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The Senior Manager (Project Purchase) Date: 26.03.2024

Global Tender Reference No: GTB19/SARA/2024/01/FIBDATBOX

GEM NAR ID: GEM/GARPTS/20032024/21R5M60VAHM3 Due Date/Time: 24.04.2024 @ 3:00 PM

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, digitally signed online bids are invited in two bid system from Class-I & Class II and Non local suppliers, for the supply of: "**Fiber Bragg Grating based Optic Sensors, Interrogators and Data Acquisition System for Long Term Monitoring of a Pre-Stressed Concrete Box Girder Bridge**" Conforming to the specifications given in **Annexure -A.**

Tender Documents may be downloaded from Central Public Procurement Portal https://etenders.gov.in/eprocure/app. Aspiring Bidders who have not enrolled / registered in e-procurement should enroll / register before participating through the website https://etenders.gov.in/eprocure/app. The portal enrolment is free of cost. Bidders are advised to go through instructions provided at **"Help for Vendors".** [Special Instructions to the Vendors / Bidders for the e-submission of the bids online through this eProcurement Portal"]

Bidders can access tender documents on the website (For searching in the NIC site, kindly go to Tender Search option and type 'IIT' Madras. Thereafter, click on "GO" button to view all IIT Madras tenders). Select the appropriate tender and fill them with all relevant information and submit the completed tender document online on the website https://etenders.gov.in/eprocure/app as per the schedule attached.

1)	**Pre-bid Meeting Details**	**:**	If required will be intimated
2)	**ICSR Vendor Registration**	**:**	**Vendor registration:** Vendor registration with IC&SR (IITM) is mandatory for bidders to participate in tenders. ** **For Vendor Registration & Guidelines, Please follow the website :** https://icandsr.iitm.ac.in/vendorportal; Helpdesk: vendorhelpdesk@icsrpis.iitm.ac.in

No manual bids will be accepted. All tender documents including Technical and Financial bids should be submitted in the E-procurement portal.

Last date for receipt of tender	**:**	**24.04.2024 @ 3:00 PM**
Date & time of opening of tender	**:**	**25.04.2024 @ 3:00 PM**

3. Instructions to the Bidder:

A)	**Searching for tender documents**	**:**	• There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender published on the CPP Portal. • Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective **"My Tender"** folder. This would enable the CPP Portal to intimate the bidders through SMS / email in case there is any corrigendum issued to the tender document. • The bidder should make a note of the **unique Tender ID** assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.
B)	**Assistance to bidders**	**:**	• Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender. • Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk. The contact number for the helpdesk is [0120-4200462, 0120-4001002, 0120-4001005]
C)	**Enrollment Process to Bidders**	**:**	**REGISTRATION** • Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal URL:https://etenders.gov.in/eprocure/app by clicking on "Online Bidder Enrollment". Enrollment on the CPP Portal is free of charge. • As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts. • Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal. • Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / TCS / nCode / eMudhra etc.) • Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse. • Bidder then may log in to the site through the secured log-in by entering their user ID / password and the password of the DSC /

			eToken. • Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/e-token in the company's name is a prerequisite for registration and participating in the bid submission activities through https://etenders.gov.in/eprocure/app • Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the web site https://etenders.gov.in/eprocure/app under the "Information about DSC".
D)	**Preparation of bids**	**:**	• Bidder should take into account any corrigendum published on the tender document before submitting their bids. • Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid. • Bidder, in advance, should prepare the bid documents to be submitted as indicated in the tender document / schedule and generally shall be in PDF / XLS formats as the case may be. Bid documents may be scanned with 100 dpi with black and white option. • To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, GSTIN Details, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use **"My Documents"** area available to them to upload such documents. These documents may be directly submitted from the **"My Documents"** area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.
E)	**Submission of bids**	**:**	• Bidder should log into the site well in advance for bid submission so that he/she can upload the bid in time i.e. on or before the bid submission date and time. Bidder will be responsible for any delay due to other issues. • The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document. • Bidder has to select the bid security declaration. Otherwise, the tender will be summarily rejected. • A standard BOQ format has been provided with the tender document to be filled by all the bidders. Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. Bidders are required to download the BOQ file, open it and complete the detail with their respective financial quotes and other details (such as name of the bidder). If the BOQ file is found to be modified by the

			bidder, the bid will be rejected. • The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission. • The Tender Inviting Authority (TIA) will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders due to local issues. • The uploaded tender documents become readable only after the tender opening by the authorized bid openers. • Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details. • Kindly add scanned PDF of all relevant documents in a single PDF file of compliance sheet. • More information useful for submitting online bids on the CPP Portal may be obtained at: https://etenders.gov.in/eprocure/app. • All tender documents including pre-qualification bid, Technical Bid &Financial Bid should be submitted separately in online CPP portal as per the specified format only. Right is reserved to ignore any tender which fails to comply with the above instructions. **No manual bid submission will be entertained.**
F)	**Marking on Technical Bid**		• The bidder eligibility criteria, technical specification and supply of item for this tender is given in Annexure A. • The Bidders shall go through the specification and submit the technical bid. • The Technical bid should be submitted in the proforma as per Annexure-B in pdf format only through online (e-tender). No manual submission of bid will be entertained. • The technical bid should have a page-wise heading as "Technical Bid" and page no. in all pages with seal and signature of authorized signatory. The total no. of pages should be mentioned at the last page of the documents. • The technical bid should consist of bidder eligibility criteria details and all technical details along with catalogue/ pamphlet which will give a detailed description of product with technical data sheet so that technical compliance can be verified.
G)	**Marking on Price Bid**		• Financial bid (BoQ) should be submitted in the prescribed proforma format as per Annexure-C in xls format through e-tender only. No manual or other form of submission of Financial Bid will be entertained

4)	**Preparation of Tender**: The bidders should submit the bids in two bid system as detailed below. **Bid I _Technical Bid** Technical Bid and Annexures dully filled in, signed, and stamped on each page by the tenderer/ authorized representative of the tenderer. The technical bid should consist of bidder eligibility criteria and technical specification compliance sheet as per Annexure-B. **Bid II _Price Bid** The price bid should be submitted in the Tabular format (BoQ) as per the proforma (Annexure C) uploaded in the e-Tender web site. The Quoted price should be for supply and installation of the item and inclusive of all cost and statutory levies at IIT Madras.
5)	**Price:** **a)** The price should be quoted in net per unit (after breakup) and must include all packing, transit insurance and delivery charges to the **Department of Civil Engineering (Structural Engineering Laboratory), IIT Madras.** **b)** The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. **c)** In the case of import supply, the price should be quoted without custom duty. IIT Madras is eligible for concessional custom duty (not exceeding 5.5%) and the price should be quoted with detailed break up on **EX-WORKS and CIP** (stating the Cost, Insurance, Freight separately and other charges in detail etc.,) and indicating the mode of shipment. IIT M - ICSR will provide all necessary documents for customs clearance of consignment including Customs Duty Exemption certificate etc. d) The rate quoted shall be all inclusive of all taxes and no extra payment will be made other than statutory revisions as per the terms and conditions stipulated in this contract document. e) The offer/bids should be submitted through online only through Single Stage Two Envelops System (Two Bid System). i.e. Technical Bid and Financial Bid separately.
6)	**Agency Commission:** Agency commission, if any, will be paid to the Indian agents in rupees after receipt of the equipment and its satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in the tender document even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The Foreign Principal should indicate the percentage of payment and it should be included in the basic price quoted originally (if any).
7)	**Tenderer shall submit along with this tender:** **(**i) Proof of having ISO or other equivalent certification given by appropriate authorities. (ii) Name and full address of the Banker and their swift code and PAN No. and GSTIN number. (iii) GST registration proof showing registration number, area of registration etc. (iv) All of your future correspondences including Invoices should bear the GST No. and Area Code.
8)	**Terms of Delivery:** Import Purchase – Responsibility of carriage of goods will be governed by Incoterms. Domestic Purchase –Supplier will be fully responsible for the safe carriage, Installation/Commissioning of goods up to the **Department of Civil Engineering (Structural Engineering Laboratory), IIT Madras**, or named place as per PO, Insurance coverage will be in the scope of the supplier.

	The tenderer should indicate clearly the time required for delivery of the item (subject to the approval of the Exclusive Purchase Committee-IIT-Madras). In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied. In the event of **delay or non-supply of materials/execution of Contract** beyond the date of delivery/completion of job. The penalty will be levied @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than accepted time frame by IIT M, the PO would be partially or fully cancelled and liquidated damages will be enforced accordingly.
9)	**Period for which the offer will remain open:** The Tender shall remain open for acceptance/validity till: 120 days from the date of opening of the tender. However, the day up to which the offer is to remain open being declared closed holiday for the Indian Institute of Technology Madras, the offer shall remain open for acceptance till the next working day.
10)	**EMD:** The EMD of **Rs.4,00,000** to be transferred to the account details mentioned in Annexure I and proof should be enclosed in the Technical Bid. Any offer not accompanied with the EMD shall be rejected summarily as non-responsive. As per rule no. 5.1.4 (vi) of the Manual of Procurement of Goods, no bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity. Withdrawal of a bid during this period will result in forfeiture of the bidder's bid security (EMD) and other sanctions. The Institute shall not be liable for payment of any interest on EMD. As per the Public Procurement Policy for MSEs, Order 2012 dated 25.03.2022, EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by the Department of Micro, Small and Medium Enterprises (MSME) and Startups as recognized by the Department of Industrial Policy & Promotion (DIPP). (MSE/MSME/DIPP PROOF should be enclosed in the cover containing the technical bid)
11)	**Performance Security: -** The successful bidder should submit Performance Security for an amount of 5% (As per Dept. of Expenditure OM No. F.1/2/2023-PPD dated 03.04.2023) of the basic invoice value of the contract/supply. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt in the name of "The Registrar, IIT Madras" from any scheduled commercial bank or Bank Guarantee from any scheduled commercial bank in India. The performance security should be furnished within 14 days from the date of the purchase order. Performance Security in the form of Bank Guarantee: - In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed directly to IIT Madras from the Bank. The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.
12)	**Indian agent:** If an Indian agent is involved, the following documents must be enclosed. (i) Foreign Principal's pro-forma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent. (ii) A Copy of the agency agreement with the foreign principal and the precise relationship between them. (iii) For the same tender, either the OEM or the authorized dealer/service provider can only quote. But both of them cannot quote separately for the same tender.

13)	The offers/bids should be submitted only for an item/Equipment of the exact standard that is acceptable to IIT Madras without Prejudice. The details of a list of customers in India for whom the item is already supplied with must accompany the quotations. Quotations for a prototype machine will not be accepted
14)	Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid.
15)	Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the Principal/OEM.
16)	**Risk Purchase Clause** In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the Item/Equipment from other sources on the total risk of the supplier under risk purchase clause.
17)	**Payment:** (i) As per GFR 2017 Terms: 90% Payment after supply and 10% after installation are agreed to wherever the installation is involved. In the case of import supplies, the payment will be made only through 100% Letter of Credit i.e. (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done) (ii) Advance Payment: No advance payment is generally admissible. In case a specific percentage of advance payment (not more than 30%) is required, the Vendor has to submit a Bank Guarantee from a scheduled commercial bank in India equivalent to the amount of advance payment.
18)	**On-site Installation:** The Equipment/Item or Machinery has to be installed or commissioned by the successful bidder within the number of days (as prescribed by PI) from the date of receipt of the item at the site of IIT Madras.
19)	**Warranty:** The offer should clearly specify the warranty period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately (For more details please refer our Technical Specifications). **** Note: PO which involves Installation, Warranty shall be applicable from the date of Installation.**
20)	**Acceptance and Rejection:** Failure to comply with any of the instructions stated in this document or offering unsatisfactory explanations for non-compliance will likely to lead to rejection of offers. I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
21)	**Debarment from Bidding:** In case of breach of Terms & Conditions, Bidder may be suspended from being eligible for bidding in any contract with the IIT Madras up to 2 Years [as per Rule 151(iii) of GFR] from the date as fixed by IIT Madras.
22)	**Disputes and Jurisdiction:** **Settlement of Disputes:** Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or

	no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate on arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai. a. **The Applicable Law:** The Purchase Order shall be construed, interpreted and governed by the Laws of India. Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause. b. Any legal disputes arising out of any breach of contact pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.
23)	**Force Majeure:** The Supplier shall not be liable for forfeiture of its performance security, liquidated damages or termination for default, if and to the extent that, it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure. For purposes of this Clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the Purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes. If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.
24)	**Eligibility Criteria:** ➢ **As per the Government of India Order, only "Class - I & II" and "Non Local suppliers" <u>can also participate in this tender.</u>** ➢ **<u>Bidder should confirm their acceptance that they comply with the provisions with report to "Guidelines for eligibility of a bidder from a country which shares a land border with India as detailed at Annexure-E. The bidder should submit Certificate for "Bidder from/ Not from Country sharing Land border with India & Registration of Bidder with Competent Authority" as per Order of DoE F.No.6/18/2019-PPD dated 23.07.2020 and No.F.7/10/2021-PPD(1) dated 23.02.2023.</u>** ➢ **Selection of Successful bidder and Award of Order - Evaluation and Award of contract will be done as per GOI MOCI Order No. 45021/2/2017-PP (BE II) Dt.16th September 2020 & P- 45021/102/2019-BE-II-Part(1) (E-50310) Dt.4th March 2021 and any subsequent Modifications/Amendments and latest orders if any issued by Govt. of India.**
25)	**Preference to "class I Local Suppliers"**: preference will be given to "**class 1 local suppliers**" (subject to class -I local supplier's quoted price falling within the margin of purchase preference) as per public procurement (preference to make in India) order 2017 .O.M No P- 45021/2/2017 – pp(BE - 11) dt 04/06/2020 subject to the conditions that the "class 1 Local Supplier" should agree to supply goods / provide service at L1 rate and furnish a certificate with the technical bid document that the goods/service provided by them consists local content equal to or more than 50%.(certificate from Chartered Accountant in case value of contract exceeds Rs 10 crore). ➢ **'Class - I local supplier'** means a supplier or service provider whose goods, services or works

	offered for procurement consists of local content equal to or more than 50% as defined under the above said order. **Declaration to be provided as per Annexure-D per item/service/work.** ➢ **'Class - II local supplier'** means a supplier or service provider whose goods, services or works offered for procurement consists of local content equal to 20% but less than 50% as defined under the above said order. **Declaration to be provided as per Annexure-D per item/service/work.** ➢ **'Non – local supplier'** means a supplier or service provider whose goods, services or works offered for procurement consists of local content less than 20% as defined under the above said order. ➢ **'Margin of purchase preference'**: - The margin of purchase preference shall be 20%. The Definition of the margin of purchase preference is defined in the Govt. of India Order No: **P-45021/12/2017-PP (BE-II) Dt.4th June, 2020) Order 2017. As per the Government of India Order – "Margin of Purchase Preference" means the maximum extent to which the price quoted by a "Class-I local supplier" may be above the L1 for the purpose of purchase preference.** ****Note: Local content percentage to be calculated in accordance with the definition provided at clause 2 of revised public procurement preference to Make in India Policy vide GoI Order no. P-45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019and 04.06.2020) MOCI order No. 45021/2/2017-PP (BE II) Dt.16th September 2020 & P-45021/102/2019-BE-II-Part(1) (E-50310) Dt.4th March 2021**
26)	**Evaluation of Bids** Bid evaluation will take place in two stages. **Stage I Technical Bid evaluation** All bidders who have fully complied with bidder eligibility criteria I, II and technical evaluation (Annexure A) will only be considered for opening of price bid. **Stage II: Price Bid Evaluation** The price bid evaluation will be based on price quoted by the bidder. The rate quoted for **Fiber Bragg Grating based Optic Sensors, Interrogators and Data Acquisition System for Long Term Monitoring of a Pre-Stressed Concrete Box Girder Bridge** unit will alone be taken up for arrival of Lowest Bid (L1) value. Bid prices expressed in different currencies shall be converted to INR as per the prevailing **Central Board of Indirect Taxes & Customs(CBIC)** exchange rate on the date of opening of price bid
27)	In accordance to the Rule 173 of GFR,2017 and relevant provisions thereof in Procurement Manuals, 2022, IC&SR, IITM reserves the right to carry out the negotiation process through its purchase/technical committee with L1/H1 (as applicable) vendor to ensure price reasonability before final recommendation to the Competent Authority. The negotiation details, if any, on case to case basis shall be recorded in minutes of meetings suitably for records.
28)	**Selection of successful bidder and Award of Order** The order will be directly awarded to the technically qualified bidder as per the condition in para 3A of DIPP, MoCI Order No. 45021/2/2017-PP (BE II) dated 16th September 2020.
29)	All information including selection and rejection of technical or financial bids of the prospective bidders will be communicated through e-Tender portal. In terms of Rule 173(iv) of General Financial Rule 2017, the bidder shall be at liberty to question the bidding conditions, bidding process and/or rejection of bids.
30)	The tenderer shall certify that the tender document submitted by him / her are of the same replica of the tender document as published by IIT Madras and no corrections, additions and alterations made to the same. If any deviation found in the same at any stage and date, the bid / contract will be rejected / terminated and actions will be initiated as per the terms and conditions of the contract.

31)	Clarification to the queries and doubts raised by the bidders will be issued as a corrigendum/addendum, if required in the e-tenders portal.
32)	In the e-tender process, participation of bidders after the due date is not possible. The eligible bidders can login to the e-Procurement portal to ascertain the tender status.

ACKNOWLEDGEMENT

It is hereby acknowledged that I/We have gone through all the points listed under "Specification, Guidelines, Terms and Conditions" of tender document. I/We totally understand the terms and conditions and agree to abide by the same.

SIGNATURE OF TENDERER ALONG WITH SEAL OF THE COMPANY WITH DATE

ANNEXURE – A

Bidder Eligibility Criteria and Technical Specification for Fiber Bragg Grating based Optic Sensors, Interrogators and Data Acquisition System for Long Term Monitoring of a Pre-Stressed Concrete Box Girder Bridge
Tender No. GTB19/SARA/2024/01/FIBDATBOX

Bidder Eligibility Criteria – I (Public Procurement – Preference to Make in India)

Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE-II) dated 16th September 2020 and other subsequent orders issued therein.

Participation of Non-local supplier may be subject to the limitation provided in para 4 (Exemption of Small Purchases) of DPIIT circular No. P-45021/2/2017-PP(BE-II) Dt 16.Sep.2020 (**ANNEXURE – D)**

Bidder Eligibility Criteria – II

1. Vendor Registration ID/Proof.
2. Land Border Certificate (**ANNEXURE – E**).
3. **OEM Certificate Form**-The Participating Bidder's firm shall be the Original Equipment Manufacturer (OEM) or OEM Certified authorized firm (**ANNEXURE – F**).
4. Non- Debarment Declaration **(ANNEXURE – H**).
5. Mandate Form **(ANNEXURE – J)**
6. EMD as per Tender to be remitted in the Account number as given in the **ANNEXURE - I** or EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) and Startups as recognized by Department of Industrial Policy & Promotion (DIPP). (MSE/MSME/DIPP PROOF should be enclosed in the cover containing technical bid).

S. No	Description	Responses	
1.	**Vendor Details**	**Original Equipment Manufacturer Name and address**	**Local Vendor Name and address (Please provide details against Sl.No.5,6,7 and 8 respectively)**
1a.	FBG Strain and temperature sensor		
1b.	FBG Tilt meter		
1c.	Optical Interrogator		
1d.	Data Recording Hardware and Software		
2.	**Previous installations**	**Contact person Name, Phone, email address and mailing address**	
2a.	FBG Strain and temperature sensor		
2b.	FBG Tilt meter		

2c,	Optical Interrogator	
2d.	Data Recording Hardware and Software	
3.	**Details of person to provide training on installation of FBG sensors**	
3a.	Name	
3b.	Technical Qualification	
3c.	Experience in FBG sensor installation	
3d.	Affiliated Organization	
3e.	Contact information: phone, email, official address	
4.	**Point of contact for the consortium:**	
4a.	Contact person name	
4b.	Affiliation	
4c.	Contact Information: Mobile, E-mail	
5.	**Local vendor – 1 credentials**	
5a.	Reference – 1: Name, Phone, Email address and mailing address	
5b.	Reference – 2: Name, Phone, Email address and mailing address	
5c.	Reference – 3: Name, Phone, Email address and mailing address	
5d.	Years of existence	
5e.	Attached income tax and sales tax clearance	
6.	**Local vendor – 2 credentials**	
6a.	Reference – 1: Name, Phone, Email address and mailing address	
6b.	Reference – 2: Name, Phone, Email address and mailing address	
6c.	Reference – 3: Name, Phone, Email address and mailing address	
6d.	Years of existence	

6e.	Attached income tax and sales tax clearance	
7.	**Local vendor – 3 credentials**	
7a.	Reference – 1: Name, Phone, Email address and mailing address	
7b.	Reference – 2: Name, Phone, Emailing address and mailing address	
7c.	Reference – 3: Name, Phone, Emailing address and mailing address	
7d.	Years of existence	
7e.	Attached income tax and sales tax clearance	
8.	**Local vendor – 4 credentials**	
8a.	Reference – 1: Name, Phone, Emailing address and mailing address	
8b.	Reference – 2: Name, Phone, Emailing address and mailing address	
8c.	Reference – 3: Name, Phone, Emailing address and mailing address	
8d.	Years of existence	
8e.	Attached income tax and sales tax clearance	

III. Technical Specification for Fiber Bragg Grating based Optic Sensors, Interrogators and Data Acquisition System for Long Term Monitoring of a Pre-Stressed Concrete Box Girder Bridge

Preamble:

IIT Madras is planning to test a full-scale single span concrete box girder bridge and do a destructive test to establish the validity of the structural health monitoring algorithms. Towards this, the bridge is to be instrumented with reusable 60 Fiber Bragg Grating (FBG) based strain sensors, 20 FBG based temperature sensors, 4 biaxial optical tilt sensors. Since long term zero stability, and dynamic measurements are needed optics-based sensors are being requested. An appropriate interrogator and data acquisition and transmission module is required. The data with a prescribed data structure must be transferred to a configurable cloud in binary format. An appropriate ventilated IP 68 enclosure for the hardware is within the scope of the bidder.

As part of this bid, training for installation and commissioning of the proposed system is required. However, the actual installation and commissioning would be done by IIT Madras.
Towards this a bid is called from potential vendors for supplying the requisite hardware, software, and system integration. To ensure the compatibility of the supplied data acquisition system, software and sensors, a single quotation is sought. **The vendors are free to form a consortium and submit one bid as a consortium**. However, there should be one point of contact for the consortium. Bids for hardware or subparts alone would be deemed incomplete and rejected.

The bid would be scrutinized in three stages. Stage 1: Scrutinize the completeness of the bid, acceptance to the terms and conditions of the bid and the credibility of the consortium. Stage 2: Scrutinize the technical compliance of the bid. Stage 3: Compare the commercial bid. Only bids that passed the previous stage would be considered for the next stage.
The duly completed forms given at the end of this document and relevant documents to support the claims in the form following the prescribed format should be submitted for each of the three forms corresponding to each stage. Bids not as per the prescribed format would be disqualified. Bids not containing any of the completed forms 1 through 3 at the end of this document would be considered as incomplete and rejected.

The entire monitoring system is required to be operational at the earliest. Hence, supply of the hardware should be within 20 weeks of the release of purchase order. Undue time taken to supply hardware or complete the training could be a cause for disqualification of the bid.

Scope of Work:

The scope of work shall be supply and training for the installation and commissioning of sensors (as per the specifications below) along with an appropriate cloud-based data acquisition system.

The power supply cable, interface cable, sensor connection cable, software, essential data acquisition accessories and any other item not explicitly specified in the bid but required for proper functioning of the system are to be provided by the consortium.

Requirements of the bid:

a. Compliance with the requirements of the consortium in the prescribed format (Form 1) and documents to establish the meeting of the eligibility of the consortium should be submitted separately.
b. Technical specifications table in the prescribed format (Form 2) and relevant data sheets to be submitted separately.
c. Commercials of the bid in the prescribed format (Form 3) along with a detailed working of costs to be submitted separately.

Requirements of the consortium:

a. The consortium should be capable of supply of all hardware, sensors, and software.
b. The consortium should have a single point of contact. The contact details of this contact should be provided.
c. Original equipment manufacturer of the requested items should be provided along with projects where these items were installed must be provided. Untested hardware, sensors or software would not be considered. Complete contact information of the persons who could testify the functioning of the sensors, hardware and software should be given in the prescribed format.
d. Local technical support and service (office details to be provided) is required.
e. Details of the persons who would provide the training has to be provided. Name, qualification, years of experience in the installation and commissioning of the FBG sensors should be provided. Proof that the trainer has at least 5 years of experience in the installation and commissioning of the FBG sensors.
f. Reference to 3 local clients who could testify to the service provided by each vendor needs to be provided in the prescribed format. Copy of purchase orders and details of the sensors supplied. Feedback would be obtained from the clients for further evaluation.
g. Each vendor should be in existence for at least 5 years as on 1 November 2023.
h. Latest income tax clearance and sales tax clearance should be produced for each vendor in the consortium.

Right to Reject:

IIT Madras reserves the right to reject all the bids without assigning any reason. Responses should be submitted with the most favorable terms that the Vendor could offer.

General terms and conditions:

- The supplier/vendor must be an original equipment manufacturer or the sole authorized agent/dealer/seller of the proprietary item.
- The system should be delivered within 20 weeks from the opening of the letter of credit or issue of purchase order, whichever is later.
- Costs and related information should be given only in the financial bid.
- The cost should include 60 months warranty of the overall system and CIP up to Chennai.
- Prices quoted should be valid for at least 120 days.
- Item-wise break up of cost should be provided for the different items (parts).
- IIT Madras reserves the right to exclude some items from the purchase.
- Training at IIT Madras should be provided with no additional cost.

Specification for hardware and services

The cross section of the prestressed concrete box girder bridge is shown in figure 1. The width of the top slab is 11 m, bottom slab 5m and the depth around 2 m.

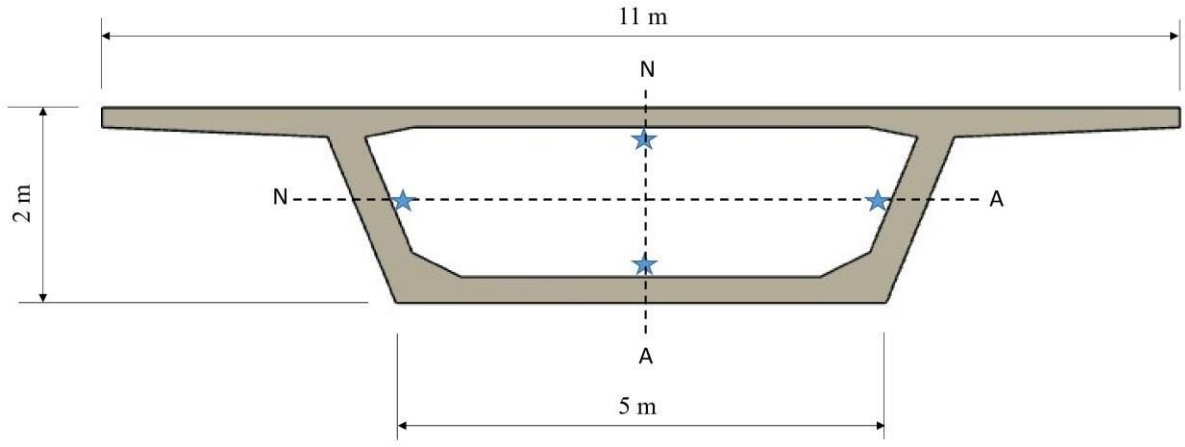

Figure 1: Cross section of the prestressed box girder bridge

At each of the star location in the figure 1 there would be 0 — 45 — 90 degree rosette and a temperature sensor formed from linear FBG sensors and assembled as shown in the figure 2. Hence, the fiber provided should be such that this configuration is achievable.

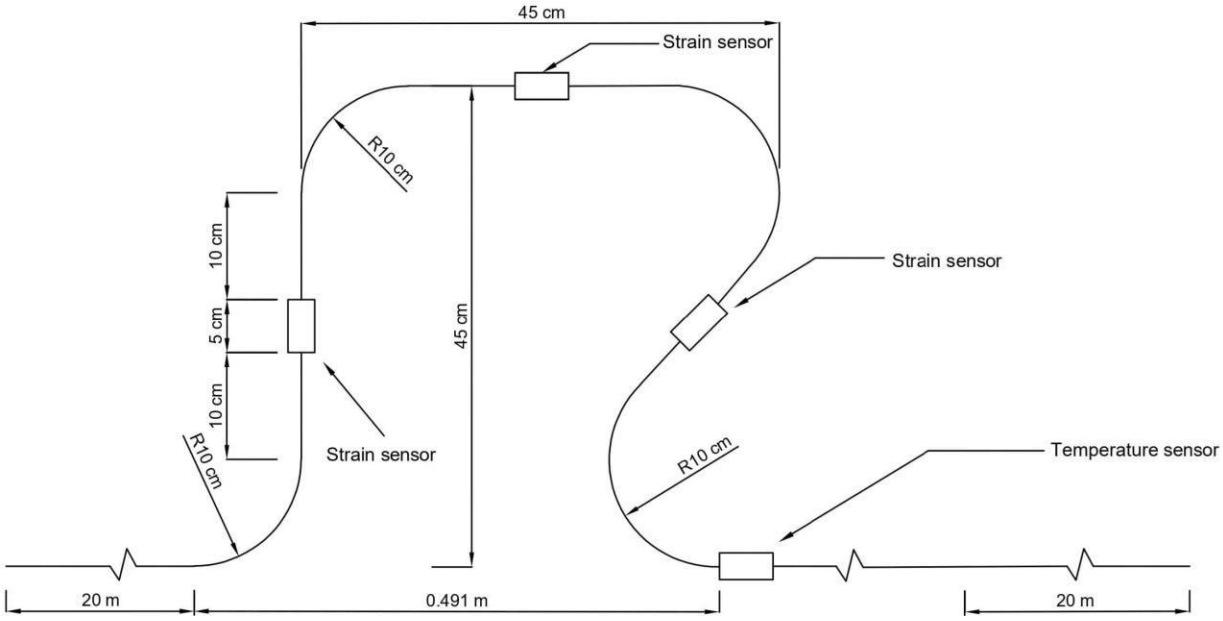

Figure 2: Layout of the rosette

Since the sensors are to be reused, the distance between sensors is kept as 3m and the extra length is to be wound and stored. The linear arrangement of the FBG and the temperature sensors at each star location is shown in figure 3. Again, the fiber used should facilitate this arrangement.

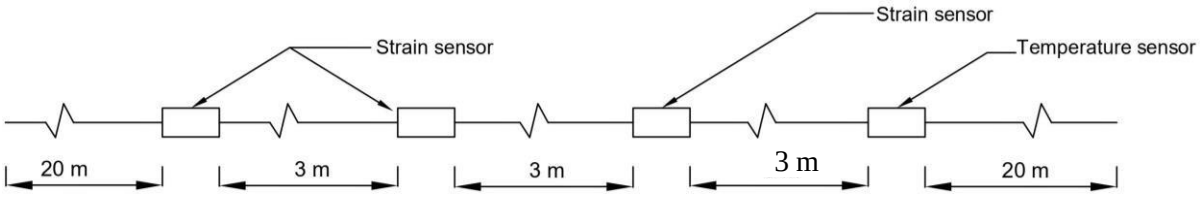

Figure 3: Linear Layout of the FBG Strain and Temperature Sensors

The fibers from the 4 rosettes at a section needs to be bundled and one or multiple fibers connect to an interrogator. The arrangements for bundling and communicating to the interrogator is within the scope of the bid. In a typical span of the bridge, the sections that would be instrumented is shown in the figure 4. Here the span of the bridge, L = 30 m.

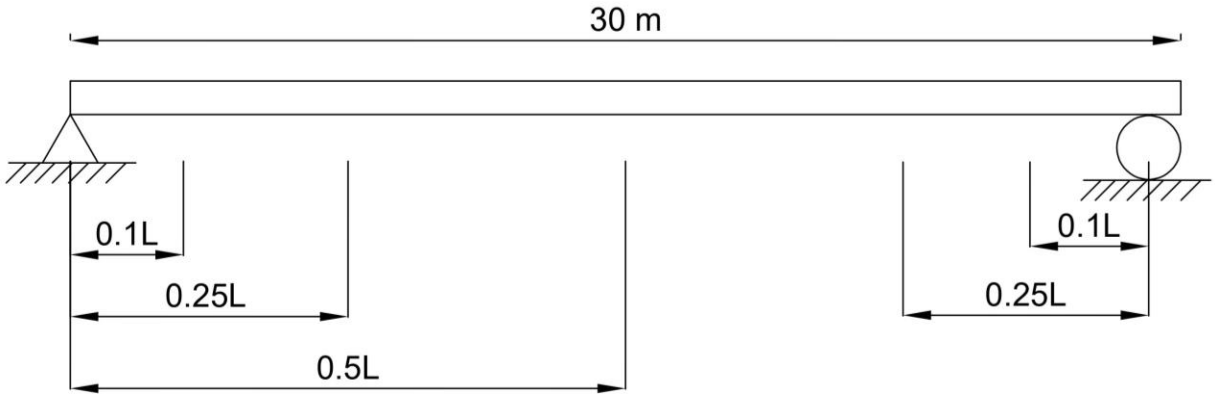

Figure 4: Layout of sections that would be instrumented.

The interrogator would be placed at one end of the span. Hence, the farthest section from the interrogator would be 50 m. Suitable arrangements for bundling the fibers and connecting to the interrogator must be given as part of the bid, as accessories.

Detailed specification of the sensors is given in table 1. Some of the accessories identified for the installation and commissioning of the sensors are given in table 2 along with their specifications. Table 3 details the specification for the interrogator, data recorder and the software.

Table: 1 Type, specification and number of sensors

S. No	Sensor Type	Specification
1.	Reusable FBG strain sensor	Fiber Bragg grating based sensor, Gauge length: 120 ± 10 mm; Measurement range: ±500 microstrains; Sensitivity: 0.96 ± 0.03 pm / microstrains; Resolution: 0.5 microstrains; Temp. Cross Sensitivity: 5.8 ± 1 pm/degree Celsius; Maximum strain damage threshold: > 4000 microstrains; Spectral width (FWHM): > 0.2 nanometer; Reflectivity: 20 ± 6%; Side lobe suppression: >10 decibel; Material: Stainless steel, ormocer; Operation Temperature: -20 …. +80 degree Celsius; Protection Type: IP68;
2.	Reusable FBG Temperature sensor	Fiber Bragg grating based sensor, Measurement range: -20 to 80 degree Celsius; Sensitivity: 30 degree Celsius /pm; Resolution: 0.02 degree Celsius; Temperature compensation: 20 microstrains/degree Celsius; Spectral width (FWHM): > 0.2 nanometer; Reflectivity: 20 ± 6%; Side lobe suppression: >10 decibel; Material: Stainless steel, ormocer; Operation Temperature: -20 …. +80 degree Celsius; Protection Type: IP68;
3.	Reusable FBG biaxial Tilt sensor	Fiber Bragg grating based sensor, Measurement range: +/- 5 deg; Sensitivity: 185 pm/deg; Resolution: <0.005 deg; Maximum calibration error: 0.05 degree; Operation Temperature: -20 to +80 degree Celsius; Biaxial Mounting: Biaxial Tilt sensor preferred, if not available two sensors mounted for Biaxial can be quoted with necessary Biaxial mounting plate; End connectors: SC/APC on both the end of the Fiber Optic cable;
4.	Cable specification & Packaging	The 3 FBG strain and 1 FBG temperature sensors are to be packaged as shown in figure 3. Cable lengths between sensors: 3m between each sensor, 20m cable length from 1st sensor and End connector, and 20m cable between last sensor and End connector; 24 such chains are required. Cable type: Ø3mm armor cable; Cable should be protected with Hytrel buffer, Steel spiral, Kelvar & Steel Mesh;

Table: 2 Optical Accessories

S. No	Hardware Requirement:	Specifications
1.	Optical Breakout Cable	1 no each of 30m, 35m &45m, 3 each of 40m & 50m Each of the breakout cable should have - 4 x FC/APC connectors at one end with 1 m as pig tail - 4 x SC/APC connectors at another end with 1 m as pig tail Cable should be protected with Hytrel buffer, Steel spiral, Kelvar & Steel Mesh
2.	Fiber Tester	Connector compatibility: FC, SC, ST Light wavelength: 635nm Operation current: 40mA Operating temperature -10 to +45°C
3.	FS cleaner	Connector compatibility: FC, SC, ST Contamination: Oil, dust
4.	Adapter	Type: SC-SC Material: Stainless Steel Loss: <0.3 decibel
5.	Adhesive	Content: methylmetacrylate Two-component adhesive (100g + 80ml) Target Material: Should be able to bond Strain Gauges on concrete surface Curing: Thumb Pressure (10 mins @ 20°C & 2 mins @ 35°C) Temperature Capability: -200°C to +60°C
6.	Covering	Viscous, kneadable putty 0.05 mm thick aluminum foil with 3mm kneading compound (205x100 mm)
7.	Distribution Box	Fiber optics distribution box with SC connectors panel, IP 65, material: ABS + PC
8.	Training	A person with at least 5 years' experience in mounting FO sensor on Bridges should give training in IIT Madras for at least 4 working Days.

Table 3: Interrogator, data recorder and software specifications

S. No	Hardware Requirement:	Specifications
1.	Optical Interrogator	Number of channels required to accommodate 60 strain channels and 20 temperature channels and 8 tilt channels. Dynamic Optical Interrogator with continuous swept laser scanning technology **Inputs**: Without multiplexing above channels must be accommodated **Connector**: FC/APC **Transducer types**: All sensors based on Fiber Bragg Grating (FBG) **Optical wavelength**: As per sensor configuration **Sample rate**: 0.1 to 2,000 S/s, Selectable **Signal bandwidth (-3 decibel)**: 800 Hz **Repeatability**: < 1.5pm @ 100 Samples/s < 2.5pm @ 2000 Samples/s Both over full temperature range and over full wavelength range for more than 50 h **Dynamic range**: >20 decibel **Smart Peak detection**: Required to ensure all sensor peaks are detected automatically even for large cable lengths with multiple connections. **Optical Spectral Analysis**: Must include a NIST traceable wavelength reference with 10,000 points per trace providing continuous calibration to ensure system accuracy over long term operation. **Filters**: Bessel, Butterworth, linear phase 0.01 to 20 (-3 dB), filter OFF **Communication**: 10Base-T/100Base-TX with direct IP address & DHCP Should be possible to have EtherCAT/ ProfitNet for future upgradation. **Synchronization**: IEEE1394b, IEEE1588 and NTP required. **Hybrid Operations**: Required synchronized operation. capability with foil type gauges / electrical sensor datalogger. **Supply voltage**: 230V AC **Operating temperature range**: -20 to +50 **Shock resistance (EN60068-2-27)**: 15g, 6ms, 600 impacts **Vibration resistance (EN60068-2-6)**: 2g, 30 min, 5 to 65Hz **Dimensions (w x h x d) & Weight**: Portable and light weight ≤ 2Kg **EMC**: As Per EN 61326 (certificate to be submitted with tender) Calibration validity: 5 years Comprehensive warranty: 5 years
2.	Data Recording	Inbuilt >200GB SSD. Possibility to expand storage with Exchangeable CFast 2.0 card, USB 3.0 stick / HDD **Ring Buffer Memory**: For 10 minutes **Recording Modes**: Time interval (periodic file creation, without data loss), Long−term measurement (time, cycle with counter/cycle, time/peak−valley), Peak values (interval), trigger and record for a particular duration **Recording Rate**: 4MS/s to 5 MS/s **Digital I/O**: 3 Digital inputs & 3 Digital outputs (TTL, 4V) **Interface**: Fire wire, 2x Gigabit Ethernet, USB 3.0, WLAN, DVI **Data transfer**: Backed up to a data server via SFTP capability

3.	Software	The software setup, simplified data Logging, simplified Hardware setup, simplified data Logging, simplified Data Viewing. The user interface must be standard and proven. No programming knowledge should be necessary. **Channel configuration**: Manual, via integrated sensor database, Calibration factor Automatically via TEDS, Project file **Data logging / start and end**: Start: Manual, via signal thresholds (limit values), End: Manual, triggered (post), timing, number of measured values. **Trigger**: Analog, calculated signals, digital input (0 / 1) Trigger type Edge (rising, falling), level (above, below) **Software Display Elements**: Online digital & graphical monitoring of all selected channels with Numeric display, chart recorder (y-t, x-y, y-f), polar diagram, Spectrum visualization, frequency diagram / color spectrogram (FFT), table (universal, simple spreadsheet), pointer, bar graph, LED (multi, uni), indicator, push button / switch (button), checkbox, list box, background image and text. The user must be able to modify the visualization screen by drag and drop, without use/knowledge of any programming. **Data Storage Format**: ASCII, and binary. The complete meta data (sensors, measurement, configuration, test parameters), statistics log should be stored for data traceability. Should have Fast Stream for highly dynamic measurements. Stable in the event of sudden interruption (no more than last data block should be lost) Separate binary/text file for each sensor type. Each file will contain information of all the sensors of the same type, arranged in a table format. For, example, the strain data text file will have readings from all strain sensors instrumented on the bridge span. The format will be like the figure 5.

		Col-1	Col-2	Col-3					Col-N
Header Rows	Row-1	Time	Sensor-1 Name	Sensor-2 Name	Sensor-3 Name	-	-		Sensor-N Name
	:		S1 Config	S2 Config	-	-	-		SN Config
	:		:	:	-	-	-		:
	:		S1 Config	S2 Config	-	-	-		SN Config
Data Rows	Row-Y	Start Date:Time T1	S1 Value @ T1	S2 Value @ T1	-	-	-		SN Value @ T1
	:	T2	S1 Value @ T2	S2 Value @ T2	-	-	-		SN Value @ T2
	:	T3	S1 Value @ T3	:	-	-	-		SN Value @ T3
	:	:	:	:	:		-		:
	:	:	:	:	-	-	-		:
	:	End Date : Time T1000	S1 Value @ T1000	S2 Value @ T1000	-	-	-		SN Value @ T1000

Figure 5: Format of a sample data stored in the binary file.

Technical Specification (Stage 2 Evaluation)

S. No	Sensor Type	Specification
1.	Reusable FBG strain sensor	Fiber Bragg grating based sensor
		Gauge length: 120 ± 10 mm
		Measurement range: ±500 microstrains
		Resolution: 0.5 microstrains
		Sensitivity: 0.96 ± 0.03 pm / microstrains
		Operation Temperature: -20 …. +80 degree Celsius
		Temp. Cross Sensitivity: 5.8 ± 1 pm/degree Celsius
		Maximum strain damage threshold: > 4000 microstrains
		Spectral width (FWHM): > 0.2 nanometer
		Reflectivity: 20 ± 6%
		Side lobe suppression: >10 decibel
		Material: Stainless steel, ormocer, bolt to the structure
		Protection Type: IP68
2.	Reusable FBG temperature sensor	Fiber Bragg grating based sensor
		Measurement range: -20 to 80 degrees Celsius
		Resolution: 0.02 degree Celsius
		Sensitivity: 30 degree Celsius /pm
		Operation Temperature: -20 …. +80 degree Celsius
		Temperature compensation: 20 microstrains/degree Celsius
		Maximum strain damage threshold: > 4000 microstrains
		Spectral width (FWHM): > 0.2 nanometer
		Reflectivity: 20 ± 6%
		Side lobe suppression: >10 decibel
		Material: Stainless steel, ormocer, bolt to the structure
		Protection Type: IP68

3.	Reusable FBG Biaxial Tilt sensor	Fiber Bragg grating based sensor
		Measurement range: +/- 5 deg
		Sensitivity: 185 pm/deg
		Resolution: <0.005 deg
		Maximum calibration error: 0.05 degree
		Operation Temperature: -20 to +80 degree Celsius
		Biaxial Tilt sensor
		Biaxial Mounting plate, if not biaxial tilt sensor
		End connectors: SC/APC on both the end of the Fiber Optic cable
		Material: Stainless steel, ormocer, bolt to the structure
		Protection Type: IP68
4.	Cable specification & Packaging	The 3 FBG strain and 1 FBG temperature sensors are to be packaged as shown in figure 3 of the specifications.
		Cable type: Ø3mm armor cable
		Cable should be protected with Hytrel buffer, Steel spiral, Kelvar & Steel Mesh
5.	Optical Interrogator	Has the number of channels required to accommodate 60 strain channels and 20 temperature channels and 8 tilt channels.
		Optical wavelength: Operating Wavelength of the strain and temperature sensors as per sensor configuration has been provided for the sensors in one channel of the interrogator
		Dynamic Optical Interrogator with continuous swept laser scanning technology
		Accommodation of above channels without multiplexing
		Connector: FC/APC
		Sample rate: 0.1 to 2,000 S/s, Selectable
		Signal bandwidth (-3 decibel): 800 Hz
		Repeatability: < 1.5pm @ 100 Samples/s < 2.5pm @ 2000 Samples/s Both over full temperature range and over full wavelength range for more than 50 h
		Dynamic range: >20 decibel

		Smart Peak detection: Required to ensure all sensor peaks are detected automatically even for large cable lengths with multiple connections.
		Optical Spectral Analysis: Include a NIST traceable wavelength reference with 10,000 points per trace providing continuous calibration to ensure system accuracy over long term operation.
		Filters: Bessel, Butterworth, linear phase 0.01 to 20 (-3 dB), filter OFF
		Communication: 10Base-T/100Base-TX with direct IP address & DHCP
		Possible to have EtherCAT/ ProfitNet for future upgradation
		Time Synchronization: IEEE1394b, IEEE1588 and NTP
		Hybrid Operations: Required synchronized operation capability with foil type gauges / electrical sensor datalogger
		Supply voltage: 230V AC
		Operating temperature range: -20 to +50
		Shock resistance (EN60068-2-27): 15g, 6ms, 600 impacts
		Vibration resistance (EN60068-2-6): 2g, 30 min, 5 to 65Hz
		EMC: As Per EN 61326 (certificate to be submitted with tender)
		Calibration validity: 5 years
		Comprehensive warranty: 5 years
6.	Data Recording	Inbuilt >200GB SSD
		Possibility to expand storage with Exchangeable CFast 2.0 card, USB 3.0 stick / HDD
		Ring Buffer Memory: For 10 minutes
		Recording Modes: Time interval (periodic file creation, without data loss), Long−term measurement (time, cycle with counter/cycle, time/peak−valley), Peak values (interval), trigger and record for a particular duration
		Recording Rate: 4MS/s to 5 MS/s
		Digital I/O: 3 Digital inputs & 3 Digital outputs (TTL, 4V)
		Interface: Fire wire, 2x Gigabit Ethernet, USB 3.0, WLAN, DVI
		Data transfer: Backed up to a data server via SFTP capability
7.	Software	The software setup, simplified data Logging, simplified Hardware setup, simplified data Logging, simplified Data Viewing, without programming knowledge
		Channel configuration: Manual, via integrated sensor database, Calibration factor Automatically via TEDS, Project file
		Data logging / start and end: Start: Manual, via signal thresholds (limit values), End: Manual, triggered (post), timing, number of measured values.
		Trigger: Analog, calculated signals, digital input (0 / 1) Trigger type Edge (rising, falling), level (above, below)
		Data Storage Format: ASCII, and binary. The complete meta data (sensors, measurement,

		configuration, test parameters), statistics log should be stored for data traceability. Should have Fast Stream for highly dynamic measurements. Stable in the event of sudden interruption (no more than last data block should be lost)
		Separate binary/text file for each sensor type. Each file will contain information of all the sensors of the same type, arranged in a table format, same as indicated in figure 5 of the specifications
		Software Display Elements: Online digital & graphical monitoring of all selected channels with Numeric display, chart recorder (y-t, x-y, y-f), polar diagram, Spectrum visualization, frequency diagram / color spectrogram (FFT), table (universal, simple spreadsheet), pointer, bar graph, LED (multi, uni), indicator, push button / switch (button), checkbox, list box, background image and text. The user must be able to modify the visualization screen by drag and drop, without use/knowledge of any programming.
8.	Optical Breakout Cable	Cable should be protected with Hytrel buffer, Steel spiral, Kelvar & Steel Mesh
		Each of the breakout cable has: - 4 x FC/APC connectors at one end with 1 m as pig tail - 4 x SC/APC connectors at another end with 1 m as pig tail
		3 no each of 40m & 50m
		1 no each of 30m, 35m &45m
9.	Fiber Tester	Connector compatibility: FC, SC, ST
		Light wavelength: 635nm
		Operation current: 40mA
		Operating temperature -10 to +45°C
10.	FS cleaner	Connector compatibility: FC, SC, ST
		Contamination: Oil, dust
11.	Adapter	Type: SC-SC
		Material: Stainless Steel
		Loss: <0.3 decibel
12.	Adhesive	Content: methylmetacrylate Two-component adhesive (100g + 80ml)
		Target Material: Should be able to bond Strain Gauges on concrete surface
		Curing: Thumb Pressure (10 mins @ 20°C & 2 mins @ 35°C)
		Temperature Capability: 10°C to +60°C
13.	Covering	Viscous, kneadable putty
		0.05 mm thick aluminum foil with 3mm kneading compound (205x100 mm)
14.	Distribution Box	Fiber optics distribution box with SC connectors panel
		IP 65, material: ABS + PC
Terms and Conditions		
15.	Training	A person with at least 5 years' experience in mounting FO sensor on Bridges should give training in IIT Madras for at least 4 working Days.

16	Warranty	i) Beyond the standard warranty to quote 5-years comprehensive warranty for the items (Optical Interrogator, Data Recorder, Software)
		ii) Supplier has to ensure no downtime of more than 1 day, until replacement unit repair/service is completed

ANNEXURE - B

TECHNICAL BID PROFORMA

Tender No. GTB19/SARA/2024/01/FIBDATBOX

Item Name: Fiber Bragg Grating based Optic Sensors, Interrogators and Data Acquisition System for Long Term Monitoring of a Pre-Stressed Concrete Box Girder Bridge

1.0 Bidder Eligibility Criteria:

I	**Bidder Eligibility Criteria-I (Public Procurement – Preference to Make in India)**	**Class I / Class II and Non-Local Suppliers**	**Local Content Percentage**	**Ref. Page No.**
I	Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein. Participation of Non local supplier may be subject to the limitation provided in para 4 (Exemption of Small Purchases) of DPIIT circular No.P-45021/2/2017-PP(BE-II) Dt 16.Sep.2020 (**ANNEXURE – D)**			

2.0 Bidder Eligibility Criteria:

II	**Bidder Eligibility Criteria-II**	**Complied/Not Complied**	**Ref Page No.**
1	Vendor Registration ID/Proof		
2	Land Border Certificate (**ANNEXURE – E**)		
3	**OEM Certificate Form**-The Participating Bidder's firm shall be the Original Equipment Manufacturer (OEM) or OEM Certified authorized firm (**ANNEXURE – F**)		
4	Non- Debarment Declaration **(ANNEXURE – H**).		
5	Mandate Form **(ANNEXURE – J)**		
6	EMD as per Tender to be remitted in the Account number as given in the **ANNEXURE I** or EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) and Startups as recognized by Department of Industrial Policy & Promotion (DIPP). (MSE/MSME/DIPP PROOF should be enclosed in the cover containing technical bid).		

S. No	Description	Responses		Complied/Not Complied	Ref Page No.
1.	**Vendor Details**	**Original Equipment Manufacturer Name and address**	**Local Vendor Name and address**		
1a.	FBG Strain and temperature sensor				
1b.	FBG Tilt meter				
1c.	Optical Interrogator				
1d.	Data Recording Hardware and Software				
2.	**Previous installations**	**Contact person Name, Phone, email address and mailing address**			
2a.	FBG Strain and temperature sensor				
2b.	FBG Tilt meter				
2c,	Optical Interrogator				
2d.	Data Recording Hardware and Software				
3.	**Details of person to provide training on installation of FBG sensors**				
3a.	Name				
3b.	Technical Qualification				
3c.	Experience in FBG sensor installation				
3d.	Affiliated Organization				
3e.	Contact information: phone, email, official address				
4.	**Point of contact for the consortium:**				
4a.	Contact person name				

4b.	Affiliation			
4c.	Contact Information: Mobile, E-mail			
5.	**Local vendor – 1 credentials**			
5a.	Reference – 1: Name, Phone, Email address and mailing address			
5b.	Reference – 2: Name, Phone, Email address and mailing address			
5c.	Reference – 3: Name, Phone, Email address and mailing address			
5d.	Years of existence			
5e.	Attached income tax and sales tax clearance			
6.	**Local vendor – 2 credentials**			
6a.	Reference – 1: Name, Phone, Email address and mailing address			
6b.	Reference – 2: Name, Phone, Email address and mailing address			
6c.	Reference – 3: Name, Phone, Email address and mailing address			
6d.	Years of existence			
6e.	Attached income tax and sales tax clearance			
7.	**Local vendor – 3 credentials**			
7a.	Reference – 1: Name, Phone, Email address and mailing address			

7b.	Reference – 2: Name, Phone, Email address and mailing address			
7c.	Reference – 3: Name, Phone, Email address and mailing address			
7d.	Years of existence			
7e.	Attached income tax and sales tax clearance			
8.	**Local vendor – 4 credentials**			
8a.	Reference – 1: Name, Phone, Email address and mailing address			
8b.	Reference – 2: Name, Phone, Email address and mailing address			
8c.	Reference – 3: Name, Phone, Emailing address and mailing address			
8d.	Years of existence			
8e.	Attached income tax and sales tax clearance			

3.0Technical Compliance:

Preamble:

IIT Madras is planning to test a full-scale single span concrete box girder bridge and do a destructive test to establish the validity of the structural health monitoring algorithms. Towards this, the bridge is to be instrumented with reusable 60 Fiber Bragg Grating (FBG) based strain sensors, 20 FBG based temperature sensors, 4 biaxial optical tilt sensors. Since long term zero stability, and dynamic measurements are needed optics-based sensors are being requested. An appropriate interrogator and data acquisition and transmission module is required. The data with a prescribed data structure must be transferred to a configurable cloud in binary format. An appropriate ventilated IP 68 enclosure for the hardware is within the scope of the bidder.

As part of this bid, training for installation and commissioning of the proposed system is required. However, the actual installation and commissioning would be done by IIT Madras.

Towards this a bid is called from potential vendors for supplying the requisite hardware, software, and system integration. To ensure the compatibility of the supplied data acquisition system, software and sensors, a single quotation is sought. **The**

vendors are free to form a consortium and submit one bid as a consortium. However, there should be one point of contact for the consortium. Bids for hardware or subparts alone would be deemed incomplete and rejected.

The bid would be scrutinized in three stages. Stage 1: Scrutinize the completeness of the bid, acceptance to the terms and conditions of the bid and the credibility of the consortium. Stage 2: Scrutinize the technical compliance of the bid. Stage 3: Compare the commercial bid. Only bids that passed the previous stage would be considered for the next stage.
The duly completed forms given at the end of this document and relevant documents to support the claims in the form following the prescribed format should be submitted for each of the three forms corresponding to each stage. Bids not as per the prescribed format would be disqualified. Bids not containing any of the completed forms 1 through 3 at the end of this document would be considered as incomplete and rejected.

The entire monitoring system is required to be operational at the earliest. Hence, supply of the hardware should be within 20 weeks of the release of purchase order. Undue time taken to supply hardware or complete the training could be a cause for disqualification of the bid.

Scope of Work:

The scope of work shall be supply and training for the installation and commissioning of sensors (as per the specifications below) along with an appropriate cloud-based data acquisition system.

The power supply cable, interface cable, sensor connection cable, software, essential data acquisition accessories and any other item not explicitly specified in the bid but required for proper functioning of the system are to be provided by the consortium.

Requirements of the bid:

a. Compliance with the requirements of the consortium in the prescribed format (Form 1) and documents to establish the meeting of the eligibility of the consortium should be submitted separately.
b. Technical specifications table in the prescribed format (Form 2) and relevant data sheets to be submitted separately.
c. Commercials of the bid in the prescribed format (Form 3) along with a detailed working of costs to be submitted separately.

Requirements of the consortium:

a. The consortium should be capable of supply of all hardware, sensors, and software.
b. The consortium should have a single point of contact. The contact details of this contact should be provided.
c. Original equipment manufacturer of the requested items should be provided along with projects where these items were installed must be provided. Untested hardware, sensors or software would not be considered. Complete contact information of the persons who could testify the functioning of the sensors, hardware and software should be given in the prescribed format.
d. Local technical support and service (office details to be provided) is required.
e. Details of the persons who would provide the training has to be provided. Name, qualification, years of experience in the installation and commissioning of the FBG sensors should be provided. Proof that the trainer has at least 5 years of experience in the installation and commissioning of the FBG sensors.
f. Reference to 3 local clients who could testify to the service provided by each vendor needs to be provided in the prescribed format. Copy of purchase orders and details of the sensors supplied. Feedback would be obtained from the clients for further evaluation.
g. Each vendor should be in existence for at least 5 years as on 1 November 2023.
h. Latest income tax clearance and sales tax clearance should be produced for each vendor in the consortium.

Right to Reject:

IIT Madras reserves the right to reject all the bids without assigning any reason. Responses should be submitted with the most favorable terms that the Vendor could offer.

General terms and conditions:

- The supplier/vendor must be an original equipment manufacturer or the sole authorized agent/dealer/seller of the proprietary item.
- The system should be delivered within 20 weeks from the opening of the letter of credit or issue of purchase order, whichever is later.
- Costs and related information should be given only in the financial bid.
- The cost should include 60 months warranty of the overall system and CIP up to Chennai.
- Prices quoted should be valid for at least 120 days.
- Item-wise break up of cost should be provided for the different items (parts).
- IIT Madras reserves the right to exclude some items from the purchase.
- Training at IIT Madras should be provided with no additional cost.

Specification for hardware and services

The cross section of the prestressed concrete box girder bridge is shown in figure 1. The width of the top slab is 11 m, bottom slab 5m and the depth around 2 m.

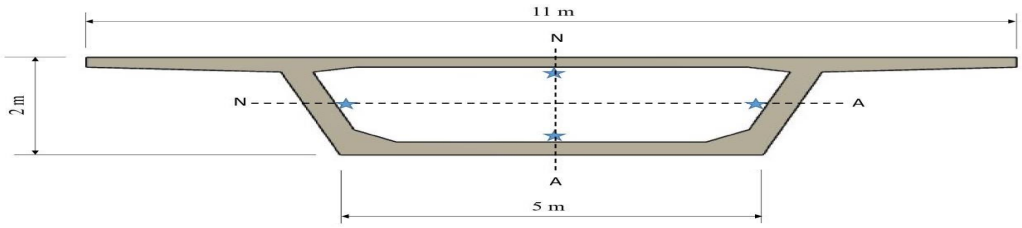

Figure 1: Cross section of the prestressed box girder bridge

At each of the star location in the figure 1 there would be 0 — 45 — 90 degree rosette and a temperature sensor formed from linear FBG sensors and assembled as shown in the figure 2. Hence, the fiber provided should be such that this configuration is achievable.

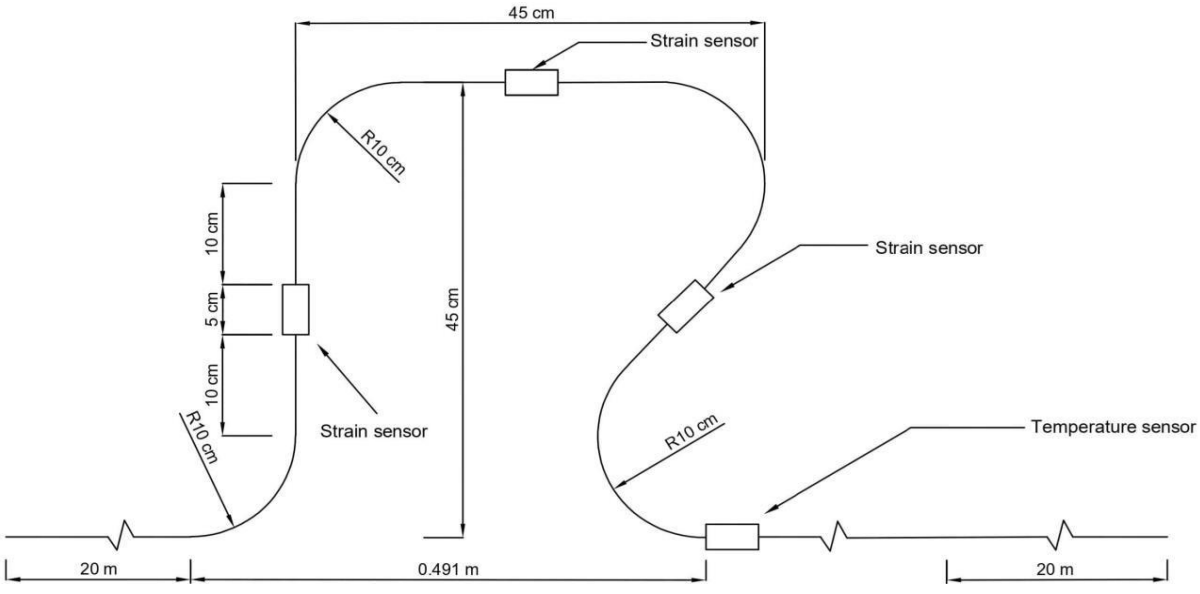

Figure 2: Layout of the rosette

Since the sensors are to be reused, the distance between sensors is kept as 3m and the extra length is to be wound and stored. The linear arrangement of the FBG and the temperature sensors at each star location is shown in figure 3. Again, the fiber used should facilitate this arrangement.

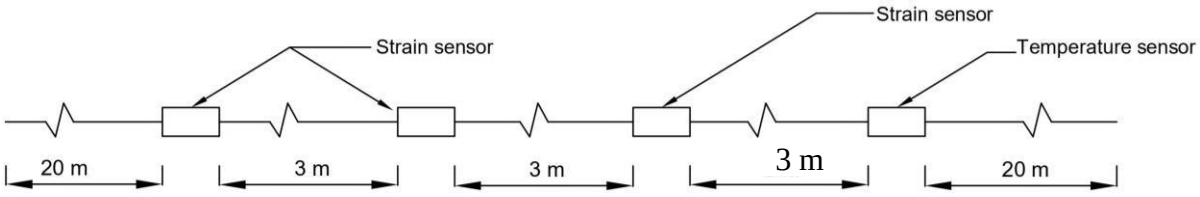

Figure 3: Linear Layout of the FBG Strain and Temperature Sensors

The fibers from the 4 rosettes at a section needs to be bundled and one or multiple fibers connect to an interrogator. The arrangements for bundling and communicating to the interrogator is within the scope of the bid. In a typical span of the bridge, the sections that would be instrumented is shown in the figure 4. Here the span of the bridge, L = 30 m.

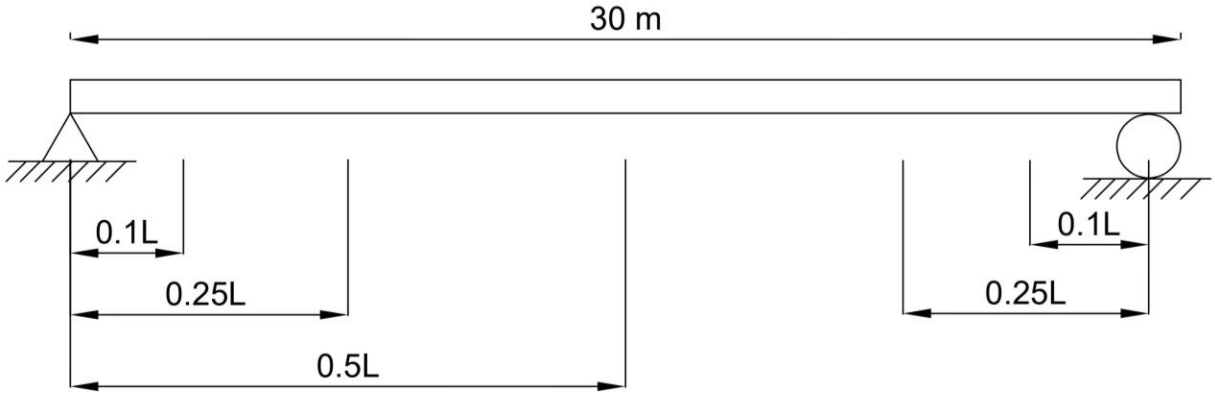

Figure 4: Layout of sections that would be instrumented.

The interrogator would be placed at one end of the span. Hence, the farthest section from the interrogator would be 50 m. Suitable arrangements for bundling the fibers and connecting to the interrogator must be given as part of the bid, as accessories.

Detailed specification of the sensors is given in table 1. Some of the accessories identified for the installation and commissioning of the sensors are given in table 2 along with their specifications. Table 3 details the specification for the interrogator, data recorder and the software.

		Col-1	Col-2	Col-3					Col-N
Header Rows	Row-1	Time	Sensor-1 Name	Sensor-2 Name	Sensor-3 Name	-	-		Sensor-N Name
	:		S1 Config	S2 Config	-	-	-		
	:		:	:	-	-	-		:
	:		S1 Config	S2 Config	-	-	-		
Data Rows	Row-Y	Start Date:Time T1	S1 Value @ T1	S2 Value @ T1	-	-	-		SN Value @ T1
	:	T2	S1 Value @ T2	S2 Value @ T2	-	-	-		SN Value @ T2
	:	T3	S1 Value @ T3	:	-	-	-		SN Value @ T3
	:	:	:	:			-		:
	:	:	:	:	-	-	-		:
	:	End Date:Time T1000	S1 Value @ T1000	S2 Value @ T1000	-	-	-		SN Value @ T1000

Figure 5: Format of a sample data stored in the binary file

Technical Compliance:

Table: 1 Type, specification and number of sensors

S. No	Sensor Type	Specification	Complied/ Not Complied	Ref. Page No.
1.	Reusable FBG strain sensor	Fiber Bragg grating based sensor, Gauge length: 120 ± 10 mm; Measurement range: ±500 microstrains; Sensitivity: 0.96 ± 0.03 pm / microstrains; Resolution: 0.5 microstrains; Temp. Cross Sensitivity: 5.8 ± 1 pm/degree Celsius; Maximum strain damage threshold: > 4000 microstrains; Spectral width (FWHM): > 0.2 nanometer; Reflectivity: 20 ± 6%; Side lobe suppression: >10 decibel; Material: Stainless steel, ormocer; Operation Temperature: -20 …. +80 degree Celsius; Protection Type: IP68;		
2.	Reusable FBG Temperature sensor	Fiber Bragg grating based sensor, Measurement range: -20 to 80 degree Celsius; Sensitivity: 30 degree Celsius /pm; Resolution: 0.02 degree Celsius; Temperature compensation: 20 microstrains/degree Celsius; Spectral width (FWHM): > 0.2 nanometer; Reflectivity: 20 ± 6%; Side lobe suppression: >10 decibel; Material: Stainless steel, ormocer; Operation Temperature: -20 …. +80 degree Celsius; Protection Type: IP68;		
3.	Reusable FBG biaxial Tilt sensor	Fiber Bragg grating based sensor, Measurement range: +/- 5 deg; Sensitivity: 185 pm/deg; Resolution: <0.005 deg; Maximum calibration error: 0.05 degree; Operation Temperature: -20 to +80 degree Celsius; Biaxial Mounting: Biaxial Tilt sensor preferred, if not available two sensors mounted for Biaxial can be quoted with necessary Biaxial mounting plate; End connectors: SC/APC on both the end of the Fiber Optic cable;		
4.	Cable specification & Packaging	The 3 FBG strain and 1 FBG temperature sensors are to be packaged as shown in figure 3. Cable lengths between sensors: 3m between each sensor, 20m cable length from 1st sensor and End connector, and 20m cable between last sensor and End connector; 24 such chains are required. Cable type: Ø3mm armor cable; Cable should be protected with Hytrel buffer, Steel spiral, Kelvar & Steel Mesh;		

Table: 2 Optical Accessories

S. No	Hardware Requirement:	Specifications	Complied/ Not Complied	Ref. Page No.
1.	Optical Breakout Cable	1 no each of 30m, 35m &45m, 3 each of 40m & 50m Each of the breakout cable should have - 4 x FC/APC connectors at one end with 1 m as pig tail - 4 x SC/APC connectors at another end with 1 m as pig tail Cable should be protected with Hytrel buffer, Steel spiral, Kelvar & Steel Mesh		
2.	Fiber Tester	Connector compatibility: FC, SC, ST Light wavelength: 635nm Operation current: 40mA Operating temperature -10 to +45°C		
3.	FS cleaner	Connector compatibility: FC, SC, ST Contamination: Oil, dust		
4.	Adapter	Type: SC-SC Material: Stainless Steel Loss: <0.3 decibel		
5.	Adhesive	Content: methylmetacrylate Two-component adhesive (100g + 80ml) Target Material: Should be able to bond Strain Gauges on concrete surface Curing: Thumb Pressure (10 mins @ 20°C & 2 mins @ 35°C) Temperature Capability: -200°C to +60°C		
6.	Covering	Viscous, kneadable putty 0.05 mm thick aluminum foil with 3mm kneading compound (205x100 mm)		
7.	Distribution Box	Fiber optics distribution box with SC connectors panel, IP 65, material: ABS + PC		
8.	Training	A person with at least 5 years' experience in mounting FO sensor on Bridges should give training in IIT Madras for at least 4 working Days.		

Table 3: Interrogator, data recorder and software specifications

S. No	Hardware Requirement:	Specifications	Complied/ Not Complied	Ref. Page No.
1.	Optical Interrogator	Number of channels required to accommodate 60 strain channels and 20 temperature channels and 8 tilt channels. Dynamic Optical Interrogator with continuous swept laser scanning technology **Inputs**: Without multiplexing above channels must be accommodated **Connector**: FC/APC **Transducer types**: All sensors based on Fiber Bragg Grating (FBG) **Optical wavelength**: As per sensor configuration **Sample rate**: 0.1 to 2,000 S/s, Selectable **Signal bandwidth (-3 decibel)**: 800 Hz **Repeatability**: < 1.5pm @ 100 Samples/s < 2.5pm @ 2000 Samples/s Both over full temperature range and over full wavelength range for more than 50 h **Dynamic range**: >20 decibel **Smart Peak detection**: Required to ensure all sensor peaks are detected automatically even for large cable lengths with multiple connections. **Optical Spectral Analysis**: Must include a NIST traceable wavelength reference with 10,000 points per trace providing continuous calibration to ensure system accuracy over long term operation. **Filters**: Bessel, Butterworth, linear phase 0.01 to 20 (-3 dB), filter OFF **Communication**: 10Base-T/100Base-TX with direct IP address & DHCP Should be possible to have EtherCAT/ ProfitNet for future upgradation. **Synchronization**: IEEE1394b, IEEE1588 and NTP required. **Hybrid Operations**: Required synchronized operation. capability with foil type gauges / electrical sensor datalogger. **Supply voltage**: 230V AC **Operating temperature range**: -20 to +50 **Shock resistance (EN60068-2-27)**: 15g, 6ms, 600 impacts **Vibration resistance (EN60068-2-6)**: 2g, 30 min, 5 to 65Hz **Dimensions (w x h x d) & Weight**: Portable and light weight ≤ 2Kg **EMC**: As Per EN 61326 (certificate to be submitted with tender) Calibration validity: 5 years Comprehensive warranty: 5 years		

2.	Data Recording	Inbuilt >200GB SSD. Possibility to expand storage with Exchangeable CFast 2.0 card, USB 3.0 stick / HDD **Ring Buffer Memory**: For 10 minutes **Recording Modes**: Time interval (periodic file creation, without data loss), Long−term measurement (time, cycle with counter/cycle, time/peak−valley), Peak values (interval), trigger and record for a particular duration **Recording Rate**: 4MS/s to 5 MS/s **Digital I/O**: 3 Digital inputs & 3 Digital outputs (TTL, 4V) **Interface**: Fire wire, 2x Gigabit Ethernet, USB 3.0, WLAN, DVI **Data transfer**: Backed up to a data server via SFTP capability		
3.	Software	The software setup, simplified data Logging, simplified Hardware setup, simplified data Logging, simplified Data Viewing. The user interface must be standard and proven. No programming knowledge should be necessary. **Channel configuration**: Manual, via integrated sensor database, Calibration factor Automatically via TEDS, Project file **Data logging / start and end**: Start: Manual, via signal thresholds (limit values), End: Manual, triggered (post), timing, number of measured values. **Trigger**: Analog, calculated signals, digital input (0 / 1) Trigger type Edge (rising, falling), level (above, below) **Software Display Elements**: Online digital & graphical monitoring of all selected channels with Numeric display, chart recorder (y-t, x-y, y-f), polar diagram, Spectrum visualization, frequency diagram / color spectrogram (FFT), table (universal, simple spreadsheet), pointer, bar graph, LED (multi, uni), indicator, push button / switch (button), checkbox, list box, background image and text. The user must be able to modify the visualization screen by drag and drop, without use/knowledge of any programming. **Data Storage Format**: ASCII, and binary. The complete meta data (sensors, measurement, configuration, test parameters), statistics log should be stored for data traceability. Should have Fast Stream for highly dynamic measurements. Stable in the event of sudden interruption (no more than last data block should be lost) Separate binary/text file for each sensor type. Each file will contain information of all the sensors of the same type, arranged in a table format. For, example, the strain data text file will have readings from all strain sensors instrumented on the bridge span. The format will be like the figure 5.		

Technical Specifications

S. No	Sensor Type	Specification	Complied/ Not Complied	Ref. Page No.
1.	Reusable FBG strain sensor	Fiber Bragg grating based sensor		
		Gauge length: 120 ± 10 mm		
		Measurement range: ±500 microstrains		
		Resolution: 0.5 microstrains		
		Sensitivity: 0.96 ± 0.03 pm / microstrains		
		Operation Temperature: -20 …. +80 degree Celsius		
		Temp. Cross Sensitivity: 5.8 ± 1 pm/degree Celsius		
		Maximum strain damage threshold: > 4000 microstrains		
		Spectral width (FWHM): > 0.2 nanometer		
		Reflectivity: 20 ± 6%		
		Side lobe suppression: >10 decibel		
		Material: Stainless steel, ormocer, bolt to the structure		
		Protection Type: IP68		
2.	Reusable FBG temperature sensor	Fiber Bragg grating based sensor		
		Measurement range: -20 to 80 degrees Celsius		
		Resolution: 0.02 degree Celsius		
		Sensitivity: 30 degree Celsius /pm		
		Operation Temperature: -20 …. +80 degree Celsius		
		Temperature compensation: 20 microstrains/degree Celsius		
		Maximum strain damage threshold: > 4000 microstrains		
		Spectral width (FWHM): > 0.2 nanometer		
		Reflectivity: 20 ± 6%		
		Side lobe suppression: >10 decibel		
		Material: Stainless steel, ormocer, bolt to the structure		
		Protection Type: IP68		
		Fiber Bragg grating based sensor		
		Measurement range: +/- 5 deg		

3.	Reusable FBG Biaxial Tilt sensor	Sensitivity: 185 pm/deg		
		Resolution: <0.005 deg		
		Maximum calibration error: 0.05 degree		
		Operation Temperature: -20 to +80 degree Celsius		
		Biaxial Tilt sensor		
		Biaxial Mounting plate, if not biaxial tilt sensor		
		End connectors: SC/APC on both the end of the Fiber Optic cable		
		Material: Stainless steel, ormocer, bolt to the structure		
		Protection Type: IP68		
4.	Cable specification & Packaging	The 3 FBG strain and 1 FBG temperature sensors are to be packaged as shown in figure 3 of the specifications.		
		Cable type: Ø3mm armor cable		
		Cable should be protected with Hytrel buffer, Steel spiral, Kelvar & Steel Mesh		
5.	Optical Interrogator	Has the number of channels required to accommodate 60 strain channels and 20 temperature channels and 8 tilt channels.		
		Optical wavelength: Operating Wavelength of the strain and temperature sensors as per sensor configuration has been provided for the sensors in one channel of the interrogator		
		Dynamic Optical Interrogator with continuous swept laser scanning technology		
		Accommodation of above channels without multiplexing		
		Connector: FC/APC		
		Sample rate: 0.1 to 2,000 S/s, Selectable		
		Signal bandwidth (-3 decibel): 800 Hz		
		Repeatability: < 1.5pm @ 100 Samples/s **< 2.5pm @ 2000 Samples/s** **Both over full temperature range and over full wavelength range for more than 50 h**		
		Dynamic range: >20 decibel		
		Repeatability: < 1.5pm @ 100 Samples/s < 2.5pm @ 2000 Samples/s Both over full temperature range and over full wavelength range for more than 50 h		
		Dynamic range: >20 decibel		

		Smart Peak detection: Required to ensure all sensor peaks are detected automatically even for large cable lengths with multiple connections.		
		Optical Spectral Analysis: Include a NIST traceable wavelength reference with 10,000 points per trace providing continuous calibration to ensure system accuracy over long term operation.		
		Filters: Bessel, Butterworth, linear phase 0.01 to 20 (-3 dB), filter OFF		
		Communication: 10Base-T/100Base-TX with direct IP address & DHCP		
		Possible to have EtherCAT/ ProfitNet for future upgradation		
		Time Synchronization: IEEE1394b, IEEE1588 and NTP		
		Hybrid Operations: Required synchronized operation capability with foil type gauges / electrical sensor datalogger		
		Supply voltage: 230V AC		
		Operating temperature range: -20 to +50		
		Shock resistance (EN60068-2-27): 15g, 6ms, 600 impacts		
		Vibration resistance (EN60068-2-6): 2g, 30 min, 5 to 65Hz		
		EMC: As Per EN 61326 (certificate to be submitted with tender)		
		Calibration validity: 5 years		
		Comprehensive warranty: 5 years		
6.	Data Recording	Inbuilt >200GB SSD		
		Possibility to expand storage with Exchangeable CFast 2.0 card, USB 3.0 stick / HDD		
		Ring Buffer Memory: For 10 minutes		
		Recording Modes: Time interval (periodic file creation, without data loss), Long−term measurement (time, cycle with counter/cycle, time/peak−valley), Peak values (interval), trigger and record for a particular duration		
		Recording Rate: 4MS/s to 5 MS/s		
		Digital I/O: 3 Digital inputs & 3 Digital outputs (TTL, 4V)		

		Interface: Fire wire, 2x Gigabit Ethernet, USB 3.0, WLAN, DVI		
		Data transfer: Backed up to a data server via SFTP capability		
		The software setup, simplified data Logging, simplified Hardware setup, simplified data Logging, simplified Data Viewing, without programming knowledge		
		Channel configuration: Manual, via integrated sensor database, Calibration factor Automatically via TEDS, Project file		
		Data logging / start and end: Start: Manual, via signal thresholds (limit values), End: Manual, triggered (post), timing, number of measured values.		
		Trigger: Analog, calculated signals, digital input (0 / 1) Trigger type Edge (rising, falling), level (above, below)		
7.	Software	**Data Storage Format:** ASCII, and binary. The complete meta data (sensors, measurement, configuration, test parameters), statistics log should be stored for data traceability. Should have Fast Stream for highly dynamic measurements. Stable in the event of sudden interruption (no more than last data block should be lost)		
		Separate binary/text file for each sensor type. Each file will contain information of all the sensors of the same type, arranged in a table format, same as indicated in figure 5 of the specifications		
		Software Display Elements: Online digital & graphical monitoring of all selected channels with Numeric display, chart recorder (y-t, x-y, y-f), polar diagram, Spectrum visualization, frequency diagram / color spectrogram (FFT), table (universal, simple spreadsheet), pointer, bar graph, LED (multi, uni), indicator, push button / switch (button), checkbox, list box, background image and text. The user must be able to modify the visualization screen by drag and drop, without use/knowledge of any programming.		
		Cable should be protected with Hytrel buffer, Steel spiral, Kelvar & Steel Mesh		
8	Optical Breakout Cable	Each of the breakout cable has: -4 x FC/APC connectors at one end with 1 m as pig tail -4 x SC/APC connectors at another end with 1 m as pig tail		
		3 no each of 40m & 50m		
		1 no each of 30m, 35m &45m		
		Connector compatibility: FC, SC, ST		
		Light wavelength: 635nm		

9	Fiber Tester	Operation current: 40mA		
		Operating temperature +45°C		
10.	FS cleaner	Connector compatibility: FC, SC, ST		
		Contamination: Oil, dust		
		Type: SC-SC		
11.	Adapter	Material: Stainless Steel		
		Loss: <0.3 decibel		
		Content: methylmetacrylate Two-component adhesive (100g + 80ml)		
12.	Adhesive	Target Material: Should be able to bond Strain Gauges on concrete surface		
		Curing: Thumb Pressure (10 mins @ 20°C & 2 mins @ 35°C)		
		Temperature Capability: 10°C to +60°C		
		Viscous, kneadable putty		
13.	Covering	0.05 mm thick aluminum foil with 3mm kneading compound (205x100 mm)		
14.	Distribution Box	Fiber optics distribution box with SC connectors panel		
		IP 65, material: ABS + PC		
Terms and Conditions				
15.	Training	A person with at least 5 years' experience in mounting FO sensor on Bridges should give training in IIT Madras for at least 4 working Days.		
16.	Warranty	i) Beyond the standard warranty to quote 5-year comprehensive warranty for the items (Optical Interrogator, Data Recorder, Software)		
		ii) Supplier has to ensure no downtime of more than 1 day, until replacement unit repair/service is completed.		

Note: It is mandatory for the bidders to provide the compliance statement (Complied/Not Complied) for the above points with document proof as required). If the compliance statement (Complied /Not Complied) is not furnished for the evaluation Bidders will be disqualified.

SIGNATURE OF BIDDER ALONG WITH SEAL OF THE COMPANY WITH DATE

ANNEXURE - C

FINANCIAL BID (PROFORMA) - BILL OF QUANTITIES (BOQ)

Item Name: Fiber Bragg Grating based Optic Sensors, Interrogators and Data Acquisition System for Long Term Monitoring of a Pre-Stressed Concrete Box Girder Bridge
Tender No. GTB19/SARA/2024/01/FIBDATBOX

It. No	Description of work	Quantity	Currency	Unit Rate Ex-Works	CIP / GST charges in value	Total (A+B)
				(A)	(B)	
1	Reusable FBG strain sensor	72 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
2	Reusable FBG temperature sensor	24 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
3	Reusable FBG biaxial tilt sensor	10 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
4	Cabling and packaging	24 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
5	Optical Interrogator	1 Lot	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
6	Data Recorder	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
7	Software	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
8	Optical breakout cable 30m	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
9	Optical breakout cable 35m	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
10	Optical breakout cable 45m	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
11	Optical breakout cable 40m	3 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
12	Optical breakout cable 50m	3 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
13	Fiber Tester	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			

14	FS Cleaner	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
15	Adapter	40 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
16	Adhesive	10 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
17	Covering	40 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
18	Distribution Box	10 Nos.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
19	Training	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
20	Warranty for 5 years	1 No.	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
21	Packaging and shipping charges	1 No	INR/USD/EUR/CAD/ JPY/GBP/AUD/SGD/CHF			
	Grand Total					

Note:

1. Price bid as per this format to be uploaded only at the financial document column in CPP Portal. Price disclosure at the technical bid will result in disqualification

2. Technical Bid Should NOT Contain Price Bid/Financial Bid details (or) Indication. If the price Details are indicated, mentioned inside the Technical bid, then bid will be disqualified and neither the Technical Bid nor the Price Bid/Financial Bid will be considered.

I/We the bidder accept all the terms and conditions as per tender including all technical & commercial conditions.

Date:
Place:

Authorized Signatory
(_____)
Seal and signature

ANNEXURE – D

FORMAT FOR AFFIDAVIT OF SELF-CERTIFICATION UNDER PREFERENCE TO MAKE IN INDIA – PER ITEM

This letter should be on the letterhead of the quoting firm and should be signed by a competent authority. Non-submission of this will lead to Disqualification of bids.

Tender Reference Number:

Name of the item / Service:

Date: _____
I/We_____S/o, D/o, W/o, _____
Resident of
_____

Hereby solemnly affirm and declare as under:
That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Policy vide GoI Order no. P-45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019and 04.06.2020) MOCI order No. 45021/2/2017-PP (BE II) Dt.16th September 2020 & P- 45021/102/2019-BE-II-Part (1) (E-50310) Dt. 4th March 2021 and any subsequent modifications/Amendments, if any and

That the local content for all inputs which constitute the said item/service/work has been verified by me and I am responsible for the correctness of the claims made therein.

Tick (✓) and Fill the Appropriate Category	
☐	I/We_____[name of the supplier] hereby confirm in respect of quoted items thatLocal Content is equal to or more than 50% and come under **"Class-I Local Supplier"** category.
☐	I/We_____[name of the supplier] hereby confirm in respect of quoted items that Local Content is equal to 20% but less than 50% and come under **"Class-II Local Supplier"** category.
☐	I/We _____ [name of the manufacturer] hereby confirm in respect of quoted items that Local Content is less than 20% come under **'Non – Local Supplier'** category

- The details of the location (s) at which the local value addition is made and the proportionate value of local content in percentage

Address _____ Percentage of Local content: _____%
_____ Country of Origin of Goods: _____

For and on behalf of ..... (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)
<Insert Name, Designation and Contact No.>

[Note: In case of procurement for a value in excess of Rs. 10 Crores, the bidders shall provide this certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

ANNEXURE – E

Land Border Sharing Declaration

(To be given on the letter head of the bidder)

In-line with Department of Expenditure's (DoE) Public Procurement Division Order vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020

Tender No._____ Dated: _____

CERTIFICATE

(Bidders from India)

"I/ we have read the clauses pertaining to Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1, 2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country which shares a land border with India. I/We hereby certify that I/ we _____ (Name of the bidder) is/are

a) Not from such a country and eligible to be considered for this tender.

OR

(Bidders from Country which shares a land border with India)

I/We _____ (Name of the bidder) is/are from _____ (Name of the Country) and has been registered with the Competent Authority. I also certify that I fulfil all the requirements in this regard and is eligible to be considered. *(Copy/ evidence of valid registration by the Competent Authority is to be attached)*

Place: Signature of the Bidder
Date: Name & Address of the Bidder with Office Stamp

ANNEXURE - F

OEM CERTIFICATION FORM
(In Original Letter Head of OEM)

Tender No: ..... Dated: .....

We are Original Equipment Manufacturers (OEM) of..... (Name of the company) Ms..... (Name of the vendor) is one of our Distributors/Dealers/Resellers/Partners (tick one) for the ……. and is participating in the above-mentioned tender by offering our product model.....(Name of the product with model number).

…….. is authorized to bid, sell and provide service support warranty for our product as mentioned above.

Name and Signature of the authorized signatory of OEM along with
seal of the company with Date

TENDER CHECKLIST – –To be filled Mandatorily and sent (inside the Main Bid Cover) along with Bidding Document.

(1) I have registered as a Vendor with IC&SR. (Proof to be enclosed) ☐
(**ISO certificate, Active GSTIN certificate, valid PAN details**)

(2) Technical Bid details and Financial Bid details have to be provided in a separate folder. ☐

(3) Completed and **Signed the Tender Form**. The Form of Tender document was signed by a legally authorized person. (Proof of Authorization to be enclosed) ☐

(4) Evidence for similar contracts completed/Products supplied is submitted. (If the details are requested in **Annexure – A)** ☐

(5) Certification of Class I / Class II Supplier (Goods, Services, or Works) is submitted as part of the Technical bid (**Annexure – D)** ☐

(6) EMD as per tender norms is deposited and the proof is enclosed(**Annexure – I**) ☐

(7) Land Border sharing declaration document is submitted(**Annexure – E**) ☐

(8) Non- Debarment Declaration Form **(Annexure – H)** ☐

(9) An authorized agent certificate from OEM is filled and submitted. (It is mandatory if an Indian agent/Indian office of OEM is participating in this tender on behalf of OEM(**Annexure F**) ☐

The bid will be valid if all the above documents are provided. Bidders are asked to supply and tick off the required information. Failure to provide any of the stated documents as per tender norms may result in the bid being considered non-compliant and rejected.

Signature of the Bidder

FORM - A
NON- DEBARMENT DECLARATION

Date: XXXX

To,
The Indian Institute of Technology Madras,
Sardar Patel road,
Guindy, Chennai - 600036

Subject: Non-debarment declaration in connection with tender RFF No: XXXXXX for procurement of "XXXXXXXXXXXXXXXXXXXXXXXXXXX"

Dear Sir,

This is to notify you that our Firm/Company/Organization <*provide Name of the Firm/Company/Organization*> intends to submit a proposal in response to the invitation for procurement of "XXXXXXXXXXXXXXXXXXXXXXXXXXX" In accordance with the above we declare that:

a. We are not involved in any major litigation that may have an impact of affecting or compromising the delivery of services as required under this assignment.

b. We are not debarred by any Central/ State Government/ agency of Central/ State Government of India or any other country in the world/ Public Sector Undertaking/ any Regulatory Authorities in India or any other country in the world for any kind of fraudulent activities in last XX years.

Sincerely,

[BIDDERS NAME]
Name
Title Signature

CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH (IC&SR)
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036

ELECTRONIC CLEARING SERVICE (Credit Clearing)/ REAL TIME GROSS SETTLEMENT (RTGS) FACILITY FOR RECEIVING PAYMENTS

A. Details of Account Holder

Name of the Institution	Indian Institute of Technology - Madras
Complete Contact Address	Industrial Consultancy and Sponsored Research Indian Institute of Technology-Madras, IIT- Madras Campus Post Office, Sardar Patel Road, Guindy, CHENNAI - 600 036
Permanent Account Number (PAN)*	AAAAI3615G
GST REGISTERATION NO.	33AAAAI3615G1Z6
Telephone No./ Fax No.	Tel - 044-2257 8356
E- mail ID of the FO/AO/REG/DIR	dricsr@iitm.ac.in

B. Bank Account Details:

Institution Account Name (As per Bank Record)	The Registrar, Indian Institute of Technology - Madras
Account No.	2722101003872
IFSC CODE	CNRB0002722
SWIFT CODE	CNRBINBBIIT
Bank Name (in full)	Canara Bank
Branch Name	IIT-Madras Branch
Complete Branch Address	Canara Bank, IIT-Madras Branch, IIT- Madras Campus Post Office, Sardar Patel Road, Guindy, CHENNAI - 600 036
MICR No.	600015085
Account Type	Savings Account

Certified that the Institute's account is in an RTGS enabled branch.
I hereby declare that the particulars given above are correct and complete.

Date: 04/08/2023

कृते केनरा बैंक / For CANARA BANK
अधिकारी / Officer
आई आई टी चेन्नई शाखा / IIT Chennai Branch
चेन्नई / Chennai - 600 036

करोलिन लेमिना.म
M. KAROLINE LEMINA
अधिकारी
OFFICER
S.P. No:64356

Signature of the Competent Authority
of the Institution with seal.

उप कुलसचिव (आईसी एवं एसआर)
DEPUTY REGISTRAR (IC & SR)
आईआईटी मद्रास
I.I.T. MADRAS

Phone : +91 (0) 44 2257 8062 / 8061 / 8060 Fax : +91 (0) 44 2257 0545 / 2257 8366 email : deanicsr@iitm.ac.in website : http://www.iitm.ac.in

MANDATE FORM

ELECTRONICS CLEARING SERVICE (CREDIT CLEARING)/REAL TIME GROSS SETTLEMENT (RTGS) FACILITY FOR RECEIVING PAYMENTS.

*****

A. **DETAILS OF ACCOUNT HOLDER: -**

NAME OF ACCOUNT HOLDER	
COMPLETE CONTACT ADDRESS	
TELEPHONE NUMBER/FAX/E MAIL	

B. **BANK ACCOUNT DETAILS: -**

BANK NAME	
BRANCH NAME WITH COMPLETE ADDRESS, TELEPHONE NUMBER AND EMAIL	
WHETHER THE BRANCH IS COMPUTERISED?	
WHETHER THE BRANCH IS RTGS ENABLED? IF YES, THEN WHAT IS THE BRANCH **IFSC CODE**	
IS THE BRANCH ALSO NEFT ENABLED?	
TYPE OF BANK ACCOUNT(SB/CURRENT/CASH CREDIT)	
COMPLETE BANK ACCOUNT NUMBER(LATEST)	
MICR CODE OF BANK	

DATE OF EFFECT:

I hereby declare that the particulars given above are correct and complete. If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information I would not hold the user institution responsible. I have read the option invitation letter and agree to discharge the responsibility expected of me as a participant under the Scheme.

(……..)

Signature of Bidder

Date:

Certified that the particulars furnished above are correct as per our records.

(Bank's Stamp)

(……..)

Signature of Bidder

1. **Please attach a photocopy of the cheque along with the verification obtained from the bank.**
2. **In case your Bank Branch is presently not "RTGS enabled", then upon its upgradation to** "RTGS Enabled" branch, please submit the information again in the above pro-forma to the Department at the earliest.