(Table 500-18 of MORT& H’s Specification)

Description	Wearing course (Bituminous concrete)
Aggregate passing 90mm sieve or larger	±7%
Aggregate passing 13.2mm, 9.5mm	±6%
Aggregate passing 4.75mm	±5%
Aggregate passing 2.36mm, 1.18mm, 0.6mm	±4%
Aggregate passing 0.3mm, 0.15mm	±3%
Aggregate passing 0.075mm	±1.5%
Binder content	±0.3%
Mixing Temperature	±10°C

Once the plant trials have demonstrated the capability of the plant, and the trials are approved, the laying operation may commence.

Laying Trials

Once the plant trials have been successfully completed and approved, the Contractor shall carryout laying trials, to demonstrate that the proposed mix can

be successfully laid, and compacted all in accordance with the specifications hereinafter. The laying trial shall be carried out on a suitable area, approved by the Engineer-in-Charge. The area of the laying trials shall be a minimum of 100 Sq.m of construction, and it shall be similar to that of the proposed road of it shall be in all respects, particularly compaction, the same as the proposed construction on which the bituminous material is to be laid.

The Contractor shall previously inform the Engineer-in-Charge of the proposed method for laying and compacting the material. The plant trials shall then establish if the proposed laying plant, compaction plant, and methodology is capable of producing satisfactory results. The density of the finished paving layer shall be determined by taking cores, no sooner than 24 hours after laying, or by other approved method.

Once the laying trials have been approved, the same plant and methodology shall be applied to the laying of the material on the work, and no variation of either shall be acceptable, unless approved in writing by the Engineer-in-Charge, who may at his discretion require further laying trials.

Construction operations

Laying shall be suspended while free standing water is present on the surface to be covered, or during rain, fog and dust storms. After rain, the bituminous surface, prime or tack coat, shall be blown off with a high pressure air jet to remove excess moisture, or the surface let to dry before laying shall start. Laying of bituminous mixtures shall not be carried out when the air temperature at the surface on which it is to be laid is below 10°C or when the wind speed at any temperature exceeds 40km per hour at 2m height unless specially approved by the Engineer-in-Charge.

Preparation of base

The base on which Bituminous concrete material is to be laid shall be prepared as directed by the Engineer-in-Charge. The surface shall be thoroughly swept clean by a mechanical broom, and the dust removed by compressed air. In locations where mechanical broom cannot access, other approved methods shall be used as directed by the Engineer-in-Charge.

Applying Tack Coat

In case the Bitumen Premix surface over which the Bituminous concrete is to be laid is fresh and has not been subjected to traffic or contaminated by dust, a tack coat is not mandatory where the overlay is completed within two days. Otherwise, tack coat shall be provided as directed by the Engineer-in-Charge as per Clause 4 above.

Mixing and transportation of the mix

The provisions as specified in Clause 5.4.1 and 5.4.2 shall apply.

Spreading

The provisions as specified in Clause 5.4.3 shall apply.

Rolling

- (i) Rolling for compaction shall be carried out in accordance with the provisions of clause 5.4.4 and clause 5.4.5.
- (ii) Rolling shall be continued until the specified density is achieved, until there is no further movement under the roller. The required frequency of testing is defined in Clause 903 of MORT & H's Specification for Road and Bridge works.

Surface finish and quality control.

The surface finish of completed construction shall conform to the requirements of Clause 902 of MORT&H's Specification for Road and Bridge works or as directed by the Engineer-in-Charge. For control on the quality of materials and works carried out, relevant provisions of Section 900 of MORT&H's Specification for Road and Bridge works shall apply.

Measurement for payment

- (i) Bituminous concrete shall be measured as finished work in cubic metres on the basis of volume of ingredients premeasured at plant site.
- (ii) For one cubic metre of compacted volume of bituminous concrete, quantity of each type of aggregate and filler and bitumen used for the work shall be as per the proportion of ingredients determined in the mix design.

Rate

The contract unit rate for premixed bituminous courses shall be payment in full for carrying out the required operations including full compensation for, but not necessarily limited to:

- (i) Making arrangements for traffic control.
- (ii) Preparation of the surface to receive the material.
- (iii) Providing all materials to be incorporated in the work including arrangement for stock yards, all royalties, fees, rents wherever necessary and all leads and lifts;
- (iv) Mixing, transporting, laying and compacting the mix as specified.
- (v) All labour, tools, equipment, plant including installation of hot mix plant, power supply units and all machinery, incidental to complete the work to these specifications.
- (vi) Carrying out the work in part widths of the road if so directed by the Engineer-in-Charge.
- (vii) Carrying out all tests for control of quality; and
- (viii) The rate shall cover the provision of bitumen at the rate specified in the contract.
- (ix) The rates are to include for all necessary testing, mix design, transporting and testing of samples, and cores. If there is no laboratory at work site, the Contractor must arrange to carry out all necessary testing at an outside Laboratory, approved by the Engineer-in-Charge, and all costs incurred are deemed to be included in the rate quoted.

- (x) The cost of all plant and laying trials as specified to prove the mixing and laying methods is deemed to be included in the Contractor's quoted rate.

8.5 BITUMINOUS MACADAM

The work consists of providing 50mm thick of compacted crushed aggregate premixed with a bituminous binder on a previously prepared sub base.

Construction operations

Laying shall be suspended while free standing water is present on the surface to be covered, or during rain, fog and dust storms. After rain, the bituminous surface, prime or tack coat, shall be blown off with a high pressure air jet to remove excess moisture, or the surface let to dry before laying shall start. Laying of bituminous mixtures shall not be carried out when the air temperature at the surface on which it is to be laid is below 10°C or when the wind speed at any temperature exceeds 40 km per hour at 2m height unless specially approved by the Engineer-in-Charge.

Preparation of base

The base on which Bituminous Macadam is to be laid shall be prepared, shaped and compacted to the required profile in accordance with clause 501.8 and 902.3 of MORT&H's Specification for Road and Bridge works or as directed by the Engineer-in-Charge. The surface shall be thoroughly swept clean by a mechanical broom, and the dust removed by compressed air. In locations where mechanical broom cannot access, other approved methods shall be used as directed by the Engineer-in-Charge. A prime coat shall be applied in accordance with Clause 7.5 above.

Applying Tack Coat

Tack coat shall then be applied as per Clause.7.5 above over the surface thus prepared.

Mixing and transportation of the mixture

Mixing

Pre-mixed bituminous materials, including bituminous macadam and bituminous concrete shall be prepared in a hot mix plant of adequate capacity and capable of yielding a mix of proper and uniform quality with thoroughly coated aggregates. Appropriate mixing temperatures can be found in Table 500-5 of MORT & H's Specification for Road and Bridge works; the difference in temperature between the binder and the aggregate should at no time exceed 14⁰ C. In order to ensure uniform quality of the mix and better coating of aggregates, the hot mix plant shall be calibrated from time to time.

Table 7 -1 Manufacturing and rolling temperatures

(Table 500-5 of MORT & H's Specification)

Bitumen Penetration	Bitumen Mixing (°C)	Aggregate Mixing (°C)	Mixed Material (°C)	Rolling (°C)	Laying (°C)
65	150-165	150-170	165 Maximum	90 Minimum	125 Minimum

Instead of installing a hot mix plant for the work at work site, the contractor shall be permitted to use an existing plant conforming to the above specifications, in the nearby locality subject to the following conditions.

- a) All materials required for the bituminous works shall be stored at the hot mix plant premises sufficiently in advance and stacked, measured and got approved by the Engineer-in-Charge before use in the work. Conveyance for the inspection / supervision of the material / works by the department staff at the plant site shall be arranged by the contractor without any extra cost to the department.
- b) Storage tank of adequate capacity for storing bitumen required for the work shall be arranged by the contractor at his risk and cost so that the progress of the work is not affected for want of bitumen.
- c) The contractor shall maintain a record of daily consumption and balance quantities of all materials measured for use in the work and also bitumen supplied from the department, at the plant site which shall be jointly signed by the representative of the Engineer-in-Charge and the contractor before starting each day's work and its closing on the day.
- d) The contractor shall take all precautionary measures to ensure the required temperature of the mix at the time of placing the same at work site.

Transporting

Bituminous materials shall be transported in clean insulated vehicles, and unless otherwise agreed by the Engineer-in-charge shall be covered while in transit or awaiting tipping. Subject to the approval of the Engineer-in-charge a thin coating of diesel or lubricating oil may be applied to the interior of the vehicle to prevent sticking and to facilitate discharge of the material.

Spreading

- (i) Except in areas where a mechanical paver cannot access, bituminous materials shall be spread, levelled and tamped by an approved self-propelled paving machine. As soon as possible after arrival at site, the materials shall be supplied continuously to the paver and land without delay.
- (ii) The rate of delivery of material to the paver shall be regulated to enable the paver to operate continuously. The travel rate of the paver and its method of operations, shall be adjusted to ensure an even and uniform flow of bituminous

material across the screed, free from dragging, tearing and segregation of the material. In areas with restricted space where a mechanical paver cannot be used, the material shall be spread, raked and levelled with suitable hand tools by experienced staff and compacted to the satisfaction of the Engineer-in-Charge..

(iii) The minimum thickness of material laid in each paver pass shall be in accordance with the minimum values given in the relevant parts in MORT&H's Specification for Road and Bridge works.

Rolling

The compaction shall carry out in accordance with the provisions of clause 7.6.4.5 and 7.6.4.6 below shall apply, as modified by the approved laying trials. Rolling shall be continued until the specified density is achieved, until there is no further movement under the roller. The required frequency of testing is defined in Clause 903 of MORT & H's Specification for Road and Bridge works.

Compaction

(i) Bituminous materials shall be laid and compacted in layers which enable the specified thickness, surface level, regularity requirements and compaction to be achieved.

(ii) Compaction of bituminous materials shall commence as soon as possible after laying. Compaction shall be substantially completed before the temperature falls below the minimum rolling temperatures stated in relevant part of the MORT&H's Specification for Road and Bridge works. Rolling of the longitudinal joints shall be done immediately behind the paving operation. After this, rolling shall commence at the edges and progress towards the centre longitudinally except that on super elevated and unidirectional cambered portions, it shall progress from the lower to the upper edge parallel to the centre line of the pavement. Rolling shall continue until all roller marks have been removed from the surface. All deficiencies in the surface after laying shall be made good by the attendants behind the paver, before initial rolling is commenced. The initial rolling shall be done with 80-100 KN dead weight smooth-wheeled rollers. The finish rolling shall be done with 80-100 KN vibrating tandem rollers.

(iii) Where compaction is to be determined by density of cores the requirements to prove the performance of rollers shall apply in order to demonstrate that the specified density can be achieved. In such cases the Contractor shall nominate the plant, and the method by which he intends to achieve the specified level of compaction and finish at temperatures above the minimum specified rolling temperature. Laying trials shall then demonstrate the acceptability of the plant and method used.

(iv) Bituminous materials shall be rolled in a longitudinal direction, with the driven rolls nearest the paver. The roller shall first compact material adjacent to

joints and then work from the lower to upper side of the layer, overlapping on successive passes by at least one-third of the width of the rear roll.

(v) In portions super elevated and uni-directional camber, after the edge has been rolled, the roller shall progress from the lower to the upper edge.

(vi) Rollers should move at a speed of not more than 5 km per hour. The roller shall not be permitted to stand on pavement which has not been fully compacted, and necessary precautions shall be taken to prevent dropping of oil, grease, petrol or other foreign matter on the pavement either when the rollers are operating or standing. The wheels of rollers shall be kept moist with water, and the spray system provided with the machine shall be in good working order, to prevent the mixture from adhering to the wheels. Only sufficient moisture to prevent adhesion between the wheels of rollers and the mixture should be used. Surplus water shall not be allowed to stand on the partially compacted pavement.

Joints

(i) Where longitudinal joints are made in pre-mixed bituminous materials, the materials shall be fully compacted and the joint made flush.

(ii) All joints shall be offset at least 300mm from parallel joints in the layer beneath or as directed, and in a layout approved by the Engineer-in-Charge. Joints in the wearing course shall coincide with either the lane edge or the lane marking, whichever is appropriate. Longitudinal joints shall not be situated in wheel track zones.

Measurement for payment

(i) Bituminous Macadam shall be measured as finished work in cubic metres on the basis of volume of ingredients premeasured at plant site.

(ii) For one cubic metre of compacted volume of Bituminous Macadam, quantity of each type of aggregate and bitumen used for the work shall be as per clause 7.8 below.

SIGNATURE OF THE TENDERER

9.DETAILED SPECIFICATIONS OF DISPOSAL OF GARBAGES

9.1 General

The work consists of collection of garbage, debris and other waste materials deposited in various places on Cochin Port Area and transporting, dumping and levelling the same in the dumping ground at A2 area at south end of W/Island or location pointed out by the Engineer-in-charge.

- 9.2 The lorry/tipper, labours (skilled or unskilled), tools and equipments etc. required for carrying out the work shall be provided by the contractor at his own cost.
- 9.3 The work shall be carried out without causing any interruption to the vehicular traffic and also without causing any hindrance to the Port's operations.
- 9.4 The payment will be made on the basis of number of lorry load/ tipper load. The lorry/tipper used for this work shall have minimum body volume of 6m³. The lorry/ tipper shall be filled with the materials to the maximum extent possible to the satisfaction of the officer in charge of the work.
- 9.5 The work shall be carried out as per the directions and to the satisfaction of the Engineer-in-Charge.
- 9.6 The work may not be operated on a regular basis and it has to be arranged occasionally as and when special need arises and the contractor is informed accordingly.

SIGNATURE OF THE TENDERER

10. SPECIFICATION FOR LABOUR SUPPLY

- 10.1. Skilled labourers supplied shall be well trained & having good health to carryout works.
- 10.2. Unskilled labourers supplied shall have good health for carrying out all type of unskilled works.
- 10.3. The labourers supplied shall have valid Identity Cards issued by the Govt. of India viz; Electoral ID card or Aadhar card.
- 10.4. The labourers supplied shall be engaged for various civil construction/ maintenance works under various sub divisions at Cochin Port Authority.
- 10.5. A register for the labourers posted shall be maintained by the contractor specifying the nature of work done by each labourer on each day. The register shall be signed by the respective Sub-Divisional Officers after completion of each days work and shall be counter signed by the Engineer-in-Charge after completing of the whole work.
- 10.6. The rate stipulated in the Schedule is for supply of labour for one day of 8 hours.

SIGNATURE OF THE TENDERER

10.SCHEDULE OF FITTINGS FOR DOORS, WINDOWS AND VENTILATORS

All fittings should be of 1st class quality and got approved by the Engineer - in - charge. The numbers in each and its use will be decided by the Engineer - in - charge according to the location and number of leaves, the doors, windows and ventilators have.

BRASS FITTINGS

DOORS: -

- a) Butt hinges: 125x75 mm heavy type brass butt hinges of approved quality with 40 mm nettle-folds brass screws to suit.
- b) 30 cms. heavy type brass tower bolts of approved quality with 25 mm nettle-folds brass screws to suit at top.
- c) 15 cms. heavy type brass tower bolts of approved quality with 25 mm nettle-folds brass screws to suit at bottom.
- d) Brass tubes 50 mm long for fixing in the floor to suit the tower bolts.
- e) 22.5 cms. heavy type brass tower bolt of approved quality with 25 mm nettle folds brass screws to suit.

WINDOWS: -

- a) 100 mm x 60 mm heavy type brass butt hinges of approved quality with 40 mm nettle-folds brass screws to suit.
- b) 15 cms. heavy type brass tower bolts of approved quality with 25 mm nettle-folds brass screws to suit at top and bottom.
- c) Brass tubes 30 mm long to suit the tower bolts.
- d) 22.5 cms. brass hooks and eyes with fixing plate of approved quality with 25 mm nettle-folds brass screws to suit.

VENTILATORS: -

- a) 62 mmx 6mmx 6mm brass sash centers fixed with 40 mm nettle-folds brass screws to suit
- b) Brass rings 25mm size fixed with 2 nos . nettle- folds brass screws to suit with necessary brass or chromium plated pulling chain . The length and sizes of chain will be decided at site by the Engineer-in-charge.

IRON FITTINGS

DOORS

- a) Butt hinges: - 125mm x 75mm heavy type iron butt hinges of approved quality with 40 mm nettle- folds brass screws to suit.
- b) 30 mm heavy type tower bolts of approved quality with 25 mm nettle -folds brass screws to suit at top.
- c) 15 cms heavy type iron tower bolts of approved quality with 25mm nettle-folds brass screws at bottom
- d) G.I tubes for fixing in the floor 50 mm long to suit the tower bolts.
- e) 22.5 mm heavy type tower bolts of approved quality with 25 mm nettle -folds brass screws to suit.

WINDOWS: -

- a) 100 mm x 60 mm heavy type brass butt hinges of approved quality with 40 mm nettle-folds brass screws to suit.
- b) 15 cms heavy type brass tower bolts of approved quality with 25 mm nettle-folds brass screws to suit at top and bottom.
- c) G.I tubes 50 mm long to suit the tower bolt.
- d) 22.5 cms iron hooks and eyes with fixing plate of approved quality with 25 mm nettle-folds brass screws to suit.

VENTILATORS: -

- a) 62 mmx 6mmx 6mm brass sash centers fixed with 25 mm nettle-folds brass screws to suit
- b) Iron rings 25mm size fixed with 2 nos. nettle- folds brass screws to suit with necessary length of G.I chain.

NOTE: All screws will be of only brass nettle- folds wherever not mentioned for works under the contract.

SIGNATURE OF THE TENDERER

COCHIN PORT AUTHORITY

**ANNUAL CIVIL MAINTENANCE CONTRACT (ACMC) FOR THE YEAR
2023-24**

UNDERTAKING REGARDING EPF AND ESI REGISTRATION

I/ We, M/s..... (Name & Address of the tenderer) solemnly affirm and undertake that I/ We do not have the required number of employees for taking registration under EPF Organisation and ESI Corporation. I/ We also undertake that I/ We take the full responsibility for all the consequences arising due to the above and indemnify CoPA officials for any actions taken in this regard

SIGNATURE OF TENDERER