EXPRESSION OF INTEREST

Selection of System Integrator For Supply, Installation and commissioning of fully integrated security Surveillance system

Ref No. BECIL/MAHAGENCO/FISS/Chandrapur/CCTV/2023
Dated: 27th October, 2023

Issued By

Chandan Kumar Singh, Manager (BECIL)

	Broadcast Engineering Consultants India Limited **(A Government of India Enterprise)** Head Office: 14-B Ring Road, IP Estate, New Delhi-110002 Tel: 011 23378823 Fax: 01123379885 Corporate Office: BECIL BHAWAN, C-56-A/17, Sector-62, Noida-201 307 Tel: 0120 4177850 Fax: 0120 4177879 Web: www.becil.com E-mail: chandan@becil.com	

DISCLAIMER

The information contained in this Request for Proposal document (the "EOI") or subsequently provided to Bidder(s), whether verbally or in documentary or any other form by or on behalf of BECIL or any of its employees or advisors, is provided to Bidder(s) on the terms and conditions set out in this EOI and such other terms and conditions subject to which such information is provided. This EOI is not an agreement and is neither an offer nor invitation by BECIL to the prospective Bidders or any other person. The purpose of this EOI is to provide interested parties with information that may be useful to them in making their offers (Bids) pursuant to this EOI. This EOI includes statements, which reflect various assumptions and assessments arrived at by BECIL in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This EOI may not be appropriate for all persons, and it is not possible for BECIL, its employees or advisors to consider the investment objectives, financial situation and particular needs of each party who reads or uses this EOI. Each Bidder should, therefore, conduct its own investigations, actual site/ facilities/location inspections and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this EOI and obtain independent advice from appropriate sources. Information provided in this EOI to the Bidder(s) is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. BECIL accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein. BECIL, its employees and advisors make no representation or warranty and shall have no liability to any person, including any Applicant or Bidder under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this EOI or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the EOI and any assessment, assumption, statement or information contained therein or deemed to form part of this EOI or arising in any way for participation in this Bid Stage. BECIL also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Bidder upon the statements contained in this EOI. BECIL may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumptions contained in this EOI. The issue of this EOI does not imply that BECIL is bound to select a Bidder or to appoint the Selected Bidder for the Project and BECIL reserves the right to reject all or any of the Bidders or Bids without assigning any reason whatsoever. The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by BECIL or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and BECIL shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid, regardless of the conduct or outcome of the Bidding Process.

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1. SECTION –I

SECTION –I

1. NOTICE INVITING EXPRESSION OF INTEREST

BECIL is interested to publish an EOI inviting firms to offer bids on the basic of BOQ attached in the EOI documents dated 27.10.2023 with reference to the request received by BECIL from MAHAGENCO. The last date to submit the competitive bids is 30th October 2023 upto 15:00Hrs.

2. INTRODUCTION

Zone-1	Zone-2	Zone-3	Zone-4
Koyna Gate WTP area	Main gate area	Plant 5,6,7 surrounding area	Plant 3 & 4 surrounding area

Zone-5	Zone-6	Zone-7	Zone-8
CHP- Coal stack area	Major stores and OHPs	Plant 8,9 & surrounding area	Perimeter wall and gate area

BECIL invites Expression of Interest (EOI) for Supply, Installation and commissioning of fully integrated security Surveillance system along with associated works at the Operating Location Chandrapur under Maharashtra State Power Generation Company Limited.

Bidders are advised to inspect the site and ascertain the conditions including leads/ lifts involved/approach to vehicles, power, water geo-political scenario etc. prior to quoting the amount.

3. INTENT OF EXPRESSION OF INTEREST

A Tender for "Supply, Installation and commissioning of fully integrated security Surveillance system along with associated works at the Operating Location Chandrapur under Maharashtra State Power Generation Company Limited.
The Intent of this Expression of Interest is (EOI) to select the Implementation Agency/ System Integrator for Implementation of "Supply, Installation and commissioning of fully integrated security Surveillance system along with associated works at the Operating Location Chandrapur under Maharashtra State Power Generation Company Limited.

Broadcast Engineering Consultants India Limited (BECIL) an ISO 9001:2008 certified, a Mini Ratna public sector enterprise of Government of India under Ministry of Information & Broadcasting, was established on 24th March,1995 for providing consultancy services of international standards for broadcasting in transmission and production technology including turnkey solutions in the specialized fields of Terrestrial & Satellite Broadcasting, Cable, Media and various Information Technology (IT) related fields, including security & surveillance, acoustics & audio-video systems and smart cities. BECIL provides tailor-made solution for unique requirement ranging from Concept to Commissioning.

Broadcast Engineering Consultants India Limited (BECIL) having its Head office at 14-B, Ring road, Indraprastha Estate, New Delhi 110002 has vast experience for successfully completing the SITC of IP Based CCTV Surveillance System along with associated worksin various Government Departments as in Ministry of Defence, Food Corporation of India (FCI), UP CM House, Airport Authority of India etc.

Submission of Bids is mandatory for this EOI. Prospective bidder/OEM/Implementation Agency s need to submit their bids with the most competitive offer for the aforementioned work. EOI document is available on BECIL website (http://becil.com) & The important dates are as given below:-

4. IMPORTANT DATES

EOI SCHEDULE AND CRITICAL DATES

S.N. ACTIVITY SCHEDULED DATE & TIME

S.N.	ACTIVITY	SCHEDULED DATE & TIME
1.	EOI Issue to Prospective bidder/Implementation Agency(s)	BECIL/PROJ./Civil & Infrastructure /CCTV/Maharashtra /2023 Dated: 27th October 2023
2	Date and Time for Submission of bids	Upto 15:00 Hrs. on 30th October, 2023

3	Date and Time for Opening of Bids	on 16:00 Hrs. on 30thOctober, 2023
4	Availability of Document	Offline
5	EOI document Fee (Form Fee) (Non- Refundable)	INR 10000/- (Plus 18% GST) (non-transferrable & non-refundable) payable through Demand Draft in Favour of BROADCAST ENGINRING CONSULTANTS INDIA LIMITED payable at NOIDA
6	Earnest Money Deposit (EMD Refundable)	10,00,000/- payable through Demand Draft /FD in Favour of BROADCAST ENGINRING CONSULTANTS INDIA LIMITED payable at NOIDA, no Interest will be paid on EMD amount.
7	Address for Communication of bids	BECIL Bhawan, Room No. 502, C-56/A-17, Sector-62, Noida- 201307
8	Contact details of BECIL	Mr. Chandan Kumar Singh (Manager, BECIL) Email : chandan@becil.com
9	Help Desk of ITI	0120-4177850 Ext- 502 (From 10:00Hrs to 18:00 Hrs)

Broadcast Engineering Consultants India Ltd. reserves the right to amend the EOI tentative schedule and critical dates. Bidders are advised to inspect the site and ascertain the conditions including leads/ lifts involved/approach to vehicles, power, water geo political scenario etc. prior to quoting the amount.

5. GENERAL INFORMATION

    a) Complete EOI document can be download from the portal of BECIL www.becil.com. The Submission mode of the bid is Offline.

b) BECIL reserves the right to accept or reject any or all EOIs or annul this process without assigning any reason and liability whatsoever and to re-invite EOI at its sole discretion. The details of EOI may be viewed on www.becil.com. The corrigendum to this EOI, if any, shall be displayed on the website.

c) The Client's Tender No _____ dated __ for (___works name____) and its subsequent addendum/ corrigendum forms an integral part of this EOI.

b) SUBMISSION OF THE PROPOSAL

Bidder/OEM/Implementation Agency are advised to study the EOI document carefully. Submission of proposals shall be deemed to have been done after careful study and examination of the EOI document with full understanding of its implications. Bidder/OEM/Implementation Agency(s) shall have to submit their proposal (Technical and Financial) offline.

c) TENDERING PROCEDURE

a) Procurement is the complete process of tendering from publishing of tenders online, inviting offline bids, evaluation and award of contract using the system. You may keep a watch of the tenders floated under www.becil.com. These will be invited for offline Bids. Bidder/OEM/Implementation Agency Enrolment can be done using "bidder/OEM/Implementation Agency Enrolment".

b) More information useful for submitting offline bids on may be obtained at:www.becil.com

d) PREPARATION FOR SUBMISSION OF EOI

The EOI must contain:

a) Company profile relevant to EOI. It should also include details of past experience relevant to the "Scope of work "

b) Declaration regarding acceptance of Terms and conditions of EOI and declaration of not been blacklisted by any of the Government agency.

c) Essential information as given below :
   i. Name & address of the agency
   ii. Business name
   iii. E-mail id
   iv. Fax No. /Telephone No.
   v. Authorized Signatory name, e-mail id and contact no.

d) The agency/ bidder/OEM/Implementation Agency shall ensure that it fulfills the eligibility criteria as desired in EOI and other essential conditions. Compliance statement of Eligibility criteria with the documents submitted as a proof is to be prepared and submitted. The supporting documents may be list of existing and past clients with details of services offered, details of similar projects executed.

e) The EOI should be duly signed on each page by authorized person. Each page should be properly numbered. Documents authorizing such person must accompany the EOI.BECIL reserves the right to reject out rightly any EOI unsupported by proof of the signatory's authority.

f) The validity period of EOI should be 6 months from the date of opening of EOI.

g) The EOI complete in all respects must be submitted with requisite information and annexure(s). The EOI should be free from ambiguity, change or interlineations. Incomplete EOI will not be considered and is liable to be rejected without making any further reference to agency/ bidder/OEM/Implementation Agency(s).

h) The EOI should be addressed to:-

Mr Chandan Kumar Singh

Manager,

BECILBhawan, Room no. 502, C-56,A/17, Sector – 62,
Noida-201301,UP

i)   Any amendment in the EOI document, if required, will be posted on website www.becil.com, All the applicants are therefore advised to regularly visit these websites before submitting the EOI.

f) PREPARATION OF BIDS

a) The bidder/OEM/Implementation Agency should take into account any corrigendum published on the tender document before submitting their bids.

b) Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid.

c) The bidder should submit the bids in three separate envelopes.

   I.   Registration Fee and EMD.

  II.   Technical section and eligibility criteria.

 III.   Financial as per BOQ

d) After receiving the registration fee and EMD, the technical envelope will be opened and the bid will be evaluated based on eligibility criteria. Those who qualify in the technical specification will have their financial bids opened.

e) Those who do not qualify based on the eligibility criteria will not have their financial bids opened.

g) SUBMISSION OF BIDS

a) The Bidder/OEM/Implementation Agency should login to the website well in advance for the submission of the bid so that it gets well in time i.e. on or before the bid submission time. Bidder/OEM/Implementation Agency will be responsible for any delay due to any issues.

b) The Bidder/OEM/Implementation Agency has to sign the required bid documents one by one as indicated in the tender document as a acceptance of the terms and conditions laid down by BECIL.

c) The bidder/OEM/ Implementation Agency has to submit mode of Demand Draft to pay the tender fee and EMD mode of Demand Draft/FD as applicable and enter details of the instrument.

d) The bidder/OEM/Implementation Agency s are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. If the price bid has been given as a standard BOQ format with the tender document, then the same is to be downloaded and to be filled by all the bidder/OEM/Implementation Agency s. bidder/OEM/Implementation Agency s are required to download the BOQ file, open it and complete the white colored (unprotected) cells with their respective financial quotes and other details (such as name of the bidder/OEM/Implementation Agency). No other cells should be changed. Once the details have been completed, the bidder/OEM/Implementation Agency should submit it offline. If the BOQ file is found to be modified by the bidder/OEM/Implementation Agency, the bid will be rejected.

h) CLARIFICATION

For any clarification related to using the portal, you may visit the below link:

www.becil.com

a) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.

b) Any queries relating to the process of offline bid submission or queries relating to tender in general may be directed to the Helpdesk Support.

Tendering Phone No.0120-4177850 Ext. 502

E-Mail id: - chandan@becil.com

6. ELIGIBILTY CRITERIA

(i) The Bidder should be registered under the Companies Act 1956/2013 and should be in existence in India for the last Three (03) years as on date of EOI publish Joint Venture or Consortium is not allowed.

(ii) The Bidder should have minimum average annual turnover of Rs.25,00,00,000/- in last three years in the field of IT/ ITES /Telecom/Surveillance system/E&M work with BMS included. Bidder should have positive net worth in last Two years. A copy of Audited financial statements and Chartered Accountant (CA) Certificate should be submitted.

(iii) The bidder should have a valid PAN and GST, PF ,ESIC Registration Certificate. Copy of PAN card ,GST ,PF,ESIC Registration certificate should be submitted in the bid.

(iv) The Authorized Signatory for signing the Contract/Agreement with BECIL should be duly authorized by Competent Authority/Board to sign the Contract/Agreement on their behalf copy of the same should be attached along with bid.

(v) The bidder should submit Manufacturers Authorization Certificate (MAF) and from Original Equipment Manufacturers (OEMs) specific to the bid for items mentioned in this EOI or declaration to be submitted accordingly.

(vi) The Bidder should have the experience of successfully completed similar works during the last five years upto the last day of month previous to the one in which EOI are being invited should be either of the following :-

Two similar completed works for Supply, Installation and Commissioning of CCTV System with allied works or E&M work (Electrical and Mechanical work with Fire Alarm System and its integration) including Building Management System (BMS) in same PO each costing cumulative not less than the amount equal to Rs. 27,00,00,000/- excluding taxes and duties as principle contractor or lead member in last 05 years in any Govt/Semi govt/Corporation organization.

OR

Four similar completed works for Supply, Installation and Commissioning of CCTV System with allied works or E&M work (Electrical and Mechanical work with Fire Alarm System integration) including Building Management System (BMS) in same PO each costing not less than the amount equal to Rs.14,00,00,000/- excluding taxes and duties as principle contractor or lead member in last 05 years in any Govt/Semi govt/Corporation organization.

OR

Six similar completed works for Supply, Installation and Commissioning of CCTV System or E&M work (Electrical and Mechanical work with Fire Alarm System integration) including Building Management System (BMS) in same PO each costing cumulative not less than the amount equal to Rs. 9,00,00,000/- excluding taxes and duties as principle contractor or lead member in last 05 years in any Govt/Semi govt. /Corporation organization.

vii) The Bidder should have minimum 10 engineer employees (Degree/Diploma) on its pay role. An undertaking for their proof of education with the list of employees should be submitted by the bidder in this respect.

(viii) Agency should attach a copy of valid Electrical contractor License from appropriate relevant state govt. authority and should be registered fire licensing agency from relevant state govt. dept. on the date of submission of bid.

(ix) The bidder should not be insolvent, in receivership, bankrupt or being wound up, not have had their business activities suspended and not be the subject of legal proceedings for any of the foregoing. An undertaking by the bidder should be submitted **Annexure I**.

(x) The Bidder should not be blacklisted/debarred/banned/restricted by any Union Govt./State Govt. / PSU as on date of submission of the Bid. "No-Conviction Certificate" duly signed by authorized signatory signing the bid, should be submitted in the prescribed format attached in **Annexure II**.

(xi) The bidder should give an undertaking on the company's letter head that all the documents/- certificates/ information submitted by them against this EOI are Genuine & True attached in **Annexure III**.

(xii) Copy of the EOI document duly signed and stamped by the bidder in support of having read, understood and complied with the requirements of the tender document.

7. EVALUATION / SCRUTINY OF EOI

I. EOI Proposals received within prescribed date and time shall be considered and evaluated. EOI proposal received after the due date and time will be rejected.

II. BECIL will not be responsible for delay in submission due to any connectivity issue/Technical issue.

III. Evaluation/Scrutiny of EOI shall be based on:

   a. Information contained in the bid, the documents annexed thereto and clarifications provided. If any.

   b. Assessment of the capability of the bidder/SI/OEM/Implementation Agency based on past record.

   c. Offered solution Document should meet the core requirement of work.

   d. BECIL shall communicate qualified bidder/SI/OEM/Implementation Agency by Post/Fax/E-mail. However, it would not constitute a contract between the parties.

8. PRELIMINARY EVALUATION

(i) BECIL shall evaluate the proposals to determine that they are complete, technically complying, no computational errors have been made, required documents as mentioned in the EOI have been furnished, the documents have been properly signed and the response is generally in order.

(ii) BECIL may waive off any minor infirmity or non-conformity or irregularity in the proposal which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any bidder/OEM/Implementation Agency.

(iii) In case only one bid is received or during the Technical Evaluation only one bidder/OEM/Implementation Agency qualifies for the next stage of the bidding process BECIL reserves the right to accept/reject the bid.

9. EVALUATION PROCESS

a) No enquiry shall be made by the bidder/OEM/Implementation Agency (s) during the course of evaluation of the EOI, after opening of bid, till final decision is conveyed to the successful bidder/OEM/Implementation Agency (s). However, the Committee/its authorized representative and office of BECIL can make any enquiry/ seek clarification from the bidder/ OEM/ Implementation Agency s, which the bidder/OEM/ Implementation Agency s must furnish within the stipulated time else the bids of such defaulting bidder/OEM/Implementation Agency s will be rejected. The proposal will be evaluated on the basis of its content, not its length.

b) The bidder/OEM/Implementation Agency s' proposals will be evaluated

as per the requirements specified in the EOI and adopting the evaluation criteria spelt out in subsequent paras of this EOI document. The bidder/OEM/Implementation Agency are required to submit all required documentation as per evaluation criteria specified in EOI.

c) Upon verification, evaluation/ assessment, if in case any information furnished by the bidder/OEM/Implementation Agency is found to be Incomplete/incorrect, their bid will be summarily rejected and no correspondence on the same shall be entertained. Submission of false/forged documents will lead to forfeiture of security deposit/EMD and blacklisting of agency for a minimum period of 3 years from participating in BECIL tenders.

d) BECIL will review the proposal to determine whether the proposals are as per the requirements laid down. Proposals that are not in accordance with these requirements are liable to be disqualified at BECIL discretion.

e) Evaluation of proposals shall be based on:

i. Information contained in the proposal, the documents submitted there to and clarifications provided, if any.

ii. Experience and Assessment of the capability of the bidder/ OEM/ Implementation Agency based on past record.

f) BECIL reserves the right to seek any clarifications on the already submitted bid documents; however, no fresh documents shall be accepted in support of proposals.

g) Conditional proposals shall NOT be accepted on any ground and shall be rejected straightway. If any clarification is required, the same should be obtained before submission of the proposals.

i. Even though bidder/OEM/Implementation Agency satisfy the necessary requirements they are subject to disqualification if they have:

ii. Made untrue or false representation in the form, statements required in the EOI document.

iii. Records of poor performance such as abandoning work, not properly completing contract, financial failures or delayed completion.

10. AWARD OF WORK/AGREEMENT TERMS & CONDITIONS

a) All the terms & conditions will be on back to back basis.

b) Bidder offering the highest net revenue share shall be declared the successful L1 bidder. Bidder offering the next lower net revenue share shall be declared successful L2 bidder in case of a tie the competent committee adopt draw of lots or any other suitable method to break the tie without giving any reason/justification. This shall be done in the presence of tied bidders. The decision of competent committee of BECIL shall be final in this regard and cannot be challenged in any manner and also be abide by all the bidders.

c) L1 bidder may be called for negotiation.

d) An agreement shall be signed by BECIL with the successful declared L1 bidder.

e) BECIL will place PO on successful L1 bidder only if the BECIL receives its PO/work order from its Customer as mentioned in this tender.

f) Currency of work Order: BECIL will place work order on bidder in INR only.

g) Relevant Taxes in line with GST i.e. SGST/CGST or IGST to be considered by the bidder. Taxes rate and nature will be on back to back basis. GST and other applicable taxes will be as per actual.

h) BECIL shall place order on successful bidder after reducing the BECIL Margin percentage i.e…………………. % of the total value ordered including taxes given to BECIL by the customer for delivery of project/work as per tender condition. PO/Work order will be issued to the successful bidder for the amount which will be calculated after reducing BECIL Revenue share from the PO/Work order issued to BECIL by the prospective buy/end user customer.

I) JURISDICTION

The BECIL and the Bidder Company/Firm/Agency shall make every effort to resolve amicably by direct negotiation any disagreement or dispute arising between them. If any dispute arises between the BECIL and the Bidder firm/company not covered by this contract such dispute or difference shall (except as to any matters, the decision of which is specifically provided for therein) be referred to the sole arbitrator appointed by the competent authority of the BECIL/Client. The award of the Arbitrators shall be binding upon the parties to the dispute. Subject as aforesaid, the provisions of the Indian Arbitration and Conciliation Act,

1996 or statutory modifications or re-enactments thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause. The venue of arbitration shall be at New Delhi.

J) ARBITRATION

The parties through respective signatories shall settle any dispute or disagreement with respect to performance, non-performance or defective performance of respective obligation amicably. In the event of disputes remaining unresolved, the parties shall refer the matter to a single arbitrator under arbitration law that may be applicable, whose appointment shall be done by Chairman & Managing Director, Broadcast Engineering Consultants India Limited. The place of arbitration shall be New Delhi and the language used shall be English.

DECLARATION REGARDING NOT BE INSOLVENT, IN RECEIVERSHIP, BANKRUPT OR BEING WOUND UP, NOT HAVE HAD THEIR BUSINESS ACTIVITIES SUSPENDED AND NOT BE THE SUBJECT OF LEGAL PROCEEDINGS FOR ANY OF THE FOREGOING.

(On Company's letter head)

I / We Proprietor/ Partner(s)/ Director(s) of M/S. -------------------------------------- hereby declare that the firm/company namely M/S.--------------------------------------- ------------------ ---------------------has not been insolvent, in receivership, bankrupt or being wound up, not have had their business activities suspended and not be the subject of legal proceedings for any of the foregoing.

Signature of Applicant with seal.

Name --------------------------------
Capacity in which as signed: ---------------------------------
Name & address of the firm: ---------------------------------- ---------------------------------------
-
Date:

DECLARATION REGARDING BLACKLISTING/ NON-BLACKLISTING FROM TAKING PART IN GOVT.TENDER BY BECIL/GOVT. DEPT

(On Company's letter head)

I / We Proprietor/ Partner(s)/ Director(s) of M/S. -------------------------------------- hereby declare that the firm/company namely M/S.-------------------------------------- -------------------------- ------------has not been blacklisted or debarred in the past by BECIL or any other Government organization from taking part in Government tenders.

Or

I / We Proprietor/ Partner(s)/ Director(s) of M/S. ………………………………… hereby declare that the firm/company namely M/S…………………………………………………………………was blacklisted or debarred by BECIL, or any other Government Department from taking part in Government tenders for a period of ………….. years w.e.f. …………………... The period is over on …………………… and now the firm/company is entitled to take part in Government tenders.

In case the above information found false I/We are fully aware that the EoI/ tender/ contract will be rejected/cancelled by BECIL, and EMD/SD shall be forfeited. In addition to the above BECIL, will not be responsible to pay the bills for any completed / partially completed work and any other suitable action may be taken against our company as deemed fit by BECIL.

Signature of Applicant with seal.

Name -------------------------------
Capacity in which as signed: --------------------------------
Name & address of the firm: -------------------------------------- --------------------------------------
Date:

ANNEXURE – III

UNDERTAKING

[Undertaking on a non-judicial stamp paper of ₹ 100/- certified by Notary]

We, <*Name of company*> hereby under take that, in case the documents submitted by me/ us is found to be forged/ false at any stage, I/ we may be debarred from BECIL for taking participation in all future BECIL works, Security deposited will tends confiscated and any other suitable action may be taken against our company as deemed fit by BECIL.

<*Name of company*> has not been found guilty of any criminal offence by any court of law in India or abroad.

<*Name of company*>, its directors and officers have not been convicted of any criminal offence related to their professional conduct or the making of false statement or misrepresentations as to their qualifications to enter into procurement contract within a period of Five years preceding the commencement of the procurement process or have not been otherwise disqualified pursuant to debarment proceedings.

SECTION – II
BILL OF QUANTITY

F.I.S.S. – CSTPS.

#	System Name	Unit	Quantity	Unit Rate (INR)	Total Rate (INR)
A	**CCTV Surveillance system for Plant area & perimeter wall**				
1	Box Camera for Perimeter (Resolution 3MP, IR with range up to 50 meters)	Nos	250		
2	Bullet Camera (Indoor / Outdoor - Plant Area) (For Indoor / Outdoor, 4MP or better, Up to 50 m IR range)	Nos	618		
3	4MP Fixed Dome Camera (4MP up to 30 fps, 30 m IR range or better)	Nos	26		
4	PTZ Dome Camera 3MP or better and Full HD (1920 x 1080) @ 60 fps or better, 200 m IR range or more)	Nos	87		
5	Long Range Thermal Camera (For Plant Area, Uncooled Vox Microbolometer Anti Sunburn, 640 x 480 - minimum)	Nos	18		
6	Dual Head Thermal Camera (For Stack Yard, Uncooled Vox Microbolometer Anti Sunburn, 640 x 480 - minimum)	Nos	4		
7	Bullet Camera (VMS based ANPR Analytics (4MP or better, Up to 50 m IR range)	Nos	14		
8	Bullet Camera (VMS based ANPR Analytics (4MP or better, Up to 50 m IR range)	Nos	3		
9	Junction Box for CCTV (Weatherproof with required accessories)	Nos	1050		
10	Industrial Grade network switch (4 / 8 x 10/100/1000 Base-T PoE+ ports & 2 1000Base-X SFP ports)	Nos	509		
11	Poles for Camera Mounting	Nos	404		

	(Pole/Angle structure of 6m height)				
12	L2/L3 Network Managed Switch (As Required)	Nos	27		
	(L2 - 24-Port 10/100/1000 POE Mbps + 4 10GBASE-T/SFP+ combo ports				
	L3 - 20*10G SFP+ ports and additional 4 10GBASE T/SFP+ combo ports)				
13	Mounting & cabling accessories at camera end	Nos	1100		
	(As required)				
14	Mobile Surveillance camera	Nos	10		
	(with built in battery, on board Storage & weatherproof housing)				
15	Vehicle Mount IP PTZ Camera with MDVR	Nos	5		
	(For QRT Vehicles)				
16	Installation & commissioning of CCTV system	Lot	1		
	(As required)				
Total					
B	Access Control System & vehicle monitoring system with required accessories & Entry Management System with Law Enforcement Equipment.				
1	Access Control Management Software	Lot	1		
	(Enterprise Class, equipped with all licenses. Time & Attendance module, Visitor Management software with Guard Tour system. Ready to integrate with Command & Control centre application)				

2 Access Control client software Nos 2

3	Access Control Server	Nos	1		
	(With required accessories & software's)				
4	Client Workstation	Nos	2		
	(With required accessories & software's)				
5	Access Control Biometric Reader cum Controller	Nos	36		
	(with required PIN+Card Reader+Biometeric & suitable housing)				

6	UHF Reader for vehicle monitoring along with Two door controller (as required)	Nos	6		
7	Biometric Enrolment Reader cum Controller	Nos	10		
8	Electronic Strike & EM lock (As required)	Nos	36		
9	Magnetic Door status sensor (As Required)	Nos	36		
10	Emergency exit push button (As Required)	Nos	36		
11	Turnstile (Half Height)	Nos	1		
12	Turnstile (Full Height)	Nos	1		
13	Boom Barrier (6 Meter with accessories like magnetic loop, traffic light with red reflective strips, controller, Intelligent Card Reader and so on)	Nos	6		
14	IP66 enclosure for controller, power supply & backup system with accessories for Intelligent Card Reader with controller for Turnstile/Boom Barriers	Nos	6		
15	Handheld Metal Detector	Lot	4		
16	Door Frame Metal Detector (with required accessories)	Lot	4		
17	X-Ray Baggage Scanner (with workstation & accessories. 3x3 meter porta cabin or suitable room arrangement for housing of baggage scanner)	Nos	1		
18	Card Enrolment/Badging workstation (for visitors' room with required accessories & software's)	Lot	1		
19	Card Programmer/Badge printer with cartridge (With required accessories & software's)	Lot	1		
20	Access Cards (for visitor's RFID/UHF as required)	Nos	300		
21	Mega Pixel camera with Tripod (With required accessories)	Nos	1		
22	Fingerprint scanner	Nos	1		
23	Laser colour printer	Nos	1		

24	L2/L3 Network Managed Switch (As Required)	Nos	10		
	(L2 - 24-Port 10/100/1000 POE Mbps + 4 10GBASE-T/SFP+ combo ports				
	L3 - 20*10G SFP+ ports and additional 4 10GBASE T/SFP+ combo ports)				
25	Accessories & Cabling from readers to controller switches (As required)	Lot	1		
26	Installation & commissioning of access control system (As required)	Lot	1		
Total					
C	**Public Address System (IP)**				
1	IP Based Centralized Controller	Lot	1		
2	Master Calling/Control Station (with required S/w & H/w)	Nos	5		
3	Field Call Stations (Indoor with required accessories)	Nos	8		
4	Field Call Stations (Outdoor with required accessories)	Nos	45		
5	Outdoor Horn Speakers (with required accessories)	Nos	88		
6	Indoor Speakers (with required accessories)	Nos	68		
7	PA Amplifier/Power Digital Amplifier for every building, 500W	Nos	6		
8	PA Amplifier/Power Digital Amplifier for every building, 250W	Nos	5		
9	PA Amplifier/Power Digital Amplifier for every building, 125W	Nos	5		
10	Flasher Beacon with required accessories	Nos	12		
11	PA System Management Software	Nos	1		
12	Client workstation (With required accessories & software's)	Nos	1		
13	Centralized PA server/exchange with intercom software, integration with command & control application, fire alarm system & IPPBX system	Nos	1		
14	L2/L3 Network Managed Switch (As Required)	Nos	15		

	(L2 - 24-Port 10/100/1000 POE Mbps + 4 10GBASE-T/SFP+ combo ports				
	L3 - 20*10G SFP+ ports and additional 4 10GBASE T/SFP+ combo ports)				
15	Accessories & Cabling from speakers to controller & switches (as required)	Lot	1		
16	Installation & commissioning of PA system (As required)	Lot	1		
Total					
E	**IPPBX System**				
1	Contact Centre, ACD, Gateway, recording, Mass Notification System, IP Soft Phone, Desk VC Unit & System, MCU along with following	Lot	1		
	-100 Analog Extension				
	-50 IP Extensions				
	- 2 PRI Lines				
	- 2 wire FXS to PAGA				
	- CTI Package				
2	Voice Mail Server for 100 Users	Lot	1		
3	PC Based Operator console with PC	Nos	2		
4	Call accounting workstations with software	Lot	1		
5	IP/Digital Telephone	Nos	50		
6	IP/Digital Telephone	Nos	50		
7	Analog Telephone	Nos	50		
8	UPS with 10AH Battery back up	Lot	1		
9	20 Port 10/100/1000 & 4x1G combo ports Ethernet switch	Nos	2		
10	Accessories & Cabling from speakers to amplifiers & switches	Lot	1		
11	Installations & commissioning of IPPBX system	Lot	1		
Total					

F	VHF Radio Communication system				
1	Handheld Radio Terminal (walkie-talkie with all standard accessories & spares such as battery, antenna & charger for minimum 25% of the quantity supplied.)	Nos	65		
2	Digital Fixed Radio Station	Nos	8		
3	Digital Mobile Radio Station	Nos	5		
4	30 meters Triangular Tubular Tower with aviation lamp, Earthing wire/trip with earth pit & foundation Item	Nos	2		
5	Digital VHF Repeater	Nos	2		
6	Dispatch Console for CCC (software with license keys)	Lot	1		
7	Solar Panel with battery backup for repeaters	Nos	2		
8	Multi-Unit charger for hand-held walkie-talkie	Nos	7		
9	Workstation for Dispatcher (With required accessories & software's)	Nos	1		
10	Radio Server (With required accessories & software's)	Nos	1		
11	Liaison work for issuance of operating license & frequency allotment letter from WPC	Lot	1		
12	Accessories & Cabling from Antenna to repeaters	Lot	1		
13	Installation & commissioning of VHF Radio system	Lot	1		
Total					
G	Variable Message Display system				
1	Message Display	Nos	8		
2	Control System for MDS				
3	Junction Box (other accessories for VMDS)				
4	Pole Structure				
5	Networking Accessories & cabling from VMDS nearby switches	Lot	1		
6	Installation & commissioning of VMDS	Lot	1		

	Total				

H	**Active & Passive networking of all systems**				
1	L3 Network Managed Switch (with required accessories)	Lot	1		
	(L3 - 20*10G SFP+ ports and additional 4 10GBASE-T/SFP+ combo ports)				
2	L2 Network Managed Switch (with required accessories)	Nos	23		
	(L2 - 24-Port 10/100/1000 POE Mbps + 4 10GBASE-T/SFP+ combo ports)				
3	Single Mode SFP for long distance	Nos	120		
4	Router (3GE, 2NIM, 1SM, 4G Flash, 4G DRAM, IPB)	Lot	1		
5	Network Firewall - with Fire Power services, 6GE, AC, 3DES/AES, SSD	Lot	1		
6	Network Management Software (NMS)	Nos	1		
7	19" 42U Racks (2100x800x800) mm	Nos	11		
8	19" 42U Racks (800x800) mm	Nos	16		
9	9U Wall Mount Racks	Nos	120		
10	Dual information outlet CAT6A with faceplate	Nos	150		
11	CAT 6A Patch cords- 3ft	Nos	120		

12 CAT 6A Patch cords- 7ft Nos 1100

13	CAT 6A Jack Panels - 24 ports with cable manager	Nos	64		
14	FOPP- 48 Ports loaded	Nos	2		
15	FOPP-24 Ports Loaded	Nos	24		
16	FOPP-12 Ports Loaded	Nos	10		
17	Shield Twisted Pair Ethernet (CAT-6A) Cable	Meters	138400		
18	6C Single Mode OFC cable	Meters	71100		
19	6 Ports LIU Fully loaded	Nos	568		
20	12C Single mode OFC cable	Meters	22900		
21	12 Ports LIU fully loaded	Nos	16		

22	Fibre Patch cord Duplex	Nos	1100		
23	Fibre Pigtails	Nos	2308		
24	25mm PVC conduit	Meters	80132		
25	25mm MS conduit	Meters	50088		
26	3Cx2.5 Sq.mm Armoured power	Meters	50088		
27	Soil Digging & cable laying	Meters	58000		
28	50mm HDPE conduits	Meters	61726		
29	Installation & configuration of switches	Lot	1		
30	Termination of Cables & cable markers on 100 meters	Lot	1		
	Total				
I	**Command & Control Centre Set up (Software, Hardware & Infrastructure)**				
1	Video Management software & Analytics application	Lot	1		
2	Command & Control application with required customization	Lot	1		
3	NVMS Server with Failover server & Failover licenses	Lot	1		
4	Video Recording Server	Lot	1		
5	SAN Storage (Primary & Secondary)	Lot	1		
6	Command & Control application server	Lot	1		
7	PTZ Joystick controller	Nos	5		
8	Voice logger software for IPPBX & required hardware server	Lot	1		
9	Workstation with two 22" Monitor & required OS, Antivirus software	Nos	8		
10	Video Wall	Lot	1		
	(46'' Ultra-HD (4K) with narrow brizzel, 4x2 configuration)				
11	Server for video analytics application, if not part of VMS application	Lot	1		
12	UPS at CCC with required distribution panels	Nos	1		
13	Internal cabling & Earthing of equipment racks	Lot	1		

14	Server & UPS installations & configurations.	Lot	1		
	Total				

J.	**UPS, Power Distribution & Earthing**				
1	UPS as per load requirement in every zone with battery bank & earthing	Nos	8		
2	Distribution Panel with MCCB	Nos	8		
3	Earthing Pit or Suitable arrangement	Nos	8		
4	Air Conditioning & Equipment cabins at zonal equipment rooms (As per Site condition)	Nos	8		
	Total				

K.	**Construction & Miscellaneous Work**				
1	Construction of Command & Control Building as per drawings	Lot	1		
2	Electrification & MEP work of Command & Control Building	Lot	1		
3	Furniture & accessories	Lot	1		
4	Landscaping & Beautification work	Lot	1		
5	Clearing vegetation around the perimeter wall & inner plant area	Lot	1		
	Total				
L.	**Additional Systems.**				
1	Integration of Anti-Drone System (along with all required components)	Lot	1		
2	Integration of Face Recognition System (Attendance System) (along with all required components)	Lot	1		
3	Development & Implementation of Intruder Monitor System/Animals movement tracking and monitoring (along with all required components)	Lot	1		
	Total				

· Any future systems to be integrated with no further additional cost to MAHAGENCO.

SECTION- III

Delivery Schedule

Implementation Plan & Timelines.

The following is an Implementation Plan with timelines.(T2: Date of issue of Purchase Order)

Role	Timeline in Weeks
Project Implementation Plan preparation	T2 + 1
On-ground survey and report	T2 + 4
Project Implementation initiation	T2 + 5
Equipment procurement, installation, and commissioning	T2 + 47
User Acceptance Testing (UAT)	T2 + 48
IT Infrastructure & Security Audit	T2 + 50
Training & Capacity Building	T2 + 50
Standard Operating Procedures (SOPs) Preparation	T2 + 50
Go-live	T2 + 52
Project Management	Onwards (for 5 years)
Operations & Maintenance	
SLA Compliance & reporting	

The following risks are assumed during the course of the implementation of this project:

i. There shall be no project time overruns due to administrative delay in-principle approval, budgetary approvals, any critical decisions to be taken during the course of the project and poor planning or implementation by the bidder.

ii. There shall be no project cost overruns arising out of administrative delays, delay in coordination with nodal authorities and poor planning or implementation by the bidder.

iii. The client shall not, on ad hoc basis, decide to forego the project implementation.

iv. The budget approval shall be done timely, and the required cash flow shall be maintained for a seamless flow of implementation activities.

v. The project implementation will not get hampered or completely stopped due to external factors such as Plant riots or factors such as natural calamity.

Probability / Impact	Low	Medium	High
Low	1. Bid response failure 2. Bid validity failure/ Re-tendering 3. Bidder absconding	1. Time overrun	1. Cost Overrun 2. Stakeholder approval & consensus 3. External Calamities
Medium			1. Budgetary approvalsand Cash flow
High	1. Administrative delay in approvals and coordination		

SECTION-IV

Scope of Work and Technical Specifications

Abbreviations

AMC Annual Maintenance Contract

CCTV Closed Circuit Television

CSTPS Chandrapur Super Thermal Power Station

FISS Fully Integrated Surveillance System

FOC Fibre Optic Cable

FOV Field of View

GTPS Gas Turbine Power Station

IP PBX Internet Protocol Private Branch Exchange

KTPS Koradi Thermal Power Station

OEM Original Equipment Manufacturer

PA Public Address

PMC Project Management Consultancy

RACI Responsible, Accountable, Consulted and Informed

RFP Request for Proposal

RFID Radio Frequency Identification

SI System Integrator

SLA Service Level Agreement

SOP Standard Operating Procedure

TPA Third Party Audit

VAS Voice Alarm System

VMS Video Management System

WHR Waste Heat Recovery

ACS Access Control System

Scope of Work (SOW)

1. Introduction and Project Overview

Maharashtra State Power Generation Company wants to undertake a Fully integrated security Surveillance System (FISS) for its Chandrapur Power Plant. As part of a major program, Maharashtra State Power Generation Co. Ltd. (MSPGCL) is in process of setting up and upgrading of Security Surveillance & Access Control system to international security standards at its power plant in Chandrapur and then other plants all over Maharashtra. The scope of this document is to survey the existing site, establish the type and quantity of the security systems, technical specifications, and costing of the project. The objective of this exercise is to equip the Chandrapur power plant with enhanced security like CCTV Surveillance along with Physical Security Systems across the plant, covering all critical locations in the plant.

As part of the above scope of work, the department proposes to initiate the implementation of Surveillance measures by installing CCTV Surveillance along with Physical Security Systems.

An extensive CCTV Surveillance inside the plant is the most basic technology-based security ring required to complement the physical security ring of the plant. Power Stations and Utilities can be protected using Perimeter Security, Surveillance Systems, Intruder Detection, Access & Entry Control to prevent and detect unauthorized access and malicious damage. Fibre Optic systems can be installed to detect any attempt to cut or climb a perimeter fence; optionally integrated with automated CCTV Surveillance which can be directed to the area of attack, centrally supervised by Control and Command systems. The surveillance and monitoring shall be much utilized by the department in a variety of ways to better control, coordinate and check on intrusions and sabotages.

Reports and warnings received from the Intelligence Bureau indicate all key government facilities like Nuclear Facilities, Power Generation Facilities, Dams and so on. are under terrorist threat. The Chandrapur Power Plant is no different and considering that the facility is not very far from Naxal Effected areas, it becomes imperative that a Surveillance & Security System be installed. In their secret report after inspection for the 2009 – 2010 and the previous, it has been mentioned that to overcome the threat from Terrorist & Maoist organizations and the local anti-social elements it is necessary to either augment the security manpower or put in electronic security surveillance system. The security personnel have been injured severely on occasions during attempts for thefts. In addition, lack of electronic surveillance gives free hand to the coal mafia to mislead and carry out misdeeds thereby causing financial losses to the Company.

Looking at the recent security threat conditions in the country and the area in particular, it has become imperative that the Maharashtra State Power Generation Company Limited (MSPGCL) should install a state-of-art Fully Integrated Security Surveillance System (FISS) with Command & Control Applications to secure the critical facilities. Indicative vulnerable areas that need to be protected / covered are given below:

a) Perimeter Wall
b) Entry / Exit Gates by Road & Rail,
c) Power Generating Plant Area
d) Weigh Bridges
e) Wagon Tippler Complex
f) Oil Tanks and Fuel Storage Area
g) Transmission Sub Station
h) Storage areas

The threat is basically on two accounts

A. Sabotage:

As per reports and warnings received from the Intelligence Bureau all key government facilities like Nuclear Facilities, Power Generation Facilities, Dams etc. are under terrorist threat. The Chandrapur Power Plant is no different and considering that the facility is not very far from Naxal

Effected areas it becomes imperative that a Surveillance & Security System be installed. The areas under threat in the plant are the Main Power Plant, Oil Tanks, Hydrogen Plant, Chlorination Plant etc.

B. Intrusion, Theft & Pilferage:

I. The plant is continuously facing the problem of coal pilferage. Coal forms a major input in power generation and hence theft in this area will have great financial repercussion. Even a small percentage of such pilferage will have a large impact.

II. There is kilometre of cables that run through the plant. These cables are a perfect target for their copper. However even more expensive than the copper is the possibility of the plant machinery going down due to the stripping of all-important cables through which the plant is controlled.

III. Long conveyors that carry the all-important coal to the electricity generating power packs run on Conveyor Rollers which have recently been stolen setting of major investigations.

IV. Pilfered metal scrap is always a source of income for thieves who find a way to get into the plant by breaking through and intruding through the long walls that run along the periphery of the plant.

V. The many empty vehicles and railway wagons are a convenient way to smuggle out stolen goods necessitating the need for checking all going vehicular traffic.

VI. Human intrusion into the plant could lead to theft, pilferage and above all to sabotage.

2. Project Goals and Objectives

The following project objectives are envisaged to be met by this project:

a. Monitoring and Surveillance of the plant:

The primary objective is to have critical area coverage of the plant with an extensive network of CCTV Surveillance System. It is desired that the critical plant area should not have any blind spots. However, if there are practical and operational challenges to having zero blind spots, the same can be addressed during implementation of the cameras.

b. Perimeter Protection:

The Chandrapur plant is surrounded on two sides by populated colonies and slum areas. The plant security is faced with a herculean task of maintaining the integrity of the wall which is breached at several places and from which anti-social elements intrude into the plant and carry out their dubious activities. To add to this problem the road that runs adjacent to the wall is frequently used by the workers that come into the plant and has heavy vegetation running along. It provides sufficient coverage to people who wish to intrude into the plant. Water nallahsthat run across the plant also help provide an easy entry for humans and animals. With complete coverage of plant area with CCTV Surveillance, it is envisaged that monitoring and management of plant and the plant activities can take place more effectively, efficiently and in a more coordinated manner. CCTVs are expected to become the extended arm for the security to help and take the burden of 24x7 manual guarding of the plant.

c. Setting up of Command and Control Centre (CCC):

Setting up of a Command and Control Centre (CCC) at the plant is one of the initiatives of the department. The key benefits of the Command and Control Centre are 24x7 real time monitoring of CCTV Surveillance System along with Physical Security System. With additional advanced functionalities like viewing play back from selected CCTV cameras at any given point of time.

3. Requirement for Security and Surveillance

The following key activities are managed by the Plant authorities on a daily or scheduled basis: **a.**

Vulnerable points and areas within the plant

The Chandrapur plant is surrounded on two sides by populated colonies and slum areas. The plant security is faced with a herculean task of maintaining the integrity of the wall which is breached at several places and from which anti-social elements intrude into the plant and carry out their dubious activities. To add to this problem the road that runs adjacent to the wall is frequently used by the workers that come into the plant and has heavy vegetation running. Water nallahs that run across the plant also help provide an easy entry for humans and animals.

The Core Zone of the plant is around the main Power Packs – the power generating units of Chandrapur Super Thermal Power Station. Along with this Core Zone, other important facilities that require surveillance are as follows:

- i. Main Generating Plant
- ii. Oil Handling Plant
- iii. Hydrogen Generation Plants
- iv. Major Stores and Other Stores
- v. Coal Handling Plant.
- vi. Admin Offices (Nirman and UrjaBhavan)

The solution proposed to combat these problems is the use of CCTV Surveillance System along with Physical Security System.

Following areas / gates are not covered

- i. Colony/Khairgaon Gate (All supplies, material to the colony)
- ii. Ambhora Gate (Solar Facility)
- iii. Aundha Gate
- iv. Residential Colony
- v. Internal Plant & Colony Roads
- vi. New Facilities like
    - a. ParyavaranChowk
    - b. Pipe Conveyor Area
    - c. IRAI Dam
    - d. Bhatadi Pipe Conveyor Loading Point
    - e. CHP Belt A,B,C inside Monitoring
    - f. CHP Belt D inside Monitoring
    - g. Solar Plant
    - h. Watch Towers
    - i. High Speed Detection on Accident Prone Roads

Note – Bidder need to supply any additional components for above areas / gates during the 1st Year of maintenance with additional cost as specified in the financial proposal.

b. Gate Monitoring & Vehicle Monitoring

The Chandrapur plant has many gates through which there is vehicular traffic as well as large movement of personnel. The Reject Gate is the entry point of all vehicles bringing through coal. The Major Stores Gate has trucks bringing in machinery spares, equipment, pipes etc. This gate also handles a large volume of workers that come in on a three-shift basis. At an average 2000 persons record their attendance every shift.

List of Gates

- i. Nagpur Gate

ii. Reject Gate (Coal and Ash are brought through this gate)

iii. Major Stores Gate (All other material, stores, machinery, spares etc are brought through this gate. Also, workers enter through this gate and hence time office is at this gate. iv. Koyna Gate (All supplies, material to the colony)

v. Security Office Gate (Entry to the main plant can also be affected through this gate.)

The challenges faced by the security department is the movement of trucks that bring in coal and return empty. Often the empty trucks on their way out are likely to carry stolen material. Though the truck has a limited time period to be inside the plant, it is difficult to track where the vehicle has traversed inside the large plant area.

Hence it becomes important to record the following:

i. Entry Time of The Truck

ii. Video Recording of the Material carried by the truck

iii. The Dwell Time of the truck inside the plant and the route followed by it.

The solution proposed to monitor this is the use of

• CCTV Surveillance System
• UHF based Vehicle monitoring system
• RFID based access control, visitor management, guard tour control system • Physical Security system covering Baggage Scanner, Handheld Metal Detectors, Door Frame Metal Detector, Single Lane - Full Height Turnstile, and so on

Proposed Benefits / Key performance indicators for FISS

The key benefits expected by implementing this project are as follows:

a) The security of the Chandrapur Super Thermal Power Station will be enhanced

b) The electronic surveillance will ensure that the actions are proactive than the present reactive model.

c) Synergy will be applied in use of security forces in case of an eventuality which will result into maximum utilization of available security staff.

d) In case of an incident, accident or any disaster, management can be handled from the nerve centre of the powerplant.

e) Accountability of the movement of resources within the plant area will be better.

f) Enhanced communication between various plant units and command & control centre for quick responsive communication.

g) The nuisance created by locals to voice their demands will be monitored & proactive actions can be taken without hampering security and the productivity of the plant

Technical Specifications

A. CCTV Surveillance system for Plant area & perimeter wall

Indicative specifications - The proposed products should comply to the following specifications and all parameters should be available on website and data sheets.

Qualification Criteria to be adhered for selection of CCTV Camera OEM.

· OEM of CCTV camera should be in the manufacturing for minimum 10 years globally. Bidder to submit OEM undertaking with details.

· OEM of CCTV camera should have Direct Presence (Not through JV, Distributor, OR any other way) in India and should have registered Sales & Support office in India from Last 10 Years documentary evidence needs to be submitted along with bid document.

· OEM of CCTV camera should have Service Centre Support in Maharashtra or in India from last 5 years.

· OEM of CCTV camera must be ISO 9001 & ISO 14001 certified.

Qualification Criteria to be adhered for selection of VMS OEM.

· OEM of VMS should be in the manufacturing for minimum 10 years globally. Bidder to submit OEM undertaking with details.

· OEM of VMS should have Direct Presence (Not through JV, Distributor, OR any other way) in India and should have registered Sales & Support office in India from minimum Last 3 years and documentary evidence needs to be submitted along with bid document.

· OEM of VMS should have Service Centre Support in Maharashtra or in India from minimum last 3 years.

· OEM of camera and VMS must have supplied and executed min. 1000 IP CCTV Camera and 1000 IP camera license in any CCTV surveillance system project (Either directly by OEM or SI) to any state / central govt / PSU / Judiciary / or any govt. institution in last 05 years ending on the tender floating date.

Item Code: A136010010060244		
1. Box Camera for Perimeter		
Sr. No	**Parameters**	**Minimum Specification**
1	Image Sensor	1) 1/2.8" CMOS or better, 2) WDR 100dB Day (color) / Night (B/W) or better
2	Resolution	1) 3MP or better 2) 25fps or better
3	Minimum Illumination	Color 0.01 lux, 0.001 lux at B/W mode 30 IRE or better

4	Lens & Viewing Range	1) Lower side 5-8 mm or better 2) Minimum Upper side 8mm to 20 mm varifocal lens; 3) External / integrated IR with range up to 50 meters; 4) auto back focus
5	Signal to Noise Ratio	≥ 50 db.
6	Lens Type	P-iris control, IR corrective
7	Pixel Resolutions	Min Pixels 2048 x 1536 &so on as per resolution standard
8	Video Compression Standards	Minimum H.264 / H.265
9	No. Of streams	Triple Streaming (or more) with a Maximum of 5 Concurrent Shared Streams or more
10	Network Protocols	IPv4 & IPv6, TCP/IP , UDP, IGMP(Multicast)DHCP Client, HTTP, HTTPs, PEAP, EAP-TLS,SSH, SOAP, CIFS, SNMP, UPNP, RTSP, LLDP
11	Protection& Housing	Minimum IP-66, IK10 with inbuilt IR, heater and blower
12	Power Supply & O/p Voltage	PoE IEEE 802.3af; 5-12 VDC or 12-24 V AC
13	Intelligent Feature	Minimum Motion Detection, Line crossing, Tempering alert / video loss and so on
14	Certification / Approvals	BIS, UL, CE/FCC, RoHS/WEEE
15	ONVIF Compliance	Minimum Profile S, G
16	Operating Environmental Conditions	(a)Operating Temperature range of 0 deg C to 50 deg C (b)Relative Humidity up to 90% (Non –Condensing)

17	SD Card Capability	Supports up to minimum 128 GB SD card Supplied with 64GB SD card
18	Alarm I/O Interface	Minimum 1 input ,1 output
19	Security	3rd party certificate for Secure data communication on network.

Functionalities:

· These cameras are for outdoor locations on the perimeter for virtual PIDS purpose. Lens used for these cameras shall be suitable for outdoor during day and night.

· Cameras shall be provided with multi-streaming for recording and monitoring on different compression modes simultaneously.

· The cameras shall be provided with in-built web browser to browse camera from remote location.

· The cameras shall work with PoE switches and shall have Noise Reduction feature (2DNR/3DNR) to get better video clarity. They shall be connected to switch with single CAT-6 cable to receive data and power from PoE switch. No additional power supply is required for the cameras except for enclosures.

· Cameras shall be installed on GI poles. Wherever poles cannot be installed, cameras shall be installed on the nearest wall or suitable arrangements shall be made with adequate mounting brackets.

· Bullet camera with necessary accessories to fulfil box camera application for perimeter detection shall be provided by bidder as per resolution passed in Ref No. MSPGCL/BM213/Item 213.42 dated 30.09.2022.

Note: All the cables, patch cables, connectors, industrial switches, accessories, Camera mounting brackets, Junction boxes, PVC Conduits, Circuit breakers, any required convertors, stands and so on required for installation, commissioning and integration of the system shall be provided by the bidder.

Item Code: A136010010060100

2. IP Bullet Camera (Indoor/ Outdoor – Plant Area)

Sr. No	Parameters	Minimum Specification

1	Image Sensor	1) 1/2.8" CMOS or better, 2) WDR 100dB Day (color) / Night (B/W) or better
2	Resolution	1) 4MP or better 2) 25fps or better
3	Minimum Illumination	Color 0.05 lux, 0.005 lux at B/W mode (30 IRE or better)
4	Lens & Viewing Range	1) Lower side 2.7-4 mm or better 2) Upper side 9 mm to 12 mm varifocal-lens or better 3) Up to 50 m IR range; 4) Motorized Varifocal and Focus,
5	Field of View (H/V)	Minimum 104°/56° 42°/24° or better
6	Lens Type	Should support Auto IRIS, IR corrective or better
7	Pixel Resolutions	Min Pixels 2688 x 1520 &so on as per resolution standard
8	Video Compression Standards	H.264 / H.265 / MJPEG
9	No. Of streams	Triple Streaming (or more) with a Maximum of 5 Concurrent Shared Streams or more

10	Network Protocols	IPv4, IPv6, TCP/IP, UDP, IGMP(Multicast)DHCP Client, HTTP, HTTPs, PEAP, EAP-TLS, SSH, SOAP, CIFS, SNMP, UPNP, RTSP, LLDP
11	Protection& Housing	Minimum IP-66, IK10 & NEMA 4x (same make as camera)
12	Power Supply & O/p Voltage	PoE IEEE 802.3af; 5-12 VDC or 12-24 V AC
13	Intelligent Features	Minimum Motion Detection, Line crossing, Tempering alert / video loss and so on
14	Certification / Approvals	BIS, UL, CE/FCC, RoHS/WEEE
15	ONVIF Compliance	Minimum Profile S, G
16	Operating Environmental Conditions	(a)Operating Temperature range of 00 C to 500 C (b)Relative Humidity up to 90% (Non –Condensing)

17	SD Card Capability	Support minimum 128 GB SD card Supplied with 64GB SD card
18	Alarm I/O Interface	Minimum 1 input ,1 output
19	Security	3rd party certificate for Secure data communication on network.

Functionalities:

· These outdoor / indoor cameras shall cover entry/exit of buildings or facilities, roads, cable galleries in plant unit.

· These cameras are for outdoor / indoor use covering plant areas, main gates - pedestrian and vehicle entry gates (ANPR, driver's and pedestrian face should be clearly visible)

· All cameras shall be provided with weatherproof housing. They shall have features like auto Iris. Lens used for these cameras should be suitable for outdoor weather and illumination during day and night

· Cameras shall be installed on GI poles. Wherever poles cannot be installed, cameras shall be installed on the nearest wall or suitable arrangements shall be made with adequate mounting brackets.

· Cameras shall have multi streaming facility to record and view on different streams with different compressions modes.

· The cameras shall be provided with web browsing facility to browse camera from remote location.

Note: All the cables, patch cables, connectors, industrial switches, accessories, Camera mounting brackets, Junction boxes, PVC Conduits, Circuit breakers, any required convertors, stands and so on required for installation, commissioning and integration of the system shall be provided by the bidder.

Item Code: A136010010060005

3. Fixed Dome Camera

Sr. No	Parameters	Minimum Specification
1	Image Sensor	1) 1/2.8" CMOS or better, 2) WDR 100dB Day (color) / Night (B/W) or better
2	Resolution	1) 4MP or better 2) 25fps or better

3	Minimum Illumination	Color 0.05 lux, 0.005 lux at B/W mode (30 IRE or better)
4	Lens & Viewing Range	1) Lower side 2.7-4 mm or better 2) Upper side 9 mm to 12 mm varifocal-lens or better 3) Up to 50 m IR range; 4) Motorized Varifocal and Focus,
5	Field of View (H/V)	Minimum 104°/56° 42°/24°
6	Lens Type	Should support Auto IRIS, IR corrective or better
7	Pixel Resolutions	Min Pixels 2688 x 1520 &so on as per resolution standard
8	Video Compression Standards	H.264 / H.265 / MJPEG
9	No. Of streams	Triple Streaming (or more) with a Maximum of 5 Concurrent Shared Streams or more
10	Network Protocols	IPv4, IPv6, TCP/IP, UDP, IGMP(Multicast)DHCP Client, HTTP, HTTPs, PEAP, EAP-TLS, SSH, SOAP, CIFS, SNMP, UPNP, RTSP, LLDP
11	Protection& Housing	Minimum IP-66, IK10 & NEMA 4x (same make as camera)
12	Power Supply & O/p Voltage	PoE IEEE 802.3af; 5-12 VDC or 12-24 V AC
13	Intelligent Feature	Minimum Motion Detection, Line crossing, Tempering alert / video loss and so on
14	Certification / Approvals	BIS, UL, CE/FCC, RoHS/WEEE
15	ONVIF Compliance	Minimum Profile S, G
16	Operating Environmental Conditions	(a)Operating Temperature range of 00 C to 500 C (b)Relative Humidity up to 90% (Non –Condensing)
17	SD Card Capability	Support minimum 128 GB SD card Supplied with 64GB SD card
18	Alarm I/O Interface	Minimum 1 input ,1 output
19	Security	3rd party certificate for Secure data communication on network.

Functionalities:

· These cameras are for indoor use covering Service building, Admin building, PCR, DAS &other suitable areas.

· The cameras shall be provided with a weatherproof housing. They shall have features like auto Iris. Lens used for these cameras should be suitable for outdoor weather and illumination during day and night.

· Cameras shall be installed on GI poles. Wherever poles cannot be installed, cameras shall be installed on the nearest wall or suitable arrangements shall be made with adequate mounting brackets.

· Cameras shall have multi streaming facility to record and view on different streams with different compressions modes.

· The cameras shall be provided with web browsing facility to browse camera from remote location.

Note: All the cables, patch cables, connectors, industrial switches, accessories, Camera mounting brackets, Junction boxes, PVC Conduits, Circuit breakers, any required convertors, stands and so on required for installation, commissioning and integration of the system shall be provided by the bidder.

Item Code: A136010010060247		
4. IP Dome PTZ Camera		
Sr. No	**Parameters**	**Minimum Specification**
1	Image Sensor	1) 1/2.8" CMOS or better, 2) WDR 120dB Day (color) / Night (B/W) or better
2	Resolution	1) 3MP or better 2) 25fps or better
3	Iris	Should support Auto IRIS, IR corrective or better
4	Minimum Illumination	Color 0.05 lux, 0.005 lux at B/W mode (30 IRE or better)
5	Lens & Optical Zoom Feature	1) Lower side 3-6 mm, 2) Upper side 120-130 mm lens or better 3) Minimum 33x Optical Zoom or better 4) 200 m IR range or more, 5) motorized and auto focus

6	Signal to Noise Ratio	≥ 50 db.
7	Image Enhancement	BLC, HLC, 3D DNR, Defog, EIS & so on
8	Video Compression Standards	3 Stream or more; stream1: Main Stream: H.265 @ 1920X1080 @ 60 fps Sub Stream: H.265 @ 640 × 360 @ 30fps Third Stream: H.265 @ 1920x1080 @ 30 fps
9	Video Output	RJ-45
10	Remote Configuration	Through web Access and existing / under implementation Video Management Software
11	Pan movement & Tilt range	1) 360° endless & +/- 0-90° 2) Pan speed Up to 450° per second or better 3) Tilt speed Up to 320° per second or better

12	SD Card Capability	Support minimum 128 GB SD card Supplied with 64GB SD card
13	Pre-set Positions	Minimum 200 positions
14	Network Protocols	IPv4, IPv6, TCP/IP, UDP, IGMP(Multicast)DHCP Client, HTTP, HTTPs
15	Protection & Housing	Integrated Housing, Min IP 66, IK10, NEMA 4x (Same Make as Model)
16	Intelligent Feature	Minimum Motion Detection, Auto Tracking, Line crossing, Tempering alert / video loss and so on
17	Operating Voltage &PoE	Voltage 230 VAC+/-10% or 24VAC +/-10% /POE+
18	Certification / Approvals	BIS, UL, CE/FCC
19	ONVIF Compliance	Minimum Profile S, G

20	Operating Environmental Conditions	(a)Operating Temperature range of 00 C to 500 C (b)Relative Humidity up to 90% (Non –Condensing)
21	Alarm I/O Interface	Minimum 2 input ,2 output or better
22	Security	3rd party certificate for Secure data communication on network.

Functionalities:

· These cameras are suitable for outdoor use covering main gates - pedestrian and vehicle entry gates. Open areas like major stores, Canteen for general surveillance purposes. Lens and motor used for these cameras should be suitable for outdoor environment and illumination during day and night.

· PTZ Speed Dome cameras (Minimum 33X optical zoom) are suitable to cover large/ wide areas like perimeter wall Main gate area etc.

· Cameras shall be installed in weatherproof housing (IP66 or more) and shall be on suitable length pole for better coverage. PTZ camera shall give a clear view up to a distance of minimum 150 meters.

· The cameras shall be provided with in-built heater, and step motor drive to work in different environmental conditions.

· Wherever poles cannot be installed, suitable arrangement shall be made with adequate brackets to cover maximum area.

· As per site requirement, a dedicated UL certified power supply shall be provided to run camera components.

· Whenever optical fibre cable is used for the camera connectivity, a media converter at each camera shall be used to convert optical media (OFC) in to LAN media (UTP RJ 45 connector). The UTP shall terminate into the camera.

Note: All the cables, patch cables, connectors, industrial switches, accessories, Camera mounting brackets, Junction boxes, PVC Conduits, Circuit breakers, any required convertors, stands and so on required for installation, commissioning and integration of the system shall be provided by the bidder.

Item Code: A136010010060007

5. Long Range Thermal Camera for Plant Area

Sr. No	Parameters	Minimum Specification
1	Thermal Sensor Type & Resolution	UncooledVoxMicrobolometer Anti Sunburn, 640 x 480 (minimum).
2	Thermal Sensitivity	Noise Equivalent Temperature Difference <35mK. F# 1.0
3	Spectrum Range	8-13μm LWIR with 17 μm pixel pitch

4	Analytics	Internal or external Intrusion detection analytics and handoff to PTZ cameras for auto tracking of Intruder
5	Analytics rules	Intelligent analytics to distinguish between human / vehicular intruders
6	Lens & Angle of view	60mm or better lens providing ≤ 9 deg (HFOV)
7	Focus	Athermalized, Focus-free and automatic uniformity correction with Dynamic Detail Enhancement
8	Image Optimization	Auto Flat Field correction
9	Zoom	4X Digital zoom
10	Thermal Sensor Performance	Performance of thermal sensor should not deteriorate for at least 10 years (OEM conformance required)
11	Thermal AGC ROI	Default, Pre-sets and User definable to ensure optimal image quality on subjects of interest
12	Modes	White-Hot & Black-Hot user selectable
13	Output	Analogue BNC and IP RJ45 (Both required)
14	Streaming	Dual Stream, ONVIF Profile S
15	Streaming Performance	720 x 576 @ 25FPS @ H.264 (Minimum)
16	Protocols	IPV4, IPV6, HTTP, UPnP, DNS, NTP, RTSP, RTCP, RTP, TCP, UDP, ICMP, IGMP, DHCP, ARP, FTP
17	Rating	IP-66 with sunshield, Heater and MIL-STD-810F, IEC 60068-2-27
18	Power	PoE/PoE+ and 12-24VAC/DC
19	Mount	Concealed Cable Wall/pole mount
20	Operating temp.	Temp: -40° C to 60°C, Humidity: 95%

Item Code: A136010010060189		
6. Dual Head Thermal Camera		
Sr. No	**Parameters**	**Minimum Specification**

1	Thermal Sensor Type & Resolution	UncooledVoxMicrobolometer Anti Sunburn, 640 x 480 (minimum).
2	Thermal Sensitivity	Noise Equivalent Temperature Difference <35mK. F# 1.0
3	Spectrum Range	8-13μm LWIR with 17 μm pixel pitch

.

4	Analytics	Internal or external Intrusion detection analytics on pre sets and handoff from fixed cameras and auto tracking of intruder
5	Thermal Camera Lens	Germanium 26-105mm Continuous Zoom Lens providing 24 to 6 Degree adjustable (HFOV)
6	Focus	Athermalized, Focus-free and automatic uniformity correction with Dynamic Detail Enhancement
7	Image Optimization	Auto Flat Field correction
8	Modes	White-Hot & Black-Hot user selectable
9	Thermal Camera Zoom	Optical - 4x Continuous;
10	Thermal Camera Zoom	Digital - 4x Continuous
11	Visible Sensor & Resolution	1/2.8" Full HD CMOS/CCD or better
12	Visible Camera Lens	4.3mm to 129mm 30X optical zoom or better
13	Visible Sensitivity	0.05 Lux or better
14	Pan	Minimum Pan: 0-360° with speed 0.2° - 60°/sec;
15	Tilt	Minimum Tilt: ±90° with speed 30°/sec (minimum) with 128 pre-sets
16	Network Interface	TCP/IP, RS-232, RS-422
17	Single IP for Camera	Thermal and Visual sensor should not use different IP Address (Single IP per camera)
18	Streaming	Dual Streaming H.264 & MJPEG for thermal and visible
19	Interoperability	Minimum ONVIF Profile S
20	Power	24 VAC / 24 VDC
21	Certifications	IP-66 with sunshield, Heater and MIL-STD-810F Transportation, IEC 60068-2-27

22	Operating Conditions	Temp: -40° C to +60°C, Humidity: 90%
23	Design	The camera should be modular, and it should be possible to replace the thermal as well as optical payloads in the field without changing the total camera
24	Thermal Sensor Performance	Performance of thermal sensor should not deteriorate for at least 10 years (OEM conformance required)

Item Code: A136010010060248

7. IP Bullet Camera (VMS based ANPR Analytics)

Sr. No	Parameters	Minimum Specification
1	Image Sensor	1) 1/2.8" CMOS or better, 2) WDR 100dB Day (color) / Night (B/W) or better
2	Resolution	1) 4MP or better 2) 25fps or better
3	Minimum Illumination	Color 0.05 lux, 0.005 lux at B/W mode (30 IRE or better)

.

4	Lens & Viewing Range	1) Lower side 2.7-4 mm or better 2) Upper side 9 mm to 12 mm varifocal-lens or better 3) Up to 50 m IR range; 4) Motorized Varifocal and Focus,
5	Field of View (H/V)	Minimum 104°/56° 42°/24° or better
6	Lens Type	Should support Auto IRIS, IR corrective or better
7	Pixel Resolutions	Min Pixels 2688 x 1520 &so on as per resolution standard
8	Video Compression Standards	H.264 / H.265 / MJPEG
9	No. Of streams	Triple Streaming (or more) with a Maximum of 5 Concurrent Shared Streams or more

10	Network Protocols	IPv4, IPv6, TCP/IP, UDP, IGMP(Multicast)DHCP Client, HTTP, HTTPs, PEAP, EAP-TLS, SSH, SOAP, CIFS, SNMP, UPNP, RTSP, LLDP
11	Protection& Housing	Minimum IP-66, IK10 & NEMA 4x (same make as camera)
12	Power Supply & O/p Voltage	PoE IEEE 802.3af; 5-12 VDC or 12-24 V AC
13	Intelligent Features	Minimum Motion Detection, Line crossing, Tempering alert / video loss and so on
14	Certification / Approvals	BIS, UL, CE/FCC, RoHS/WEEE
15	ONVIF Compliance	Minimum Profile S, G
16	Operating Environmental Conditions	(a)Operating Temperature range of 00 C to 500 C (b)Relative Humidity up to 90% (Non –Condensing)
17	SD Card Capability	Support minimum 128 GB SD card Supplied with 64GB SD card
18	Alarm I/O Interface	Minimum 1 input ,1 output
19	Security	3rd party certificate for Secure data communication on network.

Item Code: A136010010060249

8. Bullet Camera (VMS based ANPR/Speed Detection)

Sr. No	Parameters	Minimum Specification
1	Image Sensor	1) 1/2.8" CMOS or better, 2) WDR 100dB Day (color) / Night (B/W) or better
2	Resolution	1) 4MP or better 2) 25fps or better
3	Minimum Illumination	Color 0.05 lux, 0.005 lux at B/W mode (30 IRE or better)

.

4	Lens & Viewing Range	1) Lower side 2.7-4 mm or better 2) Upper side 9 mm to 12 mm varifocal-lens or better 3) Up to 50 m IR range; 4) Motorized Varifocal and Focus,
5	Field of View (H/V)	Minimum 104°/56° 42°/24° or better
6	Lens Type	Should support Auto IRIS, IR corrective or better
7	Pixel Resolutions	Min Pixels 2688 x 1520 &so on as per resolution standard
8	Video Compression Standards	H.264 / H.265 / MJPEG
9	No. Of streams	Triple Streaming (or more) with a Maximum of 5 Concurrent Shared Streams or more
10	Network Protocols	IPv4, IPv6, TCP/IP, UDP, IGMP(Multicast)DHCP Client, HTTP, HTTPs, PEAP, EAP-TLS, SSH, SOAP, CIFS, SNMP, UPNP, RTSP, LLDP
11	Protection& Housing	Minimum IP-66, IK10 & NEMA 4x (same make as camera)
12	Power Supply & O/p Voltage	PoE IEEE 802.3af; 5-12 VDC or 12-24 V AC
13	Intelligent Features	Minimum Motion Detection, Line crossing, Tempering alert / video loss and so on
14	Certification / Approvals	BIS, UL, CE/FCC, RoHS/WEEE
15	ONVIF Compliance	Minimum Profile S, G
16	Operating Environmental Conditions	(a)Operating Temperature range of 00 C to 500 C (b)Relative Humidity up to 90% (Non –Condensing)
17	SD Card Capability	Support minimum 128 GB SD card Supplied with 64GB SD card
18	Alarm I/O Interface	Minimum 1 input ,1 output
19	Security	3rd party certificate for Secure data communication on network.

Item Code: A136010010060113

9. Junction Box for CCTV (Weatherproof with Required Accessories)

Sr No	Parameter	Minimum Specification
1	Junction box (JB) cabinet	Will be a fabricated cabinet using MS CRCA sheet of suitable thickness as per our design
2	Enclosure protection class	IP65
3	Mounting	Floor mounted type as per our design
4	UPS-Inverter	UPS-Inverter of suitable rating will be housed inside the Junction box
5	Battery bank	Suitable AH capacity for 1 hr backup

6	Space for Network &other devices	Sufficient space will be provided inside the JB
		for mounting of Network switch & other devices like LIU, processing unit, ethernet switch etc.
7	Overall approx. size of JB	1100 (H) x 900 (W) x 700(D) mm (Actual design need to be planned by bidder and get approved from department)
8	Cooling	Forced cooling using fans with filter arrangement
9	Protection device	Surge protection device along with other necessary protection & isolation switchgears
		will be provided
10	Weight	Overall approx. 60Kg
11	Accessibility	Through hinged front door. A lock & key arrangement will be provided for security.
12	Location of installation	The JB will be installed on the floor just next to the pole. So that cables can eb easily routed to
		the cameras through pole cavity.

Item Code: A136010010060190

10. Industrial Grade Network Switch (4/8 Ports)

Features	Minimum Technical Specifications	
Type	Must be Industrial Grade, Din-Rail mountable Ethernet Switch	
Switching Capacity, Forwarding rate and Latency	Must have minimum 20 Gbps Switching capacity and forwarding rate of 14.4 Mpps	
No. of Ports	Minimum 4 * 10/100/1000 Base-T ports and minimum 2 * 1000 Base X SFP ports. Switch should be expandable to support total of 8*10/100/1000 Base-T ports.	
PoE / PoE+	All 4 nos. of Access ports shall deliver PoE+ with 120W power budget	
Protocol's support	Switch should support STP, RSTP, MSTP, Ring protection protocol, Ethernet IP, Modbus TCP/IP, IEEE 1588 PTP v2	
Type of VLANs	Switch should support IEEE 802.1Q Port based VLANs and Static Inter-VLAN routing	
Multicast traffic	Switch should support Multicast traffic through IGMPv1, v2, v3 snooping, IGMP filtering and IGMP querier	
Quality of Service	Switch should support ingress policing, rate limit, egress queuing and shaping and auto QoS	
Security	Switch should support port security, 802.1x, Dynamic Host Configuration Protocol (DHCP) snooping, dynamic ARP inspection, IP source guard, guest VLAN MAC authentication bypass, 802.1x multidomain authentication, storm control - unicast, multicast, broadcast, SCP, SSH, SNMPv3, TACACS+, RADIUS server/client, MAC address notification, BPDU guard, Port ACL	
Layer 2 IPv6	Switch should support IPv6 host and SNMP over IPv6	
Management	Switch should support WebUI, MIB, SmartPort, SNMP, syslog, DHCP server, SPAN session, RSPAN, Express setup, IEEE 1588 PTP, CIP sync	

Power supply	Switch should have Dual DC Power input of 9.6 to 60VDC with separate Power input terminal

Utility	Dying gasp should be inbuilt feature, removable storage (SD Card or USB) for configuration backup
Operating Temperature:	-20 to 70°C or better
Operating Humidity	5% to 95% (non-condensing)
Housing	IP30 protection and Fanless Design
MTBF	6,00,000hrs or better
Safety Certifications	UL/CSA 60950-1, CE Marking, RoHS compliant
EMC Emissions compliance	CISPR 24, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4- 5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-10, EN 61000-4-16, EN 61000-4-17, EN 61000-4-18, EN 61000-4-29, EN 61131-2, EN 61000- 6-4 Class A, EN 61000-6-2, EN 61000-6-1

Item Code: A136010010060250

11. Poles for Camera Mounting with required Accessories

Sr No	Minimum Specification
1	Pole/Angle structure of 4m / 6m height
2	Maintenance access to CCTV from rear side
3	Pole structure will be manufactured from steel confirming to IS 2062. It will be pretreated & painted with final paint shade of silver color. A ladder with safety cage will be provided for climbing on the platform.
4	At the bottom side of the safety cage a door with locking arrangement will be provided.
5	Pole structure will be provided with lightening arrestor for protection of the CCTV system.
6	The Mains supply & communication cables to CCTV will run through the pole cavity.
7	Pole design is suitable for wind load of 150KMPH

8	Height of the pole has to be 4M / 6M or above as per requirement

Item Code: A136010010060267

12. L2 /L3 Network Managed Switch (As Required)
(L2 – 24 Ports 10/100/1000 POE Mbps + 4 10G BASE – T/SFP+ Combo ports L3
– 20* 10G SFP+ Ports and additional 4 10G BASE – T SFP+ Combo Ports)

Sr. No	Minimum Technical Specification
1	**General Features:**
2	Switch should be 1U and rack mountable in standard 19" rack.
3	Switch should support internal hot-swappable Redundant Power supply from day 1.

4	Switch should have redundant fans from day 1
5	Switch should have minimum 2 GB RAM and 4 GB Flash.
6	Switch should support stacking using dedicated stacking ports in addition to the asked uplink ports. Should support for minimum 80 Gbps of stacking throughput with support for 8 switches in single stack.
7	**Performance:**
8	Switch shall have minimum 128 Gbps or more of switching fabric and 95 Mppsof forwarding rate.
9	Switch shall have minimum 16K MAC Addresses and 4096 VLAN IDs
10	Should support minimum 3K or more IPv4 routes
11	Switch shall support 1K or more multicast routes and 500 Switch Virtual Interfaces

12	Switch should support at least 8K flow entries (Jflow/Sflow/Netflow)
13	Switch should have 6MB or more packet buffer.
14	**Functionality:**
15	Switch should support IEEE Standards of Ethernet: IEEE 802.1D, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1p, 802.1Q, 802.3, 802.3u, 802.3ab, 802.3z
16	Switch must have functionality like static routing, RIP, PIM, OSPF, VRRP, PBR and QoS features from Day 1
17	Switch must have support for advance Layer 3 protocol like VRF, VXLAN, LISP and OSPFv3 as and when required in future
18	Switch shall have 802.1p class of service, marking, classification, policing and shaping and eight egress queues.
19	Switch should support management features like SSHv2, SNMPv2c, SNMPv3, NTP, RADIUS and TACACS+ .
20	Switch should support IPv6 Binding Integrity Guard, IPv6 Snooping, IPv6 RA Guard, IPv6 DHCP Guard, IPv6 Neighbor Discovery Inspection and IPv6 Source Guard.
21	Switch should support 802.1x authentication and accounting, IPv4 and IPv6 ACLs and Dynamic VLAN assignment and IEEE 802.1AE (MACSec – 128) on all the ports
22	Switch must have the capabilities to enable automatic configuration of switch ports as devices connect to the switch for the device type or equivalent solution.
23	During system boots, the system's software signatures should be checked for integrity. System should capable to understand that system OS are authentic and unmodified, it should have cryptographically signed images to provide assurance that the firmware & BIOS are authentic.
24	**Interfaces:**
25	Switch shall have 24 nos. 10/100/1000 Base-T ports and additional 4 nos. SFP+ uplinks ports from day 1.

26	The switch should support PoE/PoE+ on all ports with total PoE budget of 740 W
27	**Certifications:**

28	Switch shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 Standards for Safety requirements of Information Technology Equipment.
29	Switch shall conform to EN 55022 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B Standards for EMC (Electro Magnetic Compatibility) requirements.
30	Switch / Switch's Operating System should be tested for EAL 2/NDPP or above under Common Criteria Certification.
31	Operating Temperature: 0°C to +45°C

Item Code: A136010010060240

13. Mounting and Cabling Accessories at Camera end (As Required)

Item Code: A136010010060191

14. Mobile Surveillance camera (with Inbuilt Battery, onboard storage & weatherproof housing)

These cameras are to be used for overhauling purpose and need to be mobile/portable in nature. It shall be able to record overhauling activities in onboard storage for certain period. These solution demands design & engineering of solution thus vendor needs to get required design, drawing approvals of client & PMC before manufacturing or procurement.

Sr No	Parameter	Minimum Specification
1	Image sensor	1 / 2.8" CCD / CMOS sensor (2MP) or better
2	Electronic Shutter	1 to 1 / 10,000 s or better
3	Min illumination/ light sensitivity (Color)	2 lux (30 IRE, F 1.2) or better
4	Min illumination/ light sensitivity (B/W)	0.2 lux (30 IRE, F 1.2) or better
5	Wide Dynamic Range	100 dB or more
6	Backlight Compensation	ON / OFF
7	IRIS	DC or Automatic

8	FOCUS	Automatic & Manual
9	White Balance	Automatic & Manual
10	Frame Rate	25/30 FPS or better
11	Video	
12	Day and Night functionality	Automatic, Color, Mono
13	Max video resolution	2 MP Or better
14	Video Streams	Individually configurable 03 video streams or more (H.264, MJPEG, JPEG)
15	Intelligent Video	Motion detection, tamper detection and so on
16	Privacy Mask	4 Zones or more
17	Compression	
18	MJPEG	Required
19	H.264	Required
20	MPEG-4	Required

21	Audio	
22	Audio support	Required
23	Audio Compression	G.711 or better
24	Two-way audio	Required
25	Input / Output	01 IN and 01 OUT
26	Network and Interface	
27	Interface	RJ-45 for 10/100 base-T Ethernet
28	I/O Port	01 IN, 01 OUT
29	Upgrade	Through web browser, online, firmware upgrade supported
30	Network Protocols support	Compatible with TCP/IP, HTTP, ICMP, PPPoE, DDNS, DHCP, UDP, DNS, SMTP, RTP, RTSP, SNMP protocols
31	Compliance	Minimum ONVIF S & G
32	Application programming interface	Open API preferable

	General	
33	Slot for memory card	Support minimum up to 128 GB SD card
		Supplied with 128 GB SD card
34	IR Source	Integrated / Inbuilt
35	Battery	In built chargeable battery having 8 hrs of backup
36	Operational temperature °C	0°C to 50 °C
37	Humidity	0 to 80% RH non-condensing
38	IP rating	IP66 or better Rated Outdoor Housing
39	Power	PoE / PoE+
40	Certifications	CE, FCC, EN / UL
41	Security	3rd party certificate for Secure data communication on network.

Item Code: A136010010060251		
15. Vehicle Mount IP PTZ Camera with MDVR		
Sr No	**Parameter**	**Minimum Specification**
1	General	1/3'' Progressive Scan CMOS (or better)
		Optical zoom: 30X; Digital zoom: 16X
		Resolution: 1920x1080. 2MP or better
		Minimum ONVIF S & G Compliant
		IP66
		Up to 120m IR Light Source
2	Focal Length	4.3-125mm or better
3	Angle of View	59.8°-3.0°(Wide-Tele) or better
		Auto iris, auto focus, auto white balance, backlight compensation and auto day & night switch Electronic Image Stabilization.
4	Camera Function	Min. Illumination: Color : 0.002Lux @ (F1.5, AGC ON) or more,

		Minimum B/W : 0.0002Lux @ (F1.5, AGC ON)
		H.265/H.264/MJPEG video compression
		ROI (Region of Interest) encoding (support 10 areas or more with adjustable levels),
		Built-in Web server Onboard storage, up to 128GB
		Support for minimum 8 NAS storage;
		Edge recording (transmit the videos from SD card to the NAS after network resumed)

5	Network Functions	IPv4/Ipv6, HTTP, HTTPS, 802.1X, QoS, FTP, SMTP, UPnP, SNMP, DNS, DDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, ICMP, DHCP, PPPoE
6	Video Resolution	1920x 1080 or better PAL: 25fps or better
7	Connections	Network Connection: 10/100M self-adaptive Ethernet Protocols: ATP, Telnet, ODP, TCP, IP, HTTP, IGMP,ICMP, ARP, SNMP, ONVIF
8	Pan & Tilt Functions	Minimum Range: Pan: 360° endless, Tilt: +90° ~ -90°
		Minimum Speed: Pan: 0.1°-80°/s, Tilt: 0.1°-40°/s
		Minimum Preset: 200
		Minimum Patrol: 5 patrols, up to 32 presets per patrol
		Minimum Pattern: 4 patterns, with the recording time not less
		than 10 minutes per pattern
9	Working Temperature	-40°C ~ 55°C, humidity 90% or less
	Power	AC230V / DC12V / PoE, Max. 40W
10	IR	Up to 120m IR Light Source
11	Power	Automatically adjusted, depending on the zoom ratio
12	MDVR	Supports to 1080p & 720p cameras
		CPU with powerful processing ability
		Supports HDD/SSD for recording. Max. 2TB

		Dual streams for local recording and wireless transmission
		Support 3G/4G, Wi-Fi, GPS modules
		Support built-in G-sensor for harsh acceleration detection
		Support 2 x USB2.0. Front panel USB, for upgrading, and exporting video
		Support 8-36V wide range power input, adapt to harsh environment temp up to +55 Degree Celsius
		Data self-protection, save data when shut down abnormally
13	Other	Support for Vibration Resistance
14	Security	3rd party certificate for Secure data communication on network.

Note: These cameras & MDVR Shall be installed on QRT, Task force vehicles of security forces& Fire tenders in plant. Instruction for same shall be given by CSTPS authorities after detailed discussion & design approval.

Item Code: W033090020240023

16. Installation and Commissioning of CCTV System (As Required)

B. Access Control System & vehicle monitoring system with required accessories& Entry Management System with Law Enforcement Equipment.

Item Code: A136010010060252

1. Access Control Management Software (with Client software)
(Enterprise Class, equipped with all license. Time & Attendance module, Visitor Management software with Guard Tour system. Ready to integrate with Command & Control centre application)

SR. No.	Minimum Specification / Description
1	Blank

2	The system shall be a fully integrated Access Control, alarm processing and photo badging system capable of managing a single site, multi-tenanted sites or expandable to multiple sites in different geographical locations. It shall utilise a fully integrated badging production system and biometric template management.
3	**Directory Synchronization and Single Sign On (SS0):-**
3.1	The system must support integration with a directory service such as Microsoft Active Directory (or similar) using Active Directory Lightweight Directory Access Protocol (LDAP) Access and Kerberos Key Distribution.
3.2	The integration must support the Synchronization of card holder records and provide support for Windows Single Sign On.
3.3	1.Directory Synchronization
	a) The integration must process additions, updates, and deletions on a scheduled basis allowing the Directory Service to centrally manage cardholder access control details.
	b) Synchronization should be configurable for hourly or daily updates, with the ability to specify exact time intervals and days of the week.
	c) Configuration of the Directory Synchronization must be carried out using a built in web based interface to the system controller.
3.4	2. Single Sign On
	a) The system must support Windows Single Sign On (SSO) allowing a single action of user authentication and authorization to permit a user access to the system workstation software.
	b) Single Sign On must remove the need to enter multiple passwords.
3.5	Single Sign On must support both the client workstation software and any web-based applications that also require user authentication.
4	**Personnel PASS PRODUCTION SYSTEM: -**
4.1	The Access Control system shall be provided with the Pass Production System. This will provide the operator with a means of entering personnel details on the system along with a full range of video imaging facilities for capturing personnel images, company logos and personnel signatures and incorporating these onto professionally designed passes.
4.2	The Pass Production application shall provide a facility to capture biometric data from a person.
4.3	A Trace facility will allow a cardholder's movements to be displayed on an Alarm and Event Display workstation in real-time.
4.4	The user will be able to view the last 20 transactions for any cardholder from within the Pass Production application by clicking on a button. This list can then be saved to file or printed out.

4.5	The following card status options will be available on the system: - Expired, About to Expire, Lost/Stolen, Not Yet Operational, Current	
5	**User definable Fields: -**	

5.1	The system shall provide to ability to create user definable tabs within the Personnel, Companies, Visitors and Vehicles applications. User definable fields can be added to each tab and the layout of the tab will be fully customizable. Each application should support up to 85 user definable fields covering multiple data types such as character, integer, and date	
6	**VISITORS PASS PRODUCTION SYSTEM (Inbuilt Visitor Management System): -**	
6.1	The system shall provide a separate Visitors pass production feature. This will allow a user to create a database of all temporary site visitors and schedule the issuing of an ID card to each visitor as and when they require one.	
6.2	The application shall also allow the creation of visitor's passes (including image capture) plus a pass printing feature.	
6.3	Visitor records should support the attachment and storage of files such as driving licenses, passports, permits, and certificates etc. A Visitor record will support multiple file attachments that can be given a logical name and also be printed directly to a printer when viewing.	
7	**Oneshot:-**	
7.1	The system will offer the facility to remotely open a door from the workstation, for single user access. In this case, all door/lock times will be the same as if a valid card had been swiped.	
8	**Broadcast Zones: -**	
8.1	The Broadcast Zones application will be provided to transmit a message to a reader from a Workstation. The message sent will be a request for the device to enable or disable an output. This means that the opening/closing of doors or switching on/off of equipment can be controlled at a central location.	
8.2	Before issuing a Broadcast, a Broadcast Zone must be defined. A Broadcast Zone may contain one or more devices. For each device chosen, the particular outputs (e.g. onboard relays) that will be enabled on that device must be selected	
9	**Threat Levels: -**	
9.1	In response to a perceived threat, the system must support customizable levels of system security that can determine the cardholders who are allowed to gain access, the areas they can access, and the level of authentication required at the door. Threat Levels must be applied to cardholders, visitors, and vehicle card records.	
9.2	The system should provide dedicated applications for defining the Threat Level and Setting the Threat Level. Access to these applications should be restricted and assigned only to certain system operators. The current Threat Level must always be visible to the workstation operator.	
9.3	When defining the Threat Level, card readers are added into user defined groups whose description and colour code can be user defined. An unlimited number of threat levels must be supported.	

10	Alarm and event: -
10.1	The primary function of the Alarm and event application is to provide a robust, highly intuitive and powerful visual tool for the recognition, acknowledgment and cancellation of the system alarms / events, as and when they occur. It shall also be capable of integrating with other security monitoring systems such as CCTV systems, CCC Application, Intruder Detection systems and so on
10.2	This application will clearly display the name of the user who is currently logged in.
10.3	Alarms will be ordered on the AED by priority level. In the event of two alarms having the same priority, they will then be ordered chronologically by time of occurrence.
10.4	Unlimited site maps / diagrams may be used with the AED and provide unlimited zoom levels.
10.5	Oneshot commands may be issued to a reader from the AED software using an easy to use mouse menu.
10.6	Actions required to acknowledge / cancel alarms will be user-definable and will be configured using the Allowed Actions toolbar application.
10.7	In the event of a Traced card being used, details will appear in the AED Event Viewer, with the reason for trace, along with the personnel serial number and location clearly visible.

10.8	In the event of a transaction alarm, a "details" button will be available enabling the immediate display of that card holder's details & photograph to appear.
10.9	The system shall utilise 'dynamic icons'. The dynamic icons shall change appearance, in both colour and icon display based upon the status of the associated object. This appearance change shall occur in real time and shall not require the system operator to perform a screen refresh or exit the current screen. An alarm on the system will initially be represented by a flashing red icon, changing to a solid red icon after being acknowledged and reverting to solid green after being cancelled and cleared from the system.
10.1	Unique icons can be used for each alarm type.
10.11	A unique icon will be used for each hardware component type on the system
	e.g. Ethernet Card Reader. All icons on the system will be user-definable.
10.12	This shall provide a display of the status of each hardware component on the system example READER OFFLINE, INPUT IN ALARMED STATE, DOOR FORCED/HELD OPEN, DEVICE MAINS POWER FAIL, BATTERY LOW & POWER RESTORED
10.13	The system software shall, using a mouse, allow for placement of device icons on each graphic / floor plan. The device icons that may be placed on the graphic / floor plan can be like ALARM INPUT POINTS, CARD READERS, INPUT/OUTPUT CONTROLLERS, CCTV CAMERAS and so on
10.14	Provision to configure the graphics and floor plans (CAD / Image)

10.15	Upon activation of a selected alarm, the system shall automatically display the associated graphic / floor plan on the application screen. The operator will be able use the mouse to click on an icon on the graphic and acknowledge / cancel the alarm.
10.16	The system may be configured to play a predefined voice / video file on receipt of a specific alarm.
10.17	This software shall allow the user to configure alarm clearance using a bulk acknowledge / cancel feature. This will be available as an option that can be switched on/off by senior users if required.
10.18	This shall be capable of integrating fully with CCTV systems, allowing the operator to view real time video footage at a selected camera / monitor, or to view recorded footage tagged to an alarm event through the use of Digital Video Recording equipment. The system shall be capable of displaying motion tracking alarms from cameras and also allow for the display of Access Control device alarms that have been tagged with video footage
10.19	This display shall have the option to report in real time all cardholder transactions from individuals selected for cardholder tracing.
10.20	This software will also visually report in real time invalid security staff activity during their pre-defined Guard Tours.
10.21	An Alarm "pop up" will appear if this application is not in the foreground.
12	**Alarm & Event Command Execution: -**
12.1	This should support the addition of user defined icons with drop menus that execute 3rdparty software executable. During operation, the user should have the ability to click a desired icon to run an executable statement at any time.
13	**Allowed Actions: -**
13.1	The system will provide a feature to instruct security personnel how to respond to a particular alarm occurring. The situation that security personnel do not know what action to take in the event of a particular alarm will not be acceptable.
13.2	An Allowed Action MUST be selected when acknowledging and cancelling an alarm from the alarm & event application. The application will record what action was taken and this information will be available for later viewing in a report.
13.3	

	The Allowed Actions application will allow a system administrator to describe a number of actions to be carried out by the operator for each alarm or event type.
14	**Configuring reader messages: -**
14.1	This feature will allow the user to re-define the standard text and responses that are displayed on the reader LCD.

14.2	This may also be used in order to change the text displayed on the reader into another language.
15	**The guard tours application: -**
15.1	The Guard Tours application will provide the facility to define a list of readers / inputs that a security guard must visit in a certain order and either swipe their card or activate an input within a specified time. If the guard does not either swipe at a pre-configured card reader time, or activate a pre-configured input within the guard tour parameters, an alarm message will be sent to the alarm & event application.
15.2	This application will allow guards to be monitored on their progress in patrolling a site. The administrator may define the readers that must be visited, the order and the time between each successive swipe or input activation.
15.3	The system shall also provide a reporting tool for all Guard Tour activity on site.
16	**Ad Hoc Report Creation: -**
16.1	The system will also be compatible with industry-standard report creation packages, such as Crystal Reports™, which allows the user to tailor ad hoc reports according to their needs.

Item Code: A136010010060187

2.Access Control Client Software (Refer above specifications)

Item Code: A136010010060253

3.Access Control Server (with required accessories & Software's)

Sr. No	Features	Minimum Technical Specification
1	Processors	Rack Server shall have a minimum of two (2) Intel latest generationSkylake Processors with minimum 2.4 GHz & 16 cores per socket.
2	Chipset	Intel chipset compatible with the offered processors.
3	Internal Storage	The server should Support up to 8 hot-swappable SAS,NL-SAS and SSD drives .
4		Server should be configured with 3 Nos of 1 TB drives
5		The Server RAID controller should support the following configurations RAID 0, 1, 5, 6, 10, 50, and 60

6		Server should be configured minimum with 2GB of Flash backed write cache module.
7	Memory	Should have at least 24 DIMM slots per server and support minimum up to 1.5TB of DDR4 2666 MHz memory .
8		The Server should be configured with 32 GB of DDR4 Memory from day one
9		Support for advanced memory redundant technologies like Advanced error-correcting code (ECC) and memory mirroring.
10	Network	Should have 2 * 10 GbE (embedded) LAN ports , 4*1 GbE network cards for LAN connectivity
11	PCIe Slots	Up to 6 PCIe Generation 3.0 slots
12	Security	The server should provide cryptographic firmware updates

13		Capable to stop execution of the BIOS
14		Server should provide Anti-counterfeit
15		The server should provide hardware policy based security
16		The server should provide rack server intrusion detection
17		The server should provide Hardware root of trust
18		The server should provide system lock down
19	Management	Should support out of band upgrades, Agentless out-of-band management, integrated diagnostics and Power monitoring and reporting.
20		The system should provide management of multiple servers from single console
21		The system should provide hardware profile deployment (Single server os group of servers)
22		The server should support industry standard management protocols like IPMI v2 and SNMP v3
23		One 1-Gbps RJ-45 management port
24		The server should support multiple management interfaces including web user interface and command line interface.
25	Ports	Should have the following ports for server connectivity

26		● 1 serial port
27		● 4 USB 3.0/2.0 ports
28		● 1 VGA video port
29	Others	Supports hot swappable redundant fans
30		Supports hot swappable redundant power supplies
31		Rail Kit and cable mangement arm to be provided along with the server
32	Warranty	Server should have 05 years warranty
33	Form Factor	2U Minimum

Note: Above mentioned are indicative specifications, bidder need to provide as per System requirement

Item Code: A136010010060254

4.Client Workstation (with required accessories & software's)

SN	Parameter	Minimum Specification
1	Processor	Latest generation 64-bit x86 Dual core CPU with 3 GHz or more
2	Memory	Minimum 16 GB Memory
3	Graphics card	Graphics card with 4 GB video memory (non-shared)
4	Hard Drive	1TB SATA Hard drive @7200 rpm
5	Media Drive	NO CD / DVD Drive
6	Network interface	1000BaseT, Gigabit Ethernet (10/100/1G auto sensing)
7	Audio	Line/Mic IN, Line-out/Spr Out (3.5 mm)
8	USB ports	Minimum 6 USB ports (out of that 2 in front). These would be disabled for data transfer.
9	Keyboard	104 keys minimum OEM keyboard
10	Mouse	2 button optical scroll mouse (USB)

11	Monitor	22" TFT LCD monitor, Minimum 1920 x1080 resolution, 5 ms or better response time, TCO 03 (or higher) certified: 2 LCD Monitors
12	Operating System	64 bit pre-loaded OS with recovery disc
13	Anti-virus feature	Advanced antivirus, antispyware, desktop firewall, intrusion prevention (comprising of a single, deployable agent) which can be managed by a central server. (Support, updates, patches and errata for the entire contract/ project period)

Note: Above mentioned specifications are indicative only, Bidders need to provide as per system requirement

Item Code: A136010010060256

5. Access Control Biometric Reader Cum Controller
(with required PIN+CardReader+Biometric with suitable housing)

Sr. No	Minimum Specification / Description
1	Controller, advanced IP card reader and single biometric solution all in one that
	meets requirements for three stage identity authentications (card, PIN, and biometric verification)
2	Fast card and fingerprint verification, uses 1:1 fingerprint match at the door
3	Fingerprint module gives a high-resolution scan with FIPS201 approved
	biometric algorithm
4	For indoor or outdoor usage with an IK06 vandal resistance rating, and IP65 dust
	and water-resistant rating
5	LCD shall be Capacitive, light touch, 4.3″ Diagonal, 480 * 272 square pixel 16 bit
	color or equivalent.
6	Ability to display live video at the workstation on intercom request, when
	interfaced with CCTV system
7	Optional: PIR motion detection
8	Ability to display personal information announcements / messages
9	Housing shall be Flame retardant polycarbonate, with UV stabilization. RoHS compliant, and PBE/ PBDE free flame-retardant system

10	LED Indicator -High Intensity multi-color LED indicator
12	Voltage 10-14V DC
13	IP Rating – IP30
14	Op. Temperature - 0 to 55 deg
15	LED Indicators – 3 high intensity LED indicators
16	LCD indicators – 32 x 122 dots Monochrome graphics super twist LCD with
	backlight or equivalent
17	Temperature -15° to 50°C
18	**Fingerprint**
19	Type Optical
20	Resolution 500 dpi
A	Sensing area 16mm x 19.0mm
B	Image size (pixels) 272x320
C	**Functionality**
D	Inputs -Four analog inputs – voltage provided

21	Outputs -2 relays volt free contacts (dry contact)
A	Memory -128 MB RAM, 256MB NAND Flash
B	Expansion -Micro SD slot for optional memory expansion. Micro SD card fitted.
22	RTC Battery Backup - 3.0V rechargeable Lithium-ion
23	**Off-line Database**
24	Cardholders 123,000 (Two fingerprint templates per cardholder)
25	Transactions rate 50,000/ min
A	Card technologies MiFare (CSN), DESFire (CSN), DESFire 3DES, iClass, iClass SE,
	Picopass

B	Communication Interface
26	To Exit Reader RS485, Wiegand
27	To System Host 0/100 Base-T TCP/IP
A	Special Features 533 MHz DSP FIPS201 approved algorithm
	Robust optical Solid and scratch-free sensor surface Reliable high quality
	fingerprint image for wet & dry fingers Sensor automatically optimizes fingerprint image
B	Verification time (1:1) < 1 sec
28	BIS Certified, CE

Item Code: A136010010060257

6. UHF Reader for Vehicle Monitoring along with Controller (As Required)

Sr. No	Minimum Specification / Description
1	Protection class IP66
2	Material Aluminium chassis with UL94 ABS cover
3	Operating temperature -30 to +60°C
4	Power supply 12 to 24 VDC supply recommended / PoE+ PSE IEEE 802.3at compliant
5	Power consumption 1.5A @12VDC, 0.75 @24VDC
6	Read range Up to 10 meters (33 feet)
7	Antenna polarization Circular polarization
8	Air interface According to ISO 18000-6 C
9	Communication interfaces RS422 / RS485 , Ethernet 10/100Mbps and USB service interface
10	Communication protocols CR/LF, DC2/DC4 and various OEM protocols (for more information see firmware manuals). OSDP .
12	Relay output 1 relay output (NO, common, NC), 24 VDC 2A
13	Input 2 digital input for LED control - active low inputs (0V - 5V); 1 digital input for reader disable - active low inputs (0V - 5V)

14	Output Wiegand, Magstripe (clock & data)
15	Antenna input 1x TNC, supports external antenna
16	Standards CE, FCC

Controller for UHF Readers

Sr. No	Minimum Specification / Description
1	On-board 10/100 Mbps Ethernet.
2	Reader capacity: 2 Weigand/OSDP/Mag Stripe interfaces (data/data, clock/data)

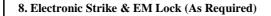|	
3	Eight supervised inputs (four available per door)
4	Two relays (normally opened or closed) and open collector outputs
5	Self-resetting fuses – saves maintenance time
6	Onboard LED - provides visual status
7	Voltage: Input 100-240 VAC 50/60Hz, Output 13.8V@ 3.5A
8	Backup Battery: Integral charging circuit provided with enclosure and space battery.
9	Temperature: -10º to 55°C (14° to 133°F)
10	LED Indicators : . Power, Link to host, CommsTx/Rx, Fault / Tamper, Lock and Relay Status
11	Database memory : 2GB SD Card
12	Cardholders : Storage up to 200,000 cardholders at the door
13	Transactions : Up to 50,000 transactions in offline operation
14	RTC Battery Backup : 3.0V rechargeable Lithium
15	Regulatory: FCC Part 15, CE, UL 294
Note: All the accessories like EM locks, door sensor, Reader Housing with required signal & power cables, connectors, network switches, Junction boxes, PVC Conduits, Circuit breakers and stands etc. required for installation, commissioning and integration of the system shall be provided by the bidder.	

Item Code: A136010010060258

7. Biometric Enrolment Reader Cum Controller

Sr. No	Minimum Specification / Description
1	Housing -Flame retardant polycarbonate containing fully encapsulated electronics.
2	Voltage - 9-14Vdc
3	IP Rating-IP30
4	Temperature range 0° to 55°C (32°F to 131°F)
5	LED Indicators- Three high intensity LED indicators red, amber and green
6	LCD Indicators -2 x 122 dots Monochrome LCD with backlight or Equivalent
7	Keypad-12 character, standard layout, tactile or non-tactile response keypad.
8	Inputs -Four analog inputs – voltage supplied
9	Outputs -Two relays fitted – Changeover volt free contacts
10	Battery Backup 3.0V rechargeable Lithium-Ion
12	Database Cardholders Storage of up to 123,000 cardholders. (Two fingerprint templates per cardholder)
13	Transactions Up to 8,000 transactions in offline operation.
14	Communication Interface to System Host 10/100 Base-T TCP/IP
15	Regulatory Compliance. FCC, CE
16	Fast card and fingerprint verification, uses 1:1 fingerprint match at the door
17	Secure storage of fingerprint on the central access control server and the reader internal database using RC4 encryption
18	Detects conductivity of the living tissue beneath the skin. Exceeds FBI requirements and is FIPS201 certified
19	Fast fingerprint enrolment and connection over 10/100 Mbps Ethernet, no need for an intelligent controller in the system design

Item Code: A136010010060182

8. Electronic Strike & EM Lock (As Required)	
Item Code: A136010010060181	
9. Magnetic Door Status Sensor (As Required)	
Item Code: A136010010060141	
10. Emergency Exit Push Button (As Required)	

Item Code: A136010010060164

11. Turnstile (Half Height)

Sr. No	Minimum Specification / Description
	The electromechanical turnstile is designed to select transit flows in high- volume passage areas, and in highly frequented contexts like stadiums, airports, stations, public buildings and in any other places where high-volume flows need to be Regulated and/or selected.
	Selective, bidirectional, electromechanical turnstile, entirely made of AISI 304 stainless steel, fitted with a removable top cover with key lock, and removable side legs.
	The aluminium tripod head bears a shiny finish and stainless steel, shiny-polished arms.
	It works by allowing only one person to transit through in the desired direction.
	A command on the device releases the mechanism to manually push the tripod arm until the mechanical brake slows the tripod down to its resting position, until a new command is given.
	• Power: 230V A.C. 50/60 Hz
	• Power Draw: 500 mA max
	• Insulation class: II
	• Minimum Protection rating: IP44
	• Weight: 60 Kg Approx..

Item Code: A136010010060223

12. Turnstile (Full Height)

Sr. No	Minimum Specification / Description
	The electromechanical turnstile is designed to select transit flows in high- volume passage areas, and in highly frequented contexts like stadiums, airports, stations, public buildings and in any other places where high-volume flows need to be Regulated and/or selected.
	Selective, bidirectional, electromechanical turnstile, entirely made of AISI 304 stainless steel, fitted with a removable top cover with key lock, and removable side legs.
	The aluminium tripod head bears a shiny finish and stainless steel, shiny-polished arms.
	It works by allowing only one person to transit through in the desired direction.
	A command on the device releases the mechanism to manually push the tripod arm until the mechanical brake slows the tripod down to its resting position, until a new command is given.
	• Power: 230V A.C. 50/60 Hz

	• Power Draw: 500 mA max
	• Insulation class: II
	• Minimum Protection rating: IP44
	• Weight: 60 Kg Approx..

Item Code: A136010010060222

13. Boom Barrier
(with accessories like Magnetic loop, traffic light with Red reflective strips, Controller,
Intelligent Card Reader & so on)

Sr. No	Minimum Specification / Description
1	Boom Barrier: Boom Length minimum 6 meter
	Motor Type- 24V DC, Max. Absorbed power - 300W Minimum Torque-600Nm.
	In built encoder for safety.

	Max. Boom length up to 7.6 Mtr.
	Separate boom barrier for entry & exit lane
	Boom should be with Strong round Aluminium pipe minimum 100mmdia,
	Provision for fixing flashing LED illumination on both sides of the boom at middle line.
	Also with provision for fixing RED reflective adhesive stickers on both side of the boom.
	Suitable for fixing additional brake away system for the boom.
	Manual operation needed in case of power failure.
	Provision for connecting Push Button switch for open/close.
	Provision for connection photoelectric cell, one side with an adaptor on the cabinet
2	Control Panel- To be located horizontally at top portion of the cabinet minimum 915 mm above the Barrier foundation for simple and quick maintenance to be compatible for connecting any access control system including RFID.
	Provision for fixing Flashing LED on top of the cabinet.
	Minimum Protection - IP 54.
	Housing - Galvanized and powder coated with minimum dimension 1300mmX330X240 Approx.
	Adjustable opening / Closing speed - 4-8 Sec Minimum
	Operating Temperature - -20 degree to +55 degree.

Intelligent Card Reader/Controller for Turnstile / Boom Barriers

Sr. No	Minimum Specification / Description
1	Intelligent IP card reader and combined controller
2	Contactless card presentation with the option to enable Personnel Identification Number (PIN) for two stage authentications
3	Integral reading support for 13.56MHz smart card and 125 kHz proximity technology
4	Secure transfer of DESFire and AES encryption keysets
5	10/100 Mbps Ethernet host connection
6	Light touch capacitive keypad

7	Four analogue inputs to monitor door or alarm conditions
8	Two changeover relay outputs to activate door strike or other equipment
9	Weather-proof casing: IP65-rated

10	Housing: Flame retardant polycarbonate, with UV stabilization. RoHS compliant
11	Voltage :9-28 VDC
12	Temperature -20° to +60° C (-4° to 140° F)
13	LED Indicator Lightbar: High intensity multi-colored
14	LCD Indicators -2.4" diagonal, 240 x RGB x 320 TFT full view, Brightness: 400 cd/m2 dimmable, Contrast ratio 400:1
15	Keypad -12 key, standard layout, (10 numeric keys, 2 function keys), capacitive, light touch
16	Memory : 32 MB SDRAM Data: 2 Gb flash Database Size in Off-line Mode
17	Cardholders : 250,000
18	Alarms & Transactions :50,000
19	Certifications : FCC Part 15, CE

Item Code: A136010010060221
14. IP66 enclosure for controller, power supply & backup system with accessories for Intelligent Card Reader with controller for Turnstile/Boom Barriers

Item Code: A136010010060030
15. Handheld Metal Detector
Minimum Specification / Description
HHMD able to detect metal without being in direct contact with the object.
Uniform Detection of Magnetic and Non-Magnetic Targets

Audio and visual alarm to indicate the detection of metal	
No adverse effects on cardiac pacemaker	
Operation temperature range from -40°C to 70°C	
Working on Batteries for 100 + hours continuous service and up to 200 hours with automatic sleep mode,	
Low battery indicator	
Built-in fast battery charger in combination with Docking station	

Item Code: A136010010060218

16. Door Frame Metal Detector with required Accessories

Sr. No	Minimum Specification / Description
1	Minimum 20 overlapping detector zones in DFMD
2	Passage clearance is 0.72m wide & 2.0m high.
3	Digitally Controlled,
4	Voltage Very Low Frequency
5	Multi-loop search coils housed in two side panels
6	9 security levels and further provision for adjustments to a fine step.
7	Detect all Metals, Zinc & Metal Alloys
8	should have uniform sensitivity throughout the door frame.
9	The unit should have Intelligent 5-digit traffic Counter display on LCD.

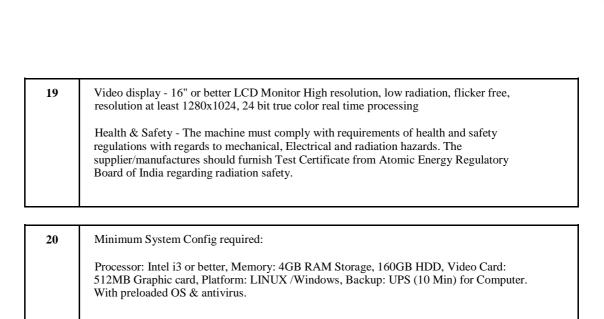| 10	The unit shall be capable of 20 different adjustable sensitivity levels.

Item Code: A136010010060027

17. X-ray Baggage Scanner
(with workstation & accessories. 3x3 meter porta cabin or suitable room arrangement for housing of baggage scanner)

Sr. No	Minimum Specification / Description
1	X Ray baggage Scanner Technology should be based on Dual energy based isometric X Ray imaging.
2	The Baggage scanner should produce isometric 3D view of the objects scanned to have more detailed information, which are not visible in traditional single view baggage scanners, which generates only the top or bottom (2D) view of the scanned objects.
3	Machine should generate the images in such a way that the depth of any scanned object can be visualized appropriately to further analyse the details of the object inside a baggage for better identification of harmful objects like Gun/Knife etc.
4	Tunnel Size - Minimum 60 cm W (width) x Minimum 40 cm H (Height).
5	Conveyor belt speed should be minimum 0.2 meter per second. Conveyor movement bi directional.
6	All machines should operate on 230 VAC, 50 Hz power supply.
7	Through put should be minimum 400 bags per hour.
8	Conveyor Capacity upto 160 kg evenly distributed.
9	Tube Voltage: Maximum 160 kVA
10	Tube Current 0.3 to 1.2 mA (Must be Adjustable)
11	Duty Cycle - 100%
12	The X-ray beam divergence should be such that the complete image at maximum size of bag is displayed without corner cuts.
13	The radiation level should not exceed accepted health standard (0.1m R/Hr at a distance of 5 CM from external housing). Relevant certificate from AERB.
14	The operating temperature should be -5° to 50° C (Test Certificate from NABL accredited Lab to be submitted at the time of bidding) .
15	Storage temperature - 20° to 60° C (Test Certificate from NABL accredited Lab to be submitted at the time of bidding), Relative Humidity- 10 to 95% non- condensing.
16	Resolution: The machine should be able to display single un-insulated tinned copper wire of 42-SWG or 38-AWG.
17	Steel penetration: 30 mm or above.
18	Sensors > 1000 diodes, L-shaped detector (folded array type).

19	Video display - 16" or better LCD Monitor High resolution, low radiation, flicker free, resolution at least 1280x1024, 24 bit true color real time processing Health & Safety - The machine must comply with requirements of health and safety regulations with regards to mechanical, Electrical and radiation hazards. The supplier/manufactures should furnish Test Certificate from Atomic Energy Regulatory Board of India regarding radiation safety.

20	Minimum System Config required: Processor: Intel i3 or better, Memory: 4GB RAM Storage, 160GB HDD, Video Card: 512MB Graphic card, Platform: LINUX /Windows, Backup: UPS (10 Min) for Computer. With preloaded OS & antivirus.

Item Code: A136010010060216

18. Card Enrolment/Badging workstation
(for visitors' room with required accessories & software's)

Item Code: A136010010060203

19. Card Programmer/Badge printer with cartridge
(With required accessories & software's)

Item Code: A136010010060259

20. Access Cards
(for visitor's RFID/UHF as required)

Item Code: A136010010060201

21. Mega Pixel camera with Tripod
(With required accessories)

Item Code: A136010010060199

22. Finger print scanner (As required)

Item Code: A136010010060224

23. Laser color printer (As Required)

Item Code: A136010010060267

24. L2 /L3 Network Managed Switch (As Required) (L2 – 24 Ports 10/100/1000 POE Mbps + 4 10G BASE – T/SFP+ Combo ports L3 – 20* 10G SFP+ Ports and additional 4 10G BASE – T SFP+ Combo Ports)

Sr. No	Minimum Technical Specification
1	**General Features:**
2	Switch should be 1U and rack mountable in standard 19" rack.
3	Switch should support internal hot-swappable Redundant Power supply from day 1.
4	Switch should have redundant fans from day 1
5	Switch should have minimum 2 GB RAM and 4 GB Flash.
6	Switch should support stacking using dedicated stacking ports in addition to the asked uplink ports. Should support for minimum 80 Gbps of stacking throughput with support for 8 switches in single stack.
7	**Performance:**

8	Switch shall have minimum 128 Gbps or more of switching fabric and 95 Mppsof forwarding rate.
9	Switch shall have minimum 16K MAC Addresses and 4096 VLAN IDs
10	Should support minimum 3K or more IPv4 routes
11	Switch shall support 1K or more multicast routes and 500 Switch Virtual Interfaces

12	Switch should support at least 8K flow entries (Jflow/Sflow/Netflow)
13	Switch should have 6MB or more packet buffer.
14	**Functionality:**
15	Switch should support IEEE Standards of Ethernet: IEEE 802.1D, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1p, 802.1Q, 802.3, 802.3u, 802.3ab, 802.3z
16	Switch must have functionality like static routing, RIP, PIM, OSPF, VRRP, PBR and QoS features from Day 1
17	Switch must have support for advance Layer 3 protocol like VRF, VXLAN, LISP and OSPFv3 as and when required in future
18	Switch shall have 802.1p class of service, marking, classification, policing and shaping and eight egress queues.
19	Switch should support management features like SSHv2, SNMPv2c, SNMPv3, NTP, RADIUS and TACACS+ .
20	Switch should support IPv6 Binding Integrity Guard, IPv6 Snooping, IPv6 RA Guard, IPv6 DHCP Guard, IPv6 Neighbor Discovery Inspection and IPv6 Source Guard.
21	Switch should support 802.1x authentication and accounting, IPv4 and IPv6 ACLs and Dynamic VLAN assignment and IEEE 802.1AE (MACSec – 128) on all the ports
22	Switch must have the capabilities to enable automatic configuration of switch ports as devices connect to the switch for the device type or equivalent solution.
23	During system boots, the system's software signatures should be checked for integrity. System should capable to understand that system OS are authentic and unmodified, it should have cryptographically signed images to provide assurance that the firmware & BIOS are authentic.
24	**Interfaces:**
25	Switch shall have 24 nos. 10/100/1000 Base-T ports and additional 4 nos. SFP+ uplinks ports from day 1.
26	The switch should support PoE/PoE+ on all ports with total PoE budget of 740 W
27	**Certifications:**

28	Switch shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 Standards for Safety requirements of Information Technology Equipment.
29	Switch shall conform to EN 55022 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B Standards for EMC (Electro Magnetic Compatibility) requirements.

30	Switch / Switch's Operating System should be tested for EAL 2/NDPP or above under Common Criteria Certification.
31	Operating Temperature: 0°C to +45°C

Item Code: W033090020240019

25. Accessories & Cabling from readers to controller switches (As required)

Item Code: W033090020240026

26. Installation & commissioning of access control system (As required)

D. Public Address System

Item Code: A136010010060266

1. IP Based Centralized Controller

Sr. No	Minimum Specification / Description
1.1	Central equipment shall consist of SIP enabled rack mounting server, Network switches at CCC& PA amplifier end, provision to interface hardware for FAS & IP-PBX system and power supply. Equipment rack shall be placed at common equipment room (CER at CCC) and redundant equipment rack hardware server and network switch is placed at control room.
	A standard Rack mount server / workstation consider specifications with a display &latest windows OS, Antivirus & Office suite.

Item Code: A136010010060282

	2. Master Calling/Control Station with required Software and Hardware
2.1	The IP control desk station shall be using DSP technology to able it to perform, e.g. point to point call, call distribution, zone calls, paging calls. The facilities shall include a monochrome or color LCD graphic display. A minimum 12-part alphanumeric full keypad and 4 function keys with a white backlight allow for intuitive operation. In addition, Base terminal shall have minimum 8 one-touch keys that can be backlit with 3-colour LEDs to perform complex control functions and to be able to display statuses separately from one another in color. Add-on module with 32 one touch buttons shall be considered for programming further requirements
2.2	This station, in the form of a console control desk or in the form of a built-in control desk, shall be made of ABS plastic, the front panel being finished in white aluminium (RAL 9006) and the rear housing in graphite grey (RAL 7024). Minimum degree of protection shall be IP 52.
2.3	The operating states shall be indicated by means of an individually configurable multi coloured and multifunction LED. An amplifier shall provide for the required volume even in the event of high ambient noise levels. Apart from facilitating communication, the station shall be able to assume control of third-party systems.
2.4	Hands-free speech shall facilitate natural and clear comprehension at an audio bandwidth of 16 kHz. The usage of an omnidirectionalelectret microphone shall allow for a speaking distance of up to 7 meters.

2.5	An amplifier shall provide for the required volume even in the event of high ambient noise levels. Apart from facilitating communication, the station shall be able to assume control of third-party systems.
2.6	The IP data rate shall be minimum 10/100 Mbit/s (full/half duplex). The equipment is guaranteed to work between 0°C and +50°C at a maximum non-condensing relative ambient humidity of 80%.

Item Code: A136010010060265

3 Field call stations (Indoor with required accessories)	
3.1	field call stations shall be deployed in plant unit & surrounding area. Indoor calling stations shall be installed at every floor on service buildings possibly by entry & exit. Proposed system call stations shall have LCD display, 10digit dial pad & 6 special keys, Preamplifier & power amplifier, Indication for 'Power Supply On' and 'Network Connection Healthy'.
3.2	The outdoor wall / column / desktop (as required) mounting type call station shall be dust tight and weather proof, with appropriate protection against direct rain, ingress of dust and moisture conforming to IP-66 degree of protection as per EN 60529.The indoor desk-top mounting type call station shall have a degree of protection of at least IP-66. All call

	stations and their components shall be capable of continued satisfactory operation at an ambient temperature at 55 Deg.
3.3	Indoor call stations Shall have built in speaker. Indoor & Outdoor call station shall work on POE supply as well as 24VDC external supply.
3.4	Indoor Call station shall have Flush, as well as optional desk mounting facility. Outdoor call stations are with wall/pole mounting arrangement. External loudspeaker shall be used at outdoor call stations.

Item Code: A136010010060264

4. Field call stations (Outdoor with required accessories)

3.1	Outdoor field call stations shall be deployed in plant unit & surrounding area. Indoor calling stations shall be installed at every floor on service buildings possibly by entry & exit. Proposed system call stations shall have LCD display, 10digit dial pad & 6 special keys, Preamplifier& power amplifier, Indication for 'Power Supply On' and 'Network Connection Healthy'.
3.2	The outdoor wall / column / desktop (as required) mounting type call station shall be dust tight and weather proof, with appropriate protection against direct rain, ingress of dust and moisture conforming to IP-66 degree of protection as per EN 60529.The indoor desk-top mounting type call station shall have a degree of protection of at least IP-66. All call
	stations and their components shall be capable of continued satisfactory operation at an ambient temperature at 55 Deg.
3.3	Indoor call stations Shall have built in speaker. Indoor & Outdoor call station shall work on POE supply as well as 24VDC external supply.
3.4	Indoor Call station shall have Flush, as well as optional desk mounting facility. Outdoor call stations are with wall/pole mounting arrangement. External loudspeaker shall be used at outdoor call stations.

Item Code: A136010010060215

5. Outdoor Horn Speakers with required accessories

	• Material / Color: ASA / RAL 7035
	• IP-rating 66 / 67

	• Rated / max. power: 15 W / 20 W
	• SPL 1W/1m :108 dB
	• SPL rated power: 118 dB
	• Effective freq. range 330 – 8000 Hz
	• Dispersion (-6dB) 1kHz / 4kHz :1300 / 330
	• Directivity factor: Q 1kHz/4kHz :3,2 / 11

Item Code: A136010010060263

6. Indoor Speakers with required accessories

	• Material / Color: PA / BS / RAL9010
	• Rated / max. power: 6 W / 20 W
	• SPL :1W/1m 93 dB
	• SPL rated power: 100 dB
	• Effective freq. range: 100 – 20000 Hz
	• Dispersion(-6dB) 1kHz / 4kHz :155° / 125° (baffle)

Item Code: A136010010060260

7. PA Amplifiers / Power Digital Amplifier for every building, 500W

Item Code: A136010010060262

8. PA Amplifiers / Power Digital Amplifier for every building, 250W

Item Code: A136010010060261

9. PA Amplifiers / Power Digital Amplifier for every building, 125W

Minimum Specifications for PA Amplifier / Power Digital Amplifier (500W/250W/125W as required)

1	Amplifier with 250W / 500 W / 125 W (as required) capacity or suitable capacity shall be provided as per need. We suggest bidder to choose amplifier as per capacity of individual building or unit. Multiple speakers shall be connected to amplifiers to cover large area over single 2 core cable. Amplifiers design provide distributed architecture, which reduces the cabling for speakers, flexible zoning for paging announcement.
2	The Class D amplifier shall be used for unidirectional communication. It shall be capable of high volumes and support a maximum audio bandwidth of 16 kHz or better as system required. Shall offer a high-power range and various audio outputs. It
	shall feature an output power of 250W / 500 W / 125 W (as required) operation with
	100 V audio output.

3	The housing shall comply with a rating of IP 20 (protection against encountering electrically active parts and the penetration of dirt) and with external housing/ cabinet
	of IP52 / IP65 provide as per usage in indoor / outdoor industrial areas.
4	It shall support a line monitoring function that permanently monitor the connected speaker circuit and immediately detect malfunctions. An integrated switch shall facilitate the direct connection of an additional IP device
5	The equipment shall work between -25°C and +55°C at a maximum relative ambient humidity of 95%.

Item Code: A136010010060200

10. Flasher Beacon with required accessories

Item Code: A136010010010003

11. PA System Management Software

1	Windows OS / LINUX (or equivalent) operating server-based configuration software with user friendly GUI is provided along with system. It can be used for re-configuration, maintenance and future expansion It is installed in PC stations provided at Unit CCR & Plant control rooms if required. Tool shall provide debugging and IP configuration facility, volume control.
2	System shall be flexible and its zone and call handling, communication facility control

		shall be possible through configuration without change of wiring diagram.
3		Configuration shall be stored in server, which can be downloaded and stored offline without stopping server. Multiple level configuration software access i.e. Administrator, Supervisor, operator shall be available with username & password to have controlled access to server configuration software.
4		Control desk software utility shall be at place to visualize, react and document. All control desk functions of the Server are displayed on one or several monitors. Interactive icons (on screen symbols) represent calls and error or alarm messages;
5		All system events shall be stored in database and reports shall be generated with date and event filters. Audio recording feature shall be available for recording of all Paging and Master control desk operations.

Item Code: A136010010060254

12. Client Workstation (with required accessories & software's)

SN	Parameter	Minimum Specification
1	Processor	Latest generation 64-bit x86 Dual core CPU with 3 GHz or more
2	Memory	Minimum 16 GB Memory
3	Graphics card	Graphics card with 4 GB video memory (non-shared)
4	Hard Drive	1TB SATA Hard drive @7200 rpm
5	Media Drive	NO CD / DVD Drive
6	Network interface	1000BaseT, Gigabit Ethernet (10/100/1G auto sensing)
7	Audio	Line/Mic IN, Line-out/Spr Out (3.5 mm)
8	USB ports	Minimum 6 USB ports (out of that 2 in front). These would be disabled for data transfer.

9	Keyboard	104 keys minimum OEM keyboard
10	Mouse	2 button optical scroll mouse (USB)
11	Monitor	22" TFT LCD monitor, Minimum 1920 x1080 resolution, 5 ms or better response time, TCO 03 (or higher) certified: 2 LCD Monitors
12	Operating System	64-bit pre-loaded OS with recovery disc

13	Anti-virus feature	Advanced antivirus, antispyware, desktop firewall, intrusion prevention (comprising of a single, deployable agent) which can be managed by a central server. (Support, updates, patches and errata for the entire contract/ project period)

Note: Above mentioned specifications are indicative only, Bidders need to provide as per system requirement

Item Code: A136010010060197

13. Centralized PA server/exchange with intercom software, integration with command & control application, fire alarm system & IPPBX system as required

Item Code: A136010010060267

14. L2 /L3 Network Managed Switch (As Required)
(L2 – 24 Ports 10/100/1000 POE Mbps + 4 10G BASE – T/SFP+ Combo ports L3
– 20* 10G SFP+ Ports and additional 4 10G BASE – T SFP+ Combo Ports)

Sr. No	Minimum Technical Specification
1	**General Features:**
2	Switch should be 1U and rack mountable in standard 19" rack.
3	Switch should support internal hot-swappable Redundant Power supply from day 1.
4	Switch should have redundant fans from day 1
5	Switch should have minimum 2 GB RAM and 4 GB Flash.
6	Switch should support stacking using dedicated stacking ports in addition to the asked uplink ports. Should support for minimum 80 Gbps of stacking throughput with support for 8 switches in single stack.
7	**Performance:**
8	Switch shall have minimum 128 Gbps or more of switching fabric and 95 Mppsof forwarding rate.

9	Switch shall have minimum 16K MAC Addresses and 4096 VLAN IDs
10	Should support minimum 3K or more IPv4 routes
11	Switch shall support 1K or more multicast routes and 500 Switch Virtual Interfaces
12	Switch should support at least 8K flow entries (Jflow/Sflow/Netflow)

13	Switch should have 6MB or more packet buffer.
14	**Functionality:**
15	Switch should support IEEE Standards of Ethernet: IEEE 802.1D, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1p, 802.1Q, 802.3, 802.3u, 802.3ab, 802.3z
16	Switch must have functionality like static routing, RIP, PIM, OSPF, VRRP, PBR and QoS features from Day 1
17	Switch must have support for advance Layer 3 protocol like VRF, VXLAN, LISP and OSPFv3 as and when required in future
18	Switch shall have 802.1p class of service, marking, classification, policing and shaping and eight egress queues.
19	Switch should support management features like SSHv2, SNMPv2c, SNMPv3, NTP, RADIUS and TACACS+ .
20	Switch should support IPv6 Binding Integrity Guard, IPv6 Snooping, IPv6 RA Guard, IPv6 DHCP Guard, IPv6 Neighbor Discovery Inspection and IPv6 Source Guard.
21	Switch should support 802.1x authentication and accounting, IPv4 and IPv6 ACLs and Dynamic VLAN assignment and IEEE 802.1AE (MACSec – 128) on all the ports
22	Switch must have the capabilities to enable automatic configuration of switch ports as devices connect to the switch for the device type or equivalent solution.
23	During system boots, the system's software signatures should be checked for integrity. System should capable to understand that system OS are authentic and unmodified, it should have cryptographically signed images to provide assurance that the firmware & BIOS are authentic.
24	**Interfaces:**

25	Switch shall have 24 nos. 10/100/1000 Base-T ports and additional 4 nos. SFP+ uplinks ports from day 1.
26	The switch should support PoE/PoE+ on all ports with total PoE budget of 740 W
27	**Certifications:**
28	Switch shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 Standards for Safety requirements of Information Technology Equipment.
29	Switch shall conform to EN 55022 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B Standards for EMC (Electro Magnetic Compatibility) requirements.
30	Switch / Switch's Operating System should be tested for EAL 2/NDPP or above under Common Criteria Certification.
31	Operating Temperature: 0°C to +45°C

Item Code: W033090020240021

15. Accessories & Cabling from speakers to controller & switches (as required)

Item Code: W033090020240027

16. Installation & commissioning of PA system (As required)

E. IPPBX System

Sr. No.	Minimum General Specifications
1	The IP telephony system should be a converged communication System with ability to run analog and IP on the same platform using same software load based on server and Gateway architecture

2	Proposed Solution should support remote site survivability on local gateways and the survivable system should provide all the telephony features as of main site. Survivability features and options that allow gateways to continue operating even if the primary server fails or in the event a WAN failure affects communications between the gateway and the IP PBX.
3	System should support High availability and seamless failover from primary server to secondary server. It should allow the administrator to make configuration changes even when primary server is down. All applications should be provided in redundancy
4	The entire solution (IP PBX, its hardware, IP Phones, Voice Gateway, Room based VC and Cloud MCU etc.) should be from a single OEM for seamless native integration and unified communication
5	The system should be based on server gateway architecture with external server running on Linux OS / Windows Server. No card-based processor systems should be quoted
6	The voice network architecture and call control functionality should be based on SIP
7	The call control system should be fully redundant solution with no single point of failure & should provide 1:1 redundancy
8	The communication server and gateway should support IP V6 from day one so as to be future proof
10	Should support signalling standards/Protocols – SIP, H.323, Q.Sig
11	Voice Codec support - G.711, G.729, G.729ab, g.722
12	The System should have GUI support web-based management console
13	The protection of signalling connections over IP by means of authentication, Integrity and encryption should be carried out using TLS
14	System should support MLPP / equivalent feature
15	Proposed system should support SRTP for media encryption and signalling encryption by TLS
16	Secure HTTP support for Call Server Administration, Serviceability, User Pages, and Call Detail Record Analysis and Reporting Tool. Should support Secure Sockets Layer (SSL) for directory

17	The administrator logging on to the call control server needs to authenticate by suitable mechanism such as User Login Information and Passwords/ Radius Server

18	System should allow custom client applications to support all call operations like make call, receive call, hold call, voice mail etc. using API available from PABX.
19	There should be seamless integration of video between Video IP phone and Video End point for point to point and multipoint conferences. For this both the components should be from the same OEM.
20	Voice gateway to be provided with 1 PRI card scalable to 3 PRI in future for PSTN (PRI) line termination.
21	Integration with C2 application and Radio Solution

Item Code: A136010010060243

1. Voice Communication Gateway for plant area IP-PBX with Contact Center, ACD, Gateway, recording, Mass Notification System, IP Soft Phone, VC Unit & System, MCU along with following
-100 Analog Extension
-50 IP Extensions
- 2 PRI Lines
- 2 wire FXS to PAGA
- CTI Package

Contact Center

Sr. No.	Minimum Requirement Specifications
1	Automatic call distribution
2	No of call centre agent's license: 15 & Supervisor License :2
3	Automatic identification of incoming number based on landline and mobile number mapping
4	Call recording mapped to incident tickets
5	Customizable agent and supervisor desktop layout
6	Inbound and outbound capability
7	Call control

8	Multisession web chat
9	Email
10	Live data reporting gadgets
11	Phone book
12	Speed Dial in IP phones
13	This call centre solution also needs to integrate with the existing Emergency Help lines (like 112, 100, 101, 108 and so on) via transfer of call / conference call

Automatic Call Distribution	
Sr. No.	**Minimum Requirement Specifications**
1	Should be highly available with hot standby and seamless failover in case of main server failure. There should not be any downtime of Contact Center in case of single server failure.
2	Should support skill-based routing and it should be possible to put all the agents into a single skill group and different skill groups
3	ACD support routing of incoming calls based upon caller input to menus, real-time queue statistics, time of day, day of week, ANI, dialled number etc.

4	ACD should support call routing based on longest available agent, circular agent selection algorithms
5	ACD should support the playing of customizable queuing announcements based upon the skill group that the call is being queued to, including announcements related to position in queue and expected delay
6	Agents should be able to chat with other Agents or supervisor from the Agent desktop software
7	Supervisor should be able to see the real-time status of agents, supervisors should be able to make agent ready or logout from the supervisor desktop
8	Should support Queuing of calls and playing different prompts depending on the type of call and time in the queue.

9	Platform support rich blending of inbound, outbound and multi-channel contacts in single queue and workflow

Gateway

Sr. No.	Minimum Requirement Specifications
1	The voice/media Gateway may be a dedicated standalone voice / media gateway.
2	Voice / Media Gateway shall be of same OEM branded/provided as the IP Telephony Server.
3	Shall have at least 2 x 10/100/1000BaseT ports.
4	It shall also have 03 or more slots to support variety of Voice interfaces like FXO, FXS, Channelized PRI (E1), etc.
5	It shall have embedded voice / video capable digital signal processor (DSP) or equivalent.
6	The voice gateway should have minimum 64 channel DSP resource scalable to 128 channels.
7	It should be capable of Survivable Call Control functionality so as to provide fall back call control service to locally connected IP and Analog phones, in case the remote site loses all connectivity to both the primary & secondary Call Control Servers. The survivability call control system has to provide all telephony features to the end users that are available from the main call control system.
8	It shall support QoS including classification, marking and prioritization.
9	Shall have support for management using CLI, Web UI (HTTP/HTTPS), Telnet, SSH and SNMPv3 as well as out of band management through console.

Recording

Sr. No.	Minimum Requirement Specifications
1	The Voice Logger System should be an IP based system to integrate with other Contact Centre components such as ACD, PBX & IP Phones.
2	The solution should support centralised/distributed call recording architecture.
3	All recordings must be tagged with at least the following information out -of-the box: Date, Time, Duration, Extension Number, CLI, Dialled Number, DNIS, Agent ID, and Call ID

4	The system should be capable of doing Bulk recording
5	The IP recording solution must be able to record 100% Voice calls
6	The Call Logger should have redundant server. In case if primary server fails, the calls should get recorded by the standby/redundant server
7	The system should have capability to view/play the recorded calls from a PC (equipped with sound card and used centrally by a supervisor).
8	There should be ability to record the call on demand by agent

Mass Notification System

Sr. No	Minimum Requirement Specifications
1	Notification Formats
	System must Support Voice Call Notification – Office Phone, Cell Phone, Home Phone
	System must support SMS, Email, Speakers / Paging
2	User Contact Lists
	System must offer Web based self-service management
	It should be possible by administrator to define attributes (location, role, etc.) for users
	It should support CSV File Upload for contacts
3	Message Configurations
	System should support One-way Notification & ACK
	System should be able to notify and respond and Notify to Conference to all stake holders
4	Administration Portal (Web Application)
	User/Group Mgmt.
	Partition Mgmt. for different departments
	Conferencing Configuration
	Security Configuration

	Channel (Device) Configuration & Mgmt.
	Communications Resource Mgmt.
	Broadcast Trigger Configuration
	Inbound Call Trigger Configuration
	Message Inbox Configuration
5	Operations Portal (Web Application)
	System Admin must be able to define Notification Scenario for quick management
	System admin must be able to do Message Mgmt. (Pre-recorded, "record on the fly", Text-To-Speech)
	User / Group Profile Mgmt.
	Security Configuration
	Message Broadcast (Priority)
	Audit logs and Reports (Web and PDF formats), Data and Analytics
	System must be able to reach 500 people within 10 minutes to play 30 second voice announcements.

Unified Communication Client (UCC)/IP Soft phones

Sr. No.	Minimum Requirement Specifications
1	It should be SIP-based unified communications client with real time collaboration capabilities in hybrid mode that enable business users to easily manage their day-to-

	day communications from a single interface. High performance multimodal sessions; VOIP, IM/presence, web conferencing and point-to-point and multiparty video
2	UC Client must be supported on Windows, mac Desktop
3	UC Client must be supported on Android and iOS Mobile devices
4	Proposed client must deliver similar experience across the devices
5	Single Sign On (SSO) must be supported by UC Client
6	UC Client must have Instant Messaging with other users having similar client running on Desktop and Mobile
7	It should be possible to share Files in .jpg, .pdf, mp4 with User and/or Group of Users
8	It should be possible to assign "Subject" to each conversation/conversation so that it is easy to navigate and access specific conversation/chat session

9	It should be possible to set "PRESENCE" with various options such as "Available", "Busy", "Do not Disturb" as well as Customer Status messages
10	Client should be easily deployed and configured using Single Sing On (SSO)
11	It must support LDAP for Enterprise Directory Access
12	It should be seamlessly integrated with MS Exchange Calendar and show summary of upcoming meetings
13	It should be possible to join scheduled Audio or Audio-Video Conference with one touch of button
14	User should be allowed to mark frequently dialled numbers as "FAVORITES" and same should be displayed in UC client
15	Call Logs - Dialled, Received, Missed
16	One touch access to Voicemail
17	Visual Indication for Voicemail notification
18	Dial Pad access
19	It should be possible to configure necessary settings for Audio-Video (such as setting up headphone, video camera etc.)
20	It must support persistent chat across the devices
21	Recipient must receive the messages even if he/she is in offline mode. Whenever user logs in to the application, he/she should be able to see the message sent by other users
22	It should be possible to escalate call from Instant Messaging to Audio Call to Video Call without switching to another other application
23	It should be possible to initiate click to call from UC Client from Web Browser
24	It should be possible to initiate point to point video call and later add more participants on the same call without disconnecting ongoing call
25	Following SECURITY features must be support:
	i) Media and Signalling Encryption
	ii) Private Trust Store
	iii) Client Identify Certificates
	iv) Enhanced Hostname Validation
	v) AES 256 bit encryption
	vi) TLS

26	It should be possible to user UCC over secured internet connection without using VPN client on the device.
27	Standard Telephony features such as Call Transfer (Consultative and Blind), Conference, Call Forward, Call back, Call Park, Call Pickup, Bridge Appearance should be supported on UCC
28	Presence Federation with Microsoft Lync / Skype / Microsoft Teams for Business should be supported
29	It should have Web Collaboration with following minimum feature:
	1. Initiate Web Collaboration through point to point or multi point video calls
	2. Document Sharing
	3. Application Sharing

	4. Screen Portion Sharing
	6. White boarding
	7. Remote Desktop Control
	9. Far end Camera Control
30	It should support Animated and Static Emojis for instant messaging
31	SIP URI dialling must be supported for calling between federated SIP domain
32	UCC should have feature to control the IP Desk phone so that call can be dialled from UCC and voice/speech can be established through IP Desk phone
33	It should be possible to use API of UCC and embed it in departments Web based applications
Desk VC Unit / Room Based VC System	
Sr. No.	**Minimum Requirement Specifications**
1	Should support video resolution up to 1080p60
2	Should support content video resolution at least 1080p30
3	Should support calls up to 6 Mbps
5	MCU compatibility: SIP, BFCP
6	Should support both H.323 and SIP protocol
7	2 simultaneous 1080p60 channels: camera + auxiliary camera or camera + content
9	Content input should support up to 1080p60 resolution

10	Video Input resolution up to 1080p60
11	Should have 1 USB ports or more
12	Should have simultaneous IPv4 and IPv6 support from day 1
13	It should support wideband audio
15	Acoustic echo cancellation and auto noise suppression should be available
16	Should have 1 or more network interfaces
17	Should support Microsoft Exchange calendar integration
18	Should support 2 HD display
19	Should have UltraHD (4K) display support
21	Should support H.264, H.265 standards
22	2 HDMI/ DVI input
24	Support for any one or more from below audio inputs:
	2 x HDMI & 2 * Microphone Inputs
25	Audio output:
	2 x HDMI
	1 x 3.5mm line out jack
26	Support for below network protocols:
	DHCP, DNS, HTTP, HTTPS, RTP/RTCP, NTP, STUN/TCP/IP, TFTP/SSH, 802.1Q/802.1X/802.1P
27	Scalable Video Coding support to achieve a great video quality
28	Should allow conference recording
30	Metadata support for Time watermark & Digital signature on recorded files
31	Optional 1+3 or more party conference support without any need of external MCU
33	H.239 and BFCP support for content sharing
34	Should support 2 microphones from day-1
35	Should support acoustic echo cancellation, Adaptive post filtering, Audio error concealment& automatic noise suppression.

36	Should provide support for G711, G.729, G.722, AAC-LD/AAC-LC,

37	Should provide Touch Panel or Apple iPad for Control
38	QoS support, DiffServ Support
39	NTP date and time synchronization
40	Microsoft Exchange calendar integration
41	Codec should support 2 camera from day-1
42	Security features like Encryption using latest TLS 1.2, AES & SHA standards
43	Should support H.264 or better
44	Camera should support minimum 20x optical zoom & 12x Digital zoom
45	Should support minimum 10 or more presets
46	Should have minimum horizontal field view of 60 degree
47	Pan range of +/-170° & Tilt range of -20° ~ +20°

Software Cloud Based MCU

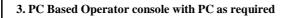| Sr. No.	Minimum Requirement Specifications
1	Application should be cloud-based team Collaboration and Meeting Tool with messaging, audio and video conferencing, file sharing and so on capability
2	Application should offer persistent personal meeting room in the cloud accessible via browser and mobile apps
3	It should provide team/group creation and management capability
4	Application should allow user to create multiple meeting rooms for different departments and projects which should be accessible all the time
5	Application should support sign-on with reputed IDP platform from day 1
6	Application should support 1000 party video conferencing from day 1
7	Application should also support 1-1 video call
8	Application should allow used to share entire desktop, specific application and browser tab during video conference presentation
9	Each meeting room should allow all features at same point in time
10	Application should support WebRTC

11	Application should support 1000 party audio conference from day 1
12	Application should have India dial-in toll/toll free number to audio only participants to join the conference. Solution must have at least 1 local number from within Maharashtra
13	User should be able to message or chat with team members of the meeting
14	User should be able to send direct messages for private conversations
15	User should be able to share files which should be visible in chat for others to view or download all the time (via soft client)
16	Should allow to add files in direct or public messages, or compose a post with additional information
17	Application should offer required storage to each user for files
20	It should support recording of meetings with required cloud storage
21	Application should offer integrations with Slack, MS Teams from day one
22	Application should offer plugin for Outlook web, Outlook desktop and Google calendar
23	Application should offer API support for quick integration with other applications
24	Application should allow Room based Video endpoint of the same OEM tand third party OEMs to join the video conference over standard based SIP & H.323 protocol. Atleast 100 such Video endpoints ust be able to join each meeting
27	Application should offer role-based access control features for Admin, Member and Guest
28	Application should support TLS encryption 1.2 capability
29	Data Retention Policy should be configurable
30	Data required by the Cloud application should be encrypted
31	Application should have unique meeting ID and password for authentication

32	Application should be licensed for 100 Users with 1-year annual prepaid license and support

Item Code: A136010010060158

2. Voice Mail Server for 100 users as required

Item Code: A136010010060159

	3. PC Based Operator console with PC as required

Item Code: A136010010060160

4. Call accounting workstations with software

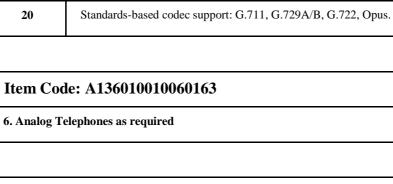|	

Item Code: A136010010060281

5. IP Phone Type- 1

Sr. No	Minimum Requirement Specifications
1	Grayscale display – 2.8 inches x 2.1 inches (7.0 cm x 5.3 cm) – Diagonal width: 3.5 inches (8.8 cm)
2	4 buttons with dual LEDs (red, green)
3	4 softkeys
4	Hard buttons for phone, messages, home, navigation cluster, headset, speaker, volume, mute
5	LEDs for speaker, mute, headset, message, history
6	20 or more physical buttons
7	Wideband audio in handset and headset
8	Full duplex speakerphone
10	Message waiting indicator
11	Mute key with optional mute alerting
13	Rich, classic and alternate ringtones
14	Dual-position stand, optional wall-mount stand.
15	Gigabit Ethernet (10/100/1000) line interface
16	Second Ethernet interface 10/100/1000 Mbps
17	PoE Class (IEEE 802.3af) class 1
18	Optional support for AC power supply
19	SIP protocol support

20	Standards-based codec support: G.711, G.729A/B, G.722, Opus.

Item Code: A136010010060163

6. Analog Telephones as required

Item Code: A136010010060165

7. UPS with 10AH Battery back up

Item Code: A136010010060267

8. L2 /L3 Network Managed Switch (As Required)
(L2 – 24 Ports 10/100/1000 POE Mbps + 4 10G BASE – T/SFP+ Combo ports

L3 – 20* 10G SFP+ Ports and additional 4 10G BASE – T SFP+ Combo Ports)

Sr. No	Minimum Technical Specification
1	**General Features:**
2	Switch should be 1U and rack mountable in standard 19" rack.
3	Switch should support internal hot-swappable Redundant Power supply from day 1.
4	Switch should have redundant fans from day 1
5	Switch should have minimum 2 GB RAM and 4 GB Flash.
6	Switch should support stacking using dedicated stacking ports in addition to the asked uplink ports. Should support for minimum 80 Gbps of stacking throughput with support for 8 switches in single stack.
7	**Performance:**

8	Switch shall have minimum 128 Gbps or more of switching fabric and 95 Mppsof forwarding rate.
9	Switch shall have minimum 16K MAC Addresses and 4096 VLAN IDs
10	Should support minimum 3K or more IPv4 routes
11	Switch shall support 1K or more multicast routes and 500 Switch Virtual Interfaces
12	Switch should support at least 8K flow entries (Jflow/Sflow/Netflow)
13	Switch should have 6MB or more packet buffer.
14	**Functionality:**
15	Switch should support IEEE Standards of Ethernet: IEEE 802.1D, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1p, 802.1Q, 802.3, 802.3u, 802.3ab, 802.3z
16	Switch must have functionality like static routing, RIP, PIM, OSPF, VRRP, PBR and QoS features from Day 1
17	Switch must have support for advance Layer 3 protocol like VRF, VXLAN, LISP and OSPFv3 as and when required in future
18	Switch shall have 802.1p class of service, marking, classification, policing and shaping and eight egress queues.
19	Switch should support management features like SSHv2, SNMPv2c, SNMPv3, NTP, RADIUS and TACACS+ .
20	Switch should support IPv6 Binding Integrity Guard, IPv6 Snooping, IPv6 RA Guard, IPv6 DHCP Guard, IPv6 Neighbor Discovery Inspection and IPv6 Source Guard.
21	Switch should support 802.1x authentication and accounting, IPv4 and IPv6 ACLs and Dynamic VLAN assignment and IEEE 802.1AE (MACSec – 128) on all the ports

22	Switch must have the capabilities to enable automatic configuration of switch ports as devices connect to the switch for the device type or equivalent solution.
23	During system boots, the system's software signatures should be checked for integrity. System should capable to understand that system OS are authentic and unmodified, it should have cryptographically signed images to provide assurance that the firmware & BIOS are authentic.

24	**Interfaces:**
25	Switch shall have 24 nos. 10/100/1000 Base-T ports and additional 4 nos. SFP+ uplinks ports from day 1.
26	The switch should support PoE/PoE+ on all ports with total PoE budget of 740 W
27	**Certifications:**
28	Switch shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 Standards for Safety requirements of Information Technology Equipment.
29	Switch shall conform to EN 55022 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B Standards for EMC (Electro Magnetic Compatibility) requirements.
30	Switch / Switch's Operating System should be tested for EAL 2/NDPP or above under Common Criteria Certification.
31	Operating Temperature: 0°C to +45°C

Item Code: W033090020240038

9. Accessories & Cabling for IPPBX System

Item Code: W033090020240033

10. Installations & commissioning of IPPBX system

F. VHF Radio Communication system

Item Code: A136010010060246

1. Handheld Radio Terminal (walkie-talkie with all standard accessories & spares such as battery, antenna & charger for minimum 25% of the quantity supplied.)

A) Handheld Radio Terminal

1	General	
1.1	Frequency Range	136 to 174 MHz (full band)
1.2	TDMA	2 Slots for simultaneous voice / data exchange in Simplex & Semi-Duplex mode

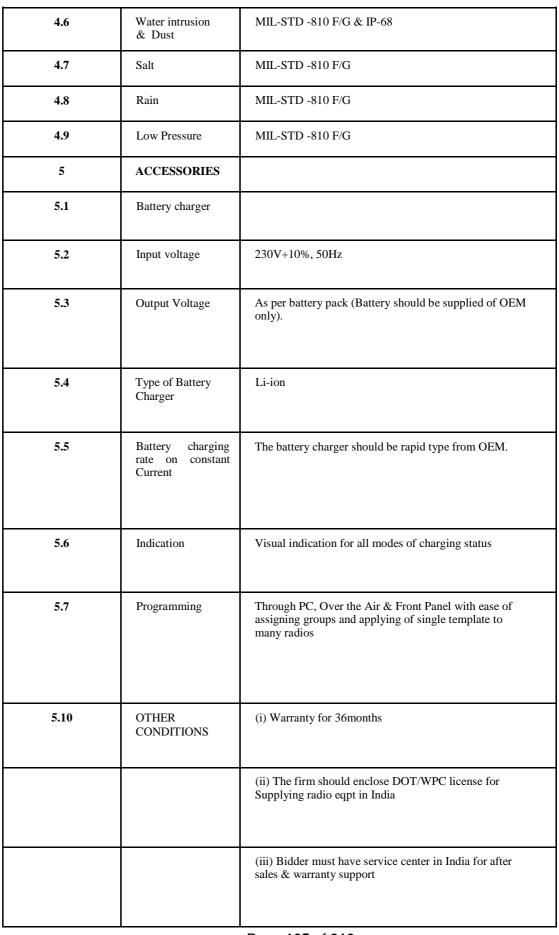| 1.3	Channel Capacity	255 or more with a separate channel knob in addition to On / Off switch
1.4	Channel Spacing	12.5KHz
1.5	Operating Voltage	7.2V ± 10% with Li-ion/Li-Poly rechargeable battery of capacity 2000 mAh or higher capacity
1.6	Average battery duty cycle 5-5-90	Digital:10 hrs or more Analog:8 hrs or more
1.7	Frequency Stability	±.5 PPM or better
1.8	Antenna Impedance	50Ω
1.9	Antenna	Helical Antenna
1.1	Weight	Less than 400 Gms with battery
1.11	EMI/EMC	ETSI EN 301 489-1 & ETSI 301 489-5/
1.12	Air Interface	Standards Shall be open Standards DMR Tier-II
2	TRANSMITTER	
2.1	RF Power Output	1 to 5 Watts (programmable)

2.2	FM Emission	11KOF3E
2.3	Digital Modulation	4FSK
2.4	Modulation Limiting	±2.5KHz @ 12.5 KHz
2.5	FM Hum & Noise	-40 dB or better
2.6	Adjacent Channel Power	-60 dBc or better
2.7	Audio Response	+1,-3dB
2.8	Audio Distortion	Less than 3 %
2.9	Digital Vocoder	AMBE +2
3	**RECEIVER**	
3.1	Sensitivity(Analog)	0.30μV (12dB SINAD) or better
3.2	Sensitivity (digital)	0.30μV at 5% BER or better

3.3	Adjacent Chanel Selectivity	60dB or better
3.4	Inter-modulation	70dB or better
4	**ENVIRONMENTAL**	
4.1	Operating Temperature	-30˚Cto+55˚C
4.2	Storage Temperature	-40˚Cto+70˚C
4.3	Humidity	95% Max. at +40° C non-condensing
4.4	Vibration	MIL-STD -810 F/G
4.5	Shock	MIL-STD -810 F/G

4.6	Water intrusion & Dust	MIL-STD -810 F/G & IP-68
4.7	Salt	MIL-STD -810 F/G
4.8	Rain	MIL-STD -810 F/G
4.9	Low Pressure	MIL-STD -810 F/G
5	**ACCESSORIES**	
5.1	Battery charger	
5.2	Input voltage	230V+10%, 50Hz
5.3	Output Voltage	As per battery pack (Battery should be supplied of OEM only).
5.4	Type of Battery Charger	Li-ion
5.5	Battery charging rate on constant Current	The battery charger should be rapid type from OEM.
5.6	Indication	Visual indication for all modes of charging status
5.7	Programming	Through PC, Over the Air & Front Panel with ease of assigning groups and applying of single template to many radios
5.10	OTHER CONDITIONS	(i) Warranty for 36months
		(ii) The firm should enclose DOT/WPC license for Supplying radio eqpt in India
		(iii) Bidder must have service center in India for after sales & warranty support

6	Important Features

6.1	Simple press to talk
6.2	Low battery alert & Announcement on checking battery level
6.3	Continuous Tone Coded Squelch System (CTCSS)
6.4	Mixed Mode Operation (analog and digital)
6.5	Capability for Multi channel & Multi site roaming facility in IP Network
6.6	Any one of 2-Tone/5-Tone/ DTMF / MDC signalling.
6.7	Busy Channel Lockout.
6.8	Selective call Decode.
6.9	Capable of VOX hand free operation.
6.11	Channel Scanning with call quieting facility.
6.12	Emergency with SOS/SIREN, Hands Free Talkback with provision for Monitoring
6.13	Lone Worker &Mandown feature
6.14	Indoor tracking capability
6.15	Automatic Number Identification (ANI)
6.16	Text and predefined message
6.17	Should have built-in GPS feature with 5 meters accuracy
6.18	Channel & Feature Announcement for ease of operation

Item Code: A136010010060245

2. Digital Fixed Radio Station

Item Code: A136010010060168

3. Digital Mobile Radio Station

	General Specifications of Digital Fixed & Mobile Radio Station
A	The Radio should be digital for clear communication lightweight and compact operating in conventional system The Microprocessor control of key circuits should provide automatic operation of most internal functions, which allows for consistent performance and reliability. The radios should conform to MIL standards like 810 C, D, E, F & G standards. The radios should be capable of interoperation with existing Analog Radios in Analog mode. The mobile radios should have cables for interconnection to battery and mounting fixtures.
B	Field Programmable -- In-field Over the Air of radios for ease of maintenance to keep proper records & faster action. Radio should have provision to upgrade for programming
C	Time-Out-Timer -- Disallows inadvertent keying of the transmitter for extended periods of time, to prevent locking up one of the communication channels unnecessarily. The time can be programmed to best suit the application.
D	Emergency button -- Allows a user to convey distress and emergency with programmablehandsfree talk back to obtain help in critical situations.
E	Each Radio set must have License for using in Multi locations

F. Minimum Technical Specification for Fixed/Mobile Radio Station

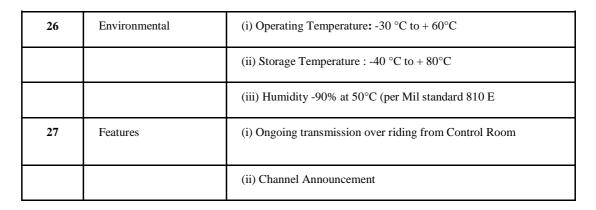| Sr. No.	Technical Specifications	Minimum Description / Specification
1	Frequency Range	136 - 174 MHz in same Radio
2	Number of Channels	512 or higher
3	Channel Spacing	12.5 Khz or better

4	Frequency stability	$+0.5$ ppm or better
5	Type of Emission	CTCSS/DCSS 4 FSK Modulation complying to DMR standards
6	Type of Operation	Open Standard Digital Protocol as defined by ETSI and TDMA based to provide 2 time slots in Simplex & Semi Duplex operation.
7	Weight	Less than 2000 gms.
8	Power source	Typical 13.8 V DC
9	Display	The Radio should be supplied with Alphanumeric 4 line color display

	Essential Features:	
10	GPS Based Tracking	Must have an in-built GPS with accuracy less than 5 m, to enable being tracked from Control Station with appropriate system.
11	Text Messaging	Should be capable of sending Short Messages from Pre defined Message list. Radio should have provision to read out incoming messages with sender's ID
12	NETWORKING	Should have software for IP based Network for features like Automatic Roaming in Multi Site & Multi Channel network environment.
	Transmitter:	
13	RF Power Output	Programmable / switchable up to 25 watt
14	Modulation limiting	+/- 2.5 KHz @12.5 Khz and +/- 5.0 KHz at 25 KHz
15	FM Modulation	11 KOF 3 E for 12.5 KHz and 16 KOF3E for 25 Khz
16	Digital Modulation	TDMA, 4 FSK Modulation 7K 60FXE
17	Frequency Stability	+ .5 ppm or better
18	Adjacent Channel Power	6-dB (12.5 KHz) & 70 dB (25 KHz)
19	Audio Distortion	Less than 3% @ 1KHz
20	FM Hum/ Noise	(i) 25 KHz : - 45 dB or better (ii) 12.5 KHz : - 40 dB or better
	Receiver:	
21	Sensitivity	(i) Analog : 0.30 μV for 12 dB SINAD or better (ii) Digital : 0.25 μV at 5%BER or better
22	Selectivity (Adjacent Channel)	(i) 65 dB @ 12.5 Khz or better (ii) 80 dB @25 KHz or better
23	Inter modulation	75 dB as per ETSI stds.
24	Audio Output	3 W internal or 7.5W external speaker 8 ohms
25	Conducted Spurious Emission	-57 dBm or better

26	Environmental	(i) Operating Temperature**:** -30 °C to + 60°C
		(ii) Storage Temperature : -40 °C to + 80°C
		(iii) Humidity -90% at 50°C (per Mil standard 810 E
27	Features	(i) Ongoing transmission over riding from Control Room
		(ii) Channel Announcement

		(iii) Noise suppression Technique : Automatic speaker volume enhancement if suddenly background noise increases
		(iv) Pre assigned Messages
		(v) Radio Should have capability of programming access key to prevent un authorized access of Repeaters
		(vi) Programmable Remote Radio Stun/Revive.
28 29	Programmable Buttons Accessories	4 frequent features dual (short / long press) programmable buttons in addition to On / Off switch and free flow channel steering knob
		· 0dB GP antenna with 30 Meter RF Cable RG 217 / low loss cable connectorized, 10 A , 12 V SMPS Power supply and any other accessory.
		· We suggest bidders to consider a separate battery of suitable ratings for mobile radio stations for vehicles.
30	Programming Accessories	Programming software with USB & Over the Air programming.
31	LITERATURE	(i) User manual with each radio set
32	OTHER CONDITIONS	(i) Warranty for 36 months.
		(ii) The firm should enclose DOT/WPC license for Supplying radio eqpt in India
		(iii) Bidder must have service center in India for after sales & warranty support

Item Code: A136010010060169

4. 30 meters Triangular Tubular Tower with aviation lamp, Earthing wire/trip with earth pit & foundation Item (with required accessories)

Item Code: A136010010060170

5. Digital VHF Repeater

SR. No.	Particular	Minimum Specification
A	GENERAL	
1	Frequency range	136-174 MHz (full band)
2	Indication	Separate LED indication of TX & RX
3	Protocol	TDMA (02 Slot)
4	Channel spacing	12.5 KHz or better
5	Channel Capacity	64 Channels

6	Frequency stability	1 PPM or batter
7	Operating Selection	Analog or digital in standalone &compatible with analog/digital radios.
8	In-built Power Supply	Input 11.0 to 14.4 Vdc 100-240 Vac, 47-63 Hz. Battery charger 12V, 3 Amps (Internal & External Power supply)
9	Communication Interface	Built-in Ethernet port for IP connectivity

10	Antenna Impedance	50 ohms
11	Duty Cycle	100%
12	Display	Indicator for:
		Transmission of both slots
		Receiving of both slots
		Ethernet Link status
		Digital / Analog operation
		Alarm: Minor / Major
		Power AC or DC Operation
13	Weight	Below 10 Kgs

14	Protection	Battery reverse polarity and high VSWR

15	Alarms	• Rx Alarm
		• Fan Alarm
		• Power System Alarm
		• Temp Alarm
		• Tx Power Alarm
		• VSWR Alarm
16	Repeater configuration / programming facility	PC programmable with USB and through IP network
	TRANSMITTER	
1	RF Power output	1-50 watts
2	Digital modulation	4FSK
3	FM Hum and noise	-45 /-50 dB (for @ 25 / 12.5 kHz)

4	Adjacent channel	75/60 dB (for @ 25 / 12.5 kHz)
	power	

5	Audio response	As per TIA603D
6	Digital Vocoder	AMBE+2
	RECEIVER	
1	Sensitivity	Analog-0.25μ V for 12dB SINAD
		Digital -0.25μ V@ 5% BER or better
2	Selectivity	80/55 dB (for @ 25 / 12.5 kHz)
3	Inter- modulation Rejection	80/70 dB
4	Audio Distortion	<1 %
	ENVIRONMENTAL SPECIFICATION	

1	Operating temperature range	30°C to +60°C
2	Humidity	RH of 95%, non-condensing at 50 °C
	Features	
1	Mode of Operation	Repeater should operate in Analog and Digital Mode. Must have provision to configure 2 repeaters in auto / manual changeover from operational repeater to standby repeater mode.
2	IP Compatibility	Repeater supplied should be provided with IP licenses

3	Duplexer	Should be Supplied with Repeater and required cables.
4	Repeater Access control	Repeater should capable of access code validation of subscribers and Repeater should have facility to deny access of black list subscriber Id's range to prevent un- authorized access

Item Code: A136010010060171

6. Dispatch Console for CCC (software with license keys)

Architecture

1	Client-Server	Capable of Multiple dispatch consoles to connect multiple Radio servers via IP.
2	Direct IP connection to Repeaters	Direct IP interface to Repeater for all functionality including voice calls.

		2-way direct IP connection for interlinking Repeaters through IP Network
		1-way direct IP connection for Multi Repeaters system or stand-alone repeaters
3	Control Stations	Presently one Dispatch Console is required whereas provision for 15 Control Stations per Radio server support.
		To provide voice functionality through the control stations.
		Analog Interface Control station.
4	Analog Mode	Analog channels support for:
		Open channel voice calls
5	**Supported Digital configurations**	
	Conventional analog and digital channels	Through Dispatcher / control stations or direct IP connection (for digital channels).
	IP Site Interface	2-way direct IP connection or through control stations
	Multi Channels	1-way direct IP connection to collect voice and data from Multi Repeaters and Control Station pool for outgoing voice and data.
	Digital Intercom Patch	Should have provision for **SIP connection to PBX.**
6	**User Functionality**	
6.1	Radio Dispatch	All type of calls (Private, Group and All call)
		Calling Subscriber Identification
		Remote Monitoring & Emergency Calls
		Monitoring for Field staff
		Voice Calls between dispatchers (Intercom)
		Voice Recording for all channels in connected network
		Radio Check

		Call Alert
		Radio Kill
		Flexible sound control
		Customizable Subscriber Call windows
		Subscriber categorization & Profiling with provision of adding photo
		Configurable profiles to manage access of dispatchers to base radios, groups, services, Digital Radio IP Site time slots
		Black list for Automatic Blocking of unauthorized radios in the Digital Radio network
		Pre-recorded voice announcements
		Custom dispatch consoles. Visual designer to draw a console specific to the customer needs.
6.2	GPS Tracking, AVL	Real-time subscriber location monitoring
		Should support different types of maps like open vector maps, raster maps, INGIT, MapPoint and Online Google Maps
		Subscriber location logging with customized color Picture / Icon on the map for locating of different subscribers
		Track animation for specified period of time
		Subscriber track details
		Geo-fencing
		Route control
		Subscriber stop control
		Subscriber's movement start control
		Monitoring loss and appearance of location signals from subscriber
		Display on map all subscribers in selected category
		Automatic location request
		Location request by event

		Different speed formats
		Color formatting for subscribers with actual location
6.3	PBX Interconnect	Intercom calls from the dispatcher console
		Intercom and radio subscribers interconnect
		3 types of calls (initiated by PBX subscriber, initiated by radio subscriber, initiated by Dispatcher Console)
		Personal and group calls
		Multiple concurrent channels to PBX
		Possibility to limit list of authorized radio subscribers
		Voice calls recording in MP3 / wav format
6.4	Data Transmission, Data and Voice Logging	Text Messaging Service
		Subscriber Status control
		Telemetry Commands control
		Event Logging of ALL activity in radio network
		Voice Recording of ALL calls in radio network (even private calls between radio subscribers)

		Additional Information about the repeater used for the subscriber activity (calls, text messages, etc)
		Subscriber Custom Properties
		Rules and Alerts for events
		GPS Rules
		Lone Worker Rules with Location
		Report Wizard
		Subscriber Activity Report
		Database back-up and restore
		Voice and event logging at both Dispatcher Consoles and Radio servers

6.5	Real Time Monitoring	Graphical representation of voice and data activity
		Graphical representation of radio network scheme
		Information about current state of connected repeaters
		Remote repeater administration in IP Site Connect and Multi Repeater systems (channel change, power level settings, turning off and on)
		System infrastructure (UPS, routers) monitoring via SNMP
		Hardware failures logging
		Graphical representation of the collected monitoring data
		Detailed reports based on collected monitoring data and filtered by number of criteria
6.6	Radio Network Bridging for IP Site connected Repeaters, Multi Repeaters, Digital and Conventional channels	Routing of all calls from one network to another
		Routing of group calls for specified talk groups
		Routing of private calls for specified subscribers
6.7	Multi Repeaters, Digital and Conventional channels	Dynamic intelligent routing of private and group calls based on the information about the subscriber registration in the network
		Support for analogue and digital channels
7	**Technical Requirements:**	
7.1	Dispatcher Console minimal configuration	Refer specifications section 7.4.10 of workstation with suitable sound card. Windows OS 7/10 with Microsoft office suite & Antivirus. Display size of 24"
7.2	Radio server minimal configuration	Refer specifications section 7.4.10 of workstation with suitable sound card with suitable display.
		Windows Server latest edition, Antivirus.

Item Code: A136010010060172

7. Solar Panel with battery backup for repeaters

Item Code: A136010010060173

8. Multi Unit charger for hand-held walkie-talkie

Item Code: A136010010060174

9. Workstation for Dispatcher (with required accessories & software's)

SN	Parameter	Minimum Specification
1	Processor	Latest generation 64-bit x86 Dual core CPU with 3 GHz or more
2	Memory	Minimum 16 GB Memory
3	Graphics card	Graphics card with 4 GB video memory (non-shared)
4	Hard Drive	1TB SATA Hard drive @7200 rpm
5	Media Drive	NO CD / DVD Drive
6	Network interface	1000BaseT, Gigabit Ethernet (10/100/1G auto sensing)
7	Audio	Line/Mic IN, Line-out/Spr Out (3.5 mm)
8	USB ports	Minimum 6 USB ports (out of that 2 in front). These would be disabled for data transfer.
9	Keyboard	104 keys minimum OEM keyboard
10	Mouse	2 button optical scroll mouse (USB)
11	Monitor	22" TFT LCD monitor, Minimum 1920 x1080 resolution, 5 ms or better response time, TCO 03 (or higher) certified: 2 LCD Monitors
12	Operating System	64-bit pre-loaded OS with recovery disc
13	Anti-virus feature	Advanced antivirus, antispyware, desktop firewall, intrusion prevention (comprising of a single, deployable agent) which can be managed by a central server. (Support, updates, patches and errata for the entire contract/ project period)

Note: Above mentioned specifications are indicative only, Bidders need to provide as per system requirement

| **Item Code: A136010010060175** |

| **10. Radio Server (with required accessories & Software's)** |

Sr. No	Features	Minimum Technical Specification
1	Processors	Rack Server shall have a minimum of two (2) Intel latest generationSkylake Processors with minimum 2.4 GHz & 16 cores per socket.
2	Chipset	Intel chipset compatible with the offered processors.
3	Internal Storage	The server should Support upto 8 hot-swappable SAS,NL-SAS and SSD drives .
4		Server should be configured with 3 Nos of 1 TB drives
5		The Server RAID controller should support the following configurations RAID 0, 1, 5, 6, 10, 50, and 60
6		Server should be configured minimum with 2GB of Flash backed write cache module.
7	Memory	Should have at least 24 DIMM slots per server and support minimum up to 1.5TB of DDR4 2666 MHz memory .
8		The Server should be configured with 32 GB of DDR4 Memory from day one
9		Support for advanced memory redundant technologies like Advanced error-correcting code (ECC) and memory mirroring.
10	Network	Should have 2 * 10 GbE (embedded) LAN ports , 4*1 GbE network cards for LAN connectivity
11	PCIe Slots	Up to 6 PCIe Generation 3.0 slots
12	Security	The server should provide cryptographic firmware updates

13		Capable to stop execution of the BIOS
14		Server should provide Anti-counterfeit
15		The server should provide hardware policy based security
16		The server should provide rack server intrusion detection

17		The server should provide Hardware root of trust
18		The server should provide system lock down
19	Management	Should support out of band upgrades, Agentless out-of-band management, integrated diagnostics and Power monitoring and reporting.
20		The system should provide management of multiple servers from single console
21		The system should provide hardware profile deployment (Single server os group of servers)
22		The server should support industry standard management protocols like IPMI v2 and SNMP v3
23		One 1-Gbps RJ-45 management port
24		The server should support multiple management interfaces including web user interface and command line interface.
25	Ports	Should have the following ports for server connectivity
26		● 1 serial port
27		● 4 USB 3.0/2.0 ports
28		● 1 VGA video port
29	Others	Supports hot swappable redundant fans
30		Supports hot swappable redundant power supplies
31		Rail Kit and cable mangement arm to be provided along with the server
32	Warranty	Server should have 05 years warranty
33	Form Factor	2U Minimum

Note: Above mentioned are indicative specifications, bidder need to provide as per System requirement

Item Code: W033090020240036

11. Liaison work for issuance of operating license & frequency allotment letter from WPC

Item Code: W033090020240014
12. Accessories & Cabling from Antenna to repeaters as required

Item Code: W033090020240034
13. Installation & commissioning of VHF Radio system

G. Variable Message Display system

Item Code: A136010010060176
1. Variable Message Display System

Sr. No	Parameter	Minimum Specification
1	LED Type	SMD or equivalent
2	Estimated LED lifespan (Hours)	100000 Hrs or better
Module		
1	Pixel Pitch (mm)	Max 5
2	Pixel	1R1G1B
3	Module Resolution (W x H)	64 X 32 pixels (320 X 160mm)
4	Module pixels	2048 dots or more
5	Pixel density	40000 dots/m2 or more
6	Module quantity	As per available sizes of module
Cabinet		
1	Size (W x H) mm	Around 2000 X 1600 mm
2	Material	Using MS CRCA sheet of suitable thickness
3	Weight (Kg)	Max 300 Kgs
MDS Display		
1	MDS screen size (W x H) mm	2240 x 1440 mm or more

2	MDS screen resolution	448 x 288 mm or more
3	Viewing angle	Hor: 140º, Ver: 140º or more
4	Brightness	≥ 5500 nits or more
5	Minimum Viewing distance	≥ 5 m or more
6	Protection Level	IP65 Front / IP54 Rear or better
7	EMI/RFI Protection	Via line filter
8	Refresh rate	≥1920Hz or better
9	Ambient Temperature	-20℃ to +50℃
10	Ambient Relative Humidity	10% ~ 95%
12	Power Supply	230VAC, 1 Ph, 50 Hz
13	Maintenance/Servicing	Rear
14	Power Consumption (Max & Average) (W/m2)	Max. 800 & Avg. 200

B) Control System for MDS:

S. N.	Parameter	Minimum Specification
1	Display Control	Asynchronous control system
2	Display language	English/ Hindi / Regional Languages
3	Display Capacity	Text, Color Images & Videos
4	Luminance control & Auto dimming	Automatic Luminance Control via sensors. Manual luminance controllable from CCC using software.
		Auto dimming capability to adjust to ambient light level (sensor based automatic control)
		Photoelectric sensor will be positioned at the sign front to measure ambient light. Capable of being continually exposed to direct sunlight without impairment of performance.
5	Communication Interface & Protocol	RJ45 / Through 3G wireless (SIM card in Purchaser's scope)
6	Certifications	CE, UL, FCC, ROHS, EN12966 and IP65

C) Junction Box

S. N.	Parameter	Minimum Specification
1	Junction box (JB) cabinet	Will be a fabricated cabinet using MS CRCA sheet of suitable thickness as per our design
2	Enclosure protection class	IP65
3	Mounting	Floor mounted type as per our design
4	UPS-Inverter	UPS-Inverter of suitable rating will be housed inside the Junction box
5	Battery bank	Suitable AH capacity for 1 hr backup
6	Space for Network & other devices	Sufficient space will be provided inside the JB for mounting of Network switch & other devices like LIU, processing unit, ethernet switch etc.
7	Overall approx. size of JB	1100 (H) x 900 (W) x 700(D) mm
8	Cooling	Forced cooling using fans with filter arrangement
9	Protection device	Surge protection device along with other necessary protection & isolation switchgears
		will be provided
10	Weight	Overall approx. 60Kg
11	Accessibility	Through hinged front door. A lock &key arrangement will be provided for security.
12	Location of installation	The JB will be installed on the floor just next to the pole. So that cables can eb easily routed to the VMS through pole cavity.

D) Pole Structure

S. N.	Minimum Specification
1	Maintenance access to VMDS from rear side by opening the rear side doors of the VMDS.

2	Pole structure will be manufactured from steel confirming to IS 2062. It will be pretreated & painted with final paint shade of silver color. A ladder with safety cage will be provided for climbing on the platform.
3	At the bottom side of the safety cage a door with locking arrangement will be provided.
4	Pole structure will be provided with lightening arrestor for protection of the VMDS system.
5	The Mains supply & communication cables to VMDS will run through the pole cavity.
6	Pole design is suitable for wind load of 150KMPH.
7	Height of the pole must be 6M or above as per requirement

Item Code: W033090020240037

2. Networking Accessories & cabling from VMDS nearby switches

Item Code: W033090020240032

3. Installation & commissioning of VMDS

H. Active & Passive networking of all systems.

Active Components

Item Code: A136010010060280

1. L3 Network Managed Switch (Core Switch with Required accessories)
(L3 - 20*10G SFP+ ports and additional 4 10GBASE-T/SFP+ combo ports)

Sr. No	Minimum Technical Specification
1	General Features & Performance :
2	It shall be a chassis based switch with at least 4 payload slots for line cards and additional two slots to accommodate two nos. of switch processor.
3	The switch will have redundant CPUs installed from day-1. Should support Non-Stop Forwarding and Stateful Switchover to ensure information between supervisor engines is fully to allow the standby supervisor engine to take over in sub-second time if the primary supervisor fails.
4	Switch should have non-blocking per-slot throughput from day 1.

5	Shall support In Service Software Upgrade (ISSU) or Hit less update to provide an upgrade of the entire chassis or an individual task/process without impacting hardware forwarding
6	Switch should have redundant power supply from day 1.
7	Switch should support field replaceable components such as Supervisor, Line cards, Power-supply and Fan trays.
8	Should have 8 GB DRAM and 8 GB Flash
9	The switch will have at up to 8 Tbps switching capacity.
10	Forwarding rates: The switch should have minimum total 3 Bpps or minimum 900Mpps forwarding rates on a per slot basis.
11	IPv4 Routing entry support : 200K or more
12	IPv6 Routing entry support : 32K or more
13	Multicast Routing entry support : 6K or more
14	MAC addresses support: 64K or more
15	VLANs ID: 4K or more
16	ACL & QOS entry support : 3K or more
17	Packet buffer : 100 MB or more
18	The device should be IPv6 ready from day one
19	Must support BGP, VRF, VXLAN, OSPF Routed Access, Policy-Based Routing (PBR), PIM SM, and Virtual Router Redundancy Protocol (VRRP) from Day 1
20	STP, PVLAN, First Hop Security, Link Aggregation Protocol (LACP)
21	STP, Trunking, Private VLAN (PVLAN), Q-in-Q, Shaped Round Robin (SRR) scheduling, Committed Information Rate (CIR), and eight egress queues per port
22	Should have IEEE 802.1AE encryption in hardware
23	OS should have support for Management automation via Netconf/Yang or equivalent
24	Should support Streaming Telemetry, Netflow/Sflow/Jflow, SPAN, RSPAN or equivalent
25	Interfaces
26	The Switch will be populated with:
27	1) Adequate line cards for installing 24 x 10G SFP+ ports supporting 10GE, 5GE, 2.5GE, 1GE speeds

28	1 x Console port

29	Scalability
30	Should have blank slot for future expansion
31	Chassis should support additional QSFP+ port line card for future expansion
32	Certification:
33	The switch should be CE Marking, UL 60950, EN 60950 and ROHS5
34	The switch should be EAL/NDPP certified
35	Operating Temperature : 0°C to +40°C

Item Code: A136010010060279

2. L2 Network Managed Switch
(L2 - 24-Port 10/100/1000 POE Mbps + 4 10GBASE-T/SFP+ combo ports)

Sr. No	Minimum Technical Specification
1	**General Features:**
2	Switch should be 1U and rack mountable in standard 19" rack.
3	Switch should support internal hot-swappable Redundant Power supply from day 1.
4	Switch should have redundant fans from day 1
5	Switch should have minimum 2 GB RAM and 4 GB Flash.

6	Switch should support stacking using dedicated stacking ports in addition to the asked uplink ports. Should support for minimum 80 Gbps of stacking throughput with support for 8 switches in single stack.
7	**Performance:**
8	Switch shall have minimum 128 Gbps or more of switching fabric and 95 Mppsof forwarding rate.
9	Switch shall have minimum 16K MAC Addresses and 4096 VLAN IDs
10	Should support minimum 3K or more IPv4 routes
11	Switch shall support 1K or more multicast routes and 500 Switch Virtual Interfaces
12	Switch should support at least 8K flow entries (Jflow/Sflow/Netflow)
13	Switch should have 6MB or more packet buffer.
14	**Functionality:**

15	Switch should support IEEE Standards of Ethernet: IEEE 802.1D, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1p, 802.1Q, 802.3, 802.3u, 802.3ab, 802.3z
16	Switch must have functionality like static routing, RIP, PIM, OSPF, VRRP, PBR and QoS features from Day 1
17	Switch must have support for advance Layer 3 protocol like VRF, VXLAN, LISP and OSPFv3 as and when required in future
18	Switch shall have 802.1p class of service, marking, classification, policing and shaping and eight egress queues.
19	Switch should support management features like SSHv2, SNMPv2c, SNMPv3, NTP, RADIUS and TACACS+ .
20	Switch should support IPv6 Binding Integrity Guard, IPv6 Snooping, IPv6 RA Guard, IPv6 DHCP Guard, IPv6 Neighbor Discovery Inspection and IPv6 Source Guard.
21	Switch should support 802.1x authentication and accounting, IPv4 and IPv6 ACLs and Dynamic VLAN assignment and IEEE 802.1AE (MACSec – 128) on all the ports

22	Switch must have the capabilities to enable automatic configuration of switch ports as devices connect to the switch for the device type or equivalent solution.
23	During system boots, the system's software signatures should be checked for integrity. System should capable to understand that system OS are authentic and unmodified, it should have cryptographically signed images to provide assurance that the firmware & BIOS are authentic.
24	**Interfaces:**
25	Switch shall have 24 nos. 10/100/1000 Base-T ports and additional 4 nos. SFP+ uplinks ports from day 1.
26	The switch should support PoE/PoE+ on all ports with total PoE budget of 740 W
27	**Certifications:**
28	Switch shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 Standards for Safety requirements of Information Technology Equipment.
29	Switch shall conform to EN 55022 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B Standards for EMC (Electro Magnetic Compatibility) requirements.
30	Switch / Switch's Operating System should be tested for EAL 2/NDPP or above under Common Criteria Certification.
31	Operating Temperature: 0°C to +45°C

Item Code: A136010010060227

3. Single Mode SFP for long distance

Item Code: A136010010060229

4. Router (3GE, 2NIM, 1SM, 4G Flash, 4G DRAM, IPB)

Sr. No	Minimum Technical Specification
1	General Requirement

1.1	The Router should support modular architecture, multi-core Processor, internal field replaceable power supply.	
2	Hardware and Interface Requirement	
2.1	Router should have 3 x 1G SFP/Base-T (combo or dedicated) port	
2.2	The Router should have support for interfaces like Channelized E1/T1, V.35, G.703, LTE, Gigabit and 10G Ethernet modules. All the modular interfaces on the router should support hot-swap ability feature to accommodate field upgrades without rebooting the router.	
2.3	The Router should have 3 empty slots for future use	
2.4	Router should have minimum 4 GB of active DRAM/RAM and 4 GB Flash. Should support expandability up to 16 GB DRAM and 16 GB Flash.	
3	Performance Requirement	
3.1	Router should have minimum 100 Mbps WAN Throughput, upgrable to 300 Mbps whenever required in future.	
3.2	Router should support minimum 100K IPv4 / IPv6 routes	
3.4	The router must support IKEv1, L2TP, IKEv2, GRE and IPSEC from day 1. The proposed solution should serve the GRE encryption for traffic from any location to other location on demand and also should able to create GRE tunnel.	
3.6	Router should support IGMP v1/v2/v3 and PIM multicast routing	
4	Layer3 Features	
4.1	Router should support IGMP v1/v2/v3 and PIM multicast routing	
4.2	Router should support static Routes, OSPFv2, OSPFv3, BGP4, MBGP, BFD, Policy based routing, IPv4 and IPv6 tunneling	
4.3	The Router should support Zone Based Firewall feature or an external appliance for the same functionality can be provided.	
4.4	Router should Support Traffic Optimization feature built in the router operating system or an external appliance for the same functionality can be provided.	

5	Manageability
5.1	Shall have 802.1p class of service and marking, classification, policing and shaping.
5.2	Router should support SSHv2, SNMPv2c, SNMPv3 and NTP
5.3	Routers should support AAA using RADIUS and TACACS+
5.4	Should have extensive support for IP SLA and best path selection for metrics like delay, latency, jitter, packet loss to assure business-critical IP applications from Day1.
5.5	Router should support monitoring of network traffic with application level insight with deep packet visibility into web traffic, RTP-Based VoIP traffic.

5.6	Router should have traffic load balancing capability on dual WAN Links based on based on advanced criteria, such as reachability, delay, loss, jitter and bandwidth utilization.
5.7	Router shall have capability to add on demand IPSec VPN tunnels dynamically established multipoint-to-multipoint IPSEC based spoke-to-spoke VPN tunnels matching traffic conditions
5.8	Router should have capability to enable SD-WAN features without hardware upgrade
6	Certification
6.1	Router shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 Standards for Safety requirements of Information Technology Equipment.
6.2	Router shall conform to EN 55022 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B Standards for EMC (Electro Magnetic Compatibility) requirements.
6.3	Router/Router's Operating System should be tested and certified for EAL 3/NDPP or above under Common Criteria Certification
6.4	Router should be IPv6 Certified/IPv6 logo ready

Item Code: A136010010060230	
5. Network Firewall - with Fire Power services, 6GE, AC, 3DES/AES, SSD	

Sr. No	Minimum Technical Specification	
1	**Hardware Architecture**	The appliance based security platform should provide firewall, AVC and IPS functionality in a single appliance from day one
		The appliance should support atleast 6 * 10G Gigabit ports and should be scalable to additional 4 * 40G in future
		The appliance hardware should be a multicore CPU architecture with a hardened 64 bit operating system to support higher memory and should support minimum of 64 GB of RAM
		Proposed Firewall should not be proprietary ASIC based in nature & should be open architecture based on multi-core cpu's to protect & scale against dynamic latest security threats.
		The proposed solution shouldn't use a proprietary ASIC hardware for any kind of performance Improvement. If option to disable ASIC is there than OEM must mention the performance numbers in datasheet
		Proposed firewall should not consume more than 1RU of rack space
2	**Performance & Scalability**	Should support 15 Gbps of NGFW (FW, AVC and IPS) real-world / production / Enterprise Testing performance
		Firewall should support atleast 10,000,000 concurrent sessions with application visibility turned on
		Firewall should support atleast 60,000 connections per second with application visibility turned on
3	**High Availability**	Firewall should have integrated redundant hot-swappable power supply
		Firewall should have integrated redundant hot-swappable fan tray / modules
		High Availability Configurations shall support Active/ Passive ro Active/Active-Clustering
4	**Firewall Features**	Firewall should support creating access-rules with IPv4 & IPv6 objects, user/groups, application, geolocation, url, zones, vlan, etc

		Firewall should support static nat, dynamic nat, dynamic pat
		Firewall should support Nat66 (IPv6-to-IPv6), Nat 64 (IPv6-to-IPv4) & Nat46 (IPv4-to-IPv6) functionality
		Should support Static, RIP, OSPF, OSPFv3 and BGP, BGPv6
		Should support Multicast protocols like IGMP, PIM, etc
		Should support capability to create multiple virtual context/instance with strict hardware resource (CPU, Memory & Storage) reservation and ensure traffic isolation between virtual context/instance
		Should support capability to integrate with other security solutions to receive contextual information like security group tags/names
		Should have the capability of passively gathering information about virtual machine traffic, network hosts and their activities, such as operating system, services, open ports, client applications, and vulnerabilities, to assist with multiple activities, such as intrusion event data correlation, elimination of false positives, and policy compliance.
		Should support more than 3000 (excluding custom application signatures) distinct application signature as application detection mechanism to optimize security effectiveness and should be able to create 40 or more application categories for operational efficiency
		Should be capable of dynamically tuning IDS/IPS sensors (e.g., selecting rules, configuring policies, updating policies, etc.) with minimal human intervention.
		Should support more than 10,000 (excluding custom signatures) IPS signatures or more. Should support capability to configure correlation rule where multiple rules/event can be combined together for better efficacy
		Should be capable of automatically providing the appropriate inspections and protections for traffic sent over non-standard communications ports.

		Should be able to link Active Directory and/or LDAP usernames to IP addresses related to suspected security events.

		Should be capable of detecting and blocking IPv6 attacks.
		The solution should be able to identify, decrypt and evaluate both inbound and outbound SSL traffic on-box
		Should support the capability to quarantine end point by integrating with other security solution like Network Admission Control
		The solution must provide IP reputation feed that comprised of several regularly updated collections of poor reputation of IP addresses determined by the proposed security vendor
		Solution must support IP reputation intelligence feeds from third party and custom lists of IP addresses including a global blacklist
		Should must support DNS threat intelligence feeds to protect against threats
		The Appliance OEM must have its own threat intelligence analysis center and should use the global footprint of security deployments for more comprehensive network protection.
		The detection engine should support capability of detecting and preventing a wide variety of threats (e.g., network probes/reconnaissance, VoIP attacks, buffer overflows, P2P attacks, etc.).
		Should be able to identify attacks based on Geo-location and define policy to block on the basis of Geo-location
		The detection engine must incorporate multiple approaches for detecting threats, including at a minimum exploit-based signatures, vulnerability-based rules, protocol anomaly detection, and behavioural anomaly detection techniques.
		Should support Open based Application ID / Custom Application ID for access to community resources and ability to easily customize security to address new and specific threats and applications quickly

5	**URL Filtering Features**	Should must support URL threat intelligence feeds to protect against threats
		Should support Reputation- and category-based URL filtering offering comprehensive alerting and control over suspect web traffic and enforces policies on more than 280 million of URLs in more than 80 categories.
		Should support safe search for YouTube EDU enforcement
6	**Anti-APT / Malware Features**	Should support the capability of providing network-based detection of malware by checking the disposition of unknown files using SHA-256 file-hash or signature (update to be provided in 300 seconds) as they transit the network and capability to

		do dynamic analysis on-premise on purpose built-appliance
		Solution shall have capability to analyze and block TCP/UDP protocol to identify attacks and malware communications. At minimum, the following protocols are supported for real-time inspection, blocking and control of download files: HTTP, SMTP, POP3, IMAP, NetBIOS-SSN and FTP
		Proposed solution shall have required subscription like Threat Intelligence for proper functioning
		Local Malware analysis appliance shall be capable of executing MS Office Documents, Portable Documents, Archive Files, Multimedia Files and executable binaries or more in a virtual environment.
		Local Malware analysis appliance shall have integrated redundant power supply and minimum of 2 x 10 Gig ports or more
7	**Management**	The management platform must be accessible via a web-based interface and ideally with no need for additional client software
		The management platform must be a dedicated OEM appliance and VM running on server will not be accepted

		The management appliance should have 2 x 10G port and integrated redundant power supply from day one
		The management platform must be able to store record of 15000 user or more
		The management platform must provide a highly customizable dashboard.
		The management platform must domain multi-domain management
		The management platform must provide centralized logging and reporting functionality
		The management platform must be capable of integrating third party vulnerability information into threat policy adjustment routines and automated tuning workflows
		The management platform must be capable of role-based administration, enabling different sets of views and configuration capabilities for different administrators subsequent to their authentication.
		Should support troubleshooting techniques like Packet tracer and capture
		Should support REST API for monitoring and config programmability

		The management platform must provide multiple report output types or formats, such as PDF, HTML, and CSV.
		The management platform must support multiple mechanisms for issuing alerts (e.g., SNMP, e-mail, SYSLOG).
		The centralized management platform must not have any limit in terms of handling logs per day Solution should be able to provide insights of hosts/user on basis of indication of compromise, any license required for this to be included from day one
		The management platform must provide built-in robust reporting capabilities, including a selection of pre-defined reports and the ability for complete customization and generation of new reports.

		The management platform support running on-demand and scheduled reports
		The management platform must risk reports like advanced malware, attacks and network
		The management platform must include an integration mechanism, preferably in the form of open APIs and/or standard interfaces, to enable events and log data to be shared with external network and security management applications, such as Security Information and Event Managers (SIEMs), and log management tools.
		Proposed solution should support 24x7x365 OEM TAC support and advance Next Business Day Hardware replacement

Item Code: A136010010060232

6. Network Management Software (NMS) with Server & required accessories

Sr. No	Minimum Technical Specification
1	General Features
	NMS has to be from the same OEM as that of Switches
	Management system should provide a single integrated solution for comprehensive lifecycle management of the wired and wireless LAN and should support rich visibility into end-user connectivity and application performance assurance issues
	Management system should be licensed to manage all the proposed network infrastructure devices. Should have the scalability to manage 1000 devices in future
	The NMS should support configuration, administration, monitoring and troubleshooting of switches
	The NMS should support guided workflows based on best practices with built-in configuration templates
	The NMS should have the capability to view the network topology
	The NMS should support Fault Management

	The NMS should support device performance management	
	The NMS should support flexible web based portal framework	
2	Inventory Management	
	The NMS should automatically discover IP devices on the network	
	The NMS should discover SNMP compliant network devices on the network and manage them	
	The NMS should present graphical view of the LAN network	
	The NMS should provide detailed network inventory and management support for platforms	
	The NMS should support equipment details - chassis, module and interface	
	The NMS should support single menu for discovery status, device status, user tracking and inventory dashboard	
3	Monitoring and Troubleshooting	
	The NMS should support troubleshooting assistant with guided workflows	
	The NMS should support embedded troubleshooting workflow for quick problem isolation and remediation	
	The NMS should quickly and proactively identify and fix network problems before they affect end users or services	
	The NMS should support centralized fault and event browser (consolidated, syslog, traps, events and alarms)	
	The NMS should support SNMP based polling to identify availability and performance issues	
	The NMS should support dashboard to provide fault and availability statistics of endpoints and to allow for real-time performance and event monitoring	
	The NMS should support feature to help validate whether the network is ready for video and rich media applications	
4	Configuration Management	

	The NMS should support configuration backup of switches	
	The NMS should support user roles and privileges	
	The NMS should support software image management of switches. Should be possible to upgrade images and maintain consistency of images through NMS	
	The NMS should support change management required to maintain and update network devices	
	The NMS should support setting up auto configuration of switch ports	
5	Reporting	
	The NMS should support flexible reporting of inventory and user tracking, compliance, switch port usage and end of sale	
	The NMS should support flexible reporting option for PSIRT (product security incident response team)	

	The NMS should support Audit trail reports or equivalent	
	The NMS should support bug summary report or equivalent	
	The NMS should support change audit report or equivalent	
	The NMS should support Device credential report or equivalent	
	The NMS should support Syslog report or equivalent	
6	Installation	
	The NMS should support an unattended install	
	The NMS should be provided on dedicated appliance/installed on a virtual appliance/Intel based server/AMD based server	
	The NMS should support installation High Availability solution via internal or 3rd party software components if required in future	

Passive Components

Item Code: A136010010060278		

7. 19'' 42U RACKS (2100X800X800) MM

Sr. No	Parameters	Minimum Specifications
1	Type	19" 42U racks mounted on the floor Floor Standing Server Rack - 42U with Heavy Duty Extruded Aluminium Frame for rigidity. Top cover with FHU provision. Top & Bottom cover with cable entry gland plates. Heavy Duty Top and Bottom frame of MS. Two pairs of 19" mounting angles with 'U' marking. Depth support channels - 3 pairs with an overall weight carrying Capacity of 500Kgs All racks should have mounting hardware 2 Packs, Blanking Panel. All racks should have mounting hardware 2 Packs, Blanking Panel. Stationery Shelf (2 sets per Rack) All racks must be lockable on all sides with unique key for each rack. Racks should have Rear Cable Management channels, Roof and base cable access
2	Wire Managers	Two vertical and four horizontal
3	Power Distribution Units	2 per rack Power Distribution Unit - Vertically Mounted, 32AMPs with 25 Power Outputs. (20 Power outs of IEC 320 C13 Sockets & 5 Power outs of 5/15 Amp Sockets), Electronically controlled circuits for Surge & Spike protection, LED readout for the total current being drawn from the channel, 32AMPS MCB, 5 KV AC isolated input to Ground & Output to Ground
4	Doors	The racks must have steel (solid / grill / mesh) front / rear doors and side panels. Racks should NOT have glass doors / panels. Front and Back doors should be perforated with at least 63% or higher perforations. Both the front and rear doors should be designed with quick release hinges allowing for quick and easy detachment without the use of tools.

5	Fans and Fan Tray	Fan 90CFM 230V AC, 4" dia (4 Nos. per Rack) Fan Housing Unit 4 Fan Position (Top Mounted) (1 no. per Rack) - Monitored - Thermostat based - The Fans should switch on based on the Temperature within the rack. The temperature setting should be factory settable. This unit should also include - humidity & temperature sensor
6	Metal	Aluminium extruded profile
7	Side Panel	Detachable side panels (set of 2 per Rack)

Item Code: A136010010060277

8. 19'' 42U RACKS (800X800) MM

Sr. No	Parameters	Minimum Specifications
1	Type	19" 42U racks mounted on the floor Floor Standing Server Rack - 42U with Heavy Duty Extruded Aluminium Frame for rigidity. Top cover with FHU provision. Top & Bottom cover with cable entry gland plates. Heavy Duty Top and Bottom frame of MS. Two pairs of 19" mounting angles with 'U' marking. Depth support channels - 3 pairs with an overall weight carrying Capacity of 500Kgs All racks should have mounting hardware 2 Packs, Blanking Panel. All racks should have mounting hardware 2 Packs, Blanking Panel. Stationery Shelf (2 sets per Rack) All racks must be lockable on all sides with unique key for each rack. Racks should have Rear Cable Management channels, Roof and base cable access
2	Wire Managers	Two vertical and four horizontal
3	Power Distribution Units	2 per rack Power Distribution Unit - Vertically Mounted, 32AMPs with 25 Power Outputs. (20 Power outs of IEC 320 C13 Sockets & 5 Power outs of 5/15 Amp Sockets), Electronically controlled circuits for Surge & Spike protection, LED readout for the total current being drawn from the channel, 32AMPS MCB, 5 KV AC isolated input to Ground & Output to Ground
4	Doors	The racks must have steel (solid / grill / mesh) front / rear doors and side panels. Racks should NOT have glass doors / panels. Front and Back doors should be perforated with at least 63% or higher perforations. Both the front and rear doors should be designed with quick release hinges allowing for quick and easy detachment without the use of tools.
5	Fans and Fan Tray	Fan 90CFM 230V AC, 4" dia (4 Nos. per Rack) Fan Housing Unit 4 Fan Position (Top Mounted) (1 no. per Rack) - Monitored - Thermostat based - The Fans should switch on based on the Temperature within the rack. The temperature setting should be factory settable. This unit should also include - humidity & temperature sensor
6	Metal	Aluminium extruded profile
7	Side Panel	Detachable side panels (set of 2 per Rack)

Item Code: A136010010060276

9. 9U Wall Mount Rack

Sr. No.	Parameters	Specifications
1	Rack Size	
2	Wall Mount 9U x 550 W x 500 D.	
3	Accessories	
4	1U Cable Manager	
5	Roof Mounted Fan Unit / 90 CFM / 230V AC	
6	6 Way 5 Amp Power Distribution Unit	
7	Mounting Hardware Kit	
8	Features	
9	Conforms to DIN 41494 OR equivalent ISO Standards	
10	Adjustable 19" equipment mounting verticals provide the better mounting flexibility, and maximizes the usable mounting space	
11	Depth adjustable mounting slots	
12	Front Glass Door with Lock	
13	Top and bottom Panel with ventilation and cable entry facility	
14	Provision to mount the cooling fans on the top panel	
15	Powder coated finish with Seven Tank pre-treatment process meeting all industry standards	
16	Grounding and Bonding Options. 100% assured compatibility with all equipment's conforming to DIN 41494 (General industrial standard for equipment's)	

Item Code: A136010010060275

10. Dual Information Outlet CAT 6A with Faceplate

Sr. No	Specifications

1	Face Plate should be able to terminate one Cat 6 keystone jack.
2	Face plate material should be ABS with white colour.
3	The face plates should have inbuilt shutter for protection against dust.
4	Face plate should be able to supply with label holder.
5	Screw and screw hole cover to be supplied with face plate.
6	Should supplied with suitable back box. It should be made from HIPS / High plastic material.

Item Code: A136010010060255

11. Shielded Twisted Pair Category 6A Patch Cord – 3Ft

Sr. No	Specifications
1	Category 6A patch cords with four pair twisted cable terminated with RJ45 modular plugs at both the ends.
2	Patch Cord should have TIA/EIA 568C.2 standard.
3	Category 6A patch cord should be 100% factory made and performance tested.
4	Should have 4-connector shielded channel Performance test report by ETL/Intertek/ISO/UL Equivalent
5	Patch cord conductor metal should be made from bare copper.
6	Patch cord conductor should be 26 AWG, multi-cores.

Item Code: A136010010060274

SECTION-V

1. Non-Functional Requirements

1) Bidder's scope of work shall be in strict compliance with scope of work detailed in the Bid Document on lump sum turnkey basis. It will include but not be limited to the following:

a) Complete project management, system design and engineering.

b) Manufacture, Procurement, Shop testing and supply of all goods.

c) Providing engineering drawings, data operation and maintenance manuals documentation etc.to the Owner.

d) Packing, forwarding, handling and transportation / shipment from manufacturer's works /dispatch point to the Project Site (s).

e) Port and customs clearance from Indian authorities at Indian Port of entry.

f) Payment of port clearance charges, demurrage, wharf age, if any etc.

g) Provision of all handling equipment, including cranes, tools tackle, other aids etc. required for loading / unloading, handling of the equipment / material dispatch point, during transportation, at the receipt point, as well as during erection / installation, testing, commissioning etc. at site.

h) Receipt, Storage, Security, preservation, and conservations of all equipment materials at the site(s).

i) Safety, security, and protection of the installed, equipment and material till the time of handling over of the system to the Owner.

j) Pre-assembly, if any, erection / installation and testing, trenching, cable laying all field laying work, commissioning, associated civil / structural work, if any, site acceptance test and trial/test run up to the handing over of the complete works.

k) Provision of all consumables required for installation, testing and commissioning of the system.

l) Provide commissioning spares for the commissioning as required.

m) Insurance coverage as per provisions of the Bid Document.

n) Supply of spares / Special tools & Tackle and test instruments.

o) Training requirements as specified in Bid Document.

p) Guarantee / Warranty requirements as specified in Bid Document.

q) All statutory clearance / approvals as may be required for execution of work, as per provisions of Material Requisitions (MR).

r) Ensure instalment of all FISS facility with the following -

    i. Proper Foundation
    ii. Proper housing & base
    iii. Management of approach road for installed FISS components (cleaning of vegetation)
    iv. Civil Enclosure as required

s) Ensure integrated CCC application / solution from where single console have provision to manage all proposed solutions like –

- CCTV Surveillance system for Plant area & perimeter wall
- Access Control System & vehicle monitoring system with required accessories
- Entry Management System with Law Enforcement Equipment.
- Public Address System
- IPPBX System
- VHF Radio Communication system

- Variable Message Display system
- Proposed / Existing Systems like Fire Alarm System and so on

2) The proposed solution shall meet the following non-functional requirements:

a) Reliability:

The proposed equipment must be designed to cater for 24-hours round-the clock operation.

b) Maintainability:

The bidder must maintain 96.0% uptime for entire system. This uptime is exclusive of regular maintenance. The minimum down-time for all the components, factors such as ease of replacement, mean-time-to-repair (MTTR) must be incorporated in the system design and proposal and the same to be submitted. The system will be maintained using the software with recording facility (The software shall be provided by the bidder). The system should show the complaint status live and alerts / reports
/ logs / event report will be generated from the software for monitoring of the maintenance / fault duration. If repeated should be resolved urgently.

c) Security:

System is directly related to law and order, Surveillance, Plant Security & Data Security. System should be fully secured so that system can't be hacked or compromised by anyone, under any circumstances.

d) Upgradeability:

Each part of the system produced should be modular and easily reconfigurable and upgradeable. The system should be based on an open system concept.

e) Electromagnetic Compatibility:

The IP Interoperability and Collaboration System shall be able to operate without any complication due to any electromagnetic interference exists in or between sub-systems. For smooth handing over/transfer of the system at the time of expiry the contract the bidder must submit all the relevant documents, working status (at the time of handing over), detailed diagrams and drawings (Software, Hardware, Network Components, Field Equipment, Components, and sub-components etc. used in the project) and also ensure that the entire system shall be fully functional.

f) Scalability:

The bidder must ensure that the system should be capable of accommodating future expansion in project (if any).

g) Compatibility

Applications across OS releases and generations of system technology and upgrades – OEM should give confirmation for binary compatibility /interoperability of applications across release of the operating system and architectural generations of CPU and system platforms; today and in the future for a period of 5 years.

Key Scope

The proposed fully integrated security surveillance system consists of the following key scope:

A. CCTV Surveillance system for Plant area & perimeter wall
B. Access Control System & vehicle monitoring system with required accessories
   Entry Management System with Law Enforcement Equipment.
C. Public Address System
E. IPPBX System
F. VHF Radio Communication system
G. Variable Message Display system
H. Active & Passive networking of all systems.
I. Command & Control Centre Set up (Software, Hardware & Infrastructure)
   General Points

2. Functional Requirements

A. CCTV Surveillance system for Plant area & perimeter wall.

1) Shortlisted vendor needs to divide the plant area as per the vicinity of the locations marked on plant map. So that there will be central location in every zone from where connectivity to every camera will be established and power to field device will be extended. These IP cameras at each location shall be connected to respective zonal network switch through industrial switch and CAT 6A cable. Preferably same cable shall transmit video as well as power from PoE (Power over Ethernet) switch as all cameras shall be PoE based.

2) Whenever optical fibre cable is used for the camera connectivity, a media converter at each camera shall be used to convert optical media (OFC) into LAN media (UTP RJ 45 connector). The UTP shall terminate into the camera (As required based on site condition).

3) Further every zonal distribution switch shall be connected over dual ring or mesh topology to core switch at central command & control centre. Overall network shall be designed in such a way that single point failure shall not affect the purpose of network scheme (connectivity / accessibility).

4) Perimeter wall will be covered with box cameras which will be placed back-to-back on the distance of 50 meters on the pole along the perimeter wall. These cameras shall cover distance of 60 meters. Field of view of each camera shall overlap with field of view of next camera by 10 meters approximately to avoid blind spots below cameras. Dedicated cameras will be required at some point on perimeter to cover nullah & drainage culverts coming or going out from perimeter wall as it could be prone to intrusion.

5) Plant building entry / exits are to be covered with fixed bullet cameras or suitable cameras as per requirement.

6) PTZ dome cameras are to be placed at strategic locations for general surveillance purpose.

7) All gates of plants are to be equipped with ANPR cameras & required law enforcement equipment. Speed detection analytics (VMS based) to be considered at some locations and required analytics & applications shall be covered under the scope

8) At some critical locations like coal stack yard, oil handling plants & back yard of discharge terminals are to be covered with long rage cameras & thermal cameras as per requirement.

9) All the switches should run on the fibre backbone.

10) Suggested CCTV solution shall support the required number for IP cameras and storage of all the cameras for up to 90 days. Bidder must calculate the required primary storage capacity considering the requirement of recording for each camera at full FPS and full HD (1920 x 1080 p) resolution for 90 days. Apart from primary storage, bidders to consider additional secondary storage capacity considering the requirement of recording for each camera at full HD (1920 x 1080 p) resolution at full FPS for 30 days.

11) For details on location wise camera, please refer Technical Specification section.

12) The bidders must provide the complete solution including Video management servers, NVRs / primary & secondary storage, analytics server, network accessories, electric and electronic components, and sub-components, required cabling in the plant (which must be capable enough to integrate futuristic / other systems). It is mandatory to ensure the compatibility / integration with the other systems like Access control system, physical security system, fire alarm system, Command & control application and so on.

13) Proposed system shall be an open standard based integrated system aimed at providing high-speed manual / automatic operation for best performance. System should be easy to maintain. All equipment used in this system should support IPV6, IPV4 protocol.

14) All IP based CCTV Cameras & system supplied shall mandatorily be ONVIF compliant. It shall be possible to replace systems / cameras / devices supplied with a different make by plug & play.

15) Architecture of the proposed system shall be fully modular and should be designed in a manner to enable the complete system to be scalable, both horizontally and vertically according to the future operations, security, and other allied requirements.

16) System requirement shall ensure that once recorded, the video shall not be altered or tampered, ensuring that the audit trail is intact for evidential purposes. The recorded video shall be acceptable in the Indian Courts of law, that is, the video transmitted by the cameras shall not use any software reformation for its rendering or storing. The system should offer recorded video corresponding to any incident in primary storage disk for its presentation in the court of law without affecting the smooth functioning of the system (particularly, recording) or any loss of data. All the data communications taking place within the network need to be AES (128 - bit) encrypted and SSL authenticated, so that any unauthorized access to the video data can be prevented.

17) The system design shall be assessed for flexibility of on-line addition of new system / subsystems (new workstation, peripherals, cameras, network switches etc.) with no disruption to either the operation or system communications for future expansion. The offered software will be assessed for in-built capability / provision to take care for future expansion and new services & features etc.

18) For cameras which needs to be installed on existing lighting mast – Camera needs to be installed on top of the pole (which is around 30 meters) along with flexible cable for ease of maintenance.

The proposed solution shall consider the following:

1) Monitor activities to protect property, manpower, spot incidents early and save days reconstructing incidents for further investigations

2) Capture powerful evidence to help reduce liability, expedite investigations, and mitigate frivolous claims

3) Prevent intrusions by tracking them effectively & conveying signals to quick response team on field at earliest.

4) Fuse video and other security intelligence to provide decision making intelligence (Unified view of all systems)

5) Benefit from a powerful, reliable solution that is simple to operate and provision to integrate with existing systems

6) Gain smarter situational awareness and event management from a single central location.

7) Achieve reliable coverage of plant activities

8) Aid in legal defence by providing strong video evidence

9) Oversee safety of employees and operators

10) The solution shall display real-time feeds as well as provision to view historical feeds.

11) System shall provide parameter-based programming interface for integrated unified application.

12) The system shall provide continuous 24 hour per day recording.

13) Provide event-recording mode of live events (on-demand).

14) The recording system shall capture, digitize, compress, and store video on a storage as well as support advances compression without compromising on video quality over network for transfer to NVR / storage devices.

15) The system shall allow each camera to be independently configured to record video.

16) Each camera shall record at

- A minimum resolution of 1920 x 1080p and VGA for thermal images

- Compressed according to the H264 or better ITU standard

- Note – For more details refer detailed Technical Specification

17) Each camera shall have an individual setup for brightness, contrast, colour, and hue.

18) All camera setups shall be independently selected and modified through the viewer & CCC software application.

19) The system shall be used for playback and monitoring of video independently.

20) Each output shall have the capability of playback at the same frame rate as recorded.

21) Each output shall have brightness and colour adjusted through the brightness slider bar control and the colour slide bar control.

22) The system should have the option to prevent overwriting of specific video clips.

23) The system must provide the ability to set the Date, Time, camera name and number (Unique ID based on location and category) for each output channel independently.

24) The system shall record and store the Unique ID, date, camera sources, audio sources and alarms.

25) This information shall be available through a query of the database for a specific segment. This segment shall allow for playback from the hard drive, an internal archived system.

26) Software must be able to select an active camera for enlarged viewing of live content.

27) Selection should not make any difference in recording size, speed, or bandwidth.

28) CCC application software must be able to cycle through predetermined set of cameras in order to setup automated viewing stations.

29) Both live images and recorded images must be accessible over the network, using either CCC application software or a standard secured browser interface.

30) Ability to remotely access and view images through secured connection.

31) Must have the ability to view cameras from more than one place. For instance, user needs to be able to monitor a set of cameras from different physical addresses simultaneously over a secured network.

32) Software must be able to control Pan/Tilt/Zoom cameras remotely with a standard PC joystick, which should be furnished and installed to work with Proposer's software.

33) Software must be able to record a constant user definable number of frames per second with the ability to speed up recording on either side of a motion or connected alarm event.

34) Software must be able to specify motion sensitivity for individual cameras, as well as the ability to block certain areas from triggering motion alarms.

35) Playback software must allow recorded video to be looked up quickly and efficiently.

36) Recording destination should be transparent to end user who should be able to pull up any camera within their access levels and view live or recorded video from any viewing stations.

37) The recording server software shall allow for remote viewing on - desktop PC's, mobile devices, laptops.

38) Plant Department requires local viewing of live video, streaming and or file based via the server hard drive array and viewing of long-term or taped media.

39) Input data should be stored using appropriate technology to ensure its readability in case of normal anticipated events, i.e., main battery failure, software error, limited equipment failure.

40) Once the condition is corrected, data should still be intact and downloadable. The capability to transfer the memory modules from one unit to another to effect recovery of the data is highly desirable.

41) Proposal needs to clearly state system capabilities with respect to data safeguards, backup, and recovery.

42) The System should facilitate viewing of live and recorded images and controlling of all the cameras by   the   authorized   users.

43) System should provide interoperability of hardware, operating system, software, networking, printing, and reporting.

44) Provision to share feeds to the individual Local Control Centre (apart from CCC) based on authorization. Where the LED screens / desktop / laptop / mobile devices shall be available for viewing.

45) The bidder for successful completion of project shall provide the poles, fixtures, fittings and so on, as required for respective location.

46) All the fittings, wiring and cabling should be as per industrial standards and not left open which can be misused by the intruders.

B. Access Control System & vehicle monitoring system & Entry Management System with Law Enforcement Equipment

A fully automated access control system & Vehicle Monitoring System shall be provided for controlling access various areas within the plant.

The access control system shall:

1. Support PIN, CARD and BIOMETRIC details for providing access to various locations.

2. Restrict access to personnel and vehicles based on their authorization levels.

3. Monitoring vehicle movement within the plant.

Access Control System

Access cards shall be provided to Technical Staff (Permanent Pass), Contractors (Long term pass) and visitors (Day Pass). Access cards shall be issued with allocation of permitted zones, pass validity period, permitted calendar (all days a week or restricted days in a week) and permitted daily work schedule and so on.

The system shall support Anti-pass back and Global Anti-pass back features across the entire system. The anti-pass back feature shall work based on peer-to-peer communication between the door controllers without any participation by the servers or workstations.

The fences, turnstiles, vehicle entry gates, physical restriction, and cameras (if available) shall be positioned and interlinked to deter personnel from entering the facility without the authorization of the Security Operator.

External doors in required buildings within the plant area shall be provided with door sensors for monitoring the door status. If possible, Cameras shall be positioned in such a way that the doors can be monitored remotely.

The system shall provide facilities to scan an identity proof, Contact Telephone Number validation (OTP Based), Name, Employer, Person visited and other required relevant details for issue of Visitor Access Card.

The system shall provide features to escalate events such as extended stay of visitors beyond their allowed time limits, so that the responsible visitors can be notified immediately for further action.

Required access-controlled doors shall have readers for "Entry" and "Exit" area with fail-safe and fail-secure provision.

Access control system shall be provided with additional input port for another emergency like earthquake. During Fire and gas hazard, the access control shall unlock all the doors, barriers, and gates of the particular area only.

The access control system shall comprise of the following components.

1. Access Control System Server with management software
2. Door Controllers

3. Access Control Readers
4. Magnetic Locks
5. Magnetic Status Sensors
6. Electric Strikes
7. Boom Barriers
8. Turnstiles
9. Forced Release Push Buttons
10. Access Control Cards
11. Badge Printer
12. Camera with tripod
13. Fingerprint Scanner
14. Access Control Workstation
15. Laser Colour Printer
16. Cables (CAT 6A, Patch cords, pair cables)
17. Cabinets

Security Domain RS485 / TCP-IP bus shall be used for interconnecting Access control system server, workstations, door controllers and other components according to the location of the door controller. All the electric strikes, magnetic locks, sliding gates, Drop Arm Barriers, Turnstiles shall be configurable "on site" for "fail safe" or "fail Secure" operation.

Required plant control room entries shall be restricted using Card, PIN and Biometric readers. Apart from this, entries to other buildings like command & control centre, admin building, Service building & other critical infrastructure to be restricted with card readers.

Vehicle Monitoring System (UHF Reader based)

A Vehicle Monitoring System shall be implemented to manage inward and outward flow of vehicles like trucks and other designated vehicles.

System shall be comprising of:

1. Contact less Smart card redder based sequencing system

2. Boom Barrier Gates at designated location

3. Software application to record and control the flow of vehicles.

4. IT hardware including workstation, printer, UPS etc.

5. LED based Variable Message Signs VMS

6. Three locations are identified for System

   a) Entry Gate
   b) Coal Unloading area
   c) Exit Gate

   Note – Multi-level UHF reader needs to be designed considering probable vehicle hights

7. UHF based Smart card shall be issued to the designated vehicles making entry into the plat at Entry gate.

8. Information related to vehicle including its registration number, weight along with date and time of entry shall be stored into the smart card.

9.

10. Following time shall be recorded in the system

    a) Time of Entry
    b) Expected time of vehicle reaching to its destination
    c) Expected wait time of vehicle at destination
    d) Time vehicle left the detonation for Exit
    e) Expected time of vehicle making an exit after leaving the destination
    f) Time of Exit of the vehicle

11. System shall keep a record of all actual time and expected times and would raise a flag for CCA on real-time basis if there are any unexpected delay.

12. 2 line & 13-character LED variable message sign display to be provided at locations identified by Mahagenco team.

13. Smart Card issued at Entry gate shall be used at ash filling/loading location and at Exit gate for the tracking purpose.

14. Every location a single UHF reader at optimum height shall be provided.

15. A smart card writer shall be provided at main entry gate where these cards shall be issued

16. All peripheral devices related to boom barrier system including Barrier Gate, Traffic light, Smart Card Reader, vehicle presence sensors, LED display, manual controller shall be connected/concentrated in one controller which shall be connected to desired operator workstation.

17. Contact-less smart card reader (CSCR) shall be having a micro-controller of 8 bits or More & Shall work on frequency higher than 860 MHz

18. CSCR or UHF card reader shall have read rage of 10 meters (33 Feet)

19. Suitable cards for UHF readers shall be supplied with data writing facility.

20. Communication between the card and workstation shall be using RS 232 or USB or Ethernet.

21. CSCR shall provide weather protection of IP65 category

Entry Management System with Law Enforcement Equipment

It is proposed to install Boom Barrier, Door Metal Detector (DFMD) & Turnstile at required locations separately.

Handheld Metal Detector is also suggested to be used, since it will help the Security for frisking visitors. X ray Baggage Scanner systems at Entry Gates to scan the bags of visitors.

D. Public Addressing System

An IP based public address system (PAS) is required for passing voice-based instructions / commands from Command & Control Centre (CCC) to different zones in plant area as per the requirement. Also, this system can be used to address the people in emergency situations like fire, earthquake and so on.

1. Currently PA system will only be addressing plant units 5,6,7,8 & 9 & other areas (as required)

2. We suggest bidder to consider following criteria for zoning

   a. Individual plant units
   b. main entry gate, CCC & admin building
   c. Any other as required

3. There will be master control unit & master calling station at command & control centre through which authorized CCC operator(s) can address individual zones, Multiple zones, or individual speaker in specific area.

4. Master calling station at CCC shall be able communicate with individual calling station on point-to-point basis as well as on broadcast basis.

5. All plant control rooms will be equipped with calling stations which can be used to address people in that specific plant unit.

6. Required floor or level of plant will be equipped with horn speakers.

7. Outdoor calling stations shall be installed on wall or at suitable structure as per the site requirement and shall be able to communicate with respective plant location / area / zone.

8. At some locations where noise levels are around 90 dB or more, installation o of flashing beacon is expected.

9. Offered solution shall be able to integrate with CCC application.

10. The Public Address and Alarm System shall be used to broadcast alarm tones and emergency speech, announcements together with general safety and routine messages through the loudspeakers. The system shall have the capability to broadcast alarm tones and 'emergency speech' in all areas.

11. Support for Routine, Emergency, General, Alarm and so on messages. It shall be possible to broadcast pre-recorded or on the spot Speech in the system.

12. Provision to activate Visual alarm beacons automatically be initiated during for Routine, Emergency, General, Alarm and so on messages.

13. The Sound Pressure Level (SPL) of all alarm tones and speech announcements shall be a minimum of 20dB for interior areas and a minimum of 15dB for exterior areas above the overall ambient noise. SPL at the listener should not exceed 110dBA or be less than 65dB (A) in any circumstances.

14. Beacons providing visual alarms shall be provided for use in external noisy areas where the ambient noise exceeds 90 dB (A). The luminescence and colour of the flashing beacon shall be clearly visible in sunlight conditions associated with the site.

15. Each of the Public Address system shall have a set of central equipment, comprising control and switching logic, alarm generators, amplifiers and power supplies shall be provided.

16. The equipment rack(s) shall be installed in the Command & Control Centre (CCC) Server Room.

17. Bidder to consider hot standby redundancy for power & controller unit of central exchange or suitable redundancy scheme as per offerings. The design of the system shall ensure that no single equipment or cable failure shall render the whole system inoperable.

18. A hot standby amplifier shall be provided for each of system amplifier racks, connected in a N+1 configuration (where 'N' = any amplifier in normal operation), and automatically switched into service, should any of the amplifiers fail.

19. Vendor shall confirm quantities and locations of loudspeakers and visual alarms based on detailed study during detail site visit.

20. All speakers installed in the field shall be of IP66 rating & should be rated for minimum 10W.

21. Software application for PAS shall be installed on a workstation/server. Software application for PAS shall be able to play pre-defined messages as per requirement.

22. The PA system shall have a Telephone System interface providing the capability for 'Routine Speech' broadcasts to be made by telephone. Announcements from the telephone system shall be routed through a voice pre-recorder device. The voice pre- recorder devices shall also have facilities to record and repeat messages.

23. The PA system shall have Fire Interface for signals from the Fire Alarm System.

E. IPPBX System

System shall be provided for voice communications within plant area and outside as required. Telephone system shall be IP based with latest technology supporting industry standard protocols

The telephone system shall consist following features

a) Dual Redundant Communication Server.
b) Analogue and IP telephones.
c) Private Automatic Branch Exchange (PABX).
d) ISDN Line for data/video and voice connection.
e) Analogue Trunk lines.
f) Conference Telephone.

g) Operator Console.
h) Distribution Frames.
i) Call Accounting and Management System.
j) Malicious call tracing

The systems shall be based on the latest, proven, state-of-the-art design, and the latest versions of Hardware, Software, and Firmware shall be provided at the time of the delivery.

• Communication Servers

Duplicated communication servers shall be provided with each of the communication servers having redundant internal power supply units. Dual power supply feeders from the UPS shall provide power to each of the communication servers. Communication servers shall be provisioned with suitable number of licenses for the phones and various applications required as per project specifications. The communication servers shall operate in redundancy mode such that if one communication server fails the other will take over without any call drops. The server configuration shall be sized to accommodate future expansion as per project requirements.

The Telephone System shall be provided have a capacity & features as follows.

a) 50IP Extensions
b) 1200 Analog Extensions
c) 50 IP Extensions
d) 2 x PRI (30Ch)
e) 10 x 2 Wire Analog Trunks
f) Voicemail Server for 100 channels
g) Operator console for maintenance & CCR building.
h) Malicious call tracing feature for extensions.

• Analogue Telephones

Existing Analog terminals shall be used at first. Analog telephones shall be desk or wall mounted type, line powered with a DTMF push-button keypad. Two types of indoor telephone shall be supplied, standard analogue desk or wall mounted telephones and executive desk standing telephones. The analog telephones shall have full hands-free speaker phone with speech volume adjustment, Display, Caller Line Identification (CLIP), Message Waiting Indication, Ring Volume Adjustment, DP/DTM Dialling, Redial, Flash button etc. Flash function timing shall be compatible with the Telephone System for accessing various functions.

• IP Telephones

IP & Digital telephones shall be powered using Power over Ethernet (POE) ports from the Office domain switch or with suitable power adapter. The use of separate power supply units shall not be permitted. The telephone sets shall have display, CLIP, Directory access, full hands-free speaker phone with speech volume adjustment, Display, Caller Line Identification (CLIP), Message Waiting Indication, Ring Volume Adjustment, DP/DTM Dialling, Redial etc. Flash function timing shall be compatible with the Telephone System for accessing various functions. Programmable buttons shall be used for special feature activation with activation status display and for frequently called numbers. IP telephones shall facilitate cascaded connectivity of network to the workstation via the IP telephone.

IP phones shall be integrated to the user's workstation office applications for directory, call initiation and other functions

• Call Accounting and Management System

Vendor shall provide a workstation with call accounting package from the Telephone System manufacturer or third-party vendors approved by the Telephone System manufacturer. The workstation shall also be provided with software form the Telephone System manufacturer for management access.

Adds moves and changes in the configurations shall be carried out from this management workstation. An A4 size plain paper laser printer shall be provided with the workstation for printing various reports.

F. VHF Radio Communication system

1) It is proposed to deploy VHF Radio System for Power Plant. The proposed System will comprise of Digital Mobile & Static base stations, Portable Walkie - Talkies & Repeaters for increasing the coverage area. It is desirable to have coverage for the entire plant area along with additional locations as required.

2) Bidders are advised to do the survey of plant site and submit the report of survey as a basis for the design such as location of repeaters, number of repeaters, etc. for the solution proposed.

3) Vendor shall liaison with the statutory authorities for operating license & Frequency allotment of VHF system. Issuance & renewal of same shall be in vendor scope for contractual period. Vendor shall pay the license fee and all the liaising charges.

4) It should have dual mode analogue/DMR in IP-linked networks.

5) It should be able to send Alarm messages directly to the terminals/ to the selected "security group" of terminals to inform the user in real time about the major failure cases occurred in the network (e.g., low power supply, IP connection failure, synchronism failure, etc...).

6) It should have Client-Server based dispatcher software which connects directly to repeater through IP protocol. API to be provided for the integration with CCC.

7) Short Messaging should be possible with this system with Mobile, Static and Portables to have seamless SMS, services.

8) All the Portables, Static, Mobile and Repeater should have individual ID and should have "Group Call", "Individual Call", "Broadcast Call" and Selective Call features and each Mobile / Portable should have option to migrate into any of the group by change of parameter/ switch/ button.

9) Each Portable/ Mobile should be capable of seamless connectivity across the plant

10) It should have IPSC facilities so that multiple repeaters will be connected via Ethernet Back Bone link.

11) It should be a "soft radio" in which all the mo-demodulation and filtering processes are achieved through SW algorithms implemented in DSP devices.

12) It should have excellent resistance to adjacent channel and blocking, noiseless transmitter and soft diversity reception reduce in-field troubles and give excellent coverage and clean communications.

13) It should perform the automatic switching between Analog and Digital modulation according to the incoming signal.

14) It should integrate all the necessary algorithms to realize professional multisite networks: IP interfaces, voting system, automatic equalization, protocol coherence, synchronization recovery, network managing,

15) It should have mixed linking network.

16) It should work on soft diversity reception.

17) It should have SIP/RTP-IP dispatching systems, automatic roaming between different networks and/or repeaters (mobility), automatic phone-radio bridging.

18) It should have PSTN/PABX Interface. Base stations can be connected to an automatic telephone line interface IP-based. This interface can be placed everywhere in the same IP sub-net of the Master station. This interface can support 1 or 2 simultaneous telephone connections (one per each timeslot)

19) It should have powerful remote-control feature which helps for setup and network maintenance operations by simplifying and speeding up from remote detailed monitoring and configuration tool. It allows also secure SW upgrade, IP backbone diagnosis and an overview of the complete radio system.

20) It should also support the SNMP protocol for direct reporting to a generic surveillance system.

21) Alarm messages should send directly to the terminals: base station should send alarm message to the selected "maintenance group" of terminals to inform the user in real time about the major failure cases occurred in the network

22) Slave/Master/Backup Master Tier2 system according to the ETSI standard Kairos TIER2 protocol and software upgradable to Tier3.

23) It should have lowest power consumption and should not go beyond 5 watts in Idle condition.

24) It should be 25-Watt 100 % duty cycle.

25) Weight of the repeater should not be more than 10 KG.

26) System Stability should be at least 0.5 ppm.

27) It should be solar panel ready

28) It should have automatic self-protections

29) It should have Alias/Backup Master structure for redundancy

30) It should have 2/4 wires +E&M for synchronization or Analog interfacing for console

31) PPS port for synchronization between local base station

32) It should be able to make call between Analogue to Digital radios.

G. Variable Message Display System (VMDS)

Supply, Installation & commissioning of Message display system or Variable message display system (VMDS) at multiple locations in plant as per suggestions of plant officials. Message display system will display current load of all plant units, employee of the month, Birthday greetings, Important Message related to Safety and First Aid methods, Pollutants in ambient air.

It has been observed that it should be Installed at specific locations. Power Plant entry gates, major gates and some important areas link Admin Building, Canteen and so on. This system will be connected over LAN, GSM so that fresh content can be pushed on the screen as and when required.

Features of Message Display System or VMDS

● A Variable Message Display System (VMDS) shall be implemented to transmit text / picture / video messages to LED based Variable Message Signs

● A full matrix multi-colour VMDS shall be installed multiple locations complete with their mounting arrangement using T-type or half Gantry. Pixel pitch of VMDS shall be minimum 25 pixels.

● VMDS shall support the display of messages in English, Hindi & Marathi. It shall also support pictorial messages & Videos.

● Minimum display Ares for VMDS required shall be 2200 (L) x 1400 (H) mm.

● VMDS shall be connected with CCC over FOC.

● VMDS shall be complying with EN12966 standard (A certificate from the proposed OEM needs to be provided)

● Software application for VMDS shall be installed on a workstation / server with provision to integrate with CCC.

● Software application for VMDS shall be able to display pre-defined messages based on pre-programmed trigger.

● VMDS enclosure shall be IP 65 rated or better

H. Active & Passive Networking

1) Local Area Network Application

Vendor shall design and supply a Data Network and Structured Cabling System that will provide all LAN and WAN services required for all field unit spread over the powerplant and its associated facilities.

2) Data platform

The network shall be based on switching and routing technologies to provide the services as stated.

- OEM should be rated Leader's in Gartner's Magic Quadrant for wired and wireless LAN for min 5 years. OEM should not be blacklisted by Govt./ PSU.
- Network switch and SFP Module should be of same make to avoid any Operability and Integration issues.

The network shall be designed with a layered structure with Core Switch at the Main Security Gate Building Telecom Room where servers are to be located and Access switches for the distribution within the buildings.

3) Core Switch

Office LAN shall be configured with a "Core" Switch at the Command & Control Centre (CCC) building. Core Switch shall switch traffic between different application Servers, Communication Servers, and Wide Area Network through Firewall.

The core switch shall be provisioned with redundant common control and power supply units for high availability. Two separate power feeders from separate UPS units shall provide power to the Core Switch. Vendor shall provide provision for complete redundancy at different level of network ensuring that communications are not affected by the failure of any one item of FISS system.

The Core Switch shall be with minimum 24 x 10/100/1000BaseT POE, 24 x 1000BaseLX interfaces and support Layer 3 functions. Vendor shall consider provision of OS version with maximum set of features. Exact details of the OS versions shall be confirmed by vendor during the detailed design stage of the project.

4) Access Switch

Access switch will switch traffic between the Desktop Workstations, IP telephones to the Core Switch for network access. All the uplinks from the Access Switch to Core Switch or other Access Switch shall be 1000Mbps as minimum.

Access switch shall be with minimum 24 x 10/100/1000BaseT with POE, 4 x SFP for supporting 1000Base Optical interfaces. Suitable 1000BaseLX SFP optical plug-in modules shall be provided as per the project requirements. The switch shall have Layer

3 functions. Vendor shall consider provision of OS version with maximum set of features. Exact details of the OS versions shall be confirmed by vendor during the detailed design stage of the project.

Vendor shall provide redundancy at Access switch level ensuring that communications are not affected by the failure of any one item of Telecommunication system.

5) STRUCTURED CABLING SYSTEM

The structured cabling system comprises the structured cabling system equipment rack(s) and the horizontal cable distribution cabling. All Structured cabling cabinets shall have a CAT 6A RJ45 voice patch panel for terminating multi-pair telephone cable from Telephone System.

Installation shall be such that data or voice connectivity can be extended to any of the wall socket by using a patch cord at the cabinet.

Vendor shall supply, install, and test the total horizontal cable distribution network that complies with the EIA/TIA-568B, EIA/TIA-569B, EIA/TIA-606 and EIA/TIA-607.

Vendor shall submit FDS (functional design specification) shall be based on this specification and the appropriate standards, and the Vendor shall demonstrate his understanding of the requirements and the reliability of the offered equipment in terms of calculated and measured MTBF/MTTR, as well as a list of in-service current systems.

Data switches and RJ45 patch panels shall be mounted in equipment cabinets. All patch panels shall be provided with a cable manager. Cabling from the equipment cabinet(s) to the structured cabling data-outlets within the same building shall be via a Structured Cabling System using a horizontal copper cable distribution system using Unshielded Twisted Pair (UTP) CAT 6A cable. This structured cabling shall terminate in the equipment cabinet(s) on a RJ45 patch panel and shall be connected via RJ45 patch cords to the switch.

6) CAT 6A cable laid along with high-tension cable:

Vendor shall ensure in case of substations and areas where Data cables are to be laid along high-tension power cables Shielded Twisted Pair (STP) cabling system shall be deployed. The CAT 6A structured cabling shall fully comply with the EIA/TIA 568-B wiring standards. The maximum length of UTP CAT 6A cable shall be 100 meters.

7) CAT 6A Patch Cords

CAT.6A patch cords will be used for patching in SCS cabinets between switch-side and equipment-side patch panels Shall be provided with RJ 45(8 pin) and 9th offset pin for port detection, connector on both ends shall be male-male.

CAT 6A patch cords shall fully comply with the EIA/TIA 568-B wiring standards.

8) Fibre Optic Patch Cords

All patch cords and pigtails shall be "LC" type flame retardant in accordance to IEC60332. Length of the patch cords and pigtails shall be decided by the vendor during detailed design stage of the project. All Fibre Optic patch cords shall be factory assembled utilizing LC connectors. All Fibre Optic patch cords shall comply with ITU G.657 standards, fabricated using Single-Mode Enhanced (SM EN) strands of Fibre and shall be extremely flexible without degrading the performance characteristics.

I. Command & Control Centre Set up (Software, Hardware & Infrastructure)

A. The bidder is required to provide Turnkey Solution that includes but is not limited to installation only which covers following scope -

1. Design, Supply, Installation, Implementation, Commissioning, Training, along with providing 5 years of comprehensive maintenance (CAMC) for the solution including all hardware, software, technical support & services related to network, cabling & field equipment an integrated part of Fully Integrated Security System (FISS) at CSTPS.

2. Work also includes construction of Command & Control building to house all IT, electronic equipment & UPS with 60 minutes of back up for command & control centre equipment. Detailed scope of same is provided in Annexures below.

3. Bidder must weed out vegetation along the perimeter wall and other areas to get the clear view and for installation of FISS components. For the details of the same, Vendor shall conduct physical survey before bidding.

4. All necessary cabling / wiring / sockets and allied infrastructure conforming to respective quality / standard norms are also to be included in the scope of work.

B. Infrastructure Requirements for Command & Control Centre (CCC) Setup.

Following are the indicative requirements for setting up of CCC at Plant.

1. The control centre should connect all the cameras installed in the plant area & Perimeter wall & gate area. The Control centre should have functions to view, control, receive alerts and notifications from any camera located anywhere in the system.

2. The control centre would house the server, ups, storage, switches, and racks.

3. Proper redundant cooling system needs to be designed for required adequately cool environment in CCC.

4. The control centre shall be set up with required software, hardware including network infrastructure (switches, routers etc.) passive components, facility services and so on.

5. Local Plant level administrative support will be provided by department for design standards of necessary civil work, communication network, furniture and so on.

6. The Control centre shall have a console table with seating capacity for minimum 10 people. The console table shall also be equipped for providing power, audio, video, and data connectors for a laptop / computer and use the Video wall for the monitoring purpose.

7. The Bidder to consider MCT blocks of suitable size for cable entries into command & control building.

8. Suitable earthing arrangement for equipment in CCC shall be considered.

9. The bidder to consider gas-based fire suppression system for equipment room in CCC.

10. Bidder Shall Consider False flooring for equipment room / server room for ease of access to cables & False ceiling as mentioned in Civil specifications.

11. CCC shall be equipped with access control system to main entry, equipment room, UPS room and all other rooms as required.

12. The control centre should have the feature of Digital Maps (GIS based) of the Powerplant to have complete details of the installed surveillance cameras and other security systems, on the map and on click of the same, the respective camera or system shall display live video, other events, shows status, all devices events and alerts, showing the health, their Connect or Disconnect Status and so on. The prioritization must be based on a user pre-defined order that should be open to updating by the user when necessary.

13. The proposed VMS should provide the facility to group the cameras on the basis of location, area or any other basis. The system should provide configurable rules with tailored alerts, dashboard visualizations, intelligent role-based situation collaboration.

14. The solution at control centre should support full-fledged video support (Camera List, Live Video, Recorded Video, Playback, Video Matrix and so on) with advanced video analytics to keep track of installed cameras simultaneously from a single location. These video analytics should have feature to detect breaching, missed object, left object, fire and so on

15. Video Interface: At any point of time Operator should be able any pre-defined number of cameras for live concurrent view and playback recorded feeds from a selected camera for defined period. The following minimum functionalities should be available:

    i. Video matrix: Provision by software to view multiple video streams in a single window
    ii. Camera List: List of cameras based on the names and categorization configured in the system
    iii. Live Video: Real time video of the cameras installed and configured

iv. Recorded Video: Provision to browse the recorded video for investigation purpose and export video to AVI or ASF file; Export single frame to BMP and JPEG file.

16. The CCTV interface should have support for providing the facility of sending alert on any breach or misfortunate event. The alert can be in form of pop up on screen, SMS & e-mail to authority, sound alarm and so on.

17. The system should have support for username and password, based authentication and authorization for system login.

18. The system should have user-role based configuration settings, live view, Playback, PTZ access, GIS maps and so on.

19. Defined administrator should have provision to create users with their roles and groups as required.

20. The CCTV interface should support open protocols like ONVIF, RTSP, HTTP, MODBUS, MQTT and so on which should support most of camera brands, VMS along with their functionality for required integration.

21. The system should allow to export these videos file playable on any computer media player. The clips should be exportable to minimum .avi & .mp4 formats.

22. Central Monitoring System should have function to generate reports in graphical & tabular form based on event, date-time & camera and export in PDF, word, excel and other desired formats.

23. The CCTV solution should have simple and user-friendly interface for:

    i. Automatic camera discovery over the Network.
    ii. Applying configuration setting of added devices to new devices by single click
    iii. Defining users with their roles: Administrator, Viewer based on Configuration Settings, Live view, Playback, PTZ access, Maps, Video Analytics
    iv. Camera or camera groups assignment to users
    v. Easy interface via Drag and Drop of the cameras on to the live view, to install & upgrade software.
    vi. Intelligent Search based on Date/Time/Camera, Name, ID, Location for more than one camera simultaneously
    vii. Easy to take backup and restore all configuration settings.

24. An internal dome camera with motion detection feature will record the footage in the control room connected to the workstation. The recording should be only on motion detection

25. Biometric Access control with electromagnetic door locks should be there to provide authorized entry in the control room.

    i. The vendor will be responsible for all the related accessories, software, locks, cables, minor civil work (if required), documentations, configuration and commissioning of the devices.
    ii. The cost of items should be inclusive of these services and items.
    iii. Proposed solution shall have capability to integrate with CCC application

26. UPS should be installed to run the complete Control centre. Minimum of 1 hour of backup in case of power failure.

27. Required Air conditioning unit (with redundant support) to be installed in control centre to keep temperatures of components and system within limit.

28. Complete Hardware and software along with necessary licenses (on the name of Mahagenco) shall be provided by the vendor.

29. The controls and displays should be mounted in ergonomically designed consoles to keep operator fatigue to a minimum and efficiency high.

30. Any component, connectors, civil work, electric work Fire alarm system & Gas suppression system etc. required at sites shall be borne by the system integrator / successful bidder at no additional cost to the department.

31. The aesthetic appearance of the cabling within office and other visible areas is to be taken into consideration while planning the cable route (inside & outside) and other interior activities.

c. Supply and Installation of the Fully Integrated Security Surveillance System.

1. Supply, install, operate, maintain and provide CAMC & related support services for hardware and upgrade/update/enhancement for system software, as detailed out in technical specifications, including related software, firmware etc. for a period of 5 years from the date of Installation & commissioning for all supplied items at the desired locations including additional material / hardware / software / services as may be required to be supplied without any additional cost to the department.

2. All software and firmware upgrade / enhancement / engineering changes applicable to the hardware and software supplied should be provided for the warranty period within a period of one month from the date of release.

3. Providing detailed architecture diagram of Test & Development, Quality and Production environment setup for optimum performance, security, scalability and desired uptime requirement. Should include all other supporting material as per the requirement to ensure smooth implementation. In that context, it is a 'turn - key' assignment.

4. The bidder will need to provide a detailed implementation plan including the architecture diagram, strategy, approach, and delivery of materials, specific issues, and their resolutions. Detailed implementation and post - implementation processes and procedures

5. The vendor must provide the CAMC for configuring and installing the hardware, deploying and installing the system software as per the requirements (porting of the application) / testing / integration of various hardware and software, as may be needed at the desired locations without any additional cost for the period of 5 years from the date of installation for all supplied items.

6. The vendor to deploy required resources to collaborate, coordinate with plant level authorities as required for the project setup. The Bidder shall also include deployment of required resources during CAMC period (which is 5 years after go-live).

7. Bidder should have a back end / back-to-back support contract / agreement / arrangement for services including supply of spare parts, expertise requirements etc. with the Original Equipment Manufacturers (OEMs) which includes the post-sales support activities to meet the Service Level Agreement (SLA) mentioned for the entire solution period. The OEM undertaking letter on OEM Letter Head in this regard should be submitted along with the bid.

8. Costs must include cost of delivery at designated locations of the department, transit handling and insurance, custom duties etc. as may be applicable. Taxes shall be shown separately as in financial bid and should include all applicable taxes as on date of bidding and shall be paid as per actual. Taxes not quoted shall not be paid to the Bidder.

9. Provide on-site CAMC as stated in Minimum Technical Specifications Warranty Clause for all the supplied items.

10. Bidder must ensure seamless integration of quoted Hardware & software product with CCC application and must provide the material / services which are not mentioned in min tech specification but required to complete the turnkey solutions without any additional cost invariably.

11. The installation must be done directly by OEM or directly by through their authorized partner / reseller / system integrator, but the overall responsibility lies with vendor only. Note that all quoted products must be configured for stated period of warranty of Hardware & Software from OEM.

12. Bidder must submit the detailed BOM (Bill of Material) & Data Sheet along with the internal part nos. for all quoted products inclusive of all required licenses.

13. Bidder must submit the OEM compliance letter showing line by line compliance with tender specification. Also, bidder must submit required certification / approval documents with technical datasheets of each item quoted otherwise technical bid will be considered as incomplete for further evaluation.

14. Bidder must submit the full compliance of the tender terms & condition, scope of work and Service level agreement by proposed product / solution

15. Bidder must strictly adhere to Service Level Agreement as defined in the section below

16. In case when virtualized environment is proposed, required support from respective OEM for necessary Installation / reinstallation, configuration and implementation shall be catered by vendor for CAMC period (i.e. 5 years after Go-Live).

General Points

A. Solution Requirements

1. The envisaged CCTV Integrated Video Surveillance system shall be IP based & ONVIF System with distributed architecture having control room at the designated Plant office with viewing facility at the control room and sub-control room of the Plant as required. Surveillance Cameras shall be used at informed location. All the cameras should be capable to record all the activities at even zero lux light.

2. The proposed Solution should allow department officials to monitor its facilities from a remote location or central location using laptop / computer / monitor / iPhone / iPad / Android phone / Android Tab and so on. Any kind of required configuration / setting shall be done by bidder without any additional cost to the department.

3. The Solution should capture, store, and analyse digital Video images with audio (as and when required) to enable central monitoring, increase operational efficiency, reduce liability, minimize risk and secure people & property.

4. The digital conversion should ensure secure and ready video access from virtually anywhere on network. Authorized personnel should be able to check the images of specific locations, people, and events, anytime and anywhere, without reviewing countless hours of video recordings.

5. The system should be provided with weatherproof enclosure / built in housing - for all categories of Cameras, lens, housing & mountings. To capture video with which, would be viewed & controlled through the Video Management Software, recorded and stored.

6. Supply, installation, testing & commissioning of UPS (Batteries provided with back up time of at least 60 Minutes system) for every zone. UPS shall be located at Zonal equipment room. Bidder must calculate the power load and accordingly do the sizing of UPS. Further distribution panel and earthing of every active component shall remain in vendor scope.

7. The NVR / Storage Server shall make continuous recording of all cameras for 24 hrs. x 7 days with hardware should have adequate primary storage for a period of 90 days & Secondary storage for 30 Days. Vendor should cater for detailed storage calculation sheet and storage, as required for primary & secondary. For any additional storage requirements, required hard disk drive shall be provided by the Bidder.

8. Vendor to prepare Functional Design Specifications, Documents, Factory Acceptance Test Procedures, Site Acceptance Test, Final Acceptance Testing Procedures and so on. The same will be approved by respective department.

9. On completion of the works and before issue of certificate of completion, the bidder shall provide inbuilt documents including manuals and operating instructions, software, software keys/passwords and training to department personnel in all aspects of system design, theory of operation of equipment, functional details, trouble shooting and familiarization with systems as per scope of work etc.

10. The intent of the specifications is to cover the turn-key responsibility for

   a. Site survey, selection of equipment and system engineering for design, supply, installation, integration and commissioning of security surveillance system and various sub systems as required to complete the FISS in all respect

b. The equipment offered together with all services to be performed by the bidder as covered under the specifications of this work shall be fully in compliance with the requirements

c. The bidder shall furnish Power requirements, complete bill of materials, drawings, technical data, information, technical literature for operation and maintenance and other details required to fully establish the capability and performance of the equipment offer.

11. The Bidder shall be responsible for providing all materials, equipment, installation / maintenance tools and services, specified or otherwise, which are required to fulfil the intent of ensuring operation-ability / maintainability and reliability of total materials covered under these specifications. The work and materials in compliance with all applicable, statutory regulations and safety requirements applicable.

12. Drawings / Maps and Data Requirements to be submitted by the Bidder for the complete system like Technical Architecture of Proposed System, Complete Bill of Quantity (BOQ), Complete Data Sheet, Complete Material Specification, solution / application specification Test, Records and Commissioning Documents, Diagrams and Wiring connection, Operation and Maintenance Manual, As Built Drawings and so on.

13. The Plant officials & Project management consultant shall have the right to inspect and test each equipment at all stages of procurement and commissioning of the system. The inspection and testing shall include but not be limited to raw materials, Components, subassemblies, prototypes, produced units, guaranteed Performance specifications, etc. For inspection and testing, bidder shall arrange all that is required like quality assurance personnel, space, and test Gear etc. for successfully carrying out of the work by the department / Project management consultant.

14. During Site Acceptance Tests the performance of each equipment and system (as a whole) shall be measured and documented by the vendor. Any failure / equipment switchover shall be documented. List of all equipment, spares/ components etc. shall be prepared. If during 'Site Acceptance Test' any defect is noticed in the system, the Bidder shall rectify / replace the same to the satisfaction of the department at no extra cost.

15. Bidder must provide Compressive AMC (CAMC) for the period of 5 years from commissioning & handover of system. Bidder shall appoint required full time resources to resolve the issues on priority and minimize the downtime.

16. All FISS implemented facility need to have Unique ID (based on Zone-Area-Category-ID and so on) for ease of identification and tracking location. Unique ID must create virtual address system within plant area.

B. Service Level Agreement (SLA)

1. Provide Compressive AMC (CAMC) for the period of 5 years from commissioning & handover of FISS system that shall be supplied and installed under this procurement throughout the period as per SLA.

2. The support coverage shall be as per "Service Level Agreement".

3. Ensure that all this equipment integrate and function as per the requirements and meet SLAs set out in this document

4. Bidder will have to maintain Service call register (ticket application) for the supplied items and submit the call log on monthly basis to the department as per the format specified by the department.

C. Training and Documentation

Bidder shall provide complete technical documentation of hardware, related software, operating systems configurations, and customizations along with necessary diagrams and documents

Bidder Shall also provide project and design documentation including but not limited to:

1. Factory / Site test certificates of various equipment supplied.

2. Original Manufacturers manual and warranty cards.

3. Installation certificates of all equipment, description of configuration profile as executed for different equipment.

4. Troubleshooting chart for all equipment, Standard OEM checklist for installation, maintenance etc., if any. Training documents

5. Data / Application Security checks and certificates

6. Training Manuals & videos (in English & Marathi)

Vendor shall provide training in below mentioned manner.

1. Bidder to impart 2 weeks (minimum) classroom training to designated operators, Supervisors & officers at Central Control Room before the handing over of the system in the batch of 5 for minimum 30 personnel.

2. Bidder to impart a classroom as well as "on-the-system" training of minimum One (1) to Three (3) Days to the designated personnel in a batch of 5 personnel at Central Control Room on every 3 (Three) month refresher basis & need basis for the complete duration of the Project.

3. For first six (6) months of system put into operation, refresher course to be imparted to all every month

D. Department's SCOPE OF WORK:

1. Providing power supply at a single location in every zone for field units shall be in respective department's scope of work. Vendor to condition, distribute, terminate, and commission the same.

2. IP Address list & lease line, Broadband connectivity would be provided by the department along with related hardware.

3. Provide required details, information, guidance to vendor about existing and proposed facilities along with available guidelines

4. Staff at CCC to monitor and control all FISS based Security

5. Facilitating recurring cost related to Lease Line, Stationary, Cleaning Staff, Electricity Bills, Pantry and so on (based on actual requirement)

Note - Apart from the details listed above, any other items / services / hardware / software required for the successful completion of turnkey FISS project shall be in vendor's scope without any additional cost to the department.

E. General Requirements

1. Department to provide single feeder of 415V, 3 phases. 50 Hz power supply at a single location in every zone (by respective department of work). Vendor must condition, distribute, terminate and commission the same along with power cables its laying and end termination, distribution boxes, ICTPN, all accessories required for this etc. for supply distribution and extension from source point. No other extra support will be given by MSPGCL. vendor should provide wiring diagram of Electrical work approved by the concerned section. Further UPS with suitable capacity, distribution panel & cabling to every field equipment shall be in Vendor's scope.

2. Successful bidder to conduct a site survey with plant officials before implementation as it would give information about existing cable routes, trenches & possible cable routes. Wherever cable is being laid in plant & offices it should be enclosed into Casing & capping & PVC conduits & paver blocks & site markers as per site requirement.

3. Successful bidder to consider suitable earthing & lightning arresters for all installation work. Bidder to consider MCT blocks of suitable size for all required cable laying in respective locations.

4. Successful bidder to arrange delivery of materials in sequential manner and this sequence must be in-line with project delivery and milestones. Plan for all delivery materials (along with tentative schedule) needs to be approved by Plant officials. Storage of delivered material along with its safety & security will be responsibility of the bidder.

5. Bidders to furnish video storage calculations with technical bid which shall be vetted & certified by proposed OEM.

6. To avoid congestion & choke points in network, bidder shall submit bandwidth calculations with technical bid which shall be vetted & certified by respective OEM.

7. Bidders to submit point wise compliance to technical specifications and any deviation or change in specification will not be entertained.

8. The Successful Bidder must provide the detailed architecture of the proposed solution.

9. Bidder should need to consider any additional h/w, s/w, infrastructure and so on which will be required to meet the compliance of the specification / system to function satisfactorily (without any additional cost apart from BOQ).

10. Language Support: Proposed FISS applications must be capable to support for the English, Marathi and Hindi. Before Go-Live comparative chart for all labels, messages, UI, reports, analytics and so on need to be approved by department.

11. DATES: All information technologies MUST properly display, calculate, and transmit date data, including, but not restricted to 21st-Century date data. All dates must be displayed and printed in 'dd/mm/yyyy' format.

12. The specifications mentioned for various IT / Non-IT components are indicative requirements and should be treated for benchmarking purpose only. Bidders are required to undertake their own requirement analysis and may propose higher specifications that are better suited to the requirements.

13. Technical Proposal should be accompanied by OEM's product brochure / datasheet. Bidders should ensure onsite Compressive AMC, warranty, and support for all equipment from OEMs. A confirmation in this regard on OEM letterhead & Manufacturer Authorization Form (MAF) must be submitted along with the Technical Bid.

14. SI should supply all equipment and parts original and new. In case of any Second Hand / Used / Refurbished equipment or parts, is supplied / installed, department will immediately issue Blacklisting notice for OEM and System Integrator.

15. Critical / Core IT components of the system should not have any requirements to have proprietary platforms and should conform to open standards.

16. For the custom-made modules, industry standards and norms should be adhered to for coding during application development to make debugging and maintenance easier. Object oriented programming methodology must be followed to facilitate sharing, componentizing and multiple-use of standard code.

17. All the clients' machines / servers shall support static assigned IP addresses or shall obtain IP addresses from a DNS/DHCP server.

18. The system servers and software applications will be hosted in a Command & Control Centre, Dedicated space for which shall be designed by SI and must be approved by CSTPS/MSPGCL. It is important that the entire set of CCC equipment are in safe custody and have access to only authorized personnel.

19. CSTPS/MSPGCL reserves the right to ask replacement of any hardware / software if it is not from a reputed brand and conforms to all the requirements specified in the tender documents.

20. All licenses should be in the name of the CSTPS/ Maharashtra State Power Generation Company Limited (MSPGCL), or its designated authority defined during the contract

21. If awarded the Contract, bidder must submit undertaking / confirmation that he/she shall accept responsibility for successful integration and interoperability of all the proposed technologies included in the System, as further specified in the Bidding Document.

22. To assist in the bid evaluation, the detailed descriptions should be organized, and cross referenced in the same manner as the Bidder's item-by-item commentary on the Technical Requirements. All information provided by cross reference must, at a minimum, include clear titles and page numbers.

23. Vendor shall submit FDS (functional design specification) based on required specification (as per tender) and the appropriate standards. Further after reviewing FDS documents & approvals from department & PMC, vendor shall proceed further to procurement plan.

24. All supplied Server Licenses should not be hardware dependent.

25. Bidder will supply suitable Antivirus and all other data security software compatible to all proposed h/w, s/w and applications.

26. CSTPS/MSPGCL will provide the store facility for supplied material, however custody, material safety, transportation to desired location will be bidder's responsibility.

27. The third-party inspection will be undertaken for the supplied material, under this project. Bidder needs to provide their technical and administrative support for the same

28. Vendor will provide the necessary Test Reports, Compressive AMC, Warranty, onsite support and so on documentation and validity (for 5 years from Go-live) along with material delivery.

29. Vendor will submit engineering drawing and get approval from MSPGCL authority prior to commencement of any work in the CSTPS premises e.g., civil, mechanical, cabling and so on.

30. Vendor will ensure proper earthing to Poles, Towers / Masts erected in this project.

31. RFP BOQ is tentative and bidder need to visit the site to acquaint themselves about the site conditions and BOQ proposal.

32. This is a turnkey project and bidder will be solely responsible for entire project completion & completeness of the integration required to meet functionality of the complete system lies in the bidder's scope.

33. For any discrepancy found, Bidders are required to bring out in notice to the PMC / Department.

34. Vendor is expected to do proper cable tagging to ensure proper identification of cable routes for respective systems / respective location

35. All proposed components of FISS need to have compliance for secure data communication on network

F. Proof of Concept

1. As a part of bid evaluation, technically qualified bidders must carry out Proof of Concept (POC) of their solution at their own cost. CSTPS/MSPGCL shall provide adequate notice of at least 5 days in advance.

2. Tentative Scope for POC

    ● Empty Land area to be provided by CSTPS/MSPGCL where bidder to install proposed FISS components & systems (of same make & model as proposed) demonstrating all capabilities for compliance of the FISS requirement

        i. CCTV Surveillance components for Plant area & perimeter wall

        ii. Access Control System & vehicle monitoring system

        iii. Entry Management System with Law Enforcement Equipment.

        iv. Public Address System

        v. VHF Radio Communication syste

vi.   Variable Message Display system

vii. IT infrastructure (as required)

viii. CCTV Integrated Command & Control Application with Debriefing functionalities

Note – CCTV Integrated Command & Control Application with Debriefing functionalities will be provided by MSPGCL along with POC invitation

3. CSTPS/MSPGCL shall also not be held responsible for theft or accident or for any damage or failure of the products or instruments during the demonstration / POC. Adequate safety arrangements need to be made by the Concessionaire for safety of human being and equipment.

4. During POC, bidder should demonstrate all standalone features (except CCA integrated with CCTV) and functionalities required by MSPGCL as per SOW and with the same make and model as mentioned in their technical bid document.

5. Power supply shall be provided at single location & further distribution shall be in the bidder's scope.

6. Bidder should complete the POC within 7 working days. Bidder shall arrange necessary materials to conduct POC within stipulated time.

7. After technical evaluation of POC, commercial bid of shortlisted bidders will be considered for further evaluation.

Pre-requisites to Implementation

1. On-ground actual survey is a must for all such projects by the implementation agency under the supervision of nodal Plant authority. Whilst the agency may suggest, the final authority for selection of sites for FISS components implementation should lay with the Plant officials only.
2. The sites to be selected by keeping in mind "threat perception" and "zero dark spots" rule along with other factors such as external weather conditions, size, area, directions to be covered, susceptibility to tampering and vandalism, future adjustments and so on
3. The following points are to be considered whilst selection of spots for CCTV installation:
    i.   Required entry and exit points should be mandatorily covered.
    ii. Required approach roads and area around the plant wall should be covered.
    iii. Required views from high rise structures or watch towers should be covered.
    iv. Required places wherein the theft incidents are taking place regularly should be marked for close and accurate monitoring.
    v.   Required places where there is a high footfall such as visitor rooms, Plant canteen, time office which are prone to crowding such as restrooms, play area, activity area which may or may not have sharp or utility objects should be covered.
    vi. Required vital installations inside the plant building should be mandatorily monitored.
    vii. The perimeter of the Plant, or at least around the CCTV installation wherever possible, should be well illuminated with light. At any dark places, inbuilt or external IR panels should be proposed and installed.
    viii. Required off limit or vacant areas within the Plant Structure should be covered for the security of both Plant unit and other buildings.
    ix. Highly critical spots may be covered from multiple angles for better view and effective coverage.
4. An actual blueprint of the Plant Structure is required in both soft and hard formats. This is to ensure accurate planning of events, effective installation and commissioning, and minimal or nil ambiguities in installation of FISS components.
5. All information regarding Plant should only lies with the Plant authorities. Post completion of activities, the implementation agency should ensure not any information is available with them to avoid any breach of privacy.
6. Fixed Box cameras with suitable housing to be sued for perimeter surveillance & PTZ cameras should be used to cover larger areas since they have better lens & zooming ability than a bullet and dome

camera. Bullet and dome cameras should be used at entry/exits of buildings. All cameras should be covered for weather proofing, tamper proofing and vandal proofing.

7. An extensive network of PA system, VHF System, video analytics, emergency fire alarms in tandem with the CCTVs should be set up to make the safety & security net highly robust and effective.

8. The quantities indicated are tentative, however it may vary to any extent. Any addition or deletion of a unit shall happen over unit rates provided by vendors.

1. General guidelines on Infrastructure and Connectivity

a. Future proofing of technology with regards to IT products and solutions should be kept in mind while finalizing IT products and solutions. End-of-life products should be entirely avoided. An Original Equipment Manufacturers (OEM) Manufacturing Authorization Form (MAF) should be taken to that effect clearly stating the support of supplied product or solution for at least 7 years from the date of undertaking.

b. Technology profile of all IT components including software should meet mandated standards in interoperability and have open standards for scaling up the solution and ready for future integration with other hardware and software solutions.

c. As far as possible laying of optical fibre should be considered for connectivity keeping in mind future expansion and activities. Adequate bandwidth provision should be considered for future scalability and any additional usage.

d. Necessary professional drawings with clear and accurate FISS Components, switches, network line, power line, etc. location markings and legends should be submitted in advance for review and approval of local Plant authorities and Plant department. All electrical, structural and any other infrastructural safety compliance certificates should be submitted to the Plant department post completion of infrastructure works undertaken.

e. For implementation inside Plant building a very high emphasis should be given on immaculate planning and execution of physical work such as digging, trenching, installation of FISS Components, Network Switches and so on. Minimal physical activity should be carried out in such installations to avoid or negate any unwanted circumstances.

f. It should be ensured that all wires and cables are entrenched inside walls, ground or ceiling and not visible to the naked eye, avoid possibility of short circuits, provision lightening arresters and should have proper cable nomenclature (for proper route & termination identification during AMC).

g. As far as possible any external installations such as poles or cantilevers, water tanks especially near the inner or outer perimeter wall, should be avoided.

h. Adequate power backup should be ensured for the Plant, FISS components and control centre through UPS in every zone & at command & control building. It is recommended to have a 24x7x365 basis power supply to system.

i. It is recommended to have Surge protection/lightening arrester measures implemented in the Plant to safeguard all electrical and network devices. Plant authorities should work closely with local utility providers to ensure power outages to their respective Plants are avoided/ minimized.

j. All procurements should be in the name of nodal Plant authority or project implementation committee as approved by the CSTPS.

k. Critical / Core components of the system should not have any requirements of proprietary platforms and should conform to open standards. This shall eliminate the risk of vendor-locking. All Active Networking Components and Storage Systems proposed should be from well-known OEMs i.e., those who are listed as leader as per Gartner's magic quadrant in respective product categories.

l. Proposed FISS System shall have capability for Disaster Recovery (DR) site (in case client wants to set up).

m. It is mandatory for all modules of the FISS project to be security audit before the final acceptance by the CSTPS. This would ensure that the applications are free from vulnerabilities and security risks. Security audit agency for such audit work should be one of firm which is CERT-IN certified.

n. All software licenses, procurements, and everything should be in the name of the officials as identified by the CSTPS.

o. Video Management System (VMS) allows multiple camera feeds on a viewing station (i.e. workstation). A joystick controller should also be provided for each of the viewing- cum controlling station, to move the PTZ camera (only select personnel should be authorized to control the PTZ movements).

p. Proper lighting needs to be ensured at the identified camera locations. In case lighting is not available bidder to consider temporary arrangement till the work of lighting is completed. The plant authorities may like to illuminate the critical locations for better video quality during evenings and nights. Infrared Illuminators need to be considered as per the requirement.

q. Standardized Signages of all FISS Components needs to be placed at respective locations.

2. Guidelines on Cable Installation

A. The general guidelines for plant cabling and installation are as follows.

● Excavation in all kinds of soils including hard soils. Suggestive cable trenches of minimum 900 mm deep & 300 to 600 mm width as per the requirement. Sand layer of minimum 150 mm, a single Brick layer & Cement Duct with paver block is suggested wherein it is being trenched through marshy/wet area, road crossing, roadside and so on. Cable trench & providing cable route markers at every 100 m is mandatory. Any other standards as directed at site by nodal officer.

● Use shielded twisted pair cable to be considered with suitable conduiting. Avoid high voltage cable. Suggestive rule to follow is - For every 100 volts there should be a separation of 1ft between the signal / telephone cable and power cable.

● Minimize cable breaks - Every extra connection in the cable can deteriorate the quality of the video signal. It is mandatory to make sure the insulation is good; otherwise over time the exposed cable can touch the ground causing ground loop currents. Following additional points to be noted -
    o Avoid sharp bends, which affects the cable impedance causing signal reflection and distortion.
    o Use metal conduits for high security applications.

B. Use of labels at both end of cable & cable ties at suitable distance is mandatory.

C. Strictly there should be enough space between data and power cabling and there should not be any cross wiring of the two, in order to avoid any interference, or corruption of data.

D. A complete copper mesh earthing grid needs to be installed for the server farm area, every rack needs to be connected to this earthing grid. A separate earthing pit needs to be in place for this copper mesh.

E. Provide separate earthing pits for Servers & UPS as per the standards.

F. The conduits for all systems shall be high impact rigid PVC heavy-duty type and shall comply with I.E.E regulations for non-metallic conduit 1.6 mm thick as per IS 9537/1983.

G. Power cable and Control Cable will be laid as per IS standard IS1255.

H. Any damage to MSPGCL property, existing laid cabling during digging / excavation work will be restored by the bidder. If the same is restored by MSPGCL the cost will be recovered from the bidder.

I. Bidder must deploy expert licensed electrical supervisor while executing electric work.

J. Bidder must take the necessary permissions from concerned authority during the laying of cable, OFC under railway track.

K. Bidder will submit daily, weekly progress report to concerned in charge.

L. Each Pole erection during the project execution will be undertaken as per IS standard IS3043.

M. Bidder will submit the cable laying layout & OTDR test reports to the concerned authority and commence the work on approval.

N. Water removal in excavated pits, trenches during rainy season, will under bidder's scope.

3. Guidelines on data storage, archival, handling and retrieval

A. All video data should be stored on 24x7 basis automatically and seamlessly without any manual intervention at all times. Video data should be stored securely in centralized location. It should be treated as a classified document. All video data from all cameras should be stored without any human intervention, either prior to viewing or while viewing. Local storage should hold data from 30 days High Quality video data consumes a lot of storage. Also, storage as a component is a substantial cost. Hence, focus should be given on the following points while finalizing storage based on budget and requirement:
    i. Type of storage
    ii. Primary and secondary storage

     iii.   Video quality, which is directly determined by the type of camera, number of megapixels, bit rate, compression standard and frames per second used

     iv.   Primary storage (90 days) and secondary storage (30 days) capacity

B. Any data on primary and secondary storage would be over-written automatically once the stipulated storage period is over. In case any data needs to be stored for a longer period of time for any legal or exceptional purposes, provisioning should be made available for the same.
Project implementation committee should meet every quarter to review project status, preservation of data, data requests, log of requested data and flagged for any external agencies etc.

C. All video footage should be stored with requisite authentication features such as watermarks, digital signatures, self-embedding techniques. Additionally, geo stamping, data and time stamping of video footage is recommended for data integrity. There should be a designated chain of command for the proper handover, custody, preservation and integrity of video feeds.

D. It is recommended that all external media ports i.e. USB, CD/DVD Drive, etc. should be disabled for the viewing stations & servers. This will curb any preliminary threat of information and data security and infection from Trojans, virus, malware etc.

E. In contrast to the above, there should be a designated chain of approval for producing data as and when required in the Court of Law. Vendor need to support for producing this data as per the legal requirements specified by the Court of Law to ensure data integrity, authentication and validity.

F. Since there would be cases where-in Plant Department / concerned authority may have to produce the CD / DVD of the video feed as evidence in court of law. It is necessary that creating such evidence on CD / DVD / any other storage media is done as per the legal requirements so that the evidence is considered as un-tampered in the court of law

4. Compressive Annual Maintenance Contract (CAMC) for 5 (Five) years

A. Once the systems have been commissioned and accepted, the Bidder shall maintain the system (Hardware, Software and peripherals) for the period of 5 years from date of acceptance for onsite comprehensive annual maintenance period (CAMC).

B. Successful bidder to maintain required spares at site to meet the SLA requirement so that system experiences minimum downtime.

C. Any cost pertaining to maintenance of system components & services required shall be considered while bidding.

D. It shall involve but not limited to the following activities.
- Ensure the desired functioning of the Interface / integration in post warranty period.
- Ensure required software updates / patches shall be installed during period without any additional cost.
- Software reinstallation and testing whenever required.
- Required changes in the location / field of view for the installed facilities
- Provide technical support & Manpower on system parameters for any addition, removal & modification of supplied components as per of requirement of Plant.
- Well qualified and experienced services engineers (familiar with the respective system) along with skilled technicians as required shall visit plant on the quarterly basis to carry out all the preventive checks & cleaning of field equipment as per recommendations of the manufacturer and standard maintenance practice.
- Any activities required to keep system downtime minimum. Like rectification of cable cuts, network congestion & repairing same. In case of Malfunctioning of control room & field equipment same shall be addressed at earliest & faulty equipment shall be replaced by new ones.
- Provide handholding support and training services as part of the post implementation services, on a periodic basis as well as on a need basis

E. Bidder to deploy team of qualified engineers & technicians at site for prompt action during contract period. Bidder shall submit list of support manpower for post-sales support & escalation matrix.

F. Defective equipment/software issues should be attended & replaced within period of two days after reporting the problem otherwise penalty will be imposed·

G. Post resolution a formal reporting to FISS team shall be done by vendor.

5. Service Level Agreement

Service Level Agreement (SLA) shall become the part of contract between CSTPS and the Successful Bidder. SLA defines the terms of the successful Bidder's responsibility in ensuring the timely delivery of the deliverables and the correctness of the same based on the agreed Performance Indicators as detailed in this section below. The successful Bidder must comply with Service Levels requirements to ensure adherence to project timelines, quality and availability of services. The successful bidder must supply application-based tools to monitor all the SLAs mentioned below.

Note: Penalties shall not be levied on the successful Bidder in the following cases:

- There is a force majeure event effecting the SLA which is beyond the control of the successful Bidder
- The non-compliance to the SLA has been due to reasons beyond the control of the bidder.
    - o Theft cases by default would not be considered as "beyond the control of bidder". However, certain cases, based on circumstances & certain locations, CSTPS may agree to qualify as "beyond the control of bidder".
    - o Damages due to Road Accident / Mishap shall be considered as "beyond the control of bidder". However, Power shut down or deliberate damage to camera / pole would not be considered as "beyond the control of bidder".
    - o The purpose of this Service Level Agreement (hereinafter referred to as SLA) is to clearly define the levels of service which shall be provided by the System Integrator to CSTPS for the duration of this contract.
    - o Down or deliberate damage to camera / Pole would not be considered as "beyond the control of bidder".
- The purpose of this Service Level Agreement (hereinafter referred to as SLA) is to clearly define the levels of service which shall be provided by the System Integrator to CSTPS for the duration of this contract.
- Definitions - For the purposes of this service level agreement, the definitions and terms are specified in the contract along with the following terms shall have the meanings set forth below:
    - o "Uptime" shall mean the time for all system components provides the specified technical output or services as per standards mentioned in RFP. Uptime, in percentage, of any component (Non IT & IT) can be calculated based on total hours in the quarter.
    - o "Downtime" shall mean the time period for which the specified services / components with specified technical and service standards are not available (fully or partial) to the user department and excludes downtime owing to Force Majeure & Reasons beyond control of SI.
- Measurement of SLA - The SLA metrics provides specifies performance parameters as baseline performance. All SLA calculations will be done on quarterly basis. The SLA specifies the penalties for lower baseline performance. Bidder shall facilitate system generated SLA Measurement Reports to CSTP respective officials.
- The Agency will get 100% of the Contracted value if all the baseline performance metrics are adhered and complied for the quarter.
- The quarterly payment shall be released under its operations, after deducting the penalty as mentioned below SLA Matrix table
- The amount of penalty if any will be deducted from the bills payable to vendor or Security Deposit. If the amount is deducted from the security deposit, the bidder will have to recoup the amount so recovered within 10 days.
- CSTPS shall also have the right to conduct, either itself or through any other agency as it may deem fit, an audit / revision of the SLA parameters. The SLAs defined, shall be reviewed by CSTPS on an annual basis after consulting the SI, Project Management Consultants and other experts. All the changes would be made by CSTPS after consultation with the SI and might include some corrections to reduce undue relaxation in Service levels or some corrections to avoid unrealistic imposition of penalty, which are noticed after project has gone live.

- Bidder is also required to note that in case of SLA penalties not being applicable for the cases considered as "beyond the control of bidder", bidder would be still required to solve the problem within the SLA defined for resolution of critical level/medium level/low level issues. In case bidder doesn't adhere to the issue resolution SLA timeline, the original SLA shall be made applicable.
- Indicative Pre-Implementation SLA - Timely Delivery of the Scope (actual SLA will be defined after award of contract)

Definition	Timely delivery of deliverables would comprise entire bill of Material and the application systems, and as per successful UAT of the same.
Service Level Requirement	All the deliverables defined in the contract must be submitted On-time on the date as mentioned in the contract with no delay.
Measurement of Service Level Parameter	To be measured in Number of weeks of delay from the timelines mentioned in the CSTPS's FISS requirements
Penalty for non-achievement of SLA Requirement	Any delay in the delivery of the project deliverables would attract a penalty per week of 0.5% of the CAPEX of contract value per week for first 6 weeks and 1% per week for every subsequent week for the respective location. If the penalty reaches 5% of the total contract value CSTPS may invoke termination clause. Penalty will be computed on Capex value of contract.

- Indicative SLA Matrix Post- Implementation (actual SLA will be defined after Go-Live which will be reviewed and updated every year)
    - Total penalty to be levied on the SI shall be capped at 10% of the total contract value.
    - CSTPS would have right to invoke termination of the contract
    - If the overall penalty applicable in any 3 quarters in a year during the contract period exceeds 50% of quarterly payments

Sr. No.	Performance Area	Baseline Metric	Penalty
1	Uptime of Overall System	=>96 %	Per hour 0.25% of quarterly payment of the respective location.
2	Network Uptime	=>96 %	Per hour 0.25% of quarterly payment of the respective location.

3	Uptime per FISS Components (example live feed available irrespective of network / power/ etc. issues)	=> 96%	Per hour 0.25% of quarterly payment of the respective location.
4	Resolution of Issue	2 days	Per issue reported 1% of quarterly payment of the respective location.

6. Indicative FISS System Architecture

Indicative FISS System Architecture

SECTION - VI

The Plant-wise details are included in this annexure as follows:

1. Zone wise Locations of the plant
2. Tabular data of proposed camera locations
3. Civil work details

1. Zone wise Locations of the plant

Zoning of Plant location is done only for ease of execution & maintenance purpose. This zoning scheme will only be referred for FISS project, it has nothing to do with operation & other functionalities of plant. The tentative locations of cameras are given below, vendor must conduct the survey & decide exact location & suitable place for installation. Vendor shall convey the list of locations/places to Client & PMC for their assertion

1. Tabular data of proposed camera locations

Notes: -

a. For execution & future maintenance purpose we suggest bidders to classify areas in zones for ease of installation & cabling.

b. This data is based on our understanding of critical nature of facility & philosophy of providing optimum Security to plant area. Actual implementation might differ from this design philosophy and may consider altering it as per situational availability of resources & plant condition.

c. Below mentioned locations are tentative and indicative only, this can be finalising during execution of FISS in consultation with plant level and HO level authorities.

1 Zone 1 - Koyna gate WTP area

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
1	Koyna Gate	Koyna Gate	3	3	1			2		
2	Raw Water Pump House 1	Raw Water Pump House 1	7		4	2	1			
3	Raw Water Pump House 2	Raw Water Pump House 2	5		2	2	1			
4	Hydrogen Plant	Hydrogen Plant	9	8	9					1
5	ETP 1	Effluent Treatment Plan1 - 1	2		1	1				
6	WTP 1 & Water reservoir	WTP 1 & Water reservoir	5		3	2				
7	DM Storage Plant	DM Storage Plant	3	2	3					
8	WTP 2 for 500	Entry	1		1					
9	WTP 2 for 500	Inside	2		2					
10	WTP 2 for 500	Panel Room	2		2					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
11	WTP Unit 8,9	Entry	1		1					
12	WTP Unit 8,9	Inside	1		1					
13	WTP Unit 8,9	Back Side	1		1					
14	WTP Unit 8,9	Control Room	1		1					
15	WTP Unit 8,9	Panel Room	2		2					
16	Padmapur Loading Point	Padmapur Loading Point	1		1					
17	VIP Guest House	Main Gate	1		1					
18	VIP Guest House	Building Entry	1		1					
19	VIP Guest House	Conference Room	1		1					
20	Chimri Guest House	Chimri Guest House	2		2					
			51	**13**	**40**	**7**	**2**	**2**	**0**	**1**

2   Zone 2 - Main Gate Area

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
1	Main Gate	Main Gate	3	1		1		2		
2	Main Gate	Project Gate	2		2					
3	Admin Building	Urja Bhavan / Admin Building	7	1	2		5			1

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
4	Admin Building	Cable Gallery	8		8					
5	New CISF Barracks	Entry Gate	1		1					
6	New CISF Barracks	Quarter Guard	2		1		1			
7	New CISF Barracks	Mess Hall	1				1			
8	New CISF Barracks	Backside of Perimeter	6	3	6					
9	CISF Security Office	CISF Security Office	1		1					
10	Command & Control Room	Command & Control Room	2	1	1	1				
			33	**6**	**22**	**2**	**7**	**2**	**0**	**1**

3   Zone 3 - Plant 5,6,7 Surrounding Area

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
1	Plant 5 - Turbine Floor	DAS	1		1					1
2	Plant 5 - Turbine Floor	Panel Room	4		4					2
3	Plant 5 - Turbine Floor	PCR	1		1					1
4	Plant 5 - Turbine Floor	Turbine & Generator Area	4			3			1	
5	Plant 5 - Breaker Floor	Unit Switch Gear Room	3		3					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
6	Plant 5 - Breaker Floor	Battery Charger Room	3		3					
7	Plant 5 - Breaker Floor	Station Switch Gear Room	4		4					
8	Plant 5 - Breaker Floor	Breaker Floor Area	4		4					
9	Plant 5 - Turbine Basement	Turbine Basement	1		1					
10	Plant 5 - Turbine Basement	Steam Water Analysis System (SWAS Room)	2		2					
11	Plant 5 - Turbine Basement	Turbine Basement Control Room	1		1					
12	Plant 5 - Turbine Basement	Hydrogen Gas Filling Station	2		2					
13	Plant 5 - Turbine Basement	Transformer Yard Front Side	3		2	1				
14	Plant 5 - Turbine Basement	Transformer Yard Back Side	2		2					
15	Plant 5 - Boiler Basement	Ash Unloading area	2		2					
16	Plant 5 - Boiler Basement	ESP Control Room	0							
17	Plant 5 - Boiler Basement	AHP Control Room	0							
18	Plant 5 - Boiler Basement	Coal Mill Area	2		2					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
19	Plant 5 - Boiler Basement	ID Fan to Delcon Gate Road	2			2				
20	Plant 5 - Firing Room	Firing Room	1		1					
21	Plant 5 - Firing Room	Coal Feeder Area	5		5					
22	Plant 5 - Firing Room	24 hrs Battery Room	2		2					
23	Plant 5 - Unit 5	Cabel Gallery End	2		2					
24	Plant 5 - Unit 5	Cabel Gallery End road	3		3					
25	Plant 6 - Turbine Floor	DAS	1		1					1
26	Plant 6 - Turbine Floor	Panel Room	4		4					2
27	Plant 6 - Turbine Floor	PCR	1		1					1
28	Plant 6 - Turbine Floor	Turbine & Generator Area	4			3			1	
29	Plant 6 - Breaker Floor	Unit Switch Gear Room	3		3					
30	Plant 6 - Breaker Floor	Battery Charger Room	3		3					
31	Plant 6 - Breaker Floor	Station Switch Gear Room	4		4					
32	Plant 6 - Breaker Floor	Breaker Floor Area	4		4					
33	Plant 6 - Turbine Basement	Turbine Basement	1		1					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
34	Plant 6 - Turbine Basement	Steam Water Analysis System (SWAS Room)	2		2					
35	Plant 6 - Turbine Basement	Turbine Basement Control Room	1		1					
36	Plant 6 - Turbine Basement	Hydrogen Gas Filling Station	2		2					
37	Plant 6 - Turbine Basement	Transforme r Yard Front Side	3		2	1				
38	Plant 6 - Turbine Basement	Transforme r Yard Back Side	2		2					
39	Plant 6 - Boiler Basement	Ash Unloading area	2		2					
40	Plant 6 - Boiler Basement	ESP Control Room	0							
41	Plant 6 - Boiler Basement	AHP Control Room	0							
42	Plant 6 - Boiler Basement	Coal Mill Area	2		2					
43	Plant 6 - Firing Room	Firing Room	1		1					
44	Plant 6 - Firing Room	Coal Feeder Area	5		5					
45	Plant 6 - Firing Room	24 hrs Battery Room	2		2					
46	Plant 6 - Unit 5	Cabel Gallery End	2		2					
47	Plant 6 - Unit 5	Cabel Gallery End road	3		3					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
48	Plant 7 - Turbine Floor	DAS	1		1					1
49	Plant 7 - Turbine Floor	Panel Room	4		4					2
50	Plant 7 - Turbine Floor	PCR	1		1					1
51	Plant 7 - Turbine Floor	Turbine & Generator Area	4			3			1	
52	Plant 7 - Breaker Floor	Unit Switch Gear Room	3		3					
53	Plant 7 - Breaker Floor	Battery Charger Room	3		3					
54	Plant 7 - Breaker Floor	Station Switch Gear Room	4		4					
55	Plant 7 - Breaker Floor	Breaker Floor Area	4		4					
56	Plant 7 - Turbine Basement	Turbine Basement	1		1					
57	Plant 7 - Turbine Basement	Steam Water Analysis System (SWAS Room)	2		2					
58	Plant 7 - Turbine Basement	Turbine Basement Control Room	1		1					
59	Plant 7 - Turbine Basement	Hydrogen Gas Filling Station	2		2					
60	Plant 7 - Turbine Basement	Transforme r Yard Front Side	3		2	1				

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
61	Plant 7 - Turbine Basement	Transformer Yard Back Side	2		2					
62	Plant 7 - Boiler Basement	Ash Unloading area	2		2					
63	Plant 7 - Boiler Basement	ESP Control Room	0							
64	Plant 7 - Boiler Basement	AHP Control Room	0							
65	Plant 7 - Boiler Basement	Coal Mill Area	2		2					
66	Plant 7 - Firing Room	Firing Room	1		1					
67	Plant 7 - Firing Room	Coal Feeder Area	5		5					
68	Plant 7 - Firing Room	24 hrs Battery Room	2		2					
69	Plant 7 - Unit 5	Cabel Gallery End	2		2					
70	Plant 7 - Unit 5	Cabel Gallery End	3		3					
71	Service Building 5,6,7 Fifth Floor	Main Lift Lobby	1				1			
72	Service Building 5,6,7 Fifth Floor	5th Floor Reception	1				1			
73	Service Building 5,6,7 Fifth Floor	5th Floor Front Side Staircase	1		1					
74	Service Building 5,6,7 Fifth Floor	5th Floor Back Side Staircase & Lift Area	1		1					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
75	Service Building 5,6,7 Fifth Floor	5th Floor Server Room	1				1			1
76	Service Building 5,6,7 - Fourth Floor	Staircase Entrance - At Front	1		1					
77	Service Building 5,6,7 - Fourth Floor	Lift & Entrance at Back side	1		1					
78	Service Building 5,6,7 - Third Floor	Staircase Entrance - At Front	1		1					
79	Service Building 5,6,7 - Third Floor	Lift & Entrance at Back side	1		1					
80	Service Building 5,6,7 - Second Floor	Staircase Entrance - At Front	1		1					
81	Service Building 5,6,7 - Second Floor	Lift & Entrance at Back side	1		1					
82	Service Building 5,6,7 - First Floor	Staircase Entrance - At Front	1		1					
83	Time Office 2 - 5,6,7	5,6,7	2		2					
84	Cooling Towers	Cooling Towers	8			8				
85	Delcon Gate	Delcon Gate	2		2					
86	Day Fuel Tank - 5	Day Fuel Tank - 5	2		1	1				

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
87	Day Fuel Tank - 6	Day Fuel Tank - 6	2	1	1	1				
88	Day Fuel Tank - 7	Day Fuel Tank - 7	2		1	1				
89	Coal Handling Plant C	Control Room	1		1					1
90	Coal Handling Plant C	Switch Gear Room	1		1					
91	Track Hopper C	Track Hopper C	4		4					
			194	**1**	**163**	**25**	**3**	**0**	**3**	**14**

4   Zone 4 - Plant 3,4 Surrounding Area

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
1	Plant 3 - Turbine Floor	DAS	1		1					1
2	Plant 3 - Turbine Floor	Panel Room	4		4					2
3	Plant 3 - Turbine Floor	PCR	1		1					1
4	Plant 3 - Turbine Floor	Turbine & Generato r Area	4			3			1	
5	Plant 3 - Breaker Floor	Unit Switch Gear Room	3		3					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
6	Plant 3 - Breaker Floor	Battery Charger Room	3		3					
7	Plant 3 - Breaker Floor	Station Switch Gear Room	4		4					
8	Plant 3 - Breaker Floor	Breaker Floor Area	4		4					
9	Plant 3 - Turbine Basement	Turbine Basemen t	1		1					
10	Plant 3 - Turbine Basement	Steam Water Analysis System (SWAS Room)	2		2					
11	Plant 3 - Turbine Basement	Turbine Basemen t Control Room	1		1					
12	Plant 3 - Turbine Basement	Hydrogen Gas Filling Station	2		2					
13	Plant 3 - Turbine Basement	Transfor mer Yard Front Side	3		2	1				
14	Plant 3 - Turbine Basement	Transfor mer Yard Back Side	2		2					
15	Plant 3 - Boiler Basement	Ash Unloadin g area	2		2					
16	Plant 3 - Boiler Basement	ESP Control Room	0							
17	Plant 3 - Boiler Basement	AHP Control Room	0							

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
18	Plant 3 - Boiler Basement	Coal Mill Area	2		2					
19	Plant 3 - Firing Room	Firing Room	1		1					
20	Plant 3 - Firing Room	Coal Feeder Area	5		5					
21	Plant 3 - Firing Room	24 hrs Battery Room	2		2					
22	Plant 3 - Unit 5	Cabel Gallery End	2		2					
23	Plant 3 - Unit 5	Cabel Gallery End road	3		3					
24	Plant 4 - Turbine Floor	DAS	1		1					1
25	Plant 4 - Turbine Floor	Panel Room	4		4					2
26	Plant 4 - Turbine Floor	PCR	1		1					1
27	Plant 4 - Turbine Floor	Turbine & Generato r Area	4			3			1	
28	Plant 4 - Breaker Floor	Unit Switch Gear Room	3		3					
29	Plant 4 - Breaker Floor	Battery Charger Room	3		3					
30	Plant 4 - Breaker Floor	Station Switch Gear Room	4		4					
31	Plant 4 - Breaker Floor	Breaker Floor Area	4		4					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
32	Plant 4 - Turbine Basement	Turbine Basemen t	1		1					
33	Plant 4 - Turbine Basement	Steam Water Analysis System (SWAS Room)	2		2					
34	Plant 4 - Turbine Basement	Turbine Basemen t Control Room	1		1					
35	Plant 4 - Turbine Basement	Hydrogen Gas Filling Station	2		2					
36	Plant 4 - Turbine Basement	Transfor mer Yard Front Side	3		2	1				
37	Plant 4 - Turbine Basement	Transfor mer Yard Back Side	2		2					
38	Plant 4 - Boiler Basement	Ash Unloadin g area	2		2					
39	Plant 4 - Boiler Basement	ESP Control Room	0							
40	Plant 4 - Boiler Basement	AHP Control Room	0							
41	Plant 4 - Boiler Basement	Coal Mill Area	2		2					
42	Plant 4 - Firing Room	Firing Room	1		1					
43	Plant 4 - Firing Room	Coal Feeder Area	5		5					
44	Plant 4 - Firing Room	24 hrs Battery Room	2		2					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
45	Plant 4 - Unit 5	Cabel Gallery End	2		2					
46	Plant 4 - Unit 5	Cabel Gallery End road	3		3					
47	Service Building 3,4 Fifth Floor	Main Lift Lobby	1				1			
48	Service Building 3,4 Fifth Floor	5th Floor Reception	1				1			
49	Service Building 3,4 Fifth Floor	5th Floor Front Side Staircase	1		1					
50	Service Building 3,4 Fifth Floor	5th Floor Back Side Staircase & Lift Area	1		1					
51	Service Building 3,4 Fifth Floor	5th Floor Server Room	1				1			1
52	Service Building 3,4 - Fourth Floor	Staircase Entrance - At Front	1		1					
53	Service Building 3,4 - Fourth Floor	Lift & Entrance at Back side	1		1					
54	Service Building 3,4 - Third Floor	Staircase Entrance - At Front	1		1					
55	Service Building 3,4 - Third Floor	Lift & Entrance at Back side	1		1					
56	Service Building 3,4 - Second Floor	Staircase Entrance - At Front	1		1					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
57	Service Building 3,4 - Second Floor	Lift & Entrance at Back side	1		1					
58	Service Building 3,4 - First Floor	Staircase Entrance - At Front	1		1					
59	Time Office 2 - 3,4	5,6,7	2		2					
			118	**0**	**105**	**8**	**3**	**0**	**2**	**9**

5 Zone 5 - CHP-Coal Stack Area

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
1	Effluent Treatment Plant - 3	Effluent Treatment Plant - 3	2		1	1				
2	Stack Yard 500	Road Inside Stack Yard	3	3		3				
3	Stack Yard 500	Lightning Mast	4						4	
4	Stack Yard 210	Road Inside Stack Yard	3	3		3				
5	Stack Yard 210	Lightning Mast	4						4	
6	Nagpur Gate	Nagpur Gate	4	2	2			2		
7	Nagpur Gate	Area Between Nagpur Gate & Reject Gate	1	1	1					
8	Reject Gate	General	1			1				
9	Reject Gate	Reject Gate	5		3			2		
10	Reject Gate	New Paryavaran Chowki Area	0							
11	Discharge Terminal	DT Control Room	3	1	2				1	

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
12	Waggon Tippler 210	For 1,2	1		1					
13	Waggon Tippler 210	For 3,4	1		1					
14	Coal Sampling Lab	Entry Gate	1		1					
15	Coal Sampling Lab	Sampling Agency Room	4				4			
16	Coal Sampling Lab	CSIR-CIMFR Staff Room	1				1			
17	Coal Sampling Lab	Sampling Lab	4		4					
18	Coal Handling Plant A	CGP - A - Control Room	1		1					1
19	Coal Handling Plant A	Switch Gear Room	1		1					
20	400 KV Gate	400 KV Gate	1	1	1					
21	Vehicle Maintenance Yard	Maintenance Area	1		1					
22	Coal Handling Plant B	CHP - B - Control Room	1		1					1
23	Coal Handling Plant B	Switch Gear Room	1		1					
24	Fire Station	Fire Station	2		2					
25	Weigh Bridge 210	For 1,2	3	2	2			1		
26	Weigh Bridge 210	For 3,4	3	2	2			1		
27	Weigh Bridge 210	Control Room	2				2			
28	Diesel Pump	Diesel Pump	2	1	2					
			60	16	30	8	7	6	9	2

6   Zone 6 - Major Stores and OHPs

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
1	Majar Gate	Outside Gate Area	1	1		1				
2	Major Gate	Entry Exit	4	2	2			2		
3	Major Store 210	Entry Gate	1					1		
4	Major Store 210	Weigh Bridge	2		2					
5	Major Store 210	Stores Area	8			8				
6	Major Store 210	Stores Office Entry	1		1					
7	Major Store 210	Stores Office Inside	5		5					
8	Major Store 210	Perimeter Wall	36	20	36					
9	Major Store 500	Office Entry Gate	1		1					
10	Major Store 500	Stores Area	6	3	6					
11	Major Store 500	Stores Material Gate	1		1					
12	Major Store 500	Stores Office Yard	4		4					
13	Major Store 500	Perimeter Wall	12	7	12					
18	Bhel Yard Weight Bridge	Bhel Yard Weight Bridge	3	2	2			1		
19	Bhel Yard Weight Bridge	Control Room	1				1			
20	Bhel Yard Weight Bridge	T Junction near Bhel Yard Weight Bridge	1		1					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
21	Bhel Yard Weight Bridge	Bhel Yard Road Towards Plant 8,9	1	1	1					
22	Oil Handling Plant 1	Unloading Pump House	2		2					
23	Oil Handling Plant 1	OHP 1 Pump House	2		2					
24	Oil Handling Plant 1	Tank Area	2						2	
25	Oil Handling Plant 2	OHP 2 Pump House	2		2					
26	Oil Handling Plant 2	Tank Area	2	2					2	
27	Slurry Tank	Slurry Tank	1		1					
28	Wagon Unloading Track	Wagon Unloading Track	4	4	4					
29	LT Bunkers	Entry Gate	1	1	1					
30	LT Bunkers	Below Conveyor Belt in front of Stores	1			1				
31	LT Bunkers	Control Room	1		1					
32	LT Bunkers	Stores	1		1					
33	LT Bunkers	Perimeter Wall	15	7	15					
34	ETP 2	Effluent Treatment Plant - 2	2		1	1				
35	CHP CISF Chowki	CHP CISF Chowki	4	2	4					
			128	52	108	11	1	4	4	0

7   Zone 7 - Plant 8,9 & Surrounding Area

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
1	Plant 8 - Turbine Floor	DAS	1		1					1
2	Plant 8 - Turbine Floor	Panel Room	4		4					2
3	Plant 8 - Turbine Floor	PCR	1		1					1
4	Plant 8 - Turbine Floor	Turbine & Generator Area	4			3			1	
5	Plant 8 - Breaker Floor	Unit Switch Gear Room	3		3					
6	Plant 8 - Breaker Floor	Battery Charger Room	3		3					
7	Plant 8 - Breaker Floor	Station Switch Gear Room	4		4					
8	Plant 8 - Breaker Floor	Breaker Floor Area	4		4					
9	Plant 8 - Turbine Basement	Turbine Basement	1		1					
10	Plant 8 - Turbine Basement	Steam Water Analysis System (SWAS Room)	2		2					
11	Plant 8 - Turbine Basement	Turbine Basement Control Room	1		1					
12	Plant 8 - Turbine Basement	Hydrogen Gas Filling Station	2		2					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
13	Plant 8 - Turbine Basement	Transformer Yard Front Side	3		2	1				
14	Plant 8 - Turbine Basement	Transformer Yard Back Side	2		2					
15	Plant 8 - Boiler Basement	Ash Unloading area	2		2					
16	Plant 8 - Boiler Basement	ESP Control Room	0							
17	Plant 8 - Boiler Basement	AHP Control Room	0							
18	Plant 8 - Boiler Basement	Coal Mill Area	2		2					
19	Plant 8 - Firing Room	Firing Room	1		1					
20	Plant 8 - Firing Room	Coal Feeder Area	5		5					
21	Plant 8 - Firing Room	24 hrs Battery Room	2		2					
22	Plant 8 - Unit 5	Cabel Gallery End	2		2					
23	Plant 8 - Unit 5	Cabel Gallery End road	3		3					
24	Plant 9 - Turbine Floor	DAS	1		1					1
25	Plant 9 - Turbine Floor	Panel Room	4		4					2
26	Plant 9 - Turbine Floor	PCR	1		1					1
27	Plant 9 - Turbine Floor	Turbine & Generator Area	4			3			1	

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
28	Plant 9 - Breaker Floor	Unit Switch Gear Room	3		3					
29	Plant 9 - Breaker Floor	Battery Charger Room	3		3					
30	Plant 9 - Breaker Floor	Station Switch Gear Room	4		4					
31	Plant 9 - Breaker Floor	Breaker Floor Area	4		4					
32	Plant 9 - Turbine Basement	Turbine Basement	1		1					
33	Plant 9 - Turbine Basement	Steam Water Analysis System (SWAS Room)	2		2					
34	Plant 9 - Turbine Basement	Turbine Basement Control Room	1		1					
35	Plant 9 - Turbine Basement	Hydrogen Gas Filling Station	2		2					
36	Plant 9 - Turbine Basement	Transformer Yard Front Side	3		2	1				
37	Plant 9 - Turbine Basement	Transformer Yard Back Side	2		2					
38	Plant 9 - Boiler Basement	Ash Unloading area	2		2					
39	Plant 9 - Boiler Basement	ESP Control Room	0							
40	Plant 9 - Boiler Basement	AHP Control Room	0							

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
41	Plant 9 - Boiler Basement	Coal Mill Area	2		2					
42	Plant 9 - Firing Room	Firing Room	1		1					
43	Plant 9 - Firing Room	Coal Feeder Area	5		5					
44	Plant 9 - Firing Room	24 hrs Battery Room	2		2					
45	Plant 9 - Unit 5	Cabel Gallery End	2		2					
46	Plant 9 - Unit 5	Cabel Gallery End road	3		3					
47	Service Building 8,9 Fifth Floor	Main Lift Lobby	1				1			
48	Service Building 8,9 Fifth Floor	5th Floor Reception	1				1			
49	Service Building 8,9 Fifth Floor	5th Floor Front Side Staircase	1		1					
50	Service Building 8,9 Fifth Floor	5th Floor Back Side Staircase & Lift Area	1		1					
51	Service Building 8,9 Fifth Floor	5th Floor Server Room	1				1			1
52	Service Building 8,9 - Fourth Floor	Staircase Entrance - At Front	1		1					
53	Service Building 8,9 - Fourth Floor	Lift & Entrance at Back side	1		1					
54	Service Building 8,9 - Third Floor	Staircase Entrance - At Front	1		1					

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
55	Service Building 8,9 - Third Floor	Lift & Entrance at Back side	1		1					
56	Service Building 8,9 - Second Floor	Staircase Entrance - At Front	1		1					
57	Service Building 8,9 - Second Floor	Lift & Entrance at Back side	1		1					
58	Service Building 8,9 - First Floor	Staircase Entrance - At Front	1		1					
59	Lube Oil	Lube Oil	1		1					
60	Tank Office 3	8,9	2		2					
61	Plant Unit 8,9	Stack Yard	5	5		3			2	
62	Plant Unit 8,9	Sub Fire Station	1		1					
63	Plant Unit 8,9	Fire Water Pump House	2		2					
64	Plant Unit 8,9	CW Pump House	1		1					
65	Plant Unit 8,9	Road Surrounding Plant	8	8		8				
66	ETP 4	Effluent Treatment Plant - 4	3		2	1				
67	Coal Handling Plant D	CGP - D - Control Room	1		1					1
68	Coal Handling Plant D	Switch Gear Room	1		1					
69	Stack Yard for Plant 8,9	Road Inside Stack Yard	3	3		3				

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
70	Stack Yard for Plant 8,9	Lightening Mast	4						4	
71	Wagon Tipler 5,6	Wagon Tipler Control Room 5,6	3		3					1
72	Wagon Tipler 5,6	Wagon Tipler Breaker Room	1		1					
73	Wagon Tipler 5,6	Wagon Tipler Area	4	2	2	2				
74	Other Wagon Tipler	Wagon Tipler Control Room	3		3					1
75	Other Wagon Tipler	Wagon Tipler Breaker Room	1		1					
76	Other Wagon Tipler	Wagon Tipler Control Room	3		3					1
77	Other Wagon Tipler	Wagon Tipler Breaker Room	1		1					
78	Other Wagon Tipler	Wagon Tipler Area 1	1		1					
79	Other Wagon Tipler	Wagon Tipler Area 2	1		1					
80	Other Wagon Tipler	Wagon Tipler Area 3	1		1					
81	Other Wagon Tipler	Wagon Tipler Area 4	1		1					
82	Other Wagon Tipler	Wagon Tipler Area 7	1		1					
83	B Cabin	B Cabin	2	1					2	

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
84	Marshalling Yard	Lightning Mast behind Marshalling Yard	2						2	
85	Marshalling Yard	Building	1			1				
86	Track Hopper B	Track Hopper B	4		4					
87	Track Hopper C	Track Hopper C	4		4					
88	Lube Oil Storage	Lube Oil Storage	1		1					
89	Canteen	Canteen	1		1					
90	Ash Silo	Ash Silo	1		1					
91	Compresso r House 8,9	Compresso r House 8,9	2		2					
92	Sub-Fire Station 8,9	Sub-Fire Station 8,9	1		1					
93	Loco Shed	Loco Shed	1		1					
94	ETP Discharge Point	ETP Discharge Point	1	1	1					
95	DTFA Tank 8,9	DTFA Tank 8,9	1		1					
			191	20	150	26	3	0	12	13

8   Zone 8 - Perimeter Wall & Gate Area

Sr. No	Location Reference	Location	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
1	Perimeter Wall	Perimeter Wall (12 KM)	250	135	250					
2	A Cabin	Railway Gate	2	2					2	
			252	**137**	**250**	**0**	**0**	**0**	**2**	**0**

9 Zone wise Counts

Zone No	Zone Name	Total Cameras	Poles	Indoor / Outdoor Fix Camera	Outdoor PTZ	Indoor Fixed Dome	ANPR	Thermal Long Range	Access Readers
Zone 1	Koyna gate WTP area	51	13	40	7	2	2	0	1
Zone 2	Main Gate Area	33	6	22	2	7	2	0	1
Zone 3	Plant 5,6,7 Surrounding Area	194	1	163	25	3	0	3	14
Zone 4	Plant 3,4 Surrounding Area	118	0	105	8	3	0	2	9
Zone 5	CHP-Coal Stack Area	60	16	30	8	7	6	9	2
Zone 6	Major Stores and OHPs	128	52	108	11	1	4	4	0
Zone 7	Plant 8,9 & Surrounding Area	191	20	150	26	3	0	12	13
Zone 8	Perimeter Wall & Gate Area	252	137	250	0	0	0	2	0
		1027	**245**	**868**	**87**	**26**	**14**	**32**	**40**

2. Civil work details

Civil work Details of Command & Control Building

Refer this section for Civil construction of Command & Control System.

AC & LT Cables

Sr. No	Item Description	Qty	Unit
1	2 Ton 5-star (Copper Condenser) inverter Air conditioner along with installation	16	Each
2	1.1KV, Armored LT Aluminum cable (3.5 X 35 sq.mm)	0.1	KM
3	1.1KV, Armored LT Aluminum cable (3.5 X 185 sq.mm)	2	KM

Sr. No	Item Description	Qty	Unit
4	Excavation of cable trench of suitable size with depth 0.7 mtrs. Placing the bricks length wise on both sides of the trench throughout the length of the trench. Laying the cables in between rows of bricks arranged as above. (The charges for laying cables will be extra). Filling the portion between the rows with sand up to the height of the row of bricks. Placing the bricks width wise over these rows throughout the length of trench one side another. Filling the trench with excavated earth to form crown of height 15 cm at the middle of trench 20 to 21 Nos. of bricks are to be provided in one mtr. span of trench. All materials to be supplied by contractor.	2100	Mtr
5	Laying of power cable of size of 3.5 X 185 sq. mm and fixing lugs and glands at both ends of cable. Laying in excavated cable trenches described under (4) above.	2.1	KM

Furniture

SR.NO	Item code Description with specification	Unit	Required Qty.
1	OFFICE CHAIR	EA	65
2	OFFICE TABLE	EA	10
3	COMPUTER TABLE	EA	30
4	NOTICE BOARD	EA	4
5	SOFA FOR VISITOR ROOM	EA	1
6	ROUND TABLE FOR SURVILLANCE ROOM FOR OPERATOR	EA	1
7	OFFICER CHAIR	EA	10
8	OFFICE CUPBOARD FOR ITEM STORAGE	EA	11
9	OFFICE CUPBOARD FOR FILES	EA	10
10	OFFICE LOCKER 12 DOOR	EA	2
11	CONFERENCE ROOM TALK MODULAR	EA	1
	TOTAL		145

Civil Work (Based on Input from Chandrapur Plant – Civil Department)

SR No	DESCRIPTION OF ITEM	QUANTITY	UNIT
1	Removing of grass, shrubs, wild & thorny unwanted vegetation, uprooting the plants, cleaning the area, disposing of the removing material up to 2 km. lead at suitable locations including all lifts, leads, conveying, transportation, T&P, labours, materials, vehicle charges, overheads charges etc. complete as directed by Engineer in charge.	360000.00	Sqm
2	Trimming of the tree branches of all types as directed, which are obstructing compound wall and patrolling road, including cutting in pieces, transporting the material within 2.0 km. lead with contractors own and as directed by Engineer – in - charge.	1000.00	No
3	Breaking and Dismantling of cement concrete pavement by mechanical means using pneumatic tools, breaking to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately etc.	5.00	Cum
4	Excavation for foundation in earth, soil of all types, sand, gravel and soft murum, including removing the excavated material up to a distance of 50 m. beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. (Lift up to 1.5 m.)	760.00	Cum
5	Excavation for foundation in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material up to a distance of 50 metres beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. (Lift from 1.5m to 3.0m) By Mechanical Means Excluding Dewatering	170.00	Cum
6	Transportation of material up to 5.0KM, obtained from Excavation/debris of various sorts including necessary excavation/ loosing including loading, unloading and conveying and disposing as directed.	470.00	Cum
7	Providing dry/ trap/ granite/ quartzite/ gneiss rubble stone soling 15 cm to 20 cm thick including hand packing and compacting etc. complete.	170.00	Cum
8	Providing and laying Cast in situ/Ready Mix cement concrete in M-10 of trap/ granite/ quartzite/ gneiss metal for foundation and bedding including bailing out water, formwork, laying/pumping, compacting, roughening them if special finish is to be provided, finishing if required and curing complete, with fully automatic microprocessor-based PLC with SCADA enabled reversible Drum Type mixer/concrete Batch mix plant (Pan mixer) etc. complete. With natural sand/V.S.I. quality Artificial Sand.	120.00	Cum

SR No	DESCRIPTION OF ITEM	QUANTITY	UNIT
9	Providing and laying Cast in situ/Ready Mix cement concrete M-25 of trap / granite /quartzite/ gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions etc. including bailing out water, Steel centering, formwork, cover blocks, laying/pumping, compaction and curing roughening the surface if special finish is to be provided (Excluding reinforcement and structural steel) etc. complete, with fully automatic microprocessor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand VSI Grade finely washed etc.)	32.00	Cum
10	Providing and laying Cast in situ/Ready Mix cement concrete M-25 of trap / granite /quartzite/ gneiss metal for R.C.C. columns as per detailed designs and drawings or as directed including steel centering, formwork, cover blocks compacting and roughening if special finish is to be provided and curing etc. complete (Excluding reinforcement and structural steel). with fully automatic microprocessor-based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand VSI Grade finely washed etc.)	30.00	Cum
11	Providing and laying Cast in situ/Ready Mix cement concrete in M-25 of trap/ granite/ quartzite/ gneiss metal for R.C.C. beams and lintels as per detailed designs and drawings or as directed including steel centering, formwork, cover blocks, laying/pumping, compaction and roughening the surface if special finish is to be provided and curing etc. complete. (Excluding reinforcement and structural steel).with fully automatic microprocessor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand VSI Grade finely washed etc.)	60.00	Cum
12	Providing and laying Cast in situ/Ready Mix cement concrete M-25 of trap/ granite / quartzite/ gneiss metal for R.C.C. slabs and landings as per detailed designs and drawings including steel centering, formwork, cover blocks, compaction, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening if special finish is to be provided and curing etc. complete.(Excluding reinforcement and structural steel).with fully automatic microprocessor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand VSI Grade finely washed etc.)	95.00	Cum
13	Providing and fixing in position TMT - FE - 500 bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. Including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete.	30.00	MT
14	Filling in plinth and floors with contractor's material/brought from outside and approved by Engineer incharge in layers of 15 cm to 20 cm including watering and compaction etc. complete.	110.00	Cum
15	Providing fly ash brick masonry with conventional/ I.S. type bricks in cement mortar 1:6 in superstructure including striking joints, raking out joints, watering and scaffolding etc. Complete	210.00	Cum

SR No	DESCRIPTION OF ITEM	QUANTITY	UNIT
16	Providing Second class fly ash brick masonry with conventional / I.S. type bricks in cement mortar 1:4 in half brick thick wall including mild steel longitudinal reinforcement of two bars of 6 mm diameter / two hoop iron strips 25 mm x 1.60 mm at every third course, properly bent and bounded at ends scaffolding raking out joints and watering etc. complete.	44.00	Sqm
17	Providing and laying Cast in situ/Ready Mix cement concrete M-15 of trap/ granite/ quartzite/ gneiss metal for coping to plinth or parapet, moulded or chamfered as per drawing or as directed including steel centering, plywood/ steel formwork compacting, roughening them if special finish is to be provided, finishing uneven and honeycombed surface and curing etc. complete. The Cement Mortar 1:3 plaster is considered for rendering uneven and honeycombed surface only. Newly laid concrete shall be covered by gunny bag, plastic, tarpaulin etc. (Wooden centering will not be allowed.) With fine aggregate (Natural Sand / Crushed sand VSI Grade finely washed etc.)	18.00	Cum
18	Providing and laying Vitrified MATT finish having decorative type of size 600 millimeter x 600 millimeter of 8 to 10 millimeter thickness (on an existing flooring) with bonding chemical and confirming to IS 15622-2006 (Group Bla) of approved make shade and pattern for flooring in required position laid on a bed of bonding chemical filling joints curing and cleaning etc.complete..	350.00	Sqm
19	Providing and laying Vitrified mirror/glossy finish having decorative type of size 590 millimeter to 605 millimeter x 590 millimeter to 605 millimeter of 8 to 10 millimeter thickness (on an existing flooring) with bonding chemical and confirming to IS 15622-2006 (Group Bla) of approved make shade and pattern for flooring/Dado in required position laid on a bed of bonding chemical filling joints curing and cleaning etc. complete.	150.00	Sqm
20	Providing internal cement plaster 6 mm thick (For ceiling) in a single coat in cement mortar 1:4 without neeru finish to concrete surface in all positions including scaffolding and curing etc. complete.	350.00	Sqm
21	Providing internal cement plaster 12mm thick in single coat in cement mortar 1:4 without neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing etc. complete.	1080.00	Sqm
22	Providing internal cement plaster 20 mm thick in single coat in cement mortar 1:4 without neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing etc. complete.	800.00	Sqm
23	Providing and applying plaster / wall punning with plaster of paris (with plaster of paris material of Ambuja / Mor Chap or equivalent make) in 10 to 13 millimeter thickness to previously plastered surface / or on newly brick surface (Excluding rough cast plaster) in all position including preparing and Finishing the surface scaffolding etc. complete.	1010.0	Sqm
24	Providing and applying washable oil-bound distemper of approved colour and shade to old and new surfaces in two coats including scaffolding, preparing the surfaces. (Excluding the primer coat.) etc. complete.	1340.0	Sqm
25	Providing and applying two coats of exterior acraylic emulsion paint confirming to corresponding I.S. of approved manufacture and of approved colour to the plastered surfaces including cleaning, preparing the plaster surface, applying	560.00	Sqm

SR No	DESCRIPTION OF ITEM	QUANTITY	UNIT
	primer coat, scaffolding if necessary, and watering the surface for two days etc complete.		
26	Providing and fixing mild steel grill work for windows, ventilators etc. 20 kg/sqm as per drawing including fixtures, necessary welding and painting with one coats of anticorrosive paint and two coats of oil painting complete.	51.00	Sqm
27	Providing and applying two coats of synthetic enamel paint of approved colour to new /old structural steel work and wood work in buildings, including scaffolding if necessary, cleaning and preparing the surface (excluding primer coat) etc. complete.	20.00	Sqm
28	Providing and fixing M40 grade thick vibrated pull cast or similar type concrete frame with chamfer conforming to I.S. 65241983 having 6 mm dia bars 3 Nos. And strips @250 mm c/c and fixing in wall with 6 Nos. of hold fast of 12 mm dia bars 500 mm long including primer and oil painting etc., complete) frame size 60 mm x 125 mm	120.00	Rmt
29	Providing and fixing solid core flush door shutter commercial in single leaf 32 mm thick without ventilator commercial type of exterior grade as per detailed drawings with wrought iron hold fast, stainless steel fixtures and fastenings and handles on both sides and finishing with oil painting 3 coats complete.	40.00	Sqm
30	Providing and fixing in position (as per 1868/1982) Aluminium sliding window of three track with rectangular pipe 95X38.10X0.90 mm at weight 0.637 kg/rmt. With window frame bottom trak section 92X31.75X1.30 mm at weight 1.070kg/rmt. Top and side track section 92X31.75X1.30 mm at weight 0.933kg/rmt. the shutter should be of bearing bottom 40X18X1.25 mm at weight 0.417 kg/rmt. interlocking section 40x18x1.10 MM AT WEIGHT 0.469kg/rmt. As per detailed drawings and as directed by Engineer in charge with all necessary Aluminium section fixtures and fastening such as roller bearing in nylon casting and sell locking catch fitted in vertical section of shutter including 5 mm thick plain glass and aluminium mosquito net shutter with stainless steel jail all required screws and nuts etc. complete. With colour Anodising without box.	51.00	Sqm
31	Providing and fixing black kadappa stone as shelves 25mm. thick machine polished, extending the polish upto 20 cm width on lowerside, rounding corners, laying in position jointing with bedding cement mortar 1:4 proportion curing etc. complete.	3.60	Sqm
32	Providing and fixing in position anodised extruded aluminum partitions, partly glazed and partly laminated having frame made out of extruded tubular section of size 40 mm x 60 mm with 12 mm thick three layered flat pressed teak wood particle board bonded with BWP type exterior grade phenol formaldehyde synthetic resin conforming to IS 128231990, laminated on both sides, Novateakor equivalent and 5 mm thick selected quality plain/ float glass panels fixed with aluminum glass clips 12 mm x 12 mm and rubber cushioning beading to glass partitions as per approved drawing etc. compete	120.00	Sqm
33	Providing and fixing in position extruded aluminium partitions having frame made out of extruded tubular section of size 65 mm x 40 mm with 12 mm thick three layered flat pressed teak wood particle board bonded with BWP type exterior grade phenol formaldehyde synthetic resin conforming to IS 129231990, laminated on both sides, Novateak or equivalent with aluminium glazing clips of size 12 mm x 12 mm (conical) as per drawing etc. complete.	25.00	Sqm

SR No	DESCRIPTION OF ITEM	QUANTITY	UNIT
34	Providing and fixing in position, Single shuttered aluminium extruded powder coated openable door of overall size 0.90 m x 2.40 m with aluminium door frame of powder coated section 101.60 x 44.75mm , 3.18 mm thick and shutter comprising of powder coated section having bottom and lock rail of size 150 mm x 44.5 mm x 3.00 mm thick top rails 47.62 x 44.45 mm x 3.00 mm thick , vertical style 47.62 x 44.45 mm, 3.00 mm thick and for shutter plain glass panes 5 mm thick for top panels and 12mm thick both side laminated phenol bonded particle board panels for bottom panels etc. , I.S.I. mark , with bijagiri having heavy duty concealed lock, necessary beading, glazing clips, PVC gaskets, 250mm length tower bolts, 150mm diam. pad handle, etc. as per detailed design and drawing or as directed by engineer in charge including all materials , labours, and equipment etc. complete	20.00	Sqm
35	Providing and fixing door closure (Hydraulic), of approved quality and make with all leads, lifts, tools and plants, necessary scaffolding, safety equipment, transportation, labours, etc complete and as directed.	10.00	No
36	Providing and fixing frame work of anodised aluminium sections for suspended false ceiling consisting of aluminium T 50 mm x 40 mm weighing 0.39 kg/m. at 60 cms c/c and fixed with (15 x 15 mm) flanges weighing 0.119 kg/m suspended on 6 mm dia. mild steel rod weighing 0.22 kg/m fixed on wall and beams including rounding of the edges with aluminium T of 50 mm x 40 mm weighing 0.39 kg/m etc. including all labour etc. complete.	327.00	Sqm
37	Providing and fixing false ceiling of teak wood particle board half perforated sheet 12 mm thick including scaffolding, if necessary, all iron work and two coats of oil painting to boards and beading i.e. visible surface etc. complete. (excluding frame work and runners)	327.00	Sqm
38	Providing and fixing P.V.C. Rain water pipes of 110mm outer diameter and having wall thickness of 2.2 to 2.7 mm confirming to I.S. 13592- 1992 including proper rainwater receiving recess with P.V.C. plug, bend, necessary fittings, such as, offsets, shoes, inluding fixing the pipe on wall using approved wooden cleats projecting 25mm to 40mm from face of wall a fixing with clips of approved quality and number ,filing the joint using rubber gasket with solvent cement and properly resting the shoe of pipes on C.C. or masonry blocks, including necessary scaffolding and maintenance for 3 years for any leakages or dislocations of pipes. All the P.V.C. fittings and additional 2-piece socket clips shall be got approved from engineer in charge etc. complete.	100.00	Rmt
39	Providing and fixing 1st class white glazed earthenware Orissa Type W.C. Pan 580 mm dia including P or S trap cast iron soil and vent pipe upto the outside face of the wall (1:5:1 0) cement concrete bedding 15 mm thick, 10 liter P.V.C. flushing cistern with all necessary pipe connection etc. complete.	2.00	No
40	Providing and fixing White Glazed Earthenware full stall type Urinal with P.V.C. flushing cistern of 5 liters capacity with fitting, inlet pipes and stop tap, brackets for fixing the cistern, 32 mm dia. P.V.C flush pipe with fittings and flushing arrangement including lead soil pipe, lead trap, soil pipe connection up to the outside face of the wall.	4.00	No

SR No	DESCRIPTION OF ITEM	QUAN TITY	UNIT
41	Providing and fixing white glazed earthenware Wash Hand Basin of 45cm x 30cm size including cold water pillar tap/cold and hot water pillar tap brackets, rubber plugs and brass chain, stop tap and necessary pipe connection including P.V.C. waste pipe and trap up to the outside face of the wall. Making good the damaged surface, testing etc. complete.	5.00	No
42	Providing, laying and fixing P.V.C. pipe of 110 mm. dia. with fittings such as bends, tees, reducers, clamps, etc. including necessary excavation, trench filling etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	80.00	Rmt
43	Providing, laying and fixing P.V.C. pipe of 75mm dia. with fittings such as bends, tees, reducers, clamps, etc. including necessary excavation, trench filling etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	130.00	Rmt
44	Providing and fixing H.D.P container Syntex or alike one-piece moulded water tank made out of high density polythyler and built corrugated inclusive of delivery up to destination hoisting and fixing of accessories such as inlet, outlet overflow pipe inclusive of all tank's capacity between 200 to 1000 liters.	1000.00	Ltr
45	Providing and fixing on walls/ ceiling/ floor 15 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	80.00	Rmt
46	Providing and fixing on walls/ ceiling/ floor 25 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	80.00	Rmt
47	Providing and fixing on walls /ceiling/ floor 40 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	120.00	Rmt
48	Providing and fixing 40 mm. dia Ball cock medium type with PVC float including sockets and necessary fittings and tested as per municipal requirements etc. complete.	1.00	No
49	Providing and fixing 15 mm dia. screw down bib/ stop tap of brass including necessary socket union nut complete.	8.00	No
50	Providing and fixing 8 cm rigid PVC Nahani trap including PVC grating ,bend, connecting piece of UPVC pipe up to the outside face of wall ,making the good damaged surface and testing etc. complete (Prior approval of sample and brand by Ex. Engr. is necessary before use)	8.00	No
51	Providing and constructing Brick Masonry Inspection Chamber 60cm x 45cm x 90cm including 1:4:8 cement concrete foundation 1:2:4 cement concrete channels half round G.S.W. pipes, Brick Masonry, plastering from inside and with frame fixed in cement concrete with R.C.C. Cover medium duty 140 kg with frame etc. complete.	8.00	No

SR No	DESCRIPTION OF ITEM	QUANTITY	UNIT
52	Providing and fixing machine cut mirror polished 18 mm to 20 mm thick telephone black granite / Amba White / Cat bary brown / RBI red / Ocean Brown granite stone partition with rounding the edges etc. complete. Both side polish	10.00	Sqm
53	Providing soak pit of size 120 cm X 120 cm X 120 cm including excavating and filling with brick-bats.	1.00	No
54	Providing and fixing 450mm x 550mm size superior type Belgium mirror with 16mm dia. nickel plated towel rod etc. complete.	5.00	No
55	Providing and fixing fiber glass reinforced polyester door shutter 30 mm thick as per IS 14856 (2000) (Reaffirmed 2006) without ventilator including chromium plated fixtures and fastening with chromium plated handles on both sides, etc. complete.	17.00	Sqm
56	Providing and laying machine cut machine Polished Kota stone flooring 25mm to 30mm thick and required width in plain/ diamond pattern on bed of 1:6 C. M. including cement float, filling joints with neat cement slurry, curing, polishing and cleaning etc. complete.	40.00	Sqm
57	Providing and fixing 40mm diameter and 1.5mm thick Stainless-steel hand railing in S.S.304 Grade including fabricating, fixtures, erecting, necessary welding, grinding, finishing, buffing to stainless steel pipe etc. complete.	16.00	Rmt
58	Providing uncoursed rubble masonry of trap / granite / quartzite / gneiss stones in cement mortar 1:6 in foundation and plinth of inner walls / in plinth of external walls including bailing out water manually, striking joints on un exposed faces and watering including pointing etc. complete.	110.00	Cum
59	Providing and erecting chain link fencing 1.6 M. height with G.I. chain link of size 50 x 50 mm, 8 gauge thick and fixed 75 mm above ground level on vertical M.S. Angles of 40 x 40 x 6 mm size, including excavating pits for foundation and embedded in C.C. block of 1:4:8 mix of size 450 x 450 x 670 mm. at 1.75 M. c/c with iron bar 16mm dia as hold fast including welding link with angle frame at 30 cm c/c with nuts and bolts and horizontal M.S. Angles at top and bottom of 25 x 25 x 5 mm size and vertical M.S. flat 35 x 5 mm and 25 x 5 mm horizontal including cross support of 40 x 40 x 6 mm angles both side at every corner or bend embedded in concrete blocks of 1:4:8 of size 450 x 450 x 670 mm including 3 coats of oil painting etc. complete.	220.00	Rmt
60	Providing and fabricating structural steel work in rolled sections like joists, channels, angles, tees etc. as per detailed design and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position making riveted / bolted /welded connections without connecting plates, braces etc. and including one coat of anticorrosive paint and over it two coats of oil painting of approved quality and shade etc. complete.	1.80	MT
61	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting with Vibratory roller. to the required density. By Mechanical Means - Grading I (Using Screening Type A (13.2) mm Aggregate)	69.00	Cum
62	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness,	46.00	Cum

SR No	DESCRIPTION OF ITEM	QUAN TITY	UNIT
	hand packing to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting with Intelligent Compactor with compaction analyzer and V-Sat attachment. To the required density. Grading II (Using Screening Type B (11.2 mm) Aggregate)		
63	Supplying hard murum/ kankar at the road site, including conveying and stacking complete.	180.00	Cum
64	Spreading hard murum/ soft murrum/ gravel or kankar for side width complete	180.00	Cum
65	Compacting the hard murum side widths including laying in layers on each side with vibratory roller including artificial watering etc. complete.	582.00	Sqm
66	Providing and laying 125 micron Low Density Polyethylene (LDPE) sheet confirming to IS 3395 : 1997 below concrete pavement including all materials and labour complete.	390.00	Sqm
67	Providing and laying in-situ M35 Grade unreinforced plain cement concrete pavement over a prepared sub base with 43 grade cement , coarse and fine aggregate (natural sand/ VSI grade finely washed crushed sand) conforming to IS 383, using fine and coarse aggregates combined gradation as per Table 600- 3 of MORTH Specification 2013, mixed in a batching and mixing plant/ non tilting mixer and Weigh batcher as per approved mix design, admixtures, transporting to site, spreading, laying with approved make paver, compacted and finished in a continuous operation, finishing to lines and grades as directed by Engineer-in-charge and curing by curing compound /by providing cement vata in cement Mortar 1:8 @0.6m X 0.6m centre to centre, admeasuring 80 mm at bottom and 40 mm at top with depth of 75mm and maintaining the same throughout curing period by any other method approved by Engineer-in-charge.	60.00	Cum
68	Providing and fixing G.I. precoated metacolour sheet of 0.50 mm thick and 930 profile for roof including roof bolt and necessary fixing arrangements all as directed by Engineer – in - charge (Prior approval of sample and brand by Ex. Engineer is necessary before use)	90.00	Sqm
69	Providing and fixing G.I. precoated metacolour accessories of 0.50 mm thick and 600 mm wide for ridge / valley including roof bolt and necessary fitting arrangements all as directed by Engineer - in – charge (Prior approval of sample and brand by Ex. Engineer is necessary before use).	15.00	Rmt
70	Royalty charges for material sand, metal, murum, boulder etc. Schedule of rates -2018-2019, given in general notes for state schedule of rates, General Notes page no. 3	799.10	Cum

Complete Electrification of FISS Control Room

Sr. No.	Description
	Complete electrification of the FISS Control Room Work of Installation, Commissioning and Testing of all Electrical Items mentioned below with approved IS standard material including all civil works. Complete installation of point concealed wiring for (Power point & light point) of the fittings along with all material such as copper flexible wires (8 sq. mm for AC and 2.5 sq.mm for lighting) casing, capping, PVC pipe, bends,

Sr. No.	Description
	elbow, plugs, buttons, fan regulators, all consumables etc. complete all as directed. Laying of Earthing wire of 14 SWG /16 SWG as per directives of Engineer in charge. Providing and fixing of following Electrical Items necessarily required for complete electrification of the Control Room are as:
A	40-watt LED Ceiling panel (2X2) for room mounted in false ceiling (Approx. 60 no's)
B	22 watt LED Tube light for passage, stair case & toilet (Approx. 28 no's)
C	50 watt LED street light fitting with bracket for perimeter lighting (Approx. 16 no's)
D	Ceiling fan (1400mm) with step type Regulator (Approx. 18 no's)
E	Exhaust fan for Toilet & Battery room (Approx. 08 no's)
F	Modular type Piano switches (Approx. 80 no's)
G	5Amp switch socket (Approx. 80 no's)
H	15Amp switch socket (Approx. 25 no's)
I	32Amp AC plug in socket with single pole 32 Amp MCB (Approx. 20 no's)
J	Concealed metal boxes with plates (Approx. 50 no's)
K	63Amp MCB Distribution board for lighting with ELCB & RCCB (Approx. 03 no's)
L	63Amp MCB Distribution board for AC with ELCB & RCCB (Approx. 03 no's)
M	100Amp ICTPN Switch (02 Nos.)
N	Earth pit (06 Nos.)
O	LT Cables as per requirement
P	Main Electrical Panel consists of following: (a) 315 Amp Incomer TPN fuse disconnect feeders (03 Nos.) (b) 315 Amp Change over switch (01 No.) (c) 125 Amp TPN fuse disconnect Outgoing feeders (04 Nos.) (d) 100 Amp TPN fuse disconnect Outgoing feeders (02 Nos.) (e) Indication lights (RYB) & Metering (f) Timer circuit for perimeter lights (g) Energy meter (h) Dry type lighting transformer 200KVA, 433/415V, 50 Hz VPI/Epoxy encapsulated cast resin type insulation class H. %Impedance < 4%, vector group Dyn - 11, Type of cooling FAN specially designed step core for reduced losses. Multiple conductors for better heat dissipation mechanical sturdy design to withstand vibrations, Thermistor embedded in winding for over temperature protection. Round coil for better short circuit withstands capacity. Low noise for indoor panel installation along with its cooling, protection and metering.

Note: - All the above requirements are tentative and will be depend upon Load study of the scheme. Proposed quantity may vary during the execution of work order. Bidder may visit CSTPS site for assessment of the work prior to submission of bid. Bidder must submit & approved the Electrification drawing before starting work from the respective in charge engineer.