

**REQUEST FOR PROPOSAL (RFP)
FOR
SUPPLY, INSTALLATION, COMMISSIONING
AND
OPERATION & MAINTENANCE SERVICES
OF
CONTINUOUS AMBIENT AIR QUALITY MONITORING
STATIONS (CAAQMS) IN CHATTISHGARH
BIDDING DOCUMENT VOLUME – I & II**



Tender No. 03/HO/CECB/SCI/CAAQMS/E-Tender/2019-20

**CHATTISHGARH ENVIRONMENT CONSERVATION
BOARD (CECB)**

**'Paryavas Bhawan, North Block, Sector - 19, Nava
Raipur, Atal Nagar (C.G.) 492002**

Web Site: <http://www.enviscecb.org>

E-mail: hocecb@gmail.com

Phone: 0771-2512220

IMPORTANT NOTE & TENDER NOTICE:

Chhattisgarh Environment Conservation Board invites bids for Selection of Supply, Installation, Commissioning and Operation & Maintenance Services of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) in Chhattisgarh State. All bids should be addressed to:

Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002
Phone :0771-2512220
E-mail: hocecb@gmail.com

Bids received after the due date will be rejected.

The document can be downloaded from the website <http://www.enviscecb.org>. The parties are advised to study the document carefully. Submission of response to this Request for Proposal shall be deemed to have been done after careful study and examination of this document with full understanding of its implications. Bidders must ensure that they submit all the required documents indicated in the RFP document without fail. Bids received without supporting documents for the various requirements mentioned in the tender document are liable to be rejected at the initial stage itself. The data sheet for all the components should be submitted by the Bidder for the scrutiny.

Chhattisgarh Environment Conservation Board reserves the right to accept or reject in part or full any or all the offers without assigning any reasons.

DISCLAIMER

The information contained in this Request for Proposal (hereinafter referred to as "RFP") document provided to the Bidders, by the Chhattisgarh Environment Conservation Board, Naya Raipur, hereinafter referred to as CECB, or any of their employees or advisors, is provided to the Bidder(s) on the terms and conditions set out in this RFP document and all other terms and conditions subject to which such information is provided.

The purpose of this RFP document is to provide the Bidder(s) with information to assist in the formulation of Proposals. This RFP document does not aim to hold all the information each Bidder may require. This RFP document may not be appropriate for all persons, and it is not possible for the Chhattisgarh Environment Conservation Board, their employees or advisors to consider the business/investment objectives, financial situation and particular needs of each Bidder who reads or uses this RFP document. Each Bidder should conduct its own investigations and analysis and should check the accuracy, reliability and completeness of the information in this RFP document and where necessary obtain independent advice from appropriate sources.

Chhattisgarh Environment Conservation Board, their employees and advisors make no representation or warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of the RFP document. Chhattisgarh Environment Conservation Board may, in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information in this RFP document.

FACT SHEET

Sl. No.	Titles	Descriptions
1	Tender No.	03/HO/CECB/SCI/CAAQMS/E-Tender/2019-20 Chhattisgarh Environment Conservation Board, Nava Raipur (CECB)/2019
2	Scope of Work	Supply, Installation, Commissioning And providing Operation & Maintenance Services Of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) In Chhattisgarh
3	Name of the tender issuer	Chhattisgarh Environment Conservation Board
4	Date of issue of tender document	14/11/2019
5	Last date for sending Pre Bid Query	25/11/2019
6	Pre Bid Meeting	A Pre-Bid meeting will be held on 25/11/2019 at 3:00 PM at Chhattisgarh Environment Conservation Board (CECB), Nava Raipur
7	Pre-bid query response would be published on	29/11/2019
8	Last Date for Submission of Bids	13/12/2019 Time: 2:00 PM
9	Physical submission of EMD (in the form of DD)	13/12/2019 by 2:00 P.M. along with Technical Bid as per submission instructions in Sec 4.5.1 of the RFP.
10	Date of Opening of Technical Bids	13/12/2019 at 04:00 P.M.
11	Date of Presentation	To be informed later through e-mail
12	Date of Commercial Bid opening	To be informed later through e-mail (Bidder should furnish the e-mail of one authorized representative)
13	Place of Physical Submission of EMD	Chhattisgarh Environment Conservation Board (CECB), North Block Sector-19,Nava Raipur(C.G.) 492002
14	Address for Communication	Member Secretary, CECB
15	Cost of Tender Document	Non-refundable Rs 5,000/- (Rs. Five Thousand only) through Demand Draft payment in the name of Member Secretary, Chhattisgarh Environment Conservation Board. <ul style="list-style-type: none"> • Original copy of the DD should be submitted in Envelop I - A • Copy of the Demand Draft should be uploaded in the e-procurement system through https://eproc.cgstate.gov.in
16	Earnest Money Deposit (EMD)	Rs. 2,00,000/- (Rupees Two Lacs only). EMD should be submitted in Demand Draft only in the name of Member Secretary, Chhattisgarh Environment Conservation Board: <ul style="list-style-type: none"> • Original copy of the DD should be submitted in Envelop I - A to Chhattisgarh Environment Conservation Board on 13/12/2019 by 2:00 PM along with Technical Bid as per instructions in the RFP. • Copy of the Demand Draft should be uploaded in the e-procurement system through https://eproc.cgstate.gov.in
17	Validity of Proposal	Proposals must remain valid for 180 days after the submission date.
18	Bid Submission	The Bidding will be in two parts through E- Tender system, Envelop I: Techno-Commercial offer and Envelop II: Financial Bid as mentioned in Section I, Clause 5 of this RFP. It may be noted that Hard copy of Envelop I is also need to be submitted by the designated date and at the place specified in Sub-clause 7.2 in this instruction
19	Availability of Tender Document	Tender can be downloaded from http://www.enviscecb.org or https://eproc.cgstate.gov.in

VOLUME –I

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INVITATION FOR BIDS (IFB)

NO. Date -----

PROJECT: SUPPLY, INSTALLATION, COMMISSIONING AND OPERATION & MAINTENANCE SERVICES OF CONTINUOUS AMBIENT AIR QUALITY MONITORING STATIONS (CAAQMS) IN CHATTISHGARH

- 1) Chhattisgarh Environment Conservation Board (CECB), invites bids in two Bidding system (Techno - commercial bid and Financial Bid through the state's e-procurement system at <https://eproc.cgstate.gov.in>) from eligible bidders for supply, installation & commissioning of equipments (listed in bid document) for Continuous Ambient Air Quality Monitoring Stations (CAAQMS) and Operation & Maintenance of this CAAQMS at various locations as listed and related services as specified in the bid document.
- 2) This invitation for the bid is open to any bidder who is a reputed manufacturer or authorized representative of the manufacturer, who on its own or along with his associate as O&M partner meets the qualifying Requirements stipulated hereunder for participation in the tender. The bidder shall furnish satisfactory evidence to establish that bidder meets the qualifying requirements.
- 3) A complete set of bidding documents can be downloaded by any interested eligible bidder from the website of Chhattisgarh Environment Conservation Board (CECB), <http://www.enviscecb.org> or <https://eproc.cgstate.gov.in> from the date of advertisement to date of submission. The payment of Bid Document Fee should be made by a non-refundable Demand Draft in favour of Member Secretary, Chhattisgarh Environment Conservation Board (CECB), Payable at HO, CECB, Nava Raipur, Atal Nagar (CG). Please refer Fact Sheet (Sl. No. 15) for details about tender fee.
- 4) Bidders are requested to submit a non-refundable Bid Document fee (Tender fees) in the form of Demand Draft in favour of Member Secretary, Chhattisgarh Environment Conservation Board (CECB), Payable at HO, CECB, Nava Raipur, Atal Nagar (CG). And scanned copy of the bid document fee should be uploaded in the specific folder marked for 'Bid Document Fee' along with the bid. However, Bid Document Fee, Earnest Money in original, original copy of affidavits and credit facility certificate must be submitted physically within the due date & time and to be marked as 'Supply, Installation, Commissioning and providing Operation & Maintenance Services of Continuous Ambient Air Quality Monitoring Stations (CAAQMS)' before bid closing date. Tenderer shall likely to be liable for legal action

for non-submission of original payment instrument like DD, etc., against the submitted bid. The Demand Draft attached/submitted for tender fee shall be non refundable.

- 5) Please refer Fact Sheet (Sl. No. 18) for details about bidding submission process. Only the bidders whose Techno-commercial bid is found substantially responsive will be notified by the Board of the date and place to participate in the public opening of the financial bid, in writing later.
- 6) Eligible Bidders must submit their bids for complete scope of work. Any bid submitted for incomplete scope shall be rejected outrightly.
- 7) The Representative of Agents of Foreign Bidders in India is also permitted to purchase Tender Document on behalf of their principals by submitting a letter of authority from their principals and by depositing requisite cost of tender document.
- 8) All the bids must be accompanied by bid security (EMD) in accordance with the Instructions to Bidders in the bidding documents.
- 9) All bids must be submitted on or before 13/12/2019 up to 02:00 PM. Any offer received after expiry of the time and date prescribed for receiving complete bid will not be entertained. Only the technical Bid will be opened in public on the date 13/12/2019, 04:00 PM in the presence of the bidders or their representative, who choose to attend on the specified date and time at the office of Chhattisgarh Environment Conservation Board (CECB).
- 10) The scanned copy of the Bid Security (EMD) should be uploaded online in the specific file marked for 'Bid Security' along with technical offer. However, Bid Security (EMD) DD in favour of Member Secretary, Chhattisgarh Environment Conservation Board (CECB), Payable at HO, CECB, Nava Raipur, Atal Nagar (CG) should be submitted physically within the due date & time and to be marked for 'Supply, Installation, Commissioning and Operation & Maintenance Services of Continuous Ambient Air Quality Monitoring Stations (CAAQMS).
- 11) Issuance of Bidding Documents will not be construed to mean that such bidders are automatically considered qualified.
- 12) The bid must accompany Bid Document Fee (Tender fees of Rs.5,000/- (Rs. Five Thousand only) in the form of Demand Draft (non refundable) and Bid Security Money (EMD) as indicated above, failing which it will not be considered.
- 13) The bidder should have at least five years experience in satisfactory operation of real time system for Ambient Air Quality Monitoring.
- 14) CECB will not be responsible for any cost(s) or expense(s) incurred by bidders in connection with the preparation or delivery of bids.

- 15) The CECB reserves the right to reject any or all the bids without assigning any reason whatsoever.
- 16) In the event of date being declared as a closed holiday the date for submissions of bids and opening of bids will be the following working day at the appointed time.
- 17) Interested eligible Bidders may obtain further information from Administrative Branch of CECB for the bidding documents.
- 18) Description of works shall be as per Annexure -I enclosed.
- 19) The original and all copies of the bid (Without Financial Bid) shall be typed or written in indelible ink and shall be stamped & signed by authorized Person of the Bidder. The Bidder shall submit whole bid (Without Financial Bid) document along with Technical Bid stamped & signed by authorized Person of the bidder.
- 20) The Financial Bid and Techno Commercial Bid must be submitted only physical mode.
- 21) The Successful bidder shall be signing the Contract Agreement with CECB at Head Office (HO), CECB, Naya Raipur, Atal Nagar (CG) after submitting the required Performance Bank Guarantee at HO, CECB, Naya Raipur, Atal Nagar.

List of the City / Locations where 4 nos. of CAAQMS will be installed

- 1) Bhilai – 2 Nos.**
- 2) Raipur – 2 Nos.**

ANNEXURE – I (For one CAAQM Station)

Sl. No.	Item / Analyzer Name	Total Quantity
1.	Monitoring Station foundations.	Actual
2.	Air Conditioner, Split Type, Roof mounted along with voltage stabilizer (2 X 2 ton, 1 X 1 Ton).	Three
3.	On line UPS (1X10KVA, 1 hr. back up and 1X5 KVA, 2 hr. back up)	Two
4.	Sampling System having 10 port manifold	One
5.	19" Rack cabinet to accommodate all analyzers & systems	Three
6.	Continuous Ambient Oxides of Nitrogen (NO/NO ₂ / NO _x) Analyzer	One
7.	Continuous Ambient Ammonia (NH ₃) Analyzer	One
8.	Continuous Ambient Sulphur Dioxide (SO ₂) Analyzer	One
9.	Continuous Ambient Ozone (O ₃) Analyzer	One
10.	Continuous Ambient Carbon Monoxide (CO) Analyzer	One
11.	Continuous BTX Monitor / Analyzer	One
12.	Multi calibration System for Gas calibration and Meteorological, Flow and Electronic Calibration	One set
13.	Automatic PM _{2.5} Particulate Matter Monitor	One
14.	Automatic PM ₁₀ Particulate Matter Monitor	One
15.	Meteorological Sensors for Wind Direction, Wind Speed, Ambient Temperature, Rainfall, Relative Humidity, Solar Radiation and Telescoping Crank – up Meteorological Tower	One set
16.	Computer System (2 PC + 2 Rack Servers): a) One PC along with Laser Printer and DAS at each monitoring station; b) One Computer System will be used for Displaying Air Quality Index of the Stations (the software will be provided by the CPCB) c) One Central Rack Server with Cisco Switch, UTM Device & Access Point for data connectivity from Stations to be setup at each of the SPCB Head Office d) One Central Rack Server with Cisco Switch, UTM Device & Access Point for data connectivity from Stations to be setup at CPCB-Delhi.	Two PC + Two Rack Servers
17.	Data display Board Transmission Device (two nos) (One for Data Display Board near to the station and another for data display at the SPCB display board)	Two
18.	Day & Night Visible Data Display Board (Near to the station)	One
19.	Day & Night Visible Data Display Board at the respective SPCB-H.O.	One
20.	Continuous Automatic Monitoring Stations with Sampling line, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display system, Recommended spares in a Housing Container OR Continuous Automatic Monitoring Stations with Sampling line, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display system, Recommended spares without a Housing Container	One set OR One set w/o container
21.	Lease Line for Internet AND Broadband or Data Card as backup of Communication system	One set

22.	RCC foundation, pillars misc works including Caging, civil & electrical work (for CAAQM stations as well as Data Display Boards)	Actual
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SECTION I: INSTRUCTION TO BIDDERS

1.0 1.0 DEFINITIONS

The terms used in this bidding document shall have the meaning defined hereunder:

- 1.1 “The Project” or “The Works” means supply, installation & Commissioning of equipments for Continuous Ambient Air Quality Monitoring Stations (CAAQMS) and providing Operation & Maintenance of this CAAQMS at the pre defined city/ location
- 1.2 “The Board” means the Chhattisgarh Environment Conservation Board (CECB), having its office at Chhattisgarh Environment Conservation Board (CECB), Payable at HO, CECB, Nava Raipur, Atal Nagar (CG) and shall include any person or persons authorized by the Board. The Board is also executing agency of the Project. “The Owner” means the Board.
- 1.3 “The Bid” means the offer or proposal of the Bidder to be submitted for the works in accordance with the stipulations set forth in this Bidding Documents.
- 1.4 “The Techno-commercial Bid” means the Technical part of the Bid.
- 1.5 “The Financial Bid” means the financial part of the Bid.
- 1.6 “The Bidder” means either the manufacturer of the Equipment or his authorized Representative, who submits the Bid for the Works.
- 1.7 “The Authorized representative” means the bidder who has enclosed the manufacturer’s authorization as per the format “Form of letter of authorities” provided as Attachment 3 of Section III.
- 1.8 “The Contractor” or “The Contractor” means the Bidder, whose Bid for the Works has been accepted by the Board and includes his personal representatives, successors and authorized assignees.
- 1.9 “The Manufacturers” mean the firms, which produces the equipment to be furnished by the Contractor under the Contract with the Board.
- 1.10 “The Bidding Documents” mean all the documents in Volume I and II in the bidding documents annexed thereto.

2.0 INTRODUCTION

- 2.1 The Chhattisgarh Environment Conservation Board (CECB) intends to invite bids from eligible bidders for supply, installation & commissioning of equipments for Continuous Ambient Air Quality Monitoring Station (CAAQMS) in Chhattisgarh; and providing operation & Maintenance of this CAAQMS at specified city / locations wise.

2.2 Scope of Works

The description of Scope of Works is set forth in Section II of this Volume 1.

2.3 Size of Bid

The whole bid is for single composite package as detailed at Section - II i.e. scope of work.

2.4 Eligible Equipment and conformity to the bidding documents

1. All countries are the eligible source countries for goods and services to be supplied under this contract.
2. For the purpose of this clause “origin” means the place where the equipment or component parts thereof are grown, or produced. Equipment are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.
3. The Bidder shall furnish the Certificate of Country of Origin (duly authenticated by competent authority of that country) of each Equipment (as per Attachment 4 to Section III) in these instructions, as the documentary evidence of the eligibility of the Equipment.
4. The origin of equipment may be distinct from the nationality of the bidders.
5. Conformity of the Bidding documents may be in the form of literature, drawings, and data, and the Bidder shall also furnish:
 - a) A detailed description of equipment, essential technical and performance characteristics.
 - b) A list giving full particulars, including available sources of all spares (whether mandatory or recommended) and their prices, special tools etc., necessary for the proper and continued functioning / maintenance of the equipment on long term basis.
 - c) An inventory of the spare parts for each equipment available with the O&M partner in India mentioning the ones not available in India and have to be imported in case necessary after the expiry of O&M period.
 - d) A clause-by-clause commentary of the Board’s Technical Specifications demonstrating the equipment’s substantial responsiveness of these specifications or a statement of deviations of exceptions to the provisions of Technical Specifications.

The above stated requirements are a minimum and the Board reserves the right to request any additional information concerning the Bid Proposal in response to this Invitation of Bids.

2.5 Qualifying Requirements of Bidders

This invitation for the Bid is open to any bidder who is a reputed manufacturer or authorized representative of the manufacturer, who on its own or along with his associate as O&M partner meets the Qualifying Requirements stipulated hereunder for participation in the tender. The bidder shall furnish satisfactory evidence to establish that bidder meets the following qualifying requirements.

2.5.1 The bidder should be a manufacturer or authorized representative as listed in the scope of work who must have manufactured, supplied, tested and commissioned minimum six (6) nos. similar air monitoring stations (CAAQMS) either container based or otherwise in any one year of the last three years which should be in satisfactory operation.

2.5.2 Bids of bidders quoting as authorized representative of a manufacturer, who meets the above requirements in full, can also be considered, provided:

- i) the manufacturer furnishes a legally enforceable authorization certificate in the prescribed form at Attachment-3 Section-III, assuming full guarantee and O&M obligations as per GCC and SCC, for the goods offered; and
- ii) The bidder, as authorized representative, supplied, tested and commissioned minimum six (6) nos. similar air monitoring stations either container based or otherwise in any one year of the last three years which should be in satisfactory operation with no adverse report for last three (3) year as on date of bid opening.

2.5.3 The bidder should furnish the information on all past supplied and satisfactory performance for both 2.5.1 and 2.5.2 (ii) above, in "Performance Statement" as per Attachment No. 8 B & 8C respectively of Section III and minimum two (2) nos. documentary evidences (client certificates in favor of bidder or manufacturers of equipment) in support of the satisfactory operation of similar air monitoring stations, which is in use for last three (3) years in case bidder is manufacturer or for last two (2) year in case bidder is authorized representative.

2.5.4 The bidder or their associates with an O&M partner in India, (any authorized agency in India) should have well trained O&M personnel on its regular rolls as per following details. To establish this bidder should enclose the curriculum vitae of following persons with required experience. The bidder should submit the copy of the service bond agreement between employer (bidder) and employee (personal i.e. Project Manager, Technician and Data Processor) for duration mention in below table at the time of bid submission.

Sl. No.	Responsibility	No. of Persons	Minimum Qualification	Experience	Service Bond Duration
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1.	Project Manager	1	Graduate Engg./ M.Sc.	10 years	3 Years
2.	Technician	2	Diploma in Electronics / C&I/ Electrical	3 years	2 Years
3	Data Processor	1	Science Graduate	2 Years	1 Year

2.5.5 The O&M partner shall furnish an undertaking regarding carrying out satisfactory O&M of CAAQMS covered in this document as per terms & conditions of the document on behalf of the bidder. This information is to be provided as per Attachment 5 & 9 of Section III.

2.5.6 The bidder should have experience in the supply and O&M of CAAQM stations to at least one Central/State Pollution Control Boards for a period of not less than two years for which necessary certificate issued by one Central/State Pollution Control board should be attached.

2.5.7 For all the items not manufactured by the Bidder i.e. Analyzers, Monitors, Calibrators and Sensors, the bidders should be authorized by the manufacturers for these items as per the format "Form of letter of authorities" provided as Attachment 3 of Section III, except where make is prescribed.

2.5.8 Bidder or their authorized representative should have a turnover of 10 Cr per year for last three financial years to execute the contract.

2.6 Bidding Procedure

- 1) The Bidding will take two envelopes and both part of the Bid shall be submitted online simultaneous Bidding procedure through e-tender system. However, Envelop I shall be submitted simultaneously in hard copy by the designated date and at the place specified in Sub-clause 7.2 in this instruction.
- 2) The Technical Bid will be evaluated first and only the Bidders who's Technical Bids will have been found substantially responsive will be notified by the Board of the date and place to participate in the publicly opening of the Financial Bid in writing.
- 3) The envelop for Techno-Commercial Bid (Envelop - I) shall consist of three (3) envelopes. The first envelope "A" will contain the Bid Security (EMD) & Tender Document Fee; the second envelope "B" will contain the qualification documents, and the third envelope "C" will contain the technical specifications pursuant to Clause 5 of this Instructions.
- 4) The Financial Bid (Envelop - II) documents must be pursuant to Clause 6 of these Instructions.
- 5) The bidder must quote for complete scope of work in package. In case the bidder does not quote for complete scope of work, the bid shall be rejected at Techno-commercial evaluation stage.

6) The bidder shall bear all costs associated with the preparation and delivery of its bid, and purchaser will in no case be responsible or liable for those costs.

3.0 BIDDING DOCUMENTS

3.1 Downloading of Documents

A complete set of bidding documents can be downloaded by any interested eligible bidder from <http://www.enviscecb.org> or <https://eproc.cgstate.gov.in>. The payment of Bid/Tender Document Fee should be made by a non-refundable demand draft in favour of Member Secretary, Chhattisgarh Environment Conservation Board, Paryavas Bhavan, North Block Sector-19, Naya Raipur (C.G.) 492002 for Amount of Indian Rupees 5,000/- (Rs. Five Thousand). The D.D. should be submitted in Envelop A.

Bidding Documents are not transferable.

3.2 Confidentiality of Documents

All recipients of the Bidding Documents, regardless of whether the Bid is submitted or not, shall treat the details of the documents as private and confidential.

3.3 Check of the Bidding Documents

Upon receipt of the Bidding Documents, the Bidder shall check the number of pages and drawings and notify the Board of any missing or duplicate pages and drawings or of any figures or words, which may be indistinct or ambiguous.

No claim will be admitted as result of the Bidder's failure to comply with the foregoing.

The address for the contact is specified in Sub-clause 3.5 of this Instruction.

3.4 Contents of Bidding Documents

The Bidding Documents include:

Volume I

Invitation for Bids

SECTION I INSTRUCTION TO BIDDERS

SECTION II SCOPE OF WORKS

SECTION III FORM OF TECHNO-COMMERCIAL BID

SECTION IV FORM OF FINANCIAL BID

SECTION V GENERAL CONDITIONS OF CONTRACT

SECTION VI SPECIAL CONDITIONS OF CONTRACT

Volume II

TECHNICAL SPECIFICATIONS

Bidders must acquaint themselves with all the Bidding Documents embodied in Volume I and Volume II. In order to familiarize with the Works, the Bidders should ascertain all

particulars regarding the location and site conditions at their own expenses. No plea attributed to lack of information or insufficient information will be entertained at any time. The Board shall reserve the right and privilege to settle the affairs in case any doubt may occur concerning the Bidding Documents.

3.5 Clarification of Bidding Documents

If a prospective Bidder has any doubt as to the meaning of any part of the Bidding Documents he may notify the Board for supplementary information and explanation in writing at the following address at least fifteen (15) days before the closing date of the bid.

Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar (C.G.) 492002

3.6 Amendment of Bidding Documents

- 1) At any time prior to the deadline for submission of the Bid, the Board, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, may modify the Bidding Documents by amendment.
- 2) All prospective Bidders who have received the Bidding Documents will be notified of the amendment in writing at the address contained in their letter of request for issue of bidding documents and will be binding on them. The Owner will bear no responsibility or liability arising out of non-receipt of the same in time or otherwise.
- 3) In order to allow prospective Bidders reasonable time in which to take amendment into account in preparing their Bids, the Board at its discretion may extend the deadline for submission of the Bid.

4.0 PREPARATION AND SUBMISSION OF BID

4.1 Language

The Bid to be prepared by the Bidders, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the Board shall be written in English. Failure to comply with this may disqualify a bid.

4.2 One Bid per Bidder

Each Bidder shall submit one Bid only.

4.3 Local Representation

- [i] Foreign Bidders, if they have in India a local representative in Indian / Indian agent shall indicate in their bid (Bid Proposal Sheets), the name of such person of firm and also shall furnish the following information in their bid:
- a. The precise relationship between the Bidder and his Indian Agent.
 - b. The mutual interest which the Bidder and the Indian Agent have in business of each other.
 - c. Any payment which the Indian Agent receives in India or abroad from the Bidder whether as a commission for the Contract or as a general retainer fee.
 - d. Indian Agent's Income Tax Permanent Account Number.
2. Bidder's Income Tax Permanent Account Number.
- a. All services to be rendered by the Indian Agent whether of general nature or in relation to the particular contract.
 - b. All above statements have to be substantiated by authenticated documents from competent authority.

[ii] Agent's commission, if any, (to be included in the Bid Price) shall be indicated separately but as a part of Bid Price and the same will be payable only in equivalent Indian Rupees. Indian agent's commission will not be subject to any escalation whatsoever and will be payable at the time of final payment after commissioning & training. To effect such payments, the Indian Agent's commission will be calculated on the basis of exchange rates (State Bank of India T T Exchange buying rate) as on the date of notice of the award to the successful Bidder.

[iii] The bidder /Contractor shall not pay Indian Agent's Commission, unless declared in the bid.

4.4 **Bid Security / Earnest Money Deposit (EMD)**

- 1) Pursuant to Clause 5.1 in this instruction, the Bidder shall furnish, as part of its Bid, his Bid Security (EMD) in the amount of Indian Rupees Two Lakh Only/- (Rs. 2, 00, 000 only/-) (for 4 stations) of quoted value in the form of Bank Demand Draft, in favour of "The Member Secretary, Chhattisgarh Environment Conservation Board, Paryavas Bhavan, North Block Sector-19, Nava Raipur, Atal Nagar(C.G.)", payable at Raipur.
- 2) The Bid security (EMD) in the form of Bank Demand Draft shall be valid for Ninety (90) days from the date of opening of Techno-commercial Bids. This Bid Security

shall provide security for the due performance by the Bidder of the obligations and undertakings in the Bid on his part contained.

- 3) Any Bid not secured by the Bid Security will be rejected by the Board as non-responsive pursuant to Sub-clause 8.4. Unsuccessful Bidder's Bid Security (EMD) will be discharged or returned as promptly as possible, but not later than thirty (30) days from the expiration of the period of the Bid validity specified in Sub-clause 4.5 hereunder. The successful Bidder's Bid Security (EMD) will be discharged upon the Bidder signing the Contract pursuant to Sub-clause 13.3 in this instruction and furnishing the Performance Security pursuant to Clause 14 in this instruction.
- 4) The Bid Security (EMD) may be forfeited:
 - a. If a Bidder withdraws its Bid during the period of Bid validity specified in Sub-clause 4.5 hereunder;
 - b. If a bidder refuses to accept the arithmetical corrections made according to ITB (Instructions to the Bidder) Clause No. 11; also successful bidder fails to acknowledge the receipt of LOA/ PO.
 - c. In case of a successful Bidder, if the Bidder fails to sign the Contract in accordance with Sub-clause 13.3 in this Instructions and furnish Performance Security in accordance with Clause 14 in this Instructions;
 - d. In case bidder refuses to withdraw, without any cost to the Owner, those deviations, which the bidder did not state in the Deviation Schedules.
- 5) **No interest will be payable by the Board on the above Bid Security.**

4.5 **Validity of Bid**

The bid shall remain valid and binding on the Bidder for one hundred eighty (180) days from the final time and date for submission of the Bid. Bid validity for a shorter period shall be rejected by the Board as non-responsive.

In exceptional circumstances, the Board may in writing or by facsimile, solicit the Bidder's consent to an extension of the period of the Bid validity. If the Bidder agrees to the request for extension, the Bid Security shall also be extended for an equivalent period of time.

Any Bidder may refuse to extend the validity of his Bid without forfeiting his Bid Security, but the Bid will not be considered.

Bidders granting the requests for extension of the Bid validity will not be required or permitted to modify their Bids.

4.6 **Modification and Withdrawal of Bid**

- a. The Bidder may modify or withdraw its Bid after the Bid's submission; provided that written notice of the modification or withdrawal is received by the Board prior to the deadline prescribed for submission of Bids.
- b. The bidder's modification or withdrawal notice shall be prepared, sealed, marked and dispatched in accordance with the provisions of clause 5 & 6 for Techno-commercial and financial bid respectively, with the outer and inner envelope additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate. A withdrawal notice may also be sent by fax but must be followed by a signed confirmation copy.
- c. No Bid shall be allowed to be modified subsequent to the deadline for submission of Bids.
- d. No bid shall be allowed to be withdrawn in the interval between the deadline for submission of Bids and the expiration of the period of bid validity specified in the clause 4.5 above. Withdrawal during this period may result in the forfeiture of the bid security pursuant to clause 4.4 (4) (a).

4.7 Rejection of Bid

Failure by the Bidder to comply with the provisions of these Instructions to Bidders or any part of the Bidding Documents may result in rejection of the Bid and forfeiture of the Bid Security.

The Board reserves the right to accept or reject any or all Bids or to amend the Bidding process at any time prior to award of the Contract without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Board's action.

The Board also reserves to itself the right of accepting the whole or any part of the Bid and the Bidder shall be bound to perform the same at the rate quoted.

4.8 Contacting the Board

Except for responses to request for clarification of the Bid by the Board, the Bidder shall not contact the Board for any matter related to this Bid from the time of submission of the Bid until the Contract is awarded.

Any efforts by the Bidder to influence the Board in his decision in respect of evaluation of the Bid or award of the Contract shall result in the rejection of the Bid and forfeiture of the Bid security.

5.0 PREPARATION OF TECHNO-COMMERCIAL BID

5.1 Contents of Envelop "A", Bid Security (EMD) & Tender Document Fee

The Bidder shall enclose his Bid Security (EMD) & Tender Document Fee in the sealed envelope marked “A” and “ORIGINAL” or “COPY” pursuant to sub-clause 4.4 in this Instructions. The Bidder shall prepare and submit one (1) original and one (1) copy.

5.2 Contents of Envelop “B”, Qualification Documents

Following documents shall be prepared in one (1) original and one (1) copy and be enclosed in the sealed envelope clearly marked “B” and “ORIGINAL” or “COPY” with the indication of the contents.

- 1) Authorization letter authorizing the signatory of the Bid to commit the Bidder.
- 2) Attachments in support of meeting qualifying requirements as per Clause No. 2.5 for the quoted packages (Attachments 8A, 8B & 9 of Section-III).
- 3) Copy of certificate of local branch, sales, residential and representative office(s) of the Bidder in India as per certificate from pursuant to Attachment 2 of Section III.
- 4) Certificate of letter of authority from manufacturers for all the Equipment (Attachment 3 of Section III).
- 5) Certificate from manufacturer stating the country of origin of each equipment duly authenticated by competent authority of that country (Attachment 4 of Section III).
- 6) Certificate of carrying out O&M by O&M Partner (Attachment 5 of Section III).
- 7) List of Equipment offered (Attachment 6 of Section III).
- 8) List of Manufacturers of the equipment offered (Attachment 7 of Section III).
- 9) Pre-requisite for installation of equipment offered (Attachment 11 of Section III).
- 10) The Authorized Indian Agent/Representative Indian supplier should have minimum 02 years continuous agency partnership/joint venture/preparation or collaboration with their Principal foreign supplier. The documentary proof of such agencyship / authorization / MOU should be submitted along with the technical part. The bid of the firm does not contain the proof of such nomination / authorization as Indian agent will be rejected.

5.3 Contents of Envelop “C”; Techno-commercial bid including Technical Specifications and Catalogs

The following documents shall be enclosed in the sealed envelope marked “C” and “ORIGINAL” or “COPY” with the indication of the contents. The Bidder shall prepare one (1) original and one (1) copy.

- 1) Attachments 1 & 2 of Financial Bid, Section IV must be submitted through online.
- 2) Deviation Schedule (Attachment 12 of Technical Bid, Section-III).
- 3) Technical Data sheets of the Equipment in the package (Annexure-I, Vol. II) offered:

- a. In case that there is no deviation from the Board's requirement, the Bidder must write down "complied" in the column for "Bidder's Response" and it is not necessary to rewrite the same words of the requirements.
- b. In case of any deviation from the requirement the Bidder must write down the "not complied" & the deviation in blanks under "Bidder's Response".
- c. The Bidder shall clearly indicate contents and quantities of standard accessories for the proposed Equipment in the blanks.
- d. The Bidder shall understand that decision of the Board will be binding in regards of anything not specifically mentioned in the technical specification.
- e. The Bidders shall offer only one manufacturer, one brand and one model.
- f. Complete set of original catalogues and/or photographs and/or pamphlets illustrating principal feature.

6.0 PREPARATION OF FINANCIAL BID

6.1 Preparation of Financial Bid

The Bidder shall enter a price or rate against all the forms specified in the following Sub-clauses from 6.2 to 6.5 and Attachments in Section IV through online E- Tender System.

6.2 Bid Form

The Bid Price to be quoted by the Bidder shall be prepared on the official letter head of the respective Bidder according to the Attachment 1 "Bid Form" in Section IV without any alteration or change.

The Bid Price shall be quoted for performing the Contract strictly in accordance with the Technical Specifications.

The Bid Price quoted by the Bidder shall be firm during the Bidder's performance of the Contract and not subject to variation on any account.

A Bid Price submitted online with an adjustable price will be treated as non-responsive and will be rejected.

6.3 Summary of Bid Price

Summary of Bid Price shall be prepared and submitted online in accordance with the Attachment 2 in Section IV.

The Bidder shall indicate prices online for the package in the following manner:

- I. For the Goods Supplied from Foreign Origin
 - A. CIF Price at Port of de-embarkment
 - a) FOB Price of the Package (for the equipment to be supplied from Foreign Origin)
 - b) Freight for complete Package

- c) Insurance covering all risks up to Port of de-embarkment
- B. Local Costs
 - a) Port handling and clearance charges
 - b) Transportation cost from the port to Port of de-embarkment to Sites
 - c) Insurance covering all risks from Port of de-embarkment up to handing over
 - d) Installation and commissioning
- II. For the Goods Supplied from India
 - a) The price of the Equipment quoted ex-works, ex-factory, ex-warehouse, ex-showroom, or off-the-shelf including all customs duties and sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of the Equipment quoted ex-works or ex-factory.
 - b) Price for handing and inland transportation, insurance up to handing over the equipment at Site and other local costs up to delivery of the Equipment to each Site.
 - c) Installation and commissioning
 - d) Price of other incidental cost, if any. Then the Bidder shall specify the same
- III. Price of other incidental cost such as Indian Agent's Commission, if any. The Bidder shall specify the same.
- IV. Cost of O&M of CAAQMS for Five (5) years including insurance.
- V. Training

The Bidder shall quote the price for the training as indicated in clause 10 of S/W.

Cost of Travel, Boarding & Lodging and local transport cost of participants shall be borne by respective board.

Note :

- 1) Quoted cost O&M of a CAAQMS for each year should be at least 15% of the cost of supply & installation of the CAAQMS. In case the bidder quotes O&M cost lower than 15% of the supply & installation cost, the Owner will reduce the supply & installation cost suitably, so as to make the O&M cost as 15% of the supply & installation cost, keeping the total quoted cost as unchanged.
- 2) All the local taxes & duties in the State of India i.e. Custom Duty, Excise duty, Sales Tax, Entry Tax, etc. which will be payable on the Equipment if the Contract is awarded shall be paid extra as actual by board.
- 3) Service tax as applicable shall be paid extra as actual the Board.

6.4 Bid Price Breakup

The Bidder shall prepare and submit online the Bid Price Breakdown (CIF Price or Ex-works price as applicable) for each item of the quoted package(s) in accordance with Attachment 3 in Section IV.

The Bidder shall prepare and submit online break up of Operation & Maintenance of CAAQMS as per Attachment 3A in Section-IV.

6.5 Currencies of Bid:

The unit rates and the prices shall be quoted by the bidder separately in INR only for the equipment, which the bidder proposes to supply. The foreign bidders should quote the price in Indian Rupee.

7.0 COMPLETION AND SUBMISSION OF BID

7.1 Completion of Bids

7.1.1 Techno-commercial Bid

The Techno-commercial Bid shall not contain any information regarding Bid Prices and other financial matters except the Bid Security pursuant Clause 4.4 in this instruction.

7.1.2 Financial Bid

The financial bid must be submit online as per price bid(s) Prescribed at Sub-clauses 6.2, 6.3, 6.4 and 6.5. The Bidder shall submit the price bid in the prescribed Price Bid Template along with the Tender Document on the portal and upload after quoting the price with the bid.

7.1.3 General

- 1) In case of discrepancy between “ORIGINAL” and “COPY” bids prepared pursuant to clause 5 in this instruction, the “ORIGINAL” shall govern.
- 2) The original and the copy of the Bid shall be typed or printed in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to bind the Bidder to the Contract. All pages of the Bid except for un-amended, printed literature, shall be initiated by the person(s) signing the Bid.
- 3) Any interlineations, erasures or over writing shall be valid only if they are initialed by the person or persons signing the bid with official stamp. A list of such occurrences are to be brought out in separate sheet including Section number, Clause number and Page number and submitted along with the respective envelope of Techno-commercial and/or financial bid.
- 4) The Bid shall be signed by the Bidder himself or for and on behalf of the Bidder by an officer or officers with authorization letter as the case may be. A notarized copy of such Power of Attorney shall be submitted with the Bid pursuant to Clause 5 in this instruction.

7.2 Submission of Bid

All the documents for the Techno-commercial Bid (technical) and Financial Bid (financial) shall be uploaded on the Government Tender Website <https://eproc.cgstate.gov.in> within the specified time and date.

Bids in the form of Telex, facsimile, telegraph or email, will not be accepted. Only the complete documents specified above, uploaded on the specified tender site and time will be considered.

All the documents for the Techno-commercial Bid shall be submitted (in Hard Copy) to the address and at the time & Date designated by the Board as follows:

The Member Secretary,

Paryavas Bhavan,

North Block Sector-19,

Nava Raipur, Atal Nagar (C.G.) 492002

Time by 02.00 PM on Date: 13/12/2019

If the outer envelopes of the Techno-commercial Bid are not sealed, Bid will not be accepted. The Bids received after the specified time and date here above for whatever reason shall be declared 'late' and rejected and returned unopened to the bidder.

Considering difficulties with document transportation, it is strongly suggested that the Bid shall be delivered by hand and the Bidder assumes all responsibilities for his Bid reaching address specified, prior to the time specified.

The Bids once opened shall not be returned to the Bidders regardless of the result of the Bid. This will apply to both the Techno-commercial and financial bids in case a bidder is not qualified at the stage of Techno-commercial evaluation.

8.0 OPENING AND EVALUATION OF TECHNO-COMMERCIAL BID'

8.1 Opening of Technical Bid

Only the Technical Bid will be opened in public at CECB, Head Office on the dated 13/12/2019, 04:00 PM at the place specified in Sub-Clause 7.2 here above. Bidders or their representatives may attend the opening.

During opening of the Techno-commercial Bid, the Bidder's name, the presence or absence of necessary envelopes, withdrawals of the Bid and such other details as the Board at their discretion may consider appropriate will be announced and recorded.

All the Bidders or their representatives present shall sign a format evidencing their attendance.

8.2 Confidentiality of the Process

Information relating to the examination, clarification, evaluation and comparison of Bids

and recommendations for the award of the contract shall not be disclosed to bidders or any other person not officially concerned with such process. Any effort by a bidder to influence the Board's processing of Bids or award decisions may result in the rejection of the Bidder's Bid. The request for clarification and response shall be in writing or by fax, but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Board in the evaluation of the bids in accordance with the clause 11.2 of these instructions.

8.3 Clarification of Techno-commercial Bids

To assist the Techno-commercial examination and evaluation of bids, the Board may, at its discretion ask the bidder for a clarification of its Techno-commercial bid. A pre bid meeting will be held on 25/11/2019. All responses to request for clarification shall be in writing in prescribed form (Attachment 1) before the pre-bid meeting date & time, and no change in the price bid shall be sought, offered or permitted after the tender closing date.

8.4 Preliminary Examination

The Board will examine the Techno-commercial Bids to determine whether they are complete, whether the documents have been properly signed and whether the Techno-commercial Bids are generally in order. Any Techno-commercial Bid found to be non-responsive for any reason i.e. non-conformity of bid security, or not meeting the eligibility criteria and/ or qualifying requirements pursuant to clause 2.4 & 2.5 of ITB etc. will be rejected by the Board. No further Techno-commercial evaluation shall be carried out for such bidders.

Prior to detailed evaluation of Techno-commercial bids, pursuant to clause 8.5, the Board will determine the substantial responsiveness of each Bid to the Bidding Documents including acceptable quality of goods offered pursuant to clause 2.4 & 2.5. A substantially responsive Bid is one, which conforms to all terms and conditions of the Bidding Documents without material deviations, objections, conditionality or reservations. A material deviation, objection, conditionality or reservation is one (i) that affects in any substantial way the scope, quality or performance of the contract; (ii) that limits in any substantial way, inconsistent with bidding documents, the Owner's right or the successful Bidder's obligations under the Contract; or (iii) whose rectification would unfairly affect the competitive position of other Bidder's who are presenting substantially responsive bids.

No deviation, whatsoever, is permitted by the Owner to the provisions relating to the following clauses (important Conditions):

- (a) Bid security (ITB Clause 4.4)
- (b) Resolution of Disputes (G.C.C clause 35),
- (c) Applicable law (G.C.C clause 40),
- (d) Taxes & duties (G.C.C Clause 38),
- (e) Performance security (ITB Clause 14 & GCC Cl.26),
- (f) Force Majeure (G.C.C Clause 33).

A bid with deviation to any of the above clauses (important Conditions) will be liable to be rejected.

The Owner's determination of bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence. If a bid is not substantially responsive, it will be rejected by the Owner, and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

8.5 Evaluation of Techno-commercial Bid

1. The Board will determine the responsive Techno-commercial Bids for the invitation of opening of Financial Bid if the Techno-commercial Bid meets satisfactorily technical specification and any other information, which they consider relevant to his offer.
2. If a Bidder is found not substantially responsive to the technical requirement, the Techno-commercial Bid will be rejected and the subsequent information as to opening of the Financial Bid will not be notified.
3. If the Techno-commercial clarifications are required by the Board to any part of the Techno-commercial Bids, the Bidders will be requested to clarify the same in writing.

8.6 Evaluation Criteria of Techno-commercial Bid

The Bidder who fulfill the requirements specified under Qualification Requirement (Clause 2.5) will be short listed. Under the Qualification Requirement a minimum threshold limit has been set for each parameter like technical experience and financial strength. Bidders not meeting the minimum threshold limit in any of these parameters will not be short-listed.

The detailed techno-commercial evaluation to be carried out shall be restricted to these short listed Bidders only.

9.0 NOTIFICATION OF SUCCESSFUL TECHNO-COMMERCIAL BID

After completing the techno-commercial evaluation of the Techno-commercial Bid first, the Board will notify in the e-tender portal about the pre-qualified and techno-commercially responsive Bidders, of the date and venue for the opening of the Financial Bid.

10.0 OPENING OF FINANCIAL BID

The Bidders to whom the opening time, date and venue for the Financial Bid are notified by the Board in the e-tender portal. The successful Bidder's (L1) name, quoted price of package and other details as the Board, as its discretion may consider appropriate will be announced and recorded.

11.0 EXAMINATION OF FINANCIAL BID

11.1 After opening of the Financial Bid, the Board will examine them to determine whether they are complete, signed, generally in order and substantially responsive to the Bidding Documents or not.

A Financial Bid determined as being not substantially responsive will be rejected. The Board may waive any minor informality or non-conformity or irregularity in a Financial Bid which does not constitute a major deviation or reservation provided such waiver does not prejudice or affect the relative ranking of any Bidder.

If there is any discrepancy between words and figures, the amount in words will prevail.

The Financial Bid which is incomplete or conditional will be rejected.

11.2 During examination of Financial Bid any arithmetical errors will be corrected as follows:

- a) If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected accordingly.
- b) The amount stated in the Form of Bid shall be adjusted by the Board in accordance with the above procedure for the correction of errors and, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount of bid, its bid will be rejected, and the bid security will be forfeited in accordance with clause 4.4 (5)

12.0 EVALUATION AND COMPARISON OF FINANCIAL BID

12.1 Evaluation Procedure

The Board will evaluate the Bid previously determined to be Techno-commercially responsive pursuant to clause 8.6. The Board reserves the right to reject any bid or bids received at its discretion without assigning any reason whatsoever.

12.2 The purchaser's evaluation of a bid will take into account following factors:

- A. Total cost of supply, installation & commissioning at the identified city /**

location of the equipment as below:

1. The CIF port of entry price of the equipment to be offered from abroad including price of consumables & spare parts.
2. The ex-factory / ex-warehouse / off-the shelf price of the equipment to be offered from within India (such price include all costs as well as duties and taxes paid or payable on components and raw material incorporated or to be incorporated in the equipment)
3. Local costs i.e.
 - a) Cost of port handling and custom clearance,
 - b) Transportation cost from Port of de-embarkment to Sites,
 - c) Insurance from Port of de-embarkment up to handing over and
 - d) Installation and commissioning charges at site.
4. Other incidental costs, if any (such as Indian agent's commission)

B. O&M cost (including insurance) for Five (05) years as Net Present Value discounted @15% per annum.

NOTE: Taxes and duties shall not be considered for the purpose of evaluation.

12.3 The Board will evaluate and compare Bid for complete package.

12.4 The rate of exchange for evaluation

To facilitate evaluation and comparison, the Owner will convert all Tender prices to Indian Rupees at the BC selling exchange rate as determined by the State Bank of India, on the date of opening of Techno-commercial Bids.

12.5 Clarification on Financial Bid

For the purpose of examination, evaluation and comparison of the Financial Bid, the Board may at his discretion request the Bidder in writing to clarify his Financial Bid, but no change in the Bid Price or substance of the Bid will be sought, offered or permitted.

12.6 Cost Compensation for deviations

Deviations specifically declared by the bidders in respective Deviation Schedule (Attachment 12 of Technical Bid, Section – III) only will be taken into account for the purpose of evaluation.

In case of any of these deviations are not acceptable to the Owner, the Bid shall be rejected.

In case any of the deviations are acceptable to the Owner, the Owner will make its own assessment of the cost of these deviations and consider it for evaluation for the purpose of ensuring fair comparison of bids.

Bidders may note that all deviations / variations and additional conditions etc. found elsewhere in the bid other than those stated in the Deviation Schedules, save those

pertaining to any rebates, shall not be given effect to in evaluation and it will be assumed that the bidder complies to all the conditions of Bidding Documents. In case bidder refuses to withdraw, without any cost of the Owner, those deviations, which the bidder did not state in the Deviation Schedules, the bid shall be rejected and the bid security of the bidder may be forfeited.

13.0 AWARD OF CONTRACT

13.1 Award of Contract to Successful Bidder

The Board will award the Contract to successful Bidder:

1. Whose Bid will be determined to be substantially responsive to this Bidding document and who will be determined by the Board, to be qualified technically, financially and otherwise in respect of such other capabilities, as the Board may be deem necessary and appropriate to satisfactory performance of the Contract and
2. Whose Bid will be determined to be lowest evaluated, responsive Bid and is determined to be qualified to satisfactorily perform the contract.
3. The Board reserves the right to reject any bid or bids received at its discretion without assigning any reason whatsoever.

13.2 Notification to Award

Prior to the expiration of the Bid validity pursuant to sub-clause 4.5 in this Instructions, the Board will notify the successful Bidder in writing by registered letter or by facsimile to confirm that its Bid has been accepted.

The notification of award will constitute the formation of the Contract. Upon the successful Bidder's furnishing of the Performance Security pursuant to Clause 14 the Board will promptly notify each unsuccessful Bidder and will discharge their Bid Security pursuant to Sub-Clause 4.4.

13.3 Signing of Contract

Within Thirty (30) days of the receipt of notification of award from the Board, the successful Bidder shall sign and date of Contract.

The Contract shall take the form of General and Special Condition attached to Section V, VI and such modifications as may be necessary.

The Bidder shall prepare at his own cost one (1) original and three (3) bound copies of the Contract including the Contract Form attached to the Special Conditions of Contract (Attachment 3 of Section VI) for distribution to the parties concerned.

14.0 PERFORMANCE SECURITY

Within thirty (30) days of notification of award from the Board, the successful Bidder shall furnish the Performance Security in the form of bank guarantee issued by a

reputable bank (as per enclosed list of Attachment – 15) having license to do business in India in accordance with Attachment 1 of Section VI "Performance Security Form" provided in Special Conditions Contract for an amount equivalent to 30% (thirty percent) of the Contract Price, for one year after successful commissioning of system. Failure of the successful Bidder to comply with the requirement of Sub-clause 13.3 or Clause 14 in these instructions shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security in which event the Board may make the award to the second high ranked Bidder or call for new Bids.

15.0 EXPENSE OF BID

Under no circumstances will the Board be liable to the Bidder for any expenses, losses or damages whatever incurred in the Bid including but not limited to expenses, losses or damages associated with preparation of the Bid, visits to the Sites and all matters in connection with the Contract negotiations and signing regardless of the conduct or outcome of the bidding process.

16.0 RESPONSIBILITY FOR INFORMATION SUPPLIED

Prior to the final time and date for submission of the Bids, no representation, communication, explanation or statement, verbal or written, made to the Bidder or anyone else by the Bidder or any of their employees or authorized representatives other than as may be set out in amendment issued in accordance with Sub-clause 3.6 in this Instructions shall bind the Bidder in the exercise of their powers and duties under the Contract.

The information given in the Bidding Documents is the best in the possession of the Board, but the Board does not hold himself responsible for its accuracy.

SECTION II: SCOPE OF WORKS

1.0 DETAILS OF PROJECT STRUCTURE

A. Successful Bidder would be awarded the project/work under a Supply and Service Agreement, which would entail:

- 1) Supply, installation and Commissioning of One Set of CAAQMS Equipment at the defined cities/ locations
- 2) Operation and Maintenance of the CAAQMS for a period of Five (05) years from the date of it's the commissioning
- 3) Daily reporting of data pertaining to Ambient Air Quality to CECB/ CPCB. CECB would make payment for CAAQMS as per schedule of requirement, for Supply, Installation and Commissioning of the system. CECB would procure all the CAAQMS equipment on its name. CECB will make regular payments for the O&M and supply of Data at the end of each Quarter. The bidders therefore need to quote two prices for;
 - a) Supply Installation and Commissioning of the System and;
 - b) Reporting of data to CECB & CPCB. The price for the data supply would include the Operation and Maintenance, including incidental charges, electricity, manpower, security, etc.

CECB would provide land for installation of CAAQMS free of cost, in the identified city/location to the Successful Bidder. Along with the land, CECB would provide letter/ documents for telephone and electricity connections at the proposed location. Bidder would bear the initial installation cost for these facilities and the monthly recurring cost

pertaining to their usage (monthly telephone and electricity bill) would also be borne by the Successful Bidder.

Six (06) no. of Day light & Night visible data display system is to be supplied, installed and maintained initially for Five (05) years. CECB would identify location for installation of Day light & Night visible data display system. The successful bidder shall also arrange telephone and electricity connections at the identified location and all the documents required for the connection shall be provided by the board. The Successful Bidder would bear the initial installation cost for these facilities and the monthly/recurring cost pertaining to their usage (monthly telephone and electricity bill) would also be borne by the Bidder. All other installation requirement for Display System is to be arranged by the successful bidder and cost for same should be included in bid price.

B. SCHEDULE OF REQUIREMENTS

The CAAQMS shall have the following schedule of requirement. The system should be completely functional. Any balance of material not specified but required for the purpose must be supplied by the bidder.

Sl. No.	Item / Analyzer Name	Total Quantity
1.	Monitoring Station foundations.	Actual
2.	Air Conditioner, Split Type, Roof mounted along with voltage stabilizer (2 X 2 ton, 1 X 1 Ton).	Three
3.	On line UPS (1X10KVA, 1 hr. back up and 1X5 KVA, 2 hr. back up)	Three
4.	Sampling System having 10 port manifold	One
5.	19" Rack cabinet to accommodate all analyzers & systems	Three
6.	Continuous Ambient Oxides of Nitrogen (NO/NO ₂ / NO _x) Analyzer	One
7.	Continuous Ambient Ammonia (NH ₃) Analyzer	One
8.	Continuous Ambient Sulphur Dioxide (SO ₂) Analyzer	One
9.	Continuous Ambient Ozone (O ₃) Analyzer	One
10.	Continuous Ambient Carbon Monoxide (CO) Analyzer	One
11.	Continuous BTX Monitor / Analyzer	One
12.	Multi calibration System for Gas calibration and Meteorological, Flow and Electronic Calibration	One set
13.	Automatic PM _{2.5} Particulate Matter Monitor	One
14.	Automatic PM ₁₀ Particulate Matter Monitor	One
15.	Meteorological Sensors for Wind Direction, Wind Speed, Ambient Temperature, Rainfall, Relative Humidity, Solar Radiation and Telescoping Crank – up Meteorological Tower	One set

16.	Computer System (2 PC + 2 Rack Servers): One PC along with Laser Printer and DAS at each monitoring station; One Computer System will be used for Displaying Air Quality Index of the Stations (the software will be provided by the CPCB) One Central Rack Server with Cisco Switch, UTM Device & Access Point for data connectivity from Stations to be setup at each of the SPCB Head Office One Central Rack Server with Cisco Switch, UTM Device & Access Point for data connectivity from Stations to be setup at CPCB-Delhi.	Two PC + Two Rack Servers
17.	Data display Board Transmission Device (two nos) (One for Data Display Board near to the station and another for data display at the SPCB display board)	Two
18.	Day & Night Visible Data Display Board (Near to the station)	One
19.	Day & Night Visible Data Display Board at the respective SPCB-H.O.	One
20.	Continuous Automatic Monitoring Stations with Sampling line, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display system, Recommended spares in a Housing Container OR Continuous Automatic Monitoring Stations with Sampling line, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display system, Recommended spares without a Housing Container	One set OR One set w/o container
21.	Lease Line for Internet AND Broadband or Data Card as backup of Communication system	One set
22.	RCC foundation, pillars misc works including Caging, civil & electrical work (for CAAQM stations as well as Data Display Boards)	Actual

In addition to above item One 5 KVA UPS and One set of Computer system & laser printer shall also be required at each Central Server location at respective Regional Office (RO) and CECB-Head Office.

2.0 SCOPE OF SERVICES

The Scope of Works under the package shall include:

- A. **The supply including packing, transportation, insurance, custom clearance, port clearance and handling, inland transportation, inland transit insurance and delivery to site, installation, testing and commissioning of equipment and provision of training of CECB officials station wise.**
- B. **Operation & Maintenance of Air Monitoring Stations for a period of five (05) years from the date of commissioning of the station, which can be extended up to three (03) years at the mutually agreed rates and terms and conditions.**
- C. **Data & Report of data pertaining to CAAQMS to CECB & CPCB.**
- D. **On line transfer of data to CECB & CPCB.**

Other services involved with performance of the Works are specified in General and Special Conditions of Contract of bid document.

3.0 MINIMUM TECHNICAL SPECIFICATIONS

The minimum technical specification requirements for the CAAQMS to be installed are given in Volume – II (Technical Specifications) of bid document. However, the actual technical proposal can have higher or better technical performance parameters and the minimum specifications proposed should not be taken as a constraint on the upper side. The technical specifications given in Volume – II (Technical Specifications) of bid documents are descriptive and Selection Committee can consider technical proposals having similar specifications.

4.0 DESIRED OUTPUT FOR CAAQMS EQUIPMENT

The desired output requirements from the CAAQMS equipment to be installed at are given in Attachment 2 to 6 of Scope of work of bid document.

5.0 DATA MANAGEMENT AND QUALITY CHECKS

1. Data shall be collected and validated according to US EPA standards/National Ambient Air Quality Standards using the methodologies included in 40 Code of Federal Regulations. All analyzers shall have current US EPA reference or equivalent method designation and shall be of the latest design.
2. Successful bidder shall submit a Standard Operating Procedure for the air quality monitoring station to the Board before award of contract. This Standard Operating Procedure shall be approved by the Board prior to award. The Standard Operating Procedure shall contain the following:
 - Operating procedures for all analyzers and meteorological sensors
 - Calibration procedures
 - Calibration schedule
 - Maintenance procedures
 - Maintenance schedule
 - Data validation procedures
 - Data reporting as per attachment 1 to 5
3. Data obtained from these calibration checks and copies of associated Quality Assurance and calibration documentation, shall be submitted to the Board along with the Air Quality Data.
4. Inventory of spares and consumables to be maintained and recorded from time to time and a buffer stock for any eventuality to be maintained.
5. Upon 3 days notice from the Board once per year, Successful Bidder shall agree to submit to an audit of calibrations, conducted, using pre-approved US EPA methodologies, by a third party. Third party audit will be arranged by the Owner (CECB) by the agency decided by them, at their cost and bidder shall provide all

necessary facilities to carryout required audit. The results of these audits shall be made immediately available to both the Seller and Buyer.

6. Operator shall participate in Proficiency Testing Exercise organized by reputed organization.

6.0 GENERAL GUIDELINES

1. Working Hours: The site for CAAQMS operation should be manned by the employees of the Successful Bidder for 24 hours a day. In addition the Successful Bidder would arrange for a security of the site and equipments through appointment for security agency (providing at least one security guards) throughout the day and Night.
2. Insurance: Successful Bidder would bear the cost of insuring the equipment (Comprehensive) and facilities against any theft, fire and other applicable provisions during tenure of contract period including O&M with a copy to CECB of an appropriate amount.
3. Station plate form, pillars Electricity & telephone / modem arrangement: The successful bidder shall construct station platform pillars etc. as required and shall also arrange electric and telephone connection modems etc. required for the smooth Operation of the station. The necessary documentation shall be provided by the concerned CECB / local authority of the board.

7.0 LOCATION

The location of the Air Monitoring Station shall be decided by the Board and city wise are as under:

List of the City / Locations where 04 (Four) nos. of CAAQMS will be installed

1) Bhilai – 2 Nos.

2) Raipur – 2 Nos.

8.0 SUPPLY OF EQUIPMENT

Attachment – 1, specifies the list of equipment in the package, quantity of equipment to be supplied, delivered and installed.

9.0 INSTALLATION OF EQUIPMENT

All the necessary arrangements and adjustments for suitable installation and operation of the equipment shall be made by the Bidder including power supply and telephone / mobile/ internet connection, however all the required document shall be arranged by the board.

10.0 INSPECTION AND TEST

10.1 Unpacking Inspection

The Contractor in the presence of CECB nominee (representative) shall inspect at Site whether all the Equipment are packed in conformity with the Equipment list and packing list without any damage immediately after arrival of the Equipment at each Location.

10.2 Performance Test

The Contractor shall carry out the performance test for all the Equipment supplied under the scope of work of this document in presence of agency / expert / committee members appointed by the Member Secretary, Chhattisgarh Environment Conservation Board (CECB).

In case the Equipment for performance test requires the supplemental and/ or supporting Equipment, the Contractor shall carry out the performance test including such Equipment.

11.0 PROVISION OF TRAINING

The supplier shall provide the training to the Board staff for minimum two (2) weeks to three (3) persons per site (maximum) after the performance test and commissioning.

Training should include but not limit to the following:

1. Inspection of the Equipment.
2. Precautions in use of the Equipment.
3. Basic measurement principle.
4. Principles of operation of the Equipment.
5. Start-up and shutdown procedure.
6. Operation of the Equipment.
7. Calibration method.
8. QA/QC.
9. Data Validation & management and software application.
10. Safety precautions.
11. Basic maintenance procedure.
12. "Do's" and "Don'ts" in operation of the Equipment.
13. Handling of hazardous chemicals and gas.
14. Others, which are deemed to be necessary by the Supplier.

In case the Equipment for training requires the supplemental and/or supporting Equipment, the Supplier shall carry out the training including such Equipment. The Supplier shall discuss and finalize the detailed contents and schedule of the training program in consultation with the Board during installation of the Equipment. The Supplier shall furnish the training manual and/or CD as required for training for all the Equipment supplied under the scope of work of this document.

Contents of training manual and/or CD for the Equipment are as follows:

1. Principle of the Equipment.
2. Operation and calibration of the Equipment.
3. Maintenance and basic repair of the Equipment.
4. Safety instruction of the Equipment.
5. Others, which are deemed to be necessary by the Supplier.

12.0 OPERATION & MAINTENANCE OF AIR MONITORING STATIONS

12.1 The Contractor's responsibilities shall include without limitations the following works to be carried out on the Air Monitoring Stations installed under this Contract during the Operation & Maintenance of the stations:

- a) Operation and Maintenance of all the commissioned equipments and amenities as supplied by the Manufacturer under the Contract including services during forced and planned outages and overhauls.
- b) The Contractor shall take over the entire Air Monitoring Station (including all equipment) for O&M after execution of Indemnity Bond as per format placed at Attachment- 13, Section III of bid document.
- c) The Contractor shall provide to the owner a monthly summary of all operation and maintenance activities performed by the contractor during each month.
- d) Operation and Maintenance Obligations:

In implementing its obligations to operate and maintain the facility under this Contract, the Contractor shall:

- (i) Undertake comprehensive maintenance including i.e. schedule and breakdown maintenance & repair at site and keep Board Informed regarding status of equipments and forward daily data as per Attachment 3 & 5 of Section – II.
- (ii) Obtain permission from the owner and inform the O&M for any assistance for which equipment is required to be sent to the works. Contractor shall arrange substitute equipment to keep CAAQM station operational.
- (iii) Take reasonable action to assure that the Personnel deployed at Air Monitoring Stations and any subcontractors and agents are provided with a work place in compliance with applicable Law.
- (iv) Keep the Air Monitoring Stations clean, well maintained and in good working condition.
- (v) Security: It is the duty of the Contractor to secure the movable, immovable and other properties of the Owner at the Air Monitoring Station. The Contractor shall indemnify the loss caused to the Owner on account of any damage, loss or theft caused to the property of the Owner.
- (vi) Scheduled Maintenance: Unless Owner and Contractor mutually agree otherwise, perform all required Scheduled maintenance for all equipment, auxiliaries etc., in accordance with the O&M specifications.

- (vii) **Unscheduled Maintenance** :Perform all **Unscheduled Maintenance** and repairs for all equipment, auxiliaries etc. within (24) hours of the occurrence of the event requiring **Unscheduled Maintenance**, the operator shall provide the Owner with detailed written information on nature of the repair or replacement to be carried out, estimated down time and other necessary details as required.
 - (viii) The Contractor shall source all the spares required for maintenance & repairs of the installed equipment from O&M only.
- e) The Operator shall not:
- (i) Make any modifications as to the Air Monitoring Stations, other than in an Emergency, without the prior written approval of the Owner, or
 - (ii) Dispose off any assets, settle law-suits or engage in transactions relating thereto on the Owner's behalf without the prior written approval of the Owner.
- f) The Contractor shall purchase spare parts, materials, supplies and other consumable items, and maintain an inventory thereof, for the Air Monitoring Stations. All such material supplied and other items shall be the property of the Contractor However all the spares shall be sourced from OEM's only.
- g) The Contractor shall review all applicable Laws and initiate and maintain such prosecution, procedures and operating plans relating to operation of the Air Monitoring Stations as are necessary to comply therewith or assist the owner in complying therewith as the case may be.
- h) The Contractor shall operate the equipment as per the laid out standards in the operating manual of the equipment and providing data for ambient air to CECB on daily basis in the suggested format. The daily monthly and yearly Reporting Formats are attached Attachment 1 to 5
- i) The CAAQMS has to be in operation for a minimum of 80% of the days in a year, 24 hours a day, and should not be inoperable for more than 7 days at a stretch.
- j) Provide data collected through operation of the equipments on daily basis in suggested output formats given in the bid document.
- (i) Establish and maintain a daily and monthly and yearly reporting system to provide storage and ready retrieval of operation and maintenance data including such information necessary to verify calculations. The monthly reporting shall contain variances from targets.
 - (ii) Provide access to the owner to the Air Monitoring Stations and its data at all reasonable times and as and when required.

(iii) Provide the operational data required to all competent authorities including, Government of India or concerned State Governments.

(iv) Online transfer of data to CECB & CPCB web site.

- k) The Contractor shall ensure accuracy of the data provided as per standards.
- l) The contractor shall ensure periodic re-calibration of all the equipment as per manufacturer's instructions and maintain "Protocol Calibration" as per Attachment 2 of Section II.

12.2 Owner shall arrange for the following and Contractor shall guide and assist the Owner:

- a) The Owner shall pay O&M charges to the Contractor at the end of each quarter after submission of validated data & report by the Contractor, in accordance with the payment terms detailed in Special Conditions of Contract.
- b) Owner shall pay all fees including GST, etc., imposed upon Owner by the Applicable Law.
- c) The Owner shall identify and hand over the site for erection & commissioning of Air Monitoring Stations free from all encumbrances.
- d) The owner shall release a letter for electricity & telephone connection at the site. However, arrangement for the same & monthly charges for both electricity and phone bill shall be borne by the Contractor.
- e) The quarterly valid data capture rate should be minimum 90%. The full payment shall only be made if validated data is 90% or above and all the quarterly reports, all the calibration protocol maintenance scheduled and spare parts/ consumable replacement document are maintained and verified by the owner/ board. The contractor has to maintain records / Receipts/ bills paid available as and when required

Data Display & supply frequencies and requirements

Description of Data Submission				
Data Display	Daily	Display on real time basis (15 min for all pollutants & meteorological data and hourly for PM)	90% or above daily data and AQI (between 6am to 6PM or as agreed upon time duration)	
	Daily	Data hourly average values of 15 min for all pollutants & meteorological data and hourly for PM	90% or above daily data (between 6am to 6PM or as agreed upon time duration)	Submission of daily data after logical checks (through software) in the form of soft and hard copy

Data Supply	Weekly	Report for all & pollutants meteorological data	90% or above weekly data	Submission of data on weekly basis (soft & hard copy)
	Monthly	Report for all & pollutants meteorological data	85% or above monthly data	Submission of data on monthly basis (soft & hard copy)
	Quarterly	Report for all & pollutants meteorological data	80% or above Quarterly data	Submission of data on Quarterly basis (soft & hard copy)
	Annually	Report for all & pollutants meteorological data	75% or above annual data	Submission of data on annual basis (soft & hard copy)
90% of data will be treated for 100% payment and less than that will be on pro-rata basis (Refer Clause 13 of Section VI (SCC)). No data will be accepted less than 75% and will be treated at nil data and the appropriate penalties shall be applied (refer Penalties clause)				

- Bidder Responsibility:
 - a) Setting up of Central Data Server Center at respective Regional Office & CECB and Lease Line connectivity for data transmission.
 - b) Trained Manpower deployment at respective Data Centers.
 - c) Bidder will participate in the coordination meetings, training, etc.
 - d) Bidder will ensure quality data generation, regular calibration of Analyzers, online data validation, timely submission of software validated data.

12.3 Handing Over of Station:

On expiry/closure/termination of the Contract Agreement, stations shall be handed over to Board in working condition to the satisfaction of Board. Few or all the spares procured by the Contractor and unused as on date of handing over may be purchased by the Owner at his discretion provided Contractor is able to provide reasonability of the costs of such spares. In addition the Contractor shall provide consumables equivalent to three months consumption on expiry/closure/termination of the Contract Agreement without any extra financial implication.

12.4 Relocation of Station:

During contract period, if Board intends to shift CAAQM station from one location of the city to another location, due to some reason – functional or otherwise, Bidder shall shift the CAAQM station for which cost of shifting including dismantling, loading & transportation, reinstallation at new location and

construction of foundation will be made by the Board at a mutual agreed cost.

12.5 Penalties:

- (i) **During O&M period**, in case of any Analyses/ system failure, penalty will be charged by CECB @ Rs.1,000/- (one thousand) per day per Analyzer after a grace period of seven (7) continuous non-working days. The grace period of seven (7) continuous non-working days shall be given only once per quarter (3 months).
- (ii) **For a failure of Data display:** Board/panel, a penalty will be charged by CECB @ Rs. 1,000/- (one thousand) per day after a grace period of five (5) continuous non-working days. The grace period of Five (5) continuous non-working days shall be given only once per quarter (3 months).
- (iii) Failure due to power outage and other Force Major conditions shall not be considered for levy of penalty.
- (iv) Total penalty per year during O&M period on account of above conditions shall be limited to 30% of total O&M charges for one year. Failing which defective/malfunctioning analyser / system has to be replaced.
- (v) In case penalty in the year exceeds 30% as above, the Contractor shall be required to replace the defective analyzer (s) or systems with new ones at his own cost, failing which the CECB shall have the right to terminate the O&M contract.

13.0 SCHEDULE

- 13.1 Contractor shall complete all activities covered in the scope of work up to installation & commissioning of Air Monitoring Stations within 90 days from date of opening of Letter of Credit.
- 13.2 The Contractor shall carry out Operation & Maintenance of Air Monitoring Stations for a period of five (05) years from the date of commissioning of the station, which can be extended up to Three (03) years at the mutually agreed rates and terms and conditions.
- 13.3 The operation and maintenance contract shall be executed by the Member Secretary of CECB. The term and condition shall be governed as per the tender document. The Member Secretary of CECB or any person authorized by him shall be the ultimate consignee.

Attachment I
Equipment List for One CAAQMS

Sl. No.	Item / Analyzer Name	Total Quantity
1.	Monitoring Station foundations.	Actual
2.	Air Conditioner, Split Type, Roof mounted along with voltage stabilizer (2 X 2 ton, 1 X 1 Ton).	Three
3.	On line UPS (1X10KVA, 1 hr. back up and 1X5 KVA, 2 hr. back up)	Two
4.	Sampling System having 10 port manifold	One
5.	19" Rack cabinet to accommodate all analyzers & systems	Three
6.	Continuous Ambient Oxides of Nitrogen (NO/NO ₂ / NO _x) Analyzer	One
7.	Continuous Ambient Ammonia (NH ₃) Analyzer	One
8.	Continuous Ambient Sulphur Dioxide (SO ₂) Analyzer	One
9.	Continuous Ambient Ozone (O ₃) Analyzer	One
10.	Continuous Ambient Carbon Monoxide (CO) Analyzer	One
11.	Continuous BTX Monitor / Analyzer	One
12.	Multi calibration System for Gas calibration and Meteorological, Flow and Electronic Calibration	One set
13.	Automatic PM _{2.5} Particulate Matter Monitor	One
14.	Automatic PM ₁₀ Particulate Matter Monitor	One
15.	Meteorological Sensors for Wind Direction, Wind Speed, Ambient Temperature, Rainfall, Relative Humidity, Solar Radiation and Telescoping Crank – up Meteorological Tower	One set
16.	Computer System (2 PC + 2 Rack Servers): a) One PC along with Laser Printer and DAS at each monitoring station; b) One Computer System will be used for Displaying Air Quality Index of the Stations (the software will be provided by the CPCB) c) One Central Rack Server with Cisco Switch, UTM Device & Access Point for data connectivity from Stations to be setup at each of the SPCB Head Office d) One Central Rack Server with Cisco Switch, UTM Device & Access Point for data connectivity from Stations to be setup at CPCB-Delhi.	Two PC + Two Rack Servers
17.	Data display Board Transmission Device (two nos) (One for Data Display Board near to the station and another for data display at the SPCB display board)	Two
18.	Day & Night Visible Data Display Board (Near to the station)	One
19.	Day & Night Visible Data Display Board at the respective SPCB-H.O.	One
20.	Continuous Automatic Monitoring Stations with Sampling line, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display system, Recommended spares in a Housing Container OR Continuous Automatic Monitoring Stations with Sampling line, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display system, Recommended spares without a Housing Container	One set OR One set w/o container
21.	Lease Line for Internet AND Broadband or Data Card as backup of Communication system	One set
22.	RCC foundation, pillars misc works including Caging, civil & electrical work (for CAAQM stations as well as Data Display Boards)	Actual

In addition to above item One 5 KVA UPS and One set of Computer system & laser printer shall also be required at each Central Server location at respective Regional Office (RO) and CECB-Head Office.

Attachment 2
STATION PROTOCOL
CAAQMS under O & M Contract

Name of CAAQMS:

Date:

S. No.	Parameter	Status	Zero Value		Zero Offset		Span Calibration			K Factor (Span)		Rem.
			Pre	Post	Pre	Post	Span Source	Pre	Post	Pre	Post	
1.	CO Analyzer											
2.	SO2 Analyzer											
3.	NOx Analyzer											
	NO											
	NO2											
	NH3											
4.	O3 Analyzer											
5.	BTX Analyzer											
	Benzene											
	Toluene											
	E-benzene											
	M+P Xylene											
O-Xylene												
6.	Dust Analyzer											
	PM2.5											
	PM10											
7.	Meteorological Parameter											
	Temperature											
	Humidity											
	Wind Speed											
	Wind Direction											
	Solar Radiation											
	Rain Fall											
8.	Computers											
9.	UPS / ACs / Others											
10.	Data Display Board											
	Maintenance Details/ Requirement											
	1											
	2											
	Specific Observation											

Station maintained by..... Station supervised by

Attachment 3
DAILY REPORTING FORMAT FOR METREOLOGICAL PARAMETERS
 (To be submitted daily at 12 Noon for the previous day ending 12 midnight)

Location:

Date:

Hrs.	WIND SCREEN	WIND DIRECTION	HUMIDITY	TEMPERATURE	SOLAR RADIATION	RAINFALL	REMARKS
00-01							
01-02							
02-03							
03-04							
04-05							
05-06							
06-07							
07-08							
08-09							
09-10							
10-11							
11-12							
12-13							
13-14							
14-15							
15-16							
16-17							
17-18							
18-19							
19-20							
20-21							
21-22							
22-23							
23-24							
Min.							
Max.							
Average							

Attachment 5
DAILY REPORTING FORMAT FOR MAIN POLLUTANTS
 (To be submitted daily at 12 Noon for the previous day ending 12 midnight)
DAILY AMBIENT AIR QUALITY DATA

Location:

Date:

Hrs.	SO ₂	NO	NO ₂	NO _x	NH ₃	CO	O ₃	PM _{2.5}	PM ₁₀	Benzen	Toluene	Xylene	Remarks
00-01													
01-02													
02-03													
03-04													
04-05													
05-06													
06-07													
07-08													
08-09													
09-10													
10-11													
11-12													
12-13													
13-14													
14-15													
15-16													
16-17													
17-18													
18-19													
19-20													
20-21													
21-22													
22-23													
23-24													
Standards													
Min.													
Max.													
Average													

Attachment 6
MONTHLY REPORTING FORMAT FOR MAIN POLLUTANTS
 (To be submitted monthly at 12 Noon next day ending month)
MONTHLY AMBIENT AIR QUALITY DATA

Location:

Month:

Date	SO ₂	NO	NO ₂	NO _x	NH ₃	CO	O ₃	PM _{2.5}	PM ₁₀	Benzen	Toluene	Xylene	Remarks
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
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19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													
31													
Min.													
Max.													
Average													

Attachment 7
MONTHLY REPORTING FORMAT FOR MAIN POLLUTANTS
 (To be submitted monthly at 12 Noon next day ending month)
MEAN CONCENTRATION AMBIENT AIR QUALITY DATA

Location:

Year:

Month	SO2	NO	NO2	NOX	NH3	CO	O3	PM 2.5	PM 10	Benzene	Toluene	Xylene	Remarks
January													
February													
March													
April													
May													
June													
July													
August													
September													
October													
November													
December													
Min.													
Max.													
Average													

**MONTHLY FIELD CHECK LIST OF (To be filled by CECB officials deputed)
CAAQM STATION UNDER OPERATION CONTRACT -----(name of the city)**

S. No.	Description	----- (name of the Station) Station	Remarks
1.	Station Visit Date		
	(i) 1 st Week		
	(ii) 2 nd Week		
	(iii) 3 rd Week		
	(iv) 4 th Week		
2.	SOP Available at Station		
3.	Environmental Condition of Station		
4.	Protocol of Station available		
5.	Availability of Calibration Gas		
6.	Availability of Permeation Tube (NIST Traceable)		
7.	Bi Weekly Calibration Done (Precision check, two point calibration check)		
8.	Full Calibration Done (Multipoint Calibration check)		
9.	Insurance Validity		
10.	Electricity Bill Paid, if any		
11.	Telephone Bill Paid, if any		
12.	Security Guard Payment, if any		
13.	Servicing of ACs installed, if any		
14.	Data Display Board Working		
15.	O & M Rate – Cheque payment, if any		
16.	Name of the Company Engineer		

	Deputed/ Present		
17.	Data Analyst at Station Deputed/ Present		
18.	Log-Book maintained and Observation entered.		
19.	Data Received (Daliy/Monthly)		
20.	Name of the visiting Officials of CECB		
21.	Special Remarks, if any		

.....
Signature of CECB official

SECTION III: FORM OF TECHNO-COMMERCIAL BID

**Attachment 1
<Letterhead of the Bidder>**

**FORM OF QUESTIONNAIRE
(To be submitted before Pre-bid meeting)**

**BIDDING DOCUMENTS
FOR SUPPLY, INSTALLATION & COMMISSIONING
OF CONTINUOUS AMBIENT AIR QUALITY MONITORING STATIONS (CAAQMS)
AND PROVIDING OPERATION & MAINTENANCE SERVICES FOR THIS CAAQMS
AT -----**

Date :

**To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002**

From: Name of Bidder
Address
Name of Representative
Position
Fax No.
Email id.
Signature

Question
Brief report of experience and capabilities and company profile.

Attachment 2

<Letterhead of the Bidder>

CERTIFICATE OF O & M PARTNER OF THE BIDDER IN INDIA

To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002

Subject: - Certificate of Existence of Local Branch, Sales Residential and Representative Office(s) in India

- 1) Name of Office (s) :
- 2) Address :
- 3) Tel. No. :
- 4) Fax No. :
- 5) Telex No. :
- 6) Email id :
- 7) Status of Office(s) :
- 8) Date of Establishment of Office (s):
- 9) Name & Address of Residential Representative:
- 10) Total No. of years of association with OEM (Name of the manufacturer):
- 11) Total Manpower :
- 12) Total No. of trained Service Engineer :
- 13) Present No. of offices in India (Name the locations & address):
- 14) Total Turnover in last 3 years:
- 15) Major job in Hand:
- 16) Experience in O&M contract:

Sr. No	Name of Client and Address, Phone No.etc	Description of Contract (Brief scope of contract)	Year of Placement of Order	Present Status

Signature:

Name:

Designation:

Seal:

Attachment 3
FORM OF LETTER OF AUTHORITY

To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002

Name of Manufacturer

Subject:- Letter of Authority from Manufacturer

Dear Sirs,

We, (Name of Manufacturer), a manufacturer duly organized and existing under the law of (Country Name) with its principal office of business as (Address) hereby make, constitute and appoint (name of Bidder), a company duly organized and existing under the laws of (Country Name) with its principal office of business at (Address) to be our true and lawful attorney in fact to do the following sets and deeds:

To present and bind us in the for Supply and O&M of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) for Chhattisgarh Environment Conservation Board in the Chhattisgarh State of India, regarding the supply and installation of the following equipment proposed in the bid which we manufacture or produce.

Sr. No	Item No.	Name of Equipment

We, as a manufacturer bind ourselves as co-worker of the bid and are jointly and severally responsible for the compliance of the said bid and once (Name of Bidder) has been selected as a successful bidder, we shall manufacture, delivery and install the equipment in accordance with the terms and conditions of contract with (Name of Bidder) and the State Pollution Control Board.

We hereby give and grant to the said (Name of Bidder) full power and authority to do and perform all and every act and thing whatsoever, requisite necessary and proper to be done in the premises, as fully, to all intents and purposes as we might or could do with full power of submission and renovation hereby ratifying and conforming all that (Name of Bidder) or its duly authorized representative shall lawfully do or cause to do done by virtue hereof.

IN WITNESS WHEREOF, we have hereto signed this document on ----- .

ACCEPTED ON -----

NAME OF BIDDER
MANUFACTURER

NAME OF ISSUING

(Name of duly authorized
representative to sign and signature)

(Name of duly authorized
representative to sign and signature)

(Rank of position and department)

(Rank of position and department)

Attachment 3A
<Letterhead of the Manufacturer>
FORM OF CERTIFICATE OF SUPPLY OF SPARES AND CONSUMABLES BY
MANUFACTURER

Date:

To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002

Sub:- Certificate of Supply of Consumables and Spare Parts by Manufacturer

This is to certify that we (Name of Manufacturer) shall supply the consumables and spare parts of the equipment mentioned below during O&M period under the contract (contract detail) to the contractor (Name of the contractor)/ Owner.

It is hereby guaranteed that we shall maintain stocks of consumables and spare parts for the following equipment for a period of Eight (8) years after the commissioning of the equipment in India.

Item No.	Name Of Equipment	Name of Manufacturer

Signature:

Name of Person:

Position:

Name of Manufacturer:

Office Seal of Manufacturer:

Legal Address of Manufacturer:

Attachment 4
<Letterhead of the Manufacturer>
FORM OF CERTIFICATE OF COUNTRY OF ORIGIN

To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002

Name of Manufacturer

Subject:- Certificate of Country of Origin

We, (Name of Manufacturer), hereby certify that our equipment for procurement and installation of equipment for Chhattisgarh Environment Conservation Board (CECB) in the State of, India is to be manufactured in the country mentioned below:

Item No.	Name Of Equipment	Country of Origin

Signature

Name of Person:

Title:

Name of Manufacturer:

Legal Address:

Attachment 5
<Letterhead of the O&M Partner>
FORM OF CERTIFICATE OF CARRYING OUT O&M OF CAAQMS's BY THE O&M
PARTNER IN INDIA

Date:

To,

Member Secretary

Chhattisgarh Environment Conservation Board

Paryavas Bhavan,

North Block Sector-19,

Nava Raipur, Atal Nagar (C.G.) 492002

Sub:- Certificate of carrying out O&M of CAAQMS's by the O&M partner in India.

This is to certify that we <Name of O&M Partner> hereby agree to carry out day to day Operation and maintenance of the one (1) CAAQMS installed and commissioned by <Name of the main bidder> for minimum of five years from the date of installation & commissioning of the CAAQMS at the rates quoted by <Name of the main bidder> against this tender, strictly in accordance with terms & conditions contained in this bid document.

Signature:

Name of Person:

Position:

Name of O&M Partner:

Name Seal of O&M Partner:

Legal Address of O&M Partner in India:

Counter-signed by main bidder

Name of Person:

Position:

Name of the Bidder:

Office Seal of Bidder:

Legal Address of Bidder:

Attachment 6
<Letterhead of the O&M Partner>
List of Equipment Imported and indigenous

Sr. No.	Name of equipment	Name of manufacturer	Quantity

Attachment 7
<Letterhead of the O&M Partner>
List of Manufacturer Imported and indigenous

Sr. No.	Name of equipment	Name of manufacturer

Attachment 8 A
PROFORMA FOR FINANCIAL CAPABILITY OF BIDDER
(for a period of last three years)

Bid No. ----- Package Code ----- Date of Opening -----

Time -----

Name of the Bidder

Year	Currency	Turnover
2016-17 Financial Year		
2017-18 Financial Year		
2018-19 Financial Year		
Average		

Note:

- 1) The annual turnover amount is to be supported by annual report.
- 2) Financial Capability: The Minimum required annual turnover in respect of Procurement of Supply, Installation and commissioning of goods for the successful bidder in the last Three (3) years shall be of amount of 30 Crores.

Signature of the Authorized Representative

Name of the Person

Position

Attachment 8 B
PROFORMA FOR PERFORMANCE STATEMENT FOR MANUFACTURER (for a period of last five years)

Bid No. _____ Name of Equipment _____ Date of Opening _____
 Time _____
 Name of the Manufacturer _____

Order placed by (full address of Purchaser)	Order No. & Date	Description of ordered equipment (Model no.)	Quantity supplied	Value of order	Date of commissioning and handing over	Has the equipment been satisfactory functioning? (Attach certificates from the Purchaser/Consignee for each equipment)
1	2	3	4	5	6	7

NOTE : Bidder to furnish above detail for each equipment of the quoted package on separate sheet.

Signature of the Authorized Representative
 Name of the Person
 Position

Attachment 8 C
PROFORMA FOR PERFORMANCE STATEMENT FOR BIDDER (O&M OPERATOR)
AS AUTHORIZED REPRESENTATIVE OF THE MANUFACTURER (for a period of
last five years)

Bid No. _____ Name of Equipment _____ Date of Opening _____
 Time _____
 Name of the Manufacturer _____

Order placed by (full address of Purchaser)	Order No. & Date	Description of ordered equipment (Model no.)	Quantity supplied	Value of order	Date of commissioning and handing over	Has the equipment been satisfactory functioning? (Attach certificates from the Purchaser/Consignee for each equipment)
1	2	3	4	5	6	7

NOTE : Bidder to furnish above detail for each equipment of the quoted package on separate sheet.

Signature of the Authorized Representative
 Name of the Person
 Position

Attachment 9
CAPABILITY & EXPERIENCE OF O&M PARTNER
Name and address of the O&M Partner in India (if applicable):

Sr. No.	Name of the O&M personnel proposed to be deployed	Educational Qualification	Experience in no. of years in carrying out O&M of CAAQMs.	Detail curriculum Vitae Attached (YES / NO)
1				
2				
3				
4				
5				
6				
7				
8				
9				

Attachment 10

FORM OF BANK GUARANTEE FOR BID SECURITY

(NOT APPLICABLE)

Attachment 11
PRE-REQUISITES FOR INSTALLATION OF EQUIPMENT

To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002

Dear Sir,

Following are the pre-requisites for installations of the equipment offered by us, which are required to be provided by you prior installation of the equipment:

Package no. / Item No.	Name of the Equipment	Installation & commissioning pre-requisites*

Signature of the Authorized Representative
Name of the Person
Position

Note:

Attachment 12
SUPPLY, INSTALLATION & COMMISSIONING OF CONTINUOUS AMBIENT AIR
QUALITY MONITORING STATIONS (CAAQMS) AND OPERATION &
MAINTENANCE SERVICES FOR CAAQM AT ----- FOR ----- CECB
(Deviation Schedule)

Bidders Name & Address

To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002

Dear Sir,

Subject:- Deviation Schedule.

We declare that the following are the only and exhaustive deviations, variations from, exceptions and exclusions to the Bidding Documents for Services as outlined in your Technical Specifications for the subject package. Except these deviations, subject to the approval and acceptance by you, the entire work shall be performed as per your specifications and documents. Further, we agree the additional conditions, if any found elsewhere in the offer other than those stated below, save that pertaining to any rebates / discount offered, shall not be given effect to:

Equipment Code No.	Vol./ Clause Ref. / Page No.	As Specified in the Bid Documents	Deviation and Variations to the Bid document

Date:

(Signature)

Place

.....
 (Printed Name)

.....
 (Designation)

.....
 (Common Seal)

Attachment 13

INDEMNITY BOND FOR HANDING OVER AIR MONITORING STATIONS INCLUDING ALL EQUIPMENT TO THE O&M CONTRACTOR

This Indemnity Bond is made this Day of 2019.....

By.....a Company registered under the Companies Act, 1956/Partnership firm / Proprietary concern having its registered office at (hereinafter called as “Contractor” or “obligator” which expression shall include its successors and permitted assigns) in favour of Chhattisgarh Environment Conservation Board (CECB) at Nava Raipur, Chhattisgarh, India, which term shall include permitted assigns and successors, (herein after called “CECB” which expression shall include its successors and assigns).

Whereas CECB has awarded to the Contractor, a contract for O&M of the one no. of Continuous Ambient Air Monitoring Stations (CAAQMS located at -----, vide its Letter of Indent / Award Letter / Contract No..... dated (herein after called the “Contract”), in the terms of which Contractor shall be responsible for the Equipments to be handed over to it by CECB for the purpose of performance of the Contract (hereinafter called the “Equipments”).

Now, therefore this Indemnity Bond witnessed as follows:

1. That in consideration of various Equipments as mentioned in the Contract, valued at Rs.----- (Rupees.....) to be handed over to the Contractor for the purpose of performance of the Contract, the Contractor hereby undertakes to indemnify and shall keep CECB indemnified, for the full value of the Equipment. The Contractor hereby acknowledges receipt of the Equipments as per details in the Schedule appended hereto.
2. That the Contractor is obliged and shall remain absolutely responsible for the safe custody of the Equipments at Continuous Ambient Air Monitoring Stations (CAAQMS) belonging to CECB against all risks whatsoever till the Equipments are duly used in accordance with all terms of the Contract. The Contractor undertakes to keep CECB harmless against any loss or damage that may be caused to the Equipment.
3. The Contractor undertakes that the Equipments shall be used exclusively for the performance/ execution of the Contract strictly in accordance with its terms and conditions and no part of the Equipments shall be utilized for any other work or purpose whatsoever. It is clearly understood by the Contractor that non-observance of the obligations under this Indemnity Bond by the Contractor shall inter-alia

constitute a criminal breach of trust on the part of the Contractor for all intents and purposes including legal / penal consequences.

4. That CECB is and shall remain the exclusive Owner of the Equipment free from all encumbrances, charges or liens of any kind, whatsoever. The Equipments shall at all times be open to inspection and checking by Project-in-Charge CECB shall always be free at all time to take possession of the Equipments in whatever form the equipments may be. If in its opinion, the equipments are likely to be endangered, misutilised or converted to uses other than those specified in the Contract, by any act of omission or commission on the part of the Contractor; he finds itself and undertakes to comply with the direction or demand of CECB to return the Equipments without any demur or reservation.
5. That this Indemnity Bond is irrevocable. If at any time any loss or damage occurs to the Equipments or the same or any part thereof is misutilised in any manner whatsoever then the Contractor hereby agrees that the decision of the Project-in-Charge of CECB as to assessment of loss or damage to the Equipments shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and / or damaged Equipments at its own or remedy that may be available to CECB against the Contractor under the Contract and under this Indemnity Bond.
6. Now the condition of this Bond is that if the Contractor shall duly and punctually complies with the terms and conditions of this bond to the satisfaction of CECB, then the above bond shall be void, but otherwise, it shall remain in full force and virtue.

In witness whereof, the Contractor has hereunto set its hand through its authorized representative under the common seal of the company, the day month and year first above mentioned.

SCHEDULE NO. 1

Particulars of the Equipments handed over	Quantity	Value of the Equipment	Signature of Authorised Person

For and on behalf of
M/s.....

Witness I
1. Signature
2. Name
3. Address

Name
Signature
Designation

Authorized representative
Witness II
1. Signature
2. Name
3. Address (Common Seal)
(In case of Company)

SECTION VI : FORM OF FINANCIAL BID

Attachment 1
<Letterhead of the Bidder>

Date:

Grant no.:-----

Bid No. -----

BID FORM

(Must be Submitted Scan Copy Online)

(selected bidder will be submitted original Letter after receiving LOA for this office record)

To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002

Gentlemen:

1. Having examined the Bidding documents for procurement, installation & commissioning and Operation & Maintenance of CAAQMS's at -----(number(s)) locations, CECB (herein after referred to as "the Works"), including, but not limited to, the Instructions to Bidders, Scope of Works, General and Special Conditions of Contract, Technical Specifications, Schedules, Attachments, Amendment Nos. we, the undersigned, offer to execute and complete the whole of the works and remedy any defects therein, in conformity with the said Bidding Documents for the sum of International trading currency (in figures.....) for the equipment including all other charges as mentioned in the document, supplied from Foreign Origin and Indian Rupees..... (INR.....) for the incidental costs incurred in India (if any) as may be ascertained in accordance with the Summary of Bid Price and Bid Price breakup attached herewith and made part of this bid.
2. We undertake, if our Bid is accepted, to complete and deliver the whole of the Works comprised in the Contract within the time specified in the contract, subject to the said conditions.
3. If our Bid is accepted, we will obtain the guarantee of a bank in a sum equivalent to ----- percent of the Contract Price for the due performance of the Contract, in the form prescribed by the Board.

4. We agree to abide by this Bid for a period of One hundred eighty (180) days from the final date of the submission of Bid fixed in sub-clause 7.2 of the Instruction of Bidders, and shall remain binding upon us and may be accepted at any time before the expiration of that period.
5. Unless and until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding Contract between us.
6. We understand that you are not bound to accept the lowest of any bid you may receive, and that you will not defray any expense incurred by us in bidding.

Date this-----day of ----- 2014.

Signature ----- in the capacity of -----

Duly authorized to sign Bid for and on behalf of -----

(IN BLOCK CAPITAL) -----

Address -----

Facsimile number -----

Telephone Number -----

Email id. -----

WITNESS -----

Address -----

Occupation -----

Attachment 2
SUMMARY OF BID PRICE

DESCRIPTION	TOTAL VALUE
I. SUPPLY OF THE EQUIPMENT	
1) For goods supplied from abroad (In Bid-Currency) a. FOB price for Package b. Freight c. Insurance up to port of de-embarkment	
CIF Price at port of de -embarkment (bid currency) (1a + 1b + 1c)	
2) Local Costs for goods supplied from abroad a. Port handling and clearance charges. b. Transportation cost from Port of de -embarkment to Sites c. Insurance from Port of de -embarkment up to handing over d. Installation and commissioning	
Sub total (2a + 2b + 2c + 2d)	
3) For the Goods Supplied from India a. The price of the Equipment quoted ex- works, ex-factory, ex-warehouse, ex- showroom, or off -the-shelf including all customs duties and sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of the Equipment quoted ex-works or ex-factory. b. Price for handling and inland transportation, insurance up to handing over the equipment at Site and other local costs upto delivery of the Equipment to each Site. c. Installation and commissioning d. Price of other incidental cost, if any. Then the Bidder shall specify the same.	
Sub total (3a + 3b + 3c + 3d)	
4) Other incidental costs, if any (such as Indian agents Commission) in INR	
TOTAL FOR SUPPLY (1 + 2 + 3 + 4)	
II Total O&M cost for five years for all the CAAQM's as indicated in Attachment 3A	
III. COST OF TRAINING (bid currency)	
GRAND TOTAL CONTRACT PRICE (BID CURRENCY/INR) (I + II + III)	
:	

Important Note

1. All the Government Taxes are payable at actual (extra) by the board (owner).
2. All local taxes, duties & levies are payable at actual (extra) by the owner.
3. Quoted cost of O&M of a CAAQMS for each year should be at least 15% of the cost of supply & installation of the CAAQMS. In case the bidder quotes O&M cost lower than 15% of the supply & installation cost, the owner will reduce the supply & installation cost suitably, so as to make the O&M cost as 15% of the supply & installation cost, keeping the total quoted cost as unchanged.
4. Indian agent's commission shall be paid in Indian rupees only. Market exchange rate ruling on the date of award in accordance with clause 4.3 (b) of instructions to bidder (section-i) will be applicable for this purpose.
5. Service tax shall be payable only on the service portion of O&M cost only (excluding supply of spares for maintenance & overhauling) as **indicated in Attachment – 3A**.

Attachment 3
BID PRICE BREAKUP FOR EQUIPMENT
(CIF) PRICE

S. No.	Item / Analyzer Name	Manufacturer	Country of Origin	Model	Quantity in Nos. / Sets	Unit Price (BID CURRENCY)	TOTAL Price (BID CURRENCY)
1.	Automatic Ambient CO Analyzer						
2.	Automatic Ambient - SO2 Analyzer						
3.	Automatic Ambient NO-NO2-NOx Analyzer						
4.	Automatic Ambient - NH3 Analyzer (Independent analyzer)						
5.	Automatic Ambient - O3 Analyzer						
6.	Automatic PM10 Monitor						
7.	Automatic PM2.5 Monitor						
8.	BTX Analyzer						
9.	Multi-calibration systems for gaseous monitors comprising of gas supply / generation and automated calibration						
10.	Meteorological Instrumentation comprising Wind direction, Wind speed, Ambient temperature, Relative humidity, Solar Radiation and Rainfall mounted on telescoping crank up meteorological Tower.						
11.	Two nos. of Computer system consisting along with One Laser Printer and a DAS Software at the monitoring station for data acquisition / Data display Board / transfer and system integration, telephone, Modem.						
12.	A Set of 'Central Rack Server (with rack) system alongwith UTM Device, CISCO Switch, Access Point and DAS' for Data Management Center at each of the SPCB Head Office in a Zone (quantity as per the State covered in a Zone) and one set at CPCB-Delhi						
13.	Housing/ Container for Continuous Automatic Monitoring Stations with Sampling System, Sampling lines, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display system, Recommended spares						
14.	Continuous Automatic Monitoring Stations with Sampling System, Sampling lines, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display						

	system, Recommended spares without container						
15.	2 Ton capacity split Air conditioner along with voltage stabilizer (2no. x 2 ton)						
16.	1 Ton capacity split Air conditioner along with voltage stabilizer (1 no. X 1 ton)						
17.	Three Phase 10 kVA UPS, 1 Hour backup on full load						
18.	Single Phase 5 kVA UPS, 2 Hrs. Backup on full load						
19.	Display Board Data Transmission Device - One for Display Board near to CAAQM stations and one each at CECB Head						
20.	Day & Night Visible Data Display Board. One near to CAAQM stations and one each at CECB Head Office						
21.	RCC Foundation, pillars and miscellaneous works including caging, civil and electrical work (for CAAQM stations as well as Data Display Boards)						

Attachment 3A

BID PRICE BREAKUP FOR O&M OF CAAQMS FOR FIVE YEARS

Sl. No	Year of O&M	Service charges (70%) for O&M in Rs.		Cost of (Incidental charges (30%) consisting of security, Electricity, Phones/ internet, Manpower, AMCs, material including spares & consumables for Operation & maintenance and other in Rs.		Total Charges for the year in Rs.	
1.	1st year						
2.	2nd year						
3.	3rd year						
4.	4th year						
5.	5th year						
TOTAL							

A. SERVICE TAQX SHALL BE PAYABLE ONLY ON THE SERVICE PORTION OF O & M COST ONLY (EXCLUDING SUPPLY OF SPARES FOR MAINTENANCE & OVERHAULING).

B. COST OF MATERIAL INCLUDING SPARES & CONSUMABLES FOR OPERATION & MAINTENANCE SHALL BE INCLUSIVE OF ALL TAXES & DUTIES.

Note:

- The above ceiling O&M cost also include incidental charges (Security, Electricity, Data Connectivity, Stations Supervisor, Insurance) and services along with manpower at Central Server Stations of respective SPCB-Head Office as well as CPCB-Delhi.
 - Health of the Stations should be sound for the entire period (07 years) so that the contract can be further renewed on mutual agreement.
- C. ALL THE STATUTORY TAXES & DUTIES AS APPLICABLE IN THE STATE OF INDIA I.E. DUTIES AND TAXES, AS APPLICABLE WILL BE PAID AS ACTUAL BY THE VENDOR FOR SIMPLIFICATION. HOWEVER, THESE TAXES WILL BE REIMBURSED BY THE BOARD ON PRODUCTION/SUBMISSION OF ORIGINAL BILLS.**

SECTION V: GENERAL CONDITIONS OF CONTRACT

GENERAL CONDITIONS OF CONTRACT

These conditions encompass all the Works to be executed and completed by the Contractor for the Project and as further defined herein.

DEFINITION

Unless the context of the General and-Special Conditions of Contract otherwise requires, the following terms wherever in the General and Special Conditions of Contract shall have the meaning defined hereunder.

Words imparting the singular shall also include the plural and vice versa where the context requires. Whether the words and phrases defined in this Clause are capitalized or not in the Contract shall not affect their meaning.

- 1) “The **Project**” or “The Works” means supply, installation & commissioning of equipments for Continuous Ambient Air Quality Monitoring Stations (CAAQMS) and their Operation & Maintenance at defined locations under the supervision and control of **Central Pollution Control Board**.
- 2) “The **Contract**” means the written agreement to be concluded between the Board and the Contractor and includes terms and conditions stipulated on the Bidding Documents and any other descriptions annexed thereto which form an integral part of the agreement to be provided by the Board.
- 3) “The **Contract Price**” means the price payable to the Contractor under the Contract for the full and proper performance of its contractual obligations for the Works.
- 4) “The **Equipment**” means all kind of materials, Machinery, Components, apparatus, articles and instruments for the Project to be provided by the Contractor to the, Board under the Contract.
- 5) “**GCC**” means the General Conditions of Contract contained in this Section.
- 6) “**SCC**” means the Special Conditions of Contract in Section VI of this Volume.
- 7) “**S/W**” means the Scope of Works in Section II of this Volume.

1.0 INTENT OF CONTRACT

- 1.1 The intent and spirit of the Contract is to provide all the details for the Works herein specified to be fully completed within the duration of the Contract.
- 1.2 It is hereby understood that the Contractor, in accepting the Contract, agrees to furnish any and everything necessary for such intent notwithstanding any omission in the Contract.

All matters omitted from the Contract which may reasonably be inferred to be obviously necessary for the efficient and stable completion of the Works shall be deemed to be included in the Contract and the Contractor shall be held responsible for any errors or losses which the Contractor may make due to such omissions as above.

2.0 PERFORMANCE OF WORKS

Unless otherwise provided for, the Works shall be performed by the Contractor in compliance with S/W, GCC, SCC and the Specifications in this Bidding Documents issued by the Board and Contract to be concluded between the Board and the Contractor.

Unless otherwise agreed or stated, the Contractor shall bear all the cost and take all the responsibilities for the performance of all the Works.

3.0 USE OF CONTRACT DOCUMENTS AND INFORMATION

3.1 The Contractor shall not, without the Board's prior written consent, disclose the Contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Board and their authorized personnel and body in connection therewith, to any person other than a person employed by the Contractor in the performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

3.2 The Contractor shall not, without the Board's prior written consent, make use of any documents or information enumerated here above except for purposes of performing the Contract.

3.3 Any documents other than the Contract itself, enumerated in here above shall remain the property of the Board and shall be returned to the Board on completion of the Contractor's performance under the Contract if so required by the Board.

4.0 LOCATION

As defined by the board as per list attached

5.0 LANGUAGE AND CALENDAR

5.1 Language

All documents and correspondence related to the Contract shall be made in English.

5.2 Calendar

All dates, months, years and terms referred in the Contract shall relate with the Gregorian Calendar, unless otherwise mentioned specifically.

6.0 SITE CONDITION

6.1 Site Condition

The Contractor shall study the existing Site Conditions, referring to the Bidding Documents carefully in order to familiarize themselves with the Works. The Contractor should ascertain all particulars of the location and Site conditions at their own expenses.

6.2 Access to Site

The Board will give the Contractor access the Sites in order to perform the Works during the period of validity of the Contract unless otherwise provided.

7.0 COUNTRY OF ORIGIN

7.1 All the Equipment supplied under the Contract shall have their origin in the eligible countries.

7.2 For the purposes of this Clause, "Origin" means the place where the Equipment were produced or manufactured. The Equipment is produced or manufactured when, though manufacturing, processing, or substantial and major assembly of components, a commercially recognized new product results that is substantially different in basic characteristics in purpose or utility from its components.

7.3 The origin of Equipment is distinct from the nationality of the Contractor.

8.0 SPECIFICATION OF EQUIPMENT

8.1 Equipment

The Contractor shall supply all the Equipment specified in the package quoted as per the package wise Equipment List of Attachment 1 of S/W. All the Equipment to be supplied under the Contract shall be new and unused.

8.2 Specification of Equipment

The performance, materials, duty, workmanship, operating conditions and design conditions for the Equipment shall meet and comply with the Specifications.

The Specifications indicate the principal and minimum technical requirements for each equipment. The details of the Equipment shall be fully examined and suitably selected through the detailed engineering and design without sacrifice in quality of serviceability of the Equipment.

The figures of dimension and weight shown in the Specifications are indicatively presented as approximate figures. These figures may not necessarily and exactly be applied for the selection of the Equipment, but the Contractors shall meet the principal and minimum requirements shown in the Specifications. Any Bidder offering better specification than the minimum prescribed shall be considered as technically qualified.

9.0 CODE AND STANDARD

9.1 Code and Standard

All the Equipment and the Works shall conform to the approved and authorized codes and standards of the origin country, the following standards wherever applicable and Indian Standard which are in force at the moment of the installation.

- Japanese Industrial Standard (JIS)
- Environmental Protection Agency of United States (U.S EPA) Standard
- International Organization for Standard (ISO)
- British Standard (BS)
- TUV Germany
- MCERTS- SIRA certification U.K Environment Agency

Other internationally prevailing standards are accepted for the Equipment, unless otherwise indicated.

Even if some codes and standards are designated in the Specifications, the other codes and standards not shown therein are also applicable instead of the designated ones as far as they are equivalent to such designated codes and standards and meet the requirement thereof.

9.2 Metric System

All dimensions and performance of the Equipment shall be stated in metric system, unless otherwise specified in the Specifications.

10.0 ELECTRICAL RATINGS

10.1 Electrical Rating

The Equipment shall conform to the following ratings and standards wherever applicable.

- 1) All the electrically operated equipment specified herein shall be single phase, 230 Volts, 50 Hz. 3% unless otherwise specified in the Specifications.
- 2) Electrical plugs for the Equipment shall conform to local regulations and standards.

10.2 Precaution against Voltage Fluctuation

Adequate automatic voltage regulator for the Equipment shall be arranged by the Contractor wherever indicated in the Specifications. The Contractor shall pay due attention to that electrical voltage fluctuation exerts a serious influence and damage upon functioning of the equipment.

11.0 NAME PLATE

Nameplate shall be affixed on a suitable place of the Equipment in accordance with the provision of SCC.

12.0 PACKING AND MARKING

12.1 Packing

- 1) **Transportation by air cargo**

The Contractor shall pack and transport the Equipment in the double carton, approved by airline and deliver separately to the designated Site in complete condition.

2) Transportation by vessel

The Equipment shall be packed and transported for seaworthy shipment in such a manner that they are carried to the Sites in complete condition. The packages shall be made shockproof, waterproof, moisture proof and any other protection against rough handling, exposure to extreme temperature, salt, precipitation, open storage and other severe tropical conditions during transit to each final Site. These Equipment shall be transported by container vessel and packed separately for the designated Site.

12.2 Marking

The outside of the package shall be marked in accordance with SCC in such a manner that they are clearly visible, protected against loss and resistance to external influences.

12.3 Packing List

Contents of each package and/or the Equipment shall be itemized on a detailed list showing the exact weight, and extreme outside dimensions of length, width and height of each package and/or the Equipment. One copy of the detailed packing list indicating name of components, assembly number and quantity which corresponds to those of the Equipment in each package shall be enclosed in each package.

Enclosed in one package, there shall also be a master packing list summarizing and identifying each individual package. Packing list shall be placed in a waterproof cover and secured against any external influence of the package.

13.0 SHIPMENT

13.1 Shipment

Shipment of the equipment from foreign origin shall be made as specified in SCC.

13.2 Shipping Documents

Promptly after shipment of equipment of foreign origin, the Contractor shall airmail the shipping documents to the Board in accordance with SCC.

13.3 Unloading and Custom Clearance

The Contractor shall arrange the clearing agent for unloading, customs clearance and storage of the equipment from the Foreign Origin, documentation and all the other procedures.

The Board will agree to assist the Contractor where required in obtaining clearance of the Equipment through the customs and provide exemption certificate, if required.

13.4 Inland Transportation

The Contractor shall be fully responsible for the delivery of all the Equipment to the Sites.

The Contractor shall arrange at his option and cost for the transportation from the port of entry to each Site for the equipment of foreign origin.

Transportation of Radioactive material if any shall be carried out by the contractor and contractor will obtain statutory clearances for the same.

13.5 Handling and Storage

The Contractor shall protect the Equipment from any damage and avoid overloading. Particular attention shall be given to the perishable Equipment and those which must be kept dry, cool or from exposure to direct sunshine and moisture.

In case a part of the Board's facilities is necessary to be occupied by the Contractor for temporary storage or installation use, the Contractor shall obtain the written approval from the Board for temporary occupation and protect facilities against any damages. Charges payable for this facility to the Board for this shall be fixed by the Board.

14.0 PROJECTION AND SAFETY

The Contractor shall be totally responsible for all the reasonable precautions against fire in respect of the Works, temporary works, offices, storage yards and other places and things connected therewith.

The Contractor shall comply with all rules, regulations and orders which have been made by the Government of India, the Board or any other competent authority and the contractor shall provide sufficient fire-fighting protection in respect of the safety of the property and personnel of the Board.

15.0 WORKS SCHEDULE

The time schedule for the Works to be carried out by the Contractor is specified in SCC. The Contractor shall complete the Works in accordance with the Works schedule specified here above.

16.0 PROJECT FORMATION

16.1 Board

The authorized personnel of the State Pollution Control Board for the Project who is responsible for any coordination with the Contractor is:

**Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002**

16.2 Any correspondence to or authorization from the Board shall be made with the Member Secretary here above.

17.0 WARRANTY / O & M CONTRACT

- 17.1 All the CAAQMS's shall be under O&M Contract from the date of commissioning of the CAAQMS's. The details terms and conditions and scope of work during O&M Contract period shall be as specified in the Scope of Work, Section – II of this document.
- 17.2 However the Contractor shall warrant to the Board that the Equipment to be supplied under the Contract is new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract. This warranty includes all spare parts and services to keep the instruments and equipment in operating condition. In case O & M is not awarded / terminated the equipment shall remain warranted for 3 years.
- 17.3 The Contractor shall further warrant to the Board that the Equipment complies strictly with the Specifications and has no defect, arising from design, materials, or workmanship or from any act or omission of the Contractor that may develop under normal use of the supplied Equipment in the conditions prevailing to the final Sites.

17.4 Period of O&M Contract

This O&M Contract shall remain operative for the period specified in SCC after the successful installation & commissioning of the stations by the Contractor.

17.5 In Case of Faulty Equipment

If any part of the Equipment breakdowns or fails due to faulty of improper design, materials, workmanship, manufacture, fabrications or instructions, or fails to meet the requirements of the Specifications, then the Contractor or his O&M partner shall promptly notify the manufacturer in writing of any claims arising under this clause.

Contractor or his O&M partner shall ensure that within the period specified in Scope of Work for O&M Contract in Section – II of the document and with all reasonable speed, the repair or replacement of the defective Equipment or improper parts thereof is carried out at the Contractor's expenses.

In the event that any part of the Equipment becomes defective due to no fault of the Contractor, such as voltage fluctuations, misuse and negligence, the Contractor will be indemnified by the Board in respect of repair thereof.

17.6 Manufacturer's Warranty

The contractor must take into account any manufacture's standard Warranty on the equipment supplied before quoting for O&M cost for the years for which such Warranty is applicable.

18.0 INSURANCE

The Equipment supplied under the Contract shall be fully insured (Comprehensive) in currency acceptable as per the existing Law of India against loss or damage incidental of manufacture or acquisition, transportation, storage, shipment, delivery, installation and training involved with the Works naming the Board as the beneficiary, in the manner specified in the SCC, until issuance of taking over certificate.

19.0 INSTALLATION

19.1 All the Equipment shall be installed and brought into suitable conditions for operation by the Contractor at the Sites designated by the Board. The Contractor shall make all the necessary and proper adjustments and arrangements, including, but not restricted to, the utility supplies and connections, foundation and erection works specified in Clause 3 of S/W in order to install the Equipment in adequate conditions for operation.

All matters omitted from this Clause which may reasonably be incurred to be obviously necessary for the proper installation and operation of the Equipment shall be deemed to be included in this installation works, and the Contractor shall be held responsible for any errors or defects which the Contractor may make due to such omissions thereof.

19.2 Only the best installation practices are to be applied, and all the installation works must be done to the satisfaction of the Board and the Contractor shall carry out his works in a neat and proper workmanlike manner. The installation shall be planned and carried out in no way to damage installation materials and the Equipment.

19.3 All the installing Equipment, tools, materials, labour, logistics and all the other requirements for installation shall be provided by the Contractor.

19.4 Prior to the establishment of Equipment layout and installation plan, the Contractor shall verify, check and inspect the designs and specific site conditions of monitoring stations and laboratories where the Equipment are to be installed so as to make good arrangement for installation and utility assembly in consultation with the Board.

20.0 INSPECTION AND TEST

20.1 The Board shall have the right to inspect and the test the Equipment to confirm their conformity to the Specifications without any extra charge to the Board by the Contractor. The Contractor shall notify the Board, in a timely manner (at least 21days in advance), of the schedule of inspections and test.

20.2 The inspections and test shall be conducted on the premises of the Contractor and/or the Manufacturers and the Sites. If conducted on the premises of the

Contractor and/or the Manufacturers, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the Inspection Team for the inspections and test at no charge to the Board.

- 20.3 Should any inspected or tested Equipment fail to conform to the Specifications, the Board may reject the Equipment, and the Contractor shall either replace the rejected Equipment or make alternations necessary to meet the Specifications requirements free of cost to the Board.
- 20.4 No pre dispatch inspection is envisaged for equipment of foreign origin and contractor shall furnish factory test / inspection reports as furnished below of the manufacturer along with the dispatch documents. However, the Board reserves the right to appoint at its cost, any inspection agency (other than suggested by contractors) which will be binding on the contractor.
- Performance Test Certificate of all analyzer/ UPS/ 1.2 mm pre-coated GI Sheet of container, NIST traceability for gas Aluminum cylinders / Permeation tube
 - Certificate of Traceability
 - Verification of System Completeness
 - Product Certificate
- 20.5 For the equipment of Indian origin contractor should submit check list for equipment for approval of CECB. For container, contractor should take prior approval of the drawing from CECB. Contractor should notify date of pre-dispatch inspection to the CECB at least 15 (fifteen) days ahead of inspection.
- 20.6 The Board's right to inspect, test and, where necessary, reject the Equipment after the Equipment's arrival in India shall in no way limited or waived by reason of the Equipment having previously been inspected, tested and passed by the Board prior to the Equipment's shipment from the country of origin.

A. Inspections and Tests

Manufacturer's test and inspection certificate to be provided along with the supply Inspection and tests prior to shipment of Goods and at final acceptance are as follows:

- i. Inspection: The Drawing of each of the equipment is to be certified by a qualified expert as may be nominated by the Member Secretary, Chhattisgarh Environment Conservation Board (CECB), Nava Raipur. The equipment shall be inspected at the manufacturer's place in India or its dispatch facility in India , prior to dispatch and also after successful installation at respective site by an agency / expert appointed by the Member Secretary, Chhattisgarh Environment Conservation Board (CECB).

Such agency shall issue the inspection and clearance certificate which will be a mandatory document for release of payments of 80 %.

- ii. The inspection of the goods shall be carried out to check whether the instruments are in conformity with the technical specifications contained in the bid document and attached with the letter of acceptance and shall be in line with the inspection/test procedures laid down in the technical specifications and the manufacturer's warranty certificate. The purchaser will test the equipment at the manufacturer's place before dispatch and also after completion of the installation and commissioning at the site of the installation. For site preparation, the supplier should furnish all details to the purchaser sufficiently in advance so as to get the works completed before receipt of the equipment. Complete hardware and software as specified in bid document should be supplied, installed and commissioned properly by the supplier prior to commencement of performance tests.
- iii. The acceptance test will be conducted by a committee chaired by The Member Secretary, Chhattisgarh Environment Conservation Board (CECB), Nava Raipur with experts members to be constituted by CECB will inspect and make recommendation on the specification for acceptance.

At its option the committee can co-opt any other subject matter specialist to facilitate the inspection. The acceptance will involve trouble-free operation for seven consecutive days. There shall not be any additional charges for carrying out acceptance tests. No malfunction, partial or complete failure of any part of hardware or excessive heating of engines and sub-systems attached to instruments should occur. The supplier shall maintain necessary log in respect of the results of the tests to establish to the entire satisfaction of the purchaser, the successful completion of the test specified. An average uptake efficiency of 98% (to modify as considered appropriate for each case) for the duration of test period shall be considered as satisfactory.

- iv. In the event of the hardware and software failing to pass the acceptance test, a period not exceeding two weeks will be given to rectify the defects and clear the acceptance test, failing which the purchaser reserves the rights to get the equipment replaced by the supplier at no extra cost to the purchaser.

B. Manuals and Drawings

- a) Before the goods and equipment are taken over by the Purchaser, the Supplier shall supply operation and maintenance manuals together with drawings of the goods and equipment. These shall be in such detail as will enable the Purchaser to operate, maintain, adjust and repair all parts of the works as stated in the specifications.

- b) The manuals and drawings shall be in the ruling language (English) and in such form and numbers as stated in the contract.
- c) Unless and otherwise agreed, the goods and equipment shall not be considered to be completed for the purpose of taking over until such manuals and drawings have been supplied to the Purchaser.

C. For the System and Other Software the following will apply:

The Supplier shall provide complete and legal documentation of hardware and all subsystems so necessary for operation of the equipments. The supplier shall also indemnify the purchaser against any levies/penalties on account of any default in this regard.

D. Acceptance Certificates:

- a) On successful completion of acceptability test, receipt of deliverables etc, and after the purchaser is satisfied with the working on the equipments, the acceptance certificate signed by the supplier and the members of acceptance committee will be issued. The date on which such certificate is signed shall be deemed to be the date of successful commissioning of the systems.
- b) The training as specified in Technical Specifications shall be conducted on the dates mutually agreed upon and within two months from the date of acceptance of supply.

21.0 TRAINING

21.1 The Contractor shall provide the Board staff with the training as specified in Clause 5 of S/W for the Equipment & Technical Specification.

21.2 The Contractor shall furnish the schedule and program of the training to the Board within 30 days after the notification of award in such a manner that proper training is imparted to Board staff members.

22.0 COMPLETION

The Contractor shall complete all the Works by the date as specified in SCC.

22.1 Taking Over

Upon successful completion of delivery, installation, inspection and training of the Equipment to and at the designated Sites and O&M of the CAAQMS for the period specified in S.C.C., the Contractor shall notify the Board in writing that all the Works under the Contract have been completed at least 30 days before expiry of O&M Contract period.

Immediately after completion of O&M Contract period as specified in S.C.C., the Board will take over the stations or make alternate arrangement for their O&M.

23.0 SUBMISSION OF DOCUMENTS

The Contractor shall submit the documents specified in SCC to the Board. The Contractor shall prepare all the documents in English.

Besides the documents thereof, the Contractor shall submit the notices, reports, and other documents when deemed necessary, in accordance with the direction of the Board.

24.0 PAYMENT

24.1 Payment

The method, terms and conditions of payment to be made to the Contractor under this Contract shall be specified in SCC.

The Contractor's request(s) for payment for, as appropriate, the Equipment delivered and the Works performed and fulfillment of other obligations stipulated in the Contract shall be made to the Board in writing, accompanied by documents specified in SCC.

24.2 The payment shall be made promptly by the Board but in no case not later than sixty (60) days after submission of invoice or claim by the contractor.

24.3 Currency of Payment

The currency in which payment is made to the Contractor under this Contract shall be specified in SCC.

25.0 26.0 PRICES

Prices charged by the Contractor to the Board for the Equipment delivered and the Works performed under the Contract shall not vary from the prices quoted by the Contractor in the Financial Bid.

26.0 PERFORMANCE SECURITY

26.1 Performance Security

The Contractor within thirty (30) days from the date of notification of award shall furnish a Bank Guarantee from a reputed Indian or Nationalized Commercial Bank having license to do business in India to the Board in line with the enclosed form as per Attachment 1 Section VI towards performance guarantee for an amount equal to thirty (30 %) percent of the total Price under the Contract for faithful and due fulfillment by the Contractor of all obligations under the terms and conditions of the Contract. (valid up to 1 Year from date of Successful installation and Commissioning.) [Attachment -1, Section VI] The Bank Guarantee for Operations and Maintenance Service shall furnish before signing the contract agreement by contractor for an amount equal to two (2) quarterly O & M Charges. (Valid for 5 Year O & M Service Period). [Attachment -4, Section VI]

The Contractor shall ensure that Contract Performance Security remains valid at one year on renewal basis after commissioning of entire system satisfactorily.

26.2 Return of Performance Security

The performance security will be discharged by the Board and returned to the Contractor not later than forty five (45) days after expiry of one year subject to date of completion of the Contractor's performance obligations under the Contract, including obligations, unless specified otherwise in SCC.

27.0 ASSIGNMENT

The Contractor shall not assign in whole or in part, its obligations to perform under this Contract, except with the Board's prior written consent.

28.0 SUBCONTRACTORS

28.1 The Contractor shall notify the Board in writing of all the Manufacturers awarded under this Contract and any other subcontractors involved with performance of the Works if not already specified in the Bid. Such notification, in the original Bid or later, shall not relieve the Contractor from any liability or obligation under the Contract.

29.0 DELAYS IN THE CONTRACTOR'S PERFORMANCE

29.1 Delays in the Contractor's Performance

Delivery of the Equipment and performance of the Works shall be made by the Contractor in accordance with the time schedule specified in SCC.

29.2 Notification of Delay

If at any time during performance of the Contract, the Contractor and/or the Manufacturers should encounter conditions impeding timely delivery of the Equipment and performance of the Works, the Contractor shall promptly notify the Board in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the Contractor's notice, the Board shall evaluate the situation and may at its discretion extend the Contractor's time for performance, with or without liquidated damages, in which case the extension shall be ratified by the Board by amendment of the Contract.

29.3 Liability of Liquidated Damages

Except as provided under Clause 33 of GCC, a delay by the Contractor in the performance of its delivery obligations shall render the Contractor liable to the imposition of liquidated damages pursuant to Clause 30 hereunder, unless an extension of time is agreed upon pursuant to Sub-clause 29.2 here above without the application of liquidated damages.

30.0 LIQUIDATED DAMAGES

If the Contractor fails to perform the Works within the period specified in Clause 11 of SCC, the Board shall, without prejudice to its other remedies under the Contract, deduct

from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in SCC. Once the maximum is reached, the Board may consider termination of the Contract pursuant to Clause 34 of GCC.

31.0 SUSPENSION OF WORK

The Contractor shall not suspend the whole or any part of the Works without notice to the Board in writing. The Contractor thereupon shall do all possible endeavors to reduce any expenses or costs resulting from the suspension. Such suspension shall not nullify the Contract.

32.0 TERMINATION FOR DEFAULT

32.1 Termination for Default

The Board, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Contractor, may terminate this Contract in whole or in part:

- 1) If the Contractor fails to perform any or all of the Works within the period specified in Clause 11 of SCC, or extension thereof granted by the Board pursuant to Clause 31 of GCC

or

- 2) If the Contractor fails to perform any other obligations under the Contract.

32.2 Liability for Excess Cost for Unperformed Work

In the event the Board terminates the Contract in whole or in part pursuant to Sub-clause 32.1 here above the Board may procure at the risk and cost of the contractor, upon such terms and in such manner as it deems appropriate, the equipment / works similar to those undelivered / unperformed and the Contractor shall be liable to the Board for any excess costs for such similar equipment / works. However, the Contractor shall continue performance of the Contract to the extent not terminated.

33.0 FORCE MAJEURE

33.1 Notwithstanding the provisions of Clauses 31, 32 and 34 in GCC, the Contractor shall not be liable for forfeiture of its performance security, liquidated damages, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

33.2 For the purposes of this Clause, "Force Majeure" means an event beyond the control of the Contractor and not involving the Contractor's fault or negligence and not foreseeable. Such events may include, but are not restricted to, acts of the Board in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

33.3 If a Force Majeure situation arises, the Contractor shall promptly notify the Board in writing of such condition and the cause thereof. Unless otherwise directed by the Board in writing, the Contractor 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.

34.0 TERMINATION FOR INSOLVENCY

The Board at any time terminates the Contract by giving written notice to the Contractor if the Contractor becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Contractor, provided that such, termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Board.

35.0 RESOLUTION OF DISPUTES

35.1 Settlement of Disputes

Any dispute(s) or difference(s) arising out of or in connection with the Contract shall, to the extent possible in the first instance be resolved amicably between the Contractor and the Owner's Engineer.

If, after thirty (30) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Contractor may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract.

In the case of dispute or difference arising between the Purchaser and a Domestic Contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The arbitral tribunal shall consist of (3) three arbitrators one each to be appointed by the Purchaser and the Contractor. The third arbitrator shall be chosen by the 2 (two) Arbitrators so appointed by the parties and shall act as Presiding arbitrator. In case of failure of the two arbitrator appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the President of the Institution of Engineers (India).

In case of a dispute with a Foreign Contractor, the dispute shall be settled in accordance with provision of UNCITRL (United Nations Commission on International Trade Law) Arbitration Rules. The Arbitral Tribunal shall consist of three Arbitrators one each to be appointed by the Purchaser and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties, and shall act as presiding arbitrator. In case failure of two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the President of the Institution of Engineers (India).

If one of the parties fails to appoint its arbitrator in pursuance of Sub-Clause (a) and (b) above, within thirty days after receipt of the notice of the appointment of its arbitrator by the other party, then the Presiding Arbitrator shall be nominated by President of the Institution of Engineers (India), both in case of the foreign contractor as well as Indian Contractor, shall appoint the arbitrator. A certified copy of the order of the President of the Institution of Engineers (India), making such an appointment shall be furnished to each of the parties.

Arbitration proceedings shall be held at Raipur, Chhattisgarh, India, and the language of the arbitration proceedings and that of documents and communications between the parties shall be English.

The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc. of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself. Where the value of the contract is Rs. 10 million and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority namely the President of the Institution of Engineers (India).

36.0 TAXES AND DUTIES

- a) Customs Duty as applicable shall be paid by Contractor.
- b) Tax, including GST, as applicable on supply of goods and incidental services like Installation, Commissioning and training and O&M service etc. shall be payable by CECB separately on submission of appropriate documents.

37.0 INJURY AND DAMAGE

37.1 Injury or Death of Persons

The Contractor shall be liable for and shall indemnify the Board against any liability, loss claim or proceedings whatsoever arising under any statute or law in respect of personal injury or death or any disability caused by the carrying out of the Works unless due to any act or neglect of the Board, or of any person for whom the Board is not responsible.

Without prejudice to the Contractor's liability to indemnify the Board, the Contractor shall maintain and cause any manufacturers and subcontractors to maintain such insurance as necessary to cover the liability of the Contractor or, as the case may be, of such Manufacturers and subcontractors, in respect of personal injuries or deaths arising out of or in the course of or caused by the carrying out of the Works.

37.2 Damage to Property

The Contractor shall liable for and indemnify the Board against and insure and cause any Manufacturers and subcontractors to insure against any expense, liability, loss claim or proceedings in respect of any damage whatsoever to any real or personal property for any one occurrence in so far as such damage arises out of or in the course of or by reason of the carrying out of the Works and is due to any negligence, omission or default of the Contractor or any person for whom the Contractor is responsible or any Manufacturers and subcontractors or person for whom the Manufacturers and subcontractors are responsible.

38.0 ROYALTY AND PATENTS

38.1 The Contractor shall pay all royalties and licenses fees for the use of any patented item, whether it may be an invention, method, arrangement, article, process or appliance used in connection with the performance of the Contract. The Contractor shall indemnify and save harmless the Board against any and all costs, damages and expenses of any nature or kind whatsoever which may arise out of or result from a claim by any person, firm or corporation that the manufacture, purchase, use of sale of any of the inventions, methods, arrangements, articles processes or appliances used in connection with the performance of this Contract infringes any patent of such other rights. The Contractor shall, at the request of the Board, defend the Board against any suit brought to enforce any such claim at the Contractors expense.

38.2 In case any such patented item used on or in conjunction with the Works is in suit held to constitute and infringement of its use enjoined, the Contractor shall either secure for the Board the right to continue using the said item by suspension of the enjoinder, by procuring for the Board a license or otherwise, or will replace such items with a non-infringing item or modify it so that it

becomes non-infringing or with the Board's approval remove the said enjoined item and refund to the Board the sums paid thereof.

39.0 EFFECTIVENESS

This Contract shall come into force and effect on the date of the Letter of Award and shall be in force until the Works have been completed and all the payments have been made to the Contractor, including the payments for O&M contract period.

40.0 LAWS AND REGULATIONS

The formation, validity and performance of this Contract shall be governed as to all matters by and under the laws and regulations of India and courts in Raipur, Chhattisgarh shall have exclusive jurisdiction in all matters arising under this Contract.

The Contractor shall respect and abide by all laws and regulations of India and shall make its best effort to ensure that the personnel of the Contractor and their dependents, while staying in India, shall respect and abide by all laws and regulations of India. The Contractor shall protect, absolve and indemnify the Board and their representatives from any claim, loss or damage arising from any non-compliance alleged or proved, without claiming them for payment.

41.0 NOTICES

Any notice given by one party to the other pursuant to this Contract shall be sent to the other party in writing or by cable, telex, facsimile and confirmed in writing to the other party's address specified in SCC.

A notice shall be effective when delivered or on the notice's effective date, whichever is later.

SECTION VI : SPECIAL CONDITIONS OF CONTRACT

SPECIAL CONDITIONS OF CONTRACT

The following Special Conditions of Contract shall supplement the General Conditions of Contract. Whenever there is a conflict the provisions herein shall prevail over those in the General Conditions of Contract the corresponding clause number of the GCC is indicated in parentheses, if applicable.

1.0 CLIMATE CONDITION

Precaution and protection against the specific climate conditions in India such as heavy rain, high temperature, high humidity, gales, excessive sunshine, flooding or any other climate conditions which could cause damage upon the Equipment or otherwise interfere with the execution of the works shall be taken. The Equipment to be supplied shall be tropicalized.

2.0 CONSUMABLES AND SPARE PARTS

2.1 Supply of Consumables and Spare Parts

The Contractor shall provide the consumables and spare parts as per requirement of Operation & maintenance of CAAQMS Stations.

2.2 After Sales Services

The Contractor shall guarantee the availability of all consumables, spare parts, maintenance and repair work for each Equipment at cost basis for at least five (5) years after the O&M period specified in Clause 7 of SCC, unless otherwise specified in the Specifications.

Bidder should submit certificates from the manufacturers in support of available service centres and availability of spares parts and consumable in India as per Attachment no. 3A of Section III.

3.0 NAME PLATE (GCC CLAUSE 12)

The Contractor shall affix the name plate with the following description in English on all the Equipment:

- 1) Name of the station
- 2) Name of the Equipment
- 3) Manufacturing date
- 4) Production serial number
- 5) Equipment model number
- 6) Name of manufacturer
- 7) Ratings of the Equipment
- 8) Logo of CECB and CPCB

4.0 MARKING (GCC SUB-CLAUSE 12.2)

The Contractor shall mark the following information in the sequence described below and in a frame commensurate with the size of packing and/or the Equipment.

- 1) Consignee: (Chhattisgarh Environment Conservation Board (CECB) & Address),
India
- 2) Name of the Works. Supply and O&M of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) for CECB for the following stations:

List of the City / Locations where 4 nos. of CAAQMS will be installed:

1) Bhilai – 2 Nos.

2) Raipur – 2 Nos.

- 4) Contract number:
- 5) Contractors name:
- 6) Port or airport of discharge:
- 7) Country of origin:
- 8) Item, and if applicable, package number in sequence, and quantity per package and/or Equipment:
- 9) Description of Equipment:
- 10) Net and gross weight and cubic measurement:
- 11) Shipper's name and/or marks:
- 12) Caution marks, if applicable:
- 13) Other markings required by the Board:

5.0 SHIPMENT (GCC CLAUSE 13)

The Contractor shall be responsible for the delivery of the Equipment to each Site designated by the Board and for the coverage of shipping charges, freight, insurance premiums up to handling over the Equipment at Sites, inland transportation and temporary storage.

5.1 Notification and Submission of Documents

Upon shipment, the Contractor shall notify the Board and the Insurance Company by cable of the following details of the shipment.

- 1) Contract number
- 2) Description and quantity of the Equipment
- 3) Name of vessel and air cargo
- 4) Number and date of bill of lading and airway bill
- 5) Date of shipment, port of discharge, expected date of departure and expected date of arrival
- 6) Invoice amount of shipment
- 7) Name of a claim settling agency in India.

5.2 The Contractor shall mail the following documents to the Board, with a copy to the Insurance Company.

A. Equipment of Foreign Origin:

- i) Four (4) Copies of the contractor's invoice showing the Equipment's description, quantity, unit price and total amount
- ii) Original and Four (4) copies of the negotiable, clean, on-board bill of lading marked freight prepaid and four copies of non-negotiable bill of lading;
- iii) Four copies of the packing list identifying contents of each package
- iv) Insurance certificate
- v) Manufacturer and Suppliers warranty certificate
- vi) Factory test and inspection certificate
- vii) Certificate of country-of origin

The above documents shall be received by the Board at least one week before arrival of the Equipment at the port or place of arrival and. If not received, the Contractor will be responsible for any consequent expenses.

Partial shipment and transshipment is allowed.

B. Equipment to be Supplied from within India:

Upon delivery of the Equipment to the transporters, the Supplier shall notify the Board and mail the following documents to the Board.

- i) Four copies of the Supplier's invoice showing the Equipment's description, quantity, unit price and total amount
- ii) Acknowledgement of receipts of goods from the consignee i.e. receipted delivery note, railway receipt (RR), or truck receipt (LR)
- iii) Supplier's and/or Manufacturer's warranty certificate
- iv) Factory test & inspection certificate and Material Dispatch Clearance Certificate (MDCC) issued by the Board.
- v) Insurance certificate
- vi) Certificate of country of origin
- vii) The above documents shall be received by the Board before arrival of the Equipment and, if not received, the Supplier shall be responsible for any consequent expenses.

6.0 WORKS SCHEDULE (GCC CLAUSE 15)

6.1 Equipment to be supplied from Foreign Country:

Delivery Period for all the packages shall be 60 days from the date of the opening of Letter of Credit (L/C). It relates to completion of delivery on CIF (designated Sea Port / Air Port) basis for equipment of foreign origin. Further transportation to the site where the CAAQMS's is to be installed and commissioned shall be completed by the contractor within thirty (30) days from the date of arrival of equipment at port of disembarkment.

6.2 Equipment to be supplier from India:

All the equipment shall be received at Continuous Ambient Air Quality Monitoring Station Site (1 no.), within 60 days from the date of notification of award and are to be installed and commissioned within thirty (30) days from date of receipt at site.

6.3 Commissioning and others incidental services:

All the equipment of the awarded package shall be commissioned within 90 days after the date of opening of Letter of Credit (L/C) including all the incidental services i.e. training etc.

6.4 O&M Contract

The contractor shall carry out Operation & Maintenance of Air Monitoring Stations for a period of five (5) years from the date of commissioning of the station, which can be extended up to extended (3) years at all mutually agreed rates and terms & conditions.

7.0 WARRANTY / O & M CONTRACT (GCC CLAUSE 17)

7.1 Period of O&M Contract

The complete CAAQMS shall be under Operation & Maintenance Contract from the date of commissioning of the station and maintenance of all the equipment including supply of all material shall be the responsibility of the Contractor during the validity of Operation & Maintenance Contract. The Contractor shall, in addition, comply with the performance guarantees if specified under the Contract. If, for reasons attributable to the Contractor, these guarantees are not attained in whole or in part, the Contractor shall make such changes, modifications, and/or additions to the Equipment or any part thereof as may be necessary in order to attain the contractual guarantees specified in the Contract at its own costs and expenses and to carry out further performance test.

8.0 INSURANCE (GCC CLAUSE 18)

- A. The **insurance (Comprehensive) shall be in an amount of equal to One Hundred Ten (110) percent** of the value of the Equipment up to handing over of the Equipment to the Board on "All Risks" basis, including war risks and strikes, naming the Board as the beneficiary.
- B. The Contractor shall take the comprehensive all risk insurance cover for the complete station during O&M period including statutory insurance of Contractor's personnel. The value shall be 110% of the total value of the stations depreciated annually as per standard norms.

9.0 INSTALLATION (GCC CLAUSE 19)

Bidder shall depute Engineer / supervisor for on-site assembly, installation, commissioning and start up of the supplied equipment. Bidder shall also furnish tools

required for assembly, commissioning and maintenance of equipment during O&M period.

10.0 INSPECTION AND TEST (GCC CLAUSE 20)

10.1 Unpacking Inspection

Unpacking inspection shall be performed by the Contractor to inspect whether all the items and quantity of the Equipment have been delivered in conformity with the Equipment and packing list without any damage during the shipment. The Contractor shall submit the unpacking inspection report to the Board.

10.2 Site Inspection

The Contractor shall carry out site inspection of the Equipment at each Site at the completion of installation works to confirm that the installation works and the function of the Equipment is satisfactory for the requirements specified in S/W and the Specifications.

The Contractor shall carry out the functional test to ensure that the consumables and spare parts are good for the operation, maintenance and replacement in future.

As a result of site inspection, the Equipment regarded as unsatisfactory or unacceptable by the Board shall be promptly remedied by the contractor. The Contractor shall submit the site inspection report to the Board.

10.3 Performance Test

The Contractor shall carry out the performance test to inspect and witness the function of each of the equipment supplied under the awarded package at site.

Performance test shall be carried out in accordance with Sub-clause 4 of S/W for all the Equipment supplied.

In case the Equipment for performance test requires the supplemental and/or supporting Equipment, the Contractor shall carry out the performance test including such Equipment.

Performance test will be considered to be complete only after successful completion of performance test of each equipment pertaining to respective packages.

In case of results of such performance test found to be unsatisfactory by the Board same shall be promptly reminded by the Contractor.

The Contractor shall prepare the performance test procedures for approval by the Board at least thirty (30) days prior to the testing schedules. The Contractor submits the performance test report to the Board.

11.0 COMPLETION (GCC CLAUSE 22)

The Contractor shall complete all the Works up to installation and commissioning of CAAQMS's within 90 days after the date of opening of Letter of Credit (LC).

12.0 SUBMISSION OF DOCUMENTS (GCC CLAUSE 23)

12.1 Work Program

Within thirty (30) days from the notification of award of the Contract, the Contractor shall submit the detailed Works program and schedule to the Board indicating the following items:

- a. Equipment supply program and Equipment layout plan (if applicable)
- b. Design drawings and utility list, if required
- c. Subcontractor list for installation work of the Equipment if not already specified in the Techno-commercial Bid
- d. Program for factory, pre-shipment, unpacking and site inspections and performance test
- e. Installation program including personnel organization chart of the Contractor.

The Contractor shall be responsible for any discrepancies, errors or omissions or delay in delivery and submission of the work program, and any expenses resulting there from shall be borne by the Contractor.

12.2 Other Documents

The Contractor shall submit the following documents within forty five (45) days after the notification of award.

Item	Number of Documents to be sent to CECB
Catalogues, product data and test reports	4
Installation manuals	4
List of consumables and spare parts	4
Manufacture's specifications	4
Training program	4

Besides the documents here above, the Contractor shall submit the following documents at the designated time for submissions as follows:

Item	Number of Document	Time of Submission
Inspection report	2	At the time of completion of factory, pre-shipment unpacking and site inspections (if applicable)
Training manual	10	At the time of commencement of installation of Equipment
Operation and maintenance manual	10	At the time of commencement of installation of Equipment
Training program	1	By the time of completion of installation of Equipment
Report of performance test	1	At the time of completion of performance test
Video CD (Optional)	1	By the time of commencement of training
List of Equipment supplied	2	At the time of completion of the Work

Besides the documents here above, the Contractor shall submit the notices, reports, and other documents when deemed necessary, in accordance with the direction of the Board.

13.0 PAYMENT (GCC CLAUSE 24)

13.1 Method of Payment

The payment shall be made in the currency specified i.e Indian Rupee in the contract by means of an irrevocable Letter of Credit (LC) for equipment against dispatch. Other payment shall be made through Cheque only.

13.2 Terms and Conditions of Payment

Bids with terms and conditions of payment other than that specified below shall be rejected.

a) Payment for goods and services (excluding O&M charges) supplied from abroad:

- i) On shipment: Fifty (50) percent of the contract price of the Goods shipped shall be paid through irrevocable Letter of Credit opened in favour of the supplier in a bank in his country and upon submission of the documents specified in sub-clause 5.2 (1) of SCC including : (i) Packing list and (ii) Supplier's certificate that the amounts shown in the invoice are correct in terms of the contract and that all the terms and conditions of the contract have been complied with and
- ii) On Final Acceptance: Balance Fifty (50) percent of contract price of the equipment including 100% of the local costs, incidental cost, cost of training after satisfactory completion of installation & commissioning including Training (to be certified by the Board) of all the Equipment of the package at specified site(s) and submission of acceptance certificate as per Attachment 3 of SCC.
- iii) 100% Payment of local currency portion including agency commission shall be paid after satisfactory completion of installation & commissioning including Training (to be certified by the Board) of all the Equipment of the at specified site(s).

b) Payment of goods and services (excluding O&M charges) supplied from India

- i) On Delivery: Fifty (50)% of the contract price shall be paid (through LC) on receipt of Goods and upon submission of the documents specified in Clause 5.2 (2) of SCC: and
- ii) On Final Acceptance: Balance Fifty (50) percent of contract price of the equipment including 100% of the local costs, incidental cost, costs of training after satisfactory completion of installation & commissioning including Training

(to be certified by the Board) of all the Equipment of the particular package at specified site and submission of acceptance certificate as per Attachment 3 of SCC.

c) Payment of Operation and Maintenance charges:

O&M cost of each year shall be paid after end of every quarter in equal installments based on submission of required air quality report as per Attachment 1 to 5 along with data obtained from calibration documentation. Any penalties applicable if any as referred in Scope of Work for O&M Contract and as per notification of award of contract shall be deducted from the quarterly payment. Payment during O&M period will be made as per following protocol:

- If more than 90% of validated data is supplied in a quarter, full payment for that quarter will be considered.
- If less than 75% of validated data is supplied in a quarter, no payment for that quarter will be considered.
- If more than 75% but less than 90% of validated data is supplied in a quarter, payment for that quarter will be made on a pro-rata basis.

The percentage of data will be calculated by considering each of air-pollutants as unit stream and the meteorology as another unit stream. Therefore the total number of data streams will be 12 (number of air pollutants) + 1 (Meteorology) = 13. Since there are 6 meteorological parameters therefore, each of these parameters constitute 1/6th data unit. Hence, in a given day it is expected $13 \times 24 = 312$ data will be streamed. Assuming, 30 days in a month, total number of validated data to be uploaded in a quarter (i.e. 90 days) will be 28080. Actual percentage of data submission will be calculated accordingly.

14.0 PRICES (GCC CLAUSE 25)

The prices quoted shall be firm throughout the tenure of the Contract. Any increased cost incidental to the performance of the Works due to any economic dislocation either in the origin country or India or to any other causes such as currency restriction, price hike of the Equipment, wage hike for labour or revaluation of the currency can not be claimed by the Contractor to the Board.

15.0 PERFORMANCE SECURITY (GCC CLAUSE 26)

15.1 Performance Security

The amount of performance security as a percentage of the Contract Price shall be thirty (30 %) percent.

16.0 LIQUIDATED DAMAGES (GCC CLAUSE 30)

16.1 Rate

The Contractor shall pay to the Board as liquidated damages a sum equivalent to half (0.5) percent of the contract price of each station for per week of delay in commissioning of each station after scheduled date of completion.

16.2 Maximum Deduction

The total liquidated damages on account of delay in supplies payable to the Board shall not in any case exceed ten (10) percent of the Contract price of supply portion only (Excluding O&M charges).

16.3 In addition to above Liquidated damages for delay, the Contractor is liable to pay penalty on account of failure of systems during O&M period as elaborated in Section – II (Scope of work) of this document.

17.0 NOTICES (GCC CLAUSE 41)

Any notice, request or consent shall be deemed to have been given or made when delivered in person to an authorized representative of the party to whom the communication is addressed or when sent by registered mail telex, telegram, facsimile to such party at the following address:

Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002
Phone :0771-2512220
E-mail: hocecb@gmail.com

Attachment 1
Form of Bank Guarantee for Performance Security
[for main equipment]

(to be stamped in accordance with Stamp Act, if any, of the Country of the issuing Bank)

Bank Guarantee No. -----
Date : -----
Ref. No.:-----

To,
Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar (C.G.) 492002

Dear Sir,

THIS AGREEMENT is made on the -----days of----- 2014 -----

Between [Name of the Bank] of ----- [address of the bank]

(hereinafter called "the Guarantor") of the one part and Chhattisgarh Environment Conservation Board, Atal Nagar, Nava Raipur (hereinafter called "the Board") of the other part.

WHEREAS

- 1) this agreement is supplemental to a contract number -----(insert Contract Number) (hereinafter called "the Contract") made between [name of Contractor] of ----- [address of Contractor] (hereinafter called "the Contractor) of the one part and the Board of the other part whereby the Contractor agreed and undertook to execute the works of Supply and O&M of Continuous Ambient Air Quality Monitoring Station (CAAQMS) for CECB at against the Contract for the sum of ----- [amount in Contract Currency] being the Contract Price; and

2) the Guarantor has agreed to guarantee the due performance of the Contract in the manner hereinafter appearing.

NOW, THEREFORE, the Guarantor hereby agrees with the Board as follows;

- a) If the Contractor (unless relieved from the performance by any clause of the Contract or by statute or by the decision of a tribunal of competent jurisdiction) shall in any respect fail to execute the Contract or commit any breach of his obligations there under then the Guarantor will indemnify and pay the Board the aggregate sum of ----- [amount of Guarantee shall be thirty (30)% (Percent) of the said value of the Contract]----- [in words], such sum being payable in the types and amount of currencies in which the Contract Price is payable, provided that the Board or his Authorized Representative has notified the Guarantor to that effect and has made a claim against the Guarantor before the expiry of O&M period.
- b) The guarantor shall not be discharged or released from his guarantee by an arrangement between the Contractor and the Board, with or without the consent of the Guarantor, or by any alteration in the obligations undertaken by the Contractor, or by any forbearance on the part of the Contractor, whether as to payment, time, performance, or other wise, any notice to the Guarantor of any such arrangement, alteration, or forbearance is hereby expressly waived.

This guarantee shall be valid for one year from date of successful installation and commissions of entire system as specified in the Contract.

Given under our hand on the date first mentioned above.

SIGNED BY -----
for and on behalf of the
Guarantor
(Seal of Guarantor)

in the presence of

(Witness)

Attachment 2
FORM FOR CONTRACT AGREEMENT FOR SUPPLY AND OPERATION & MAINTENANCE OF CONTINUOUS AMBIENT AIR QUALITY MONITORING STATIONS (CAAQMS)

This operation and Maintenance Agreement (“Agreement”) is made on this -----
----- day of by and between:

Chhattishgarh Environment Conservation Board (CECB), India which term shall include permitted assigns and successors (Hereinafter called as “The Board” or “the Owner”).

And

M/s. ----- a company incorporated

----- with Regd. Office at -----

which term shall include permitted assigns and successors (hereinafter called as “Contractor” or “the Contractor”)

RECITALS

Whereas the Owner had invited Bids under reference ----- for supply and Operation & Maintenance continuous ambient Air quality monitoring Station located at:

and M/s ----- had submitted their bid against the aforesaid invitation to bid

and Owner has accepted the bid of M/s ----- and has decided to entrust the job of

supply and Operation & Maintenance (O&M) of the one Air Monitoring Station located at

to the Contractor vide Letter of Award ref.----- dated ----- at a total Contract

Price for complete scope of work of ----- (Contract Price in Words and Figures)

(Hereinafter “the Contract Price”).

Whereas the Contractor has accepted the Letter of Award issued by the Owner in writing vide its letter no.----- dated ----- and has furnished Contract

Performance Security for an amount of Rs. ----- [Rupees-----only] and which is

initially valid up to ----- and Owner has accepted the said Contract Performance

Security.

Whereas, Contractor is having expertise in the business inter alia, of supplying and

operation & maintenance of Air Monitoring Stations and the owner has engaged the

Contractor to supply and perform operation and maintenance of said Air monitoring

stations upon the terms & conditions set forth in this

Agreement and the Letter of Award referred above issued by the Owner including all

the documents referred in the above Letter of Award.

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS;

- 1) In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.
- 2) The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
 - (i) Scope of Works;
 - (ii) Financial Bid;
 - (iii) Technical Specifications;
 - (iv) General Conditions of Contract;
 - (v) Special Conditions of Contract; and
 - (vi) The Board's Notification of Award.

This Contract sets forth the entire contract and agreement between the parties pertaining to the supply of the Goods described herein and Operation & Maintenance of the Air Monitoring Stations and supersedes any and all earlier verbal or written agreements pertaining to the supply of the Goods.

This Contract shall prevail over all other Contract documents. In the event of any discrepancy or inconsistency within the Contract documents, then the documents shall prevail in the order listed above.

- 3) In consideration of the payments to be made by the Board to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Board to perform the Works and to remedy defects therein conformity in all respects with the provisions of the Contract.
- 4) The Board hereby covenants to pay the Contractor in consideration of the performance of the Works and the remedying of defects therein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
- 5) Any notice under the Contract shall be in the form of letter, telex, cable or facsimile. Notices to either party shall be given at such address or addresses as such party shall specify from time to time by written notice to the other. In the absence of such notice to the contrary, notice to the Board shall be properly addressed to:

**Member Secretary
Chhattisgarh Environment Conservation Board
Paryavas Bhavan,
North Block Sector-19,
Nava Raipur, Atal Nagar(C.G.) 492002**

And notice to the Contractor shall be properly addressed to:

[Contractor's address and electronic transmission address]

A notice shall be effective when delivered or on the notice's effective date, whichever is later.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signature of Board's Authorized
Representative

Signature of Contractor

Signed, Sealed and Delivered by the said

(For the Board) in the presence of

Signed, Sealed and Delivered by the said

(For the Contractor) in the presence of

Attachment 3
PROFORMA OF CERTIFICATE FOR ISSUE BY THE CECB
AFTER SUCCESSFUL COMMISSIONING OF EQUIPMENT

No.: Date:
M/s -----

Subject: Certificate of Commissioning of equipment.

1) This is to certify that the equipment as detailed below has / have been received in good condition along with all the standard and special accessories (subject to remarks in Para No.2) and a set of spares in accordance with the Contract / specifications. The same have been installed and commissioned.

- a) Contract No..... dated
- b) Name of CAAQM station/ city
- c) Description of the equipment
- d) Package No.
- e) Quantity
- f) Bill of Lading dated
- g) (for import contract)
- h) Name of the vessel/transporter
- i) RR No. dated
- j) Name of the consignee
- k) Date of commissioning and performance test

2) Details of recoveries to be made on that account:

Sl. No.	Description	Amount to the recovered

3) The proving/performance test has been done to out entire satisfaction and personnel have been trained to operate the equipment.

BOARD

CONTRACTOR

4) The contractor has fulfilled his contractual obligation satisfactorily. Explanatory notes for filling up the certificates:

- a) he has adhered to the time schedule specified in the contract in dispatching the documents drawing pursuant to Technical Specifications.
- b) He has supervised the commissioning of the item in time i.e. within the period specified in the contract form the date of intimation by the Purchaser in respect of the installation of the plant.

- c) Training of personnel has been done by the contractor specified in the contract.
- d) in the event of documents/drawings having not been contractor or installation and commissioning of the plant have been delayed on act of the contractor, the extent of delay should always be mentioned.

OR

The contractor has failed to fulfill his contractual obligations with regard to the following i.e. instruction or training etc.

- a)
- b)
- c)
- d)
- 5) The amount of recovery, on account of non-supply of accessories and spares is given under Para No. 2.
- 6) The amount of recovery on account of failure of the contractor to meet his contractual obligations is as indicated in endorsement of the letter.

Signature

Name

Designation with stamp.....

Member Secretary
State Pollution Control Board

Attachment 4

**PROFORMA FOR BANK GUARANTEE
TO BE FURNISHED BY O&M PARTNER**

(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT,
IF ANY, OF THE COUNTRY OF THE ISSUING BANK)

Bank Guarantee No.....

Date

In consideration of (Name of the Board) (hereinafter referred to as “Employer” which expression shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to with its Head Office at.....(herein-after referred to as.....or “Contractor”) a Contract for Supply and Operation & Maintenance of Continuous Ambient Air Quality Monitoring Stations (CAAQMS), vide Contract No. dated.....and the same having been unequivocally accepted by the Contractor resulting in a “Contract”, which award is on the strength of Form of Certificate by the O&M Partner in India for Carrying out O&M of CAAQM’s dated (hereinafter referred to as “Undertaking”) given by M/s..... (O&M Partner) having its registered office at (hereinafter called O&M Partner), and the Contractor having further executed with (O&M Partner) a Sub-Contract dated and the same having been unequivocally accepted by the O&M Partner resulting in a Sub-Contract Agreement for (hereinafter called “Sub-Contract Agreement”) and..... (O&M Partner) having agreed to provide a Performance Guarantee amounting equal to two (2) quarterly O and M charges in addition to the Contract Performance Security to be provided by the Contractor to the Employer on the terms and conditions specified in the “Undertaking”.

We..... Bank, having its Head Office (herein-after referred to as the “Bank”, which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay to the Employer on demand any and all monies to the extent of(Specify currency and amount in words and figures) only as aforesaid at any time upto.....@.....without any demur, reservation, context, recourse or protest and/or without any references to “O&M Partner” or “Contractor”. Any such demand made by the Employer on the Bank shall be conclusive and binding, not

withstanding any difference between the Employer and Contractor and/or between the Employer and O&M Partner or any dispute pending before any Court, Tribunal, Arbitrator or any other Authority. The Bank undertakes not to revoke this guarantee during its currency without previous consent of the Employer and further agrees that the guarantee herein contained shall be enforceable till ninety (90) days after expiry of its validity.

The Employer shall have the fullest liberty, without affecting in any way the liability of the Bank under this guarantee, from time to time to extend the time for performance of the Contract or the Component Agreement by the O&M Partner. The Employer shall have the fullest liberty, without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the O&M Partner and to exercise the same at any time, in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract or Undertaking or any other course or remedy or security available to the Employer. The Bank shall not be released of its obligations under this presents by any exercise of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Employer or any other indulgence shown by the Employer or by any other matter or thing whatsoever which under law would, but for this provision have the effect of relieving the Bank from its obligations.

The Bank also agrees that the Employer at is option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against Contractor or O&M Partner and notwithstanding any security or other guarantee that the Employer may have in relation to Contractor's or O&M Partner's liabilities.

Notwithstanding anything contained hereinabove our liability under this guarantee is restricted to and, it shall remain in force upto and including @ and shall be extended from time to time for such period (not exceeding one year), as may be desired by M/s (O&M Partner) on whose behalf this guarantee has been given.

This guarantee shall be valid for one year after successful commissions of entire system from the date of expiry of O&M period (i.e. 6 Years)as specified in the Contract. Date this day of 2014..... at

WITNESS :

(Signature)..... (Signature).....

(Name)..... (Name & Designation).....

(Official Address)..... (Bank's Seal).....

Authorised vide Power of Attorney No.....

Date.....

* Brief Name of the Contractor

@ The date will be ninety (90) days after the end of the defect liability period as specified in Contract.

NOTE :

1. The stamp papers of appropriate value shall be purchased in the name of the Guarantee issuing Bank.
2. (i) The Bank Guarantee from a Bank in the list of Banks at Attachment – 15 to Section – III of bid documents.

**TECHNICAL SPECIFICATIONS FOR
CONTINUOUS REAL TIME AMBIENT AIR
QUALITY MONITORING ANALYSERS /
STATION**

VOLUME –II



Tender No. -----CECB/CAAQMS/OWQMS/2019

**CHATTISHGARH ENVIRONMENT CONSERVATION
BOARD (CECB)**

**'Paryavas Bhawan, North Block, Sector - 19, Nava
Raipur, Atal Nagar (C.G.) 492002
Web Site: <http://www.enviscecb.org>
E-mail: hocecb@gmail.com
Phone: 0771-2512220**

TECHNICAL SPECIFICATIONS

1.0 MONITORINGS STATION

- 1.1 **Monitoring Station:** is designed for housing the ambient air quality monitoring instruments to protect them from dust and heat. Temperature and Humidity sensors shall be installed in the housing for checking the humidity and temperature inside the station. Three Nos. 19" racks shall be installed inside the station so that the analysers are easily accessible from front & back for calibration and maintenance.
- 1.2 **Dimensions: Inside length: Approx. 4200 mm**
Inside width: Approx. 3500 mm
Inside height: Approx. 2500 mm
- 1.3 **Frame:** All the material used for the construction of the floor, frame, roof frame etc, the 4 corner posts and 8 integrated, reinforced container corners should be of metal. The exterior panel of the container shall be made of pre-coated MS Sheet of approved colour shade. All other steel parts should be hot dipped galvanized having minimum rate of galvanisation of 275 gram per square meter. All joints of like metal such as steel-to-steel or aluminium-to-aluminium shall be protected against corrosion by liberal application of joining compound. All joints of dissimilar metals such as steel to aluminium shall be protected against corrosion due to galvanic action by liberal application of dielectric compound as well as jointing compound on both mating surfaces. For lifting / fixing the container, International Standard eyebolts should be provided at the corners.
- 1.4 **Paneling:** The outer paneling will be of 1.2 mm of Pre-coated MS sheet to withstand external impacts and abrasions. Outer side of the MS Sheet i.e. exposed face of the sheet, shall be permanently colour coated with silicon modified polyester coating of dry film thickness (DFT) 20 micron (min.) of approved colour shade over primer. Inner face of the sheet shall be provided with suitable pre-coating of minimum 7 micron off-white colour. The inner paneling will be of PVC coated 2 mm thick aluminium sheet, fixed over an inlay of 4 mm marine plywood. 100 mm thick polyurethane insulation will be used between the outer and inner walls (Pre-coated MS sheet and Marine plywood) as insulating material. Z spacers if required shall be made out of at least 2 mm thick galvanized steel sheet of grade 275 as per IS:277
- 1.5 **Floor:** The floor will be laid in frame of 600 x 600 mm centre to centre with 50 x50 x 6 mm MS angle. The floor surface will be of 19 mm marine plywood covered with robust quality Vinyl flooring, 2 mm thick of approved colour. The floor should be of

acid and alkaline resistant, waterproof, easily cleanable / washable. Bottom plate of thickness 2 mm hot dipped galvanised MS Plate shall be provided.

- 1.6 **Outer Door:** One door of size approx. 2000 x 900 mm will be provided at the front side (L = 4200 mm) of the station with isolated 3 – point locking & door handle flush fitted.
- 1.7 **Electric Power Supply Box:** Three - phase (3 Ø) electrical wiring will be laid in ducts. Copper wiring of appropriate gauge will be used. The terminal board should be mounted in a central power distribution box. Over voltage protection for each phase shall be provided along with the lightning arrestor. 2 numbers Emergency cut off switch & Thermostat switch (35°C) for power disconnection, 6 free sockets and 3 fluorescent lamps for lighting will be provided. The station shall be properly grounded with chemical earthing or as per BIS Standards with proper plate and only copper strip at-least on 2 corners (diametrically opposite). One three phase energy meter (Digital Type) shall be installed. Weatherproof cubicles / enclosure for housing of MCB / TP & N Switch of main power termination (outside shelter) and weatherproof telephone junction box for terminations of telephone line are to be provided. Proper earthing for telescopic mast of meteorological system shall be provided. There should be conduction between the telescopic mast of the meteorological system and the station. The guy ropes or wires shall be provided for supporting the mast.

List of Consumables

All fuses	: 02 set
Lighting arrestor	: 02 set
Emergency switch	: 02 pcs
Thermostat	: 01 pcs

- 1.8 The housing will be partitioned as per drawing to create space for storing of gas cylinders, Meteorological mast & UPS. The size will be 2000 x 1400 x 2300 mm. A lockable door of size 900 x 2000 mm along-with 3 – Point locking system shall be provided on the outer wall of the housing. A 300 mm, single-phase (230 volts ± 10 volts AC and 50 Hz ± 3%) exhaust fan with safety grills will be provided. Mounting brackets in 2 levels for fixing of at-least 06 (six) gas bottles should be provided. The internal lights of the housing should be sensor based. Air conditioners shall be mounted on proper rust proof supporting structures with rubber blocks to avoid vibration of structures. Proper caging / grill should also be provided for the safety of ACs. Sun shades for external AC units shall be provided with fabricated pre-coated MS sheet (same as monitoring station) with supporting

arrangements. AC unit's external piping shall be placed in GI trays. Cable trays fixed on exterior wall shall be covered with pre-coated MS sheet, of same colour shade of monitoring station. Roof top sheet to be levelled and sloped properly. Rain water spout shall be fixed at top with rain water down pipe at two corners. The external lights of the station should be Solar operated.

1.9 Station Furnishing:

- i. 19" racks – 3 Nos.
- ii. Fire extinguishers – 2 Nos.
- iii. Furniture:
 - a. Material - Furniture made of water resistant laminated board
 - b. Cupboard – As per drawing
 - c. Working table – Powdered coated MS frame size 1400 x 900 x 750 mm (w x d x h) and top 19 mm thickness Board
 - d. Revolving tilting chair – 2 Nos.
- iv. Miscellaneous
 - a. The exhaust gases from the analyser should be collected and discharged by a common exhaust pipe and vented.
 - b. Folding aluminium ladder for roof access
 - c. Thermostat for measuring the temperature of the station
 - d. Hygro Meter for measurement of Humidity inside the station
 - e. Mounting bracket for the ladder
 - f. No smoking stickers
 - g. Vacuum cleaner of reputed make with minimum 100 watt power
 - h. Tool Kit having following tools:
 1. One screw driver set
 2. One multi-meter (Philips, Mico make)
 3. One box spanner set
 4. One D spanner set
 5. One watch maker set
 6. One Hammer set
 7. One precision screw driver set
 8. One pliers set
 9. One Tong tester
 - i. One Emergency LED Cluster light
 - j. Sign boards along-with logo of Central Pollution Control Board, Delhi / State Pollution Control Board, to be embedded with size 1500 x 900 mm on the front of the container and on the two side of the container, The name of the Station i.e. Continuous Ambient Air Quality Monitoring Station, (Location) both in English and Hindi or local language to be inscribed. The Signs boards to be mounted on the station with proper spacers.

1.9.1 Security Cabin (Optional)

A 4 feet x 4 feet wooden / Paneled security cabin with chair and small folding table for security guard with covered over head selves to be provided separately with the station container.

1.9.2 Container Foundation (RCC)

L X W 6000 x 6000 mm

Height 300 mm from ground

Pillars: Nine concrete pillars of 300 mm above the ground level and below the ground level with 200 x 200 mm beam and between pillar bricks to be used for filling the space. Outer wall of the foundation to be plastered with 1:4, Cement : Sand ratio and same has to be painted with weather proof coat.

Top of the platform: RCC 150 mm with concrete ratio of 1:1:2 and to plastered and painted with weather proof paint.

2.0 AIR CONDITIONER

2.1 Type: 3 Nos. split type, roof mounted of 5 star rating with an automatic timer. Separate Voltage stabilizer will be provided with each unit.

2.2 Capacity: 2.0 Ton (2 Nos.) and 1Ton (1 No.). The indoor units should be running alternately at an interval of four hours with timer control and the temperature inside the station should be maintained at 25 C inside during peak summer months.

2.3 Nominal Cooling: Btu /hr – 24000, Kcal / hr: 6000

2.4 Fan type: Propeller Fan

2.5 Fan Motor type: Permanent Split Capacitor, 1/8 Horse power

2.6 Control Type: Remote

2.7 Compressor: Reciprocating

2.8 Refrigerant: Eco Friendly

2.9 Power supply: 230 volts \pm 10 volts AC and 50 Hz \pm 3%.

3.0 ON LINE UNINTERRUPTED POWER SUPPLY (UPS)

3.1 Three phase 10 kVA UPS along with Automatic Delayed Restoration Device (ADRD) with 1 hour backup in full capacity should be provided for the smooth operation of one 2 Ton capacity split AC at the station.

3.1.1	Capacity	:	10.0 Kva
3.1.2	Technology	:	PWM using IGBT / MOSFETS
3.1.3	Crest Factor	:	More than 3: 1
3.1.4	Input	:	230 V AC
	Voltage	:	
	Voltage Range	:	\pm 25%

3.1.5	Output	Frequency	: 50 Hz ± 3%
		Voltage	: 230 V AC
		Voltage regulation	: ± 1%
		Frequency	: 50 Hz
		Frequency regulation	: ± 0.01%
3.1.6	Battery	Waveform	: Pure sine wave
		Battery type	: Sealed maintenance free
		Back up time	: 1 Hour at full load
		Battery Capacity	: For required backup time
		Recharge time	: 5 hrs 90 after complete to % discharge
3.1.7	Distortion		: Less than 1% on linear load
3.1.8	Power factor		: 0.9 to 1
3.1.9	Indicator		: L.E.D. – Battery Charge, Load level, on Line, over load, on battery, replace battery
3.1.10	Alarm		: Audible alarm for battery backup, battery low, and fault
3.1.11	Protections	Surge	: Surge suppression meets BIS or International standard
		Overload	Fuse & current limited
		Short circuit	Fuse & current limited & cut – off
		Battery low cut – off	No battery drain after cut - off
3.1.12	Overload Capacity		: 110% for continuous load
3.1.13	Efficiency		: More than 90%
3.1.14	Environment	Operating Temperature	: 0 – 50 ⁰ C
		Operating Humidity	: 10% to 95% (Non condensing)
		Audible Noise	: Less than 45 db (at 1 meter)

3.2 Single phase 5 kVA UPS along with Automatic Delayed Restoration Device (ADRD) with 2 hours backup in full capacity should be provided for the smooth operation of Analyzers and peripherals at the station:

3.2.1	Capacity		: 5.0 kVA
3.2.2	Technology		: PWM using IGBT / MOSFETS
3.2.3	Crest Factor		: More than 3: 1
3.2.4	Input	Voltage	: 230 V AC
		Voltage Range	: ± 25%
		Frequency	: 50 Hz ± 3%
3.2.5	Output	Voltage	: 230 V AC
		Voltage regulation	: ± 1%
		Frequency	: 50 Hz
		Frequency regulation	: ± 0.01%
		Waveform	: Pure sine wave
3.2.6	Battery	Battery type	: Sealed maintenance free

	Back up time	:	2 Hours at full load
	Battery Capacity	:	For required backup time
	Recharge time	:	5 hrs 90 after complete to % discharge
3.2.7	Distortion	:	Less than 1% on linear load
3.2.8	Power factor	:	0.9 to 1
3.2.9	Indicator	:	L.E.D. – Battery Charge, Load level, on Line, over load, on battery, replace battery
3.2.10	Alarm	:	Audible alarm for battery backup, battery low and fault
3.2.11	Protections		
	Surge	:	Surge suppression meets BIS or International standard
	Overload	:	Fuse & current limited
	Short circuit	:	Fuse & current limited cut – & off
	Battery low cut – off	:	No battery drain after - off cut
3.2.12	Overload Capacity	:	110% for continuous load
3.2.13	Efficiency	:	More than 90%
3.2.14	Environment		
	Operating Temperature	:	0 – 50 ^o C
	Operating Humidity	:	10% to 95% (Non condensing)
	Audible Noise	:	Less than 45 db (at 1 meter)

4.0 AIR QUALITY ANALYSIS SYSTEM

(CO, SO₂, NO_x, NH₃, BTX, PM₁₀, PM_{2.5} and O₃ Analysers)

(General Specifications for all Analysers)

- 4.1 The analysers should be 19" rack mounting model with facilities for fixing the analysers from front side.
- 4.2 The ON / OFF switch and display of the entire important status signal viz. Sample flow, temperature, concentration, range switch, manual / auto mode, zero / span mode should be on front panel.
- 4.3 The analysers should operate at operating voltage 230 volts ± 10 volts AC and 50 Hz ± 3%. The power supply input to be protected against spikes from and to the analyser by an LC filter. The power connection cable should be CEE type complete with 15 Amperes plug adaptable to Indian mains socket.
- 4.4 The analysers must function properly in Indian conditions without any defect between 0 – 50^o C ambient temperature, 10 – 95% relative humidity and in high ambient dust levels. The data capture rate should not be less than 90%.
- 4.5 The Manufacturer shall provide minimum of 2 weeks of operational & preventive maintenance hands-on training for 3 persons (maximum) per State.

- 4.6 The analysers should be complete with calibration system. The calibration system should be delivered along-with respective span gas cylinder and permeation tubes. The span gas concentration should be within 60 – 90% of first measuring range. The analyser must have zero point internal calibration system and in agreement with minimum detection limit of each analyser. The calibration procedures are to be integrated into the software system for automatic calibration.
- 4.7 The permeation tube and the calibration gases provided with the system shall have Traceability to NIST.
- 4.8 The analysers shall be supplied with all ancillaries necessary for operation including external pump (if any) and any other items such as charcoal scrubber, Teflon air sample intake filter, drier, Teflon tubing suitable for connection to air sampling manifold. All such items are to be itemized. Dust filter in all the analysers should be provided before solenoid valve to protect frequent chocking of solenoid valve.
- 4.9 The connector systems for out-going signal for recording and the computer terminal should be on back panel with screw type connecting pins.
- 4.10 All ambient gas analysers shall conform with the USEPA automated reference / TUV / EN or equivalent method designation as required by the specification for individual equipment / parameters. Method of measurement used shall also comply with the stipulation on National Ambient Air Quality Standards (NAAQS) 2009 (Details of Methods of Measurement is available at MoEF and CPCB websites). All analysers shall be micro – processor controlled with automatic calibration using an external dilution calibrator and calibration standards. All analysers and sensors should be fully integrated in the rack cabinet, fully calibrated & tested before supply and ready for start – up at the respective sites. Analyzer must exhibit performance equal to or better than values specified in the Calibration & test certificate provided with each analyzer.
- 4.11 The manufacturer shall specify the cross sensitivity of measurement for all the analyzers.
- 4.12 Each set of analyzers shall be supplied with two copies of elaborate operation manuals comprising details in three parts:
- Parts (I) should comprise installation, operational and trouble shooting details;
 - Parts (II) should have details about preventive, routine and corrective maintenance;

Parts (III) should comprise details of all electrical, electronic and pneumatic circuit diagrams, details of each spare parts, Catalogue No. etc. and details of each electronic card / PCB's; and

Parts (IV) Schematic diagram for possible repair & maintenance.

4.13 Digital Output:

- a) Multi drop RS 232 port shared between Analyzers, Dust Monitor (PM2.5 & PM10), Meteorological Sensors and computer for data, status and control.

4.14 Quality Control and Standard

4.15 Data shall be collected and validated according to US EPA standards, using the methodologies included in 40 Code of Federal Regulations. All analyzers shall have current US EPA reference or equivalent method designation and shall be of the latest design.

4.16 The supplier shall submit a Standard Operating Procedure for the air quality monitoring stations to the Buyer at the time of bid submission. This Standard Operating Procedure shall be approved by the Buyer prior to award. The Standard Operating Procedure shall contain the following:

- i. Operating procedures for all analyzers and meteorological sensors
- ii. Calibration procedures
- iii. Calibration schedule
- iv. Maintenance procedures
- v. Maintenance schedule
- vi. Data validation procedures
- vii. Quality Assurance procedures
- viii. Sample quality assurance documentation
- ix. Sample Air Quality Report

The calibration procedures for analyzers shall conform to US EPA methodologies and shall include daily calibration checks, biweekly precision checks and linearity checks every six weeks. All analyzers shall undergo full calibration every six weeks. Data obtained from these calibration checks and copies of associated Quality Assurance and calibration documentation, shall be submitted to the Buyer along with the Air Quality Data.

Air Quality Data shall be submitted to the Buyer on a monthly basis in the form of an Air Quality Report. This report shall include tabular and graphic information on gas and dust concentrations as well as meteorological data for each site. The data shall be reported in the form of 15 minute averages and shall also include daily,

weekly and monthly averages, minimums, maximums, standard deviations, total data captured and percent data capture. The Air Quality Report shall also include wind roses where wind speed and direction are measured.

Upon 24 hour notice from the Buyer, once per year, the supplier shall agree to submit to an audit of calibrations, conducted, using pre-approved US EPA methodologies, by a third party. The results of these audits shall be made immediately available to both the supplier and Buyer.

5.0 SPECIFICATIONS OF SAMPLING SYSTEM

A suitable sampling system as specified by USEPA having 10 ports manifold and fitted with a suction pump to draw ambient air. System duly equipped with moisture removal systems should be provided for sampling of ambient air separately for gaseous and dust measurement.

Gases sampling system:

- 5.1 Height of the sampling system: Approx. 1.0 meter above the roof
- 5.2 Roof entry cut out: Stainless Steel
- 5.3 Conduit: Stainless Steel
- 5.4 Inner sampling system: Borosilicate glass
- 5.5 Sampling head: Stainless Steel
- 5.6 Manifold: 10 port for tubes 6 x 1 mm, self- tightening

6.0 SPECIFICATIONS OF 19” RACK

Suitable 19” Rack cabinet to accommodate all analyzers, calibrators, Zero air generators, data logger etc. The dimension of the rack without doors, with aluminum section and rear of 2 mm steel sheet, one removable roof plate, fitted with 4 filling eyebolts. Four roof fixing screws included in package to replace the lifting eyebolts. One gland plate three part, one pair of 475 mm (19”) mounting angles depth adjustable in 25 mm pitch pattern fitted on two fixing angles approximately 150 mm unit from the front standard. To accommodate panel width of 19” size: width = 600 mm, Height = 1400 mm and Depth = 800 mm. The 19” racks should be screwed to the floor of the station with anti-vibration pads. All nuts and bolts shall be cadmium coated.

7.0 AMBIENT AIR QUALITY MONITORING ANALYSERS

A. AMBIENT OXIDES OF NITROGEN (NO-NO2-NOx) ANALYSER

(Conforming to USEPA Automated Federal Reference Method (FRM) Designation)

01.	Principle	:	Chemiluminiscence
02.	Measurement	:	NO / NO 2 / NO x in Ambient Air
03.	Display	:	Digital
04.	Ranges	:	Auto ranging 0 -2000 PPB

05.	Minimum Detectable Limit	:	1 PPB
06.	Noise Level	:	0.5 PPB
07.	Zero Drift	:	< 1 PPB/24 Hrs.
08.	Span Drift	:	< 2% in 15 days of full scale
09.	Response Time	:	30 seconds or earlier
10.	Linearity	:	± 1% of full scale
11.	Calibration	:	Please see Multi-calibration section (Sl. No. J) and also calibration section in General Specifications (4.6 & 4.7).
12.	Output Signals or Analog Output	:	3 Analog output 0 – 1 V, 0 – 10 V, 0 – 20 mA or 4 – 20 mA
13.	Digital Output	:	Multi drop RS 232 port
14.	Consumables and spares	:	Recommended requirements of 3 years of continuous operation along with the list of Items.

B. AMBIENT AMMONIA ANALYSER (NH₃)

(Conforming to USEPA Automated Federal Reference Method (FRM) Designation)

01.	Principle		Chemiluminescence NH ₃ conversion to NO by oxidation. NO ₂ also converted to NO. The difference obtained by measuring NO in output of two sample stream as equal to NH ₃
02.	Measurement		Ammonia in Ambient Air
03.	Display		Digital
04.	Ranges		Auto ranging 0 -1000 PPB
05.	Minimum Detectable Limit		1 PPB
06.	Noise Level		0.2% of reading
07.	Zero Drift		< 5 PPB /24 Hrs.
08.	Span Drift		< 2% in 15 days of full scale
09.	NH ₃ /NO converter		Quartz at approx 1000 °C
10.	Linearity		□ 1% of full scale
11.	Response time		180 second
12.	Calibration		Please see Multi -calibration section (Sl. No. J) and also calibration section in General Specifications (4.6 & 4.7).
13.	Rise / fall Time 95% of the final value		< 30 Sec
14.	Digital Output		Multi drop RS 232 port
15.	Analog Output		0 – 1 V, 0 – 10 V, 0 – 20 mA, 4 – 20 mA
16.	Consumables and spares		Recommended requirements of 3 years operation along with the list of Items.

C. AMBIENT SULPHUR DIOXIDE (SO₂) ANALYSER

(Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation)

01.	Principle	:	Pulsed UV Fluorescence
02.	Measurement	:	Sulphur Dioxide in Ambient Air
03.	Lower Detectable Limit	:	1 PPB
04.	Ranges	:	Auto ranging 0 - 500 PPB
05.	Display	:	Digital
06.	Noise Level	:	0.50 PPB or 1% of the reading
07.	Zero Drift	:	< 1 PPB / 24 Hrs. With automatic zero compensation
08.	Span Drift	:	< 2 PPB full scale in 15 days

09.	Calibration	:	Please see Multi-calibration section (Sl. No. J) and also calibration section in General Specifications (4.6 & 4.7).
10.	Precision	:	0.5 ppb or 1% reading whichever is greater
11.	Output Signals or Analog Output	:	3 Analog output 0 – 1 V, 0 – 10 V, 0 – 20 mA or 4 – 20 mA
12.	Digital Output	:	Multiple drop RS 232
13.	Consumables and spares	:	Recommended requirements of 3 years of continuous operation along with the list of Items.

D. AMBIENT OZONE (O3) ANALYSER

(Conforming to USEPA Automated Federal Reference Method (FRM) Designation)

01.	Principle	:	UV Photometric
02.	Measurement	:	Ozone in Ambient Air
03.	Display	:	Digital
04.	Range	:	Auto ranging 0 - 500 PPB
05.	Minimum Detectable Limit	:	2.0 PPB
06.	Noise	:	± 1.0 PPB
07.	Zero Drift	:	< ½% per month
08.	Span Drift	:	< 1% per month
09.	Calibration	:	With built in Zero and span generator and also see Multi -calibration section (Sl. No. J)
10.	Linearity	:	Continuous + 1%
11.	Output Signals or Analog Output	:	3 Analog output 0 – 1 V, 0 – 10 V, 0 – 20 mA or 4 – 20 mA
12.	Digital Output	:	Multiple drop RS 232
13.	Consumables and spares	:	Recommended requirements of 3 years of continuous operation along with the list of Items.

E. AMBIENT CARBON MONOXIDE (CO) ANALYSER

(Conforming to USEPA Automated Federal Reference Method (FRM) Designation)

01.	Principle	:	Non Dispersive Infra -Red (NDIR) with Gas Filter Correlation
02.	Measurement	:	Carbon Monoxide in Ambient Air
03.	Display	:	Digital
04.	Ranges	:	At least four ranges Auto ranging 0 - 100 PPM.
05.	Minimum Detectable Limit	:	0.1 PPM
06.	Zero Noise	:	0.05 PPM with time constant □ 30 seconds
07.	Zero Drift	:	< 0.2 PPM/7 days
08.	Span Drift	:	< 1% full scale in 24 hrs.
09.	Calibration	:	Calibration gas (CO) cylinder – 15 liters capacity. A Highly polished aluminum cylinder portable filled with 40 PPM NIST traceable Calibration gas has to be provided along -with the instrument for calibration purpose. It should also have pressure gas valve for Zero and Span gas.
10.	Linearity	:	Continuous + 1%
11.	Output Signals or Analog Output	:	3 Analog output 0 – 1 V, 0 – 10 V, 0 – 20 mA or 4 – 20 mA
12.	Digital Output	:	Multiple drop RS 232
13.	Consumables and spares	:	Recommended requirements of 3 years of continuous operation along with the list of Items.

F. PM10 MONITOR

(Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation)

Based on the principle of β -ray attenuation by particulate sampled through the instrument and collected on fiberglass filter tape. Before and after sampling β -ray radiation is measured by scintillation / G.M. counter. An internal microprocessor handles all sequences and automatically calculates the concentration of SPM.

01.	Principle	:	Continuous measurement of PM 10 in ambient air
02.	Particle Size Cut Off	:	0 - 10 Microns
03.	Measuring Range	:	0 to 2000 $\mu\text{g}/\text{m}^3$
04.	Resolution	:	1% of the concentration
05.	Minimum Detectable Limit	:	2 $\mu\text{g}/\text{m}^3$
06.	Detector	:	Plastic Scintillator / GM Counter, Silicon Semiconductor Beta Detector
07.	Air Flow Rate	:	At - least 1.5 m^3/hrs . (Adjustable to 1 m^3/hr)
08.	Filter Material	:	Glass Fiber Filter
09.	Display	:	LED / LCD
10.	Sampling Head	:	Dynamic heated sampling head for measurement of PM10, with adjustable temperature 20 – 70 $^{\circ}\text{C}$
11.	Calibration	:	Reference membrane facility should be provided for calibration of analyser.
12.	Compatibility	:	Analyser should be compatible with protocols mentioned in DAS section
13.	Roll Length	:	Approximately 30 meters
14.	Measurement Result	:	1 hr average or shorter
15.	Consumables and spares	:	Recommended requirements of 3 years of continuous operation along with the list of Items.

G. PM2.5 MONITOR

(Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation)

Based on the principle of β -ray attenuation by particulate sampled through the instrument and collected on fiberglass filter tape. Before and after sampling β -ray radiation is measured by scintillation / G.M. counter. An internal microprocessor handles all sequences and automatically calculates the concentration of SPM.

01.	Principle	:	Continuous measurement of PM 2.5 in ambient air
02.	Particle Size Cut Off	:	0 – 2.5 Microns
03.	Measuring Range	:	0 to 1000 $\mu\text{g}/\text{m}^3$
04.	Resolution	:	1% of the concentration
05.	Minimum Detectable Limit	:	2 $\mu\text{g}/\text{m}^3$
06.	Detector	:	Plastic Scintillator / GM Counter, Silicon Semiconductor Beta Detector
07.	Air Flow Rate	:	At - least 1.5 m^3/hrs . (Adjustable to 1 m^3/hr)
08.	Filter Material	:	Glass Fiber Filter
09.	Display	:	LED / LCD
10.	Sampling Head	:	Dynamic heated sampling head for measurement of PM2.5 with adjustable temperature 20 – 70 $^{\circ}\text{C}$
11.	Calibration	:	Reference membrane facility should be provided for calibration of analyser.

12.	Compatibility	:	Analyser should be compatible with protocols mentioned in DAS section
13.	Roll Length	:	Approximately 30 meters
14.	Measurement Result	:	1 hr average or shorter
15.	Consumables and spares	:	Recommended requirements of 3 years of continuous operation along with the list of Items.

Or

H. Ambient Particulate Monitor based on the principle “Tapered Element Oscillating Microbalance” (TEOM) Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation (EQPM-0609-182)

SPECIFICATIONS

TEOM 1405-DF Ambient Particulate Monitor 1405DF = Dual TEOM w/ FDMS

Regulatory Designations

- U.S. EPA approved PM-2.5 equivalent monitor (EQPM-0609-182)
- Menu-driven software for user interaction via 1/4 VGA display with touch screen
- Connecting and Interface Cables, and Vacuum Pump
- Consumables for average three year’s operation (ambient)
- RPCOMM and ePort Software for Local or Remote Communication

Instrument Performance (3 l/min, 1s, stable conditions)

- Measurement Range: 0 to 1,000,000 µg/m³ (1 g/m³)
- Resolution: 0.5 µg/m³
- Precision: ±2.0 µg/m³ (1-hour average), ±1.0 µg/m³ (24-hour avg.)
- Accuracy for Mass Measurement: ±1%

Data Averaging and Output

- Real-time Mass Conc. Average: 1 hour rolling average updated every six minutes
- Long-Term Averaging: 1, 8, and 24 hr
- Data Output Rate: selectable from 10 sec to 24 hour

Operating Range

- The temperature of the sampled air may vary between -40 and 60 °C. The TEOM Sensor and Control Units must be weather protected within the range of 8 to 25 °C. An optional Complete Outdoor Enclosure provides complete weather protection.

Sample Flow

- Activol flow control system uses the mass flow sensors and the measured ambient temperature and pressure to maintain constant volumetric flow rates.
- Main Flow Rate: Fine PM filter: 3.0 l/min; Coarse PM filter: 1.67 l/min
- Bypass Flow Rate: 12.0 l/min

Data Storage

- Internal data logging of user-specified variables; capacity of 500,000 records.

Filter Media

- Sample Filter: Pallflex TX40, 13 mm effective diameter
- Sample Conditioner Filter: 47 mm diameter housed in an FRM-style molded filter cassette, maintained at 4°C. Suitable for collecting and archiving time-integrated PM samples for subsequent laboratory analysis.

Sample Conditioning

- Sample Equilibration System (SES) dryer lowers the main flow relative humidity and allows for mass transducer operation at 5°C over the peak air monitoring station temperature
- Purge Filter Conditioner contains a heat exchanger that maintains the temperature of the main flow and particle filter at 4°C to efficiently filter the volatile and non-volatile PM in the sample.

Data Output and Input

- ePort software to view and change system operation from PC
- Touch screen user interface
- Ethernet with embedded FTP server, USB, RS232, RS485
- 8 User-Defined Analog Outputs (0-1 or 0-5 VDC)
- 2 User-Defined Contact Closure Alarm Circuits
- 4 Averaged Analog Inputs (0-5 VDC) with user-defined conversion to engineering units

I. BTX MONITOR / ANALYSER

1.0 GENERAL

A complete monitor / analyzer system including continuous automatic sampling (pump etc.), sampling, analyzer, detector, calibrator, computer hardware and software for instrument control, data storage, display, acquisition, processing and for selective determination of volatile compounds in ambient air optimized for Benzene, Toluene, Ethyl Benzene and o, m, p -Xylenes. Compatible to power supply (voltage 230 volts \pm 10 volts AC and 50 Hz \pm 3%). Continuous unattended

measurement system of individual BTEX should work without cryogenic cooling. System should have protocol compatible to communicate & transfer data to main computer through modem and subsequently to CPCB/CECB website preferably having features of security, data validation & alarms etc. Raw data storage capacity without erase minimum for three month or more. The system should be delivered with all necessary spares, consumables, tubing etc. for making it functional

2.0 TECHNICAL SPECIFICATIONS

2.1 **AUTOMATIC SAMPLING (MONITOR)** with Sample volume controlled by thermal mass flow controller (dust protected). Sample flow range may be 20 -100 ml/min or more (adjustable). Sample volume should be between 400 ml – one liter or more of ambient air over a 10-15 min sampling cycle. All sample transfer tubing's should be in stainless steel flow / pressure sensor to be preferred with digital display. Sample volume should be controlled by flow controller (dust protected) with volume measurement saved in memory.

2.2 Detector

Photo Ionization Detector (PID) or other equivalent detector as per EPA/EU/TUV approved specs, which do not require hydrogen or other gas to operate it. The system should have auto-clean & auto calibration facilities. PID Lamp eV should be 10.6eV. PID sensitivity sensor should be available to check sensitivity.

2.3 Minimum Specifications

Lowest detector limit	:	0.1 µg/m ³ (0.03 ppb) or less for Benzene (There should be no interferences on Methyl-cyclopentane, 2, 2, 3 - trimethylbutane, 2, 4 - dimethylpentane, Tetrachloromethane, Cyclohexane, 2, 3 - dimethylpentane, 2 - methylhexane, 3 - ethylpentane , Trichloroethylene, n - heptane, isooctane with BTX components.)
Temperature Range	:	5 - 35oC or more
Measuring Range	:	1 - 1000 µg / m ³ or better (0.3 ppb to 270 ppb)
Repeatability	:	Retention Time : <0.1% RSD Amount : <1.0% RSD
Typical Cycle Time	:	Total Cycle Time should not exceed 15/30 min. approx. i.e. Sample Collection Time - 15 min. approx. Analytical Time – 15 min. approx.

2.4 Calibration Unit With Span Gas/In Built Calibration With /Permeation Tubes And Gas Mixing/Dilution Facility

In Built Calibration/Permeation Tubes Facility in the analyzer with the certified permeation tubes and span or calibration gas mixture (low conc. in ppb range, stable for at-least 6 months) with S.S. container/cylinder, regulators with filters should be provided. Calibration unit having gas flow (approx): 10 ml / min

(calibration gas); 1.4-2.0 lit / min (dilution gas) with auto gas selection/dilution option for automatic calibration for ppb level calibration gas (10-30 ppb of individual compound of interest). Manual and software selectable valves for sample, calibration span and blank zero air gases. Dilution factor between 1 : 50 to 150.

2.5 **Memory And Control Facilities**

Method auto load and system restart after power failure. Methods storage capacity with timed events programs for control of system parameters in permanent memory.

Diagnostics & Fault status; gas supply (low press). System stability (temperature and sample flow). Detector signal (low) and communication should be in digital form on monitor by LED's & be controlled from computer.

Output signals: Analog 0-1 mV, Serial RS 232 for data intermission and CP-BUS for monitor control from remote. Both digital & analog outputs should be available.

2.6 **Hardware/Software(S)**

Latest PC with operating system/software. Basic Window based latest software's (English version) consisting instrumental control features as well as data storage, acquisition, processing and handling in desired/customized format including sorting of data (1 / 4 / 8 / 12 / 24 hourly, days wise /date wise reporting as microgram / m3 or ppb (selectable) & averaging, data capture rate s etc.).

Data presentation / graphical & statistical processing & data transfer to Excel including time series, correlation matrix etc. is required.

Communication software with protocol compatible to communicate & transfer data from BTX monitor to central computer through modem (preferably including sample chromatogram) and from central computer to CPCB website preferably having features of security, data validation & alarms etc.

System should have remote access to BTX monitor.

Resident program as well BTX control / monitor user program with monitor startup / off / status, blank / calibration and sample gas measured, fault status, carrier gas if any, and communication errors indications. Updation of response factors automatically after calibration run. Auto tune facility. Raw data storage capacity without erase minimum for three month or more.

3.0 **SPARES FOR 3 YEARS**

The system should be delivered with 3 years comprehensive warranty including all necessary spares such as electronic boards/circuits consumables, tubing, filters

for removal of dust & unwanted impurities (moisture / hydrocarbons etc.); septas, ferrules, teflon tubing, traps/columns if applicable etc. for making the analyzer functional / continuous operation without breakdown along-with list of items with quantity.

J. MULTICALIBRATION SYSTEM

Calibration system should provide for the calibration of the air quality analysers, data acquisition system, meteorological equipment, and gas calibration system.

a) Gas Calibration System:

The calibration system for air monitoring equipment (listed above) should incorporate an automatic gas dilution calibrator, calibration gas standards and a high performance zero air generator to calibrate all of the analysers in the system. The calibration cycles should be able to be configured through the Data Acquisition System at any specific time during the day and night. It should be mounted on standard 19" rack.

The dilution calibrator should be able to perform mixing of source gas, from the calibration gas bottles, with zero air generator, in order to generate a wide range of calibration gas concentrations and minimising the number of calibration gas standards required. All the calibration gases provided along-with the system MUST be NIST Traceable (certificate should be provided). The system should include at least three permeation chambers and should accept a Permeation Tube up to 11 cm in total length and 2 cm in diameter. It should also have facility for Gas Phase titration (GPT), having Ozone generator of 6 PPM / Liters and the converter efficiency should be 100 % for conversion of NO₂ concentration to NO.

The system should also include calibration of Ozone analyzer.

b) Meteorological, Flow and Electronics Calibration

The supplier should provide calibration devices or calibration check devices for all the meteorological and other electrical equipment mentioned above as per the specifications of the manufacturers.

Recommended Spare Parts and accessories required for the next three years for normal operation should be supplied along-with the calibration system.

8.0 METEOROLOGICAL MONITORING SYSTEM

The meteorological instrumentation should be interfaced directly with the Data Acquisition System after passing through a lightning protection isolation box. A crank - up telescopic 10 meters tower should be erected for mounting of meteorological sensors. The relative humidity and solar radiation sensors should

be mounted on the tower. All sensors should be NIST (National Institute for Standards and Technology, USA) traceable. The specifications are follows:

(i) **WIND SPEED**

Range (Operation)	:	0 – 60 m/s or better
Sustainability	:	Up-to 75 m/sec
Accuracy	:	± 0.5 m/sec or better
Resolution	:	0.1 m/sec
Sensor Type	:	Ultrasonic
Threshold	:	0.5 m/sec or less
Response time	:	10 sec or better

(ii) WIND DIRECTION

Range	:	0 – 359 degree
Accuracy	:	± 5 degree or better
Resolution	:	1 degree
Sensor type	:	Ultrasonic
Threshold	:	0.5 m/sec or less
Response time	:	10 sec or better

(iii) AMBIENT TEMPERATURE

Range	:	-10 o C to 60 o C
Accuracy	:	± 0.2 o C or better (with radiation shield)
Response	:	10 seconds in still air
Sensor type	:	Resistance type
Response time	:	10 sec or better

(iv) RELATIVE HUMIDITY

Range	:	0 to 100% RH
Accuracy	:	± 3.0 % or better
Resolution	:	1%
Sensor type	:	Capacitive / Solid State
Response Time	:	10 sec or better

(v) SOLAR RADIATION

Range	:	0 to 1500 W/m2 or better
Accuracy	:	± 5.0 % or better
Resolution	:	5W/m2

(vi) RAINFALL

Range	:	0.2 mm to 100 mm /hr
Accuracy	:	± 5% or better
Resolution	:	0.2 mm
Sensor type	:	Tipping bucket rain gauge or any other suitable sensor
Response Time	:	10 sec or better

(vii) TELESCOPIC CRANK – UP METEOROLOGICAL TOWER

The wind speed, wind direction, temperature, relative humidity and solar radiation sensors are to be mounted on the Meteorological Tower. The tower is to be a free standing four section telescopic tower provided with a hand crank to raise and lower the instruments mounted on the tower. Specifications are as follows:

Extended Height	:	10 meters
Retracted Height	:	2 metres
Wind load Limit	:	0.7896 sq. m. (8.5 sq. ft) at 50 mph
Number of Sections	:	4
Construction material	:	Galvanised steel or aluminium

Note: Humidity and temperature sensors are to be supplied with weather and thermal radiation shield made of anodized aluminium and sensor should be supplied with all necessary cables, connector and mounting arrangements as required.

(viii) **SPECIFICATIONS OF DATA LOGGER**

Data logger with 8 analog, 24 digital inputs and 18 bit resolution. Ability to log channels at different intervals and should have capability of averaging and displaying real time data and averaged data over a period of 1 min, 10 min, ½ hr, 1 hr, 4 hrs, 8 hrs, 24 hrs, 1 month and year. Communication between data logger and computer using standard multi drop RS 232 Connector. The data logger should have internal battery with charger. The data logger should support PSTN line or Internal GSM modem for data transfer.

9.0 SPECIFICATION OF SOFTWARE FOR CAAQMS

A. DATA ACQUISITION SYSTEM IN THE STATION

B. DATA ACQUISITION SYSTEM IN THE CENTRAL

C. COMPATIBILITY

D. SECURITY

E. OTHER TECHNICAL CONDITIONS

F. ANNEXURE – I

DETAILS OF DESIRED DATA VALIDATION SYSTEM

G. LIST OF PROTOCOLS FOR WHICH SOFTWARE SHOULD SUPPORT

H. CHECKLIST TO COMPARE FIRM'S TECHNICAL CAPABILITY TABLE FOR SPECIFICATION OF SOFTWARE.

A. DATA ACQUISITION SYSTEM IN THE STATION

SPECIFICATIONS OF STATION SOFTWARE

The station software captures data from all channels in the system and stores in the Personal Computer. Personal computer is used for calibration and configuration of each channel.

1) Data Acquisition

- a) Frequency of data acquisition
 - (i) User selectable 1, 5, 30, 60, 120 second averaging duration online digitally.
- b) Channel size
 - (i) 32 Channels or more supported
 - (ii) Expandable to 64 channels, if required in future
- c) Data input
 - (i) Either Analog (0-1 volt / 0-10 volt / 2-20mA / 4-20mA)
 - (ii) Or Digital (firm will develop the protocol, if required without additional cost within project duration) to configure with the PC.
- d) User configurable channels, stations and equipments with communication parameters.
- e) Analyzer data channel should comprise of Name, Units, Communication Address, Validity Range, Operation and Error Status.
- f) Provision to incorporate conversion factors such as PPB to $\mu\text{g}/\text{m}^3$ etc.
- g) Software should be equipped to configure the analysers with it, irrespective of the output mode i.e. Analog or Digital (RS 232) of the instrument.
- h) System should read raw data values of the analyzers and meteorological instruments and duration of averaging data should be user selectable like 10 / 20 / 30 / 40 / 50 / 60 seconds.
- i) The output should be converted into realistic data in prescribed units.

2) Data Collection

- a) Software should collect each second data.
- b) Average data over user selectable time (1, 5, 30, 60 seconds time interval) period.
- c) Operational status, Error status, calibration status and calibration values observed from the analyzer should be captured and should be made available along with the data with a frequency of maximum five minutes.

- d) System should collect of the diagnostics of the instrument comprising actual diagnostics parameters and their values at least once in every five minute to check the state of the health analyzer.
- e) Calibration parameters
 - (i) Provision to entering calibration, span calibration values of gas cylinder/permeation to devices
 - (ii) Provision for collecting zero calibration, span calibration values(pre calibration & post calibration) in to the database for further analysis.
 - (iii) Provisions to collect electronic system pre calibration & post calibration to ascertain the percentage deviation/ correction apply during each calibration.

3) Data Storage

- a) Data along-with diagnostic, calibration, alarms should be stored at station computer at a defined path.
- b) Interval of data dumping will be same as defined in the data collection
- c) System should be capable to keep every second acquired data from 32 channels for a period of minimum five years.
- d) Data stored should be plain text format
- e) No data encryption should be done at the station and if encryption is done than decryption procedure should be made available in soft file format to check the data at station at any point of time. To convert data on continuous basis for exporting to any other software, if required, procedure should be available without any licensing.

4) Data Display (Statistical analysis of data)

- a) In 4-in-4 graphs, 4-in-1 graph and / or 16-in-1 graph formats
- b) In terms of 4-in-1 table format
- c) Real time multi – graphs over user selectable time period.
- d) Display of graphic & tabular display of the current data.
- e) Graphical form should comprise of 4-4 graphs, 4-1 graphs in user defined format i.e. 1, 5, 10, 15, 30 min, 1hour, 4, 8, 24 hour, 30 days and yearly. (user definable time series)
- f) Tabular form should comprise of 4 channel list in user defined format i.e. 1, 5, 10, 15, 30 min, 1hour, 4, 8, 24 hour, 30 days and yearly. (user definable time series)

- g) Station instruments basic configuration etc. should be visible on screen continuously.
- h) Main window for real time display of all measured parameters with status of all analyzers/sensors.
- i) Statistical analysis tools like regression analysis, co-relation analysis and other analysis as per industry standards in the field of environment should be available and if not the firm should develop these for CPCB within a time frame.
- j) The system should have procedures for normal analysis tools like calculation of data with respect to a threshold value, average, minimum, maximum, calculation of violating value with respect defined values (Air Quality Standards) for defined period for the database etc.
- k) Data analysis of diagnostics parameters
- l) Data analysis of Pre calibration and post calibration data (if facility not available can be developed)
- m) Data analysis of corrections applied of each calibration cycle (if facility not available can be developed)

5) Data Backup

- a) There should be defined data backup procedure through which data can be extracted from station computer in simple text format / excel (user definable).
- b) There should be defined restore procedure also to restore the data in case of data loss.
- c) A display screen should be available to update the user about data availability.

6) Data Validation automatic checks at station software

- a) Zero level and span level checks if performed cyclically and defined results are not obtained up to +/- 5% (user definable 0-10%) then system should alarm the user of system failure and the recorded alarm should be transmitted to central software.
- b) After instruments perform the calibration the results obtained should be recorded and should be transmitted to central computer.

7) Data validation requests generated at station computer

At least three tier request generation and request acceptance system procedure is desired. Details are given in the Annexure –I.

- a) Inbuilt checks capability may be provided, where if instrument throws erratic data software can check automatically and display message and send

information in the form of corrected data in corrected database to be approved by the central software at central level. (facility if not available needs to be developed by the system provider)

- b) There should be provision of two databases one is raw database and another corrected database. (facility if not available needs to be developed by the system provider)
- c) Validation of data through calibration database Pre calibration & post calibration values collected.

8) Calibration of systems

- a) Calibration window for analyzer for the calibration from computer.
- b) Remote Access to Calibration: Calibration exercise need to be done remotely. All necessary arrangements for it should be made in the system.
- c) Calibration data file may be prepared separately.
- d) Calibration database need to be formed, stored and transmitted to central.
- e) Calibration cycles to be as per the models of the instruments.
- f) Calibration records should store the calibration values displayed by instrument.
- g) Diagnostics during calibration should also be recorded.

9) Location of station

- a) Fixed Station location to be recorded
- b) Moving station location to be recorded
- c) Latitude and longitude of stations be recorded

10) Data transfer to Central

All data captured at station computer should be transferred to central software.

- a) User selectable time frame for transmission of data to central server.
- b) Diagnostics (actual diagnostics parameter values recorded each time in the station), configurations (station channel configurations), alarms(generated alarms) should be transmitted.

11) Data transfer to Display Boards

The system provider is responsible to make necessary software provisions to connect output on display boards. The formats of files may vary, the formation of defined formats is the responsibility of system provider for the project duration.

- a) Software should be capable to transfer and display online data on display board at the station location.

- b) The data in user defined formats (customizable) should be made available for continuous display.

B. DATA ACQUISITION SYSTEM AT THE CENTRAL STATION

SPECIFICATIONS OF CENTRAL SOFTWARE

Data communication system handles the data transmission of an ambient air quality network and receives incoming messages / signals from remote stations. The central software processes signals and data and displays it on the web and other interfaces.

Detailed requirement is as below:

1) Software at Central Station

- a) Software should not have any restriction on number of locations and computers either technologically or in terms of licensing.
- b) Should display multiple stations on - line data (momentary values) in tabular text and graphic format.
- c) Data should be received by the central from all locations within 5minutes duration or at user defined time intervals.
- d) Data along-with diagnostics and calibration details should be transmitted at central from all connected locations.
- e) Should support dialup systems, broadband connectivity, wireless connectivity, 2G or 3G or any new technology which shall be in place during project time should be compatible and if not need to developed by the system provider up-to project duration without additional charges.
- f) Should have the remote control facilities for calibrations (Zero & Span) of instruments and measuring range modifications.
- g) Should have facility for displaying data communication error reports, image management which should be recorded and should be available for display.

2) Data Display at Central

- a) In 4-in-4 graphs, 4-in-1 graph and/or 16-in-1 graph formats
- b) In terms of 4-in-1 table format
- c) Real time multi – graphs over user selectable time period.
- d) Display of graphic & tabular display of the current data like simple 3D line and column chart, polar diagnostics and 3D perspective column chart.

- e) Graphical form should comprise of 4-4 graphs, 4-1 graphs in user defined format i.e. 1, 5, 10, 15, 30 min, 1hour, 4, 8, 24 hour, 30 days and yearly. (user definable time series)
- f) Tabular form should comprise of 4 channel list in user defined format i.e. 1, 5, 10, 15, 30 min, 1hour, 4, 8, 24 hour, 30 days and yearly. (user definable time series)
- g) Display of data using selectable name of different stations.
- h) Generation of Wind Roses, Pollution Roses (12 & 16 directional i.e. 0 degree, 22.5, 45, 67.5, 90 and 360 degree) with user defined time limits.
- i) Calculate vector mean of wind direction.
- j) Programmable down loading of data.
- k) Comparison of data w.r.t. Standards in Graphical form and tabular form with information of values exceeds the Standards.
- l) Specific data zooming facility
- m) Database correction procedure
- n) Separate user ID and Password for correction of database so that all regional level users if authorized can validate their regions data and the events be recorded along-with ID and time.
- o) Data validation trail recording.

3) **Data Export**

- a) Customizable data format developing capability required.
- b) Possibility to export the data files in Excel, Text and other formats Tabular form should be in user defined format i.e. 1, 5, 10, 15, 30 min, 1 hour, 4, 8, 24 hour, 30 days and yearly.

4) **Data Import**

- a) In case of communication medium phase there should a mechanism to shift the data into Pen drive (Physical medium for data collection) physically and a procedure to import the same on central software.

5) **Printing**

- a) Possibility to connect different types of printers and auto printing facility for all displays generated throughout the analysis of data at any point of time.

6) **Data Validation automatic checks at Central software**

- a) Zero level and span level checks if performed cyclically and defined results are not obtained up to +/- 5% (user definable 0-10%) then system should generate

alarm the user of system failure and the recorded alarm should be transmitted to central software and stored. There should be provisions to read these alarms in a database for corrective actions and for comparison of data for acceptability or rejection.

- b) After instruments perform the calibration the results obtained should be recorded and should be transmitted to central computer and stored.
- c) There should be provisions to configure at least 08 alarms for any given instrument auto check.

7) Data validation requests management at central computer (if not available facility may be developed by the firm)

- a) Data validation requests sent by station computer should be recorded and the system should provide a window to user to accept or reject the reasons mentioned by the user end.
- b) Inbuilt checks capability should be provided, which can be configured by the administrator at central to put alarms according to requirement on data, errors generated or on diagnostics of systems.
- c) The software at central should have facility to log in data validation requests. These requests will carry the erroneous data for user selected period and for which user at station will request to change the data due to environmental or instrumental operation conditions. These requests will reside in central location and whenever user at central agrees the data will be changed in the validated database. Hence, system will have two types of databases 1) Raw database which can never be touched 2) which has to be modified and corrected as per agreed conditions. The detail of user requesting or applying changes in corrected database should be recorded with time.

8) Data Display at Web (if not available facility may be developed by the firm)

- a) System should have standard web display software in place.
- b) Central software should be capable to show the data in predefined formats at website on a physical map.
- c) The data from Corrected database shall be displayed on the web.
- d) Current data should be displayed on web page.
- e) There should be provisions to show no. of violations occurred, percentage of violation occurred at stations parameters comparing hourly, 8 hourly, 24 hourly and yearly standards

- f) Provision is required to change standard value, since standard values do change after certain period of time as per Govt. policy.
- g) Displayed web page should have facility of providing information to all with respect to environment as well as to provide specific files for downloading.
- h) The logo of CPCB should be displayed on webpage.
- i) The disclaimer have to be provided on the webpage
- j) Some predefined queries have to be developed to display the data on web page. A search page needs to be developed for converting data into meaningful format for the general public. Help in developing such kind of systems can be taken from existing running system at www.cpcb.gov.in/caaqm and www.cpcb.gov.in/cpcbpa.
- k) The current data displayed on the web should have comment inserting facility at individual data and for running data as well like if any station instrument out of order then station official should be able to display message "Instrument under maintenance".
- l) Similarly, when data goes beyond a defined limit it should automatically display a predefined message as comment on webpage as "Data under Scrutiny".
- m) Automatic e-mail messages to be generated for the identified end users to start a corrective action.
- n) Station photos to be uploaded for the display along-with the data.
- o) User defined 05 pages may be developed additionally, if required by CPCB designs for which may be decided mutually.

9) Data display at display board outside the office at central location also

Data display is also required at regional and central locations for which software provision has to be made at each location.

10) Remote Procedures (if not available facility may be developed by the firm)

- a) Central software should have capability to allow to connect any station instrument through remote.
- b) Central software administrator should be able to go for remote calibration of any of the systems.
- c) Software should be capable to operate remote stations configurations.
- d) Control panel window should be available for controlling each analyzer.
- e) Alarm window for valid alarms of all analyzers and sensors.
- f) It should have transparent data – connection to each analyzer from remote.

- g) System should be capable to remotely configure all stations through remote location using configuration file to maintain the uniformity. The configuration command from central or from regional location should be active.

11) Data Reports Generation

- a) To prepare reports hourly, weekly, monthly, yearly in user defined interval and formats.
- b) Mean, Median, Percentile, Maximum, Standard deviation, Frequency analysis and Maximum Frequency analysis.
- c) System should have predefined user selectable procedures through which reports of any specific station or multi stations reports upto four parameters can be generated as per user selected time frame.
- d) Data Comparison
Software should be able to compare any of the four channels irrespective of type of data in the system with respect to each other on a single time scale user selectable.
- e) Data Comparison on different time scale
Software should be able to compare data on the basis of different time scales like one station (x) parameter (y) of one given date is compared with other station (z) parameter (y) on any other date in a single graph.
- f) Data reports, calibration reports and status reports with user time periods.
- g) Historic multi – curves / graphs over user selectable time period.
- h) Report generation over user selectable time period (instantaneous or averaged over a period of 1, 15, 30 min, 1 hr, 4, 8, 12, 16 and 24 hrs etc.).
- i) Diurnal variation, standard deviation, regression and other statistical parameter reporting possibilities with various available mathematical methods.
- j) If required separate report generation procedures have to be developed for which firm will be responsible for project duration.

C. COMPATIBILITY

Should have compatibility with the latest Operating System with a contract of 05 (five) years from the date of supply of software for providing assistance to operate system at CPCB and all the new patches developed for the software during these 05 years without additional cost. Software should have capability of data transmission with the presently available PROTOCOL (list attached).

D. Security

- a) System should have the facility to have it Password protected or without password as decided by CPCB at the time of implementation.
- b) System software should be totally secured and any antivirus software required to run the system for the complete project duration has to be managed by the system provider.

E. Other Technical Conditions

1. Hardware required for data transmission has to be made available by the firm and there should not be non-compatibility.
2. Firm should have the capability to develop the Software PROTOCOL for data transmission from any system available in the field in future during next 05 years or up-to the project period.
3. Should support the latest formats of Windows 32 bit or 64 bit or any other available platform like Linux etc.
4. Manual of complete system should be provided.
5. Firm should provide the hardware required for data acquisition along with all the software's required like OS, MS. Office, Networking software, Remote functionality software, Data uploading software on website, Data display software if required, and should maintain hardware for project duration.
6. Since, system has to be placed in NIC domain for which the web software developed along-with the database and web server software should be certified by CERT-IN empanelled vendors for vulnerability. The system provider is responsible for fulfilling all criteria required to place the system at NIC domain. The firm will be responsible for entire duration of the project for any vulnerability if noticed by NIC.
7. The computers required for the work will be procured by CPCB and configuration for the same will have to be provided by the system provider.
8. Display board will be procured by the CPCB.

F. DETAILS OF DESIRED DATA VALIDATION SYSTEM

Annexure-I

At least three tier request generation and requests acceptance procedure is desired in the system. It is presumed that level 1 is station, level 2 is Central location at regional level and level 3 at Central level.

The regional and central levels will have central station computers and software installed and stations will have station computer installed with station data acquisition software and data transmission software.

The flow of data has to be from station to Regional Level and then to Central level. It is desired that environmental database has to be corrected for instrumentation issues as well as for the environmental issues. Hence, officials available at stations will communicate with central and state levels through system itself by commenting on the data. The respective data can be picked up from the database at station itself, corrected to the desired numbers and then transmitted to regional level central computer where, the administrator of system if agrees to the changes desired then data flows to the next level else request is rejected. If request will come to Central server for accepting or rejecting then central level should have authority of accepting or rejecting the data. If central level agrees to the changes than data should be changed in the corrected database else request should be rejected. Hence, there should be provisions for accepting or rejecting data at all three levels accordingly. Here, whenever such requests are generated, concerned administrators need to be sent email alerts.

G. LIST OF PROTOCOLS FOR WHICH CAAQM SOFTWARE SHOULD SUPPORT

Bayern-Hessen	Intercomp5	FH62 Konf.	ChemPro 100
Intercomp 6	Intercomp 1	PVM100	MultiPD II
LabCom	Metek USA-1	VC820	X am 7000
Unor, Oxor	AK R+P	TSI 30222/25	HG Monitor 3000
Defor	MBF	Blendmaster	ESM FH40G
Multor	Gemi	Klimet	Travelpilot DX-V
Adam Module	Uras 14 Modbus	Thygan	AK Conf.
CLD700	Binos1000	USA Turbulence	Thermo Instr.
FH62	HP34970A	Thies DL14/15	PR820R
Hygrowin	Almemo	Innova1312	PAC3
Gesytec II	Modbus	Multiwarn II	Data Collect SDR
RFM433	DGH Module	MeteoBus	VDO Navigation
NMEA183	BH/Timo 9600	Windobserver	

H. CHECKLIST TO COMPARE FIRM'S TECHNICAL CAPABILITY TABLE FOR SPECIFICATIONS OF SOFTWARE

Sr. No.	Details	Capability of firm's software as on date	Firm agree or disagree to develop software in future	If firm agrees to develop application then time frame from individual activity
1.	Data transfer interval Max. 5 minutes from all locations?			
2.	System will transmit data along with diagnostics. If yes then how many channels diagnostics values shall be transmitted to central and at what duration?			
3.	System will transmit data along with Calibration values (Pre cal and Post Cal)?			
4.	System has remote calibration procedures in place for Regional level and central level both?			
5.	System has remote configuration facility for regional and central level both?			
6.	System has database validation procedure in place?			
7.	Web software already developed or not?			
8.	If Web software is available is it modifiable as per CPCB need by the firm?			
9.	Whether agree to develop five web pages as per mutual discussion			
10.	Web software with password and or without password			
11.	Password providing facility available at regional levels			
12.	Statistical tools available at web software or not?			
13.	System provider is capable of placing system in NIC domain			
14.	System provider will provide certification from CERT - IN empanelled firms			
15.	Data import from other files			
16.	Data export to other files			
17.	Pre defined queries to be inbuilt for providing data to public whether these are already available or to be developed if yes then time frame?			
18.	Standards comparison and exceedances be reported on web			
19.	Different types of predefined formats of report preparation available or not?			

20.	Support various protocols available till date as listed provided or not?			
21.	If new protocol based software is to be developed whether firm will			
22.	Unlimited Number of stations supported by Central Server software or not? If not then support for how many stations will be provided			
23.	System compatibility with Dialup/BB /2G/3G/Wireless available or not? If not then what technologies supported as on date? What time frame if other to be develop.			
24.	Software has Wind rose reports generating capability			
25.	Software has pollution rose generating facility			
26.	Software has diurnal variation facility			
27.	Software has mathematic al tools			
28.	Software has 16 channels display at on page			
29.	Software has data communication error reports			
30.	System has error correction procedure			
31.	Software has parallel data display reports			
32.	Software has virtual channel deployment capacity			
33.	Software has data encrypting procedures at stations or not? If yes then data can be retrieved from station or not?			
34.	Software compatible for ANDROID technology			
35.	System Provider will provide all Hardware required at station and Central			
36.	System Provider all necessary software required for data acquisition, display, Analysis, website uploading etc.			

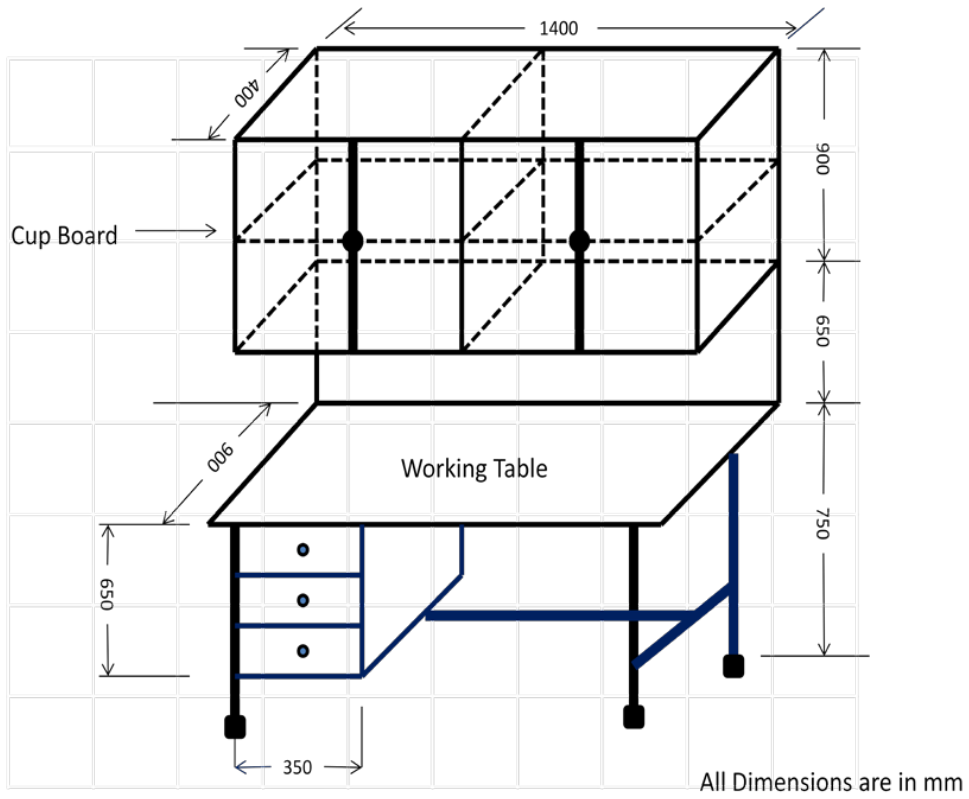
10.0 SPECIFICATIONS OF DAY LIGHT & NIGHT VISIBLE DATA DISPLAY SYSTEM

- 10.1 Size of display System : 4' x 12'
- 10.2 Visibility range : 200 Meters (Day Time)
- 10.3 Nos. of display Line : 4
- 10.4 Display of colour elements : Multi Colour (Red, Green and Blue)
- 10.5 Minimum life span of the system : 10 Years
- 10.6 Smallest Character Size : 260 mm x 190 mm (approx.)
- 10.7 Operating and Non Operating Temperature : 0 – 50 ° C
- 10.8 Humidity Tolerance Range : 0 – 100%
- 10.9 Languages supported by the display : English & Hindi
- 10.10 Color Gradient : Cluster LED based
- 10.11 Display Characters (Example):

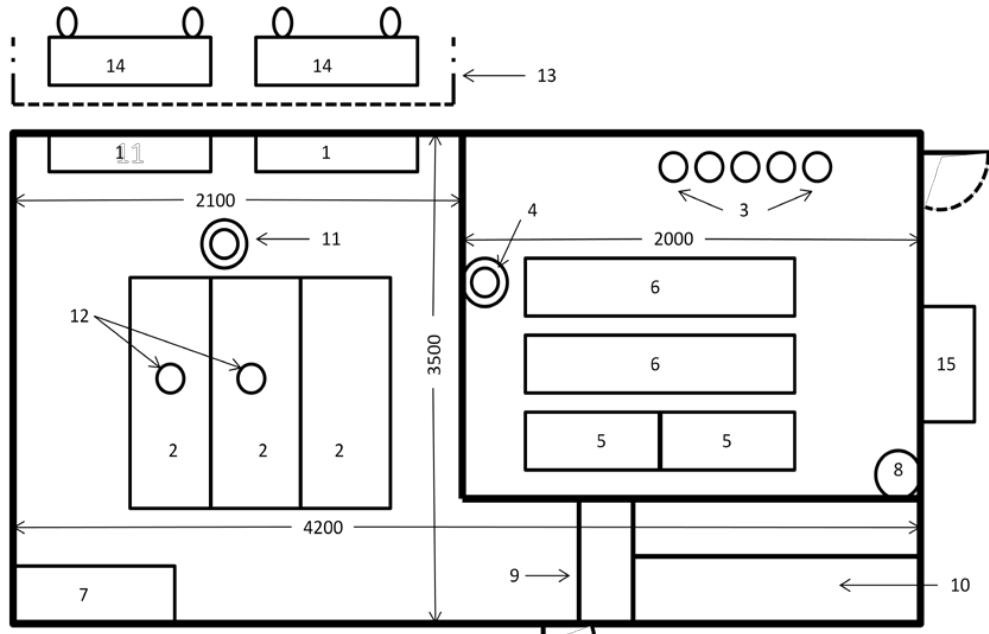
S. No.	Parameters	Concentration (µg / m ³)	Standard Limit (µg / m ³)
10.11.1	Particulate Matter (PM 10)	400	100
10.11.2	Particulate Matter (PM 2.5)	160	60
10.11.3	SO ₂	35	80
10.11.4	NO ₂	79	80
10.11.5	CO	3320	2000
.....
.....

The display of above variable data should be supported with moving messages / slogans to be changed from time to time

- Input Power requirement : Cluster LED based
- Display Mounting : Weather proof casing to cope up with local condition
- Computer System : Software compatible with latest version
- General : The display system should be capable to transfer the data from computer to Display Board through Modem System. The system should also have the facility to display the environment message, environmental picture through video camera / VCR / C D Player etc. for public awareness.



Drawing of Cup Board and Working Table



- | | |
|------------------------------------|--|
| 1. Roof Mounted Split AC | 9. Working Table |
| 2. 19" Rack | 10. Racks for spare parts |
| 3. Gas Bottles | 11. Ambient Air Sampling System |
| 4. Mast for Meteorological Sensors | 12. Dust Sampling System (PM _{2.5} & PM ₁₀) |
| 5. Battery Box for UPS | 13. Sun Shed |
| 6. UPS Unit (5 and 10 kVA) | 14. Air Conditioning unit |
| 7. Electric supply Box | 15. UPS Room AC (1 Ton Capacity) |
| 8. Exhaust fan | |

All Dimensions are in mm

Drawing of Continuous Ambient Air Quality Monitoring Station

S. No.	Item / Analyzer Name	Manufacturer	Country of Origin	Model
1.	Automatic Ambient CO Analyzer			
2.	Automatic Ambient SO 2 Analyzer			
3.	Automatic Ambient NOx and NH 3 Analyzer			
4.	Automatic Ambient O 3 Analyzer			
5.	PM10 Monitor			
6.	PM2.5 Monitor			
7.	BTX Analyzer			
8.	Multi-calibration systems for gaseous monitors comprising of gas supply / generation and automated calibration			
9.	Meteorological Instrumentation comprising Wind direction, Wind speed, Ambient temperature, Relative humidity, Solar Radiation and Rainfall mounted on telescoping crank up meteorological Mast.			
10.	Computer system consisting of one PC along with Laser Printer and DAS at the monitoring station and one PC at central office with peripherals and software for data acquisition / Data display Board / transfer and system integration, telephone, Modem.			
11.	Housing/ Container for Continuous Automatic Monitoring Stations with Sampling line, Internal fitting, Instruments racks, Electrical fittings and Gas line fittings, Tools (electrical and mechanical), Data display system, Re commended spares .			
12.	2 Ton capacity split Air conditioner			
13.	1 Ton capacity split Air conditioner			
14.	Single Phase 10 kVA UPS, 1 Hour ba ckup			
15.	Single Phase 5 kVA UPS, 2 Hrs. backup			
16.	RCC Foundation, pillars and miscellaneous works including civil and electric al			

Technical Data Sheet for Supply and O & M of Continuous Ambient Air Quality Monitoring Stations (CAAQMS)

Sr. No.	Specifications		Bidder's Response
1	MONITORINGS STATION		
1.1	Monitoring Station :	Monitoring Station : is designed for housing the ambient air quality monitoring instruments to protect them from dust and heat. Temperature and Humidity sensors shall be installed in the housing for checking the humidity and temperature inside the station. Three Nos. 19" racks shall be installed inside the station so that the analysers are easily accessible from front & back for calibration and maintenance.	
1.2	Dimensions :	Inside length: Approx. 4200 mm Inside width: Approx. 3500 mm Inside height: Approx. 2500 mm	
1.3	Frame	<p>All the material used for the construction of the floor, frame, roof frame etc, the 4 corner posts and 8 integrated, reinforced container corners should be of metal. The exterior panel of the container shall be made of pre-coated MS Sheet of approved colour shade. All other steel parts should be hot dipped galvanized having minimum rate of galvanisation of 275 gram per square meter.</p> <p>All joints of like metal such as steel-to-steel or aluminium-to-aluminium shall be protected against corrosion by liberal application of joining compound. All joints of dissimilar metals such as steel to aluminium shall be protected against corrosion due to galvanic action by liberal application of dielectric compound as well as jointing compound on both mating surfaces. For lifting / fixing the container, International Standard eyebolts should be provided at the corners.</p>	

1.4	Paneling	<p>The outer paneling will be of 1.2 mm of Pre-coated MS sheet to withstand external impacts and abrasions. Outer side of the MS Sheet i.e. exposed face of the sheet, shall be permanently colour coated with silicon modified polyester coating of dry film thickness (DFT) 20 micron (min.) of approved colour shade over primer. Inner face of the sheet shall be provided with suitable pre - coating of minimum 7 micron off - white colour. The inner paneling will be of PVC coated 2 mm thick aluminium sheet, fixed over an i nlay of 4 mm marine plywood. 100 mm thick polyurethane insulation will be used between the outer and inner walls (Pre- coated MS sheet and Marine plywood) as insulating material. Z spacers if required shall be made out of at least 2 mm thick galvanized ste el sheet of grade 275 as per IS:277</p>	
1.5	Floor	<p>The floor will be laid in frame of 600 x 600 mm centre to centre with 50 x50 x 6 mm MS angle. The floor surface will be of 19 mm marine plywood covered with robust quality Vinyl flooring, 2 mm thick of approved colour. The floor should be of acid and alkaline resistant, waterproof, easily cleanable/washable. Bottom plate of thickness 2 mm hot dipped galvanised MS Plate shall be provided.</p>	
1.6	Outer Door	<p>One door of size approx. 2000 x 900 mm will be provided at the front side (L = 4200 mm) of the station with isolated 3 – point locking & door handle flush fitted.</p>	

1.7	Electric Power Supply Box	<p>Three - phase (3 Ø) electrical wiring will be laid in ducts. Copper wiring of appropriate gauge will be used . The terminal board should be mounted in a central power distribution box. Over voltage protection for each phase shall be provided along with the lightning arrestor. 2 numbers Emergency cut off switch & Thermostat switch (35 0 C) for power disconnection, 6 free sockets and 3 fluorescent lamps for lighting will be provided. The station shall be properly grounded with chemical earthing or as per BIS Standards with proper plate and only copper strip at –least on 2 corners (diametrically opposite). One three phase energy meter (Digital Type) shall be installed. Weatherproof cubicles/enclosure for housing of MCB / TP & N Switch of main power termination (outside shelter) and weatherproof telephone junction box for terminations of telephone line are to be provided. Proper earthing for telescopic mast of meteorological system shall be provided. There should be conduction between the telescopic mast of the meteorological system and the station. The guy ropes or wires shall be provided for supporting the mast.</p> <p>List of Consumables</p> <p>All Fuses : 02 set Lightning arrestor : 02 set Emergency Switch : 02 pcs Thermostat : 01 pc</p>	
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1.8	Housing	<p>The housing will be partitioned as per drawing to create space for storing of gas cylinders, Meteorological mast & UPS. The size will be 2000 x 1400 x 2300 mm. A lockable door of size 900 x 2000 mm along with 3-Point locking system shall be provided on the outer wall of the housing. A 300 mm, single –phase (230 volts ± 10 volts AC and 50 Hz ± 3%) exhaust fan with safety grills will be provided. Mounting brackets in 2 levels for fixing of at - least 06 (six) gas bottles should be provided. The internal lights of the housing should be sensor based.</p> <p>Air conditioners shall be mounted on proper rust proof supporting structures with rubber blocks to avoid vibration of structures. Proper caging / grill should also be provided for the safety of ACs. Sun shades for external AC units shall be provided with fabricated pre-coated MS sheet (same as monitoring station) with supporting arrangements. AC unit's external piping shall be placed in GI trays. Cable trays fixed on exterior wall shall be covered with pre-coated MS sheet, of same colour shade of monitoring station. Roof top sheet to be levelled and sloped properly. Rain water spout shall be fixed at top with rain water down pipe at two corners. The external lights of the station should be Solar operated.</p>	
1.9	Station Furnishing	<ol style="list-style-type: none"> 1) 19” racks – 3 Nos. 2) Fire extinguishers – 2 Nos. 3) Furniture: <ol style="list-style-type: none"> (i) Material-Furniture made of water resistant laminated board (ii) Cupboard – As per drawing (iii) Workingtable – Powdered coated MS frame size 1400 x 900 x 750 mm (w x d x h) and top 19 mm thickness Board (iv) Revolving tilting chair – 2 Nos. 4) Miscellaneous 	

		<ul style="list-style-type: none"> (v) The exhaust gases from the analyser should be collected and discharged by a common exhaust pipe and vented. (vi) Folding aluminium ladder for roof access (vii) Thermostat for measuring the temperature of the station (viii) Hygro Meter for measurement of Humidity inside the station (ix) Mounting bracket for the ladder (x) No smoking stickers (xi) Vacuum cleaner of reputed make with minimum 100 watt power (xii) Tool Kit having following tools: (xiii) One screw driver set (xiv) One multi-meter (xv) (Philips, Mico make) (xvi) One box spanner set (xvii) One D spanner set (xviii) One watch maker set (xix) One Hammer set (xx) One precision screw driver set (xxi) One pliers set (xxii) One Tong tester (xxiii) One Emergency LED Cluster light (xxiv) Sign boards along -with logo of Chhattisgarh Environment Conservation Board (CECB) to be embedded with size 1500 x 900 mm on the front of the container and on the two side of the container, The name of the Station i.e. Continuous Ambient Air Quality Monitoring Station, (Location) both in English and Hindi or local language to be inscribed. The Signs boards to be mounted on the station with proper spacers. 	
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1.9.1	Security Cabin (Optional)	A 4 feet x 4 feet wooden / Paneled security cabin with chair and small folding table for security guard with covered over head selves to be provided separately with the station container.	
1.9.2	Container Foundation (RCC)	L X W 6000 x 6000 mm Height 300 mm from ground	
	Pillars	Nine concrete pillars of 300 mm above the ground level and below the ground level with 200 x 200 mm beam and between pillar bricks to be used for filling the space. Outer wall of the foundation to be plastered with 1:4, Cement : Sand ratio and same has to be painted with weather proof coat.	
	Top of the platform	RCC 150 mm with concrete ratio of 1:1:2 and to plastered and painted with weather proof paint.	
	Stair case	Staircase to approach the main door of the container and the UPS / Gas room door in the side to be provided and each step should not be more than 150 mm	
2.0	AIR CONDITIONER		
2.1	Type	3 Nos. split type, roof mounted of 5 star rating with an automatic timer. Separate Voltage stabilizer will be provided with each unit.	
2.2	Capacity	2.0 Ton (2 Nos.) and 1Ton (1 No.). The indoor units should be running alternately at an interval of four hours with timer control and the temperature inside the station should be maintained at 25 0 C inside during peak summer months.	
2.3	Nominal Cooling	Btu /hr – 24000, Kcal / hr: 6000	
2.4	Fan type	Propeller Fan	
2.5	Fan Motor type	Permanent Split Capacitor, 1/8 Horse power	
2.6	Control Type	Remote	

2.7	Compressor	Reciprocating	
2.8	Refrigerant	Eco Friendly	
2.9	Power supply	230 volts \pm 10 volts AC and 50 Hz \pm 3%.	
3.0	ON LINE UNINTERRUPTED POWER SUPPLY (UPS)		
3.1	Single phase 10 kVA UPS along with Automatic Delayed Restoration Device (ADRD) with 1 hour backup in full capacity should be provided for the smooth operation of one 2 Ton capacity split AC at the station.		
3.1.1	Capacity	10.0 kVA	
3.1.2	Technology	PWM using IGBT / MOSFETS	
3.1.3	Crest Factor	More than 3: 1	
3.1.4	Input Voltage Voltage Range Frequency	230 V AC \pm 25% 50 Hz \pm 3%	
3.1.5	Output Voltage Voltage regulation Frequency regulation Waveform	230 V AC \pm 1% 50 Hz \pm 0.01% Pure sine wave	
3.1.6	Battery type Back up time Battery Capacity Recharge time	Sealed maintenance free 1 Hour at full load For required backup time 5 hrs to 90% after complete discharge	
3.1.7	Distortion	Less than 1% on linear load	
3.1.8	Power factor	0.9 to 1	
3.1.9	Indicator	L.E.D. – Battery Charge, Load level, on Line, over load, on battery, replace battery	
3.1.10	Alarm	Audible alarm for battery backup, battery low, and fault	

3.1.11	Protections Surge Overload Short circuit Battery low cut – off	Surge suppression meets BIS or International standard Fuse & current limited Fuse & current limited & cut – off No battery drain after cut - off	
3.1.11	Protections	110% for continuous load	
3.1.13	Efficiency	More than 90%	
3.1.14	Environment Operating Temperature Operating Humidity Audible Noise	0 – 500 C 10% to 95% (Non condensing) Less than 45 db (at 1 meter)	
3.2	Single phase 5 kVA UPS along with Automatic Delayed Restoration Device (ADRD) with 2 hours backup in full capacity should be provided for the smooth operation of Analyzers and peripherals at the station		
3.2.1	Capacity	5.0 kVA	
3.2.2	Technology	PWM using IGBT / MOSFETS	
3.2.3	Crest Factor	More than 3: 1	
3.2.4	Input Voltage Voltage Range Frequency	230 V AC ± 25% 50 Hz ± 3%	
3.2.5	Output Voltage Voltage regulation Frequency Frequency regulation Waveform	230 V AC ± 1% 50 Hz ± 0.01% Pure sine wave	
3.2.6	Battery type Back up time Battery Capacity Recharge time	Sealed maintenance free 2 Hour at full load For required backup time 5 hrs to 90% after complete discharge	
3.2.7	Distortion	Less than 1% on linear load	

3.2.8	Power factor	0.9 to 1	
3.2.9	Indicator	L.E.D. – Battery Charge, Load level, on Line, over load, on battery, replace battery	
3.2.10	Alarm	Audible alarm for battery backup, battery low and fault	
3.2.11	Protections Surge Overload Short circuit Battery low cut – off	Surge suppression meets BIS or International standard Fuse & current limited Fuse & current limited & cut – off No battery drain after cut - off	
3.2.12	Overload Capacity	110% for continuous load	
3.2.13	Efficiency	More than 90%	
3.2.14	Environment Operating Temperature Operating Humidity Audible Noise	0 – 500 C 10% to 95% (Non condensing) Less than 45 db (at 1 meter)	
4.0	AIR QUALITY ANALYSIS SYSTEM		
	(CO, SO 2, NOx, NH3, BTX, PM10,PM2 and O 3 Analyzers) (General Specifications for all Analyzers)		
4.1	The analyzers should be 19" rack mounting model with facilities for fixing the analyzers from front side		
4.2	The ON / OFF switch and display of the entire important status signal viz. Sample flow, temperature, concentration, range switch, manual / auto mode, zero / span mode should be on front panel.		
4.3	The analysers should operate at operating voltage 230 volts \pm 10 volts AC and 50 Hz \pm 3%. The power supply input to be protected against spikes from and to the		

	analyser by an LC filter. The power connection cable should be CEE type complete with 15 Amperes plug adaptable to Indian mains socket.		
4.4	The analysers must function properly in Indian conditions without any defect between 0 – 50o C ambient temperature, 10 – 95% relative humidity and in high ambient dust levels. The data capture rate should not be less than 90%.		
4.5	The Manufacturer shall provide minimum of 2 weeks of operational & preventive maintenance hands - on training for 3 persons (maximum) per State.		
4.6	The analysers should be complete with calibration system. The calibration system should be delivered along -with respective span gas cylinder and permeation tubes. The span gas concentration should be within 60 – 90% of first measuring range. The analyser must have zero point internal calibration system and in agreement with minimum detection limit of each analyser. The calibration procedures are to integrated into the software system for automatic calibration.		
4.7	The permeation tube and the calibration gases provide d with the system shall have Traceability to NIST.		

4.8	The analysers shall be supplied with all ancillaries necessary for operation including external pump (if any) and any other items such as charcoal scrubber, Teflon air sample intake filter, drier, Teflon tubing suitable for connection to air sampling manifold. All such items are to be itemized. Dust filter in all the analysers should be provided before solenoid valve to protect frequent chocking of solenoid valve.		
4.9	The connector systems for out - going signal for recording and the computer terminal should be on back panel with screw type connecting pins.		
4.10	All ambient gas analysers shall conform with the USEPA automated reference / TUV / EN or equivalent method designation as required by the specification for individual equipment / parameters. Method of measurement used shall also comply with the stipulation on National Ambient Air Quality Standards (NAAQS) 2009 (Details of Methods of Measurement is available at MoEF and CPCB websites). All analysers shall be micro – processor controlled with automatic calibration using an external dilution calibrator and calibration standards. All analysers and sensors should be fully integrated in the rack cabinet, fully calibrated & tested before supply and ready for start – up at the		

	respective sites. Analyzer must exhibit performance equal to or better than values specified in the Calibration & test certificate provided with each analyzer.		
4.11	The manufacturer shall specify the cross sensitivity of measurement for all the analyzers.		
4.12	<p>Each set of analyzers shall be supplied with two copies of elaborate operation manuals comprising details in three parts:</p> <p>Parts (I) should comprise installation, operational and trouble shooting details;</p> <p>Parts (II) should have details about preventive, routine and corrective maintenance;</p> <p>Parts (III) should comprise details of all electrical, electronic and pneumatic circuit diagrams, details of each spare parts, Catalogue No. etc. and details of each electronic card / PCB's; and</p> <p>Parts (IV) Schematic diagram for possible repair & maintenance.</p>		

4.13	<p>Digital Output: Multi drop RS 232 port shared between Analyzers, Dust Monitor (PM 2.5 & PM 10), Meteorological Sensors and computer for data, status and control.</p>		
4.14	<p>Quality Control and Standard Data shall be collected and validated according to US EPA standards, using the methodologies included in 40 Code of Federal Regulations. All analyzers shall have current US EPA reference or equivalent method designation and shall be of the latest design.</p> <p>The supplier shall submit a Standard Operating Procedure for the air quality monitoring stations to the Buyer at the time of bid submission. This Standard Operating Procedure shall be approved by the Buyer prior to award. The Standard Operating Procedure shall contain the following:</p> <ul style="list-style-type: none"> x. Operating procedures for all analyzers and meteorological sensors xi. Calibration procedures xii. Calibration schedule xiii. Maintenance procedures xiv. Maintenance schedule xv. Data validation procedures xvi. Quality Assurance procedures xvii. Sample quality assurance Documentation xviii. Sample Air Quality Report 		

	<p>The calibration procedures for analyzers shall conform to US EPA methodologies and shall include daily calibration checks, biweekly precision checks and linearity checks every six weeks. All analyzers shall undergo full calibration every six weeks. Data obtained from these calibration checks and copies of associated Quality Assurance and calibration documentation, shall be submitted to the Buyer along with the Air Quality Data.</p> <p>Air Quality Data shall be submitted to the Buyer on a monthly basis in the form of an Air Quality Report. This report shall include tabular and graphic information on gas and dust concentrations as well as meteorological data for each site. The data shall be reported in the form of 15 minute averages and shall also include daily, weekly and monthly averages, minimums, maximums, standard deviations, total data captured and percent data capture. The Air Quality Report shall also include wind roses where wind speed and direction are measured.</p> <p>Upon 24 hour notice from the Buyer, once per year, the supplier shall agree to submit to an audit of calibrations, conducted, using pre - approved US EPA methodologies, by a third party. The results of these audits shall be made</p>		
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	immediately available to both the supplier and Buyer.		
5.0	SPECIFICATIONS OF SAMPLING SYSTEM		
	A suitable sampling system as specified by USEPA having 10 ports manifold and fitted with a suction pump to draw ambient air. System duly equipped with moisture removal systems should be provided for sampling of ambient air separately for gaseous and dust measurement. Gases sampling system:		
5.1	Height of the sampling system:	Approx. 1.0 meter above the roof	
5.2	Roof entry cut out:	Stainless Steel	
5.3	Conduit:	Stainless Steel	
5.4	Inner sampling system:	Borosilicate glass	
5.5	Sampling head:	Stainless Steel	
5.6	Manifold:	10 port for tubes 6 x 1 mm, self - tightening	
6.0	SPECIFICATIONS OF 19" RACK Suitable 19" Rack cabinet to accommodate all analyzers, calibrators, Zero air generators, data logger etc. The dimension of the rack without doors, with aluminum section and rear of 2 mm steel sheet, one removable roof plate, fitted with 4 lifting eyebolts. Four roof fixing screws included in package to replace the lifting		

	<p>eyebolts. One gland plate three part, one pair of 475 mm (19") mounting angles depth adjustable in 25 mm pitch pattern fitted on two fixing angles approximately 150 mm unit from the front standard. To accommodate panel width of 19" size: width = 600 mm, Height = 1400 mm and Depth = 800 mm. The 19" racks should be screwed to the floor of the station with anti - vibration pads. All nuts and bolts shall be cadmium coated.</p>		
7.0	AMBIENT AIR QUALITY MONITORING ANALYSERS		
(A)	AMBIENT OXIDES OF NITROGEN (NO-NO2-NOx) ANALYSER		
	Conforming to USEPA Automated Federal Reference Method (FRM) Designation		
1.	Principle	Chemiluminescence	
2.	Measurement	NO / NO 2 / NO x in Ambient Air	
3.	Display	Digital	
4.	Ranges	Auto ranging 0 -2000 PPB	
5.	Minimum Detectable Limit	1 PPB	
6.	Noise Level	0.5 PPB	
7.	Zero Drift	< 1 PPB/24 Hrs.	
8.	Span Drift	< 2% in 15 days of full scale	
9.	Response Time	30 seconds or earlier	
10.	Linearity	<input type="checkbox"/> 1% of full scale	
11.	Calibration	Please see Multi-calibration section (Sl. No. J) and also calibration section in General Specifications (4.6 & 4.7).	

12.	Output Signals or Analog Output	3 Analog output 0 – 1 V, 0 – 10 V, 0 – 20 mA or 4 – 20 mA	
13.	Digital Output	Multi drop RS 232 port	
14.	Consumables and spares	Recommended requirements of 3 years of continuous operation along with the list of Items.	
(B)	AMBIENT AMMONIA ANALYSER (NH₃) Conforming to USEPA Automated Federal Reference Method (FRM) Designation		
1.	Principle	Chemiluminescence NH ₃ conversion to NO by oxidation. NO ₂ also converted to NO. The difference obtained by measuring NO in output of two sample stream as equal to NH ₃	
2.	Measurement	Ammonia in Ambient Air	
3.	Display	Digital	
4.	Ranges	Auto ranging 0 -1000 PPB	
5.	Minimum Detectable Limit	1 PPB	
6.	Noise Level	0.2% of reading	
7.	Zero Drift	< 5 PPB /24 Hrs.	
8.	Span Drift	< 2% in 15 days of full scale	
9.	NH ₃ /NO converter	Quartz at approx 1000 °C	
10.	Linearity	□ 1% of full scale	
11.	Response time	180 second	
12.	Calibration	Please see Multi -c alibration section (Sl. No. J) and also calibration section in General Specifications (4.6 & 4.7).	
13.	Rise / fall Time 95% of the final value	< 30 Sec	
14.	Digital Output	Multi drop RS 232 port	
15.	Analog Output	0 – 1 V, 0 – 10 V, 0 – 20 mA, 4 – 20 mA	
16.	Consumables and spares	Recommended requirements of 3 years operation along with the list of Items.	

(C)	AMBIENT SULPHUR DIOXIDE (SO₂) ANALYSER Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation		
1.	Principle	Pulsed UV Fluorescence	
2.	Measurement	Sulphur Dioxide in Ambient Air	
3.	Lower Detectable Limit	1 PPB	
4.	Ranges	Auto ranging 0 - 500 PPB	
5.	Display	Digital	
6.	Noise Level	0.50 PPB or 1% of the reading	
7.	Zero Drift	< 1 PPB / 24 Hrs. With automatic zero compensation	
8.	Span Drift	< 2 PPB full scale in 15 days	
9.	Calibration	Please see Multi-calibration section (Sl. No. J) and also calibration section in General Specifications (4.6 & 4.7).	
10.	Precision	0.5 ppb or 1% reading whichever is greater	
11.	Output Signals or Analog Output	3 Analog output 0 – 1 V, 0 – 10 V, 0 – 20 mA or 4 – 20 mA	
12.	Digital Output	Multiple drop RS 232	
13.	Consumables and spares	Recommended requirements of 3 years of continuous operation along with the list of Items.	
(D)	AMBIENT OZONE (O₃) ANALYSER Conforming to USEPA Automated Federal Reference Method (FRM) Designation		
1.	Principle	UV Photometric	
2.	Measurement	Ozone in Ambient Air	
3.	Display	Digital	
4.	Range	Auto ranging 0 - 500 PPB	

5.	Minimum Detectable Limit	2.0 PPB	
6.	Noise	□ 1.0 PPB	
7.	Zero Drift	< ½% per month	
8.	Span Drift	< 1% per month	
9.	Calibration	With built in Zero and span generator and also see Multi -calibration section (Sl. No. J)	
10.	Linearity	Continuous + 1%	
11.	Output Signals or Analog Output	3 Analog output 0 – 1 V, 0 – 10 V, 0 – 20 mA or 4 – 20 mA	
12.	Digital Output	Multiple drop RS 232	
13.	Consumables and spares	Recommended requirements of 3 years of continuous operation along with the list of Items.	
(E)	AMBIENT CARBON MONOXIDE (CO) ANALYSER Conforming to USEPA Automated Federal Reference Method (FRM) Designation		
01.	Principle	Non Dispersive Infra -Red (NDIR) with Gas Filter Correlation	
02.	Measurement	Carbon Monoxide in Ambient Air	
03.	Display	Digital	
04.	Ranges	At least four ranges Auto ranging 0 - 100 PPM.	
05.	Minimum Detectable Limit	0.1 PPM	
06.	Zero Noise	0.05 PPM with time constant □ 30 seconds	
07.	Zero Drift	< 0.2 PPM/7 days	
08.	Span Drift	< 1% full scale in 24 hrs.	

09.	Calibration	Calibration gas (CO) cylinder – 15 liters capacity. A Highly polished aluminum cylinder portable filled with 40 PPM NIST traceable Calibration gas has to be provided along -with the instrument for calibration purpose. It should also have pressure gas valve for Zero and Span gas.	
10.	Linearity	Continuous + 1%	
11.	Output Signals or Analog Output	3 Analog output 0 – 1 V, 0 – 10 V, 0 – 20 mA or 4 – 20 mA	
12.	Digital Output	Multiple drop RS 232	
13.	Consumables and spares	Recommended requirements of 3 years of continuous operation along with the list of Items.	
(F)	<p>PM10 MONITOR Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation</p> <p>Based on the principle of α-ray attenuation by particulate sampled through the instrument and collected on fiberglass filter tape. Before and after sampling α-ray radiation is measured by scintillation / G.M. counter. An internal microprocessor handles all sequences and automatic ally calculates the concentration of SPM.</p>		
01.	Principle	Continuous measurement of PM 10 in ambient air	
02.	Particle Size Cut Off	0 - 10 Microns	
03.	Measuring Range	0 to 2000 $\mu\text{g}/\text{m}^3$	
04.	Resolution	1% of the concentration	
05.	Minimum Detectable Limit	2 $\mu\text{g}/\text{m}^3$	

06.	Detector	Plastic Scintillator / GM Counter, Silicon Semiconductor Beta Detector	
07.	Air Flow Rate	At - least 1.5 m ³ / hrs. (Adjustable to 1 m ³ / hr)	
08.	Filter Material	Glass Fiber Filter	
09.	Display	LED / LCD	
10.	Sampling Head	Dynamic heated sampling head for measurement of PM 10, with adjustable temperature 20 – 70 °C	
11.	Calibration	Reference membrane facility should be provided for calibration of analyser.	
12.	Compatibility	Analyser should be compatible with protocols mentioned in DAS section	
13.	Roll Length	Approximately 30 meters	
14.	Measurement Result	1 hr average or shorter	
15.	Consumables and spares	Recommended requirements of 3 years of continuous operation along with the list of items.	
(G)	PM2.5 MONITOR Conforming to USEPA Automated Federal Equivalent Method (FEM)		
	Designation Based on the principle of α -ray attenuation by particulate sampled through the instrument and collected on fiberglass filter tape. Before and after sampling α -ray radiation is measured by scintillation / G.M. counter. An internal microprocessor handles all sequences and automatically calculates the concentration of SPM.		

01.	Principle	Continuous measurement of PM 2.5 in ambient air	
02.	Particle Size Cut Off	0 – 2.5 Microns	
03.	Measuring Range	0 to 1000 $\mu\text{g}/\text{m}^3$	
04.	Resolution	1% of the concentration	
05.	Minimum Detectable Limit	2 $\mu\text{g}/\text{m}^3$	
06.	Detector	Plastic Scintillator / GM Counter, Silicon Semiconductor Beta Detector	
07.	Air Flow Rate	At - least 1.5 m^3 / hrs. (Adjustable to 1 m^3/hr)	
08.	Filter Material	Glass Fiber Filter	
09.	Display	LED / LCD	
10.	Sampling Head	Dynamic heated sampling head for measurement of PM 2.5 with adjustable temperature 20 – 70 $^{\circ}\text{C}$	
11.	Calibration	Reference membrane facility should be provided for calibration of analyser.	
12.	Compatibility	Analyser should be compatible with protocols mentioned in DAS section	
13.	Roll Length	Approximately 30 meters	
14.	Measurement Result	1 hr average or shorter	
15.	Consumables and spares	Recommended requirements of 3 years of continuous operation along with the list of items.	
	Or		

(H)	Ambient Particulate Monitor based on the principle “Tapered Element Oscillating Microbalance” (TEOM) Conforming to USEPA Automated Federal Equivalent Method (FEM) Designation (EQPM -0609-182		
	<u>SPECIFICATIONS</u> TEOM 1405-DF Ambient Particulate Monitor 1405DF = Dual TEOM w/ FDMS		
	Regulatory Designations	<ul style="list-style-type: none"> • U.S. EPA approved PM -2.5 equivalent monitor (EQPM-0609-182) • Menu-driven software for user interaction via 1/4 VGA display with touchscreen • Connecting and Interface Cables, and Vacuum Pump • Consumables for average three year’s operation (ambient) • RPCOMM and ePort Software for Local or Remote Communication 	
	Instrument Performance (3 l/min, 1s, stable conditions)	<ul style="list-style-type: none"> • Measurement Range: 0 to 1,000,000 µg/m³ (1g/m³) • Resolution: 0.5µg/m³ • Precision: ±2.0 µg/m³ (1-hour average), ±1.0 µg/m³ (24-hour avg.) • Accuracy for Mass Measurement: ±1% 	
	Data Averaging and Output	<ul style="list-style-type: none"> • Real-time Mass Conc. Average: 1 hour rolling average updated every six minutes • Long-Term Averaging: 1, 8, and 24 hr • Data Output Rate: selectable from 10 sec to 24 hour 	

	Operating Range	<ul style="list-style-type: none"> The temperature of the sampled air may vary between -40 and 60 °C. The TEOM Sensor and Control Units must be weather protected within the range of 8 to 25 °C. An optional Complete Outdoor Enclosure provides complete weather protection. 	
	Sample Flow	<ul style="list-style-type: none"> Activol flow control system uses the mass flow sensors and the measured ambient temperature and pressure to maintain constant volumetric flow rates. Main Flow Rate: Fine PM filter: 3.0 l/min; Coarse PM filter: 1.67 l/min Bypass Flow Rate: 12.0 l/min 	
	Data Storage	<ul style="list-style-type: none"> Internal data logging of user -specified variables; capacity of 500,000 records. 	
	Filter Media	<ul style="list-style-type: none"> Sample Filter: Pallflex TX40, 13 mm effective diameter Sample Conditioner Filter: 47 mm diameter housed in an FRM -style molded filter cassette, maintained at 4°C. Suitable for collecting and archiving time-integrated PM samples for subsequent laboratory analysis. 	
	Sample Conditioning	<p>Sample Equilibration System (SES) dryer lowers the main flow relative humidity and allows for mass transducer operation at 5°C over the peak air monitoring station temperature</p> <ul style="list-style-type: none"> Purge Filter Conditioner contains a heat exchanger that maintains the temperature of the main flow and particle filter at 4°C to efficiently filter the volatile and non -volatile PM in the sample. 	

	Data Output and Input	<ul style="list-style-type: none"> • ePort software to view and change system operation from PC • Touch screen user interface • Ethernet with embedded FTP server, USB, RS232, RS485 • 8 User-Defined Analog Outputs (0 -1 or 0-5 VDC) • 2 User-Defined Contact Closure Alarm Circuits • 4 Averaged Analog Inputs (0 -5 VDC) with user-defined conversion to engineering units 	
(I)	BTX MONITOR / ANALYSER		
1.0	<p>GENERAL</p> <p>A complete monitor / analyzer system including continuous automatic sampling (pump etc.), sampling, analyzer, detector, calibrator, computer hardware and software for instrument control, data storage, display, acquisition, processing and for selective determination of volatile compounds in ambient air optimized for Benzene, Toluene, Ethyl Benzene and o, m, p -Xylenes. Compatible to power supply (voltage 230 volts \pm 10 volts AC and 50 Hz \pm 3%). Continuous unattended measurement system of individual BTEX should work without cryogenic cooling. System should have protocol compatible to communicate & transfer data</p>		

	to main computer through modem and subsequently to CPCB/CECB website preferably having features of security, data validation & alarms etc. Raw data storage capacity without erase minimum for three month or more. The system should be delivered with all necessary spares, consumables, tubing etc. for making it functional		
2.0	TECHNICAL SPECIFICATIONS		
2.1	AUTOMATIC SAMPLING (MONITOR) With Sample volume controlled by thermal mass flow controller (dust protected). Sample flow range may be 20 - 100 ml/min or more (adjustable). Sample volume should be between 400 ml – one liter or more of ambient air over a 10- 15 min sampling cycle. All sample transfer tubing's should be in stainless steel flow / pressure sensor to be preferred with digital display. Sample volume should be controlled by flow controller (dust protected) with volume measurement saved in memory.		
2.2	DETECTOR Photo Ionization Detector (PID) or other equivalent detector as per EPA/EU/TUV approved specs, which do not require		

	hydrogen or other gas to operate it. The system should have auto-clean & auto calibration facilities. PID Lamp eV should be 10.6eV. PID sensitivity sensor should be available to check sensitivity.		
2.3	MINIMUM SPECIFICATIONS		
	Lowest detector limit	0.1 µg / m ³ (0.03 ppb) or less for Benzene (There should be no interferences on Methyl-cyclopentane, 2, 2, 3 - trimethylbutane, 2, 4 - dimethylpentane, Tetrachloromethane, Cyclohexane, 2, 3 - dimethylpentane, 2 - methylhexane, 3 - ethylpentane, Trichloroethylene, n - heptane, isooctane with BTX components.)	
	Temperature Range	5 - 35°C or more	
	Measuring Range	1 - 1000 µg / m ³ or better (0.3 ppb to 270 ppb)	
	Repeatability	Retention Time : <0.1% RSD	
		Amount : <1.0% RSD	
	Typical Cycle Time	Total Cycle Time should not exceed 15/30 min. approx. i.e. Sample Collection Time - 15 min. approx. Analytical Time - 15 min. approx.	
2.5	CALIBRATION UNIT WITH SPAN GAS / IN BUILT CALIBRATION WITH / PERMEATION TUBES AND GAS MIXING / DILUTION FACILITY In Built Calibration/Permeation Tubes Facility in the analyzer with the certified permeation tubes and span or calibration gas mixture (low conc. in ppb		

	<p>range, stable for at -least 6 months) with S.S. container/cylinder, regulators with filters should be provided. Calibration unit having gas flow (approx): 10 ml / min (calibration gas); 1.4 -2.0 lit / min (dilution gas) with auto gas selection/dilution option for automatic calibration for ppb level calibration gas (10 -30 ppb of individual compound of interest). Manual and software selectable valves for sample, calibration span and blank zero air gases. Dilution factor between 1 : 50 to 150.</p>		
<p>2.6</p>	<p>MEMORY AND CONTROL FACILITIES Method auto load and system restart after power failure. Methods storage capacity with timed events programs for control of system parameters in permanent memory. Diagnostics & Fault status; gas supply (low press). System stability (temperature and sample flow). Detector signal (low) and communication should be in digital form on monitor by LED's & be controlled from computer. Output signals: Analog 0 -1 mV, Serial RS 232 for data intermission and CP -BUS for monitor control from remote.</p>		

	Both digital & analog outputs should be available.		
2.7	<p>Hardware/Software(s) Latest PC with operating system/software. Basic Window based latest software's (English version) consisting instrumental control features as well as data storage, acquisition, processing and handling in desired/customized format including sorting of data (1 / 4 / 8 / 12 / 24 hourly, days wise /date wise reporting as microgram / m³ or ppb (selectable) & averaging, data capture rates etc.)</p> <p>Data presentation / graphical & statistical processing & data transfer to Excel including time series, correlation matrix etc. is required.</p> <p>Communication software with protocol compatible to communicate & transfer data from BTX monitor to central computer through modem (preferably including sample chromatogram) and from central computer to CPCB website preferably having features of security, data validation & alarms etc.</p> <p>System should have remote</p>		

	<p>access to BTX monitor.</p> <p>Resident program as well BTX control / monitor user program with monitor startup / off / status, blank / calibration and sample gas measured, fault status, carrier gas if any, and communication errors indications. Updation of response factors automatically after calibration run. Auto tune facility. Raw data storage capacity without erase minimum for three month or more.</p>		
3.0	<p>SPARES FOR 3 YEARS</p> <p>The system should be delivered with 3 years comprehensive warranty including all necessary spares such as electronic boards/circuits consumables, tubing , filters for removal of dust & unwanted impurities (moisture / hydrocarbons etc.); septas, ferrules, teflon tubing, traps/columns if applicable etc. for making the analyzer functional / continuous operation without breakdown along-with list of items with quantity.</p>		
(J)	<p>MULTICALIBRATION SYSTEM</p> <p>Calibration system should provide for the calibration of the air quality analysers, data acquisition system, meteorological equipment, and</p>		

	gas calibration system.		
a)	<p>Gas Calibration System: The calibration system for air monitoring equipment (listed above) should incorporate an automatic gas dilution calibrator, calibration gas standards and a high performance zero air generator to calibrate all of the analysers in the system. The calibration cycles should be able to be configured through the Data Acquisition System at any specific time during the day and night. It should be mounted on standard 19" rack.</p> <p>The dilution calibrator should be able to perform mixing of source gas, from the calibration gas bottles, with zero air generator, in order to generate a wide range of calibration gas concentrations and minimising the number of calibration gas standards required. All the calibration gases provided along with the system MUST be NIST Traceable (certificate should be provided). The system should include at least three permeation chambers and should accept a Permeation Tube up to 11 cm in total length and 2 cm in diameter. It should also have facility for Gas Phase titration</p>		

	<p>(GPT), having Ozone generator of 6 PPM / Liters and the converter efficiency should be 100 % for conversion of NO₂ concentration to NO. The system should also include calibration of Ozone analyzer.</p>		
b)	<p>Meteorological, Flow and Electronics Calibration The supplier should provide calibration devices or calibration check devices for all the meteorological and other electrical equipment mentioned above as per the specifications of the manufacturers.</p> <p>Recommended Spare Parts and accessories required for the next three years for normal operation should be supplied along -with the calibration system.</p>		
8.0	<p>METEOROLOGICAL MONITORING SYSTEM The meteorological instrumentation should be interfaced directly with the Data Acquisition System after passing through a lightning protection isolation box. A crank - up telescopic 10 meters tower should be erected for mounting of meteorological sensors. The relative humidity</p>		

	and solar radiation sensors should be mounted on the tower. All sensors should be NIST (National Institute for Standards and Technology, USA) traceable. The specifications are follows:		
(a)	WIND SPEED		
	Range (Operation)	0 – 60 m/s or better	
	Sustainability	Up-to 75 m/sec	
	Accuracy	± 0.5 m/sec or better	
	Resolution	0.1 m/sec	
	Sensor Type	Ultrasonic	
	Threshold	0.5 m/sec or less	
	Response time	10 sec or better	
(b)	WIND DIRECTION		
	Range	0 – 359 degree	
	Accuracy	± 5 degree or better	
	Resolution	1 degree	
	Sensor type	Ultrasonic	
	Threshold	0.5 m/sec or less	
	Response time	10 sec or better	
(c)	AMBIENT TEMPERATURE		
	Range	-10 °C to 60 °C	
	Accuracy	± 0.2 °C or better (with radiation shield)	
	Response	10 seconds in still air	
	Sensor type	Resistance type	
	Response time	10 sec or better	
(d)	RELATIVE HUMIDITY		
	Range	0 to 100% RH	
	Accuracy	± 3.0 % or better	
	Resolution	1%	

	Sensor type	Capacitive / Solid State	
	Response Time	10 sec or better	
(e)	SOLAR RADIATION		
	Range	0 to 1500 W/m ² or better	
	Accuracy	± 5.0 % or better	
	Resolution	5W/ m ²	
(f)	RAINFALL		
	Range	0.2 mm to 100 mm /hr	
	Accuracy	± 5% or better	
	Resolution	0.2 mm	
	Sensor type	Tipping bucket rain gauge or any other suitable sensor	
	Response Time	10 sec or better	
(g)	TELESCOPIC CRANK – UP METEOROLOGICAL TOWER The wind speed, wind direction, temperature, relative humidity and solar radiation sensors are to be mounted on the Meteorological Tower. The tower is to be a free standing four section telescopic tower provided with a hand crank to raise and lower the instruments mounted on the tower. Specifications are as follows:		
	Extended Height	10 meters	
	Retracted Height	2 metres	
	Wind load Limit	0.7896 sq. m. (8.5 sq. ft) at 50 mph	
	Number of Sections	4	
	Construction material	Galvanised steel or aluminium	
	Note: Humidity and temperature sensors are to		

	be supplied with weather and thermal radiation shield made of anodized aluminium and sensor should be supplied with all necessary cables, connector and mounting arrangements as required.		
(h)	SPECIFICATIONS OF DATA LOGGER		
	Data logger with 8 analog, 24 digital inputs and 18 bit resolution. Ability to log channels at different intervals and should have capability of averaging and displaying real time data and averaged data over a period of 1 min, 10 min, ½ hr, 1 hr, 4 hrs, 8 hrs, 24 hrs, 1 month and year. Communication between data logger and computer using standard multi drop RS 232 Connector. The data logger should have internal battery with charger. The data logger should support PSTN line or Internal GSM modem for data transfer.		
9.0	SPECIFICATION OF SOFTWARE FOR <u>CAAQMS.</u>		
	<u>TABLE OF CONTENT</u> I. DATA ACQUISITION SYSTEM IN THE STATION J. DATA ACQUISITION SYSTEM IN THE CENTRAL		

	<p>K. COMPATIBILITY</p> <p>L. SECURITY</p> <p>M. OTHER TECHNICAL CONDITIONS</p> <p>N. ANNEXURE – I DETAILS OF DESIRED DATA VALIDATION SYSTEM</p> <p>O. LIST OF PROTOCOLS FOR WHICH SOFTWARE SHOULD SUPPORT</p> <p>P. CHECKLIST TO COMPARE FIRM'S TECHNICAL CAPABILITY TABLE FOR SPECIFICATION OF SOFTWARE.</p>		
A	<p>DATA ACQUISITION SYSTEM IN THE STATION</p> <p>SPECIFICATIONS OF STATION SOFTWARE</p> <p>The station software captures data from all channels in the system and stores in the Personal Computer. Personal computer is used for calibration and configuration of each channel.</p>		
1)	Data Acquisition	<p>c) Frequency of data acquisition</p> <p>i) User selectable 1, 5, 30, 60, 120 second averaging duration online digitally.</p> <p>d) Channel size</p> <p>i) 32 Channels or more supported</p>	

		<ul style="list-style-type: none"> ii) Expandable to 64 channels, if required in future <p>e) Data input</p> <ul style="list-style-type: none"> i) Either Analog (0 -1 volt / 0- 10 volt / 2- 20mA / 4- 20mA) ii) Or Digital (firm will develop the protocol, if required without additional cost within project duration) to configure with the PC. <p>f) User configurable channels, stations and equipments with communication parameters.</p> <p>g) Analyzer data channel should comprise of Name, Units, Communication Address, Validity Range, Operation and Error Status.</p> <p>h) Provision to incorporate conversion factors such as PPB to $\mu\text{g}/\text{m}^3$ etc.</p> <p>i) Software should be equipped to configure the analysers with it, irrespective of the output mode i.e. Analog or Digital (RS 232) of the instrument.</p> <p>j) System should read raw data values of the analyzers and meteorological instruments and duration of averaging data should be user selectable like 10 / 20 / 30 / 40 / 50 / 60 seconds.</p> <p>i) The output should be converted into realistic data in prescribed units.</p>	
12)	Data Collection	<ul style="list-style-type: none"> a) Software should collect each second data. b) Average data over user selectable time (1, 5, 30, 60 seconds time interval) period. c) Operational status, Error status, calibration status and calibration values observed from the analyzer should be captured and should be made available along with the 	

		<p>data with a frequency of maximum five minutes.</p> <p>d) System should collect of the diagnostics of the instrument comprising actual diagnostics parameters and their values at least once in every five minute to check the state of the health analyzer.</p> <p>e) Calibration parameters</p> <ul style="list-style-type: none"> i) Provision to entering calibration, span calibration values of gas cylinder/permeation to devices ii) Provision for collecting zero calibration, span calibration values(pre calibration & post calibration) in to the database for further analysis. iii) Provisions to collect electronic system pre calibration & post calibration to ascertain the percentage deviation/ correction apply during each calibration. 	
13)	Data Storage	<ul style="list-style-type: none"> a) Data along -with diagnostic, calibratio alarms should be stored at station comput at a defined path. b) Interval of data dumping will be same defined in the data collection c) System should be capable to keep eve sec ond a c quired data from 32 channels f a period of minimum five years. d) Data stored should be plain textformat e) No data encryption should be done at the station and if encryption is done than decryption procedure should be made available in soft file format to check the data at station at any point of time. To convert data on continuous basis for exporting to any other software, if 	

		required, procedure should be available without any licensing.	
14)	Data Display (Statistical analysis of data)	<ul style="list-style-type: none"> a) In 4-in-4 graphs, 4 -in-1 graph and / or 16 -in-1 graph formats b) In terms of 4 -in-1 table format c) Real time multi – graphs over user selectable time period. d) Display of graphic & tabular display of the current data. e) Graphical form should comprise of 4 -4 graphs, 4 -1 graphs in user defined format i.e. 1, 5, 10, 15, 30 min, 1hour, 4, 8, 24 hour, 30 days and yearly. (user definable time series) f) Tabular form should comprise of 4 channel list in user defined format i.e. 1, 5, 10, 15, 30 min, 1hour, 4, 8, 24 hour, 30 days and yearly. (user definable timeseries) g) Station instruments basic configuration etc. should be visible on screen continuously. h) Main window for real time display of all measured parameters with status of all analyzers/sensors. i) Statistical analysis tools like regression analysis, c o-relation analysis and other analysis as per industry standards in the field of environment should be available and if not the firm should develop these for CPCB within a time frame . j) The system should have procedures for normal analysis tools like calculation of data with respect to a threshold value, average, minimum, maximum, calculation of violating value with respect defined values (Air Quality Standards) for defined period for the database etc. 	

		<ul style="list-style-type: none"> k) Data analysis of diagnostics parameters l) Data analysis of Pre calibration and post calibration data (if facility not available can be developed) m) Data analysis of corrections applied of each calibration cycle (if facility not available can be developed) 	
15)	Data Backup	<ul style="list-style-type: none"> a) There should be defined data backup procedure through which data can be extracted from station computer in simple text format / excel (user definable). b) There should be defined restore procedure also to restore the data in case of data loss. c) A display screen should be available to update the user about data availability. 	
16)	Data Validation automatic check at station software	<ul style="list-style-type: none"> a) Zero level and span level checks if performed cyclically and defined results are not obtained up to +/- 5% (user definable 0-10%) then system should alarm the user of system failure and the recorded alarm should be transmitted to central software. b) After instruments perform the calibration the results obtained should be recorded and should be transmitted to central computer. 	
17)	Data validation requests generated at station computer	<p>At least three tier request generation and request acceptance system procedure is desired. Details are given in the Annexure -I.</p> <ul style="list-style-type: none"> a) Inbuilt checks capability may be provided, where if instrument throws erratic data software can check automatically and display message and send information in the form of corrected data in corrected database to be approved by the central software at 	

		<p>central level. (facility if not available needs to be developed by the system provider)</p> <p>b) There should be provision of two databases one is raw database and another corrected database. (facility if not available needs to be developed by the system provider)</p> <p>c) Validation of data through calibration database Pre calibration & post calibration values collected.</p>	
18)	Calibration of systems	<p>h. Calibration window for analyzer for the calibration from computer.</p> <p>i. Remote Access to Calibration: Calibration exercise need to be done remotely. All necessary arrangements for it should be made in the system.</p> <p>j. Calibration data file may be prepared separately .</p> <p>k. Calibration database need to be formed, stored and transmitted to central.</p> <p>l. Calibration cycles to be as per the models of the instruments.</p> <p>m. Calibration records should store the calibration values displayed by instrument.</p> <p>n. Diagnostics during calibration should also be recorded.</p>	
19)	Location of station	<p>a) Fixed Station location to be recorded</p> <p>b) Moving station location to be recorded</p> <p>c) Latitude and longitude of stations be recorded</p>	
20)	Data transfer to Central	<p>All data captured at station computer should be transferred to central software..</p> <p>a) User selectable time frame for Transmission of data to central server.</p> <p>b) Diagnostics (actual diagnostics parameter values recorded each time in the station),</p>	

		configurations (station channel configurations), alarms(generated alarms) should be transmitted.	
21)	Data transfer to Display Boards	<p>The system provider is responsible to make necessary software provisions to connect output on display boards. The formats of files may vary and the formation of defined formats is the responsibility of system provider for the project duration.</p> <p>a) Software should be capable to transfer and display online data on display board at the station location.</p> <p>b) The data in user defined formats (customizable) should be made available for continuous display.</p>	
B	<p>DATA ACQUISITION SYSTEM AT THE CENTRAL STATION</p> <p>SPECIFICATIONS OF CENTRAL SOFTWARE</p> <p>Data communication system handles the data transmission of an ambient air quality network and receives incoming messages / signals from remote stations. The central software processes signals and data and displays it on the web and other interfaces. Detailed requirement is as below:</p>		
	Software at Central Station	<p>h) Software should not have any restriction on number of locations and computers either technologically or in terms of licensing.</p> <p>i) Should display multiple stations on - line data (momentary values) in tabular text and graphic format.</p>	

		<ul style="list-style-type: none"> j) Data should be received by the central from all locations within 5minutes duration or at user defined time intervals. k) Data along-with diagnostics and calibration details should be transmitted at central from all connected locations. l) Should support dialup systems, broadband connectivity, wireless connectivity, 2G or 3G or any new technology which shall be in place during project time should be compatible and if not need to developed by the system provider up -to project duration without additional charges. m) Should have the remo te control facilities for calibrations (Zero & Span) of instruments and measuring range modifications. n) Should have facility for displaying data communication error reports, image management which should be recorded and should be available for display. 	
2)	Data Display at Central	<ul style="list-style-type: none"> p) In 4-in-4 graphs, 4 -in-1 graph and/or 16 -in-1 graph formats q) In terms of 4 -in-1 table format r) Real time multi – graphs over user selectable time period. s) Display of graphic & tabular display of the current data like simple 3D line and column chart, polar diagnostics and 3D perspective column chart. t) Graphical form should comprise of 4 -4 graphs, 4 -1 graphs in user defined format i.e. 1, 5, 10, 15, 30 min, 1hour, 4, 8, 24 hour, 30 days and yearly. (user definable time series) u) Tabular form should comprise of 4 	

		<p>channel list in user defined format i.e. 1, 5, 10, 15, 30 min, 1hour, 4, 8, 24 hour, 30 days and yearly. (user definable timeseries)</p> <p>v) Display of data using selectable name of different stations.</p> <p>w) Generation of Wind Roses, Pollution Ros es (12 & 16 directional i.e. 0 degree, 22.5, 45, 67.5, 90 and 360 degree) with user defined time limits.</p> <p>x) Calculate vector mean of wind direction.</p> <p>y) Programmable down loading of data.</p> <p>z) Comparison of data w.r.t. Standards in Graphical form and tabul ar form with information of values exceeds the Standards.</p> <p>aa) Specific data zooming facility</p> <p>bb) Database c orrection procedure</p> <p>cc) Separate user ID and Password for correction of database so that all regional level users if authorized can validate their regions data a nd the events be recorded along -with ID and time.</p> <p>dd) Data validation trail recording.</p>	
3)	Data Export	<p>a) Customizable data format developing capability required.</p> <p>b) Possibility to export the data files in Excel, Text and other formats Tabular form should be in user defined format i.e. 1, 5, 10, 15, 30 min, 1 hour, 4, 8, 24 hour, 30 days and yearly.</p>	
4)	Data Import	<p>a) In case of communication medium phase there should a mechanism to shift the data into Pen drive (Physical medium for data collection) physically and a procedure to import the same on central software.</p>	

5)	Printing	a) Possibility to connect different types printers and auto printing facility for displays generated throughout the analy of data at any point of time.	
6)	Data Validation automatic checks at Central software	<p>a) Zero level and span level checks if performed cyclically and defined results are not obtained up to +/- 5% (user definable 0 -10%) then system should generate alarm the user of system failure and the recorded alarm should be transmitted to central software and stored. There should be provisions to read these alarms in a database for corrective actions and for comparison of data for acceptability or rejection.</p> <p>b) After instruments perform the calibration the results obtained should be recorded and should be transmitted to central computer and stored.</p> <p>c) There should be provisions to configure at least 08 alarms for any given instrument auto check.</p> <p>7) Data validation requests management at central computer (if not available facility may be developed by the firm)</p> <p>d) Data validation requests sent by station computer should be recorded and the system should provide a window to user to accept or reject the reasons mentioned by the user end.</p> <p>e) Inbuilt checks capability should be provided, which can be configured by the administrator at central to put alarms according to requirement on data, errors generated or on diagnostics of systems.</p> <p>f) The software at central should have facility to log in data validation requests.</p>	

		<p>These requests will carry the erroneous data for user selected period and for which user at station will request to change the data due to environmental or instrumental operation conditions. These requests will reside in central location and whenever user at central agrees the data will be changed in the validated database. Hence, system will have two types of databases 1) Raw database which can never be touched 2) which has to be modified and corrected as per agreed conditions. The detail of user requesting or applying changes in corrected database should be recorded with time.</p>	
7)	<p>Data Display at Web (if not available facility may be developed by the firm)</p>	<p>p) System should have standard web display software in place. q) Central software should be capable to show the data in predefined formats at website on a physical map. r) The data from Corrected database shall be displayed on the web. s) Current data should be displayed on web page. t) There should be provisions to show no. of violations occurred, percentage of violation occurred at stations parameters comparing hourly, 8 hourly, 24 hourly and yearly standards u) Provision is required to change standard value, since standard values do change after certain period of time as per Govt. policy. v) Displayed web page should have facility of providing information to all with respect to environment as well as to</p>	

		<p>provide specific files for downloading.</p> <p>w) The logo of CPCB should be displayed on webpage.</p> <p>x) The disclaimer have to be provided on the webpage</p> <p>y) Some predefined queries have to be developed to display the data on webpage. A search page needs to be developed for converting data into meaningful format for the general public. Help in developing such kind of systems can be taken from existing running system at www.cpcb.gov.in/caaqm and www.cpcb.gov.in/cpcbpa.</p> <p>z) The current data displayed on the web should have comment inserting facility at individual data and for running data as well like if any station instrument out of order then station official should be able to display message "Instrument under maintenance".</p> <p>aa) Similarly, when data goes beyond a defined limit it should automatically display a predefined message as comment on webpage as "Data under Scrutiny".</p> <p>bb) Automatic e-mail messages to be generated for the identified end users to start a corrective action.</p> <p>cc) Station photos to be uploaded for the display along with the data.</p> <p>dd) User defined 05 pages may be developed additionally, if required by CPCB designs for which may be decided mutually.</p>	
9)	Data display at display board outside the office at central	Data display is also required at regional and central locations for which software provision has	

	location also	to be made at ea ch loc ation.	
10)	Remote Procedures (if not available facility may be developed by the firm)	<ul style="list-style-type: none"> h) Central software should have capability to allow to connect any station instrument through remote. i) Central software administrator should be able to go for remote calibration of any of the systems. j) Softw are should be capable to operate remote stations configurations. k) Control panel window should be available for controlling each analyzer. l) Alarm window for valid alarms of all analyzers and sensors. m)It should have transparent data – connection to each analyzer from remote. n) System should be capable to remotely configure all stations through remote location using configuration file to maintain the uniformity. The configuration command from central or from regional location should be active. 	
11)	Data Reports Generation	<ul style="list-style-type: none"> k) To prepare reports hourly, weekly, monthly, yearly in user defined interval and formats. l) Mean, Median, Percentile, Maximum, Standard deviation, Frequency analysis and Maximum Frequency analysis. m) System should have predefined user selecta ble procedures through which reports of any specific station or multi stations reports upto four parameters can be generated as per user selected time frame. n) Data Comparison Software should be able to compare any of the four channels irrespective of type of 	

		<p>data in the system with respect to each other on a single time scale user selectable.</p> <p>o) Data Comparison on different time scale Software should be able to compare data on the basis of different time scales like one station (x) parameter (y) of one given date is compared with other station (z) parameter (y) on any other date in a single graph.</p> <p>p) Data reports, calibration reports and status reports with user time periods.</p> <p>q) Historic multi – curves / graphs over user selectable time period.</p> <p>r) Report generation over user selectable time period (instantaneous or averaged over a period of 1, 15, 30 min, 1 hr, 4, 8, 12, 16 and 24 hrs etc.).</p> <p>s) Diurnal variation, standard deviation, regression and other statistical parameter reporting possibilities with various available mathematical methods.</p> <p>t) If required separate report generation procedures have to be developed for which firm will be responsible for project duration.</p>	
C.	Compatibility	Should have compatibility with the latest Operating System with a contract of 05 (five) years from the date of supply of software for providing assistance to operate system at CPCB and all the new patches developed for the software during these 05 years without additional cost. Software should have capability of data transmission with the presently available PROTOCOL (list attached).	
D.	Security	c. System should have the facility to have it	

		<p>Password protected or without password as decided by CPCB at the time of implementation.</p> <p>d. System software should be totally secured and any antivirus software required to run the system for the complete project duration has to be managed by the system provider.</p>	
E.	Other Technical Conditions	<p>9. Hardware required for data transmission has to be made available by the firm and there should not be non-compatibility.</p> <p>10. Firm should have the capability to develop the Software PROTOCOL for data transmission from any system available in the field in future during next 05 years or up-to the project period.</p> <p>11. Should support the latest formats of Windows 32 bit or 64 bit or any other available platform like Linux etc.</p> <p>12. Manual of complete system should be provided.</p> <p>13. Firm should provide the hardware required for data acquisition along with all the software's required like OS, MS. Office, Networking software, Remote functionality software, Data uploading software on website, Data display software if required, and should maintain hardware for project duration.</p> <p>14. Since, system has to be placed in NIC domain for which the web software developed along-with the database and web server software should be certified by CERT-IN empanelled vendors for vulnerability. The system provider is responsible for fulfilling all criteria required to place the system at NIC domain. The</p>	

		<p>firm will be responsible for entire duration of the project for any vulnerability if noticed by NIC.</p> <p>15. The computers required for the work will be procured by CPCB and configuration for the same will have to be provided by the system provider.</p> <p>16. Display board will be procured by the CPCB.</p>	
F.	DETAILS OF DESIRED DATA	Annexure -I	
	VALIDATION SYSTEM	<p>At least three tier request generation and requests acceptance procedure is desired in the system. It is presumed that level 1 is station, level 2 is Central location at regional level and level 3 at Central level.</p> <p>The regional and central levels will have central station computers and software installed and stations will have station computer installed with station data acquisition software and data transmission software.</p> <p>The flow of data has to be from station to Regional Level and then to Central level. It is desired that environmental database has to be corrected for instrumentation issues as well as for the environmental issues. Hence, officials available at stations will communicate with central and state levels through system itself by commenting on the data. The respective data can be picked up from the database at station itself, corrected to the desired numbers and then transmitted to regional level central computer where, the administrator of system if agrees to the changes desired</p>	

		then data flows to the next level else request is rejected. If request will come to Central server for accepting or rejecting then central level should have authority of accepting or rejecting the data. If central level agrees to the changes than data should be changed in the corrected database else request should be rejected. Hence, there should be provisions for accepting or rejecting data at all three levels accordingly. Here, whenever such requests are generated, concerned administrators need to be sent email alerts.	
G.	List of protocols for which CAAQM software should support		
	Bayern-Hessen Intercomp5 FH62 Konf. ChemPro 100 Intercomp 6 Intercomp 1 PVM100 MultiPD II LabCom Metek USA-1 VC820 X am 7000 Unor, Oxor AK R+P TSI 30222/25 HG Monitor 3000 Defor MBF Blendmaster ESM FH40G Multor Gemi Klimet Travelpilot DX- V Adam Module Uras 14Modbus Thygan AK Conf. CLD700 Binos1000 USA Turbulence Thermo Instr. FH62 HP34970A Thies DL14/15 PR820R Hygrowin Almemo Innova1312 PAC3 Gesytac II Modbus Multiwarn II Data Collect SDR RFM433 DGH Module MeteoBus VDO Navigation NMEA183 BH/Timo 9600 Windobserver		
10.0	SPECIFICATIONS OF DAY LIGHT & NIGHT VISIBLE DATA DISPLAY SYSTEM		
10.1	Size of display System	4' x 12'	
10.2	Visibility range	200 Meters (Day Time)	
10.3	Nos. of display Line	4	

10.4	Display of colour elements	Multi Colour (Red, Green and Blue)	
10.5	Minimum life span of the system	10 Years	
10.6	Smallest Character Size	260 mm x 190 mm (approx.)	
10.7	Operating and Non Operating Temperature	0 – 50 °C	
10.8	Humidity Tolerance Range	0 – 100%	
10.9	Languages supported by the display	English & Hindi	
10.10	Color Gradient	Cluster LED based	
10.11	Display Characters (Example):		
	Parameters	Concentration ($\mu\text{g} / \text{m}^3$)	Standard Limit ($\mu\text{g} / \text{m}^3$)
10.11.1	Particulate Matter (PM ₁₀)	400	100
10.11.2	Particulate Matter (PM _{2.5})	160	60
10.11.3	SO ₂	35	80
10.11.4	NO ₂	79	80
10.11.5	CO	3320	2000
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.....
The display of above variable data should be supported with moving messages / slogans to be changed from time to time			
10.12	Input Power requirement	Cluster LED based	
10.13	Display Mounting	Weather proof casing to cope up with local condition	
10.14	Computer System	Software compatible with latest version	
10.15	General	The display system should be capable to transfer the data from computer to Display Board through Modem System. The system should also have the facility to display the environment message, environmental picture through video camera / VCR / CD Player etc. for public awareness.	

H. Checklist to compare Firm's Technical capability table for specifications of Software

S. No	Details	Capability of firm's software as on date	Firm agree or disagree to develop software in future	If firm agrees to develop application then time frame from individual activity
1.	Data transfer interval Max. 5 minutes from all locations?			
2.	System will transmit data along with diagnostics. If yes then how many channels diagnostics values shall be transmitted to central and at what duration?			
3.	System will transmit data along with Calibration values (Pre cal and Post Cal)?			
4.	System has remote calibration procedures in place for Regional level and central level both?			
5.	System has remote configuration facility for regional and central level both?			
6.	System has database validation procedure in place?			
7.	Web software already developed or not?			
8.	If Web software is available is it modifiable as per CPCB need by the firm?			
9.	Whether agree to develop five web pages as per mutual discussion			
10.	Web software with password and or without password			
11.	Password providing facility available at regional levels			
12.	Statistical tools available at web software or not?			
13.	System provider is capable of placing system in NIC domain			
14.	System provider will provide certification from CERT -IN empanelled firms			
15.	Data import from other files			
16.	Data export to other files			
17.	Pre defined queries to be inbuilt for providing data to public whether these are already available or to be developed if yes then time frame?			
18.	Standards comparison and exceedances be reported on web			
19.	Different types of predefined formats of report preparation available or not?			
20.	Support various protocols available till date as listed provided or not?			
21.	If new protocol based software is to be developed whether firm will			
22.	Unlimited Number of stations supported by Central Server software or not? If not then support for how many stations will			

	be provided			
23.	System compatibility with Dialup /BB/2G/3G/Wireless available or not? If not then what technologies supported as on date? What time frame if other to be develop.			
24.	Software has Wind rose reports generating capability			
25.	Software has pollution rose generating facility			
26.	Software has diurnal variation facility			
27.	Software has mathematic al tools			
28.	Software has 16 channels display at on page			
29.	Software has data communication error reports			
30.	System has error correction procedure			
31.	Software has parallel data display reports			
32.	Software has virtual channel deployment capacity			
33.	Software has data encrypting procedures at stations or not? If yes then data can be retrieved from station or not?			
34.	Software compatible for ANDROID technology			
35.	System Provider will provide all Hardware required at station and Central			
36.	System Provider all necessary software required for data acquisition, display, Analysis, website uploading etc.			