



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

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**TENDER DOCUMENT FOR 'PROVIDING DUCTILE IRON FRESH
WATER SUPPLY PIPE LINE TO THE PLOT ALLOTTED TO CSL FOR
ISRF AT MATTANCHERRY HALT'**

TECHNICAL BID (e-Tendering Mode)

Website:www.tenderwizard.com/CPT

CHIEF ENGINEER'S OFFICE

COCHIN PORT AUTHORITY

COCHIN-682009

TENDER No.T6/T-2015/2024-C

Rs.885/- (Rs.750+ 18% GST)

COCHIN PORT AUTHORITY

**TENDER FOR ‘PROVIDING DUCTILE IRON FRESH WATER SUPPLY PIPE
LINE TO THE PLOT ALLOTTED TO CSL FOR ISRF AT MATTANCHERRY
HALT’**

(Tender No.T6/T-2015/2024-C)

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SIGNATURE OF TENDERER

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-2015/2024-C

Date : 12/08/2024

NOTICE INVITING TENDER

Electronic Tenders (**e-tenders**) on percentage basis are invited by Cochin Port Authority 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 **“Providing Ductile Iron fresh water supply pipe line to the plot allotted to CSL for ISRF at Mattancherry Halt.”**

1. Minimum Eligibility Criteria:

a) Experience

The tenderers should have experience of having successfully completed during the last 7 (seven) years ending **30th June, 2024**, at least either:

- i. Three Similar Works each costing not less than **Rs. 4.03 lakhs**
(OR)
- ii. Two Similar Works each costing not less than **Rs.5.03 lakhs**
(OR)
- iii. One Similar Work costing not less than **Rs.8.05 lakhs**

b) Financial Turnover

Average Financial Turnover of the tenderer over the last three financial years ending 31st March 2023 [2020-'21, 2021-'22 & 2022-'23] shall not be less than **Rs. 3.02 lakhs.**

Explanatory Notes to a) & b):

- i. Similar work(s) means **“Providing water supply lines using D.I/AC/HDPE/C.I Pipes”**. The experience certificate of works executed in private sectors/ organisations shall be considered for qualification, only on submission of TDS certificate (Form 26AS) along with work order and completion certificate.
- ii. Copy of completion certificates of each work issued by the employer/ owner/ responsible officer of the employer/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 (Balance Sheet & Profit & Loss Account Statement) & Turnover Certificate signed by the Chartered Accountant or IT returns duly acknowledged by the Income Tax department along with Computation Statement signed by the Chartered Accountant, for the last three years ending on 31st March 2023 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, disqualifications/ black listing/ debarring by Govt. departments etc.

2.2 **The bidders having EPF/ ESI registration certificates only shall be considered for qualification in the tender, 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	<i>12-08-2024</i>
2	Download period of Bid Documents	<i>12-08-2024 to 27-08-2024</i>
3	Date of Pre-Bid meeting	<i>Not Applicable</i>
4	Last date for seeking clarification	<i>19-08-2024</i>
5	Last date and time of submission of Bid	<i>27-08-2024 up to 14.30 hrs</i>
6	Date and time of opening the Bid	<i>27 -08-2024 after 15.00hrs</i>

ii) **Bid information :**

Table 3

i)	Estimated Amount put to Tender	Rs. 10,05,150/-
ii)	Earnest Money Deposit	Rs.20,105/- 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 or through RTGS/NEFT mode.
iii)	Cost of Bid document	Rs.885/- (Rs.750+18% GST) (Non refundable) furnished either through Demand Draft/ Banker's Cheque drawn in favour of the Financial Adviser & Chief Accounts Officer, CoPA from any Commercial Bank in India, or through RTGS/NEFT mode. being the cost of single copy of the tender document
iv)	Validity period of Tender	90 days from the Last Date of Submission of Bid.
v)	Time for Completion	4 Months from the date of commencement

4. This work essentially comprises of the following:

- i) Excavating trenches of required width for pipes ,cables, etc including excavation for sockets and dressing of sides, ramming of bottoms, depth up to 1.5m including getting out the excavated soil, and returning the soil as required in layers not exceeding 20cm in depth ,including consolidating each deposited layer by ramming watering etc .
- ii) Providing and laying Ductile Iron pipes conforming to IS:8329:150 mm dia Ductile Iron Class K-9 pipes.
- iii) Providing & laying flanged C.I standard specials such as tees, bends collars, apers, caps etc, suitable for flanged jointing as per IS:1538 upto 300mm dia .
- iv) Providing and fixing CI sluice valves (with cap) complete with bolts nuts rubber insertions etc.(the tail pieces if required will be paid separately) 150mm diameter Class II.
- v) Construction masonry Chamber of various sizes
- vi) Providing Water Meters
- vii) Providing laying spreading compacting graded stone aggregate (size range 53 mm to 0.75mm) to Wet Mix Macadam (WMM) and
- viii) Reinstating road portions cut for providing pipelines.

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 and EMD shall be furnished in the form of Demand Draft/ Banker's Cheque drawn in favour of FA & CAO, CoPA or through RTGS/NEFT mode. The bidder shall submit the Originals of (i) DD / Bankers Cheque towards the cost of tender document and EMD and (ii) Power of Attorney in favour of signatory(s) to the tender if applicable, with letter of submission in a sealed cover to the **Suptdg. Engineer-I, Cochin Port Authority, W/Island, Cochin-682009, Kerala**, on due date of Submission of bid within the prescribed time limit **Non submission of**

original financial document towards cost of tender document and EMD will make the tender liable for rejection, and such tenders would not be evaluated further.

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 such incomplete Tender Documents may be rejected by the employer and would not be evaluated.**
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. **EARNEST MONEY TO BE DEPOSITED**
 - 11.1 Each tender should be accompanied by an Earnest Money amounting to **Rs. 20,105/-**.
 - 11.2 The Earnest Money can be deposited through Demand Draft or Banker’s Cheque from a Scheduled Bank in India, drawn in favour of Financial Adviser & Chief Accounts Officer, COCHIN PORT AUTHORITY or online payment through RTGS/NEFT. The original DD/ Banker’s Cheque shall be submitted to the Superintending Engineer-I, Cochin Port Authority, Cochin-09, **on the due date of submission of the bid within the prescribed time limit.** Scanned copy of the DD/ Banker’s Cheque shall be attached with the tender submitted “online”. If online payment is made, the evidence thereof shall be attached with the tender submitted “online”. If hard copy of the original DD/Bankers Cheque is not received within the stipulated period, or if the evidence of making online payment towards EMD is not attached with the tender submitted online, then such bids will not be further evaluated and shall be rejected summarily. The Earnest Money deposited will not carry any interest.
 - 11.3 Bank details of Cochin Port Authority are given below.

Name of bank	:	State Bank of India
Name of Branch	:	Cochin Port Trust Branch
IFSC Code	:	SBIN0006367
Account No	:	41401802288
Account Holders Name	:	Cochin Port Authority
 - 11.4 EMD of L1 & L2 bidder shall be refunded to the respective bidders on submission and acceptance of Performance Security and entering into agreement by the L1 Bidder. EMD of other bidders will be refunded immediately after finalization of the bid.
12. 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.

13. Securities:

13.1 Security Deposit (SD) shall be 10% of the Contract value or value of the work done whichever is higher and it shall consist of the following:

- a) **Performance Security** 5% of contract value payable on award of the work.
- b) **Retention Money:** @ 5% of the gross amount of each bill.

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.

13.2 **Performance Security:** The Performance Security retained till end of Defect Liability period (1 year from the date of completion of work) shall be 5% of Contract Value or Cost of Work Done, whichever is higher. So, initially 5% of the Contract value shall be furnished as Performance Security.

13.3 The Security Deposit/ Performance Security @ 5% of the value of the contract awarded (Rounded off to the nearest Rs.1000/-), shall be furnished by the Contractor to the Employer, not later than **14 days** from the date of receipt of letter of acceptance or such extension of that period as may be permitted by the official of Cochin Port writing, and shall be furnished in one of the following forms:

- i) Banker's Cheque / Demand Draft of a Scheduled Bank/ online payment through RTGS/NEFT. If online payment is made, the evidence thereof shall be submitted to the office.
- ii) An irrevocable Bank Guarantee(BG) enforceable and encashable at Cochin, drawn from any Scheduled Bank operating in India as per the prescribed proforma.

13.4 **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.**

13.5 If Performance Security is not furnished within the period as specified above or such extension of that period as may be permitted by the official of Cochin Port Authority in writing, Cochin Port Authority at its discretion may cancel the Letter of Acceptance without paying any compensation to such bidder, and in addition to forfeiture of EMD. In addition, such bidder 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 cancellation of Letter of Acceptance.**

13.6 **Retention Money:** Retention Money @ 5% shall be retained from each payment due to the Contractor.

13.7 Retention Money shall be deducted at 5% of the gross amount of the bill from the first Running Account bill onwards till the recovered sum alongwith Performance Security amounts to 10% of the Contract value or the value of the work done whichever is higher at all times. **Retention Money shall be refunded to the Contractor within 14 days from the date of payment of final bill.**

13.8 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 Retention Money recovered from the running account bills, shall amount to 10% of the Cost of Work done.

13.9 In cases where cost of Work done exceeds the Contract Value while releasing the Retention Money after payment of Final Bill, only 5% cost of Work Done is released, instead of the entire Retention Money recovered from the bills. The balance amount shall be retained; to make up for the shortage in the Performance Security, upto the completion of Defects Liability Period.

- 14 In the event of the tenderer, after the issue of the communication of acceptance of offer by Cochin Port Authority, 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, Cochin Port Authority shall have full right to claim damages therefore either together with or in addition to the forfeiture of Earnest Money Deposit.
- 15 **Signing of Agreement:**
- 15.1 The successful tenderer will be required to execute within **21 days** from the date of receipt of Letter of Acceptance and after submission of Performance Security, 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.
- If Agreement is not executed within the period as specified above or such extension of that period as may be permitted by the official of Cochin Port Authority in writing, Cochin Port Authority at its discretion may cancel the Letter of Acceptance without paying any compensation to such bidder, and in addition to forfeiture of Performance Security.
- 15.2 The Contractor shall make 10 copies of the Agreement and submit to CoPA within 7 days following the date of signing of Agreement.
- 16 Till signing of agreement the tender together with the acceptance letter shall constitute a binding Contract between the Contractor and Cochin Port.
- 17 Failure to comply with conditions **3ii(iv), 13 and 15** above will entail forfeiture of the Earnest Money.
18. **Micro and Small Enterprises (MSE's) 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.**
19. 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. It is not mandatory for Cochin Port to accept the bid of the Lowest Bidder, and Cochin Port at its discretion may accept the bid of any bidder, without mentioning any reason.
20. CoPA will determine whether the Tender is substantially responsive to the requirements of the Tender documents. For the purpose of this clause a substantially responsive Tender is one which inter alia conforms to all the terms, general conditions and specifications of the Tender documents and technically suitable. The Tenderer shall carefully submit all the documents as required under the Tender

- failing which the offer is liable to be treated as non-responsive. A Tender which, in relation to the cost estimates of CoPA, is seriously unbalanced may be rejected as non-responsive. The Tender which does not satisfy the pre-qualification criteria shall summarily be rejected and shall not be considered for further evaluation 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.
21. The Tenderer shall quote realistic rates in respect of the services to be provided. The rates shall be firm and no other increase or decrease in prices will be allowed during the currency of the contract. Canvassing in connection with tender is strictly prohibited and tenders submitted by the Contractors who resort to canvassing will be liable to rejection.
22. **Taxes and Duties:**
- 22.1 TDS as per Income Tax Law & GST law shall also be deducted at prevailing rates.
- 22.2 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.
- 21.2. 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.
- 21.3. 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.
- 22 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.
- 24 The Tender Document shall form part of the Contract.

Sd/-

Suptg.Engineer-I

COCHIN PORT AUTHORITY

FOR AND ON BEHALF OF THE BOARD OF MAJOR 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 : **Providing Ductile Iron fresh water supply pipe line to the plot allotted to CSL for ISRF at Mattancherry Halt.**
- b) Estimated cost : **Rs. 10,05,150/-**
- c) Earnest Money : **Rs. 20,105/- (2%)**
- d) Security Deposit : 10% of the value of the Contract awarded or value of the work done whichever is higher. (Performance Security @ 5% of contract value payable on award of the work and Retention Money 5% of the gross amount of each bill)
- e) Percentage, if any, to be deducted from the bills : The Retention Money will be recovered from the first running bill onwards at the rate of 5% of the gross amount of each bill.
- f) Time allowed for commencement of work from the date of receipt of Letter of Acceptance/work order : **7 days**
- g) Time allowed for the work from the date of commencement of work : **4 Months**
- 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 tender and conditions of Contract annexed hereto and in default to execute an agreement with CoPA in the prescribed form within prescribed period, or submission of Performance Security within the prescribed period, agree to forfeit the Earnest Money deposited by me/us, in addition to any other remedy available with Cochin Port against me/us. The sum of Rs..... which will be deposited with Financial Adviser and Chief Accounts Officer of the Port Authority as Performance Security (a) the full value of which is to be absolutely forfeited to CoPA without prejudice to any other rights or remedies of CoPA should I/We fail to commence the work specified in the Contract Data or should I/We make any delay in progress of the work or if the contract is terminated on my/our default. ; 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 General Conditions of Contract.

Dated the day of 2024

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 of2024.

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: center;">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 : Sri. B.Kasiviswanathan, IRSME, Chairperson, Cochin Port Authority, Cochin -9.																	
3	The Engineer is																	
	Name : Sri. A.G.Sathyan Chief Engineer i/c, Cochin Port Authority, Cochin-9.																	
	Name of Nominee/Engineer-in-Charge: Name: Sri. M.V.Johny, Suptg.Engineer-I																	
4	Name of Contract- Providing Ductile Iron fresh water supply pipe line to the plot allotted to CSL for ISRF at Mattancherry Halt. Tender No. T6/T-2015/2024-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 4 Months with the following milestones:	(17,28)						
8	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" data-bbox="363 568 1203 613">Milestone dates:</td> </tr> <tr> <td data-bbox="363 613 852 786">Physical works to be completed</td> <td data-bbox="852 613 1203 786">Period from the date of receipt of LoA to commence and proceed with the work</td> </tr> <tr> <td data-bbox="363 786 852 909" style="text-align: center;">4 Months</td> <td data-bbox="852 786 1203 909" style="text-align: center;">7 days</td> </tr> </table>	Milestone dates:		Physical works to be completed	Period from the date of receipt of LoA to commence and proceed with the work	4 Months	7 days	
Milestone dates:								
Physical works to be completed	Period from the date of receipt of LoA to commence and proceed with the work							
4 Months	7 days							
9	<p>The following shall form part of the Contract Document:</p> <ol style="list-style-type: none"> (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 3 days of date of the Letter of Acceptance.	(27)						
11	<p>The site possession date</p> <p>The site will be handed over within 7 days after issue of LoA, and failure to take over the same within such period shall be attributable to contractor alone.</p>	(21)						
12	The start date shall be 7 days from the date of receipt of the Letter of Acceptance (LoA) by the Contractor.	(1)						

Sl. No.	Description	Reference Clause No. in GCC
13	The site is located in W/Island.	
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.	(13)
16	The following events shall also be Compensation Events: NIL	(44)
17	The period between Programme updates shall be 7 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 5% from each bill subject to a maximum of 5% 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: NA	(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.	
31	Base Rate for materials to be considered for price variation NA	(47)

Sl. No.	Description	Reference Clause No. in GCC
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 **“Providing Ductile Iron fresh water supply pipe line to the plot allotted to CSL for ISRF at Mattancherry Halt”**.
- 4.2 The tenderer shall submit the tender Cover-A (Hard Copy of EMD & Cost of Tender form **on the due date of submission of the tender within the prescribed time limit**. 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 containing hard copy of EMD & Cost of Tender form as mentioned in Table 3 of Tender Notice shall be submitted **on the due date of submission of the tender within the prescribed time limit**.
- 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.**
- 4.5.2.5 No changes shall be made in the tender documents. An undertaking that no changes have been made in the Tender document downloaded has to be furnished in **Annexure-II**
- 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:** The bidders eligible for participating in the tender may be Individual, Proprietorship, Registered Partnership firms, L.L.P, Company or JV. The proof thereof shall be submitted.

c) Experience

The tenderers should have experience of having successfully completed during the last 7 (seven) years ending **30th June, 2024**, at least either:

- i. Three Similar Works each costing not less than **Rs. 4.03 lakhs**
(OR)
- ii. Two Similar Works each costing not less than **Rs.5.03 lakhs**
(OR)
- iii. One Similar Work costing not less than **Rs.8.05 lakhs**

a) Financial Turnover

- b) Average Financial Turnover of the tenderer over the last three financial years ending 31st March 2023 [2020-'21, 2021-'22 & 2022-'23] shall not be less than **Rs.3.02 lakhs.****

Explanatory Notes to a) & b) :

- i. Similar work(s) means "**Providing water supply lines using D.I/AC/HDPE/C.I Pipes**". 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 employer/owner/responsible officer of the employer/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 (Balance Sheet & Profit & Loss Account Statement) & Turnover Certificate signed by the Chartered Accountant or IT returns duly acknowledged by the Income Tax department along with Computation Statement signed by the Chartered Accountant, for the last three years

ending on 31st March 2023 shall be produced by the tenderer.

c) Other Eligibility Considerations

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, disqualification/ black listing/ debarring by Govt. departments etc.

d) The bidders having EPF/ ESI registration certificates only shall be considered for qualification in the tender, 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 **27/08/2024**, the last date fixed for receiving the bid, in the SE-I'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.

4.9 Bid Validity

Bids shall remain valid for a period not less than Ninety days (90 days) from the deadline date for bid submission. A bid valid for a shorter period shall be rejected by the Employer as non-responsive.

In exceptional circumstances, prior to expiry of the original time limit, the Employer may request the Bidder to extend the period of validity for an additional period. The request and bidders response shall be made in writing. A bidder agreeing to the request will not be permitted to modify his bid (ie, the extension shall be unconditional).

SIGNATURE OF TENDERER.

5. GENERAL DESCRIPTION AND SPECIAL CONDITIONS OF CONTRACT

1. SCOPE OF WORK

1.1 The proposed work is for “Providing Ductile Iron fresh water supply pipe line to the plot allotted to CSL for ISRF at Mattancherry Halt”.

The work consists of the following:

- i. Excavating trenches of required width for pipes ,cables,etc including excavation for sockets and dressing of sides, ramming of bottoms, depth up to 1.5m including getting out the excavated soil, and returning the soil as required in layers not exceeding 20cm in depth ,including consolidating each deposited layer by ramming watering etc .
 - ii. Providing and laying Ductile Iron pipes conforming to IS:8329:150 mm dia Ductile Iron Class K-9 pipes.
 - iii. Providing & laying flanged C.I standard specials such as tees, bends collars, apers, caps etc, suitable for flanged jointing as per IS:1538 upto 300mm dia .
 - iv. Providing and fixing CI sluice valves (with cap) complete with bolts nuts rubber insertions etc.(the tail pieces if required will be paid separately) 150mm diameter Class II.
 - v. Construction masonry Chamber of various sizes
 - vi. Providing Water Meters
 - vii. Providing laying spreading compacting graded stone aggregate (size range 53 mm to 0.75mm) to Wet Mix Macadam (WMM) and
 - viii. Reinstating road portions cut for providing pipelines.
- 1.2 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.

2. WORK SITE

The work has to be carried out is at ISRF at Mattancherry Halt. The site is accessible through road. Security rules and regulations including obtaining passes etc. for work are to be observed by the contractor. The work is to be carried out without disturbing the normal Port operations.

3. TIME SCHEDULE AND MONITORING OF PROGRESS

- 3.1 The tenderer shall prepare and attach with the tender a detailed work schedule indicating key activities and critical items for completing the work within the stipulated Contract period of **4 Months**. This time schedule will form the basis for monitoring the progress of work.

4. MATERIALS / FACILITIES TO BE PROVIDED BY DEPARTMENT

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. CONTRACTOR'S RESPONSIBILITY

- 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.
- 5.2 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.
- 5.3 Samples of all materials, to be incorporated in the work shall be got approved by the

- Engineer's Nominee before procurement.
- 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 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.
 - 5.6 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.
 - 5.7 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.
 - 5.8 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.
 - 5.9 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.
 - 5.10 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.
 - 5.11 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.
 - 5.12 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.
- 5.13 The Contractor shall ensure that no labourers with criminal background are engaged for the work.
- 5.14 The contractor shall take all precautions for not to damage any cables, pipelines etc. passing through the area of work.
- 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.
- 5.16 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..**
- 5.17 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.
- 5.18 The Contractor shall also be responsible for arranging and carrying out works as mentioned in Clauses 1.1 & 1.2 above.
- 5.19 Defect Liability period of the work is one year from the date of completion of the work.**
- 6. POWER AND WATER**
- 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.
- 6.2 Water required for the work shall be arranged by the Contractor at his own cost.
- 7. WORKMANSHIP**
- 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.
- 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.
- 7.3 Precautions shall be taken for not to damage cables/ pipe lines etc.
- 7.4 The work shall be arranged in the order of preference and as directed by the Engineer's Nominee of work.
- 8. TEMPORARY WORKS**
- 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.

- 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.

9. TIME FOR COMPLETION

- 9.1 The time allowed for carrying out the work as mentioned in the memorandum 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.

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

10. 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.

11. 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.

12. 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.

13. MEASUREMENT

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

14. 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.

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

16. 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, as certain 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.

17. 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 as per the prevailing rate 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.

GST -TDS Under GST Law Shall Be Deducted As Per Prevailing Rate

18. 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.
23. Any disputes and differences between the parties shall be resolved in the Jurisdiction of Courts in Cochin alone.
24. In case of any contradiction between the Clauses in Tender Document and that in GCC, the clauses in the tender document shall prevail

SIGNATURE OF TENDERER

6 DETAILED SPECIFICATIONS FOR MATERIALS TO BE USED ON WORK

1 GENERAL

- 1.1. Except where otherwise specified or authorized by the Engineer-in-Charge, materials supplied by the contractor shall conform to the latest edition of the Indian Standard Specifications and code of practices published by the Indian Standard Institution. Samples of materials to be supplied by the contractor shall be shown to the Engineer-in-Charge sufficiently in advance for approval of its quality for use on the work.
- 1.2. All materials supplied shall be stored appropriately to prevent deterioration/ damage from any cause what so ever and to the entire satisfaction of the Engineer-in Charge.
- 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.
- 1.4. Payment for the materials supplied, shall be given only after they are used on the work.
- 1.5. Tolls are payable by the Contractor as per rules for vehicles using the Port's road for supplying the materials.

2. CEMENT

- 2.1 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.
- 2.2 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, the cement required for the Work will have to be procured from the 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.
- 2.3 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 BIS codes. In case, test results indicate that the cement arranged by the Contractor does not conform to the relevant BIS 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.
- 2.4 A cement godown 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.
- 2.5 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.
- 2.6 The cement shall be stored in a weather proof building with facilities for inspection.
- 2.7 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.

3. WATER

- 3.1 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.
- 3.2 **Cochin Port Authority will not provide/supply water for the Work.** Water has to be arranged by the Contractor himself for the construction works including curing work **at his own risk and cost.**
- 3.3 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.

4. SAND FOR MAKING MORTAR FOR MASONRY WORK/ PLASTERING WORK

- 4.1 Sand used for masonry mortar shall conform to IS: 2116. Sand used for plastering shall conform to IS: 1542.

5 AGGREGATES FOR CONCRETE

- 5.1 Aggregates (fine and coarse) for concrete shall comply with the requirements of IS: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.
- 5.2 The fine aggregates shall be clean, hard, durable, uncoated, dry and free from injurious, soft or flaky pieces and organic or other deleterious substances
- 5.3 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.
- 5.4 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 DUCTILE IRON PIPE WITH SOCKET & SPIGOT ENDS

- 6.1 Ductile Iron pipes shall conform strictly to IS:8329/2005. The pipe shall be of Class K-9 type with Spigot & Socket ends.
- 6.2 Each pipe shall be marked in accordance with IS:8329. Each pipe shall also be marked with ISI Certification mark.
- 6.3 Pipes shall be tested in accordance with IS 8329.

7 RUBBER GASKET

- 7.1 Rubber gasket shall conform to IS:638 and shall be of 6mm thickness. It shall be of grade I, type A or B as directed by the Engineer-in-charge.
- 7.2 Rubber Gasket used with Push-on joints or mechanical joints shall conform to IS-5382.

8 DUCTILE IRON FLANGED SPIGOT

- 8.1 Adaptors used for connecting valves in the line shall be flanged spigots and shall conform to IS: 8329.

9 DUCTILE IRON DETACHABLE JOINT (D.I.D JOINT)

- 9.1 D.I.D joint supplied shall conform to the details given under clause 5.5.9.2 of SP: 35 (S&T) – 1987. D.I.D joint set supplied shall be suitable for the connection of Ductile Iron pipe. The joint set shall be designated by the nominal bore of pipe to be connected. D.I.D joint set supplied shall consist of D.I. Collar, D.I. Flanges, rubber rings, bolts & nuts etc. for complete connection.

10 MATERIALS FOR WET MIX MACADAM

- 10.1 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.
- 10.2 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
0.750mm	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

11 AGGREGATES FOR BITUMINOUS MACADAM

11.1 Coarse aggregates

The coarse aggregates shall consist of crushed rock, crushed granite or other hard material passing through 26.50mm sieve and 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 500-3 of MORT&H's Specification for Road and Bridge works.

11.2 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.

11.3 Combined grading

The aggregates shall be proportioned and blended to produce a uniform mixture complying with the requirements of Table 500-4 of Ministry of Road Transport & Highways Specification for Road & Bridge work as below.

TABLE 6.3 [TABLE 500-4 of MOSRT &H's specification]

Mix designation	Grading-2
Nominal aggregate size	19 mm
IS Sieve (mm)	Cumulative % by weight of total aggregate passing
26.5	100
19.0	90-100
13.2	56-88
4.75	16-36
2.36	4-19
0.30	2-10
0.075	0-8
Bitumen content % by weight of total mixture	3.3
Bitumen grade	VG 30 grade

12 BITUMEN

12.1 Bitumen for work shall be of VG 30 grade.

12.2 As far as possible, the bitumen required for the work shall be procured from BPCL-KR / IOC / HPCL. In case supply from BPCL-KR / IOC / HPCL is not available, the contractor shall obtain specific approval from the Engineer-in-Charge well in advance for purchase from other source(s). The bitumen shall, if required by the Engineer-in-Charge, be tested and analyzed by an independent analyst approved by the Engineer-in-charge at the Contractor's cost and result produced to the Engineer-in-Charge before its use on the work.

12.3 The bitumen brought to the site and bitumen remaining unused after completion of work shall not be removed from the site without written permission of the Engineer-in-Charge

12.4 The contractor shall maintain a register showing the quantities and dates of receipt, daily consumption and balance in the pro forma approved by the Engineer-in-charge and it shall be accessible to the Engineer-in-Charge.

13 MATERIALS FOR PRIME COAT AND TACK COAT

13.1 The materials used for tack coat/ prime coat shall be bituminous emulsion, type MS (Medium Setting) complying with IS: 8887. The Kinematic Viscosity shall be 45 Centistokes at 60°C.

13.2 The binder used for tack coat shall be bituminous emulsion, type RS (Rapid Setting) complying with IS: 8887.

14 MATERIALS FOR BITUMINOUS CONCRETE**14.1 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 500-3 of MORT & H's specification for Road and Bridge works.

14.2 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.

14.3 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 500-9

IS Sieve (mm)	Cumulative percent passing by weight
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.

14.4 Combined grading

The combined grading of the coarse and fine aggregate and added filler shall fall within the limits shown in **Table 500-18** of MORT&H's Specification for Road & Bridge work below

Table 500-18

Nominal aggregate size	13 mm
IS Sieve (mm)	Cumulative % by weight of total aggregate passing
19	100
13.2	79-100
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	
Bitumen grade	VG 30 grade

15 MATERIALS NOT SPECIFIED

All materials not herein detailed and fully specified but which may be required for use on works, shall be subjected to the approval of the Engineer-in-Charge without which they shall not be used anywhere in the permanent works

16 SAMPLING AND TESTING OF MATERIALS

- 16.1 Sampling and testing of the material supplied by the contractor for use on the Work shall be done as per the provisions of the relevant BIS codes/specifications. In the absence of BIS specification in a particular case, the sampling and testing shall be done as directed by the Engineer-in-Charge as per sound engineering practice. Material conforming to the specifications and approved by the Engineer-in-Charge shall only be used by the Contractor.
- 16.2 All the sampling and testing shall be done at the Contractor's cost.

SIGNATURE OF TENDERER

7. DETAILED SPECIFICATIONS FOR ITEMS OF WORKS

1. GENERAL

1.1 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.

2. PLAIN CEMENT CONCRETE

2.1 General

The concrete used for all works, concreting procedure etc. shall be in accordance with I.S. 456-2000.

2.2 Concrete Mix

For Plain cement concrete, nominal mix shall be used unless otherwise specified in the schedule.

2.3 Nominal Mix

2.3.1 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.

Sl. No	Type of Concrete	Cement content Per Cu. M
1	Cement concrete 1:2:4 (1 cement:2 sand: 4, 20mm size graded metal)	320 kg
2	Cement concrete 1:1.5:3 (1 cement:1.5 sand: 3, 20mm size graded metal)	400 kg

2.3.2 For all grades of nominal mix concrete the requirement of water cement ratio shall be as per IS:456-2000

2.4 Size Of Coarse Aggregate

For all concrete, 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.

2.5 Form 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, shaving and saw dust, 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.

2.6 Mixing of Concrete

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.

2.7 Transporting, Placing, Compacting and Curing of Concrete

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

2.7.2 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.

2.7.3 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.

2.7.4 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.

2.7.5 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 I.S: 456-2000.

2.7.6 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.

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

2.7.8 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.

2.7.9 The unit rate quoted by the tenderer shall be for the finished work and deemed to include cost of all materials and labour, form work, provision of holes, recess, other contingent items etc. required for the completion of work as specified etc.

3. EARTH WORK EXCAVATION

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.

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.

- 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 at no extra cost to keep the excavated surface dry for construction. 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.

4. PROVIDING AND LAYING DUCTILE IRON (DI) K9 PIPE LINE

4.1 Trenching For Laying Pipeline

4.1.1 General

Forming trenches for laying pipe shall be in accordance with IS:3114. Trenching for laying to required depth and to a 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.

4.1.2 Trenching In Hard Surfaced Area

The hard surfaced area consists of bituminous surface, water bound macadam, rubble soling & concrete surfaces. Trenching at this location consists of cutting and removing the hard surfaced area. The rate shall also include bailing out water, providing shoring etc. for the complete work.

4.1.3 Transporting, Laying, Jointing And Testing Of Pipes.

Transporting, laying, jointing and testing of ductile Iron pipes shall be done as per the relevant IS.

4.1.4 Transportation

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

4.1.5 Other Materials To Be Made Availbale By The Contractor.

All other materials, required for jointing and laying pipes, including gasket, lubricant etc. shall be brought by the contractor at his own cost.

4.1.6 Laying

4.1.6.1 The pipes shall be lowered in to the trench by means of suitable pully blocks, shear legs, chairs, ropes etc. If no case the pipes shall be rolled, and dropped in to the trench. After lowering, the pipes shall be arranged so that the spigot of one pipe is carefully centred into the socket of the next pipe and pushed to the full distance that it can go. The pipeline shall be laid to the levels required. Specials shall also be laid in their proper position as stated above. The pipe laid on the level ground shall be laid with socket end facing upstream.

4.1.6.2 At the end of each days work, the last pipe laid shall have its open ends securely closed with a wooden plug to prevent entry of water, soil, rats and any other foreign matter into the pipe. Fixing of valves and fittings shall be done as part of laying the pipe line as directed by the Engineer-in-charge.

4.1.7 Jointing

4.1.7.1 Basic conditions to be ensured for jointing are

- (a). Cleanliness of all parts
- (b). Correct location of components.

- (c). Centralisation of spigot with socket and
- (d). Strict compliance with jointing instructions.

4.1.7.2 The inside of sockets and the outside of spigots should be cleaned for atleast the insertion depth for each joint. The materials required for jointing are gaskets, lubricant supplied by manufacturers.

4.1.7.3 Gasket should be wiped clean and inspected for damage. Where lifting gear has been used to place the pipe in the trench it should be used to support the pipe and as sit in centralising the spigot in the socket. Where the pipe line is suspected to be subject to movement due to ground settlement or temperature variation, a suitable gap should be left between the end of the spigot and bottom of the socket to ensure this, two band marks are made near the spigot end. After jointing the end of the socket must end between these two bands.

4.1.8 Testing Of Pipe Lines For Pressure Test & Leakage Test

Testing shall be done as per IS : 8329. Testing of pipe line shall be done after the entire length of line is laid or in sections according to the site conditions, as approved by the Engineer-in-charge.

a. Pressure Test

Pressure test shall be carried out for a test pressure of 18 Kg/cm². The section shall be first subjected to test pressure normal to the area and the exposed parts shall be carefully examined. If any defects are found they shall be repaired and pressure test repeated until no defects are found. Prior to testing enough back fill shall be placed over the pipe line to resist upward thrust, if required. The open end of the section shall be sealed with an end cap having an outlet which can be served as an air relief vent or for filling the line. The blind face of the cap shall be properly braced during testing by screw jacks and wooden planks or steel plate.

The section of the line to be tested shall be filled with water manually or by a low pressure pump. Air shall be vented out. The test pressure shall be raised at the rate of approximately one Kg/ sq.cm / minute. The duration of initial tests shall be sufficient to make careful check on the pipeline. Any cracked or defective pipes, fittings or valves discovered in consequence of this pressure test shall be removed and replaced by sound material and the test shall be repeated and defects rectified until all joints are seen water tight as approved by the Engineer-in-charge, without any extra cost. The final test shall be done by retaining the pressure for a minimum of one hour.

b. Leakage Test

The leakage test shall be conducted after the satisfactory completion of pressure test at a test pressure of 12Kg./Sq. Centimetre. The pipe line shall not show any sign of leakage or sweating.

4.1.9 Payment

Payment shall be done in running metre basis measured centre line length. All specials, fittings, valves etc. will be paid under separate item. The rate quoted for providing pipe lines shall include the cost of materials like Gasket, lubricant, solvent cement, bolts, nuts etc. to be made available by the contractor for jointing pipes, and testing the line as aforesaid.

5. BACK FILLING

5.1 The soil under the pipe shall be solidly tampered to provide a firm and continuous support for the pipe lines. If it is desired to observe the joints or coupling 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. The initial back fill materials used shall be free from large stones & lumps. Back fill shall be placed evenly in a layer of 20cm. thick and compacted as directed by the Engineer-in-charge. This shall be continued till the ground surface in the general area and up to the bottom level of rubble soling in the case of surfaced area/ road crossing. At surfaced area/ road crossing, above the filling thus made rubble and metal soling blinded with excavated sand/ earth shall be formed by hand packing with available rubble metal etc. and compacting this base course as per the direction of Engineer-in-charge.

- 5.2** The surplus excavated material shall be cleared from the site and disposed off with in a lead of 2 to 4 Km as directed by the Engineer-in-charge, which will be measured and paid under separate item.

6. INSTALLATION OF SLUICE VALVE

Sluice Valve: A valve in which the flow of water is cut off by means of a circular disc., fitting against machine-smoothed faces, at right angles to the direction of flow. The disc is raised or lowered by means of a threaded stem connected to the handle of the valve; the opening in the valve is usually as large as the full bore of the pipe.

- 6.1** The sluice valves shall conform to IS: 780. The valves are used in a pipe line for controlling or stopping flow of water. These shall be of specified size and class and shall be of inside non-raising screw type up to 300 mm size and raising or non-raising screw type above 300 mm with either double flange or double socket ends and cap or hand wheel. These shall in all respects comply with the Indian Standard Specification IS 780 for valves up to and including 300 mm size and for valves above 300 mm size. Class I sluice valves are used for maximum working pressure of 10 Kg/sq.cm (100 metre head) and class II sluice valve for 15 Kg/sq.cm (150 metre head). The body, domes covers, wedge gate and stuffing box shall be of good quality cast iron, the spindle of bronze, and the nut and valve seats of leaded tin bronze. The bodies, spindles and other parts shall be truly machined with surface smoothly finished. The area of the water way of the fittings shall be not less than the area equal to the nominal bore of the pipe. The valve shall be marked with an arrow to show the direction of turn for closing of the valve.

- 6.2** The valve shall be fully examined and cleared of all foreign matter before being fixed. The fixing of the valve shall be done by means of bolts, nuts and 3 mm rubber insertions or chemically treated compressed fiber board 1.5 mm minimum thickness and of weight not less than 0.183 gm./sq.cm. with the flanges of spigot and the socketed tail pieces drilled to the same specification in case of S&S pipes and with flanges in case of flanged pipes. The tail pieces shall conform to IS 1938. These shall be jointed to the pipe line by means of lead caulked joints.

6.3 Measurements

Sluice valve shall be enumerated.

6.4 Rate

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

7. INSTALLATION OF WATER METER

- 7.1** The water line shall be cut to the required length at the position where the meter and stop cock are required to be fixed. The ends at the pipe shall then be threaded. The meter and stop cock shall be fixed in position by means of connecting pipes, G.I. jam nut and socket etc. The stop cock shall be fixed near the inlet of the water meter. The paper disc inserted in the nipples of the meter shall be removed and the meter installed exactly horizontal or vertical in the flow line in the direction shown by the arrow cast on the body of the meter. Care shall be taken that the factory seal of the meter is not disturbed. Wherever the meter shall be fixed to a newly fitted pipe line, the pipe line shall have to be completely washed before fitting the meter. For this

purpose a piece of pipe equal to the length of the meter shall be fitted in the proposed position of the meter in the new pipe line. The water shall be allowed to flow completely to wash the pipe line and then the meter installed as described above by replacing the connecting piece.

8. TESTING OF JOINTS

8.1 The pipes and fittings after they are laid and jointed shall be tested to hydraulic pressure of 6 Kg/sq.cm (60 meter). The pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The draw off taps and stop cocks shall then be closed and specified hydraulic pressure shall be applied gradually. Pressure gauge must be accurate and preferably should CPWD SPECIFICATIONS 2009 820 have been recalibrated before the test. The test pump having been stopped, the test pressure should be maintained without loss for at least half an hour. The pipes and fittings shall be tested in sections as the work of laying proceeds, having the joints exposed for inspection during the testing. Pipes or fittings which are found leaking shall be replaced and joints found leaking shall be redone, without extra payment

9. WET MIX MACADAM BASE (WMM)

9.1 The work consists of providing, laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass for 200mm thick in two layers over Soling/subbase to lines and grades as per drawings and directions of the Engineer-in-Charge.

9.2 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 grade 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 hand rammer/hand roller.
- (b) Any displacement occurring as a result of reversing of the direction of the roller or from any other cause shall be corrected at once as specified and/or removed and made good.
- (c) 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.
- (d) 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.
- (e) 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)
- (f) 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.

9.3 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.

9.4 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.

9.5 Measurement for payment

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

9.6 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.

10. BITUMEN EMULSION TACK COAT/ PRIME COAT OVER WET MIX MACADAM

10.1 General

10.1.1 The work consists of application of single coat of low viscosity bituminous material on the WMM layer laid preparatory to superimposition of bituminous macadam to be laid.

10.1.2 The primer shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Surfaces which are to receive emulsion primer should be damp, but no free or standing water shall be present.

10.1.3 The primer distributor shall be a self propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at the specified rate and temperatures. Small areas, inaccessible to the distributor or narrow strips shall be sprayed with a pressure hand sprayer, or as directed by the Engineer-in-Charge.

10.2 Preparation of surface

The surface finish of granular surface on which bituminous works are to be placed, shall be free from dust. All the loose materials shall be removed from the surface to be primed. Immediately prior to applying the primer the surface shall be carefully swept clean by means of mechanical broom and dust removed by air jet, or other means approved by the Engineer – in-charge, care being taken not to disturb the interlocked aggregate. This is best achieved when the surface layer is slightly moist (lightly sprayed with water and the surface allowed to dry) and the surface should be kept moist until the primer is applied.

10.3 Application of primer

The viscosity and rate of application of the primer shall be as specified in the clauses stated above.. The bituminous primer shall be sprayed uniformly on the prepared surface. The sprayer used for applying primer shall be operated in such a way that will ensure an even distribution of primer on the surface.

10.4 Curing of primer

The primed surface shall be allowed to cure for at least 24 hours or such other period as is found to be necessary to allow all the volatiles to evaporate before any subsequent surface treatment or mix is laid. Any unabsorbed primer shall first be blotted with an application of sand, using the minimum quantity possible. A primed surface shall not be opened to traffic other than that necessary to lay the next course. A very thin layer of clean sand may be applied to the surface of the Primer, to prevent the primer picking up under the wheels of the paver and the trucks delivering bituminous material to the paver.

10.5 Measurement for payment

Prime coat shall be measured in terms of surface area of application in square meters.

10.6 Rate

The contract unit rate for prime coat shall be payment in full for carrying out the required operations as specified above. The rate quoted shall also include the cost of labour, materials, plants and equipments etc. required for surface preparation and providing prime coat.

11. BITUMEN EMULSION TACK COAT OVER ALREADY PRIMED WMM SURFACE

11.1 General

(i) The work consists of application of a single coat of bitumen emulsion (RS) over the already primed surface.

(ii) The tack coat distributor shall be a self-propelled or towed bitumen pressure sprayer, equipped for spraying the material uniformly at specified rate. Small areas, inaccessible to the distributor or narrow strips shall be sprayed with pressure hand sprayer, or as directed by the Engineer-in-charge.

11.2 Preparation of base

The surface on which tack coat is to be applied shall be clean and free from dust, dirt, and any extraneous material. Immediately before the application of the tack coat, the surface shall be swept clean with a mechanical broom and high pressure air jet, or by other means as directed by the Engineer-in-charge.

11.3 Application of Tack coat

The rate of application of the tack coat shall be as specified in the clauses 7.14. The bitumen emulsion shall be sprayed uniformly on the prepared surface. The sprayer used for applying tack coat shall be operated in such a way that will ensure an even distribution of primer on the surface. The normal range of spraying temperatures for a bituminous emulsion shall be 20°C to 70°C. Excessive deposits of emulsion on the surface caused by stopping and starting the sprayer or distribution by leakage should not be allowed, spraying shall in all case be carried out parallel to the centre line of the surface. Tack coat shall be applied just ahead of the oncoming bituminous macadam and bituminous concrete construction and shall be left to cure until all the volatiles have evaporated before any subsequent construction is started. No plant or vehicles shall be allowed on the tack coat other than those essential for the construction.

11.4 Measurement for payment

Tack coat shall be measured in terms of surface area of application in square metres.

11.5 Rate

(i) The contract unit rate for tack coat shall be payment in full for carrying out the required operations as specified above. The rate quoted shall also include cost of labour, material, plants and equipments etc. required for surface preparation and providing tack coat.

(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.

12. BITUMINOUS MACADAM

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

12.1 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.

12.2 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 7.6 above.

12.3 Applying Tack Coat

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

12.4 Mixing and transportation of the mixture

12.4.1 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 14⁰C. 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.

12.4.2 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.

12.4.3 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 laid 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.

12.4.4 Rolling

The compaction shall carry out in accordance with the provisions of clauses specified 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.

12.4.5 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.

12.4.6 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.

12.4.7 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 7.14 below.

13. BITUMINOUS CONCRETE WEARING COURSE

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

13.1 Mix design

The mix for bituminous concrete shall be design mix. The mix shall meet the following requirements set out in Table 500-19 of MORT & H's Specification for Road and Bridge works below.

Table 500 -19 Requirements for Bituminous Concrete

Minimum stability (KN at 60°C)	9
Minimum flow(mm)	2
Maximum flow (mm)	4
Compaction level (Number of blows)	75 Blows on each of the two faces of the specimen
Percent air voids	3-6
Percent voids in mineral aggregate (VMA)	12-14
Percent voids filled with bitumen (VFB)	65-75
Loss of stability on immersion in water at 60°C (ASTM D 1075)	Minimum 75 percent retained strength

13.2 Job Mix Formula

(i) The contractor shall bring the job mix formula proposed for use in the works collected from National Highways Authorities or State Govt. Departments including the following details:

- a. Source and location of all materials.
- b. Proportions of all materials expressed as follows each is applicable
 - i. Binder type, and percentage by weight of total mixture.
 - ii. Coarse aggregates/ fine aggregate/ mineral filler as percentage by weight of total aggregate including mineral filler.
- c. A single definite percentage passing each sieve for the mixed aggregate.
- d. The individual gradings of the individual aggregate fractions, and the proportion of each in the combined grade.
- e. The results of tests enumerated in **Table 500-19** as obtained by the Contractors.
- f. Where the mixer is a batch mixer, the individual weights of each type of aggregate, and the binder per batch.
- g. Test results of physical characteristics of aggregates to be used:
- h. Mixing temperature and compacting temperature.

All supporting details of the Job mix Formula, Test certificate etc. shall be got approved by the Engineer-in-Charge of the work before carrying out the work.

13.3 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 10oC or when the wind speed at any temperature exceeds 40 km per hour at 2m height unless specially approved by the Engineer-in-Charge.

13.4 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.

13.5 Mixing and transportation of the mix

13.5.1 Mixing

Pre-mixed bituminous materials, such as 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 14⁰C. 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.

500 -5 Manufacturing and rolling temperatures

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 work shall be stored at 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 for the material/ work by the department staff at the plant site shall be arranged by the contractor without any extra cost to the department.
- b) Storage tanks of adequate capacity for storing bitumen required for the work shall be arranged by the contractor at his 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 days 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 worksite.

13.6 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.

13.7 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 leveled 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.

13.8 Rolling

The compaction shall carried out in accordance with the provisions of clauses 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.

13.9 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 8-10 tonnes dead weight smooth-wheeled rollers. The finish rolling shall be done with 8-10 tonnes 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.

13.10 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 & Bridges works shall apply**.

13.11 Measurement for payment

- (i) Bituminous concrete shall be measured as finished work in square meters on the basis of area of work done.
- (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.

14. QUANTITIES OF MATERIALS TO BE USED FOR VARIOUS ITEMS OF WORKS

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

a)	200mm thick rubble soling	For one Square metre
	Granite Rough Stone	400.00 Kg
b)	Wet Mix Macadam	For one cubic metre

	45mm to 22.40mm metal	0.40m ³
	22.40mm to 2.36mm	0.53m ³
	2.36mm to 75 micron	0.40m ³
c)	Bitumen Emulsion Tack coat / Priming coat over WMM	For 10 Square metre
	Bitumen Emulsion (MS) Medium Setting	4.00Kg
d)	Bitumen Emulsion Tack coat	For 10 Square metre
	Bitumen Emulsion (RS) Rapid Setting	2.50Kg
e)	Bituminous Macadam	For one cubic Metre
	Bitumen VG-30 grade	73.00 Kg
	25 to 10 mm metal	0.57m ³
	10 to 5 mm	0.57m ³
	5mm and below	0.28m ³
	Total	1.42m ³
f)	Bituminous Concrete	For one cubic metre
	Bitumen VG 30 grade Minimum bitumen content	5% by weight of total mix
	Aggregates and filler	As per mix design

SIGNATURE OF TENDERER

COCHIN PORT AUTHORITY

**PROVIDING DUCTILE IRON FRESH WATER SUPPLY PIPE LINE TO THE
PLOT ALLOTTED TO CSL FOR ISRF AT MATTANCHERRY HALT**

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

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