COCHIN PORT AUTHORITY
COCHIN-682009, KERALA, INDIA
Tele: 91-0484-2666414, 2666871
Telefax: 91-0484-2666414
E-mail:coptce@gmail.com

TENDER DOCUMENT FOR RECTIFICATION AND RESURFACING OF VARIOUS ROADS AT WILLINGDON ISLAND

TECHNICAL BID (e-Tendering Mode)

Website:www.tenderwizard.com/CPT

CHIEF ENGINEER'S OFFICE
COCHIN PORT AUTHORITY
COCHIN-682009

TENDER No.T6/T-1994/2023-C **Rs.1,770/- (Rs.1,500/-+18% GST)**

COCHIN PORT AUTHORITY

TENDER FOR 'RECTIFICATION AND RESURFACING OF VARIOUS ROADS AT WILLINGDON ISLAND'.
(Tender No.T6/T-1994/2023-C)

CONTENTS

SIGNATURE OF TENDERER

COCHIN PORT AUTHORITY

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

Tender No. T6/T-1994/2023-C **Date : 19/06/2023**

NOTICE INVITING TENDER

Electronic Tenders **(e-tenders)** on percentage basis are invited by Cochin Port Authority on behalf of GoI from reputed contractors in Single Stage Two Cover bidding procedure [Technical Bid and Financial Bid], meeting the Minimum Eligibility Criteria specified below for the work of **"Rectification and Resurfacing of various roads at Willingdon Island".**

1. ***Minimum Eligibility Criteria:***

a) Experience

The tenderers should have experience of having successfully completed during the last 7 (seven) years ending **31st May, 2023,** at least either:

i) Three Similar Works each costing not less than **Rs.34.34 lakhs**

(OR)

ii) Two Similar Works each costing not less than **Rs.42.93 lakhs**

(OR)

iii) One Similar Work costing not less than **Rs.68.68 lakhs**

b) Financial Turnover

Average Financial Turnover of the tenderer over the last three financial years ending 31st MAy 2022 *[2019-'20, 2020-'21 & 2021-'22]* shall not be less than **Rs.25.76 lakhs.**

Explanatory Notes to a) & b) :

i. Similar work(s) means "***Civil Construction work / Civil Repair Works / Construction or Repair works of roads*".** 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 owner/ responsible officer of the owner under whom he has executed such contract shall be attached. The certificate shall contain details of work involved specifying the nature of work, the completion cost of the work, date of commencement & date of completion of the work.

iii. The works reckoned for the above purpose are those executed by the tenderers as prime Contractor or proportionately as member of joint venture or Sub Contractor. The Sub-Contractor shall be an authorized and approved Sub-Contractor by the Employer of the work(s) against which the tenderer has claimed his experience. The tenderer shall attach attested copy(s) of approval issued by the Employer(s) authorizing as a Sub-Contractor; in proof of the claim of the tenderer as a sub-Contractor. The tenderer is also obliged to produce the original of the certified copy(s) on request by the department.

iv. Following enhancement factors will be used for the costs of works executed for bringing the financial figures to a common base value in respect of the works completed in the past years.

Table 1

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

v. **Financial Turnover:**

In proof of Financial Turnover Audited Annual Accounts Statements (Balance Sheet & Profit & Loss Account Statement) & Turnover Certficate or IT returns duly acknowledged by the Income Tax department along with Computation Statement signed by the Chartered Accountant, for the last three years shall be produced by the tenderer.

2. **Other Eligibility Considerations**

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

i) made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or

ii) record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures, black listing/ debarring by Govt. departments etc.

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

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

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

Table 2

Sl. No.	Particulars	Date and Time
1	Tender e- publication date	***19 -06-2023***
2	Download period of Bid Documents	***19 -06-2023 to 10-07-2023***
3	Date of Pre-Bid meeting	***Not Applicable***
4	Last date for seeking clarification	***30-06-2023***
5	Last date and time of submission of Bid	***10-07-2023*** **up to 14.30 hrs**
6	Date and time of opening the Bid	***10-07-2023*** **after 15.00 hrs**

ii) Bid information :

Table 3

i)	Estimated Amount put to Tender	**: Rs.84,85,370/-**
ii)	Earnest Money Deposit	: **Rs.84,860/-** furnished through Demand Draft or Banker's Cheque drawn in favour of Financial Adviser & Chief Accounts Officer, CoPA from any Nationalised Bank/ Scheduled Bank in India.
iii)	Cost of Bid document	Rs.1,770/- (Rs.1,500/-+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 Nationalized Bank/ Scheduled Bank in India, being the cost of single copy of the tender document
iv)	Validity period of Tender	120 days from the Last Date of Submission of Bid.
v)	Time for Completion	**4 Months**

4. This work essentially comprises of the following:
   i. Providing and applying Tack Coat.
   ii. Providing and laying Bituminous Macadam.
   iii. Providing and laying Bituminous Concrete.
   iv. Providing and applying retro reflective road marking strips..
   v. Demolishing Cement Concrete.
   vi. Providing Wet Mix Macadam.
   vii. Providing Bitumen Premix in 80mm layers.
   viii. Providing Close Graded Premix surfacing.
5. Tender documents can be downloaded from the e-Tendering portal *www.tenderwizard.com/CPT* on the dates specified in Table 2 given above by making online requisition. Bid document will also be available in Cochin Port website (www.cochinport.gov.in) as well as Govt. tender website, www.eprocure.gov.in, which can be downloaded for submission. The cost of bid document shall be furnished in the form of Demand Draft/ Banker's Cheque drawn in favour of FA & CAO, CoPA. The bidder shall submit the Originals of (i) DD / Bankers Cheque towards the cost of tender and EMD and (ii) Power of Attorney in favour of signatory(s) to the tender, with letter of submission in a sealed cover to the **Suptdg. Engineer(CM), Cochin Port Authority, W/Island, Cochin-682009, Kerala,** within 3 (Three) working days from the date of opening**. Non submission of original financial documents towards cost of tender document and EMD within 3 (Three) working days from the date of opening, will make the tender liable for rejection.**
6. The bidders need to obtain the one time User ID & password for log-in to in **e-Tendering** system from the service provider **KEONICS** by paying registration amount of **Rs.1124/-** by online Payment using Credit/Debit Card/Net banking or DD in favour of "KSEDCL, Bangalore".
7. The intending bidder must have valid Class-II or III digital signature certificate to submit the bid. For further details and to obtain the digital signature, please contact e-Tender Help Desk No.080-40482000 / 9746118529 / 9605557738.
8. Tenders shall be submitted "**online"** strictly in accordance with the Instructions to Tenderers and Terms & Conditions given in the tender document.
9. The bidder is responsible to download Addenda/ Amendments/ Errata/ Replies to the queries of the bidders etc., if any, issued by the Employer, from the website before submission of the bid. **Any shortfall in uploading the said Addenda/ Amendments/ Errata/ Replies to the queries of Tenderer etc. duly signed along with the downloaded documents while uploading the Tender will render the Tender incomplete and incomplete Tender Documents may be rejected**.
10. All Bids are to be submitted **online only** on the website www.tenderwizard.com/ COPT. No Bids shall be accepted off-line (Hard copy).
11. Original DD / Bankers Cheque towards the cost of tender and EMD, shall be submitted in a sealed cover to the **Suptdg. Engineer (CM), COCHIN PORT**

AUTHORITY, W/Island, Cochin-682009, KERALA, and these original documents shall be reached to the employer within 3 (THREE) working days from the Bid Due date. Non submission of original financial instruments towards the cost of tender document, EMD, within the above period leads to disqualification of Bids.

12. The intending bidder must have valid Class-II or III digital signature certificate to submit the bid. **For further details, please contact e-Tender Help Desk No. 080-40482000/ 9746118529/9605557738.**

13. **EARNEST MONEY TO BE DEPOSITED**

13.1 Each tender should be accompanied by an Earnest Money amounting to **Rs.84,860/-**.

13.2 The Earnest Money can be deposited through Demand Draft or Banker's Cheque or Pay Order from a Scheduled Bank in India, drawn in favour of Financial Adviser & Chief Accounts Officer, Cochin Port Authority. The original DD/ Banker's Cheque/ Pay Order shall be submitted to the SE(CM), Cochin Port Authority, Cochin-9, **within 3 (THREE) working days from the Bid Due date.**. Scanned copy of the DD/ Banker's Cheque/ Pay Order shall be attached with the tender submitted "online". The Earnest Money deposited will not carry any interest.

13.3 EMD shall be refunded to the Contractor on acceptance of Performance Security and entering into agreement.

14. Cochin Port Authority will not be held responsible for any technical snag or net work failure during online bidding. It is the bidder's responsibility to comply with the system requirements i.e. hardware, software and internet connectivity at bidder's premises, to access the e-Tender portal. Under any circumstances, Cochin Port Authority shall not be liable to the bidders for any direct/indirect loss or damages incurred by them arising out of incorrect use of the e-Tender system or internet connectivity failures.

15. The Bidder shall submit Originals of: (i) DD / Banker's Cheque towards the cost of Tender document and EMD; and (ii) Power of Attorney along with letter of submission in a sealed cover **to the Suptdg. Engineer(CM), Cochin Port Authority, W/Island, Cochin – 682009, KERALA**, , **within 3 (THREE) working days from the Bid Due date**. **Non submission of original financial document towards cost of Tender document and EMD etc as above will be liable for rejection**.

16 Securities:

16.1 Security Deposit (SD) shall be 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.

16.2 **Performance Security:** The Performance Security retained till end of Defect Liability period (1 year from the date of completion of work) shall be 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.

16.3 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 letter of acceptance or such extension of that period as may be permitted by the Engineer in writing, and shall be furnished in one of the following forms:

i) Banker's Cheque/Demand Draft/Pay Order of a Scheduled Bank.

ii) An irrevocable Bank Guarantee(BG) enforceable and encashable at Cochin, drawn from any Scheduled Bank operating in India as per the prescribed proforma.

16.4 The Security Deposit/ Performance Security retained till end of Defects Liability Period **(1 year from the date of completion)** shall be 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. **The BG furnished towards the Performance Security shall be valid until a date 30 days from the day of expiry of the Defect Liability Period stipulated as per the terms of the Contract**.

16.5 Unless Performance Security is furnished within the period as specified above or such extension of that period as may be permitted by the Engineer in writing, tenderer will be suspended and shall not be eligible to participate in the tenders invited by COCHIN PORT AUTHORITY for a period of **Two Years from the date of such suspension order**.

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

16.7 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.**

16.8 **The Performance Security retained till end of Defect Liability Period shall be 5% of Contract Value or Cost of Work Done, whichever is higher**.

16.9 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.

16.10 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, upon completion of the Defects Liability Period.

17 In the event of the tenderer, after the issue of the communication of acceptance of offer by the Board, failing /refusing to execute the agreement as hereinafter provided, the tenderer shall be deemed to have abandoned the Contract and such an act shall amount to and be construed as the Contractor's calculated and willful breach of the Contract, the cost and consequence of which shall be to the sole account of the tenderer and upon such an event, the Board shall have full right to claim damages therefore either together with or in addition to the forfeiture of Earnest Money Deposit.

19 **Signing of Agreement:**

19.1 The successful tenderer will be required to execute within **21 days** from the date of receipt of work order, an agreement at his expense on proper value Kerala State Stamp Paper in the prescribed departmental form, consisting of:

a) The Tender Notice, all the documents including additional conditions/specifications and drawings, if any, forming the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading there to, and

b) General Conditions of Contract-2016 (GCC), for the due and proper fulfillment of the Contract.

19.2 The Contractor shall make 10 copies of the Agreement and submit to CoPT within 7 days following the date of signing of Agreement.

20 Till signing of agreement the tender together with the acceptance letter shall constitute a binding Contract between the Contractor and Cochin Port.

1.21 Failure to comply with conditions **3ii(iv), 16 and 19** above will entail forfeiture of the Earnest Money.

16. **MSME Bidders who are registered with District Industries Centre (DIC) or Khadi and Village Industries Commission (KVIC) or Khadi and Village Industries Board (KVIB) or Coir Board or National Small Industries Corporation (NSIC) or directorate of Handicrafts and Handlooms or Udyog Aadhaar Memorandum or any other body specified by Ministry of MSME for similar nature of Works shall be eligible for issue of Bid Document free of cost and exemption from payment for issue of tender document & payment of EMD. They are required to submit documentary proof of such registration along with the offer, as detailed in Instructions to Bidders, for claiming the available exemptions and a scanned copy of Exemption Certificate duly notarized shall be uploaded in the e-Tender Portal. If the Registration Certificate does not pertain to the Category of 'Similar Works' mentioned above, the Tender will be rejected**.

17. The undersigned reserves the right to reject/cancel/postpone any one or all tenders at any stage of the tender, which shall be binding on all bidders.

18 Tenders which do not fulfill all or any of the above conditions or which contain any other condition of any sort including conditional rebates or are incomplete in

any respect is liable for rejection. Such tenders shall be entered in the tender opening register but their rates shall neither be read out nor entered in the register. Only remark mentioning the reason of rejection in brief shall be appended against such entry.

19 Canvassing in connection with tender is strictly prohibited and tenders submitted by the Contractors who resort to canvassing will be liable to rejection.

20 **Taxes and Duties**:

20.1 Deductions towards statutory taxes as per the rules, prevailing in force at the time of payment of bills shall be made while releasing the bill amount.

20.2. GST for the work will be paid extra by the Port. The GST applicable as per law can be billed on the Port Authority, which will be paid to the Contractor by the Board along with the bills, for which the Contractor holds valid GST Registration number and the GST is being collected. The following are also to be considered while claiming payment towards GST:

i. Invoice in specific format should be provided by the Contractor for every payment.
ii. GST Registration Number of COCHIN PORT AUTHORITY and the Contractor is to be clearly mentioned with all the bills.
iii. Invoice should be attached along with the running bills.
iv. The Contractor shall comply all the GST regulations, viz.; timely uploading of invoices and issue of debit/ credit notes.

20.3. Any stipulation by a tenderer that taxes and duties deductable from these bills should be borne by the Port Authority will result in the summary rejection of his /their tender.

21 Cess as per Building and other Construction Workers Welfare Cess Act (Act 28 of 1996) at the rate of one percent or at the rates prevailing in force at the time of payment of bills, of the cost of construction should be borne by the Contractor and the same will be deducted from Contractor's bills while making payment or when crediting amount to Contractor's account.

22 This Tender Notice shall form part of the Contract.

Sd/-

Suptdg. Engineer(CM)
COCHIN PORT AUTHORITY
FOR AND ON BEHALF OF THE BOARD OF MAJOUR PORT AUTHORITY FOR COCHIN PORT

2. TENDER FOR WORKS

To

The Board of
Majour 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.

M E M O R A N D U M

a)	General description of work	:	**Rectification and Resurfacing of various roads at Willingdon Island**
b)	Estimated cost	:	**Rs.84,85,370/-**
c)	Earnest Money	:	**Rs.84,860/-**
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 Retension 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 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 said conditions of Contract annexed here to so far as applicable or in default thereof forfeit and pay to the Board the sum of money mentioned in the said conditions and to execute an agreement with the Board in the prescribed form or in default thereof to forfeit the Earnest Money deposited by me/us. The sum of Rs..... has been deposited with Financial Adviser and Chief Accounts Officer of the Port Authority as Earnest Money: (a) the full value of which is to be absolutely forfeited to the Board in office without prejudice to any other rights or remedies of the said Board in office should I/We fail to commence the work specified in the Contract Data or should I/We not deposit the full amount of Performance Security specified in the Contract Data in accordance with clause 52 of the said conditions of Contract otherwise the said sum of Rs. ..... shall be retained by the Board as on account of such security deposit as aforesaid; or (b) the full value of which shall be retained by the Board on account of the security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, upto maximum of the percentage mentioned in Contract Data and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 40.3 of the Conditions of Contract.

Dated the .....……..... day of …… 2023

Signature of the Tenderer

Address :

Witness :

Address :

Occupation :

ACCEPTANCE

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

Dated the ……..day of …….....……2023.

Dated……

Chief Engineer

COCHIN PORT AUTHORITY

3. CONTRACT DATA

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

<table>
<tr><th>Sl. No.</th><th>Description</th><th>Reference Clause No. in GCC</th></tr>
<tr><td>1</td><td>The following documents are also part of the Contract</td><td></td></tr>
<tr><td></td><td>The Schedule of other Contractors</td><td>(8.2)</td></tr>
<tr><td></td><td>The Schedule of Key personnel – As per Tender
<table>
<tr><th>Qualification of Staff</th><th>No.</th><th>Min. Experience (Years)</th><th>Rate of recovery in case of non-compliance</th></tr>
<tr><td>Graduate Engineer

or

Diploma Engineer</td><td>1

1</td><td>2

5</td><td>Rs.15,000/- p.m

Rs.15,000/- p.m</td></tr>
</table></td><td>(9)</td></tr>
<tr><td>2</td><td>The Employer is:</td><td>(1)</td></tr>
<tr><td></td><td>The Board of Majour Port Authority for Cochin Port,
COCHIN PORT AUTHORITY,
Cochin -9.</td><td></td></tr>
<tr><td></td><td>Name of Authorized Representative:</td><td></td></tr>
<tr><td></td><td>Name : Dr. M. Beena,
Chairperson,
Cochin Port Authority,
Cochin -9.</td><td></td></tr>
<tr><td>3</td><td>The Engineer is</td><td></td></tr>
<tr><td></td><td>Name : Smt.E.Rema,
Chief Engineer,
Cochin Port Authority,
Cochin-9.</td><td></td></tr>
<tr><td></td><td>Name of Nominee/Engineer-in-Charge:
Name: Sri. Sathyan.A.G, Suptdg. Engineer(CM)</td><td></td></tr>
</table>

<table>
<tr><th>Sl. No.</th><th>Description</th><th>Reference Clause No. in GCC</th></tr>
<tr><td>4</td><td>Name of Contract- Providing interlocking paver blocks infront of CFS gate and road between Drishti building & CFS.
Tender No. T6/T-1994/2023-C</td><td>(1)</td></tr>
<tr><td>5</td><td>10 copies of Contract Agreement shall be furnished by the Contractor</td><td>(7.1)</td></tr>
<tr><td>6</td><td>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</td><td>(7.2)</td></tr>
<tr><td>7</td><td>The Intended completion date for the whole of the Work is 4 Months with the following milestones:</td><td>(17,28)</td></tr>
<tr><td>8</td><td>Milestone dates:
<table>
<tr><th>Physical works to be completed</th><th>Period from the date of receipt of LoA to proceed with the work</th></tr>
<tr><td>4 Months</td><td>7 days</td></tr>
</table></td><td></td></tr>
<tr><td>9</td><td>The following shall form part of the Contract Document:
(1) Agreement
(2) Letter of Acceptance
(3) Bill of quantities
(4) Contractor’s Bid
(5) Correspondence exchanged after the opening of the Bid and before the issue of Letter of Acceptance by which the Condition of Contract are amended, varied or modified in any way by mutual consent (to be enumerated).
(6) Contract Data
(7) General Conditions of Contract
(8) General Description and Special Conditions of Contract
(9) Technical Specifications
(10) Drawings if any and
(11) Any other documents listed in the Contract Data</td><td>(2.3)</td></tr>
</table>

Sl. No.	Description	Reference Clause No. in GCC
	as forming part of the Contract.	
10	The Contractor shall submit a Program for the Works within 21 days of date of the Letter of Acceptance.	(27)
11	**The site possession date** The site will be handed over within **7 days** after issue of LoA.	(21)
12	The start date shall be **7 days** from the date of receipt of the Letter of Acceptance (LoA) by the Contractor.	(1)
13	The site is located in W/Island.	
14	The Defects Liability Period: **One year from the date of completion of the work.**	(36)
15	The minimum insurance cover for physical property, injury and death is **Rs.10 lakhs (Rupees Ten lakhs)** per occurrence with the number of occurrences unlimited. After each occurrence, Contractor will pay additional premium necessary to make insurance valid always. Also refer Clause 4 of Special Conditions of Contract – Section III of this tender document.	(13)
16	The following events shall also be Compensation Events: **NIL**	(44)
17	The period between Programme updates shall be 30 days.	(27)
18	The amount to be withheld for late submission of an updated programme shall be **------- NA**	(27)
19	The language of the Contract documents is **English.**	(3)
20	The law, which applies to the Contract, is the law of Union of India.	(3)
21	The currency of the Contract is **Indian Rupees.**	(46)
22	The proportion of payments retained (Retention Money) shall be 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:	

Sl. No.	Description	Reference Clause No. in GCC
	NA	
25	Repayment of advance payment for mobilization: **NA**	(51)
26	Repayment of advance payment for Construction and equipment: **NA**	(51)
27	Repayment of Secured Advance	(51)
28	The date by which "as-built" drawings are required is within 90 days of issue of certificate of completion of whole or section of the work, as the case may be: **NA**	(58)
29	The amount to be withheld for failing to supply "as built" drawings and/or operating and maintenance manuals by the date required is ------- **NA**	(58)
30	Schedule of Rates Applicable: CPWD DSR 2018 + 55% Cost Index x 0.8768 for deducting GST.	
31	Base Rate for materials to be considered for price variation **NA**	(47)
32	Permissible wastage on theoretical quantities of (a) Cement : (+) 2% (b) Steel Reinforcement and structural steel sections for each diameter, section and category : (+) 5.99 % (c) Bitumen/Bitumen emulsion : (+) 2.5%	(47)

4. INSTRUCTIONS TO TENDERERS

4.1 Electronic Tenders (e-tenders) on percentage basis under "Two Cover system" are invited for **"Rectification and Resurfacing of various roads at Willingdon Island"**

4.2 The tenderer shall submit the tender Cover-A (Hard Copy of EMD & Cost of Tender form) **within 3 (THREE) working days from the Bid Due date**. All the Technical Bid documents & Price Bid shall be submitted **"online".**

4.3 The Tender Document will be available as three separate files in the e-tendering Portal:

i. A. Technical Bid Documents (as per Sl. No 1 to 7 of the Contents sheet)
ii. B. Price Bid: Schedule of quantities of Work- Schedule-A and
iii. C. General Conditions of Contract-2016

4.4 The tenderer shall upload the documents indicated in 4.3 (i) & (iii) above and also the Schedule of Quantities(Percentage) [as per Cl.4.3(ii), duly filled in, **"online".**

4.5 SUBMISSION OF TENDERS

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

4.5.2 Technical Bid (Online mode)

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

a) A covering letter from the tenderer enlisting the enclosures/ attachments.
b) Original Tender Document (Technical Bid) except Schedule of Quantities.
c) Copy of the documents in proof of fulfillment of the Minimum Qualification Criteria.
d) Copy of PAN Card, ESI/EPF & GST Registration documents.
e) Copy of Authorisation documents of Signatory of the bid in case of Registered Partnership firm / Limited company
f) Partnership deed or Memorandum and Article of Association of the company and registration certificate of the company as the case may be.
g) Any other relevant document.

4.5.2.3 Scanned copies of all documents as per Clause 4.5.2, EMD and Cost of Tender Form shall be submitted as "Technical Bid".

4.5.2.4 Departmental Tender Document (except Schedule of Quantities), along with scanned copies of Cost of Tender form, EMD and other documents as per Clause 4.5.2 shall be submitted **'online'** before 14.30 hrs of opening date of the Tender.

In no case shall filled in Price Bid - Schedule of Quantities be submitted in hard copy, as it shall result in rejection of the tender.

4.5.3 Price Bid:

4.5.3.1 Price Bid shall contain only the "Schedule of Quantities", which shall be **submitted only in e-tendering mode.**

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

4.6 Minimum Eligibility Criteria:

a) Experience

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

i) Three Similar Works each costing not less than **Rs.34.44 lakhs**

(OR)

ii) Two Similar Works each costing not less than **Rs.42.93lakhs**

(OR)

iii) One Similar Work costing not less than **Rs.68.68 lakhs**

b) Financial Turnover

Average Financial Turnover of the tenderer over the last three financial years ending 31st March 2021 *[2018-'19, 2019-'20& 2020-'21]* shall not be less than **Rs.25.76 lakhs.**

Explanatory Notes to a) & b) :

i. Similar work(s) means "***Civil Construction work / Civil Repair Works / Construction or Repair works of roads*".** The experience certificate of works executed in private sectors/ organisations shall be considered for qualification, only on submission of TDS (Form 26AS) certificate along with work order and completion certificate.

ii. Copy of completion certificates of each work issued by the owner/ responsible officer of the owner under whom he has executed such contract shall be attached. The certificate shall contain details of work involved specifying the nature of work, the completion cost of the work, date of commencement & date of completion of the work.

iii. The works reckoned for the above purpose are those executed by the tenderers as prime Contractor or proportionately as member of joint venture or Sub Contractor. The Sub-Contractor shall be an authorized and approved

Sub-Contractor by the Employer of the work(s) against which the tenderer has claimed his experience. The tenderer shall attach attested copy(s) of approval issued by the Employer(s) authorizing as a Sub-Contractor; in proof of the claim of the tenderer as a sub-Contractor. The tenderer is also obliged to produce the original of the certified copy(s) on request by the department.

iv. Following enhancement factors will be used for the costs of works executed for bringing the financial figures to a common base value in respect of the works completed in the past years.

Table 1

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

v. <u>Financial Turnover:</u>

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

c) Other Eligibility Considerations

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

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

ii. record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures, black listing/ debarring by Govt. departments etc.

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

4.7. OPENING AND EVALUATION OF TENDERS

4.7.1 Technical Bids of the tenders received shall be opened at 15.00 hrs. on **10/07/2023,** the last date fixed for receiving the bid, in the SE's chamber in the presence of the tenderers or their representatives as may be present.

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

4.8 GENERAL INSTRUCTIONS TO TENDERERS

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

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

4.8.3 The tenderer is expected to examine the Tender Documents including all conditions, specifications, forms etc and also conditions in the G.C.C. Failure to furnish the information required in the Tender Documents/ G.C.C. or submission of a tender not conforming to the requirements in every respect, is likely to result in the rejection of the tender.

4.8.4 The tenderer shall quote for the work on percentage basis. The departmental rate for each item of work is given in the Schedule of Quantities. The tenderer shall fill the percentage above or below the Departmental rate, in the column provided for the purpose in the Schedule.

4.8.5 In case of discrepancy between the specifications and the drawings, the following order of preference shall be observed:

a. Conditions & Specifications of tender
b. Drawings.
c. B.I.S Specifications.
d. Sound Engineering Practice.

4.8.6. If there are varying or conflicting provisions made in any document forming part of the Contract, the Chief Engineer, Cochin Port Authority, Cochin-682009 shall be the deciding authority with regard to the intention of the document which will be binding on the tenderer/ Contractor.

4.8.7 Any error in description, any omissions there shall not vitiate the Contract or release the Contractor from the execution of whole or any part of the works comprised therein according to specifications or from any of his obligation under the Contract.

4.8.8 The Chief Engineer, Cochin Port Authority shall have the right to omit or Suspend certain items of work or revise or amend the Tender. Documents at any time prior to the due date of submission of the tender. Such revisions or amendments or extensions if any, shall be communicated to all the bidders who have downloaded the Tender Documents, in the form of an addendum by telefax /e- mail / writing. In order to afford the Bidders with reasonable time to take addendum into

account, or for any other reason, the Port Authority may, at its discretion, extend the due date for submission of tender.

4.8.9 All payments due to the Contractor under this Contract will be made in Indian Rupees only.

4.8.10 Tenders received after the date specified for submission shall not be opened.

4.8.11 The Bank Guarantees (BGs) to be furnished by the Contractors in connection with the tender shall be sent to by the Chief Engineer, Cochin Port Authority directly by the issuing bank under registered post with AD. The Contractor shall take the responsibility of sending BGs directly to the Port Authority by the issuing bank.

SIGNATURE OF TENDERER.

5. GENERAL DESCRIPTION AND SPECIAL CONDITIONS OF CONTRACT

1. SCOPE OF WORK

1.1 The proposed work is for "**Rectification and Resurfacing of various roads at Willingdon Island**". The work consists of the following:

i. Providing and applying Tack Coat.
ii. Providing and laying Bituminous Macadam.
iii. Providing and laying Bituminous Concrete.
iv. Providing and applying retro reflective road marking strips..
v. Demolishing Cement Concrete.
vi. Providing Wet Mix Macadam.
vii. Providing Bitumen Premix in 80mm layers.
viii. Providing Close Graded Premix surfacing.

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 Willingdon Island at the following locations.

i. Malabar road from Ad. Block to Embarkation jetty at North End.
ii. Road at South End Reclamation area near M/s.Tropicana & M/s.Konkan Storage System, (Kochi) Pvt. Ltd and
iii. Road leading to Lakshadeep Wharf

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 at the rate of 2% plus surcharge or such other rates as may be specified by the Central

Government from time to time, on the gross amount of the Contractor's bill for payment. The Contractor shall comply all the GST Regulations viz. timely uploading of bills, issue of debit/ credit notes etc.

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.

SIGNATURE OF TENDERER

6. DETAILED SPECIFICATIONS FOR MATERIALS TO BE USED ON WORK

6.1 GENERAL

6.1.1 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.

6.1.2 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.

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

6.1.4 Payment for the materials supplied, shall be given only after they are used on the work.

6.1.5 Tolls are payable by the Contractor as per rules for vehicles using the Port's road for supplying the materials.

6.2 MATERIALS FOR TACK COAT

6.2.1 The binder used for tack coat shall be bituminous emulsion, Medium Setting/ Rapid setting type conforming to IS : 8887.

6.3 BITUMEN

6.3.1 Bitumen used for work shall be of VG-30 grade.

6.3.2 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.

6.3.3 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.

6.3.4 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.

6.4 MATERIALS FOR BITUMINOUS CONCRETE

6.4.1 **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.

6.4.2 **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.

6.4.3 **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.

6.4.4 **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

6.5 MATERIALS FOR HOT APPLIED THERMOPLASTIC MARKING

6.5.1 The thermoplastic material shall be homogenously composed of aggregate, pigment, resin and glass reflecting beads. The colour of the compound shall be white and yellow or as directed by the Engineer-in-charg**e.**

6.5.2 **Composition:** The pigment, beads, and aggregate shall be uniformly dispersed in the resin. The material shall be free from all skins, dirt and foreign objects and shall comply with requirements indicated in Table 800-3 of Ministry of Road Transport & Highways Specification for Road & Bridge work.

Table 800-3 of MORT&H

Proportions of constituents of marking material (Percentage by weight)

Compound	**White**	**Yellow**
Binder	18.0 min.	18.0 min.
Glass Beads	30-40	30-40
Titanium Dioxide	10.0 min.	-
Calcium Carbonate and Inert Fillers	42.0 max.	See Note*
Yellow Pigments	-	

***Note:** Amount of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, provided all other requirements of this specification are met.

6.6 **Reflectorising glass beads**

(i) Reflectorisation shall be achieved by incorporation of glass beads. The glass beads shall be transparent, colourless and free from milkiness, dark particles and excessive air inclusions.

(ii) This Specification covers two types of glass beads to be used for the production of reflectorised pavement markings.

(iii) Type-1 beads are those which are a constituent of the basic thermoplastic compound vide Table 800-3 and Type 2 beads are those which are to be sprayed on the surface as per clause 803.6.3 of Ministry of Road Transport & Highways Specification for Road & Bridge work.

6.6.1 **Gradation**

The glass beads shall meet the gradation requirements as given in Table 800-4 of Ministry of Road Transport & Highways Specification for Road & Bridge work.

Table 800-4 of MORT&H

Graduation requirements for glass beads

Sieve size	Per Cent retained	
	Type 1	Type 2
1.18 mm	0 to 3	-
850 micron	5 to 20	0 to 5
600 –do-	-	5 to 20
425 -do-	65 to 95	-
300 -do-	-	30 to 75
180 -do-	0 to 10	10 to 30
Below 180	-	0 to 15

6.6.2 **Sampling and testing**:

The Contractor shall furnish to the Engineer-in-charge a copy of certified test reports required as per Ministry of Road Transport & Highways Specification for Road & Bridge work from the approved manufacturers of the thermoplastic material and glass beads showing results of all the tests and shall certify that the material meets all requirements of this specification.

6.7 **MATERIALS FOR WET MIX MACADAM**

6.7.1 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.

6.7.2 Grading requirements: The aggregates shall conform to the grading given in Table 2 below:

TABLE 2
(Table 400.13 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	0-5

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.

6.6 **WATER**

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

6.6.2 Cochin Port 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.**

6.6.3 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.

6.7 MATERIALS NOT SPECIFIED

6.7.1 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.

6.8 SAMPLING AND TESTING OF MATERIALS

6.8.1 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.

6.8.2 All the sampling and testing shall be done at the Contractor's cost.

SIGNATURE OF TENDERER

7. DETAILED SPECIFICATIONS FOR ITEMS OF WORKS

7.1 GENERAL

7.1.1 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.

7.2 PROVIDING TACK COAT WITH BITUMEN EMULSION

7.2.1 General

(i) The work consists of application of a single coat of bitumen emulsion (MS) over the already cleaned 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.

7.2.2 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.

7.2.3 Application of Tack coat

The rate of application of the tack coat shall be as specified in the Schedule of Quantities. 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^{o}C to 70^{o}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.

7.2.4 **Measurement for payment**

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

7.2.5 **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.

7.3 PROVIDING AND LAYING BITUMINOUS MACADAM

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

7.3.2 **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^{o}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.

7.3.3 **Preparation of base**

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

7.3.4 **Applying Tack Coat**

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

7.3.5 **Mixing and transportation of the mixture**

Mixing

Pre-mixed bituminous materials, including bituminous macadam and bituminous concrete shall be prepared in a hot mix plant of adequate capacity and capable of yielding a mix of proper and uniform quality with thoroughly coated aggregates. Appropriate mixing temperatures can be found in Table 500-5 of MORT & H's Specification for Road and Bridge works; the difference in temperature between the binder and the aggregate should at no time exceed 14^0 C. In order to ensure uniform quality of the mix and better coating of aggregates, the hot mix plant shall be calibrated from time to time.

Table 7 -1 Manufacturing and rolling temperatures

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

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

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

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

Transporting

Bituminous materials shall be transported in clean insulated vehicles, and unless otherwise agreed by the Engineer-in-charge shall be covered while in transit or

awaiting tipping. Subject to the approval of the Engineer-in-charge a thin coating of diesel or lubricating oil may be applied to the interior of the vehicle to prevent sticking and to facilitate discharge of the material.

Spreading

(i) Except in areas where a mechanical paver cannot access, bituminous materials shall be spread, levelled and tamped by an approved self–propelled paving machine. As soon as possible after arrival at site, the materials shall be supplied continuously to the paver and land without delay.

(ii) The rate of delivery of material to the paver shall be regulated to enable the paver to operate continuously. The travel rate of the paver and its method of operations, shall be adjusted to ensure an even and uniform flow of bituminous material across the screed, free from dragging, tearing and segregation of the material. In areas with restricted space where a mechanical paver cannot be used, the material shall be spread, raked and levelled with suitable hand tools by experienced staff and compacted to the satisfaction of the Engineer-in-Charge..

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

Rolling

The compaction process shall be carried out as per MORTH Specification.

Compaction

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

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

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

(iv) Bituminous materials shall be rolled in a longitudinal direction, with the driven rolls nearest the paver. The roller shall first compact material adjacent to joints and then work from the lower to upper side of the layer, overlapping on successive passes by at least one-third of the width of the rear roll.

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

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

Joints

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

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

Measurement for payment

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

(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 7.10 below.

7.4 PROVIDING BITUMINOUS CONCRETE WEARING COURSE

7.4.1 The work consists of providing 40mm thick Bituminous Concrete Wearing Course on the already provided tack surface.

7.4.2 **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 - 2 Requirements for Bituminous Concrete

(Table 500-19 of MORT & H's Specification)

Minimum stability (KN at 60^{o}C)	9.0
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^{o}C (ASTM D 1075)	Minimum 75 percent retained strength

7.4.3 **Job Mix Formula**

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

i. Source and location of all materials.

ii. Proportions of all materials expressed as follows each is applicable

   a. Binder type, and percentage by weight of total mixture.

   b. Coarse aggregates/fine aggregate/ mineral filler as percentage by weight of total aggregate including mineral filler.

iii. A single definite percentage passing each sieve for the mixed aggregate.

iv. The individual grading of the individual aggregate fractions, and the proportion of each in the combined grade.

v. The results of tests enumerated in Table 500-11 as obtained by the Contractors.

vi. Where the mixer is a batch mixer, the individual weights of each type of aggregate, and the binder per batch.

vii. Test results of physical characteristics of aggregates to be used.

viii. Mixing temperature and compacting temperature.

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

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

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

7.4.4 **Plant Trials- Permissible Variation in Job Mix Formula**

7.4.4.1 Once the laboratory job mix formula is approved, the Contractor shall carry out plant trials at the mixer to establish that the plant can be set up to produce a uniform mix conforming to the approved job mix formula. The permissible variations of the individual percentages of the various ingredients in the actual mix from the job mix formula to be used shall be within the limits as specified in Table 500-13 of MORT& H's Specification for Road and Bridge works below.

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

Table -3
(Table 500-13 of MORT& H's Specification)

Description	**Permissible variation**	
	Base/Binder Course (Bituminous Macadam)	**Wearing course (Bituminous concrete)**

Aggregate passing 90mm sieve or larger	±8%	±7%
Aggregate passing13.2mm.9.5mm	±7%	±6% ±5%
Aggregate passing 4.75mm	±6%	±4%
Aggregate passing 2.36mm,1.18mm,0.6mm	±5%	±3%
Aggregate passing 0.3mm,0.15mm	±4%	±1.5%
Aggregate passing 0.075mm	±2%	±0.3%
Binder content	±0.3%	±10°C
Mixing Temperature	±10°C	

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

7.4.5 Laying Trials

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

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

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

7.4.6 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^{o}C or when the wind speed at any temperature exceeds 40km per hour at 2m height unless specially approved by the Engineer-in-Charge.

7.4.7 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.

7.4.8 Applying Tack Coat

Tack coat shall be provided as directed by the Engineer-in-Charge as per Clause.5.4 above.

7.4.9 Mixing and transportation of the mix

7.4.9.1 Mixing

Pre-mixed bituminous materials, 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 14^{0} C. In order to ensure uniform quality of the mix and better coating of aggregates, the hot mix plant shall be calibrated from time to time.

Table -1 Manufacturing and rolling temperatures
(Table 500-5 of MORT & H's Specification)

Bitumen Penetration	Bitumen Mixing (^{o}C)	Aggregate Mixing (^{o}C)	Mixed Material (^{o}C)	Rolling (^{o}C)	Laying (^{o}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.

e) 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.

f) 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.

g) 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.

h) 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.

7.4.9.2 **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.

7.4.9.3 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 land without delay.

(ii) The rate of delivery of material to the paver shall be regulated to enable the paver to operate continuously. The travel rate of the paver and its method of operations, shall be adjusted to ensure an even and uniform flow of bituminous material across the screed, free from dragging, tearing and segregation of the material. In areas with restricted space where a mechanical paver cannot be used, the material shall be spread, raked and levelled with

suitable hand tools by experienced staff and compacted to the satisfaction of the Engineer-in-Charge..

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

7.4.9.4 **Rolling**

The compaction process shall be carried out as per MORTH Specification. 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.

7.4.9.5 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.

7.4.9.6 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..

7.4.9.7 Surface finish and quality control.

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

7.4.10 Measurement for payment

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

(ii) For one cubic metre of compacted volume of bituminous concrete, quantity of each type of aggregate and filler and bitumen used for the work shall be as per the proportion of ingredients determined in the mix design.

7.4.11 Rate

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

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

7.5 PROVIDING HOT APPLIED THERMOPLASTIC ROAD MARKING

7.5.1 **General**

7.5.2 The work under this section consists of marking traffic strips using a thermoplastic compound **meeting** the requirements specified in clause1.1.49.

7.5.3 The colour, width and layout of road markings shall be in accordance with the Code of practice for Road Markings with paints, IRC: 35 or as directed by the Engineer-in-Charge.

7.5.4 The thermoplastic compound shall be screeded/extruded on to the pavement surface in a molten state by suitable machine capable of controlled preparation and laying with surface application of glass beads at a specific rate. Upon cooling to ambient pavement temperature, it shall produce an adherent pavement marking of specified thickness and width and capable of resisting deformation by traffic.

7.5.5 Road markings shall be of ordinary road marking paint (retro-reflective), hot

applied thermoplastic compound as specified in the item.

7.5.6 The thermoplastic material shall be homogenously composed of aggregate, pigment, resins and glass reflectorizing beads.

7.5.7 The thermoplastic material shall conform to ASTM D36/BS-3262-(Part I).

The material shall meet the requirements of these specifications for a period of one year. The thermoplastic material must also melt uniformly with no evidence of skins or unmelted particles for the one year storage period. Any material not meeting the above requirements shall be

replaced by the manufacturer/supplier/Contractor.

7.5.8 Each container of the thermoplastic material shall be clearly and indelibly marked with the following information:

1. The name, trade mark or other means of identification of manufacturer.
2. Batch number
3. Date of manufacture
4. Colour (White or yellow)
5. Maximum application temperature and maximum safe heating temperature.

7.5.9 **Sampling and Testing :** The thermoplastic material shall be sampled and tested in accordance with the appropriate ASTM/BS method. The Contractor shall furnish to the Engineer-in-Charge a copy of certified test reports from the manufacturers of the thermoplastic material showing results of all tests specified herein and shall certify that the material meets all requirements of this Specification.

7.5.10 **Preparation:**

7.5.10.1 The material shall be melted in accordance with the manufacturer's instructions in a heater fitted with a mechanical stirrer to give a smooth consistency to the **thermoplastic** material to avoid local overheating. The temperature of the mass shall be within the range specified by the manufacturer, and shall on no account be allowed to exceed the maximum temperature stated by the manufacturer. The molten material should be used as expeditiously as possible and for thermoplastic material which has natural binders or is otherwise sensitive to prolonged heating, the material shall not be maintained in a molten condition for more than 4 hours.

7.5.10.2 After transfer to the laying equipment, the material shall be maintained within the temperature range specified by the manufacturer for achieving the desired consistency for laying.

7.5.11 **Properties of Finished Road Marking**

(a) The stripe shall not be slippery when wet.

(b) The marking shall not lift from the pavement in freezing weather.

(c) After application and proper drying, the stripe shall show no appreciable

deformation or discolouration under traffic and under road temperatures upto 60oC.

(d) The marking shall not deteriorate by contact with sodium chloride, calcium chloride or oil drippings from traffic.The stripe or marking shall maintain its original dimensions and position. Cold ductility of the material shall be such as to permit normal movment with the road surface without chopping or cracking.

(e) The colour of yellow marking shall conform to IS Colour No. 356 as given in IS 164.

7.5.12 **Application**

Marking shall be done by fully /semi automatic paint applicator machine fitted with profile shoe, glass beads dispenser, propane tank heater and profile shoe heater, driven by experienced operator as specified in item. For locations where painting cannot be done by machine, approved manual methods shall be used with prior approval of the Engineer-in-charge. The Contractor shall maintain control over traffic while painting operations are in progress so as to cause minimum inconvenience to traffic compatible with protecting the workmen.

7.5.13 The thermoplastic material shall be applied hot either by screeding or extrusion process. After transfer to the laying apparatus, the material shall be laid at a temperature within the range specified by the manufacturer for the particular method of laying being used. The paint shall be applied using a screed or extrusion machine.

7.5.14 The pavement temperature shall not be less than 10o C during application. All surfaces to be marked shall be thoroughly cleaned of all dust, dirt, grease, oil and other foreign matter before application of the paint.

7.5.15 Thermoplastic paint shall be applied in intermittent or continuous lines of uniform thickness of at least 2.5 mm unless specified otherwise. Where arrows or letters are to be provided, thermoplastic compound may be hand-sprayed.

7.5.16 The material, when formed into traffic stripes, must be readily renewable by placing an overlay of new material directly over an old line of compatible material. Such new material shall so bond itself to the old line that no splitting or separation takes place. Thermoplastic paint shall be applied in intermittent or continuous lines of uniform thickness of at least 2.5 mm unless specified otherwise. Where arrows or letters are to be provided, thermoplastic compound may be hand-sprayed. In addition to the beads included in the material, a further quantity of glass beads of Type 2 shall be sprayed uniformly into a mono-layer on to the hot paint line in quick succession of the paint spraying operation. The glass beads shall be applied at the rate of 250 grams per square metre area.

7.5.17 The minimum thickness specified is exclusive of surface applied glass beads. The method of thickness measurement shall be in accordance with Appendices B and

C of BS -3262 (Part 3).

7.5.18 The finished lines shall be free from ruggedness on sides and ends and be parallel to the general alignment of the carriageway. The upper surface of the lines shall be level, uniform and free from streaks.

7.5.19 Measurements for payment

The painted markings shall be measured in sq. metres of actual area marked (excluding the gaps, if any). The rate include the cost of all materials, labour and equipments required in all the above operations.

7.6 DISMANTLING/ DEMOLISHING WORK

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

7.6.2 Cement Concrete shall be dismantled as per the directions of Engineer-in-Charge. All the dismantled usable materials shall be stacked at the area pointed out by the Engineer-in-Charge and all unusable materials shall be disposed by the Contractor.

7.6.3 All the taking out works shall be done carefully without causing any damage to the existing structure/ pipe lines/ water supply lines. The unserviceable dismantled / cut materials shall be disposed off within 6 kms of the work site and levelled as directed by the Engineer-in-Charge.

7.7 PROVIDING AND LAYING WET MIX MACADAM BASE (WMM)

7.7.1 The work consists of providing, laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass for required thickness in two layers over the existing scarified tar surface/ sub base to lines and grades as per directions of the Engineer-in-Charge.

7.7.2 **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 roller. If the thickness of single compacted layer does not exceed 100mm, a smooth wheel roller of 80 to 100 kN weight may be used. For a compacted single layer upto 200 mm, the compaction shall be done with the help of vibratory roller of

minimum static weight of 80 to 100 kN or equivalent capacity roller. The speed of the r**oll**er shall not exceed 5 km/hr.

(b) In the portions having unidirectional super elevation, rolling shall commence from the lower edge and progress gradually towards the upper edge. Thereafter, roller should progress parallel to the centre line of the road, uniformly over-lapping each preceding track by at least one-third width until the entire surface has been rolled. Alternate trips of the roller shall be terminated in stops at least 1m away from any preceding stop.

(c) In portions in camber, rolling should begin at the edge with the roller running forward and backward until the edges have been firmly compacted. The roller shall then progress gradually towards the center parallel to the centre line of the road uniformly overlapping each of the preceding track by at least one- third width until the entire surface has been rolled.

(d) Any displacement occurring as a result of reversing of the direction of the roller or from any other cause shall be corrected at once as specified and/or removed and made good.

(e) Along forms, kerbs, walls or other places not accessible to the roller the mixture shall be thoroughly compacted with mechanical tampers or a plate compactor. Skin patching of an area without scarifying the surface to permit proper bonding of the added materials shall not be permitted.

(f) Rolling should not be done when the sub grade is soft or yielding or when it causes a wave-like motion in the sub grade. If irregularities develop during rolling which exceed 12mm when tested with a 3 metre straight edge, the surface be loosened and premixed material added or removed as required before rolling again so as to achieve a uniform surface conforming to the desired grade and camber. In no case should the use of unmixed material be permitted to make up the depressions.

(g) Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry density for the material as determined by the method outlined in IS: 2720 (Part-8)

(h) After completion, the surface of any finished layer shall be well closed, free from movement under compaction equipment or any compaction planes, ridges, cracks and loose material. All loose, segregated or otherwise defective areas be made good to the full thickness of the layer and re-compacted.

(vi) Setting and drying

After final compaction of wet mix macadam course, the surface shall be allowed to dry for 24 hours.

7.7.3 **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.

7.7.4 **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.

7.7.5 **Measurement for payment**

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

7.7.6 **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.

7.8 PROVIDING BITUMIN PREMIX FOR FILLING POT HOLE

a. **CONSTRUCTION OPERATIONS**

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

b. **BITUMEN PREMIX**

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

c. PREPARATION AND TRANSPORTATION OF THE MIX

i. <u>MIXING</u>

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

ii . <u>TRANSPORTING</u>

Bituminous mix shall be transported in clean insulated vehicles, and unless otherwise agreed by the Engineer-in-charge, & shall be covered while in transit or awaiting tipping. Subject to the approval of the Engineer-in-charge a thin

coating of diesel or lubricating oil may be applied to the interior of the vehicle to prevent sticking and to facilitate discharge of the material.

iii. SPREADING & ROLLING

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

iv. MEASUREMENT FOR PAYMENT

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

7.9 PROVIDING CLOSE GRADED PREMIX SURFACING 25 MM THICK

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

7.10 QUANTITIES OF MATERIALS TO BE USED FOR VARIOUS WORKS

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

a)	**For Bitumen premix 80mm**		
	For 1m3		
	40mm graded granite metal	:	1m3
	Bitumen VG 30	:	0.048 Tonne
b)	**Close graded Premix 25mm thick**		
	For 10m2		
	12mm graded granite metal	:	0.225m3
	6mm graded granite metal	:	0.113m3

	Crusher run screening	:	0.063
	Bitumen VG30	:	0.024 Tonne
c)	**For tack coat using Bitumen Emulsion**		
I	on WBM/ WMM surface		
	Quantity for one sq.metre		
	Bitumen Emulsion	:	0.40 kg.
ii	On Bituminous surface		
	Quantity for one sq.metre		
	Bitumen Emulsion	:	0.25 kg.
d)	**Bituminous Concrete- For 1m3**		
	Bitumen VG 30 grade Minimum bitumen content		5% by weight of total mix
	Aggregates and filler		As per mix design
e)	**Bituminous Macadam**		
	Qty for 1m3		
	Bitumen VG-30		73 kg
	25mm to 10mm metal		0.57m3
	10mm to 5mm		0.57m3
	5mm below		0.28m3
	Total		1.42m3

SIGNATURE OF TENDERER

ANNEXURE-I

COCHIN PORT AUTHORITY

RECTIFICATION AND RESURFACING OF VARIOUS ROADS AT WILLINGDON ISLAND

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