

**Request for Proposal
(RFP)**
**for the Selection of a
System Integrator
for implementation
(Design, Build,
Commission and O&M)
of
Greenfield State Data
Centre**

Volume 1: Instruction to Bidder

Issued By:



**Gujarat Informatics Limited
(GIL)**

(A Government of Gujarat Undertaking)
On behalf of

**Department of Science &
Technology (DST)**

GIL, Block No. 2, 2nd Floor, C & D Wing,
Karmayogi Bhavan Sector - 10 A,
Gandhinagar - 382010 Gujarat

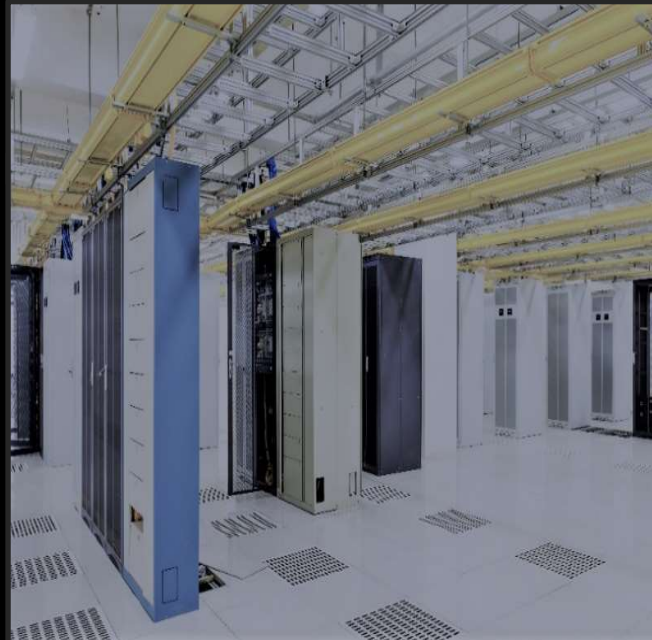


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Acronyms

S. No.	Abbreviations	Description/ Definitions
1.	GIL	Gujarat Informatics Limited
2.	DST	Department of Science and Technology
3.	GSDC	Gujarat State Data Centre
4.	BOM	Bill of Material
5.	BOQ	Bill of Quantity
6.	CAPEX	Capital Expenditure
7.	Cr.	Crores
8.	CCTV	Closed Circuit Television
9.	DC	Data Centre
10.	DG	Diesel Generator
11.	DOT	Department of Telecom
12.	DPR	Detailed Project Report
13.	DCOM	Data Centre Operation Management
14.	FAT	Final Acceptance Test
15.	G2B	Government to Business
16.	G2C	Government to Citizens
17.	G2G	Government to Government
18.	HLD	High-Level Design
19.	HPC	High-Performance Computing
20.	HVAC	Heating, Ventilation, and Air Conditioning
21.	HT	High Tension
22.	IBMS	Integrated Building Management Systems
23.	ISO	International Organization for Standardization
24.	LT	Low Tension
25.	MeitY	Ministry of Electronics and Information Technology
26.	NFPA	National Fire Protection Agency
27.	O&M	Operations and Maintenance
28.	OEM	Original Equipment Manufacturer
29.	OPEX	Operational Expenditure
30.	PAC	Precision Air Conditioning
31.	PAT	Partial Acceptance Test

S. No.	Abbreviations	Description/ Definitions
32.	PAHU	Precision Air Handling Unit
33.	POE	Power over Ethernet
34.	POI	Point of Interconnect
35.	PDU	Power Distribution Unit
36.	PUE	Power Usage Effectiveness
37.	QoS	Quality of Services
38.	SDC	State Data Centre
39.	SI	System Integrator
40.	SPV	Special Purpose Vehicle
41.	GoG	Government of Gujarat
42.	ToR	Terms of Reference
43.	UAT	User Acceptance Test
44.	UPS	Uninterrupted Power Supply
45.	VRF	Variable Refrigerant Flow
46.	VRV	Variable Refrigerant Volume
47.	VESDA	Very Early Smoke Detection Apparatus
48.	WAN	Wide Area Network
49.	WLD	Water Leak Detection System
50.	ATP	Advance Threat Protection
51.	EDR	Endpoint Detection & Response
52.	Core Team	GoG representative of GSDC
53.	MEP	Mechanical Electrical Plumbing

Definitions

In this connection, the following terms shall be interpreted as indicated below:

- "The DST/GIL/PURCHASER/Tenderer" means Department of Science and Technology/Gujarat Informatics Limited owner of the project/Nodal implementation agency.
- "Bidder/SI/System Integrator/Managed Service Provider" means an eligible entity/firm submitting the Bid in response to this RFP.
- "Bid" means the written reply or submission of response to this RFP.
- "The Contract" means the agreement entered between the DST/GIL and the SI, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
- "System Integrator (SI)" is the successful Bidder found eligible as per eligibility criteria set out in this RFP, whose technical Bid has been accepted, and who has emerged as TC1 Bidder as per the selection criteria set out in the RFP and to whom notification of award has been given by DST/GIL.
- "The Contract Price/Project Cost" means the price payable to the SI under the Contract for the full and proper performance of its contractual obligations.
- "The Equipment/Product" means all the Non-IT/Civil components, including but not limited to Hardware / Software / Firmware/ Middleware/ services etc., which the SI is required to supply to the DST/GIL under this Contract.
- "Final Acceptance Test" means the date on which Final Acceptance Test certificate is issued shall be deemed to be the date of successful commissioning (Sign Off) of the Project. The final acceptance shall cover 100% of Phase Design, Supply, Built, Testing & Commission for this Project, after successful testing; a Final Acceptance Test Certificate (FAT) shall be issued by the DST/GIL to the selected SI.
- "The Services" means those services pertaining to the Planning, Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer of Tier III Complaint, certified Data Centre, and other obligations such as transportation, transit insurance, customization, integration, provision of technical assistance, training, etc.; to be covered under the Contract by the SI.
- "The Project" means setting up a Tier III Complaint and Tier IV Ready Data Centre on Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer of Tier III Complaint and Tier IV Ready Data Centre for DST/GIL, at Sector- 18 adjacent to the State Emergency Operation Centre (SEOC), Gandhinagar- 382021.
- "The Project Site" means locations where supply and services as desired in this RFP document are to be provided.
- Defect Liability Period is Supervision of all equipment (including but not limited to Hardware / software / Firmware/ Middleware/ Services etc.). The SI will also be liable for any defects in this period and will take care of the remedial procedure. Defect liability Period starts one (1) year from the date of Final Acceptance Test (FAT).
- Term/Period of this Contract This period includes time taken to Design, Build, Supply, Installation, Testing, Commissioning and 7 years for Maintenance and operation of the Data Centre from the date of acceptance by the DST/GIL.
- "Data Centre" means complete campus facility including but not limited to Data Centre building, other ancillary building, facilities, utility areas, etc.

Disclaimer

- Gujarat Informatics Limited (herein after referred to as “GIL”) a company owned by Department of Science & Technology, Govt. of Gujarat (herein after referred to as “DST”) invites proposals for Setting up of Tier III Compliant and Tier IV Ready Greenfield Gujarat State Data Centre (GSDC) on Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer model at ‘Sector-18 adjacent to the State Emergency Operation Centre (SEOC), Gandhinagar- 382021’. of Department of Science & Technology, Govt. of Gujarat for a period of Seven years. The scope of work and other requirement of this project are specified in this RFP document.
- In order to meet the Data Centre's Design, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer requirement, the GIL proposes to invite tenders from eligible System Integrators (herein referred to as SI) to undertake Design, Build, Supply, Installation, Testing, Operation, Commissioning, Maintenance and Transfer of Data Centre for DST/GIL at Sector- 18 adjacent to the State Emergency Operation Centre (SEOC), Gandhinagar- 382021 as per details/Scope of Work mentioned in Section 3 of the RFP vol.2 Scope of work document.
- Bidder shall mean any entity (i.e., juristic person) who meets the eligibility criteria given in Section 4 of Instructions to Bidders of this RFP and willing to provide the goods and services as required in this bidding document. The interested Bidders who agree to all the terms and conditions contained in this document may submit their Bids with the information desired in this bidding document (Request for Proposal).
- Interested Bidders are advised to go through the entire document before submission of Bids to avoid any chance of elimination. The eligible Bidders desirous of taking up the project for DST/GIL are invited to submit their technical and commercial proposal in response to this RFP. The criteria and the actual process of evaluation of the responses to this RFP and subsequent selection of the successful Bidder will be entirely at the DST/GIL discretion. This RFP seeks proposals from Bidders who have the necessary experience, capability & expertise as per the DST/GIL requirements outlined in this RFP. Any clause's final interpretation rests with the tenderer if there is any ambiguity.
- This RFP document is not an agreement and is not an offer or invitation to any party. The purpose of this RFP is to provide the Bidders or any other person with information to assist the formulation of their technical and financial offers (“Bid”). This RFP includes statements, which reflect various assumptions and assessments arrived at by GIL in relation to this scope. This RFP document does not purport to contain all the information each Bidder may require. This RFP document may not be appropriate for all persons, and it is not possible for the GIL and their employees or advisors to consider the objectives, technical expertise and needs of each Bidder. The assumptions, assessments, statements, and information contained in the RFP document, may not be complete, accurate, adequate, or correct. Each Bidder must therefore conduct its own analysis of the information contained in this RFP and to seek its own professional advice from appropriate sources and proposed the entire solution according to the functional and technical specifications mentioned in this RFP.
- Information provided in this RFP document to the Bidder 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. GIL accepts no responsibility for the accuracy or otherwise for any interpretation of opinion on law expressed herein.
- GIL and their employees and advisors make no representation or warranty and shall incur no liability to any person, including the Bidder under law, statute, rules or regulations or tort, the principles of restitution or unjust enrichment or otherwise for any loss, cost, expense or damage which may arise

from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, reliability or completeness of the RFP, and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP or arising in any way in this Selection Process.

- GIL 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 RFP. GIL may in its absolute discretion, but without being under any obligation to do so, can amend or supplement the information in this RFP.
- The issue of this RFP document does not imply that GIL is bound to select a Bidder or to appoint the Selected Bidder (as defined hereinafter), for implementation and GIL 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 GIL, or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and GIL 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 for submission of the Bid, regardless of the conduct or outcome of the selection process.
- The address for submission of Bids, contact details including email address for sending communications are given in Section 1 (Bid Control Sheet) of this RFP document.
- The purpose of DST/GIL behind this RFP is to seek a detailed technical and commercial proposal for Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer of Tier III Compliant and Tier IV Ready Greenfield Gujarat State Data Centre (GSDC) as desired in this document.
- This document shall not be transferred, reproduced, or otherwise used for purpose other than for which it is specifically issued.

1 Bid Control Sheet

Sr. No.	Information	Details
1	Tender Inviting Agency	Gujarat Informatics Limited (GIL) (A Government of Gujarat Undertaking) on behalf of Department of Science & Technology (DST)
2	Tender Name/ Name of Work	Request for Proposal (RFP) for the Selection of a System Integrator for implementation (Design, Build, Commission and O&M) of Greenfield State Data Centre.
3	RFP Reference No. and date	As per GeM BID
4	Availability of RFP Documents	RFP document can be downloaded from the website of https://www.gil.gujarat.gov.in/ https://gem.gov.in/ .
5	Start date for downloading RFP	As per GeM BID
6	Last date for downloading RFP	As per GeM BID
7	Last Date for Submission of Queries for clarification.	To be submitted 2days before Pre-BID.
8	Place, date, and time of pre-bid meeting	As per GeM BID Venue: Conference Hall, Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector 10A, Sector 10, Gandhinagar, Gujarat 382010
9	Earnest Money Deposit	INR 15,00,00,000/- (valid for 9 months from the last date of bid submission)
10	Last date and time for submission of EMD, Bid Fee, Pre-Qualification Bid, Technical Bid and Commercial Proposal (Online)	As per GeM BID
11	Deadline for physical submission of EMD, Bid Fee, Pre-Qualification Bid, Technical Bid (2-Copy)	As per GeM BID
12	Date, time, and venue of opening of Pre-Qualification Bid	As per GeM BID Venue: Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector 10A, Sector 10, Gandhinagar, Gujarat 382010
13	Place, time, and date of opening of Technical, Financial Proposals received in response to the tender notice	To be intimated later to the qualified bidders.
14	Bid validity period	180 days from the last date of submission
15	Currency	INR only.
16	Language of Bid Submission	Proposals should be submitted in English only.
17	Contact email id for queries	ddict-gil@gujarat.gov.in / vipulp@gujarat.gov.in
18	Communication Address/Address for submission of Tender	Deputy Director (IT), Gujarat Informatics Limited, Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector - 10 A, Gandhinagar 382010, Phone: (079)-23252026, 23259227 Fax No. (079) 23238925

Note: The above dates, time and venue may be altered by the Purchaser at its sole discretion after giving prior notice to the Bidders. Some of the information provided in the above control Sheet is further elaborated in the subsequent sections of this RFP. Information provided in the control Sheet and subsequent sections of this RFP are to be read in conjunction and are to be interpreted harmoniously.

2 Structure of RFP

The RFP document includes Two Volumes. Broad areas covered in these two volumes is given below:

Volume 1 – Instructions to Bidders

- a. Introduction and Background of the project
- b. Qualification Criteria(s) for the Bidders
- c. Instructions to Bidders
- d. General Conditions of Contract
- e. Bid Evaluation Process
- f. Delivery Milestones and Payment schedule
- g. Service Level Agreements (SLA)
- h. Bid Submission Formats

Volume 2- Scope of work

- a. Summary of the Scope of Work
- b. Functional Specifications
- c. Technical Specifications
- d. Manpower Requirement Details
- e. Special Conditions for Green Building.
- d. Operation & Maintenance

The bidders are expected to respond to the requirements as completely and in as much relevant detail as possible and focus on demonstrating bidders' suitability to be selected. The bidders are expected to examine all instructions, forms, terms, Project requirements and other information in the tender documents. Failure to furnish all information required as mentioned in the tender documents or submission of a proposal not responsive to the tender documents in every respect will be at the Bidders risk and may result in rejection of the proposal.

The whole project is required to be completed and maintained by the bidder. Accordingly, bidder is understood to have assessed and quoted for all the items required for successful completion of the Project. It will be the responsibility of the bidder to provide such items on free of cost basis, which are not quoted in the bid but otherwise required at the time of installation for completion and successful commissioning of the project.

3 About DST and GIL

Department of Science & Technology (DST):

Department of Science & Technology (DST) has been constituted vide General Administration Department G.R. No. DST/2002/398/ITD dated 21st June 2002 and it has been operational since 01.04.2003. This department mainly looks after the growth and development of new & emerging technology areas and is responsible for formulation and implementation of key policies in this sector in the State of Gujarat. As of now DST has been looking after the following areas of technology in the State.

- Information & Communication Technology including e-Governance
- Biotechnology
- Science & Technology
- Remote Sensing and Space Application
- Seismology

Objective:

- To position Gujarat as a key State in the knowledge economy sectors of the country.
- To create employment opportunities in the knowledge economy sectors including promotion of Semiconductor/micro/nano/Biotechnology based manufacturing units in the State.
- To improve the availability of skilled manpower in the emerging areas of technology through training / industry institute partnership.
- To make government citizen interface more effective, efficient, and transparent

Gujarat Informatics Limited (GIL):

Gujarat Informatics Ltd. (GIL) was established as the nodal agency for IT development in the state in February 1999, by the Government. of Gujarat. The company was started with a clear objective to promote IT and accelerate the process of E- Governance in the state. Along with the announcement of the IT policy, the Government has enabled GIL to effectively implement IT projects in the state.

Since its inception, GIL has worked aggressively to make stunning forays in the implementation of IT in the state. Having made a promising beginning with projects like the INFOCITY, GSWAN and the GR BOOK, GIL is gaining significant ground with its endeavors for computerization of Government departments, training of CIO's, developing applications, forming mergers, and signing MOUs with leading national and international companies.

4 Pre –Qualification Criteria

4.1 Pre-Qualification for Bidder

Pre-Qualification: Bidder's response to this RFP shall be evaluated by the Purchaser as per criteria defined in this document. Only, bidders who meet the pre-qualification criteria shall be eligible for evaluation of the technical qualification criteria.

Technical Qualification: In technical qualification round, bidder will be required to submit the details regarding the projects mentioned, showing their work experience, in response to this RFP. During Technical evaluation round, bidder has to give presentation on Proposed design and solution taking reference from the indicative solution mentioned in this RFP. Bidders must present evidence to substantiate their claims to secure marking.

Pre-Qualification Criteria

Note: The supporting documents submitted as evidence to fulfil the eligibility criteria will be evaluated by the Purchaser/Evaluation Committee. During the bid evaluation stage, the Purchaser may request for clarification (if required).

A bidder participating in the procurement process shall possess the following minimum pre- qualification/ eligibility criteria.

Pre-qualification Criteria:

Sr. No	Eligibility Criteria	Documents to be submitted
1	Legal Entity The bidder should be A company registered under Indian Companies Act, 1956/2013 and subsequent amendments thereto OR A partnership firm registered under Indian Partnership Act, 1932 and subsequent amendments thereto OR partnership firm register under LLP Act, 2008 since last 5 years as on 31st March 2022. Note: Consortium is not allowed under this Tender.	Copy of Valid Registration Certificate OR Copy of Certificates of Incorporation
2	The Bidder must have minimum average annual turnover of Rs. 2000 crore, in any 3 of last 04 financial year(s) i.e., FY 2018-19, FY 2019-20, FY 2020-21 and FY 2021-22 as on 31st March 2022.	CA certified and audited Balance Sheet and Profit & Loss statement for any three of last four audited financial years (2018-19, 2019- 20, 2020-21, 2021-22). CA certificate mentioning turnover from the said business.
3	The Bidder should have positive Net-worth in any 3 of last 04 financial year(s) i.e., FY 2018-19, FY 2019-20, FY 2020-21, and FY 2021-22 as on 31st March 2022.	CA certified and audited Balance Sheet and Profit & Loss statement for any three of last four audited financial years (2018-19, 2019- 20, 2020-21,

Sr. No	Eligibility Criteria	Documents to be submitted
		2021-22). CA certificate mentioning turnover from the said business.
4	The Bidder shall be national /international level company having relevant experience in Building constructions for last 10 years.	1. Bidder shall submit certificate of incorporation AND 2. Completion certificates/ Part completion certificates from clients mentioning the periods OR The self-certification of the applicant is also permitted accompanied by certified copy of work order/document by competent authority of Bidders on its letterhead.
5	The bidder should have experience of Designing, constructing, and commissioning of minimum 1 certified Uptime Institute Tier III or TIA-942 Rated III (Design Certified) Data Centre project of having minimum 100+ racks in single project in last 7 years as on publishing date of this tender.	FOR Data Centre built for Client 1. Copy of the Work order/Purchase Order AND Certificate of completion of the work from client or phase wise completion certificate from client. 2. Uptime/TIA Certification
6	During the last 07 years, the Bidder must have built, implemented/completed and operated Data Centre projects for Central / State Governments, PSUs, Banking & Financial Institutions, Telecom, and IT companies in India which includes (i) Turnkey Data Centre/ Tier-III/IV Data Centre consisting of building construction, along with installation, commissioning of Electrical Distribution & Lighting, Electrical Substation, DG sets with HSD tank, Precision AC/ Chiller Plant, UPS System, Fire Detection & suppression system, Access Control, Lifts and CCTV, BMS, VESDA, Rodent Repellent System, Civil and Interiors etc. AND (ii) Operation & Maintenance including FMS of the Data	1. Copy of work order(s) / Purchase Order and Contract Agreement AND 2. Certificate of timely completion of the work from client or phase wise completion certificate from client. OR 2. Go Live or FAT certificates issued by the customer

Sr. No	Eligibility Criteria	Documents to be submitted
	Centre as on last date of Bid submission, that meets the below mentioned requirement. a. Single order of value of INR 350 Crore or more. OR b. Two orders each having minimum value of INR 200 Crore or more. OR c. Three orders each having minimum value of INR 150 Crore or more	
7	The bidder should be registered or should deploy Principal Architect registered with council of Architect, and registration / membership should be valid as on date, having 7+ years of experience.	Copy of registration certificate and Declaration on Bidder's letterhead stating compliance of this condition.
8	The bidder must have on its payroll at least 150 Professionals in the Civil Construction domain, Data Centre Electrical, Mechanical, Structural drawing, Cooling, building architecture etc. and other utility Services and having the prior experience in providing the Data Centre Infrastructure maintenance services as on bid submission date. Bidder Must have at least following technical manpower strength on its payroll: i. At least 30 number of engineers on its payroll having 10+ years of experience in relevant fields (10 should be Civil engineer, 10 should be electrical engineer, 10 should be mechanical engineer having B.E/B. Tech degree) ii. At least 1 qualified professional having relevant Degree certificate for his position in, • Principal structural Consultants (BE/B.Tech. in Civil having 10+ years of relevant experience) • Principal Electrical consultants (BE/ B. Tech with. Electrical having 10+ years of relevant experience)	HR certificate on company's letterhead stating the points with employee Name, employee ID, Qualification, Certification to be submitted along with copy of the relevant certificate

Sr. No	Eligibility Criteria	Documents to be submitted
	• Principal Mechanical Consultant (BE/ B. Tech with Mechanical having 10+ years of relevant experience) • Principal Plumbing Consultant (BE/ B.Tech with Civil having 10+ years of relevant experience) • Principal Green Building Consultants (BE/ B. Tech with Civil having 10+ years of relevant experience) • Quality Assurance Manager (BE/ B. Tech with Civil having 10+ years of relevant experience) iii. At least 2 no. of Architects (B. Arch.) having 10+ years of relevant experience on its payroll iv. At least 05 resources should be CDCP/CDCS/CDCE certified. v. At least One Data Centre Design Consultants having ATD (Accredited Tier Designer) certification from Uptime Institute/ Equivalent TIA certification vi. At least 05 Project management professional with PMP or Prince-2 certified	
9	The Bidder should not have been blacklisted by any Government and Public Sector Unit during the last 3 years.	Bidder shall submit declaration on their letterhead in this regard.
10	The Bidder should have a local presence of Office in Gujarat and level 3 support (highest escalation) locally in India. And Bidder should be setting up one Project site office in Gandhinagar for day-to-day Project Management & Monitoring activity during entire project life cycle (till Go Live phase)	Bidder shall submit declaration on their letterhead in this regard. In case of no office in Gujarat on bidding date, Bidder needs to submit undertaking if after getting award of order, he shall setup Support center in Gujarat in 30 days' time.

Sr. No	Eligibility Criteria	Documents to be submitted
11	Tax registration and clearance The bidder should furnish following information 1. COI 2. MOA & AOA 3. GST No Income Tax / Pan Number.	Valid documentary proof of: 1. Memorandum of Association & Articles of Association 2. GST registration document. 3. Income Tax registration / PAN number
12	The Bidder must have followed Certificate at the time of bidding, a. ISO 9001:2015 b. ISO/IEC 20000 c. ISO/IEC 27001:2013	Copy of Valid Certificates
13	Mandatory Undertaking/Declaration Bidder should: a) not be insolvent, in receivership, bankrupt or being wound up, not have its affairs administered by a court or a judicial officer, not have its business activities suspended. b) not have a conflict of interest in the procurement in question as specified in the bidding document.	A Declaration letter as per Annexure-B1: Self-Declaration
14	Bidder from a country which shares a land border with India will be eligible to bid in this tender only if they are registered with Competent Authority as per OM No. 6/18/2019-PPD dated 23rd July 2020 issued by Department of Expenditure, GoI.	Self-certification from bidder as per Annexure H.

4.2 Submission of the Proposal

i. Instruction to the bidders for online bid submission

Tender documents are available only in electronic format which Bidders can download by paying pre-requisite fee from the website <https://gem.gov.in/>. and <https://www.gil.gujarat.gov.in/>.

The bids have been invited through the e-tendering route i.e., the Pre-qualification, technical and financial bids shall be submitted online on the website: <https://gem.gov.in/>. and <https://www.gil.gujarat.gov.in/>.

Bidders who wish to participate in this bid will have to register on <https://gem.gov.in/>.

ii. Amendment in RFP Document

At any time before the deadline for submission of bids, DST/GIL may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the

RFP Document by amendment. All the amendments/corrigendum made in the document would be published on GeM Portal. All such amendments shall be binding to all the bidders. **The bidders are also advised to visit the website on regular basis for checking necessary updates.**

iii. Address for submission of Bid Security and Correspondence

All queries and/or correspondence regarding clarification in the bid should be addressed to Deputy Director (Tech.), Gujarat Informatics Limited, Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector - 10 A, Gandhinagar 382010, Phone: (079)-23256022

Email: ddictgil@gujarat.gov.in / vipulp@gujarat.gov.in

iv. The response to RFP shall consist of the following documents

Sr. No.	Document Type	Document format
1	Bidder's Authorization Certificate along with copy of PoA/ Board resolution stating that Auth. Signatory can sign the proposal/ contract on behalf of the firm.	As per Annexure-D1 (PDF)
2	All the documents mentioned in the "Eligibility Criteria", in support of the pre-qualification criteria.	As per the format mentioned against the respective eligibility criteria clause (PDF) for pre-qualification criteria
3	All the documents mentioned in the "Eligibility Criteria", in support of the technical-qualification criteria	As per the format mentioned against the respective eligibility criteria clause (PDF) for technical qualification criteria
4	Technical Proposed Solution	As submitted by Bidder
5	Bidders Details	As per Annexure-J (PDF)

- v.** The bidder should ensure that all the required documents, as mentioned in this bidding document, are submitted along with the Bid and in the prescribed format only. Non- submission of the required documents or submission of the documents in a different format/ content may lead to the rejections of the Bid submitted by the bidder.
- vi.** All the documents uploaded should be digitally signed with the DSC of authorized signatory. A set of Pre-Qualification support documents & Technical Qualification support documents needs to be submitted in hardcopy Envelop method to Deputy Director (IT), Gujarat Informatics Limited, Block No. 2, 2nd Floor, C &

D Wing, Karmayogi Bhavan, Sector - 10 A, Gandhinagar 382010, Phone: (079)-23252026/23259227 within 3 working days from date of online submission.

4.3 Deadline for Submission of Proposals

- Bids must be received by the DST/GIL at the address specified and by the date and time mentioned in the "Bid Control Sheets".
- In the event of the specified date for submission of Bids being declared a holiday for the DST/GIL, the Bids will be received up to the date on online GEM Portal.
- In case the DST/GIL extends the scheduled date of submission of Bid document, the Bids shall be submitted by the time and date rescheduled. All rights and obligations of the DST/GIL and Bidders will remain the same.
- Any Bid received after the deadline for submission of Bids prescribed, will be rejected, and returned unopened to the Bidder.

4.4 Late proposals

The Bids received after the due date and the specified time (including the extended period if any) shall not be entertained. The Bids submitted by telex/telegram/fax/e-mail etc. shall not be considered. No correspondence will be entertained on this matter."

4.5 Proposal Prices

The prices indicated in the price schedule shall be entered in the following manner:

- i. The total price quoted must be inclusive of cost of Civil, Build and supplying / providing hardware, licenses, software, services for installation, testing, and commissioning of the Solution and support, all applicable taxes, duties, levies, charges, etc., it also includes the cost of incidental services such as transportation, insurance, training etc.
- ii. The cost of operation and maintenance of the building, and non-IT infrastructure for a period of SEVEN (7) years after the date of final Go Live.
- iii. The Bidder cannot quote for the project in part.
- iv. The Bidder may visit all proposed site/location, which will be part of Greenfield Gujarat State Data Centre at Gandhinagar before bidding to assess the actual physical & Technical requirements. A site visit may be facilitated on mail request to the Contact Officer as mentioned in the invitation of bid.

4.6 Earnest money deposit

- i. The Bidder shall furnish EMD for the amount and validity period mentioned in **Section 1 (Bid Control Sheet)**.
- ii. EMD is required to protect the DST/GIL against the risk of Bidder's conduct.
- iii. The EMD may be in the form of a Demand draft or Pay order or Bank Guarantee [on the lines of **Annexure-O**, issued by a Nationalized Bank in India, drawn in favor of DST/GIL payable at Gandhinagar.
- iv. Any Bid not accompanied by EMD for the specified amount as mentioned

- elsewhere in the RFP will be rejected as non-responsive.
- v. The EMD of the unsuccessful bidders shall be returned within 2 weeks from the date of Bid finalization.
 - vi. The EMD of the successful Bidder will be discharged upon the Bidder signing the contract and furnishing the Performance Bank Guarantee for the amount and validity as mentioned in **Section 1 (Bid Control Sheet)** of this RFP, which should be strictly on the lines of format placed at **Annexure-P**.
 - vii. No interest is payable on EMD.
 - viii. The EMD may be forfeited: -
 - a) if a Bidder withdraws his Bid during the period of Bid validity specified in this RFP or
 - b) if a Bidder makes any statement or encloses any form which turns out to be false/incorrect at any time prior to the signing of the contract; or if the successful Bidder fails to sign the contract or furnish Performance Bank Guarantee, within the specified time in the RFP/Purchase Order.
 - ix. If EMD is forfeited for any reasons mentioned above, the concerned Bidder may be debarred from participating in the RFPs floated by the DST/GIL, in future, as per sole discretion of the DST/GIL.

4.7 Completeness of Tender Offer

The Bidder is expected to examine all instructions, forms, terms, conditions, and deliverables in the tender document. Failure to furnish all information required by the tender documents or submission of a tender offer not substantially responsive in every respect to the tender documents will be at the Bidder's risk and may result in rejection of its tender offer. The tender offer is liable to be rejected outright without any intimation to the Bidder if complete information as called for in the tender document is not given therein, or if particulars asked for in the forms /proforma in the tender are not fully furnished.

4.8 'Pre-bid Meetings Clarification

- i. Bidders requiring any clarification on the bidding documents may notify the DST/GIL in writing strictly as per the format given in **Annexure-V** at the address/by e-mail given in **Section 1** of this document within the date/time mentioned in the Bid Control Sheets.
- ii. A Pre-Bid Meeting will be held on the date and time specified in the Bid Control Sheets which may be attended by the authorized representatives of the Bidders interested to respond to this RFP.
- iii. The queries received (without identifying source of query) and response of the DST/GIL thereof will be posted on the GIL website or conveyed to the Bidders.
- iv. Queries received after the scheduled date and time will not be responded/acted upon.

4.9 Responses to pre-bid queries and issue of corrigendum

- i. Bidder may seek clarification on this RFP document not later than the date specified in the Invitation of Bid section. DST/GIL reserves the right to not to entertain any queries post that date. The bidders are requested to submit their queries in MS Excel form.
- ii. At any time prior to the last date for receipt of bids, DST/GIL may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the RFP document by a corrigendum.
- iii. The corrigendum or clarifications (if any) to the queries from any bidder will be published on the website, <https://gem.gov.in/> in form of modified RFP/corrigendum etc.
- iv. Any such corrigendum shall be deemed to be part of this RFP and it will be incorporated into this RFP.
- v. In order to provide prospective bidders reasonable time for taking the corrigendum/modifications into account, DST/GIL may, at its discretion, extend the last date for the receipt of Bids.
- vi. It is the responsibility of the Bidder to check the above websites time to time for updates.

4.10 Amendment of Proposals

- i. DST/GIL reserves the right to amend, rescind or reissue the RFP, at any time prior to the deadline for submission of Bids. The DST/GIL, for any reason, whether, on its own initiative or in response to a clarification requested by a prospective Bidder, may modify the bidding document, by amendment which will be made available to the Bidders by way of corrigendum/addendum. The interested Parties/Bidders are advised to check the GIL website regularly till the date of submission of Bid document specified in the Bid Control Sheets/email and ensure that clarifications / amendments issued by the DST/GIL, if any, have been taken into consideration before submitting the Bid. Such amendments/clarifications, if any, issued by the DST/GIL will be binding on the participating Bidders. DST/GIL will not take any responsibility for any such omissions by the Bidder. DST/GIL, at its own discretion, may extend the deadline for submission of Bids in order to allow prospective Bidders a reasonable time to prepare the Bid, for taking the amendment into account. Nothing in this RFP or any addenda/ corrigenda or clarifications issued in connection thereto is intended to relieve Bidders from forming their own opinions and conclusions in respect of the matters addresses in this RFP or any addenda/ corrigenda or clarifications issued in connection thereto thereof.
- ii. Request for any change in commercial/legal terms and conditions, other than what has been mentioned in the RFP or any addenda/corrigenda or clarifications issued in connection thereto, will not be entertained.

4.11 Opening of proposals by Tenderer

- i. All the Technical Bids received up to the specified time and date will be opened for initial evaluation on the time and date mentioned in the Bid Control Sheets available in **Section 1** of this document. The Technical Bids will be opened in the presence of representatives of the Bidders who choose to attend the same. However, Bids may be opened even in the absence of representatives of one or more of the Bidders.

- ii.** In the first stage, only the Technical Bid will be opened and evaluated. Proposals of such Bidders satisfying eligibility criteria and agreeing to comply with all the Terms and conditions specified in the RFP, will be evaluated for technical criteria/specifications/eligibility. Only those Bids complying with Technical Criteria shall become eligible for Commercial Bid opening and further RFP evaluation process.
- iii.** The DST/GIL will examine the Bids to determine whether they are complete, required formats have been furnished, the documents have been properly signed, EMD for the desired amount and validity period is available and the Bids are generally in order. The DST/GIL may, at its discretion waive any minor non-conformity or irregularity in a Bid which does not constitute a material deviation.
- iv.** Prior to the detailed evaluation, the DST/GIL will determine the responsiveness of each Bid to the bidding document. For purposes of these clauses, a responsive Bid is one, which conforms to all the terms and conditions of the bidding document in totality, without any deviation.
- v.** The DST/GIL determination of a Bid's responsiveness will be based on the contents of the Bid itself, without recourse to extrinsic evidence.
- vi.** After opening of the technical Bids and preliminary evaluation, some or all the Bidders may be asked to make presentations on all equipment (Civil and Non-IT) including hardware / software / services, operating software/ firmware proposed to be offered by them.
- vii.** If a Bid is not responsive, it will be rejected by the DST/GIL and will not subsequently be made responsive by the Bidder by correction of the non-conformity.

4.12 Evaluation Procedure

- i.** DST/GIL may constitute an Evaluation Committee to evaluate the responses of the bidders.
- ii.** The Evaluation Committee constituted by DST/GIL shall evaluate the responses to the RFP and all supporting documents / documentary evidence. Inability to submit requisite supporting documents / documentary evidence, may lead to rejection.
- iii.** The interpretation of the bids and the decision made by the Evaluation Committee in the evaluation of responses to the RFP shall be final. No correspondence will be entertained outside the process of evaluation with the committee.
- iv.** The Evaluation Committee may ask for meetings with the bidders to seek clarifications on their bids.
- v.** The Evaluation Committee reserves the right to reject any or all bids on the basis of any deviations.
- vi.** Each of the responses shall be evaluated as per the criteria and requirements specified in this RFP.
- vii.** Initial Proposal scrutiny will be held, and incomplete details as given below will be treated as non-responsive. If Bids:
 - a.** Are submitted without tender fee or EMD in prescribed format.
 - b.** Are not submitted as specified in the RFP document.
 - c.** Received without the Letter of Authorization (Power of Attorney)
 - d.** Are found with suppression of details
 - e.** With incomplete information, subjective, conditional offers and partial offers submitted
 - f.** Submitted without the documents requested in the Proforma/Annexure.
 - g.** Have non-compliance of any of the clauses stipulated in the RFP

- h.** With lesser validity period
- viii.** Evaluation Committee will prepare a list of responsive bidders, who comply with all the Terms and Conditions of the RFP. All eligible bids will be considered for further evaluation by a committee according to the Evaluation process define in this RFP document. The decision of the Committee will be final in this regard. All responsive Bids will be considered for further processing as below:
- a.** Evaluation committee will examine the bids to determine whether they are complete, whether any computational errors have been made, and whether the bids are generally in order. The interpretations made by the evaluation committee will be final and binding on the bidders.
 - b.** Reasonableness of Prices: Prices quoted by bidders must be reasonable with prevalent market rates. AHR (Abnormally High Rates) and ALR (Abnormally Low rates) shall not be accepted, and DST/GIL shall reassess and decide on the reasonableness of the price by appointing a technical committee.
 - c.** In a case where the item is mentioned in the BOQ/BOM/Price bid, but the prices are not mentioned against the item, then DST/GIL shall have the discretion to consider the price of the item as zero. However, the bidder has to supply and execute the item at free of cost only. In case an item has been left out in the BOQ/BOM/Price bid by a particular bidder but required for the successful implementation of project and/or it is mentioned in the solution document of the bidder, DST/GIL will have the right to treat the price as zero OR ask the bidder to supply the item free of cost.
 - d.** It is mandatory for bidder to submit detailed BOQ and BOM (Bill of material with quantity) as unpriced bid in technical bid. Any discrepancy in price and unpriced bid will lead to disqualification of the bid OR DST/GIL will have the right to consider the highest amongst the BOQ/BOM and the price bid.
 - e.** In case of no price quoted or zero price quoted against an item by a bidder, price for the item will be loaded with highest prices quoted amongst all the other bidders for that item for evaluation purpose. However, the bidder has to complete the SITC for the item at zero cost.
 - f.** In case of a situation where the bidder has quoted abnormally low quantity or abnormally high quantity for an item, DST/GIL will have the rights to ask for an explanation during technical evaluation stage. The bidder will be given chance to increase or decrease the quantity as per the solution the bidder would propose and accepted DST/GIL. This will not be applicable for the quantity mentioned against items that is already asked in the tender. Accordingly, during commercial evaluation, the prices will be calculated for revised quantity submitted by bidder.
 - g.** Arithmetical errors will be rectified on the following basis:
 - If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected.
 - If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail, and the total shall be corrected.
 - If the Bidder does not accept the correction of the errors, his proposal will be rejected.
 - If there is a discrepancy between words and figures, the amount in words will prevail.
 - h.** DST/GIL may conduct clarification meetings with each or any Bidder to discuss any matters, technical or otherwise. Result of such meeting/ clarification may be published on specified website; however, no material changes in the bid shall be permitted.

- i. Further, the scope of the evaluation committee also covers taking any decision with regards to the RFP Document, execution/ implementation of the project including management period.
- j. Proposal shall be opened in the presence of bidder's representatives who intend to attend at their cost. The bidders' representatives who are present shall sign a register giving evidence of their attendance.
- k. Proposal document shall be evaluated as per the following steps.
 - **Preliminary Examination of Eligibility Criteria documents:** The Eligibility document will be examined to determine whether the Bidder meets the eligibility criteria, whether the proposal is complete in all respects, whether the documents have been properly signed and whether the bids are generally in order. Any bids found to be non-responsive for any reason or not meeting the minimum levels of the performance or eligibility criteria specified in various sections of this RFP Document will be rejected and will not be considered further.
 - **Technical Evaluation:** A detailed evaluation of the bids shall be carried out in order to determine whether the bidders are competent enough and whether the technical aspects are substantially responsive to the requirements set forth in the RFP document. Bids received would be assigned scores based on the parameters defined in the table.
 - The technically qualified bidders shall be invited during opening of the commercial bids and subsequently commercial evaluation shall be carried out.

4.13 Technical Bid Evaluation Scoring Matrix

- i. The Technical Bids of only those Bidders, who qualify in the Pre-Qualification stage and having compliance on all Technical and Function requirement as mentioned in this RFP, shall be considered, and will be evaluated as per the evaluation criteria in this clause.
- ii. In order to qualify technically, a Bid must secure a minimum of 70% of total marks in the technical evaluation. Only those Bids which have a minimum score of 70% of total marks in technical evaluation will be considered for opening of their commercial Bid.
- iii. Technical evaluation will include technical information submitted as per the Technical Bid format, demonstration of proposed project, reference calls and site visits, wherever required. The Bidder may highlight the noteworthy/superior features of relevant project. The Bidder will demonstrate/substantiate all claims made in the technical Bid to the satisfaction of the DST/GIL, the capability of the project to support all the required functionalities at their cost or those at other organizations where similar projects are deployed.
- iv. DST/GIL will evaluate the technical and functional specifications of all the designs and equipment quoted by the Bidder.
- v. During evaluation and comparison of Bids, the DST/GIL may, at its discretion ask the Bidders for clarification on the Bids received. The request for clarification shall be in writing and no change in prices or substance of the Bid shall be sought, offered, or permitted. No post Bid clarification at the initiative of the Bidder shall be entertained.
- vi. The evaluation will also take into account:
 - a. The equipment to be supplied/services offered by the Bidder to any State Data Centre or Data Centre in India. The Bidder should furnish the details of such services offered.
 - b. Does the proposed design, equipment/product offer a proven solution to meet the

- requirements?
- Upgrade(s) assurance by the Bidder as per requirements of the DST/GIL for the duration of the project.
 - Capability of the proposed design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance, and Transfer of Tier III Data Centre to meet future requirements outlined in the RFP.
 - Bidder support facilities: support requirements like online support/ email support/ offline support, time period.

To qualify in the Technical Evaluation, a Bidder must comply with all the requirements as listed in the table below.

Sr. No	Evaluation Criteria	Max Marks	Criteria															
1	Capability of the Bidder to execute similar large projects	25	Bidder's experience in setting-up Data Centre Infrastructure in India, quantified in terms of number of projects will be evaluated. Only Projects constructed and commissioned in the last 7 years from the date of Release of RFP will be considered. <table><tr><td>Project Type</td><td>No. of Projects (having >=100 rack)</td><td>Marks</td></tr><tr><td rowspan="4">Tier III/Rated III or More</td><td>>4</td><td>15</td></tr><tr><td>3</td><td>9</td></tr><tr><td>2</td><td>6</td></tr><tr><td>1</td><td>3</td></tr><tr><td></td><td></td><td></td></tr></table> <i>* 05 Marks will be given extra for each Tier IV Data Centre credential i.e., 05 marks for one Tier IV DC, 10 Marks for 02 Tier IV DC etc. (maximum up to 10). These marks will be added in Marks secured by bidder as per above table.</i> Bidder needs to submit Purchase order along with Project Phase wise Completion Certificate from Client AND Uptime/TIA Certification	Project Type	No. of Projects (having >=100 rack)	Marks	Tier III/Rated III or More	>4	15	3	9	2	6	1	3			
Project Type	No. of Projects (having >=100 rack)	Marks																
Tier III/Rated III or More	>4	15																
	3	9																
	2	6																
	1	3																
2	Bidder's experience in Building, Designing/ Implementation of Data Centre Projects, Tier-III/IV or higher Data Centre consisting of building construction, along with installation, commissioning of Electrical Distribution & Lighting, Electrical Substation, DG sets with HSD tank, Precision AC/ Chiller Plant, UPS System. Fire Detection &	20	<table><tr><td>Project Type</td><td>No. of Projects</td><td>Marks</td></tr><tr><td>Having project Value of >= INR. 600 Cr</td><td>>=1</td><td>20</td></tr><tr><td></td><td>>=2</td><td>20</td></tr></table>	Project Type	No. of Projects	Marks	Having project Value of >= INR. 600 Cr	>=1	20		>=2	20						
Project Type	No. of Projects	Marks																
Having project Value of >= INR. 600 Cr	>=1	20																
	>=2	20																

Sr. No	Evaluation Criteria	Max Marks	Criteria																
	suppression system, Access Control, Lifts and CCTV, BMS, VESDA, Rodent Repellent System, Civil and Interiors etc.		<table><tr><td>Having Project value of INR ≥ 350 Cr</td><td>1</td><td>10</td></tr><tr><td rowspan="2">Having Project value of INR ≥ 200 Cr</td><td>≥ 3</td><td>20</td></tr><tr><td>2</td><td>10</td></tr><tr><td rowspan="2">Having Project value of INR ≥ 150 Cr</td><td>≥ 4</td><td>20</td></tr><tr><td>3</td><td>10</td></tr></table>				Having Project value of INR ≥ 350 Cr	1	10	Having Project value of INR ≥ 200 Cr	≥ 3	20	2	10	Having Project value of INR ≥ 150 Cr	≥ 4	20	3	10
Having Project value of INR ≥ 350 Cr	1	10																	
Having Project value of INR ≥ 200 Cr	≥ 3	20																	
	2	10																	
Having Project value of INR ≥ 150 Cr	≥ 4	20																	
	3	10																	
			Bidder needs to submit Purchase order along with Project Phase wise Completion Certificate from Client AND Uptime/TIA Certification *Marks under this section is capped at 20. In any combinations, the Marks shall not be given more than 20.																
3	Technical Solution and Presentation given by Bidders	30	Based on Technical Solution submitted in this Bid, Bidder shall be requested to make Technical Presentation to the Bid Evaluation Committee appointed by DST/GIL. The Bid Evaluation Committee (BEC) shall evaluate the presentation based on the following criteria: 1. Demonstration of understanding regarding the project scope consisting of, but not limited to, Detailed Project plan, Building Construction plan, Interior & Exterior Layout/Design plan, Technical Design and Solution, timeline for each phase: 10 marks 2. Detailed approach & methodology to meet the project requirement: 10 Marks 3. Resource deployment plan along with their Profiles, Competency & relevant Experience: 10 Marks																
4	Bidder's Technical Resource Capabilities (on bidders' payroll)	25	<table><tr><td>Resource Type</td><td>No. of Resource</td><td>Marks</td></tr><tr><td rowspan="3">Total Technical resources- B.E/B.Tech/Diploma (as mentioned in pre- qualification)</td><td>≥ 200</td><td>5</td></tr><tr><td>≥ 150</td><td>3</td></tr><tr><td>≥ 100</td><td>2</td></tr></table>				Resource Type	No. of Resource	Marks	Total Technical resources- B.E/B.Tech/Diploma (as mentioned in pre- qualification)	≥ 200	5	≥ 150	3	≥ 100	2			
Resource Type	No. of Resource	Marks																	
Total Technical resources- B.E/B.Tech/Diploma (as mentioned in pre- qualification)	≥ 200	5																	
	≥ 150	3																	
	≥ 100	2																	

Sr. No	Evaluation Criteria	Max Marks	Criteria															
			<table><tr><td>Civil Engineer having BE/B.Tech degree</td><td>>15</td><td>4</td></tr><tr><td>Electrical Engineer having BE/B.Tech degree</td><td>>15</td><td>4</td></tr><tr><td>Mechanical Engineer having BE/B.Tech degree</td><td>>15</td><td>4</td></tr><tr><td>Resources with CDCP/CDCS/CDCE certification</td><td>>7</td><td>4</td></tr><tr><td>No. of Architects (B. Arch.) having 10+ years of relevant experience</td><td>>2</td><td>4</td></tr></table> The Bidders shall submit HR declaration consisting of employee details with respect to above mentioning Name, Designation, Payroll, Employee ID, Education detail, Certificate, Total years of experience etc. on bidder's Letter head.	Civil Engineer having BE/B.Tech degree	>15	4	Electrical Engineer having BE/B.Tech degree	>15	4	Mechanical Engineer having BE/B.Tech degree	>15	4	Resources with CDCP/CDCS/CDCE certification	>7	4	No. of Architects (B. Arch.) having 10+ years of relevant experience	>2	4
Civil Engineer having BE/B.Tech degree	>15	4																
Electrical Engineer having BE/B.Tech degree	>15	4																
Mechanical Engineer having BE/B.Tech degree	>15	4																
Resources with CDCP/CDCS/CDCE certification	>7	4																
No. of Architects (B. Arch.) having 10+ years of relevant experience	>2	4																
Total		100																

4.14 Evaluation of Bids and Award of Contract.

Technical Evaluation: A detailed evaluation of the bids shall be carried out in order to determine whether the bidders are competent, enough and whether the technical aspects are substantially responsive to the requirements set forth in the RFP document. Bids received would be assigned scores based on the parameters defined in the above table.

Every bidder will be given a time slot of 60 minutes to present the Approach and Methodology, components and resources proposed for the project.

The technically qualified bidders shall be invited during opening of the commercial bids and subsequently commercial evaluation shall be carried out.

PURCHASER will form a committee which will evaluate the proposals submitted by the bidders for a detailed scrutiny. During evaluation of proposals, PURCHASER, may, at its discretion, ask the bidders for clarification of their Proposals.

The technical bids of the bidders will be considered for Bid evaluation. Proposal of Bidder meeting the Specifications mentioned in the RFP document and other compliance to the terms and conditions. In case of conditional bid or major deviations from the RFP requirements, PURCHASER may seek the clarification in writing from the bidder, if required. If bidder fails to submit the required clarifications in due time, the technical evaluation will be done based on the information submitted in the technical bid.

The Commercial Bids of Technically qualified bidders only would be opened and evaluated to determine the L1 bid. **The Criteria for selection will be the LCBS (Least cost based selection), lowest cost to the Purchaser i.e., Sum total of all the line items without taxes for the qualified bid.** PURCHASER/DST/GIL may negotiate the prices with L1 Bidder, under each item/head offered by Bidder.

Bidders are not allowed to change the quoted make & model during the contract period.

Award Criteria: The Criteria for selection will be the lowest cost to PURCHASER amongst the technically qualified bids.

PURCHASER's right to vary requirements at time of award: PURCHASER reserves the right at the time of award to increase or decrease quantity for the requirements originally specified in the document without any change in Bid rate or other terms and conditions.

In case, if lowest bidder does not accept the award of contract or found to be involved in corrupt and/or fraudulent practices, the next lowest bidder will be awarded the contract, if he agrees to match the price quoted by L1/Lowest bidder.

4.15 Deviations and Exclusions

Bids shall be submitted strictly in accordance with the requirements and terms & conditions of the RFP. No Major deviation will be accepted. However, deviations those are minor in nature can be deviated to a maximum tune of 25% may be accepted. It is under absolute discretion of the technical committee to decide the quantum of deviation (percentage) and criticality (Major or Minor). Major and minor deviation will be based on product and installation quality, Life cycle cost, sustainable performance of Data Centre and execution timelines.

4.16 Rejection of Bids

The bids shall be rejected on the following grounds:

- i. In the event of any assumptions, presumptions, key points of discussion, recommendations or any points of similar nature submitted along with the Bid, DST/GIL reserves the right to reject the Bid and forfeit the EMD
- ii. If any of the eligibility criteria as per the Pre-qualification criteria is not met
- iii. EMD/ Tender fee /Tender Processing fee not submitted
- iv. If RFP terms and conditions are not met
- v. Commercial bid is enclosed with the same document as the technical bid.
- vi. If Bidder gives incorrect/misleading/ fraudulent information in the bid.
- vii. Failure to furnish all information required in the RFP document.
- viii. Canvassing in any form in connection with the bids
- ix. If the bid is incomplete /partial bid/ conditional/unclear in any form, has deviations from the terms and conditions of the RFP
- x. Information submitted in the technical bid is found to be misrepresented, incorrect or false, accidentally, unwittingly, or otherwise, at any time during the processing of the contract (no matter at what stage) or during the tenure of the contract including the extension period if any
- xi. Bids submitted after due date and time.
- xii. Bids are submitted through Telex/Fax/ e-mail

- xiii.** Erasure and/or overwriting
- xiv.** Bids not signed by authorized signatory or without power of attorney
- xv.** Bids containing more than one make/model or multiple makes for a unique item shall be rejected

4.17 Notification of Acceptance of Proposal

Prior to the expiry of the period of Proposal validity, DST/GIL will notify the selected Bidder through GIL/GEM portal that its proposal has been accepted and has been selected to do the project.

5 General Conditions of Contract

5.1 Termination and Effects of Termination

Termination for Default

The DST/GIL, without prejudice to any other remedy for breach of Contract, by a written notice of not less than 30 (thirty) days sent to the SI, may terminate the Contract in whole or in part:

- a. If the Successful Bidder(s) (herein after referred as "System Integrator" or "SI") fails to deliver the project or any of the Equipment and Services within the period(s) specified in the Contract, or within any extension thereof granted by the DST/GIL; or
- b. If the SI fails to perform any other obligation(s) under the contract; or
- c. Laxity in adherence to standards laid down by the DST/GIL; or
- d. Discrepancies/deviations in the agreed processes and/or Equipment/Products; or
- e. Violations of terms and conditions stipulated in this RFP.

In the event the DST/GIL terminates the Contract in whole or in part for the breaches attributable to the SI, the DST/GIL may procure, upon such terms and in such manner as it deems appropriate, Equipment/Products and Services similar to those undelivered, and the SI shall be liable to the DST/GIL for any increase in cost for such similar Equipment/Products and/or Services. However, the SI shall continue performance of the Contract to the extent not terminated.

If the contract is terminated under any termination clause, the SI shall handover all documents/ executable/ Project data or any other relevant information to the DST/GIL in timely manner and in proper format as per scope of this RFP and shall also support the orderly transition to another SI or to the DST/GIL.

During the transition, the SI shall also support the DST/GIL on technical queries/support on process implementation or in case of software provision for future upgrades.

The DST/GIL right to terminate the Contract will be in addition to the penalties / liquidated damages and other actions as deemed fit.

In the event of failure of SI to render the Services or in the event of termination of Contract or expiry of term or otherwise, without prejudice to any other right, the DST/GIL at its sole discretion may make alternate arrangement for getting the Services contracted with another SI. In such case, the DST/GIL shall give prior notice to the existing SI. The existing SI shall continue to provide services as per the terms of Contract until a 'New SI' completely takes over the work. During the transition phase, the existing SI shall render all reasonable assistance to the new SI within such period prescribed by the DST/GIL, at no additional cost to the DST/GIL, for ensuring smooth switch over and continuity of services. If existing SI is breach of this obligation, it shall be liable for paying a penalty of as provided in **Section 1 (Bid Control Sheets)** on demand to the DST/GIL, which may be settled from the payment of invoices or Performance Bank Guarantee for the contracted period or by invocation of Performance Bank Guarantee. The DST/GIL and SI shall also enter into a Transition Plan as mentioned in **Annexure-X**

Termination for Insolvency

The DST/GIL may, at any time, terminate the Contract by giving written notice to the SI, if the SI becomes Bankrupt or insolvent or any application for bankruptcy, insolvency or winding up has been filed against it by any person. In this event, termination will be without compensation to the SI, provided that such termination will not prejudice or affect any right of action or remedy, which has accrued or will accrue thereafter to the DST/GIL.

Termination for Convenience

The DST/GIL, by written notice of not less than 90 (ninety) days sent to the SI, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the DST/GIL convenience, the extent to which performance of the SI under the Contract is terminated, and the date upon which such termination becomes effective.

Effects of Termination

Upon contract expiration or termination of this Agreement:

- a. The System integrator shall:
 - i. Notify forthwith the particulars of all project assets.
 - ii. Deliver forthwith actual or constructive possession of the assets free and clear of all encumbrances and execute such deeds, writings and documents as may be required for fully and effectively divesting the Bidder all of its rights, title, and interest in the State Data Centre
 - iii. Deliver relevant records and reports pertaining to the State Data Centre and its design, engineering, operation, and maintenance including all operations & maintenance records and manuals pertaining thereto and complete as on the date of termination or expiration. And
 - iv. Shall expeditiously settle the accounts.
- b. In the event DST/GIL terminates this Agreement pursuant to any material breach by the System Integrator to complete its obligations under this Agreement, Performance Bank Guarantee furnished by SI may be forfeited for reasons, to be recorded in writing.
- c. Upon termination (or prior to expiry/ upon expiry, as the case may be) of this Agreement, the Parties will comply with the Exit Management Clause set out in this Agreement.
- d. DST/GIL agrees to pay the System Integrator for all charges for Services / Equipment provided by it and accepted by DST/GIL till effective date of termination.
- e. Any and all payments under this clause shall be payable only after the System Integrator has complied with and completed the transition and exit management as per the Exit Management Clause approved by DST/GIL. In case of expiry of the Agreement, the last due payment shall be payable to the System Integrator after it has complied with and completed the transition and exit management as per the exit management clause, Approved by DST/GIL.
- f. SI immediately upon termination, discontinue providing any or all of the services contemplated hereunder.
- g. DST/GIL shall upon termination, by under no obligation to make any payments to System Integrator forthwith, except for any payments that may be due and payable to SI in respect of satisfactory services already completed as per scope of this agreement; and

- h.** SI shall return all the property which belongs to DST/GIL including any data, information, files of completed or unfinished work. SI shall have no lien over the property of DST/GIL.
- i.** Upon the termination or expiration this agreement, in case before complete delivery of materials, then the title and ownership of all materials, plans, ideas, services or information (developed by System Integrator for DST/GIL) shall be transferred by SI to DST/GIL. Thereafter, DST/GIL, shall have no liability to SI's service arising from DST/GIL use of any material was approved, used, published, or presented by or on behalf of DST/GIL. SI shall transfer such property, and documentation related thereto, to DST/GIL immediately after termination in case termination happens before complete delivery of materials.

5.2 Consequences of Breach and penalties

In the event of breach, DST/GIL shall have the right to recover any loss, damage or cost of hardship caused due to the breach of the terms of this Agreement, from the payment due to the Service Provider. Notwithstanding the above, in the event the amount due to the Service Provider fall short of the costs incurred or suffered by DST/GIL on account of loss, damage or cost of hardship, the Service Provider shall also be liable to make good all such losses, damages or cost of hardship caused to DST/GIL.

5.3 Statutory Compliances

- System Integrator shall comply with all applicable statutes. DST/GIL shall not be liable in any manner whatsoever for any non-compliance on part of the System Integrator of the applicable laws and in the event of any claim of whatsoever nature arising thereof, the entire burden shall be strictly borne by the System Integrator.
- System Integrator shall maintain all requisite records, registers, account books etc. related to this project which are obligatory under any applicable law in connection with the Services being rendered or work being performed to DST/GIL and shall provide such information as may be required under any law to any authority.

5.4 Consequences of Termination

1. In the event of termination of the contract due to any cause whatsoever, whether consequent to the stipulated term of the Contract or otherwise, DST/GIL shall be entitled to impose any such obligations and conditions and issue any clarifications as may be necessary to ensure an efficient transition and effective business continuity of the Service(s) which the Vendor shall be obliged to comply with and take all available steps to minimize loss resulting from that termination/material breach, and further allow the next successor SI to take over the obligations of the erstwhile.
2. SI in relation to the execution/continued execution of the scope of the Contract.
3. Nothing herein shall restrict the right of DST/GIL to invoke the Guarantee and other guarantees, securities furnished, enforce the Deed of Indemnity, and pursue such other rights and/or remedies that may be available DST/GIL under law or otherwise.
4. The termination hereof shall not affect any accrued right or liability of either Party nor affect the operation of the provisions of the Contract that are expressly or by implication intended to come into or continue in force on or after such termination.
5. Upon Termination of the Contract, the System Integrator shall:
 - Prepare and present a detailed exit plan within five calendar days of termination notice receipt to the customer.

- The customer and along with designated team will review the Exit plan. If approved, SI shall start working on the same immediately. If the plan is rejected, SI shall prepare alternate plan within two calendar days. If the second plan is also rejected, the customer or the authorized person will provide a plan for SI, and it should be adhered by in totality.

5.5 Indemnification

Successful System Integrator hereby indemnifies, hold harmless & undertakes to defend DST/GIL, its affiliates and their respective employees, officers, and directors against any claim by a third party including but not limited to damages, costs, expenses as a result of such claim with regard to:

1. the extent that the System Integrator provided to DST/GIL by System Integrator under this Agreement infringes any third party's intellectual property rights.
2. taxes/charges/cess/levies (and interest or penalties assessed thereon) against DST/GIL that are obligations of System Integrator pursuant to this Agreement.
3. any damages for bodily injury (including death) and damage to real property and tangible personal property caused by the System Integrator.
4. any claim or action by or on behalf of the System Integrator personnel based on his or her employment with the System Integrator, including claims arising under occupational health and safety, worker's compensation, provident fund or other applicable laws or regulations.
5. claims by government regulators or agencies for fines, penalties, sanctions, or other remedies arising from or in connection with the System Integrator failure to comply with its regulatory/legal requirements and compliances.
6. any claim on account of an alleged breach of confidentiality and security of data occurring as a result of acts of omissions or commission of the System Integrator employees/its affiliates partner.
7. any claim occurring on account of misconduct, negligence or wrongful acts of omission and commission of employees of the System Integrator.
8. any claim occurring on account of misuse or negligent application, misuse of systems, failure to follow established procedure by the System Integrator.
9. System Integrator shall ensure compliance with all applicable laws, local and Central, including all labor laws like ESI, EPF, Minimum Wages Act, Gujarat Shops & Establishments Act, Contract Labour (Regulation and abolition) Act 1970, Payment of Bonus Act etc. and shall keep First Part indemnified and harmless in case of any action for violation by Second Part of any of the applicable laws so long as this arrangement is in force. For all purposes the persons deployed will be employees of second part and they will have no relation whatsoever with First Part. Second Part shall be responsible to furnish all such information/documents to First Part in this regard as may be required by it from time to time. Furthermore, the Second part shall be responsible to furnish self-attested copies of all returns/challans filed by the second part in the office of ESI, EPF, Minimum Wages Act, Contract Labour, etc. on monthly basis to the first party, in case, the second part fails to submit or not willing to submit the

copies of returns, first part shall be entitled to stop the payments till the submissions of the returns.

10. In event of any theft, loss, damage, destruction, or any other act of vandalism or sabotage of the property of the Customer in the possession of the System Integrator by virtue of this agreement, the System Integrator shall be liable to indemnify the first part to the extent of damage or loss so caused.
11. System Integrator has all the requisite consents, licenses, and permissions to (I) enter into this Agreement (II) carry out the obligations set out in this Agreement, and it shall keep all such consents, licenses and permissions renewed and valid at all times during the continuance of the Agreement.

5.6 Dispute Resolution and Arbitration

I. Dispute Resolution

1. DST/GIL and the System Integrator shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with this Agreement.
2. All negotiations, statements and/or documentation pursuant to this disputed matter shall be without prejudice and confidential (unless mutually agreed otherwise).
3. The time and resources costs of complying with its obligations under this provision shall be borne by respective Parties.
4. All Arbitration proceedings shall be held at Gandhinagar, Gujarat State, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be in English.

II. Arbitration

1. Any and all disputes, controversies, and conflicts ("Disputes") arising out of this Agreement between the Parties or arising out of or relating to or in connection with this Agreement or the performance or non-performance of the rights and obligations set forth herein or the breach, termination, invalidity, or interpretation thereof shall be referred for arbitration in terms of the Arbitration and Conciliation Act, 1996 or any amendments thereof. Prior to submitting the Disputes to arbitration, the Parties shall resolve to settle the Dispute/s through mutual negotiation and discussions. In the event that the said Dispute/s are not settled within thirty (30) days of the arising thereof, the same shall finally be settled and determined by arbitration in accordance with the Arbitration & Conciliation Act, 1996 or any amendment thereof. The place of arbitration shall be Gandhinagar and the language used in the arbitral proceedings shall be English.
2. The arbitral award shall be in writing and shall be final and binding on each Party and shall be enforceable in any court of competent jurisdiction. None of the Parties shall be entitled to commence or maintain any action in a court of law upon any Dispute arising out of or relating to or in connection with this Agreement (infringement of IPR Excepted), except for the enforcement of an arbitral award or as permitted under the Arbitration & Conciliation Act, 1996.

5.7 Force Majeure

Force Majeure is herein defined as any cause, which is beyond the control of the SI or DST/GIL as the case may be which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affect the performance of the contract, such as:

1. Neither Party shall be responsible to the other for any delay or failure in performance of its obligations due to any occurrence commonly known as Force Majeure which is beyond the control of any parties, including, but is not limited to, flood, explosion, thundering, acts of God or any Governmental body, public disorder, riots, embargoes, or strikes, acts of military authority, epidemics, lockouts or other labour disputes, insurrections, civil commotion, war, enemy actions.
2. If a Force Majeure arises, the System Integrator shall notify promptly within a reasonable time frame to DS/GIL in writing of such condition and the cause thereof. Unless otherwise directed by DST/GIL, System Integrator shall continue to perform his obligations under the Agreement as far as is reasonably practical and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.
3. The System Integrator shall be excused from performance of his obligations in whole or part as long as such cases, circumstances or events shall continue to prevent or delay such performance. Neither Party shall have any liability to the other Party in respect of the termination of this Agreement as a result of an event of Force Majeure.
4. System Integrator shall be paid for supply and services till last date of termination in case of force majeure.
5. If force majeure conditions continue for more than 30 days and the services are suspended, then either party has the right to terminate this agreement.

5.8 Confidentiality

1. DST/GIL may allow the System Integrator to utilize Confidential Information and the System Integrator shall maintain the highest level of secrecy, confidentiality, and privacy with regard to such Confidential Information. The System Integrator shall use its best efforts to protect the confidentiality and proprietary of Confidential Information.
2. Additionally, the System Integrator shall keep confidential all the details and information with regard to the Project, including systems, facilities, operations, management, and maintenance of the systems/facilities. The System Integrator shall use the information only to execute the Project.
3. DST/GIL shall retain all rights to prevent, stop and if required take the necessary punitive action against the System Integrator regarding any forbidden disclosure.

4. The System Integrator may share basic required information with its employees, affiliates, but only strictly on a need-to-know basis in order to accomplish the scope of services under this Agreement. Upon request of DST/GIL, the System Integrator shall execute a corporate non-disclosure agreement with DST/GIL in the mutually agreed format provided by DST/GIL and shall ensure that all its employees, affiliates are governed by confidential obligations similar to the one contained herein.
5. To the extent the System Integrator shares its confidential or proprietary information with DST/GIL for effective performance of the Services, the provisions of the confidentiality Clause (i) to (ii) shall apply mutatis mutandis on DST/GIL.

5.9 Limitation of Liability and Risk Purchase

1. Neither Party; nor its subsidiaries or its affiliates will be liable to the other Party, whether in contract, tort (including negligence), strict liability or otherwise, for loss of business, revenue, profits, loss of goodwill or reputation; or indirect, consequential, or special loss, arising in connection with any order, product, service, related documentation, information and/or the intended use thereof, even if a Party has been advised, knew or should have known of the possibility of such damages.
2. Subject to the above and notwithstanding anything to the contrary elsewhere contained herein, the maximum aggregate liability of the bidder for all claims under or in relation to this agreement shall be regardless of the form of claims shall be limited to 100% of the amount to be paid to SI by DST/GIL under the applicable statement of work that gives rise to such liability (as of the date the liability arose).

5.10 Fraud and Corrupt practices

1. The SI and their respective officers, employees, agents, and advisers shall observe the highest standard of ethics during the Selection Process. Notwithstanding anything to the contrary contained in this RFP, DST/GIL shall reject a Proposal without being liable in any manner whatsoever to the SI, if it determines that the SI has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice, or restrictive practice (collectively the "Prohibited Practices") in the Selection Process. In such an event, DST/GIL shall, without prejudice to its any other rights or remedies, forfeit and appropriate the Proposal Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to the Authority for, inter alia, time, cost, and effort of the Authority, in regard to the RFP, including consideration and evaluation of such SI Proposal.
2. Without prejudice to the rights of DST/GIL under Clause above and the rights and remedies which DST/GIL may have under the LoI or the Contract Agreement, if Systems Integrator, as the case may be, is found by DST/GIL to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Selection Process, or after the issue of the LoI or the execution of the Agreement, such SI shall not be eligible to participate in any tender or RFP issued by DST/GIL during a period of < period, suggested 2 (two) > years from the date such SI, as the case may be, is found by DST/GIL to have directly or through an

agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as the case may be.

3. For the purposes of this Section, the following terms shall have the meaning hereinafter respectively assigned to them:
 - a) "Corrupt practice" means Engaging in any manner whatsoever, whether during the Selection Process or after the issue of the LoI or after the execution of the Agreement, as the case may be, any person in respect of any matter relating to the Project or the LoI or the Agreement, who at any time has been or is a legal, financial or technical consultant/ adviser of DST/GIL in relation to any matter concerning the Project.
 - b) "fraudulent practice" means a misrepresentation or omission of facts or disclosure of incomplete facts, in order to influence the Selection Process; the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any person connected with the Selection Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of DST/GIL who is or has been associated in any manner, directly or indirectly with the Selection Process or the LoA or has dealt with matters concerning the Agreement or arising there from, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of DST/GIL, shall be deemed to constitute influencing the actions of a person connected with the Selection Process); or
 - c) "Coercive practice" means impairing or harming or threatening to impair or harm, directly or indirectly, any persons or property to influence any person's participation or action in the Selection Process.
4. "Undesirable practice" means establishing contact with any person connected with or employed or engaged by DST/GIL with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Selection Process; or having a Conflict of Interest; and
5. "Restrictive practice" means forming a cartel or arriving at any understanding or arrangement among SI with the objective of restricting or manipulating a full and fair competition in the Selection Process.

5.11 Exit Management Plan

The SI shall not exit from the contract within stipulated time period of Seven (7) years after Final Go-Live. However, in the event that the SI decides to opt out of the contract prematurely it has to notify the authority six months in advance through a written letter, SI will not seek ownership rights over the equipment and its PBG will also be forfeited.

If the SI exits from the contract during the execution within the stipulated time period, then DST/GIL reserves the right to terminate the contract and may ask the bidder with L2 price to match the price of L1 and execute the remaining work as per RFP scope of work.

I. Purpose

- a) This clause sets out the provisions which will apply upon completion of the contract period or upon termination of the agreement for default of the System Integrator. The Parties shall ensure that their respective associated entities, in case of DST/GIL, GoG, any third party appointed by DST/GIL and in case of the System Integrator carry out their respective obligations set out in this Exit Management Clause. Exit Management criteria will be a part of Master Service Agreement with detailed information about exit criteria and exit management plan.
- b) The exit management period starts, in case of expiry of contract, or on the date when the contract comes to an end or in case of termination of contract, or on the date when the notice of termination is sent to the System Integrator. The exit management period ends on the date agreed upon by DST/GIL or one year after the beginning of the exit management period, whichever is earlier.
- c) The System Integrator shall divest all the project assets at the beginning of the Exit management period to DST/GIL at zero value in case of expiry of contract and at the depreciated rate as per Indian Income Tax Act if there is a termination of contract.
- d) The System Integrator shall pay all transfer costs and stamp duty applicable on transfer of project assets except in case the Project is being terminated due to default of DST/GIL, GoG, where DST/GIL, GoG shall be responsible for transfer costs and stamp duty, if any. For clarification of doubt, transfer costs in this Clause relate to taxes and duties applicable due to transfer of the Greenfield GSDC project, if any.

At the beginning of the exit management period, the System Integrator shall ensure that

- i. All Project Assets including the hardware, software, documentation, and any other infrastructure shall have been cured of all defects and deficiencies as necessary so that the Greenfield GSDC Project is compliant with the Specifications and Standards set forth in the RFP, Agreement and any other amendments made during the contract period.
- ii. the System Integrator delivers relevant records and reports pertaining to the Greenfield GSDC Project and its design, engineering, operation, and maintenance including all operation and maintenance records and manuals pertaining thereto and complete as on the Divestment Date.
- iii. On request by DST/GIL, GoG or any third party appointed by DST/GIL, GoG, the System Integrator shall effect such assignments, transfers, licenses and sub-licenses related to any equipment lease, maintenance or service provision agreement between System Integrator and any third party, in favour of DST/GIL, GoG or any third party appointed by DST/GIL, GoG if it is required by DST/GIL, GoG or any third party appointed by DST/GIL, GoG and is reasonably necessary for the continuation of services by DST/GIL, GoG or any third party appointed by DST/GIL, GoG;
- iv. The System Integrator complies with all other requirements as may be prescribed under Applicable Laws to complete the divestment and assignment of all the rights, title and interest of the System Integrator in the Greenfield GSDC Project free from all encumbrances absolutely and free of any charge or tax to DST/GIL, GoG or its nominee.

II. During the Exit Management period

- i. The System Integrator will allow DST/GIL, GoG or any third party appointed by DST/GIL, GoG, access to information reasonably required to define the current mode of operation associated with the provision of the services to enable DST/GIL, GoG or any third party appointed by DST/GIL, GoG to assess the existing services being delivered.
- ii. Promptly on reasonable request by DST/GIL, GoG or any third party appointed by DST/GIL, GoG, the System Integrator shall provide access to and copies of all information held or controlled by them which they have prepared or maintained in accordance with the "Contract", the Project Plan, SLA, and scope of work, relating to any material aspect of the services (whether provided by the Greenfield State Data Centre System Integrator). DST/GIL, GoG or any third party appointed shall be entitled to copy all such information. Such information shall include details pertaining to the services rendered and other performance data. The System Integrator shall permit DST/GIL, GoG or any third party appointed to have reasonable access to its employees and facilities as reasonably required by DST/GIL, GoG or any third party appointed to understand the methods of delivery of the services employed by the System Integrator and to assist appropriate knowledge transfer.
- iii. Before the end of exit management period, the System Integrator will assist in a successful trial run of Network administration, Facility management including helpdesk management by DST/GIL, GoG or by any third party appointed.

5.12 Severability and Waiver

If any provision of this Agreement, or any part thereof, shall be found by any court or administrative body of competent jurisdiction to be illegal, invalid, or unenforceable the illegality, invalidity or unenforceability of such provision or part provision shall not affect the other provisions of this Agreement or the remainder of the provisions in question which shall remain in full force and effect. The relevant Parties shall negotiate in good faith in order to agree to substitute for any illegal, invalid, or unenforceable provision by a valid and enforceable provision which achieves to the greatest extent possible the economic, legal, and commercial objectives of the illegal, invalid, or unenforceable provision or part provision. No failure to exercise or enforce and no delay in exercising or enforcing on the part of either Party to this Agreement of any right, remedy or provision of this Agreement shall operate as a waiver of such right, remedy or provision in any future application nor shall any single or partial exercise or enforcement of any right, remedy or provision preclude any other or further exercise or enforcement of such right, remedy or provision or the exercise or enforcement of any other right, remedy or provision.

5.13 Applicability of Liquidated Damages

The System Integrator shall accomplish the scope of work under this Agreement as per the Project Timelines and as per the Service Level Agreements. If the System Integrator fails to achieve the Project Timelines or if it fails to achieve the Service Levels (in the SLAs) for any reason whatsoever, the System Integrator shall be liable to pay liquidated damages as provided in QGR SLA and Penalty Table & LD Table of this Agreement. DST/GIL shall have the right to determine such extent of fault and liquidated damages in consultation with System Integrator

and any other Party as it deems fit. Payment of liquidated damages shall be the sole and exclusive remedies available to DST/GIL. Liquidated damages will be 1 % of the Capex cost for delay of every week and capped at 25% of the cost of Capex as mentioned in the Agreement.

If the liquidated damages exceed the cap as mentioned in the Agreement, the Purchaser or DST/GIL shall have the right to terminate the agreement for default and consequences for such termination as provided in the agreement shall be applicable. In case it leads to termination, DST/GIL shall give Sixty days' notice to the SI of its intention to terminate the contract and shall so terminate the contract unless during the Sixty days' notice period, the SI initiates remedial action acceptable to DST/GIL.

Each of the Parties shall ensure that the range of the Services/Deliverables under the SLA shall not be varied, reduced, or increased except with the prior written agreement /consent between the Purchaser and the SI in accordance with the provisions of change request procedure as set out in this Agreement.

5.14 Intellectual Property Rights

- All Intellectual Property of DST/GIL under the Letter of Invitation and/ or the Contract will belong exclusively to GoG, except the pre-existing intellectual property rights of the Bidder. On payment of all of consultant's fees in connection with this Agreement and subject to the other provisions of this Agreement, GoG shall at all times retain to use within its internal business all right title and interest in and to any Intellectual Property Rights in the deliverables to be provided by the Bidder under this Agreement and any modifications thereto or works derived from there except the pre-existing intellectual property rights of Consultant if any. It is hereby expressly clarified that Bidder shall have no right, title or interest in or to such Intellectual Property Rights of DST/GIL for any purpose, except the right to use, modify, enhance and operate such designs, programs, modifications as per requirement of DST/GIL. Bidder shall not use such Intellectual Property of DST/GIL for any other purpose during and after the term of the Contract.
- No services covered under the Contract shall be sold or disposed by the Bidder to DST/GIL in violation of any right whatsoever of third party, and in particular, but without prejudice to the generality of the foregoing, of any patent right, trademark or similar right, or any charge mortgage or lien.
- The Bidder shall continue to retain sole ownership of the pre-existing proprietary knowledge, tools, methodology, templates, works of authorship, materials, information plus any modifications or enhancements thereto and intellectual property content brought in by Bidder to this engagement and/or incorporated in the deliverables submitted by Bidder to DST/GIL or created independently of the performance of the Services. For the avoidance of doubt, it is clarified that Bidder shall have the right to use any works of authorship or other intellectual property that may be included in the Deliverables, to develop for themselves, or for others, materials or processes that may be similar to those produced as a result of the Services. Further, any third-party licenses other than the hardware and software to be used by the Bidder resources for delivering the deliverables under this Agreement, necessary for the performance of the Services under this Agreement, would need to be procured by DST/GIL. The bidder hereby undertakes.
- Not to provide access to the Intellectual Property of DST/GIL to persons other than authorized users to ensure that all authorized users are appropriately notified of

the importance of respecting the Intellectual Property Rights of DST/GIL and that they are made aware of and undertake to abide by the similar terms and conditions of this Agreement. Not to permit any person, other than the authorized users, to copy, duplicate, translate into any language, or in any way reproduce the Intellectual Property of DST/GIL. To effect and maintain reasonable security measures to safeguard the Intellectual Property of DST/GIL from unauthorized access or use by any third party other than the authorized users. To notify DST/GIL promptly of any unauthorized disclosure, use or copying of the Intellectual Property of DST/GIL of which Bidder becomes aware. To change the manpower deployed if DST/GIL notifies issue (along with the justifiable ground) in the satisfactory performance of the respective resource.

Notice

Any queries or other documents, which may be given by either Party under this Agreement or under the SLA, shall be given in writing in person or by pre-paid recorded delivery post or by facsimile transmission or through email to the notified address.

In relation to a notice given under this Agreement, any such notice or other document shall be addressed to the other Party's principal or registered office address as set out below:

- (i) To GIL:
Attention: [Deputy Director-IT]
Gujarat Informatics Limited,
Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,
Sector - 10 A, Gandhinagar 382010,
Phone: (079)-23252026
- (ii) To
[Name and Address of Successful Bidder]

Any notice or other document shall be deemed to have been given to the other Party (or, if relevant, its relevant associated company) when delivered (if delivered in person) if delivered between the hours of 10.00 am and 5.00 pm on a working day at the address of the other Party set forth above or if sent by fax, provided the copy of the fax is accompanied by a confirmation of transmission, or on the next working day thereafter if delivered outside such hours, and 7 days from the date of posting (if by letter).

Notice can also be given through email address furnished by the System Integrator. The time of the sent message in the outbox of the sender will be considered to be time of delivery of the message.

Either Party to this Agreement or to the SLA may change its address, telephone number, facsimile number and nominated email for notification purposes by giving the other reasonable prior written notice of the new information and its effective date.

5.15 Taxes and Duties

All payments will be subjected to tax deduction at source as applicable/ required at the prevailing tax rates. Any changes, revision or enactment in duties like GST, taxes or any CESS during the period of validity of the Bids and also during the contract period by Central/State/Other Government bodies will be considered and

applied after due consideration. The decision of DST/GIL in this regard will be final and binding and no dispute will be entertained. Any taxes at the time of supply goods and services shall be applicable as per the LAW.

5.16 Insurance

Insurance coverage for project period for any losses, damages to equipment may be taken by SI directly. However, the SI has also to do transit insurance, which shall cover until the delivery of products to the customer's premises. All the equipment supplied against Greenfield GSDC needs to be cover under Insurance till the support period of the contract.

5.17 Failure to agree with terms & conditions of the contract

Failure of the SI to agree with the Terms & Conditions of the RFP shall constitute sufficient grounds for the annulment of the award, in which event DST/GIL may award the contract to the next best value SI or call for new bids from the interested bidders or invoke the PBG of the most responsive SI. However, SI shall be allowed to submit minor deviations without any cost implications and allowed for opportunity to mutually discuss its terms and conditions. The final decision in such an occurrence lies with DST/GIL.

5.18 Governing Law & Jurisdiction

This Agreement shall be governed by the laws in India and courts in Gandhinagar only shall have exclusive jurisdiction over matters relating to or arising from this Agreement.

5.19 Audit, Access, and Reporting

The System Integrator shall allow access to or its nominated agencies to restricted to all data related to Greenfield GSDC which is in the possession or control of the System Integrator or its agents, suppliers etc. and which relates to the provision of the Services as set out in the Audit, Access and Reporting Schedule and which is reasonably required by DST/GIL to comply with the terms of the Audit, Access and Reporting of this Agreement.

5.20 GSDC's Right to accept and to reject any or all proposals

Notwithstanding anything else contained to contrary in this RFP Document, DST/GIL reserves the right to accept or reject any Bid or to annul the bidding process fully or partially or modifying the same and to reject all Proposals at any time prior to the award of work, without incurring any liabilities in this regard.

5.21 Ownership

1. Products and fixes: all COTS (Commercial off-the-shelf) products and related solutions and fixes provided pursuant to this Agreement shall be licensed according to the terms of the license agreement packaged with or otherwise applicable to

such product. The System Integrator would be responsible for arranging any licenses associated with products. "Product" means any computer code, web-based services, or materials comprising commercially released, pre-release or beta products (whether licensed for a fee or no charge) and any derivatives of the foregoing which are made available to DST/GIL for license which is published by product owner or its affiliates, or a third party. "Fixes" means product fixes that are either released generally (such as commercial product service packs) or that are provided to DST/GIL when performing services (such as workarounds, patches, bug fixes, beta fixes and beta builds) and any derivatives of the foregoing. All intellectual property rights in any exclusive development to meet the functional requirement of this Agreement shall be owned by DST/GIL.

2. Training and other material: The ownership of all IPR rights in any and all documents, artefacts, etc. (including all training material) made pursuant to this Agreement during the Term for implementation of the Project under this Agreement will lie with DST/GIL.

5.22 Right to terminate the process

1. DST/GIL may terminate the RFP process at any time and without assigning any reason. DST/GIL make no commitments, express or implied, that this process will result in a business transaction with anyone.
2. This RFP does not constitute an offer by DST/GIL. The bidders' participation in this process may result DST/GIL selecting a Bidder to engage towards execution of the contract.

5.23 Language of Proposal & Correspondence

The proposal will be prepared by the Bidder in English language only. All the documents relating to the Proposal (including brochures) supplied by the Bidder should also be in English, and the correspondence between the Bidder & DST/GIL shall be in English language only. The correspondence by Fax / E-mail must be subsequently confirmed by a duly signed copy (unless already signed digitally).

5.24 Modification and withdrawal of bids

1. The Bidder may be allowed to modify or withdraw its submitted proposal any time prior to the last date prescribed for receipt of bids, by giving a written notice to DST/GIL.
2. The Bidder's modification or withdrawal notice shall be prepared, sealed, marked and dispatched in a manner similar to the original Proposal.
3. Subsequent to the last date for receipt of bids, no modification of bids shall be allowed. No bid may be withdrawn in the interval between the deadline for submission of bids and expiration of the of bid validity period specified. Withdrawal of a bid during this period will result in Bidder's forfeiture of bid security/EMD.

6 Project Timelines

Bidder shall deliver all project activities/milestones/deliverables to the GIL as per the timelines stated in this RFP document. GIL or its authorized representative shall review and provide comments/input on all respective deliverables. SI shall ensure that all comments provided by the GIL, or its authorized representative shall be incorporated in the final version of all deliverables/activities.

All deliverables/activities indicated in the tables below are indicative only and shall be read in conjunction with the Scope of Work section and Standard Form of Contract of the RFP for detailed requirements. Client or its authorized representative reserves the right to ask for additional information, documents, and deliverables throughout the Project.

The start date of the project shall be the date of issuance of LOI for the project.

G0 – Represents the Project Start Date for Selected Bidder/System Integrator

6.1 Liquidity Damage/Implementation Penalty:

If the Bidder fails to complete the work within the agreed time schedule, means the milestone within schedule timeline as specified in the project plan in the agreement or any extension thereof, department shall recover the Liquidated Damage (LD) from the successful bidder as mentioned in Section 7 of this RFP. Equipment delivery / work will be deemed to have been delivered / completed, only when it's all components, Parts / all item of works are also delivered / completed. If certain components / items of equipment / work are not delivered in time, the same will be considered as delayed until such time due missing / incomplete parts / item of works are delivered / completed.

7 Project Milestone, Payment schedule & Liquidated Damages (LD)

7.1 Project Milestone, Payment Schedule & Liquidated damages (LD) for CAPEX Civil

➤ Project Initiation and Designing Phase

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	LD for Civil Works
G0	Project Award	Issue of Letter of Intent (LOI) i.e. (Start Date of the project) Letter of acceptance by successful bidder within 7 days of LOI.	G0	NA	NA
G1 =G0 + 3 Week	Project Initiation	MSA to be signed within three (3) Weeks from the date of issuance of LOI. PBG @ 10% of the TCV (Total Contract Value) to be submitted by SI simultaneously.	G1	NA	LD will be 0.1% per week or part thereof of total CAPEX value of Civil (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).
G2 =G1 + 1 Week	Project Kick-off & Mobilization	Kick-off meeting along with all stake holders, to happen within 1 week from the G1. Along with Deployment of resources. SI to coordinate with DST/GIL for Kickoff meeting. Detail Project plan to be submitted by SI before Kickoff meetings.	G2	2.5% Against total Capex of Civil Price BID (Schedule -I) (As Mobilization Advance Payment)	Kick off meeting delay: LD will be 0.1% per week or part thereof of total CAPEX value of Civil (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I). Delay in Deployment of resources: LD will be 0.1% per week or part thereof of total CAPEX value of Civil (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	LD for Civil Works
G3 =G2 + 2 Months	Preparation & Submission of Site survey, readiness for Civil work, Server farm layout, Structural drawings, Civil work Implementation Plan, Interior works layout for approval	Submission of Design Documents, Layout, draft Drawing etc. ready for statutory approvals and Uptime Institute Certifications	G3.1= G2+ 1 Months	NA	NA
	Finalization and submission of Design documents , Layout, Drawings etc. after incorporating all the inputs.	SI has to finalization all the Design Documents, Layout, Drawings etc. after incorporating all the submission by all the stakeholders. SI has to final submit Design document, Layout, Drawing etc., for the following certificates. 1. statutory approvals and 2. Tier Design Certificate from the Uptime Institute	G3.2=G2+ 2 Months	2.5% Against total Capex of Civil Price BID (Schedule -I)	LD will 0.2% per week or part thereof of total CAPEX value of the Civil (Schedule-I) subject to maximum of 10% of the value of Civil CAPEX (Schedule-I).

Note: * For mobilization advance payment, selected bidder needs to submit ABG (Advance bank Guarantee) of 5% against total CAPEX of Schedule – I (Civile Price Bid) and Schedule – II (Non-IT Price BID) and the validity period of ABG should be additional six months from effective period of contract.

➤ **Implementation Phase**

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	Penalty Civil
G4 =G3 + 14 Months	Completion of Civil & Interior Works including Structural, Architectural, Plumbing, Fire Fighting	Completion of all Civil & Interior works including Structural, Architectural, Plumbing, Fire Fighting works. Request for inspection of all the item delivered & Installation of the same SI to furnish weekly progress report.	G4.1 = G3.2 + 2 Months Completion of Foundation Level Up to Plinth Level A) Earth work in excavation. B) PCC below raft foundation and water proofing. C) RCC work complete for Footing/ Raft Foundation, retaining walls, columns, Plinth Beams, Grade Slab etc. and Waterproofing complete.	12% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).
			G4.2 = G3.2 + 3.5 Months On completion of Ground Floor (From Plinth Level to 1st Floor Level) including 1st floor slab. A) RCC work for Column, beam, slab fins. fascia complete including Reinforcement and formwork complete. B) Brick work/AAC work in walls complete	5% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).
			G4.3 = G3.2 + 5 Months On completion of First Floor (From 1st Floor Level to 2nd floor level) including 2nd floor slab. A) RCC work for Column, beam, slab fins. fascia complete including Reinforcement and formwork complete. B) Brick work/AAC work in walls complete	5% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	Penalty Civil
			G4.4 = G3.2 + 6.5 Months On completion of Second Floor (From 2nd Floor Level to 3rd floor level) including 3rd floor slab. A) RCC work for Column, beam, slab fins. fascia complete including Reinforcement and formwork complete. B) Brick work/AAC work in walls complete	5% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).
			G4.5 = G3.2 + 8 Months On Completion of Third Floor (From 3rd Floor Level to 4th floor level) including 4th floor slab. A) RCC work for Column, beam, slab fins. fascia complete including Reinforcement and formwork complete. B) Brick work/AAC work in walls complete	5% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).
			G4.6 = G3.2 + 9.5 Months On completion of Fourth Floor (From 4th Floor Level to 5th floor level) including 5th floor slab. A) RCC work for Column, beam, slab fins. fascia complete including Reinforcement and formwork complete. B) Brick work/AAC work in walls complete	5% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	Penalty Civil
			G4.7 = G3.2 + 11 Months On completion of Fifth Floor (From 5th Floor Level to Terrace level) including Terrace slab and structural works above terrace. A) RCC work for Column, beam, slab fins. fascia complete including Reinforcement and formwork complete. B) Brick work/AAC work in walls complete. C) RCC works in Water tanks, Mumty, Machine room, Parapets, columns, walls etc. Complete above terrace level. D) Roof Treatment, Water Proofing of RCC Tank and Misc. works	6% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).
			G4.8 = G3.2 + 12.5 Months Finishing works, fittings and fixtures at all floors (Ground floor to Fifth Floor including Mumty/Machine room complete. A) Wood and Steel work complete B) Internal Plastering, painting, flooring, internal and external finishing and cladding work Complete.. C) False ceiling, Wall paneling, structural Glazing and acoustical work complete. D) Aluminium Work in doors, windows, Fire Doors including fittings complete. E) Water proofing to sunken slabs, toilets	18% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	Penalty Civil
			etc. complete. (This can be Paid 3% for Each floor Finishing = $6 \times 3 = 18\%$) for G+5 Building		
			G4.9= G3.2 + 14 Months Other Works A) Hardscape, horticulture works, and all pending works complete B) Road work, Pathways, Foot paths, Grass Pavers etc. complete C) Boundary Wall D) External Water supply line E) External Storm Drainage System and RWH F) External Sewer line up to Main Line	5% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).

➤ **PAT and FAT Phase**

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	Penalty Civil
G5 = G4 + 1 Months	PAT of Civil infrastructure Inspection of Installation of all Civil infrastructure System	On Successful Completion of inspection of Civil Infra GIL will issue an Acceptance Test (PAT) sign-off for Civil Infrastructure system.	G5	5% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).
G6 = G5 + 1 Months	FAT of complete Civil Infrastructure (Project Sign-Off & Go-Live# of the	After closure of all points / observations from IT solution Bidder, SI to offer the final inspection of Civil	G6	15% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.7% per week or part thereof of against total CAPEX of Civil

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	Penalty Civil
	Project - subject to successful completion of FAT of Non-IT)	infrastructure. Basis, on successful completion of FAT Integrated with Non-IT /MEP services GIL to issue Final Acceptance Test (FAT) certificate for Civil and finalize the date of Go-Live. *Comprise of Building Utilization permission. *Municipal NOC etc. *NOC taken from DST/GIL/Committee for Integration of Solution of IT solution			Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).

➤ **Certification and IT Integration/Defect Liability Phase**

Timeline	Milestone	Activity Detail	Project Milestone Civil Work	Payment Against Total Capex of Civil	Penalty Civil
G7 = G6 + 1.5 Months	IGBC Rating for Green Data Centre Certificate	IGBC Rating for Green Data Centre Certificate	G7	4% Against total Capex of Civil Price BID (Schedule-I)	LD will be 0.5% per week or part thereof of against total CAPEX of Civil Price Bid (Schedule-I) subject to Maximum of 10% of the value of Civil CAPEX (Schedule-I).
G8 = G6+5 Months	Defect Liability and Integration with IT solution Period for 5 Months	During this period, Contractor is responsible for defects resolve without any extra payment, with respect to the Project/Works.	G8	5% Against total Capex of Civil Price BID (Schedule-I)	Payment will be released against Successful completion of IT Integration/DLP

***NOTE: Total LD % under this RFP is capped at Maximum 20% of the total contract value.**

7.2 Project Milestone, Payment Schedule & Penalty for CAPEX Non-IT

Timeline	Milestone	Activity Detail	Project Milestone Non-IT	Payment Against Total Capex of Non-IT	Penalty non-IT
G0	Project Award	Issue of Letter of Intent (LOI) i.e. (Start Date of the project) Letter of acceptance by successful bidder within 7 days of LOI.	G0	NA	NA
G1 =G0 + 3 Week	Project Initiation	MSA to be signed within three (3) Weeks from the date of issuance of LOI. PBG @ 10% of the TCV (Total Contract Value) to be submitted by SI simultaneously.	G1	NA	LD will be 0.1% per week or part thereof of against total CAPEX Non-IT Price Bid (Schedule-II) subject to Maximum of 10% of the value of Non-IT CAPEX (Schedule-II).
G2 =G1 + 1 Week	Project Kick-off & Mobilization	Kick-off meeting along with all stake holders, to happen within 1 week from the G1. Along with Deployment of resources. Detail Project plan to be submitted by SI before Kickoff meetings.	G2	2.5% Against total Capex of Non-IT Price BID (Schedule-II)	LD will be 0.2% per week or part thereof of against total CAPEX Non-IT Price Bid (Schedule-II) subject to maximum of 10% of the value of Non-IT CAPEX (Schedule-II).
G3 =G2 + 2 Months	Preparation & Submission of Site survey, readiness for Civil work, Server farm layout, Structural drawings, Civil work Implementation	Submission of Design Documents, Layout, draft Drawing etc. ready for statutory approvals and Uptime Institute Certifications	G3.1= G2+ 1 Months	NA	NA

Timeline	Milestone	Activity Detail	Project Milestone Non-IT	Payment Against Total Capex of Non-IT	Penalty non-IT
	Plan, Interior works layout for approval				
	Finalization and submission of Design documents, Layout, Drawings etc. after incorporating all the inputs.	SI has to finalization all the Design Documents, Layout, Drawings etc. after incorporating all the submission by all the stakeholders. SI has to final submit Design document, Layout, Drawing etc. for all the statutory approvals and Uptime Institute for requisite certification.	G3.1 = G2 + 2 Months	2.5% Against total Capex of Non-IT Price Bid (Schedule-II)	LD will be 0.2% per week or part thereof of against total CAPEX Non-IT Price Bid (Schedule-II) subject to maximum of 10% of the value of Non-IT CAPEX (Schedule-II).
G4' = G4.4 (Civil) + 4 Months	Delivery of All No-IT component as per Non-IT Price Bid Annexure.	Completion of Delivery of Electrical, HVAC, DCIM, Lifts, UPS & Battery, DG, Rack & IP-PDU, Video Wall, Passive Cabling works. etc. SI to furnish weekly progress report.	G4' = G4.4 (Civil) + 4 Months All Non-IT Components Delivery to be completed **	60% Against Capex value of the Item delivered at site. As per Non-IT price BID (Schedule-II)	LD will be 0.5% per week or part thereof of against total CAPEX Non-IT Price Bid (Schedule-II) subject to maximum of 10% of the value of Non-IT CAPEX (Schedule-II).
G5' = G4' + 8.5 Months	Installation commissioning of all non-IT components Followed by PAT of Non-IT System.	DST/GIL/ Committee appointed by DST/GIL to carry out the inspection of installation and commissioning of all non-IT system. Then, GIL to issue an Acceptance Test (PAT) sign-off for Non-IT Infrastructure system.	G5' = G 4.4. + 8.5 months	10% Against successful Completed PAT Item. As per Non-IT price BID (Schedule-II)	LD will be 0.5% per week or part thereof of against total CAPEX Non-IT Price Bid (Schedule-II) subject to maximum of 10% of the value of Non-IT CAPEX (Schedule-II).

Timeline	Milestone	Activity Detail	Project Milestone Non-IT	Payment Against Total Capex of Non-IT	Penalty non-IT
G6' = G5' + 1 Months	FAT of complete Non-IT Integrated solution. (Project Sign-Off & Go-Live# of the Project-subject to successful completion of FAT of CIVIL)	After closure of all points or observations from IT solution Bidder, DST/GIL/Committee appointed by DST/GIL to complete the final inspection of all installation and commissioning of complete Civil, Non-IT Then, GIL to issue Final Acceptance Test (FAT) certificate for all commissioned Civil, Non-IT and finalize the date of Go-Live. *Comprise of Building Utilization permission. Municipal NOC etc.	G6'	15% Against FAT Item. As per Non-IT price BID (Schedule-II)	LD will be 0.7% per week or part thereof of against total CAPEX Non-IT Price Bid (Schedule-II) subject to maximum of 10% of the value of Non-IT CAPEX (Schedule-II).
G7 = G6 + 1.5 Months	IGBC Rating for Green Data Centre Certificate	IGBC Rating for Green Data Centre Certificate	G7	4%	The LD will be applicable as 0.5% per week of the not completed deliverables subject to a maximum of 10% of the value of the deliverables

➤ **Certification and IT Integration/Defect Liability Phase**

Timeline	Milestone	Activity Detail	Project Milestone non-IT	Payment Against Total Capex of Non-IT	Penalty non-IT
G7' = G6' + 1.5 Months	Uptime Tier-III Facility Certificate	Obtaining Uptime Tier-III Facility Certification	G7'	5% Against total Capex of Non-IT Price BID (Schedule-II)	LD will be 0.5% per week or part thereof of against total CAPEX Non-IT Price Bid

Timeline	Milestone	Activity Detail	Project Milestone non-IT	Payment Against Total Capex of Non-IT	Penalty non-IT
					(Schedule-II) subject to maximum of 10% of the value of Non-IT CAPEX (Schedule-II).
G8' = G6'+5 Months	Defect Liability and Integration with IT solution Period for 5 Months	Commencing at Completion of the Project/Works, during which the Contractor is responsible for defects resolve without any extra payment, with respect to the Project/Works.	G8'	5% Against total Capex of Non-IT Price BID (Schedule-II)	Payment will be released against Successful completion of IT Integration/DLP

***NOTE: Total LD % under this RFP is capped at Maximum 20% of the total contract value for implementation phase of project for civil and non-IT both.**

#Go Live – This is referred as “Stage wise-Go Live” of the Project and shall be issued against completion of FAT of CIVIL and Non-IT components respectively. The “Final Go-Live certification” will be issued by DST/GIL post successful completion of the G8 & G8’ milestone referred above.

7.3 Payment Schedule for O&M period

Sr. No.	Phases	Deliverables	Payable	Timelin e (In Months)
1	Operations and Maintenance for 7 years payable quarterly	Payment made post submission and acceptance of all set of deliverables mentioned in Scope of Work for O&M phase.	Payable in 28 equated quarterly installments (of O&M Price bid) at end of each quarter.	Per Quarter
Total O&M			100%	28 Quarters

***NOTE: The overall penalty under this RFP is capped at 20% of QP amount. If the cap of overall penalty is reached in 03 consecutive quarters, DST/GIL may terminate the contract.**

7.4 Health, Safety and Environment Management

The SI shall adhere consistently to all provisions of HSE requirements. In case of non-compliances and also for repeated failure in implementation of any of the HSE provisions, the DST/GIL may impose stoppage of work without any cost & time implication to the DST/GIL. The DST/GIL may impose a suitable penalty. The amount of penalty applicable for the SI on different types of HSE violations is specified below:

Sr. No	Violation of HSE Norms	LD/Penalty Amount
1	For not using personal protective equipment (Helmet, Shoes, Goggles, Gloves, Full body harness, Face shield etc.	Rs. 250/- per day/Item/Person
2	Working without Work Permit/Clearance	Rs. 50000/- per occasion
3	Unsafe electrical practices (not installing Earth Leakage circuit breaker (ELCB), using poor joints of cables, using naked wire without top plug into socket, laying wire/cables on the roads, electrical jobs by incompetent person, etc.)	Rs. 2500/- per day/Item/Person
4	Working at height without full body harness, using non- standard/ rejected scaffolding and not arranging fall protection arrangement as required, like handrails, lifelines, Safety Nets etc.	Rs. 2500/- per case per day
5	Unsafe handling of compressed gas cylinders (No trolley, jubilee clips double gauge regulator, improper storage/handling)	Rs. 100/- per day/Item/Person
6	Use of domestic LPG for cutting purpose	Rs. 1000/- per occasion
7	No fencing/barricading of excavated areas / trenches	Rs. 1000/- per occasion
8	Not providing shoring/strutting/proper slope and not keeping the excavated earth at least 1.5M away from excavated area	Rs. 5000/- per occasion
9	Non display of caution boards, list of hospitals, emergency services available at work locations	Rs. 500/- per occasion
10	Traffic rules violations like over speeding of vehicles, rash driving, talking on mobile phones during vehicle driving, wrong parking, not using seat belts, vehicles not fitted with reverse horn / warning alarms	Rs. 1000/- per occasion
11	Absence of SI's top most executive at site in the safety meetings whenever called by purchaser.	Rs. 5000/- per meeting
12	Failure to maintain HSE records by SI Safety personnel	Rs. 500/- per meeting
13	Failure to conduct daily site safety site inspection, HSE meeting and HSE audit at predefined frequencies	Rs. 1000/- per occasion
14	Failure to submit the monthly HSE report by 5th of subsequent month to Project's Engineer-in-Charge.	Rs. 5000/- per occasion and Rs 100/- per day for further delay.
15	Poor House Keeping	Rs. 1000/- per occasion
16	Failure to report & follow up accident (including Near Miss) reporting system.	Rs. 10,000/- per occasion
17	Degradation of environment (not confining toxic spills, spilling oil/lubricants onto ground)	Rs. 1000/- per occasion

Sr. No	Violation of HSE Norms	LD/Penalty Amount
18	Not medically examining the workers before allowing them to work at height, not providing earmuffs while allowing them to work in noise polluted areas, made them to work in air polluted areas without respiratory protective devices, etc.	Rs. 1000/- per occasion and warning letter will be issued.
19	Violation of any other safety condition as per job HSE plan / work permit and HSE conditions of contract (e.g., using crowbar on cable trenches, improper welding booth, not keeping fire extinguisher ready at hot work site, unsafe rigging practices, non-availability of First-Aid box at site etc.)	Rs. 1000/- per occasion and warning letter will be issued.
20	Failure to carry-out Safety audit in time (internal & external), close-out of identified shortfalls of Observations of Safety Aspects etc.	Rs. 500/- per occasion and warning letter will be issued.
21	Any incident / accident at project site has been caused because of willful negligence or gross violation of safety measures / provisions on the part of the SI or any of its sub-agencies	Rs. 5000/- per occasion
22	Any violation not covered above	To be decided by the Purchaser.

Penalty Capping for Health, Safety and Environment Management: Overall ceiling of 2% (Two percent) of the Agreed Phase 1 CAPEX Payment.

This penalty shall be in addition to all other penalties specified elsewhere in the contract. The decision of imposing stop-work-instruction and imposition of penalty shall rest with the DST/GIL. The same shall be binding on the SI. Imposition of penalty does not make the SI eligible to continue the work in unsafe manner.

7.5 LD/Penalties against Civil GCC Violation

Civil - GCC Clause No.	Sub Point	Note
RFP Vol. 2 Section 4.3.5	i	Warning/ Caution Boards: If the SI fails to provide the warning /caution boards within 7 days of written direction of Engineer In charge or his authorized representative, recovery of Rs. 10000/- on per day basis shall be made.
RFP Vol. 2 Section 4.3.5	ii	Sign Boards: In case of non-compliance/delay in compliance in this, a recovery @ Rs. 5000/- per day will be imposed which will be recovered from the immediate next R/A Bill of the SI
RFP Vol. 2 Section 4.2.1	-	A site laboratory: with the minimum equipment's as specified in CPWD specifications/in this tender document shall be established, made functional and maintained within three months from the commencement date or date of start without any extra cost to the department. In case of non-compliance / delay in compliance in this, a recovery @ Rs. 10000/- per day will be imposed which will be recovered from the immediate next R/A Bill of the SI.
RFP Vol. 2	v	Quality Assurance Plan: All the materials to be used in the work, to give the finished work complete in all respects, shall comply with the requirements of the

Civil - GCC Clause No.	Sub Point	Note
Section 5.31		specifications, and shall pass all the tests required as per specifications as applicable or such specifications / standards as directed by the Engineer-in-Charge. Further, a recovery of Rs. 5000/- shall be made on per day basis in case of delay in submission of the above Program/Plan.
RFP Vol. 2 Section 5.31	xix	Laboratory Staff: If the SI does not provide adequate supporting staff or labour or both for carrying out field tests or collecting and forwarding samples to outside laboratory or for maintaining test records, Engineer in charge may carry out field tests or collect and forward sample to outside laboratory or appoint any person to maintain the registers at risk and cost of SI. The charges so incurred shall be entirely borne by SI and shall be deducted from Running or final bill of SI. Further, recovery of Rs. 2000/- for each default shall be levied to SI.
RFP Vol. 2 Section 5.33	h	Program Schedule: Program for achieving fortnightly micro milestones and periodic milestones. h. In case of non-compliance/delay in compliance in this, a recovery @ Rs. 25000/- per week or part thereof will be imposed which will be recovered from the immediate next R/A Bill of the SI.
RFP Vol. 2 Section 5.34	v	Progress Report: In case of non-compliance / delay in compliance in submission of fortnight progress report, a recovery @ Rs. 10000/- per report will be imposed which will be recovered from the immediate next R/A Bill of the SI.
RFP Vol. 2 Section 6.23	-	Site Management Plan: The SI shall prepare and submit a site Management Plan (SMP) within 10 days of start, for an approval by the Engineer -in-charge. This SMP shall indicate the locations of go down, stockpiles, barricading, waste storage, offices, vehicular movement routes etc. In short, this SMP would comprehensively represent how the site activities shall be managed conforming to GRIHA guidelines. SI will be penalized @ Rs. 1000 per day of delay on non-submission of SMP beyond due date to be recovered from next RA bill.
RFP Vol. 2 Section 6.27	-	AS Built: The SI shall submit to the Engineer -in-Charge after construction of the buildings, a detailed as built quantification of the following within 10 days of recording of completion. SI will be penalized @ Rs. 10000 per day of delay on non-submission of SMP beyond due date to be recovered from the Final bill:

8 Service Level Agreement (SLA) of O&M

8.1 Overview

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 selected bidder to the DST/GIL for the duration of this O&M contract. The DST/GIL will regularly review the performance of the services being provided by the selected bidder and impose penalties if any deficiency is found in the services.

The overall penalty would be generally capped at 20% of QP amount. If the cap of overall penalty is reached in 03 consecutive quarters, DST/GIL may terminate the contract.

It is acknowledged that service levels may change as service needs evolves over the course of the contract. The present SLAs have been worked out on the basis of current expectations. Service levels between the DST/GIL and bidder can be revised after the start of O&M phase in view of experience gained.

The experience gained during this period will be used to fine tune the SLAs, including parameters, targets and penalties, if required. Any changes to the levels of services provided during the project period will be consented, documented and negotiated in good faith by both parties. Either party can request a change. Changes will be documented as an addendum to SI must be required to generate periodical reports as desired by the Purchaser in customized format.

8.2 SLA Categories

The SLA has been logically segregated in the following categories:

Infrastructure service levels

a) Equipment/Services Downtime is the time in Minutes that the equipment/ services is not available and excludes planned downtime, which are approved by the DST/GIL. The downtime shall be calculated from the DCIM, or any equivalent Tools/EMS/NMS as may be applicable. In case, downtime of any equipment/ Services is not available on DCIM it shall be calculated from the helpdesk or available any other alternative tools/means.

b) Total time is equal to total number of Minutes in the given quarter.

c) Planned Downtime means any time when the equipment's/services are unavailable because of maintenance, installation/reinstallation or other services with the prior approval of the DST/GIL.

Infrastructure service levels				
Sr. No.	Service description	Measurement parameter	Target	Penalty
1	Uptime of All Data Centre Components and services under scope (to be calculated for each component)	Uptime of an equipment = $\{1 - [(Equipment\ downtime) / (Total\ Time)]\} * 100$	$\geq 99.982\%$	NA
			$< 99.982\%$	For every 0.25% slab degradation in the uptime, there will be a penalty of 1% of the Agreed Quarterly Payment.

				If the uptime goes below 96.982%, an additional penalty of 1% will be charged on Quarterly Payment for each 1% slab downtime
2	Preventive Maintenance (each equipment / component installed in Data Centre)	As approved APM (Annual Preventive maintenance Plan) by DST/GIL. In case of no APM available, it is applicable for per Quarter.	Completed as per frequency defined in Preventive Maintenance Plan or per Quarter	NA
		If not carried in the defined time, the penalty will be applicable	If not completed as per frequency defined in Preventive Maintenance Plan	1% of CAPEX value of component as per Price BID per component/device/instant /incident Note : If the rate of any component/device is not available/discovered in RFP, penalty of Rs. 10000 per component/device/instant /incident will be levied
3	Power Usage Efficiency (PUE)	>50% of IT Load	<=1.50	NA
		25% - 50% of IT Load	1.51-1.59	For every 0.1 degradation or part thereof, in the PUE value, there will be a penalty of 0.25% of Agreed Quarterly Payment
		<=25% of IT Load	1.6-1.69	For every 0.1 degradation in the PUE value there will be a penalty of 0.50% of Agreed Quarterly Payment
Help Desk Service Levels				
Sr. No.	Service Description	Measurement Parameter	Target	Penalty
1	Various incidents related to comprehensive onsite maintenance and FMS promptly	Incidents will be logged in the Helpdesk and the O&M team will have to resolve the incident and provide necessary updates through the Help Desk Portal and	Priority Level 1 Incident - Within 1 Hr.	level 1 Incident 0.25% of QP for every 2 Hr. delay in resolution
			Priority Level 2 Incident - Within 12 Hr.	Level 2 Incident 0.25% of QP for every 6 Hr. delay in resolution

		coordinate with respective stakeholder. Root Cause should be identified for all incidents; if root cause is not identified then additional penalties will be levied.	Priority Level 3 Incident Within 24 Hr.	Level 3 Incident 0.25% of QP for every 12 Hr. delay in resolution
3	Request Resolution	Request like, any new requirement, resetting of parameters for UPS, Chiller, DG etc. will be logged in Helpdesk & the O&M team will have to resolve the request and provide necessary updates through the help desk portal and co-ordinate with respective Dept stakeholder.	Priority Level 1 Incident - Within 1 Hr.	Level 1 Incident 0.25% of QP for every 2 Hr. delay in resolution
			Priority Level 2 Incident - Within 12 Hr.	Level 2 Incident 0.25% of QP for every 6 Hr. delay in resolution
			Priority Level 3 Incident - Within 24 Hr.	Level 3 Incident 0.25% of QP for every 12
Compliance & Reporting Procedures				
Sr. No	Service Description	Measurement Parameter	Target	Penalty
1	Submission of Quarterly/Monthly /Weekly /Daily MIS Reports	The SI shall submit the various MIS reports as per frequency defined in this RFP.	As per frequency defined in this RFP.	- For Daily/Weekly report, Rs. 1000 per instance per Deliverable/report - For Monthly report, Rs. 5000 per instance per Deliverable/report - For Quarterly or other frequency, Rs. 10000 per instance per Deliverable
2	Maintenance of Inventory	SI should maintain an inventory of items that will be required on an ongoing basis. For e.g., tiles, cables etc.	100% as per the inventory log committed and maintained by SI.	If inventory does not maintain for a particular Quarter, penalty of Rs. 10000 will be deducted.
Change Request/ Management				
Sr. No	Service Description	Measurement Parameter	Target	Penalty
1	Change Resolution	Per day	Timeline as defined in – Implementation plan and approved in Change advisory Board (CAB)	Delay of Rs. 1000 per day for closure of Change Request.
Civil Works SLA				
Sr. No	Service Description	Measurement Parameter	Target	Penalty

1	Major Civil & other MEP Works	Major Civil Work including the False Flooring, False Ceiling, raised flooring, Doors & Locking, Partitioning, Fire Proofing of all surfaces, Furniture & Fixtures (Door, windows, Table, chair) and Painting to be attended ideally within 2 days of reporting the problem. The SI should maintain sufficient inventory to carry out civil, electrical HVAC and DCIM, etc. repairs without any disruption to operations. For critical items, the resolution time shall be mutually agreed by the DST/GIL and the SI at the time of award of contract.	T	NA
			T1=T+ up to 2 days	0.5% of the Agreed Quarterly Payment For every unresolved call
			T2=T1+ up to 2 days	0.75% of the Agreed Quarterly Payment for every unresolved call
			>T2	1% of the Agreed Quarterly Payment for every unresolved call.
2	Minor Civil Works	Minor Civil work including Cement Concrete Work, Masonry Work, Trench Work, Storage, Glazing and Scaffolding Work to be carried ideally within 4 days of the reporting problem	T	NA
			T1=T+ up to 4 days	0.05% of the Agreed Quarterly Payment for every unresolved call
			T2=T1+ up to 2 days	0.1% of the Agreed Quarterly Payment for every unresolved call
			>T2	0.5% of the Agreed Quarterly Payment for every unresolved call
3	Essential repairing or Service restoration like Plumbing, sanitary, water supply, lighting, etc.	Any fault/service issue in essential service/facility i.e., Plumbing/Sanitary/water supply/ lighting etc.		After 1 hour from detecting the fault, INR 1000/- per day per instance to be deducted for unavailability of the service from the Quarterly Payment + Letter of warning
Closure of Audit Findings				
1	Closure of Audit Findings	Periodic Audits will be conducted by DST/GIL, or any Authorized agency/personnel nominated by DST/GIL the Audit Findings shall be closed by the O&M Agency within 21 working days or as per the closure schedule defined by the Auditor. If there is any delay in closing the audit findings, then penalties will be levied	100.00%	Rs.10,000/- per day delay for closure of each high and medium classified audit finding Rs. 2,000/- per day delay for closure of each low classified audit finding
Facility Management Soft Services				

1	Data Centre entire premises	Maintain Hygiene and cleanness of entire Data Centre premises including the maintenance required consumable i.e., stationary, toiletry etc.	Daily	Rs. 5000 per instance per day
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Note: In case of civil works, **T** the resolution time **(for Points 1 & 2 of Civil works SLA)** shall be the agreed resolution as per timeline approved by DST/GIL considering the criticality / urgency of work.

8.3 Manpower availability service levels

The key resource deployed by SI for carrying out and providing FMS services shall necessarily be on direct payroll of the bidder organization and should not be outsourced / subcontracted in any circumstances.

The SI shall deploy on-site dedicated (with no additional responsibility other than this Greenfield Data Centre) Program Manager to look after the entire operation of the Data Centre with his/her on-site team. The Program manager shall be SPOC for this project and will coordinate with the designated officer of the DST/GIL.

Prior Intimated Leave: 24 days per designated post in a Year (i.e., 2 leaves per Month is allowed). If a resource proceeding on leave or becoming absent is replaced with a resource approved by authority, then such substitution will not be treated as absence. Penalty will be calculated per day on Monthly basis.

- Overall Penalties shall be capped to maximum of 20% of total order value.

Minimum manpower requirement for FMS/O&M is defined in the table mentioned below.

Sr. No.	Role	Penalty on non- availability of resource (Per resource per shift)
1	Program Manager	10000
2	Electrical Engineer	6000
3	HVAC Engineer	6000
4	DCIM Engineer	6000
5	Facility Management Services	4000
6	Electrical Technician (L1)	4000
7	HVAC Technician (L1)	4000
8	Fire men	2500
9	Helpers	1500
10	Security Staff including female staff	1500
11	Receptionist	1500

- The SI must propose "Manpower Requirement" as per format given in above table and shall always maintain above minimum but not limited to manpower on-site throughout the period of the contract. The Successful bidder has to ensure proper replacement for weekly off/absence/leave of any manpower resource without any

cost. Every resource must hand over its own work and status of his shift to subsequent resource in next shift.

- The resources shall be deployed by the SI to manage the Data Centre 24 *7 and maintain the service level requirements. Provisions of leave reserve, providing leaves and other facilities / perks shall be as per SI's prevailing policies / practices which shall be taken care by SI without any liability and/or financial implications on the part of the DST/GIL.
- Periodic training to entire Data Centre staff for procedures to be followed for applicable Certification shall be provided by the SI at no extra cost. The team deployment plan at the site during O&M shall be prepared by SI periodically and shall obtain approval from designated authority of the DST/GIL prior to its implementation. No resource shall be absent without prior permission of the designated authority of the DST/GIL.
- An absence of more than half an hour from the workplace, without having permission of Designated Authority of the DST/GIL shall be considered as absent for the shift.
- Operational Hardware, Software, and other resources: The SI shall deploy sufficient devices like desktops/laptop, printers, scanners, multi-function devices etc. for carrying out Data Centre operations and monitoring by its manpower resources deployed. All the required consumables shall be arranged by the SI at his own cost. The equipment deployed shall generally not be moved from the place of installation except for the purpose of repair/ maintenance with permission of the DST/GIL.
- Facility management services is the responsibility of the SI only.
- Total penalties excluding those defined in RFP Section 8.3: "Manpower availability service levels" shall not be higher than 20% of Agreed Quarterly Payment for respective quarter, whereas total penalty including penalties towards "Manpower availability service levels" shall not be higher than the Agreed Quarterly Payment for respective quarter.

9 Minimum Bill of Quantity

9.1 General Instructions

- Bidder should provide all prices as per the prescribed format under this chapter.
- All the prices are to be entered in Indian Rupees ONLY.
- Prices indicated in the schedules shall be inclusive of all taxes, Levies, duties etc. The prices should also include the seven-years support cost from final Go-live as per provided formats.
- It is mandatory to provide breakup of all Taxes, Duties and Levies wherever asked for.
- PURCHASER reserves the right to ask the Bidder to submit proof of payment against any of the taxes, duties, levies indicated.
- PURCHASER may consider all Taxes, Duties & Levies for Evaluation
- The Bidder needs to account for all Out-of-Pocket expenses due to Boarding, Lodging and other related items.
- Quantities mentioned in the commercial formats are indicative in number. PURCHASER may or may not procure above components. PURCHASER has the rights to delete any of the product/equipment before final implementation. Also, PURCHASER reserves the right to remove any of the line components (as per BOQ provided) and to change the location of final implementation of any product/equipment.
- During the project period, the Purchaser can increase or decrease the quantity by 30% of any product/equipment. The bidder must supply, implement and service the product/equipment/solution at the unit price mentioned in the bid. No extra cost will be given by purchaser.
- The Unit Rate as mentioned in the following formats may be used for 'Change Order' for respective items, if any. However, based on the market trends, PURCHASER, retains the right to negotiate this rate for future requirement. Bidder shall ensure that the future products supplied are of latest specifications as per the OEM roadmap.
- For evaluation of Commercial Bids, PURCHASER shall make appropriate assumptions to arrive at a common bid price for all the Bidders. This however shall have no co-relation with the Contract value or actual payment to be made to the Bidder.
- Bidder should refer to the RFP for details on the functional requirements and the benchmark specifications for the items mentioned in the Commercial formats.
- Line items mentioned in the Commercial Formats are for representation purpose and bidder may propose alternate equivalent product/ technology / solution (with proper justification). Bidders are required to suitably add line items / merge the cost components depending upon their proposed solution.
- Total Amount (INR) (without tax) -are inclusive of income tax, duties, fees, levies, charges, and commissions and excluding of GST as applicable under the relevant Laws of India.
- Total Amount (INR) (with tax) are inclusive of income tax, duties, fees, levies, charges, and commissions and inclusive of GST as applicable under the relevant Laws of India. Should there be a change in applicable taxes / levies, the actual taxes / levies on the date of billing would prevail.
- Qty. mentioned in financial bid format are minimum qty which will be considered for commercial evaluation purpose. However actual qty needs to be provided by SI as per their proposed solution considering overall scope

of project & SLA mentioned in the RFP documents and subsequent corrigenda. Further, purchaser will give the order as per the actual requirement at the time of the placing order. if bidders think he needs to add some extra item which is not defined in the tender as per his quoted solution, then he has to provide the same as proposed in total quoted cost only or at free of cost.

- All the software licenses included /supplied in the project will be perpetual. The support and maintenance (on-site), updates, subscription etc. of all the software will be for the total project period i.e., 7 years from the final go-live of the project.

9.2 Bill of Material – Greenfield GSDC Civil

Civil BOQ (Indicative)			
A. Civil & Interiors:			
Sl. No	Item Description	UOM	Qty
	Civil Infrastructure Work		
	(Pile Work, Structure Work, Earth Work, Concrete Work, reinforced Cement Concrete, Brick Work) AND		
	Other Civil, Interior and Exterior (Façade, Boundary wall, internal roads, landscape) Work		
1	(Stonework, Marble Work, Wood & PVC Work, Steel Work, Flooring, Roofing Work, Finishing, Dismantling & Demolishing(if any), Rainwater Harvesting, Road Work, Drainage, Aluminum, Water Proofing Work, Horticulture Work, Structural Glazing and Aluminum Composite Panel, False Ceiling, Raise Floor, Painting / POP, Ramps, / Steps, Fire Rated Doors & Partitions, Landscaping Work, Boundary Wall etc.)	LOT	1
	PLUMBING WORKS (INTERNAL)		
2	(Sewerage System, Soil Waste Vent Pipes & Fittings, Internal Water Supply, Sanitary Fixtures etc.)	LOT	1
	PLUMBING WORKS (EXTERNAL)		
3	(Sewerage System, Storm Water Drainage System, External Water Supply System, Tube well & Tube well Pumps, Internal & External Fire Hydrant System, Sanitary Fixtures, Pumping System, Suction & Delivery Pipes & Valves for Water Supply Pumps etc.)	LOT	1
	FIRE FIGHTING WORKS		
4	(Fire Fighting Pumps & Equipment, Internal & External Fire Hydrant System, Wet Riser & Sprinkler System, Fire Extinguishers etc.)	LOT	1

B. Modular Furniture:

Sl. No	Item Description	UOM	Qty
1	MODULAR FURNITURE	LOT	1
	(Furniture for entire building i.e., NOC, SOC, Innovation Centre, Helpdesk, Reception, customer, pantry, Security Cabin, Driver Rest Room, Waiting Room, Conference Room, Meeting Room, Managers Rooms, and other office areas.) Modular furniture includes Chairs, desks, walls, ceilings, floorings, Tables, Storage cabinets, acoustic paneling, doors, White Board, Notice Boards, Fire safe storage, Workstations, Personal computers, Water Filter, Sofas, Shoe Rack, Dustbins, etc.		

C. IGBC Rating Green Building Certificate:

Sl. No	Item Description	UOM	Qty
1	IGBC Rating Certification	No.	1

9.3 Bill of Material – Greenfield GSDC Non- IT**8Non-IT BOQ (Indicative but not Limited)****A. ELECTRICAL WORKS**

Sl. No	Item Description	UOM	QTY
1	Electrical wiring, MCCB & MCB/ELCB & ACB & DB, Cable Trays, Earthing, Lightning Protection System, HV & MV Cable Laying, HV & MV Cable joining & End termination, Civil Items, Light Fixtures, HT Switchgear, Transformers, HT Cable, Battery Charger, HT & LT Panels, Sandwich Bus duct, LT Cables & Cable Trays, Cable Terminations, Raceways, Busbar Trunking System, Power receptacles, Metering Cubicle, Cable Laying, Rubber mats etc.	LOT	1
2	HT Panel with 1 incomer and 1 outgoing and accessories	Set	2
3	Metering panel	Set	2
4	33KV Dry type Transformer (Capacity: 5 MVA)	Nos	2
5	Transformer Output panel	Nos	Bidder to Propose
6	HT Cable	Mtr	Bidder to Propose
7	BUS BAR trunk from Transformer-to-Transformer output panel and DG to DG Sync Panel with all accessories	Mtr	Bidder to Propose
8	KVM Switch*	Nos	Bidder to Propose

9	Indoor/Outdoor/Straight Through type heat shrinkable HT cable termination kit	Nos	Bidder to Propose
10	Diesel Generator (Data Centre continuous rated) 5 MVA	Set	2
11	HSD tank and accessories	Set	1
12	DG exhaust stack as manufacturer standard and compliance as per CPCB norms.	Lot	Bidder to Propose
13	Fuel piping with valves and accessories.	Set	Bidder to Propose
14	Fuel Pump with intrinsically safe meter having feature to connect to DCIM for real time fuel consumption monitoring	Set	Bidder to Propose
15	Cables as per cable schedule with terminations	Lot	1
16	UPS systems 600 KVA for Critical Load with Li-ion batteries for 30 minutes backup including battery Breakers and all required accessories.	Set	4
17	UPS systems 250 KVA for Non-Critical Load with Li-ion batteries for 30 minutes backup including battery Breakers and all required accessories.	Set	2
18	Main LT panel 1 (MLTP 1) with all accessories	Set	1
19	Main LT panel 2 (MLTP 2) with all accessories	Set	1
20	LT panel (SDC LPT 2) with all accessories	Set	2
21	DG Synchronizing Panel (IP 66) outdoor type	Set	1
22	Copper Earth pit	Nos	Bidder to Propose
23	GI Earth Pit	Nos	Bidder to Propose
24	Copper earth Strip with insulation	Mtr	Bidder to Propose
25	GI Earth Strip with insulation	Mtr	Bidder to Propose
26	Distribution Board (TPN)	Nos	Bidder to Propose
27	Distribution Board (SPN)	Nos	Bidder to Propose
28	Sub mains cabling	Mtr	Bidder to Propose
29	Light and Power point Wiring	Lot	1
30	Modular switch board with switches and sockets for wall	Nos	Bidder to Propose
31	Modular switch board with switches and sockets for Desk	Nos	Bidder to Propose
32	MS Conduit with accessories	Mtr	Bidder to Propose

33	PVC conduit with accessories	Mtr	Bidder to Propose
34	Flexible MS conduit	Mtr	Bidder to Propose
35	Flexible PVC conduit	Mtr	Bidder to Propose
36	Smart LED lights Rectangular	Nos	Bidder to Propose
37	Smart LED light Round	Nos	Bidder to Propose
38	Smart LED Lights Square 2'x2'	Nos	Bidder to Propose
39	Smart LED lights Square 1'x1'	Nos	Bidder to Propose
40	Occupancy sensor range 6-7 meter	Nos	Bidder to Propose
41	NEMA (IEC 309) connectors with breaker	Nos	Bidder to Propose
42	Track bus way (BBT) inside Data Centre with all accessories	Mtr	Bidder to Propose
43	Tap off box with accessories for track busway system	Nos	Bidder to Propose
44	UPS output panel with K13 isolation transformer for critical load	Nos	4
45	HVAC panel	Nos	Bidder to Propose
46	SVG Panel	Nos	Bidder to Propose
47	APF Panel	Nos	Bidder to Propose
48	Industrial Socket for PAC and CAC	Nos	Bidder to Propose
49	Equipotential grid on DC below raise floor by 25x3 copper strip with insulation	Mtr	Bidder to Propose
50	Perforated cable tray (factory made galvanized). Please add items for various size	Mtr	Bidder to Propose
51	MS raceway with cover. (Bidder to Propose the sizes)	Mtr	Bidder to Propose
52	Ladder tray. Please add items for various size	Mtr	Bidder to Propose
53	PVC raceway under PCC floor	Mtr	Bidder to Propose
54	Wall fans	Nos	Bidder to Propose
55	Ceiling Fan	Nos	Bidder to Propose
56	Single line diagram A2 size laminated	Nos	30
57	Exhaust fan (min 18-inch dia.) with gravity damper	Lot	1

58	Clamp meter AC, DC, with clamp side suitable to fit in 240 sq. mm single core cable	Nos	2
59	Intelligent PDU for racks	Nos	300
60	Server /Network Rack (800 X 1200 mm)	Nos	150
61	Data Centre Infrastructure Management System	Lot	1
62	Battery Impedance tester	Nos	1
63	Thermal Temperature gun	Nos	2
64	Round bottomed fire buckets-4 Nos	Lot	1
65	shock treatment chart	Nos	20
66	Danger boards Signage	Nos	50
67	Fixing of as built Single line drawing duly laminated / framed in A1 size.	Lot	1
68	cable route markers with necessary angle iron supports	Lot	1
69	Temporary lighting, temporary DB, Power Supply to all service vendor for DC construction till Go-live.	Lot	1
70	Solar Inverter with all cabling, software and required all accessories	Nos	2
71	Solar panel with frame structure and required all accessories	Nos	Bidder to Propose
72	Raise floor	Sq.ft	Bidder to Propose
73	False ceiling	Sq.ft	Bidder to Propose
74	Intelligent Data cabling system (Copper & Fiber)	lot	Bidder to Propose
75	Fiber runner	Lot	Bidder to Propose
76	Necessary passive cabling and accessories for existing EPABX system (Voice system)	Lot	Bidder to Propose
77	Passenger Lift (Elevator System)	Set	2
78	Material Lift (Elevator System)	Set	1

B. HVAC:

Sl. No	Item Description	UOM	QTY
1	In-row cooling system with all accessories for all Server farm area	Nos	58
2	Air cooled chiller system 570 TR with all sub-components and accessories	Set	2
3	SS Piping to connect chiller with In-row cooling with insulation and all accessories (pump, motor, flow meter, valve, etc.) required	Lot	Bidder to Propose
4	Wall mount Precision Air Handling Units for all IBMS room	Nos	Bidder to Propose

5	Precision Air Handling (CRAC) Units for all UPS & battery Rooms	Nos	Bidder to Propose
6	Dehumidifier water line piping with all accessories	Mtr	Bidder to Propose
7	VRF system for Other Areas	Nos	Bidder to Propose
8	Comfort AC indoor units	Nos	Bidder to Propose
9	Refrigerant piping for VRV/VRF system with insulation	Mtr	Bidder to Propose
10	Cold aisle/Hot aisle containment with door and accessories	Sq. Mtr	Bidder to Propose

C. SAFETY, SECURITY, SURVEILLANCE:

Sl. No	Item Description	UOM	QTY
1	Addressable fire alarm system with cabling & all accessories	Lot	1
2	Gas based suppression system for server floor and utility floors (1st , 2nd and 3rd floor)	Lot	1
3	Aspiration smoke detection system for Server floors (1st & 3rd floors)	Lot	1
4	PTZ Camera	Nos	Bidder to Propose
5	Bullet fixed camera	Nos	Bidder to Propose
6	Dome camera	Nos	Bidder to Propose
7	NVR for Close circuit television (CCTV)	Nos	Bidder to Propose
8	Video management software (VMS) for video analytics	Set	Bidder to Propose
9	55-inch Display screen (Integrated Security Room)	Nos	1
10	Door Access control system	Lot	1
11	Flab Barrier	Nos	Bidder to Propose
12	Swipe barrier	Nos	1
13	Full height turnstile	Nos	1
14	Baggage Screening System (X-Ray Based)	Nos	1
15	Metal detector Full height	Nos	1
16	Handheld metal detector	Nos	4
17	Fire extinguisher	Nos	50
18	Water leak detection system	Lot	1
19	Rodent repellent system	Lot	1
20	Steel fireproof Media storage 340 ltr.	Nos	3
21	Asset tracking system	Lot	1
22	Rack access control system	Lot	1

23	Rack humidity and temp sensor	Lot	1
24	Workstation for access control system	Nos	Bidder to Propose
25	Workstation for CCTV	Nos	Bidder to Propose
26	Workstation for DCIM	Nos	Bidder to Propose
27	Degausser (for CD, DVD, SATA/HDD drive with receipt printing)	Nos	Bidder to Propose
28	Mobile Computer Trolley with monitor, keyboard and mouse of desired specifications.	Set	2
29	Safety Gloves, Jacket, Boot, Goggles, Fireman's axe Etc.	Set	4
30	Evacuation Chart	Nos	20
31	Signage's	Nos	50
32	Self-illumination tape	Mtr	500
33	Portable oxygen cylinder with mask	Nos	4
34	LED torch (Industrial type)	Nos	4
35	Portable emergency light	Nos	4
36	Visitor management system with all hardware such as Photo I card printer, Computer, camera and software etc.	Lot	1
37	Fire Hydrant and water mist System with all subcomponents like Pumps, storage Tanks and accessories (for support areas).	Lot	1
38	Public Address system	Set	1
39	Data safe	Nos	2

D. NOC, SOC & Innovation Centre Infrastructure:

Sl. No	Item Description	UOM	QTY
1	Video Wall for NOC & SOC room (SITC of 7x2 Matrix Video Wall System with Controllers, Cables (Fiber Connectivity) and accessories complete in all respect & Podium system)	Nos	2
2	Video Wall for DCIM room SITC of 4x2 Matrix Video Wall System with Controllers, Cables (Fiber Connectivity) and accessories complete in all respect & Podium system	Nos	1
3	85" LED display on Innovation Centre wall (LH, RH and center side)	Nos	4

E. MISCELLANEOUS/FMS Items(Indicative but not limited):

Sl. No	Item Description	UOM	QTY
1	Hand operated forklift	Nos	4
2	Paper shredder	Nos	4
3	Water filter with RO facility	Nos	5
4	Water dispenser	Nos	5

5	Shoes stand 20 pair shoe capacity	Nos	4
6	first aid box	Nos	3
7	DG foundation as per OEM specification	Cu Mtr	Bidder to Propose
8	DG shed	Lot	1
9	Wire Mesh partition	Sq. Mtr	Bidder to Propose
10	Fixed Iron Grill partition	Kg	Bidder to Propose
11	Key Box	Nos	4
12	Shoe Shiner (dual shade electrically motor operated with sensor)	Nos	4
13	Dust bin (Stainless steel), Tile puller (3 cup suction type), Vacuum Cleaner Industrial type, White board, pin up Notice board, etc. but not limited	Lot	1
14	Hygiene including the maintenance and consumables i.e., stationery and toiletry	Lot	1
15	Refrigerator 300 Ltr.	Nos	4
16	Tea/ Coffee Vending machine	Nos	4
17	Motorized Heavy Duty Trolley, Boom Barrier, RFID System etc.	Lot	1

F. Installation, commissioning & Project management:

Sl. No	Item Description	UOM	QTY
1	Transport charges, loading, unloading, lifting, shifting and Installation charges of the project	Lot	1
2	Testing & commissioning charges of the project	Lot	1
3	Project management charges including manpower deployment charges for the project execution	Lot	1
4	Project Handover Documentation charges	Lot	1

G. Certification Cost:

1	Uptime Tier III Certification of Design of the Data Centre	Lot	1
2	Uptime Tier III Certification of constructed Facility for all areas of the Data Centre Facility to be constructed under this contract	Lot	1
3	Uptime Tier III Certification of operational sustainability of the Data Centre	Lot	1

10 Roles & Responsibilities of Stakeholders

The roles of the stakeholders shall change over a period as the project will evolve from design to implementation and enter the operations phase. Stakeholders' responsibilities, illustrative organizational structure for the design & implementation phase, operational phase is given below:

Various Stakeholders identified for the Project are as below:

PURCHASER PURCHASER and its designated agencies

PMC Project Management Consultant

SI Systems Integrator

Responsibilities are shown using RACI Matrix which splits project tasks down to four participatory responsibility types that are then assigned to different Stakeholders in the project.

R (Responsible) - Those who do work to achieve the task

A (Accountable) - The Stakeholder that ultimately accountable for the task

C (Consulted) - One who is consulted for opinions and recommendations (2-way communication)

I (Informed) - Those who are kept up to date on progress (1-way communication)

#	Activity	SI	PMC	PURCHASER
1.	Signing of the Contract	R	C	R
2.	Inception Report	R	C	I
3.	Site Survey for the finalization of proposed solution	A, R	C	I
4.	Sharing of Project Plan & Design Document	A, R	C	I
5.	Validation of Project Plan & Design Document	I	R	A
6.	Approval of Project Plan & Design Document	I	C	A, R
7.	Obtaining all the Statutory approval from respective authority	A, R	I	I
8.	Completion of all the Civil construction works with all amenities	R	C	A
9.	Completion of all the Procurement, Installation & Commissioning of IT and Non-IT Devices	R	C	A
10.	Provide Monitoring and Administrative Support as required for the Project	I	C, R	A, R
11.	Periodic updates for progress of Implementation works (weekly / monthly / quarterly reports)	A, R	C	I
12.	Review of Reports and Progress update	I	R	A
13.	Project Management Activities as per industry best practices	R	R	A
14.	Preparation of Mitigation Plan	R	C	A
15.	Dispute Resolution and Support Process	I	C	A, R

#	Activity	SI	PMC	PURCHASER
16.	Completion of Data and Application Migration	R	C	A
17.	Preparation of Test Plan and Schedule for Acceptance Test	A, R	C	I
18.	Conduct of Acceptance Test	R	R	C
19.	Recommendation of Acceptance (PAT & FAT)	I	A	R
20.	Release of Acceptance Certificate	I	C	A, R
21.	Recommendation of Payments as per agreed milestones	-	A, R	C
22.	Release of Payments after recommendation	I	C	A, R
23.	Operations & Maintenance of Complete Solution	A, R	-	C
24.	SLA Verification and Payment Recommendation	I	-	C
25.	Release of QGR payment	I	-	C
26.	Initiation of Change Requests (Operational or functional)	I	-	C
27.	Processing and approval of Change Requests (Operational or functional)	I	-	C

Note: All decisions will be taken by Purchaser, and they will be abided by all the stakeholders in the above matrix.

Indicative Reporting Mechanism

Activity	Daily	Weekly	Fortnightly	Monthly	Quarterly
Project Review Meetings by GIL			√	√	√
Weekly status review meetings		√			
Daily team review meetings	√				
SLA review report		√			
Project plan analysis		√			
Issue matrix		√			
Risk matrix			√		

11 Annexures

Annexure-A: Pre-qualification Compliance Sheet

To be declared in the bidder letter head

Sr No	Eligibility Criteria	Documents to be submitted	Compliance (Y/N)	Reference of Supporting Documents in the Bid with page numbers
1	Legal Entity The bidder should be A company registered under Indian Companies Act, 1956/2013 OR A partnership firm registered under Indian Partnership Act, 1932. OR Partnership firm register under LLP Act, 2008 since last 5 years as on 31st March 2022. Note: Consortium is not allowed under this Tender.	Scan Copy of Valid Registration Certificate OR Copy of Certificates of Incorporation		
2	The Bidder must have minimum average turnover of Rs. 2000 crore, in any 3 of last 04 financial year(s) i.e., FY 2018-19, FY 2019-20, FY 2020-21 and FY 2021-22 as on 31st March 2022.	CA certified and audited Balance Sheet and Profit & Loss statement for any three of last four audited financial years (2018-19, 2019- 20, 2020-21, 2021-22). CA certificate mentioning turnover from the said business.		
3	The Bidder should have positive Net-worth in any 3 of last 04 financial year(s) i.e., FY 2018-19, FY 2019-20, FY 2020-21 and FY 2021-22 as on 31st March 2022.	CA certified and audited Balance Sheet and Profit & Loss statement for any three of last four audited financial years (2018-19, 2019- 20, 2020-21, 2021-22). CA certificate mentioning turnover from the said business.		
4	The Bidder shall be national /international level company having relevant experience in Building constructions for last 10 years.	1. Bidder shall submit certificate of incorporation AND 2. Completion certificates/ Part completion certificates from clients mentioning the periods OR		

		The self-certification of the applicant is also permitted accompanied by certified copy of work order/document by competent authority of Bidders on its letterhead.		
5	The bidder should have experience of Designing, constructing and commissioning of minimum 1 certified Uptime Institute Tier III or TIA-942 Rated III (Design Certified) Data Centre project of having minimum 100+ racks in single project in last 7 years as on publishing date of this tender.	FOR Data Centre built for Client 1. Copy of the Work order/Purchase Order AND Certificate of completion of the work from client or phase wise completion certificate from client. 2. Uptime/TIA Certification		
6	During the last 07 years, the Bidder must have built, implemented/completed and operated Data Centre projects for Central / State Governments, PSUs, Banking & Financial Institutions, Telecom and IT companies in India which includes (i) Turnkey Data Centre/ Tier-III/IV Data Centre consisting of building construction, along with installation, commissioning of Electrical Distribution & Lighting, Electrical Substation, DG sets with HSD tank, Precision AC/ Chiller Plant, UPS System, Fire Detection & suppression system, Access Control, Lifts and CCTV, BMS, VESDA, Rodent Repellent System, Civil and Interiors etc. AND (ii) Operation & Maintenance including FMS of the Data Centre as on last date of Bid submission, that meets the below mentioned requirement. a. Single order of value of INR 350 Crore or more. OR b. Two orders each having minimum value of INR 200 Crore or more. OR c. Three orders each having minimum value of INR 150 Crore or more	1. Copy of work order(s) / Purchase Order and Contract Agreement AND Certificate of timely completion of the work from client or phase wise completion certificate from client. 2. Go Live or FAT certificates issued by the customer		

7	The bidder should be registered or should deploy Principal Architect registered with council of Architect, and registration / membership should be valid as on date, having 7+ years of experience.	Copy of registration certificate and Declaration on Bidder's letterhead stating compliance of this condition.		
8	The bidder must have on its roll at least 150 Professionals in the Civil Construction domain, Data Centre Electrical, Mechanical, Structural drawing, Cooling, building architecture etc. and other utility Services and having the prior experience in providing the Data Centre Infrastructure maintenance services as on bid submission date. Bidder Must have at least following technical manpower strength on its payroll: (i) At least 30 number of engineers on its payroll having 10+ years of experience in relevant fields (10 should be Civil engineer, 10 should be electrical engineer, 10 should be mechanical engineer having B.E/B. Tech degree) (ii) At least 1 qualified professional having relevant Degree certificate for his position in, • Principal structural Consultants (BE. Civil.) having 10+ years of relevant experience. • Principal Electrical consultants (BE. Ele.) having 10+ years of relevant experience. • Principal Mechanical Consultant (BE. Mech.) having 10+ years of relevant experience • Principal Plumbing Consultant (BE. Civil.) having 10+ years of relevant experience. • Principal Green Building Consultants (BE. Civil.) having 10+ years of relevant experience. • Quality Assurance Manager (BE. Civil.) having 10+ years of relevant experience. (iii) At least 2 no. of Architects (B. Arch.) having 10+ years of relevant experience on its payroll (iv) At least 05 resources should be CDCP/CDCS/CDCE certified. (v) At least One Data Centre Design Consultants having ATD (Accredited Tier Designer)	HR certificate on company's letterhead stating the points with employee Name, employee ID, Qualification, Certification to be submitted along with copy of the relevant certificate		

	certification from Uptime Institute/ Equivalent TIA certification (vi) At least 05 Project management professional with PMP or Prince-2 certified			
9	The Bidder should not have been blacklisted by any Government and Public Sector Unit during the last 3 years.	Bidder shall submit declaration on their letterhead in this regard.		
10	The Bidder should have a local presence of Office in Gujarat and level 3 support (highest escalation) locally in India. And Bidder should be setting up one Project site office in Gandhinagar for day-to-day Project Management & Monitoring activity during entire project life cycle (till Go Live phase)	Bidder shall submit declaration on their letterhead in this regard. In case of no office in Gujarat on bidding date, Bidder needs to submit undertaking if after getting award of order, he shall setup Support center in Gujarat in 30 days' time.		
11	Tax registration and clearance The bidder should furnish following information 1. COI 2. MOA & AOA 3. GST No Income Tax / Pan Number.	Valid documentary proof of: 1. Memorandum of Association & Articles of Association 2. GST registration document. 3. Income Tax registration / PAN number		
12	The Bidder must have followed Certificate at the time of bidding, a. ISO 9001:2015 b. ISO/IEC 20000 c. ISO/IEC 27001:2013	Copy of Valid Certificates		
13	Mandatory Undertaking/Declaration Bidder should: a) not be insolvent, in receivership, bankrupt or being wound up, not have its affairs administered by a court or a judicial officer, not have its business activities suspended. b) not have a conflict of interest in the procurement in question as specified in the bidding document.	A Declaration letter as per Annexure-B1: Self-Declaration		
14	Bidder from a country which shares a land border with India will be eligible to bid in this tender only if they are registered with Competent Authority as per OM No. 6/18/2019-PPD dated 23rd July 2020 issued by Department of Expenditure, GoI.	Self-certification from bidder as per Annexure H.		

Annexure-B: Bidder's Annual Turnover**Annual Turnover calculation**

(On the Applicant Statutory Auditors Letterhead)

Date:

This is to certify that we M/s----- are the statutory Auditors of M/s-----
 -- and that the below mentioned calculations are true as per the Audited Financial Statements of
 M/s----- for the below mentioned years. (Any three of last four audited financial years)

Sr. No.	Annual Sales Turnover Calculation	2018-19	2019-20	2020-21	2021-22
1	Total Sales as per the P/L A/c (A)				
2	Less: Custom and/or Excise Duty if included in total Sales as per P/L in Total Sales as per P/L A/C (B)				
3	Less: Sales Tax if included in Total Sales as per P/L A/c (C)				
4	Less: Any other statutory taxes if included in total Sales as per P/L A/C (D)				
5	Less: Any other income from sources other than the normal business source if included in Total Sales as per P/L A/c (E)				
6	Annual Turnover (F) =(A)-(B)-(C)-(D)-(E)				

The Bidder is required to enclose the audit financial statements for any three of these four years.

Company Secretary / Statutory Auditor

Name of Signatory:

Bidder Company Name:

Date:

Place:

Annexure-C: Bidder's Net worth

Net Worth calculation

(On Applicant's Statutory Auditor's letterhead)

Date:

This is to certify that we M/s----- are the statutory Auditors of M/s----- and that the below mentioned calculations are true as per the Audited Financial Statements of M/s----- for the below mentioned years. (Any three of last four audited financial years)

S No.	Annual Sales Turnover Calculation	2018-19	2019-20	2020-21	2021-22
1	Paid up Share Capital as per B/S (A)				
2	Add: Free Reserves as per B/S (B)				
3	Less: Deferred Payment if any as per B/S (C)				
4	Amount of probable impact on reserves due to audit qualification (D)				
5	Net Worth (F) =(A)+(B)-(C)-(D)				
6	Annual Turnover (F) =(A)-(B)-(C)-(D)-(E)				

Note: Please attach audited Balance Sheets and IT return statements to confirming the figures mentioned in columns.

Company Secretary / Statutory Auditor

Name of Signatory:

Bidder Company Name:

Date:

Annexure-D: Citations Format

As per the format below, the bidder/s should provide information for each project on similar assignments required for pre-qualification and technical evaluation criteria.

Sl. No.	Item	Detail
General Information		
1.	Customer Name/ Government Department	
2.	Details of Contact Person - Name: - Designation: - Email: - Phone: & Fax: - Mailing Address:	
Project Details		
3.	Name of the project	
4.	Government/Non-government	
5.	Start Date/End Date	
6.	Current Status	(Work in Progress (PAT/FAT/Go-Live) OR completed)
7.	Contract Tenure	
8.	Area of the Data Centre	
9.	Effort involved in Payroll person-months in the complete project	
10	Order Value of the project (in Crores)	
11.	Please provide copies of Work Order or Certificate of Completion for completed projects from the customer	
12.		
More than one same table content may be provided for more than one project detail.		

Annexure-E: Undertaking on litigation

Undertaking on litigation(s)

This is to certify that << COMPANY NAME >> is not involved in any major litigation that may have an impact of affecting or compromising the delivery of services as required under this RFP.

Company Secretary / Authorized Signatory

Name of Signatory:

Bidder Company Name:

Date:

Place:

Annexure-F: Undertaking of Authenticity

To:

(Name and address of Procuring Office)

Sub: Undertaking of Authenticity for all Equipment Supplied

Ref: GIL_____ dated 00.00.2022

1. With reference to the equipment being quoted to you vide our proposal No: _____, we hereby confirm that all the components /parts /assembly / software etc. used in the equipment to be supplied shall be original new components / parts / assembly / software only, from respective OEMs of the Equipment/products and that no refurbished / duplicate / second hand components /parts/ assembly / software shall be supplied or shall be used. We also undertake to produce certificate from the Original Equipment Manufacturers (if required by you) in support of the above statement at the time of delivery / installation
2. We also confirm that in respect of licensed operating systems and other software utilities to be supplied, the same will be procured from authorized sources and supplied with Authorized License Certificate (i.e., Product keys on Certification of Authenticity in case of Microsoft Windows Operating System)
3. In case of default and the DST/GIL finds that the above conditions are not complied with, we agree to take back the equipment supplied and return the money paid by you, in full within seven days of intimation of the same by the DST/GIL, without demur or any reference to a third party and without prejudice to any remedies the DST/GIL may deem fit.
4. In case of default and we are unable to comply with above at the time of delivery or during installation, of all equipment already billed, we agree to take back the equipment without demur, if already supplied and return the money if any paid to us by you in this regard.
5. We also take full responsibility of both parts & Service SLA as per the content even if there is any defect by our authorized Service Center / Reseller / SI etc.

Dated this day of.....2022

(Signature)

(Name)

(In the capacity of)

Duly authorized to sign Bid for and on behalf of

Annexure-G: Undertaking on Not Being Blacklisted

Undertaking on Not Being Blacklisted

This is to certify that << COMPANY NAME >> is not blacklisted by the Government of Gujarat or any of its agencies for any reasons whatsoever and not blacklisted by Central / any other State/UT Government or its agencies for indulging in corrupt or fraudulent practices or for indulging in unfair trade practices and not backed out from executing the work after award of the work as on the tender submission date.

Company Secretary / Authorized Signatory

Name of Signatory:

Bidder Company Name:

Date:

Place:

Annexure-H: Undertaking from bidder & OEM on country which shares a land border with India.

On letterhead of Bidder

Sub: Undertaking as per Office Memorandum No.: F. No.6/18/2019-PPD dated 23.07.2020 published by Ministry of Finance, Dept. of Expenditure, Public Procurement division

Ref: Bid Number: _____

I have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India. I certify that we as a bidder and quoted product from following OEMs are not from such a country or, if from such a country, these quoted products OEM has been registered with competent authority. I hereby certify that these quoted product & its OEM fulfills all requirements in this regard and is eligible to be considered for procurement for Bid number_____.

No	Item Category	Quoted Make & Make

In case I'm supplying material from a country which shares a land border with India, I will provide evidence for valid registration by the competent authority, otherwise GIL/End user Dept. reserves the right to take legal action on us.

(Signature)

Authorized Signatory of M/s <Name of Company>

On letterhead of OEM

**Sub : Undertaking as per Office Memorandum No.: F. No.6/18/2019-PPD dated 23.07.2020
published by Ministry of Finance, Dept. of Expenditure, Public Procurement division**

Ref: Bid Number: _____

Dear Sir,

I have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India. I certify that our quoted product and our company are not from such a country, or if from such a country, our quoted product and our company have been registered with competent authority. I hereby certify that these quoted product and our company fulfill all requirements in this regard and is eligible to be considered for procurement for Bid number_____.

No.	Item Category	Quoted Make & Model

In case I'm supplying material from a country which shares a land border with India, I will provide evidence for valid registration by the competent authority; otherwise, GIL/End user Dept. reserves the right to take legal action on us.

(Signature)

Authorized Signatory of **M/s <<Name of Company>>**

Annexure-I: Local Presence of Bidder

S No.	Location	Full Address	Phone/ Fax	GST No.	Operational since

Yours sincerely,

(Seal & Signature of the Authorized signatory of the System Integrator)

Name:

Place:

Designation:

Date:

Annexure-J: Bidder's Details

1.	Name of Bidder			
2.	Name of Contact Person			
3.	Registered Office Address			
4.	Address of the bidder from which bid is submitted			
5.	Year of Establishment			
6.	Type of Firm	Public Limited	Private Limited	Others
	Put Tick (☐) mark	☐	☐	☐
7.	Telephone Number(s)			
8.	Email Address/ Website	Email:	Web - Site:	
9.	Fax No.			
10.	Mobile/	Mobile:		
11.	Service Tax No.			
12.	VAT/CST No:			
13.	PAN NO:			
14.	Area of Specialization			

Annexure-K: Bid Form (Technical Bid)

[On Company's letter head]
(To be included in Technical Bid Proposal)

Date: _____ To:
< Address of

GIL >

Dear Sir,

Ref: _____

1. We have examined the above RFP, the receipt of which is hereby duly acknowledged and subsequent Pre-Bid clarifications/ modifications / revisions, if any, furnished by the DST/GIL and we offer to Design, supply, Install, test, commission and support the desired equipment detailed in this RFP. We shall abide by the terms and conditions spelt out in the RFP. We shall participate and submit the commercial Bid through online Portal to be conducted by the DST/GIL authorized SI, on the date advised to us.
2. While submitting this Bid, we certify that:
 - The undersigned is authorized to sign on behalf of the SI and the necessary support document delegating this authority is enclosed to this letter.
 - We declare that we are not in contravention of conflict-of-interest obligation mentioned in this RFP.
 - Prices submitted by us have been arrived at without agreement with any other Bidder of this RFP for the purpose of restricting competition.
 - The prices submitted by us have not been disclosed and will not be disclosed to any other Bidder responding to this RFP.
 - We have not induced or attempted to induce any other Bidder to submit or not to submit a Bid for restricting competition.
 - The rate quoted in the price Bids are as per the RFP and subsequent pre-Bid clarifications/ modifications/ revisions furnished by the DST/GIL, without any exception.
3. If our offer is accepted, we undertake to complete the formalities for design, supply, installation, testing and commissioning of the equipment and supporting facility and operational support within the period specified in this document.
4. We agree to abide by all the Bid terms and conditions, contents of Penalties & SLA as defined in this RFP document and the rates quoted therein for the orders awarded by the DST/GIL up to the period prescribed in the Bid, which shall remain binding upon us.
5. Until a formal contract is prepared and executed, this Bid, together with your written acceptance thereof and your notification of award, shall constitute a binding Contract between us.
6. We undertake that in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988".
7. We undertake that we will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favor, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the DST/GIL, connected directly or indirectly with the bidding process, or to any person, organization or third party related to

the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.

8. We undertake that we will not resort to canvassing with any official of the DST/GIL, connected directly or indirectly with the bidding process to derive any undue advantage. We also understand that any violation in this regard, will result in disqualification of bidder from further bidding process.
9. We certify that we have not made any changes in the contents of the RFP document read with its amendments/clarifications provided by the DST/GIL submitted by us in our Bid document.
10. It is further certified that the contents of our Bid are factually correct. We also accept that in the event of any information / data / particulars proving to be incorrect, the DST/GIL will have the right to disqualify us from the Bid.
11. We understand that you are not bound to accept the lowest or any Bid you may receive, and you may reject all or any Bid without assigning any reason or giving any explanation whatsoever.
12. We hereby undertake that our name does not appear in any "Caution" list of GOG / GOI or any other regulatory body for outsourcing activity.
13. If our Bid is accepted, we undertake to enter into and execute at our cost, when called upon by the DST/GIL to do so, a contract in the prescribed form and we shall be jointly and severally responsible for the due performance of the contract.
14. The name(s) of successful Bidder to whom the contract is finally awarded after the completion of bidding process shall be displayed on the website of the DST/GIL and/or communicated to the successful Bidder(s).
15. The Technical commercial bidding process will be through the L1 (Lower Cost Base Selection) process to be conducted by the DST/GIL or a company authorized by the DST/GIL. We understand that our authorized representative who would participate in the commercial bid opening process would be possessing a valid digital certificate for the purpose.
16. We hereby undertake and agree to abide by all the terms and conditions stipulated by the DST/GIL in the RFP document.

Dated thisday of.....2022

(Signature)

(Name)

(In the capacity of)

Duly authorized to sign Bid for and on behalf of

Seal of the company.

Annexure-L: Compliance sheet for Technical Specification & Functional Requirement for Non-IT Components

Bidders must comply with all the requirements as mentioned in RFP vol.2 Section 10 and Section 11 Technical Specification and Function Requirement for Non-IT Components (Minimum Requirement) and must submit their response in column "**Compliance**" as Yes or No or deviation only, any other statement shall be treated as non-compliance. All technical specifications should be included by the bidder in the format provided below; failure to do so will result in disqualification. Any consideration of excluding any parameters listed in the Technical Specification will result in disqualification. The order in which each supporting material is listed should match that within section 10.

False Ceiling						
Sr. No.	Parameter	Minimum Requirement	Make	Model	Compliance (Yes/No)	Remark
1						
2						
N						

Annexure-M: Format of Technical Proposal Document

BID No.: -----

Date:

To,

Deputy Director (IT)

Gujarat Informatics Limited

Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,

Sector 10A, Gandhinagar, Gujarat 382010

Subject: Submission of Technical proposal for "System Integrator for implementation (Design, Build, Commission and O&M) of Greenfield State Data Centre".

Dear Sir/Madam,

We, the undersigned, offer to provide Systems Implementation solutions to DST/GIL Ltd on <Name of the Systems Implementation engagement> with your Request for Proposal dated <insert date> and our Proposal. We are hereby submitting our Proposal, which includes this technical bid and the Financial Bid separately as per the e-forms.

We hereby declare that all the information and statements made in this technical bid are true and accept that any misinterpretation contained in it may lead to our disqualification.

We undertake, if our Proposal is accepted, to initiate the Implementation services related to the assignment not later than the date indicated in Data sheet.

We agree to abide by all the terms and conditions of the RFP document. We would hold the terms of our bid valid for 180 days as stipulated in the RFP document.

We hereby declare that we are not insolvent, in receivership, bankrupt or being wound up, our affairs are not being administered by a court or a judicial officer, our business activities have not been suspended and we are not the subject of legal proceedings for any of the foregoing.

We understand you are not bound to accept any Proposal you receive.

Yours sincerely,

(Seal & Signature of the Authorized signatory of the System Integrator)

Name:

Place:

Designation:

Date:

Annexure-N: Proposal Covering Letter

PROPOSAL COVERING LETTER

To,
Deputy Director (IT)
Gujarat Informatics Limited
Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,
Sector 10A, Gandhinagar, Gujarat 382010

Sir,

Ref: Request for Proposal (RFP): Selection of System Integrator for implementation (Design, Build, Commission and O&M) of Greenfield State Data Centre

Have examined the RFP, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to provide best of quality goods and professional services as required and outlined in the RFP for the Selection of System Integrator for implementation (Design, Build, Commission and O&M) of Greenfield State Data Centre to meet such requirements and provide such services as required are set out in the RFP.

We attach hereto the technical response as required by the RFP, which constitutes our proposal. We undertake that, if our proposal is accepted, to adhere to the Project Timeline and Service Levels given in the RFP for various activities.

If our proposal is accepted, we will obtain a performance bank guarantee in the given format in the RFP document issued by a Scheduled Commercial Bank in India, acceptable to DST/GIL, for a sum equivalent to 10% of the total price as quoted in our financial proposal for the due performance of the contract.

We hereby declare that in case the contract is awarded to us, we will submit Advance Bank Guarantee (ABG) equivalent to 5% of total project CAPEX as quoted in the commercial bid in the form prescribed in the tender.

We agree for unconditional acceptance of all the terms and conditions set out in the RFP document and also agree to abide by this tender response for a period of 180 days from the bid opening date and it shall remain binding upon us with full force and virtue, until within this period a formal contract is prepared and executed, this tender response, together with your written acceptance thereof in your notification of award, shall constitute a binding contract between us and DST/GIL.

We confirm that the information contained in this proposal or any part thereof, including its exhibits, schedules, and other documents and instruments delivered or to be delivered to DST/GIL is true, accurate, and complete. This proposal includes all information necessary to ensure that the statements therein do not in whole or in part mislead DST/GIL as to any material fact.

We agree that you are not bound to accept the lowest or any tender response you may receive. We also agree that you reserve the right in absolute sense to reject all or any of the products / services specified in the tender response.

It is hereby confirmed that we are entitled to act on behalf of our corporation/ company/ firm / organization and empowered to sign this document as well as such relevant documents, which may be required in this connection.

Dated this _____ Day of 2022.

(Signature)

(In the capacity of)

Having the Power of Attorney & duly authorized to sign the Tender Response for and on behalf of:

(Name and Address of Company)

Seal/Stamp of Bidder

Witness Signature:

Witness Name:

Witness Address:

CERTIFICATE AS TO AUTHORISED SIGNATORIES

I, certify that I am of the, and that who signed the above Bid is authorized to bind the corporation by authority of its governing body.

Annexure-O: Format for EMD Bank Guarantee

To:

Dear Sir,

EMD BANK GUARANTEE for Setting up a Tier III Data Centre at Gandhinagar on Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer model for DST/GIL.

BID NO: _____ DATED 00.00.2022

WHEREAS GIL, having its Corporate Office at Block no- 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector- 10 A, Gandhinagar-382010, Gujarat in India has invited Request for Proposal for Design, Build, Supply, Installation, Testing, Commissioning, Maintenance Operation, and Transfer a Tier III Data Centre for DST/GIL and such services as are set out in the DST/GIL, Request for Proposal **BID NO: _____ DATED 00.00.2022.**

1. It is one of the terms of said Request for Proposal that the Bidder shall furnish a Bank Guarantee for a sum of Rs. _____/-(Rupees _____ Only) as Earnest Money Deposit.
2. M/s. _____, (hereinafter called as Bidder, who are our constituents intends to submit their Bid for the said work and have requested us to furnish guarantee in respect of the said sum of Rs. _____/- (Rupees _____ Only)
3. NOW THIS GUARANTEE WITNESSETH THAT
We _____ (Bank) do hereby agree with and undertake to the DST/GIL, their Successors, assigns that in the event of the DST/GIL coming to the conclusion that the Bidder has not performed their obligations under the said conditions of the RFP or have committed a breach thereof, which conclusion shall be binding on us as well as the said Bidder, we shall on demand by the DST/GIL, pay without demur to the DST/GIL, a sum of Rs. _____/-(Rupees _____ Only) that may be demanded by DST/GIL. Our guarantee shall be treated as equivalent to the Earnest Money Deposit for the due performance of the obligations of the Bidder under the said conditions, provided, however, that our liability against such sum shall not exceed the sum of Rs. _____/- (Rupees _____ Only).
4. We also agree to undertake to and confirm that the sum not exceeding Rs. _____/- (Rupees _____ Only) as aforesaid shall be paid by us without any demur or protest, merely on demand from the DST/GIL on receipt of a notice in writing stating the amount is due to them and we shall not ask for any further proof or evidence and the notice from the DST/GIL shall be conclusive and binding on us and shall not be questioned by us in any respect or manner whatsoever. We undertake to pay the amount claimed by the DST/GIL within 24 hours from the date of receipt of the notice as aforesaid. We confirm that our obligation to the DST/GIL under this guarantee shall be independent of the agreement or agreements or other understandings between the DST/GIL and the Bidder. This guarantee shall not be revoked by us without prior consent in writing of the DST/GIL.
5. We hereby further agree that –

Any forbearance or commission on the part of the DST/GIL in enforcing the conditions of the said agreement or in compliance with any of the terms and conditions stipulated in the said Bid and/or hereunder or granting of any time or showing of any indulgence by the DST/GIL to the Bidder or any other matter in connection therewith shall not discharge us in any way our obligation under this guarantee. This guarantee shall be discharged only by the performance of the Bidder of their obligations and in the event of their failure to do so, by payment to us of the sum not exceeding Rs.____/- (Rupees____Only)

- a) Our liability under these presents shall not exceed the sum of Rs._____-/- (Rupees_____Only)
- b) Our liability under this agreement shall not be affected by any infirmity or irregularity on the part of our said constituents in tendering for the said work or their obligations there under or by dissolution or change in the constitution of our said constituents.
- c) This guarantee shall remain in force up to 180 days provided that if so desired by the DST/GIL, this guarantee shall be renewed for a further period as may be indicated by them on the same terms and conditions as contained herein.
- d) Our liability under this presents will terminate unless these presents are renewed as provided herein up to 180 days or on the day when our said constituents comply with their obligations, as to which a certificate in writing by the DST/GIL alone is the conclusive proof, whichever date is later.
- e) Unless a claim or suit or action is filed against us within six months from that date or any extended period, all the rights of the DST/GIL against us under this guarantee shall be forfeited and we shall be released and discharged from all our obligations and liabilities hereunder.

Notwithstanding anything contained hereinabove:

- (a) Our liability under this Bank Guarantee shall not exceed Rs...../- (Rupees only)
- (b) This Bank Guarantee shall be valid up to
- (c) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before

Yours faithfully,

For and on behalf of

Authorized official.

(Note: This guarantee will require stamp duty as applicable in the State where it is executed and shall be signed by the official(s) whose signature and authority shall be verified)

Annexure-P: Performance Bank Guarantee Format

PERFORMANCE BANK GUARANTEE FORMAT

(TO BE STAMPED AS AN AGREEMENT)

THIS PERFORMANCE BANK GUARANTEE AGREEMENT executed at this..... day of

2022 by (Name of the Bank) having its Registered Office atand its Branch at(hereinafter referred to as "the Guarantor", which expression shall, unless it be repugnant to the subject, meaning or context thereof, be deemed to mean and include its successors and permitted assigns) **IN FAVOUR OF** GIL, having its office at Block no- 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector- 10 A, Gandhinagar-382010, Gujarat (**procuring office address**), hereinafter referred to as "**GIL**" which expression shall, unless repugnant to the subject, context or meaning thereof, be deemed to mean and include its successors and assigns).

WHEREAS M/s _____, incorporated under _____ Act having its registered office at _____ and principal place of business at _____ (hereinafter referred to as "**SI**" which expression shall unless repugnant to the context or meaning thereof shall include its successor, executor & assigns) has agreed to Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer a Tier III Data Centre at Gandhinagar, Gujarat for DST/GIL (hereinafter referred to as "**Services**") to DST/GIL in accordance with the Request for Proposal (RFP) _____ dated 00.00.2022.

WHEREAS, DST/GIL has agreed to avail the above Services from the SI for a period of _____ year(s).

WHEREAS, in accordance with terms and conditions of the RFP/Purchase order/Agreement dated....., SI is required to furnish a Bank Guarantee for a sum of Rs. _____/- (Rupees _____ only) for due performance of the obligations of the SI in providing the Services, in accordance with the RFP/Purchase order/Agreement guaranteeing payment of the said amount of Rs. _____/- (Rupees _____ only) to DST/GIL, if SI fails to fulfill its obligations as agreed in RFP/Agreement.

WHEREAS the Bank Guarantee is required to be valid for a total period of _____ months and in the event of failure, on the part of SI, to fulfill any of its commitments / obligations under the RFP/Agreement, DST/GIL shall be entitled to invoke the Guarantee.

AND WHEREAS, the Guarantor, at the request of SI, agreed to issue, on behalf of SI, Guarantee as above, for an amount of Rs. _____/- (Rupees _____ only).

NOW THIS GUARANTEE WITNESSETH THAT

1. In consideration of DST/GIL having agreed to entrust the SI for rendering Services as mentioned in the RFP, we, the Guarantors, hereby unconditionally and irrevocably guarantee that SI shall fulfill its commitments and obligations in respect of providing the Services as mentioned in the RFP/Agreement and in the event of SI failing to perform / fulfill its commitments / obligations in respect of providing Services as mentioned in the RFP/Agreement, we (the Guarantor) shall on demand(s), from time to time from DST/GIL, without protest or demur or without reference to SI and notwithstanding any contestation or existence of any dispute whatsoever between SI and DST/GIL, pay DST/GIL forthwith the sums so demanded by DST/GIL in each of the demands, subject to a cumulative maximum amount of Rs. _____/- (Rupees _____ only).

2. Any notice / communication / demand from DST/GIL to the effect that SI has failed to fulfill its commitments / obligations in respect of rendering the Services as mentioned in the Agreement, shall be conclusive, final & binding on the Guarantor and shall not be questioned by the Guarantor in or outside the court, tribunal, authority or arbitration as the case may be and all such demands shall be honored by the Guarantor without any delay.
3. We (the Guarantor) confirm that our obligation to the DST/GIL, under this guarantee shall be independent of the agreement or other understandings, whatsoever, between the DST/GIL and the SI.
4. This guarantee shall not be revoked by us (the Guarantor) without prior consent in writing of the DST/GIL.

WE (THE GUARANTOR) HEREBY FURTHER AGREE & DECLARE THAT-

- (i) Any neglect or forbearance on the part of DST/GIL to SI or any indulgence of any kind shown by DST/GIL to SI or any change in the terms and conditions of the Agreement or the Services shall not, in any way, release or discharge the Bank from its liabilities under this Guarantee.
- (ii) This Guarantee herein contained shall be distinct and independent and shall be enforceable against the Guarantor, notwithstanding any Guarantee or Security now or hereinafter held by DST/GIL at its discretion.
- (iii) This Guarantee shall not be affected by any infirmity or absence or irregularity in the execution of this Guarantee by and / or on behalf of the Guarantor or by merger or amalgamation or any change in the Constitution or name of the Guarantor.
- (iv) The guarantee shall not be affected by any change in the constitution of DST/GIL or SI or winding up / liquidation of SI, whether voluntary or otherwise
- (v) This guarantee shall be a continuing guarantee during its validity period and the DST/GIL can make its claim in one or more events within the total liability of the Guarantor mentioned herein.
- (vi) This Guarantee shall remain in full force and effect for a period of years from the date of the issuance i.e., up to ____ Unless a claim under this Guarantee is made against us within three (3) months from that date i.e., on or before, all your rights under this Guarantee shall be forfeited and we shall be relieved and discharged from all liabilities there under.
- (vii) This guarantee shall be governed by Indian Laws and the Courts in Gandhinagar/Ahmedabad, India alone shall have the jurisdiction to try & entertain any dispute arising out of this guarantee.

Notwithstanding anything contained herein above:

- (a) Our liability under this Bank Guarantee shall not exceed Rs /- (Rupees..... only)
- (b) This Bank Guarantee shall be valid up to.....
- (c) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if DST/GIL serve upon us a written claim or demand on or before (date which is 3 months after date mentioned at (b) above.

Yours faithfully,

For and on behalf of Bank.

Authorized official

Annexure-Q: Format of Commercial Proposal Document

Format for reporting commercials and mandatory letters that needs to be part of the commercial proposal document. Breakdown of cost mentioned, cost of each component, operating cost, employee cost, cost of operations and management, any other cost which the Bidder feels.

To,
Deputy Director (IT)
Gujarat Informatics Limited
Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,
Sector 10A, Gandhinagar, Gujarat 382010

Subject: Submission of Commercial proposal for "Selection of System Integrator for implementation (Design, Build, Commission and O&M) of Greenfield State Data Centre".

Reference: BID No: ----- Dated: __/__/____

We, the undersigned Bidder, having read and examined in detail the tender documents for "RFP for Selection of System Integrator for implementation (Design, Build, Commission and O&M) of Greenfield State Data Centre". I / we do hereby propose to provide services as specified in the BID number----- **Dated** __/__/____

1. PRICE PROPOSAL AND VALIDITY

All the prices mentioned in our Tender are in accordance with the terms as specified in the Tender documents. All the prices and other terms and conditions of this Tender are valid for a period of 180 days from the opening of Financial Bid as desired in the tender.

We hereby confirm that our Tender prices include all taxes. However, all the taxes are quoted separately under relevant sections.

We have studied the clause relating to Indian Income Tax and hereby declare that if any income tax, surcharge on Income Tax, Professional and any other corporate Tax in altered under the law, we shall pay the same.

2. UNIT RATES

We have indicated in the relevant schedules enclosed the unit rates for the purpose of on account of payment as well as for price adjustment in case of any increase to / decrease from the scope of work under the contract.

3. DEVIATIONS

We declare that all the services shall be performed strictly in accordance with the Tender documents except for the variations and deviations, all of which have been detailed out exhaustively in the following statement, irrespective of whatever has been stated to the contrary anywhere else in our proposal. Further, we agree that additional conditions, if any, found in the Tender documents, other than those stated in deviation schedule, shall not be given effect to.

4. TENDER PRICING

We further confirm that the prices stated in our proposal are in accordance with your Instruction to Bidders included in Tender documents.

5. QUALIFYING DATA

We confirm having submitted the information as required by you in your Instruction to Bidders. In case you require any other further information/documentary proof in this regard before evaluation of our Tender, we agree to furnish the same in time to your satisfaction.

6. PROPOSAL PRICE

We declare that our Proposal Price is for the entire scope of the work as specified in the Schedule of Requirements and Tender documents.

7. PERFORMANCE BANK GUARANTEE BOND

We hereby declare that in case the contract is awarded to us, we shall submit the PBG bond in the form prescribed in Proforma of Bank Guarantee towards PBG and as per General Conditions of Contract. We hereby declare that our Tender is made in good faith, without collusion or fraud and the information contained in the Tender is true and correct to the best of our knowledge and belief. We understand that our Tender is binding on us and that you are not bound to accept a Tender you receive. We confirm that no technical deviations are attached here with this commercial offer.

Yours sincerely,

(Seal & Signature of the Authorized signatory of the System Integrator)

Name:

Place:

Designation:

Date:

Annexure-R: Commercial Bid Price

Summary of Bid Price:

Sr. No	Bid Price for Schedule I, II and III	Amount without Tax	Amount With Tax
A	Schedule I: Total Capex value for Civil infrastructure/services		
B	Schedule II: Total Capex value for non-IT components/services		
C	Schedule III: Operation & Maintenance (O&M) charges for support up to 7 years from final Go-Live including Manpower		
D	Grand Total (A+B+C)		

NOTE:

1. L1 will be the lowest sum total of above table (without tax).
2. Sum Total of Schedule - III would be paid in 28 equated Quarters.
3. Bidder needs to upload detailed break-up of Schedule III separately.

Schedule I: Bid Price Civil

A. Civil & Interiors:				Figure in INR				
Sl. No	Item Description	UOM	Qty	Unit Rate	Total Amt	GST Rate %	GST Amt.	Total Amt with all taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = $\frac{D \times E}{100}$	(G) = (D + F)
1	Civil Infrastructure Work	LOT	1					
	(Pile Work, Structure Work, Earth Work, Concrete Work, reinforced Cement Concrete, Brick Work) AND							
	Other Civil, Interior and Exterior (Façade, Boundary wall, internal roads, landscape) Work							
	(Stonework, Marble Work, Wood & PVC Work, Steel Work, Flooring, Roofing Work, Finishing, Dismantling & Demolishing(if any), Rainwater Harvesting, Road Work, Drainage, Aluminum, Water Proofing Work, Horticulture Work, Structural Glazing and Aluminum Composite Panel, False Ceiling, Raise Floor, Painting / POP, Ramps, / Steps, Fire Rated Doors & Partitions, Landscaping Work, Boundary Wall etc.)							
2	PLUMBING WORKS (INTERNAL)	LOT	1					
	(Sewerage System, Soil Waste Vent Pipes & Fittings, Internal Water Supply, Sanitary Fixtures etc.)							
3	PLUMBING WORKS (EXTERNAL)	LOT	1					

	(Sewerage System, Storm Water Drainage System, External Water Supply System, Tube well & Tube well Pumps, Internal & External Fire Hydrant System, Sanitary Fixtures, Pumping System, Suction & Delivery Pipes & Valves for Water Supply Pumps etc.)							
4	FIRE FIGHTING WORKS	LOT	1					
	(Fire Fighting Pumps & Equipment, Internal & External Fire Hydrant System, Wet Riser & Sprinkler System, Fire Extinguishers etc.)							
B. Modular Furniture:								
Sl. No	Item Description	UOM	Qty	Unit Rate	Total Amt	GST Rate %	GST Amt.	Total Amt with all taxes
1	MODULAR FURNITURE	LOT	1					
	(Furniture for entire building i.e., NOC, SOC, Innovation Centre, Helpdesk, Reception, customer, pantry, Security Cabin, Driver Rest Room, Waiting Room, Conference Room, Meeting Room, Managers Rooms, and other office areas.)							
	Modular furniture includes Chairs, desks, walls, ceilings, floorings, Tables, Storage cabinets, acoustic paneling, doors, White Board, Notice Boards, Fire safe storage, Workstations, Personal computers, Water Filter, Sofas, Shoe Rack, Dustbins, etc.							
Sl. No	Item Description	UOM	Qty	Unit Rate	Total Amt	GST Rate %	GST Amt.	Total Amt with all taxes
1	IGBC Rating Certification	No.	1					
Additional Item								
Sl. No	Item Description	UOM	Qty	Unit Rate	Total Amt	GST Rate %	GST Amt.	Total Amt with all taxes
1	Any other components required to cater to the scope of work mentioned in RFP. (Bidder to specify breakup)	Lot	1					
	Grand Total Price in INR for Schedule I							

Schedule II: Bid Non-IT

Sr. No.	Item Description	UOM	Quantity	Figure in INR				
				Unit Rate	Total Amt.	GST Rate %	GST Amt.	Total Amt. Inc. taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = D x E/100	(G) = (D+F)
A. ELECTRICAL WORKS:								
1	Electrical wiring, MCCB & MCB/ELCB & ACB & DB, Cable Trays, Earthing, Lightning Protection System, HV & MV Cable Laying, HV & MV Cable joining & End termination, Civil Items, Light Fixtures, HT Switchgear, Transformers, HT Cable, Battery Charger, HT & LT Panels, Sandwich Bus duct, LT Cables & Cable Trays, Cable Terminations, Raceways, Busbar Trunking System, Power receptacles, Metering Cubicle, Cable Laying, Rubber mats etc.	LOT	1					
2	HT Panel with 1 incomer and 1 outgoing and accessories	Set	2					
3	Metering panel	Set	2					
4	33KV Dry type Transformer (Capacity: 5 MVA)	Nos	2					
5	Transformer Output panel	Nos	Bidder to Propose					
6	HT Cable	Mtr	Bidder to Propose					
7	BUS BAR trunk from Transformer-to-Transformer output panel and DG to DG Sync Panel with all accessories	Mtr	Bidder to Propose					
8	KVM Switch*	Nos	Bidder to Propose					
9	Indoor/Outdoor/Straight Through type heat shrinkable HT cable termination kit	Nos	Bidder to Propose					
10	Diesel Generator (Data Centre continuous rated) 5 MVA	Set	2					
11	HSD tank and accessories	Set	1					
12	DG exhaust stack as manufacturer standard and compliance as per CPCB norms.	Lot	Bidder to Propose					
13	Fuel piping with valves and accessories.	Set	Bidder to Propose					
14	Fuel Pump with intrinsically safe meter having feature to connect to DCIM for real	Set	Bidder to Propose					

Sr. No.	Item Description	UOM	Quantity	Figure in INR				
				Unit Rate	Total Amt.	GST Rate %	GST Amt.	Total Amt. Inc. taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = D x E/100	(G) = (D+F)
	time fuel consumption monitoring							
15	Cables as per cable schedule with terminations	Lot	1					
16	UPS systems 600 KVA for Critical Load with Li-ion batteries for 30 minutes backup including battery Breakers and all required accessories.	Set	4					
17	UPS systems 250 KVA for Non-Critical Load with Li-ion batteries for 30 minutes backup including battery Breakers and all required accessories.	Set	2					
18	Main LT panel 1 (MLTP 1) with all accessories	Set	1					
19	Main LT panel 2 (MLTP 2) with all accessories	Set	1					
20	LT panel (SDC LPT 2) with all accessories	Set	2					
21	DG Synchronizing Panel (IP 66) outdoor type	Set	1					
22	Copper Earth pit	Nos	Bidder to Propose					
23	GI Earth Pit	Nos	Bidder to Propose					
24	Copper earth Strip with insulation	Mtr	Bidder to Propose					
25	GI Earth Strip with insulation	Mtr	Bidder to Propose					
26	Distribution Board (TPN)	Nos	Bidder to Propose					
27	Distribution Board (SPN)	Nos	Bidder to Propose					
28	Sub mains cabling	Mtr	Bidder to Propose					
29	Light and Power point Wiring	Lot	1					
30	Modular switch board with switches and sockets for wall	Nos	Bidder to Propose					
31	Modular switch board with switches and sockets for Desk	Nos	Bidder to Propose					
32	MS Conduit with accessories	Mtr	Bidder to Propose					
33	PVC conduit with accessories	Mtr	Bidder to Propose					
34	Flexible MS conduit	Mtr	Bidder to Propose					
35	Flexible PVC conduit	Mtr	Bidder to Propose					

Sr. No.	Item Description	UOM	Quantity	Figure in INR				
				Unit Rate	Total Amt.	GST Rate %	GST Amt.	Total Amt. Inc. taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = D x E/100	(G) = (D+F)
36	Smart LED lights Rectangular	Nos	Bidder to Propose					
37	Smart LED light Round	Nos	Bidder to Propose					
38	Smart LED Lights Square 2'x2'	Nos	Bidder to Propose					
39	Smart LED lights Square 1'x1'	Nos	Bidder to Propose					
40	Occupancy sensor range 6-7 meter	Nos	Bidder to Propose					
41	NEMA (IEC 309) connectors with breaker	Nos	Bidder to Propose					
42	Track bus way (BBT) inside Data Centre with all accessories	Mtr	Bidder to Propose					
43	Tap off box with accessories for track busway system	Nos	Bidder to Propose					
44	UPS output panel with K13 isolation transformer for critical load	Nos	4					
45	HVAC panel	Nos	Bidder to Propose					
46	SVG Panel	Nos	Bidder to Propose					
47	APF Panel	Nos	Bidder to Propose					
48	Industrial Socket for PAC and CAC	Nos	Bidder to Propose					
49	Equipotential grid on DC below raise floor by 25x3 copper strip with insulation	Mtr	Bidder to Propose					
50	Perforated cable tray (factory made galvanized). Please add items for various size	Mtr	Bidder to Propose					
51	MS raceway with cover. (Bidder to Propose the sizes)	Mtr	Bidder to Propose					
52	Ladder tray. Please add items for various size	Mtr	Bidder to Propose					
53	PVC raceway under PCC floor	Mtr	Bidder to Propose					
54	Wall fans	Nos	Bidder to Propose					
55	Ceiling Fan	Nos	Bidder to Propose					
56	Single line diagram A2 size laminated	Nos	30					
57	Exhaust fan (min 18-inch dia.) with gravity damper	Lot	1					
58	Clamp meter AC, DC, with clamp side suitable to fit in 240 sq. mm single core cable	Nos	2					
59	Intelligent PDU for racks	Nos	300					

Sr. No.	Item Description	UOM	Quantity	Figure in INR				
				Unit Rate	Total Amt.	GST Rate %	GST Amt.	Total Amt. Inc. taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = D x E/100	(G) = (D+F)
60	Server /Network Rack (800 X 1200 mm)	Nos	150					
61	Data Centre Infrastructure Management System	Lot	1					
62	Battery Impedance tester	Nos	1					
63	Thermal Temperature gun	Nos	2					
64	Round bottomed fire buckets-4 Nos	Lot	1					
65	shock treatment chart	Nos	20					
66	Danger boards Signage	Nos	50					
67	Fixing of as built Single line drawing duly laminated / framed in A1 size.	Lot	1					
68	cable route markers with necessary angle iron supports	Lot	1					
69	Temporary lighting, temporary DB, Power Supply to all service vendor for DC construction till Go-live.	Lot	1					
70	Solar Inverter with all cabling, software and required all accessories	Nos	2					
71	Solar panel with frame structure and required all accessories	Nos	Bidder to Propose					
72	Raise floor	Sq.ft	Bidder to Propose					
73	False ceiling	Sq.ft	Bidder to Propose					
74	Intelligent Data cabling system (Copper & Fiber)	lot	Bidder to Propose					
75	Fiber runner	Lot	Bidder to Propose					
76	Necessary passive cabling and accessories for existing EPABX system (Voice system)	Lot	Bidder to Propose					
77	Passenger Lift (Elevator System)	Set	2					
78	Material Lift (Elevator System)	Set	1					
B. HVAC:								
1	In-row cooling system with all accessories for all Server farm area	Nos	58					
2	Air cooled chiller system 570 TR with all sub-components and accessories	Set	2					

Sr. No.	Item Description	UOM	Quantity	Figure in INR				
				Unit Rate	Total Amt.	GST Rate %	GST Amt.	Total Amt. Inc. taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = D x E/100	(G) = (D+F)
3	SS Piping to connect chiller with In-row cooling with insulation and all accessories (pump, motor, flow meter, valve, etc.) required	Lot	Bidder to Propose					
4	Wall mount Precision Air Handling Units for all IBMS room	Nos	Bidder to Propose					
5	Precision Air Handling (CRAC) Units for all UPS & battery Rooms	Nos	Bidder to Propose					
6	Dehumidifier water line piping with all accessories	Mtr	Bidder to Propose					
7	VRF system for Other Areas	Nos	Bidder to Propose					
8	Comfort AC indoor units	Nos	Bidder to Propose					
9	Refrigerant piping for VRV/VRF system with insulation	Mtr	Bidder to Propose					
10	Cold aisle/Hot aisle containment with door and accessories	Sq. Mtr	Bidder to Propose					
C. SAFETY, SECURITY, SURVEILLANCE:								
1	Addressable fire alarm system with cabling & all accessories	Lot	1					
2	Gas based suppression system for server floor and utility floors (1st , 2nd and 3rd floor)	Lot	1					
3	Aspiration smoke detection system for Server floors (1st & 3rd floors)	Lot	1					
4	PTZ Camera	Nos	Bidder to Propose					
5	Bullet fixed camera	Nos	Bidder to Propose					
6	Dome camera	Nos	Bidder to Propose					
7	NVR for Close circuit television (CCTV)	Nos	Bidder to Propose					
8	Video management software (VMS) for video analytics	Set	Bidder to Propose					
9	55-inch Display screen (Integrated Security Room)	Nos	1					
10	Door Access control system	Lot	1					
11	Flab Barrier	Nos	Bidder to Propose					
12	Swipe barrier	Nos	1					
13	Full height turnstile	Nos	1					

Sr. No.	Item Description	UOM	Quantity	Figure in INR				
				Unit Rate	Total Amt.	GST Rate %	GST Amt.	Total Amt. Inc. taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = D x E/100	(G) = (D+F)
14	Baggage Screening System (X-Ray Based)	Nos	1					
15	Metal detector Full height	Nos	1					
16	Handheld metal detector	Nos	4					
17	Fire extinguisher	Nos	50					
18	Water leak detection system	Lot	1					
19	Rodent repellent system	Lot	1					
20	Steel fireproof Media storage 340 ltr.	Nos	3					
21	Asset tracking system	Lot	1					
22	Rack access control system	Lot	1					
23	Rack humidity and temp sensor	Lot	1					
24	Workstation for access control system	Nos	Bidder to Propose					
25	Workstation for CCTV	Nos	Bidder to Propose					
26	Workstation for DCIM	Nos	Bidder to Propose					
27	Degausser (for CD, DVD, SATA/HDD drive with receipt printing)	Nos	Bidder to Propose					
28	Mobile Computer Trolley with monitor, keyboard and mouse of desired specifications.	Set	2					
29	Safety Gloves, Jacket, Boot, Goggles, Fireman's axe Etc.	Set	4					
30	Evacuation Chart	Nos	20					
31	Signage's	Nos	50					
32	Self-illumination tape	Mtr	500					
33	Portable oxygen cylinder with mask	Nos	4					
34	LED torch (Industrial type)	Nos	4					
35	Portable emergency light	Nos	4					
36	Visitor management system with all hardware such as Photo I card printer, Computer, camera and software etc.	Lot	1					
37	Fire Hydrant and water mist System with all subcomponents like Pumps, storage Tanks and accessories (for support areas).	Lot	1					
38	Public Address system	Set	1					
39	Data safe	Nos	2					

Sr. No.	Item Description	UOM	Quantity	Figure in INR				
				Unit Rate	Total Amt.	GST Rate %	GST Amt.	Total Amt. Inc. taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = D x E/100	(G) = (D+F)
D. NOC, SOC & Innovation Centre Infrastructure:								
1	Video Wall for NOC & SOC room (SITC of 7x2 Matrix Video Wall System with Controllers, Cables (Fiber) and accessories complete in all respect & Podium system)	Nos	2					
2	Video Wall for DCIM room & Innovation Centre SITC of 4x2 Matrix Video Wall System with Controllers, Cables (Fiber) and accessories complete in all respect & Podium system	Nos	2					
3	85" LED display on Innovation Centre wall (LH, RH and center side)	Nos	4					
E. MISCELLANEOUS/FMS Items (Indicative but not Limited):								
1	Hand operated forklift	Nos	4					
2	Paper shredder	Nos	4					
3	Water filter with RO facility	Nos	5					
4	Water dispenser	Nos	5					
5	Shoes stand 20 pair shoe capacity	Nos	4					
6	first aid box	Nos	3					
7	DG foundation as per OEM specification	Cu Mtr	Bidder to Propose					
8	DG shed	Lot	1					
9	Wire Mesh partition	Sq. Mtr	Bidder to Propose					
10	Fixed Iron Grill partition	Kg	Bidder to Propose					
11	Key Box	Nos	4					
12	Shoe Shiner (dual shade electrically motor operated with sensor)	Nos	4					
13	Dust bin (Stainless steel), Tile puller (3 cup suction type), Vacuum Cleaner Industrial type, White board, pin up Notice board, etc. but not limited	Lot	1					
14	Hygiene including the maintenance and consumables i.e., stationery and toiletry	Lot	1					
15	Refrigerator 300 Ltr.	Nos	4					
16	Tea/ Coffee Vending machine	Nos	4					

Sr. No.	Item Description	UOM	Quantity	Figure in INR				
				Unit Rate	Total Amt.	GST Rate %	GST Amt.	Total Amt. Inc. taxes
		(A)	(B)	(C)	(D) = (B x C)	(E)	(F) = D x E/100	(G) = (D+F)
17	Motorized Heavy Duty Trolley, Boom Barrier, RFID System etc.	Lot	1					
F. Installation, commissioning & Project management:								
1	Transport charges, loading, unloading, lifting, shifting and Installation charges of the project	Lot	1					
2	Testing & commissioning charges of the project	Lot	1					
3	Project management charges including manpower deployment charges for the project execution	Lot	1					
4	Project Handover Documentation charges	Lot	1					
G. Certification Cost:								
1	Uptime Tier III Certification of Design of the Data Centre	Lot	1					
2	Uptime Tier III Certification of constructed Facility for all areas of the Data Centre Facility to be constructed under this contract	Lot	1					
3	Uptime Tier III Certification of operational sustainability of the Data Centre	Lot	1					
Additional Item								
1	Any other components required to cater the scope of work mentioned in this RFP. (Bidder to specify breakup)	Lot	1					
	Grand Total Price in INR for Schedule II							

Schedule III: Bid Price for O&M including Manpower

Operation & Maintenance (O&M)		
1	*Operation & Maintenance (O&M) charges for support up to 7 years from final Go-Live including Manpower	
	Grand Total Price in INR for Schedule III	

*Year wise O&M breakup with Manpower cost needs to be given by Bidder.

Annexure-S: Manufacturers' authorization form

MANUFACTURERS' AUTHORIZATION FORM

No.

Date:

To:

Dear Sir:

Ref: BID NO:_____dated 00.00.2022

1. We, who are established and reputable manufacturers / producers of _____having factories / development facilities at (address of factory / facility) do hereby authorize M/s _____(Name and address of Agent) to submit a Bid and sign the contract with you against the above Bid Invitation.
2. We hereby extend our full warranty for the Solution, Equipment/Products and services offered by the above firm against this Bid Invitation.
3. We also undertake to provide any or all of the following materials, notifications, and information pertaining to the Equipment manufactured or distributed by the SI:
 - (a) Such Equipment as the DST/GIL may opt to purchase from the SI, provided, that this option shall not relieve the SI of any warranty obligations under the Contract; and
 - (b) in the event of termination of production of such Equipment:
 - I. advance notification to the DST/GIL of the pending termination, in sufficient time to permit the DST/GIL to procure needed requirements; and
 - II. Following such termination, furnishing, operations manuals, standards, and specifications of the Equipment, if requested.
4. We duly authorize the said firm to act on our behalf in fulfilling all installations, technical support and maintenance obligations required by the contract.

Yours faithfully,

(Name of Manufacturer / Producer)

Note: This letter of authority should be on the letterhead of the manufacturer and should be signed by a person competent and having the power of attorney to bind the manufacturer. The Bidder in its Bid should include it.

Annexure-T: PROFORMA for Completion Certificate

PROFORMA OF CERTIFICATE TO BE ISSUED BY THE DST/GIL AFTER SUCCESSFUL COMMISSIONING OF THE DATA CENTRE ON DESIGN, BUILD, SUPPLY, INSTALLATION, TESTING, COMMISSIONING, OPERATION, MAINTENANCE AND TRANSFER MODEL

Date: _____

M/s. _____

Sub: Certificate of commissioning of the Data Centre on Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer Model

1. This is to certify that all the Design, Equipment/ Products as detailed below has/have been received in good condition along with all the standard and special accessories (subject to remarks in Para No. 2) in accordance with the Contract/Specifications. The same has been installed and commissioned.

a) Bid No. _____ dated _____

b) Description of the Solution _____

c) Quantity _____

d) Date of commissioning _____

e) Date of acceptance test _____

2. Details of equipment not yet supplied, any other Task not completed as per scope, recoveries (if any) to be made on that account:

Sr. No.	Description Amount to be recovered

3. The acceptance test has been done to our entire satisfaction and Staff have been trained to operate the Equipment/ Products.

4. The SI has fulfilled his contractual obligations satisfactorily*
or

The SI has failed to fulfill his contractual obligations with regard to the following:

(a)

(b)

(c)

5. The amount of recovery on account of non-supply of Equipment/ Products is given under Para No. 2.
6. The amount of recovery on account of failure of the SI to meet his contractual obligations is as indicated in endorsement of the letter.

Signature _____

Name _____

Designation with stamp _____

*Explanatory notes for filling up the certificates:

- (a) The SI has adhered to the time schedule specified in the contract in dispatching the Equipment/Products / Manuals pursuant to Technical Specifications.
- (b) The SI has supervised the commissioning of the solution in time i.e., within the period specified in the contract from the date of intimation by the DST/GIL in respect of the installation of the Equipment/Product.
- (c) Training of personnel has been done by the SI as specified in the contract.
- (d) In the event of Manuals having not been supplied or installation and commissioning of the Solution having been delayed on account of the SI, the extent of delay should always be mentioned.

Annexure-U: Non-Disclosure Agreement

NON-DISCLOSURE AGREEMENT

THIS RECIPROCAL NON-DISCLOSURE AGREEMENT (the "Agreement") is made at Gandhinagar between:

_____ constituted under the _____ Act,
_____ having its Corporate Centre at _____
_____ (hereinafter referred to as "DST/GIL" which expression includes its successors and assigns) of the ONE PART.

And

_____ (Hereinafter referred to as "_____" which expression shall unless repugnant to the subject or context thereof, shall mean and include its successors and permitted assigns) of the OTHER PART.

And Whereas

1. _____ is carrying on business of providing _____, has agreed to _____ for the DST/GIL and other related tasks.
2. For purposes of advancing their business relationship, the parties would need to disclose certain valuable confidential information to each other. Therefore, in consideration of covenants and agreements contained herein for the mutual disclosure of confidential information to each other, and intending to be legally bound, the parties agree to terms and conditions as set out hereunder.

NOW IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES AS UNDER

1. Confidential Information and Confidential Materials:

- (a) "Confidential Information" means non-public information that Disclosing Party designates as being confidential or which, under the circumstances surrounding disclosure ought to be treated as confidential. "Confidential Information" includes, without limitation, information relating to installed or purchased Disclosing Party software or hardware products, the information relating to general architecture of Disclosing Party's network, information relating to nature and content of data stored within network or in any other storage media, Disclosing Party's business policies, practices, methodology, policy design delivery, and information received from others that Disclosing Party is obligated to treat as confidential. Confidential Information disclosed to Receiving Party by any Disclosing Party Subsidiary and/ or agents is covered by this agreement
- (b) Confidential Information shall not include any information that: (i) is or subsequently becomes publicly available without Receiving Party's breach of any obligation owed to Disclosing party; (ii) becomes known to Receiving Party prior to Disclosing Party's disclosure of such information to Receiving Party; (iii) became known to Receiving Party from a source other than Disclosing Party other than by the breach of an obligation of confidentiality owed to Disclosing Party; or (iv) is independently developed by Receiving Party.
- (c) "Confidential Materials" shall mean all tangible materials containing Confidential Information, including without limitation written or printed documents and computer disks or tapes, whether machine or user readable.

2. Restrictions

- (a) Each party shall treat as confidential the Contract and any and all information ("confidential information") obtained from the other pursuant to the Contract and shall not divulge such information to any person (except to such party's own employees and other persons and then only to those employees and persons who need to know the same) without the other party's written consent provided that this clause shall not extend to information which was rightfully in the possession of such party prior to the commencement of the negotiations leading to the Contract, which is already public knowledge or becomes so at a future date (otherwise than as a result of a breach of this clause). Receiving Party will have executed or shall execute appropriate written agreements with its employees and consultants specifically assigned and/or otherwise, sufficient to enable it to comply with all the provisions of this Agreement.
- (b) Receiving Party may disclose Confidential Information in accordance with judicial or other governmental order to the intended recipients (as detailed in this clause), provided Receiving Party shall give Disclosing Party reasonable notice prior to such disclosure and shall comply with any applicable protective order or equivalent. The intended recipients for this purpose are:
 - (1) The statutory auditors of the DST/GIL and
 - (2) Regulatory authorities regulating the affairs of the DST/GIL and inspectors and supervisory bodies thereof
- (c) The foregoing obligations as to confidentiality shall survive any termination of this Agreement
- (d) Confidential Information and Confidential Material may be disclosed, reproduced, summarized or distributed only in pursuance of Receiving Party's business relationship with Disclosing Party, and only as otherwise provided hereunder. Receiving Party agrees to segregate all such Confidential Material from the confidential material of others in order to prevent mixing.
- (e) Receiving Party may not reverse engineer, decompile or disassemble any software disclosed to Receiving Party.

3. Rights and Remedies

- (a) Receiving Party shall notify Disclosing Party immediately upon discovery of any unauthorized used or disclosure of Confidential Information and/ or Confidential Materials, or any other breach of this Agreement by Receiving Party and will cooperate with Disclosing Party in every reasonable way to help Disclosing Party regain possession of the Confidential Information and/ or Confidential Materials and prevent its further unauthorized use.
- (b) Receiving Party shall return all originals, copies, reproductions and summaries of Confidential Information or Confidential Materials at Disclosing Party's request, or at Disclosing Party's option, certify destruction of the same.
- (c) Receiving Party acknowledges that monetary damages may not be the only and / or a sufficient remedy for unauthorized disclosure of Confidential Information and that disclosing party shall be entitled, without waiving any other rights or remedies (as listed below), to injunctive or equitable relief as may be deemed proper by a Court of competent jurisdiction.
 - a. Suspension of access privileges
 - b. Change of personnel assigned to the job
 - c. Financial liability for actual, consequential, or incidental damages
 - d. Termination of contract
- (d) Disclosing Party may visit Receiving Party's premises, with reasonable prior notice and during normal business hours, to review Receiving Party's compliance with the term of this Agreement.

4. Miscellaneous

- (a) All Confidential Information and Confidential Materials are and shall remain the property of Disclosing Party. By disclosing information to Receiving Party, Disclosing Party does not grant any expressed or implied right to Receiving Party to disclose information under the Disclosing Party patents, copyrights, trademarks, or trade secret information.
- (b) Any document provided under this Agreement is provided with RESTRICTED RIGHTS.
- (c) Neither party grants to the other party any license, by implication or otherwise, to use the Confidential Information, other than for the limited purpose of evaluating or advancing a

business relationship between the parties, or any license rights whatsoever in any patent, copyright or other intellectual property rights pertaining to the Confidential Information.

- (d) The terms of Confidentiality under this Agreement shall not be construed to limit either party's right to independently develop or acquire Equipment/Product without use of the other party's Confidential Information. Further, either party shall be free to use for any purpose the residuals resulting from access to or work with such Confidential Information, provided that such party shall maintain the confidentiality of the Confidential Information as provided herein. The term "residuals" means information in non-tangible form, which may be retained by person who has had access to the Confidential Information, including ideas, concepts, know-how or techniques contained therein. Neither party shall have any obligation to limit or restrict the assignment of such persons or to pay royalties for any work resulting from the use of residuals. However, the foregoing shall not be deemed to grant to either party a license under the other party's copyrights or patents.
- (e) This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof. It shall not be modified except by a written agreement dated subsequently to the date of this Agreement and signed by both parties. None of the provisions of this Agreement shall be deemed to have been waived by any act or acquiescence on the part of Disclosing Party, its agents, or employees, except by an instrument in writing signed by an authorized officer of Disclosing Party. No waiver of any provision of this Agreement shall constitute a waiver of any other provision(s) or of the same provision on another occasion.
- (f) In case of any dispute, both the parties agree for neutral third-party arbitration. Such arbitrator will be jointly selected by the two parties, and he/she may be an auditor, lawyer, consultant or any other person of trust. The said proceedings shall be conducted in English language at Gandhinagar and in accordance with the provisions of Indian Arbitration and Conciliation Act 1996 or any Amendments or Re-enactments thereto.
- (g) Subject to the limitations set forth in this Agreement, this Agreement will inure to the benefit of and be binding upon the parties, their successors and assigns.
- (h) If any provision of this Agreement shall be held by a court of competent jurisdiction to be illegal, invalid or unenforceable, the remaining provisions shall remain in full force and effect.
- (i) All obligations created by this Agreement shall survive change or termination of the parties' business relationship.

5. Suggestions and Feedback

- (a) Either party from time to time may provide suggestions, comments or other feedback to the other party with respect to Confidential Information provided originally by the other party (hereinafter "feedback"). Both parties agree that all Feedback is and shall be entirely voluntary and shall not in absence of separate agreement, create any confidentially obligation for the receiving party. However, the Receiving Party shall not disclose the source of any feedback without the providing party's consent. Feedback shall be clearly designated as such and, except as otherwise provided herein, each party shall be free to disclose and use such Feedback as it sees fit, entirely without obligation of any kind to other party. The foregoing shall not, however, affect either party's obligations hereunder with respect to Confidential Information of other party.

Dated this _____ day of _____ 2022 at _____
(month) (place)

For and on behalf of _____

Name		
Designation		
Place		
Signature		

For and on behalf of _____

Name		
Designation		
Place		
Signature		

Annexure-V: Pre-Bid Format

Pre-Bid Query Format

(To be provided strictly in Excel format)

Sr. No.	Bidding Entity	RFP Document Reference			Content of the RFP requiring clarification	Clarification Sought
		Volume	Section No.	Page No.		
1						
2						
n						

Annexure-W: Pre-Contract Integrity Pact

PRE-CONTRACT INTEGRITY PACT

(TO BE STAMPED AS AN AGREEMENT)

1. General

This pre-Bid pre-contract Agreement (hereinafter called the Integrity Pact) is made on day of the month of 2022, between, on the one hand, the GIL having its Corporate Office at Block no- 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector- 10 A, Gandhinagar through its -----Department / Office at -----,-----,-----, (Hereinafter called the "BUYER", which expression shall mean and include, unless the context otherwise requires, its successors) of the First Part and M/s represented by Shri , Chief Executive Officer (hereinafter called the "BIDDER/Seller which expression shall mean and include, unless the context otherwise requires, its / his successors and permitted assigns of the Second Part. WHEREAS the BUYER proposes to setup a Tier III Data Centre on Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer model and procure (Name of the Stores/Equipment/Item) the equipment required, and the BIDDER/Seller is willing to offer/has offered the services and WHEREAS the BIDDER is a private company/public company/Government undertaking/partnership/registered export agency, constituted in accordance with the relevant law in the matter and the BUYER is an Office / Department of GIL performing its functions on behalf of Department of Science and Technology.

NOW, THEREFORE,

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:

- Enabling the BUYER to obtain the desired service / Equipment/ product at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement; and
- Enabling BIDDERS to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the BUYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:
Commitments of the BUYER

- 1.1 The BUYER undertakes that no official of the BUYER, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favor or any material or immaterial benefit or any other advantage from the BIDDER, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, Bid evaluation, contracting or implementation process related to the contract.
- 1.2 The BUYER will, during the pre-contract stage, treat all BIDDERS alike, and will provide to all BIDDERS the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular BIDDER in comparison to other BIDDERS.
- 1.3 All the officials of the BUYER will report to the appropriate authority any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.
- 1.4 In case any such preceding misconduct on the part of such official(s) is reported by the BIDDER to the BUYER with full and verifiable facts and the same is prima facie found to be correct by the BUYER, necessary disciplinary proceedings, or

any other action as deemed fit, including criminal proceedings may be initiated by the BUYER and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the BUYER the proceedings under the contract would not be stalled.

2. Commitments of BIDDERS

- 2.1 The BIDDER commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its Bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commit itself to the following:
- 2.2 The BIDDER will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favor, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.
- 2.3 The BIDDER further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favor, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other contract with DST/GIL for showing or forbearing to show favor or disfavor to any person in relation to the contract or any other contract with DST/GIL.
- 2.4 Wherever applicable, the BIDDER shall disclose the name and address of agents and representatives permitted by the Bid documents and Indian BIDDERS shall disclose their foreign principals or associates, if any.
- 2.5 The BIDDER confirms and declares that they have not made any payments to any agents/brokers or any other intermediary, in connection with this Bid/contract.
- 2.6 The BIDDER further confirms and declares to the BUYER that the BIDDER is the original SI in respect of Equipment / product / service covered in the Bid documents and the BIDDER has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the BUYER or any of its functionaries, whether officially or unofficially to the award of the contract to the BIDDER, nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.
- 2.7 The BIDDER, at the earliest available opportunity, i.e., either while presenting the Bid or during pre-contract negotiations and in any case before opening the financial Bid and before signing the contract, shall disclose any payments he has made, is committed to or intends to make to officials of the BUYER or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.
- 2.8 The BIDDER will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.
- 2.9 The BIDDER will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.
- 2.10 The BIDDER shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the BUYER as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The BIDDER also undertakes to exercise due and adequate care lest any such information is divulged.
- 2.11 The BIDDER commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.
- 2.12 The BIDDER shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.
- 2.13 If the BIDDER or any employee of the BIDDER or any person acting on behalf of the

BIDDER, either directly or indirectly, is a relative of any of the officers of the BUYER, or alternatively, if any relative of an officer of the BUYER has financial Interest/stake in the BIDDER's firm, the same shall be disclosed by the BIDDER at the time of filing of tender. The term 'relative' for this purpose would be as defined in Section 6 of the Companies Act 1956.

- 2.14 The BIDDER shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the BUYER.

3. Previous Transgression

- 3.1 The BIDDER declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise / Public Sector Banks in India or any Government Department in India or RBI that could justify BIDDER's exclusion from the tender process.
- 3.2 The BIDDER agrees that if it makes incorrect statement on this subject, BIDDER can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

4. Earnest Money (Security Deposit)

- 4.1 While submitting commercial Bid, the BIDDER shall deposit an amount (specified in RFP) as Earnest Money/Security Deposit, with the BUYER through any of the mode mentioned in the RFP/ Bid document and no such mode is specified, by a Bank Draft or a Pay Order in favor of DST/GIL from a nationalized Bank. However, payment of any such amount by way of Bank Guarantee, if so, permitted as per Bid documents / RFP should be from any nationalized Bank and promising payment of the guaranteed sum to the BUYER on demand within three working days without any demur whatsoever and without seeking any reasons whatsoever. The demand for payment by the BUYER shall be treated as conclusive proof for making such payment to the BUYER.
- 4.2 Unless otherwise stipulated in the Bid document / RFP, the Earnest Money/Security Deposit shall be valid up to a period of Seven years or the complete conclusion of the contractual obligations to the complete satisfaction of both the BIDDER and the BUYER, including warranty period, whichever is later.
- 4.3 In case of the successful BIDDER a clause would also be incorporated in the Article pertaining to Performance Bond in the Purchase Contract that the provisions of Sanctions for Violation shall be applicable for forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.
- 4.4 No interest shall be payable by the BUYER to the BIDDER on Earnest Money/Security Deposit for the period of its currency.

5. Sanctions for Violations

- 5.1 Any breach of the aforesaid provisions by the BIDDER or anyone employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER) shall entitle the BUYER to take all or any one of the following actions, wherever required:
- 5.1.1 To immediately call off the pre contract negotiations without assigning any reason and without giving any compensation to the BIDDER. However, the proceedings with the other BIDDER(s) would continue, unless the BUYER desires to drop the entire process.
- 5.1.2 The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract is signed) shall stand forfeited either fully or partially, as decided by the BUYER and the BUYER shall not be required to assign any reason, therefore.
- 5.1.3 To immediately cancel the contract, if already signed, without giving any compensation to the BIDDER.
- 5.1.4 If any outstanding payment is due to the BIDDER from the BUYER in connection

- with any other contract for any other stores, such outstanding could also be utilized to recover the aforesaid sum and interest.
- 5.1.5 To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the BIDDER, in order to recover the payments, already made by the BUYER, along with interest.
- 5.1.6 To cancel all or any other Contracts with the BIDDER. The BIDDER shall be liable to pay compensation for any loss or damage to the BUYER resulting from such cancellation/rescission and the BUYER shall be entitled to deduct the amount so payable from the money(s) due to the BIDDER.
- 5.1.7 To debar the BIDDER from participating in future bidding processes of the BUYER or any of its Subsidiaries for a minimum period of five years, which may be further extended at the discretion of the BUYER. To recover all sums paid, in violation of this Pact, by BIDDER(s) to any middleman or agent or broker with a view to securing the contract. Forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.
- 5.1.8 Intimate to the CVC, IBA, RBI, as the BUYER deemed fit the details of such events for appropriate action by such authorities.
- 5.2 The BUYER will be entitled to take all or any of the actions mentioned at para 6.1(i) to (x) of this Pact also on the Commission by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER), of an offence as defined in Chapter IX of the Indian Penal code, 1860 or Prevention of Corruption Act, 1988 or any other statute enacted for prevention of corruption.
- 5.3 The decision of the BUYER to the effect that a breach of the provisions of this Pact has been committed by the BIDDER shall be final and conclusive on the BIDDER. However, the BIDDER can approach the Independent Monitor(s) appointed for the purposes of this Pact.

6. Fall Clause

The BIDDER undertakes that it has not supplied/is not supplying similar service/product/equipment/systems or subsystems at a price lower than that offered in the present Bid in respect of any other Ministry/Department of the Government of India or PSU or any other Bank and if it is found at any stage that similar Equipment/product/systems or sub systems was supplied by the BIDDER to any other Ministry/Department of the Government of India or a PSU or a Bank at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the BIDDER to the BUYER, if the contract has already been concluded.

7. Facilitation of Investigation

In case of any allegation of violation of any provisions of this Pact or payment of commission, the BUYER or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER and the BIDDER shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

8. Law and Place of Jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the BUYER.

9. Other Legal Actions

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

10. Validity

- 10.1 The validity of this Integrity Pact shall be from date of its signing and extend up to 7 years or the complete execution of the contract to the satisfaction of both the BUYER and the BIDDER/Seller, including warranty period, whichever is later. In case BIDDER is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract, with the successful Bidder by the BUYER.
- 10.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

11. The parties hereby sign this Integrity Pact at _____ on _____

For BUYER

Name of the Officer.

Chief Executive Officer Designation

Office / Department /

Branch

GIL

Witness

1

2

for BIDDER

Witness

1.

2.

* Provisions of these clauses would need to be amended/ deleted in line with the policy of the BUYER in regard to involvement of Indian agents of foreign suppliers.

Note: This agreement will require stamp duty as applicable in the State where it is executed.

Annexure-X: Transition Plan

1. Introduction

This Annexure describes the duties and responsibilities of the Systems Integrator (SI) and the DST/GIL to ensure proper transition of all assets and services and to ensure complete knowledge transfer related to Data Centre project.

2. Objectives

The objectives of this annexure are to:

- (1) ensure a smooth transition of Services from the existing SI to a New SI or back to the DST/GIL at the termination or expiry of this Agreement.
- (2) ensure that the responsibilities of both parties to this Agreement are clearly defined in the event of exit and transfer; and
- (3) ensure that all relevant Assets are transferred.

3. General

- 3.1. Where the DST/GIL intends to continue equivalent or substantially similar services to the Services provided by the SI after termination or expiry of the Agreement, either by performing them itself or by means of a New/Replacement of SI, the existing SI shall ensure the smooth transition to the New/Replacement SI and shall co-operate with the DST/GIL, or the New/Replacement SI as required in order to fulfil the obligations under this annexure.
- 3.2. The existing SI shall co-operate fully with the DST/GIL and any potential Replacement/New SI tendering for any Services, including the transfer of responsibility for the provision of the Services previously performed by the existing SI to be achieved with the minimum of disruption. In particular:
 - 3.2.1. during any procurement process initiated by the DST/GIL and in anticipation of the expiry or termination of the Agreement and irrespective of the identity of any potential or actual Replacement /New SI, the existing SI shall comply with all reasonable requests by the DST/GIL to provide information relating to the operation of the Services, including but not limited to equipment, hardware, software, firmware used, inter-working, coordinating with other application owners, access to and provision of all performance reports, agreed procedures, and any other relevant information (including the configurations set up for the DST/GIL and procedures used by the existing SI for handling Data) reasonably necessary to achieve an effective transition, provided that:
 - 3.2.1.1. the existing SI shall not be obliged to provide any information concerning the costs of delivery of the Services or any part thereof or disclose the financial records of the SI to any such party.
 - 3.2.1.2. the existing SI shall not be obliged to disclose any such information for use by an actual or potential Replacement/New SI unless such a party shall have entered into a confidentiality agreement; and
 - 3.2.1.3. While supplying information as contemplated in this paragraph 3.2.1 the existing SI shall provide sufficient information to comply with the reasonable requests of the DST/GIL to enable an effective tendering process to take place but shall not be required to provide information or material which the SI may not disclose as a matter of law.

- 3.3. In assisting the DST/GIL and/or the Replacement SI to transfer the Services the following commercial approach shall apply:

3.3.1. Where the existing SI does not have to utilize resources in addition to those normally used to deliver the Services prior to termination or expiry, the existing SI shall make no additional Charges. The DST/GIL may reasonably request that support and materials already in place to provide the Services may be redeployed onto work required to effect the transition provided always that where the DST/GIL agrees in advance that such redeployment will prevent the SI from meeting any Service Levels, achieving any other key dates or from providing any specific deliverables to the DST/GIL, the DST/GIL shall not be entitled to claim any penalty or liquidated damages for the same.

Where any support and materials necessary to undertake the transfer work or any costs incurred by existing SI are additional to those in place as part of the proper provision of the Services. The DST/GIL shall pay the existing SI for staff time agreed in advance at the rates agreed between the parties and for materials and other costs at a reasonable price which shall be agreed with the DST/GIL.

- 3.4. If so, required by the DST/GIL, on the provision of no less than six (6) months' notice in writing, the SI shall continue to provide the Services or an agreed part of the Services for a period not less than month and not exceeding months beyond the date of termination or expiry of the Agreement. In such event the DST/GIL shall reimburse the existing SI for such elements of the Services as are provided beyond the date of termination or expiry date of the Agreement on the basis that:

- a) materials and other costs will be charged at a reasonable price which shall be agreed between the Parties; and/or
- b) any other fees agreed between the Parties at the time of termination or expiry.

- 3.5. The existing SI shall provide to the DST/GIL an analysis of the Services to the extent reasonably necessary to enable the DST/GIL to plan migration of such workload to a Replacement SI provided always that this analysis involves providing performance data already delivered to the DST/GIL as part of the performance monitoring regime.
- 3.6. The SI shall provide such information as the DST/GIL reasonably considers to be necessary for the actual Replacement/ New SI, or any potential Replacement SI during any procurement process, to define the tasks which would need to be undertaken in order to ensure the smooth transition of all or any part of the Services.
- 3.7. the existing SI shall make available such Key Personnel who have been involved in the provision of the Services as the Parties may agree to assist the DST/GIL or a Replacement/ New SI (as appropriate) in the continued support of the Services beyond the expiry or termination of the Agreement, in which event the DST/GIL shall pay for the services of such Key Personnel on a time and materials basis at the rates agreed between the parties.
- 3.8. The existing SI shall co-operate with the DST/GIL during the handover to a Replacement/ New SI and such co-operation shall extend to, but shall not be limited to, inter-working, coordinating and access to and provision of all operational and performance documents, reports, summaries produced by the existing SI for the DST/GIL, including the configurations set up for the DST/GIL and any and all information to be provided by the existing SI to the DST/GIL under any other term of this Agreement necessary to achieve an effective transition without disruption to routine operational requirements.

4. Replacement/ New SI

- 4.1 In the event that the Services are to be transferred to a Replacement/ New SI, the DST/GIL

will use reasonable endeavors to ensure that the Replacement/ New SI co-operates with the existing SI during the handover of the Services.

5. Sub SIs

- 5.1 The existing SI agrees to provide the DST/GIL with details of the Subcontracts used in the provision of the Services. The existing SI will not restrain or hinder its Sub SIs from entering into agreements with other prospective SIs for the delivery of supplies or services to the Replacement/ New SI.

6. Transfer of Assets

- 6.1. Six (6) months prior to expiry or within 2 (two) weeks of notice of termination of the Agreement the existing SI shall deliver to the DST/GIL the Asset Register comprising:
- (1) a list of all Assets eligible for transfer to the DST/GIL; and
 - (2) a list identifying all other Assets, (including human resources, skillset requirement and know-how), that are ineligible for transfer, but which are essential to the delivery of the Services. The purpose of each component and the reason for ineligibility for transfer shall be included in the list.
- 6.2. Within one (1) month of receiving the Asset Register as described above, the DST/GIL shall notify the existing SI of the Assets it requires to be transferred, (the "Required Assets"), and the DST/GIL and the existing SI shall provide for the approval of the DST/GIL a draft plan for the Asset transfer.
- 6.3. In the event that the Required Assets are not located on DST/GIL premises:
- (1) the existing SI shall be responsible for the dismantling and packing of the Required Assets and to ensure their availability for collection by the DST/GIL or its authorized representative by the date agreed for this.
 - (2) any charges levied by the existing SI for the Required Assets not owned by the DST/GIL shall be fair and reasonable in relation to the condition of the Assets and the then fair market value; and
 - (3) for the avoidance of doubt, the DST/GIL will not be responsible for the Assets.
- 6.4. The existing SI warrants that the Required Assets and any components thereof transferred to the DST/GIL or Replacement SI benefit from any remaining manufacturer's warranty relating to the Required Assets at that time, always provided such warranties are transferable to a third party.

7. Transfer of Software Licenses

- 7.1. Six (6) months prior to expiry or within two (2) weeks of notice of termination of this Agreement the existing SI shall deliver to the DST/GIL all licenses for Software used in the provision of Services which were purchased by the DST/GIL.
- 7.2. On notice of termination of this Agreement the existing SI shall, within 2 (two) weeks of such notice, deliver to the DST/GIL details of all licenses for SI's Software and SI's Third Party Software used in the provision of the Services, including the terms of the software license agreements. For the avoidance of doubt, the DST/GIL shall be responsible for any costs incurred in the transfer of licenses from the existing SI to the DST/GIL or to a

Replacement SI provided such costs shall be agreed in advance. Where transfer is not possible or not economically viable the Parties will discuss alternative licensing arrangements.

- 7.3. Within one (1) month of receiving the software license information as described above, the DST/GIL shall notify the existing SI of the licenses it wishes to be transferred, and the existing SI shall provide for the approval of the DST/GIL a draft plan for license transfer, covering novation of agreements with relevant software providers, as required. Where novation is not possible or not economically viable the Parties will discuss alternative licensing arrangements.

8. Transfer of Software

- 8.1. Wherein DST/GIL is the owner of the software, six (6) months prior to expiry or within two (2) weeks of notice of termination of this Agreement the existing SI shall deliver, or otherwise certify in writing that it has delivered, to the DST/GIL a full, accurate and up to date version of the Software including up to date versions and latest releases of, but not limited to:
- (a) source code (with source tree) and associated documentation,
 - (b) application architecture documentation and diagrams,
 - (c) release documentation for functional, technical and interface specifications,
 - (d) a plan with allocated resources to handover code and design to new development and test teams (this should include architectural design and code 'walk-through'),
 - (e) source code and supporting documentation for testing framework tool and performance tool,
 - (f) test director database,
 - (g) test results for the latest full runs of the testing framework tool and performance tool on each environment; and

9. Transfer of Documentation

- 9.1 Six (6) months prior to expiry or within two (2) weeks of notice of termination of this Agreement the existing SI shall deliver to the DST/GIL a full, accurate and up-to date set of Documentation that relates to any element of the Project.

10. Transfer of Service Management Process

- 10.1 Six (6) months prior to expiry or within two (2) weeks of notice of termination of this Agreement the existing SI shall deliver to the DST/GIL:
- (a) a plan for the handover and continuous delivery of the Service Desk function and allocate the required resources,
 - (b) full and up to date, both historical and outstanding Service Desk ticket data including, but not limited to:
 - (1) Incidents,
 - (2) Problems,
 - (3) Service Requests,
 - (4) Changes,
 - (5) Service Level reporting data,
 - (c) a list and topology of all tools and products associated with the provision of the

Software and the Services,

- (d) full content of software builds and server configuration details for software deployment and management and
- (e) monitoring software tools and configuration.

11.Transfer of Knowledge Base

- 11.1 Six (6) months prior to expiry or within two (2) weeks of notice of termination of this Agreement the existing SI shall deliver to the DST/GIL a full, accurate and up to date cut of content from the knowledge base (or equivalent) used to troubleshoot issues arising with the Services but shall not be required to provide information or material which the SI may not disclose as a matter of law.

12.Transfer of Service Structure

- 12.1 Six (6) months prior to expiry or within two (2) weeks' notice of termination of this Agreement the existing SI shall deliver to the DST/GIL a full, accurate and up to date version of the following, as a minimum:

- (a) archive of records including:
 - (1) Questionnaire Packs,
 - (2) project plans and sign off,
 - (3) Acceptance Criteria and
 - (4) Post Implementation Reviews.
- (b) program plan of all work in progress currently accepted and those in progress,
- (c) latest version of documentation set,
- (d) source code (if appropriate) and all documentation to support the services build tool with any documentation for 'workarounds' that have taken place,
- (e) source code, application architecture documentation/diagram and other documentation,
- (f) source code, application architecture documentation/diagram and other documentation for Helpdesk and
- (g) project plan and resource required to hand Service Structure capability over to the new team.

13.Transfer of Data

- 13.1 In the event of expiry or termination of this Agreement, the existing SI shall cease to use the DST/GIL Data and, at the request of the DST/GIL, shall destroy all such copies of the DST/GIL Data then in its possession to the extent specified by the DST/GIL.
- 13.2 Except where, pursuant to paragraph 14.1 above, the DST/GIL has instructed the existing SI to destroy such DST/GIL Data as is held and controlled by the existing SI, one (1) month prior to expiry or within one (1) month of termination of this Agreement, the existing SI shall deliver to the DST/GIL:
- (1) An inventory of the DST/GIL Data held and controlled by the existing SI, plus any other data required to support the Services; and/or
 - (2) a draft plan for the transfer of the DST/GIL Data held and controlled by the existing

SI and any other available data to be transferred.

14.Training Services on Transfer

- 14.1. The existing SI shall comply with the DST/GIL's reasonable request to assist in the identification and specification of any training requirements following expiry or termination. The purpose of such training shall be to enable the DST/GIL or a Replacement SI to adopt, integrate and utilize the Data and Assets transferred and to deliver an equivalent service previously provided by the existing SI.
- 14.2. The provision of any training services and/or deliverables and the charges for such services and/or deliverables shall be agreed between the parties.
- 14.3. Subject to paragraph 15.2 above, the existing SI shall produce for the DST/GIL's consideration and approval six (6) months prior to expiry or within ten (10) Working Days of issue of notice of termination:
 - (1) A training strategy, which details the required courses and their objectives.
 - (2) Training materials (including assessment criteria); and
 - (3) A training plan of the required training events.
- 14.4. Subject to paragraph 15.2 above, the SI shall schedule all necessary resources to fulfil the training plan, and deliver the training as agreed with the DST/GIL.
- 14.5. SI shall provide training courses on operation of licensed /open-source software product at DST/GIL's, at such times, during business hours as DST/GIL may reasonably request. Each training course per day will last for minimum hours. DST/GIL may enroll up to _of its staff or ___employees of the new/replacement SI in any training course, and the SI shall provide a hard copy of the Product (licensed or open sourced) standard training manual for each enrollee. Each training course will be taught by a technical expert with no fewer than Years of experience in operating software system. SI shall provide the training without any additional charges.

15.Transfer Support Activities

- 15.1. Six (6) months prior to expiry or within ten (10) Working Days of issue of notice of termination, the SI shall assist the DST/GIL or Replacement SI to develop a viable exit transition plan which shall contain details of the tasks and responsibilities required to enable the transition from the Services provided under this Agreement to the Replacement SI or the DST/GIL, as the case may be.
- 15.2. The exit transition plan shall be in a format to be agreed with the DST/GIL and shall include, but not be limited to:
 - (1) a timetable of events,
 - (2) resources,
 - (3) assumptions,
 - (4) activities,
 - (5) responsibilities and
 - (6) risks.

15.3. The existing SI shall supply to the DST/GIL or a Replacement SI specific material including but not limited to:

- (a) Change Request log,
- (b) entire back-up history and
- (c) dump of database contents including the Asset Register, problem management system and operating procedures. For the avoidance of doubt this shall not include proprietary software tools of the SI which are used for project management purposes generally within the SI's business.

15.4. The existing SI shall supply to the DST/GIL or a Replacement SI proposal for the retention of Key Personnel for the duration of the transition period.

15.5. On the date of expiry, the existing SI shall provide to the DST/GIL refreshed versions of the materials required under paragraph 16.3 above which shall reflect the position as at the date of expiry.

15.6. The existing SI shall provide to the DST/GIL or to any Replacement SI within fourteen (14) Working Days of expiry or termination a full and complete copy of the Incident logbook and all associated documentation recorded by the SI till the date of expiry or termination.

15.7. The existing SI shall provide for the approval of the DST/GIL a draft plan to transfer or complete work-in-progress at the date of expiry or termination.

16. Use of DST/GIL Premises

16.1 Prior to expiry or on notice of termination of this Agreement, the existing SI shall provide for the approval of the DST/GIL a draft plan specifying the necessary steps to be taken by both the existing SI and the DST/GIL to ensure that the DST/GIL's Premises are vacated by the existing SI.

16.2 Unless otherwise agreed, the existing SI shall be responsible for all costs associated with the vacation of the DST/GIL's Premises, removal of equipment and furnishings, redeployment of SI's Personnel, termination of arrangements with SubSIs and service SIs and restoration of the DST/GIL Premises to their original condition (subject to a reasonable allowance for wear and tear).

IN WITNESS WHEREOF, the parties hereto have caused this annexure to be executed by their duly authorized representatives as ofday of

DST/GIL

By:

Name:

Designation:

Date:

WITNESS:

1.

Systems Integrator

By:

Name:

Designation:

Date:

1.

Annexure-Y: Specification for Quality Management System (QMS) Requirements from SI

1. Scope

This specification establishes the Quality Management System requirements to be met by SI/Sub- SIs after award of work/during contract execution.

2. Definitions

2.1 Project Quality Plan

Document tailored from Standard Quality Management System Manual of SI, specifying how the quality requirements of the project will be met.

2.2 Owner

Owner means the owner of the project (i.e., DST/GIL) for which services / equipment are being purchased and includes their representatives, successors and assignees.

3. Quality Management System - General

Unless otherwise agreed with DST/GIL, the SI proposed quality system shall fully satisfy all relevant requirements of ISO 9001 "Quality Management Systems Requirements." Evidence of compliance shall be current certificate of quality system registration to ISO 9001 or a recent compliance audit recommending registration from a registrar. The quality system shall provide the planned and systematic control of all quality related activities for execution of contract. Implementation of the system shall be in accordance with SI Quality Manual and PROJECT specific Quality plan.

4. Quality System Requirements

- 4.1 SI shall ensure that the responsible authority for execution of the contract has communicated the contract requirements including any identified or intended statutory and regulatory requirements to all concerned in their organization and sub-SI's organization who are contributing to the execution of this contract.
- 4.2 SI shall establish a documented Quality policy and Quality Objectives to achieve the specified and intended requirement of this contract.
- 4.3 SI shall identify and communicate the responsibilities and authorities of the personnel contributing to the execution of this contract.
- 4.4 SI shall deploy competent and trained personnel for various activities for fulfillment of the contract. SI shall arrange adequate infrastructure and work environment to ensure that the specification and quality of the deliverable are maintained.
- 4.5 SI shall do the quality planning for all activities involved in delivery of order. quality planning shall cover as minimum the following:
 - a) Resources
 - b) Product deliverable characteristics to be controlled.
 - c) Process characteristics to ensure the identified product characteristics are realized
 - d) Identification of any measurement requirements, acceptance criteria

- e) Records to be generated
- f) Need for any documented procedure

The quality planning shall result into the quality assurance plan, inspection and test plans and job procedures for the project activities in the scope of SI. These documents shall be submitted to DST/GIL for review/approval before commencement of work.

- 4.6 Requirements for sub-contracting / purchasing of services specified in contract / tender shall be adhered to. Wherever requirements are not specified, the SI shall establish and maintain a system for purchasing/sub-contracting to ensure that purchased product / service conforms to specified requirement. Criteria for selection of sub-SI, evaluation, re-evaluation, maintenance of purchasing data and verification of purchased product (sub-SI services), constitute important components of this requirement.
- 4.7 SI shall plan and carry production and service provision under controlled conditions.
- 4.8 Controlled conditions shall include, as applicable
 - a) the availability of information that describes the characteristics of the product
 - b) the availability of work instructions
 - c) the use of suitable equipment
 - d) the availability and use of monitoring and measuring devices
 - e) the implementation of monitoring and measurement
 - f) the implementation of release, delivery and post-delivery activities
- 4.9 SI shall validate any processes for production and service provision where resulting output cannot be verified by subsequent monitoring and measurement. This includes any process where deficiencies become apparent only after the product is in use or service has been delivered.
- 4.10 SI shall establish a system for identification and traceability of product / deliverable throughout product realization. Product status with respect to inspection and testing requirements shall be identified.
- 4.11 SI shall identify, verify, protect and safeguard DST/GIL property (material / document) provided for use or incorporation into the product. If any DST/GIL property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the DST/GIL.
- 4.12 SI shall preserve the conformity of product / deliverable during internal processing and delivery to the intended destination. Requirements mentioned in the tender shall be adhered to.
- 4.13 SI shall establish system to ensure that inspection and testing activities are carried out in a manner that is consistent with the inspection and testing requirements. Where necessary, measuring equipment shall be calibrated at specified frequency, against national or international measurement standards; where no such standard exists, the basis used for calibration shall be recorded. The measuring equipment shall be adjusted or re-adjusted as necessary, identified to enable the calibration status to be determined. The measuring equipment shall be protected from damage during handling, maintenance and storage.
- 4.14 SI shall ensure effective monitoring, using suitable methods, of the processes involved in production and other related processes for delivery of the scope of contract.
- 4.15 SI shall monitor and measure the characteristics of the product/deliverable to verify that product requirement has been met. The inspection by SI and DST/GIL personnel shall be carried out strictly as per the Inspection and Test Plans (ITPs) forming part of the contract. Product release or service delivery shall not proceed until the planned arrangements have been satisfactorily completed, unless otherwise approved by relevant authority and where applicable by DST/GIL.

- 4.16 SI shall establish and maintain a documented procedure to ensure that the product which does not conform to requirements is identified and controlled to prevent its unintended use or delivery
- 4.17 All non-conformities (NCs) / deficiencies found by the SI'S inspection / surveillance staff shall be duly recorded, including their disposal action shall be recorded and resolved suitably. Effective corrective and preventive action shall be implemented by the SI so that similar NCS including deficiencies do not recur.
- 4.18 All deficiencies noticed and reported by DST/GIL shall be analyzed by the SI and appropriate corrective and preventive actions shall be implemented. SI shall intimate DST/GIL of all such corrective and preventive action implemented by him.
- 4.19 SI should follow the standards, specifications and approved drawings. Concessions/Deviations shall be allowed only in case of unavoidable circumstances. In such situations Concession/deviation request must be made by the SI in attached Format A.
- 4.20 SI shall have documented procedure for control of documents.
- 4.21 All project records shall be carefully kept, maintained and protected for any damage or loss until the project completion, then handed over to DST/GIL or disposed of as per **Annexure-M** of the contract requirement.
- 4.22 SI shall prepare and submit for review and approval, project Quality plan / Quality Assurance Plan for contracted scope I job. The SI'S Quality Plan shall address all of the applicable elements of ISO 9001, identify responsible parties within SI'S organization, for the implementation / control of each area, reference the applicable procedures used to control / assure each area, and verify the documents produced for each area. The Project Quality Plan shall necessarily define control or make reference to the relevant procedures, for design and engineering, documentation, record control, bid evaluation, inspection, production/manufacturing, preservation, packaging and storage, quality control at construction site, pre-commissioning, commissioning and handing over (as applicable) in line with contract requirement and scope of work

5. Audits

SI shall plan and carry out the QMS audit for the job. Quality audit program shall cover design, procurement, construction management, commissioning and Operation as applicable including activities carried out by sub-vendors / sub-SIs. This shall be additional to the certification body surveillance audits carried out under BIDDERS own ISO 9001 certification scheme. The audit programs and audit reports shall be submitted to DST/GIL as per specified documentation requirements. DST/GIL representative reserves the right to attend, as a witness, any audit conducted during the execution of the Project. In addition to above any third party may be appointed by DST/GIL to perform Quality and Technical compliance audits. SI shall provide assistance and access to their systems and sub-SI / vendor systems as required for this purpose. Any deficiencies noted shall be immediately rectified by SI.

6. Documentation Requirements

- 6.1 SI shall submit following QMS documents immediately after award of work (within one week) for record / review by DST/GIL.
 - a. Organization chart (for complete organization structure and for the project)
 - b. Project Quality plan/Quality Assurance Plan
 - c. Job specific Inspection Test Plans
 - d. Job Procedures
 - e. Inspection test Formats
- 6.2 In addition to above QMS documents, following documentation shall be maintained by the SI for submission to DST/GIL on demand at any point of time during execution

of the project.

- a. Quality Manual
- b. CVs of the personnel in SI'S QA Organogram
- c. Certificate of approval for compliance to ISO: 9001 standards
- d. Procedure for Control of Non-conforming Product
- e. Procedure for Control of Documents
- f. Sample audit report Of the QMS internal and external audits conducted during last one year
- g. Customer satisfaction reports from at least 2 customers, during the last One year
- h. Project audit report
- i. Corrective action report on the project audits
- j. technical audit reports for the project

6.3 Documents as specified above are minimum requirements. SI shall submit any other document/data required for completion of the job as per DST/GIL's instructions.

Abbreviation:

MR	Material Requisition
PR	Purchase Requisition
PO	Purchase Order
QA	Quality Assurance
QMS	Quality Management System
ISO	International Organization for Standardization
CV	Curriculum Vitae

Format A: Concession / Deviation Permit

(Only this page for communication with SI/Sub- SI)

To be filled by Originator	Project:	Originator Ref:
	Job No:	Order/Contract No:
	Equipment Title:	Item No
	Originator: SI/ Sub-SI	
	Caution: Originator to note that any delay in processing of concession/deviation permit shall be to originator's account and shall not be used as a reason for extension in delivery	
	Requirement as per Specification	Description of Concession/Deviation Sought
Why is the Concession/Deviation required? Supporting evidence/calculations enclosed/not enclosed		

	Time impact	More/Less/No change
	Cost impact	More/Less/No change
	Performance Warranty/Guarantee	Affected/NOT affected
	Under present constraints requested Concession/deviation is most optimum for the project and does not involve any hazard and shall meet the stipulated performance requirements.	
	Date:	Signature
		Vendor /SI (with seal)

Decision on Concession/Deviation including decision, on time and cost implications
(To be filled by the Inspection Engineer, responsible for conveying the decision to the originator, after resolution)

Whether any SI/Sub-SI made 'Technically not Acceptable' during bid evaluation, on the aspect of which this concession deviation is sought (yes/No):

Date: Name:

Clients Decision, if required
Date:

Name:

Annexure-Z: Preferred Make list for Civil Items

Preferred Brands names of materials, whichever are applicable for the scope of work are listed below. Only BIS marked materials shall be used in the work. Non-BIS marked materials may be permitted by the Engineer-in-charge only when BIS marked materials are not manufactured.

Sr. No.	Materials	List of Approved Make
1	(i) Ordinary Portland Cement/ Portland Pozzolana Cement.	A.C.C., Ultratech, Ambuja Cement, J.K. Cement,
	(ii) White Cement	A.C.C., Ultratech, Ambuja Cement, J.K. Cement, Birla White, J.K. White, ACC
2	Reinforcement Steel	SAIL, Tata Steel, Rashtriya Ispat Nigam Ltd (RINL), JSW Steel Ltd., Jindal Steel & Power Ltd.
3	Admixtures, Plasticizer, Super Plasticizer,	Fosroc, BULWORK, Sika BASF, Ardex Endura (Bal Endura) McCoy Soudal
4	AAC Blocks	Magicrete, Modcrete Blocks, BILT
5	Structural Steel	SAIL, Tata Steel, Rashtriya Ispat Nigam Ltd (RINL) and JSW Steel Ltd.
6	Polycarbonate Sheet	GE Plastic, LEXAN COVESTRO India Pvt. (Brand name Makrolon), Tuflite Polymer Limited
7	Profile Steel Sheet (Precoated)	Ezydeck of TATA, Lloyd Superdesk, JSW, Jindal
8	Particle Board	Kitply, Action TESA, Greenlam, Merino.
9	Laminated Particle Board, Laminates	Kitply, Action TESA, Greenlam, Century, Ply, Merino
10	Flush Door Shutters	Duro, Kitply Industries (Swastik), Century, Durian, Green Ply, Jain Wood Industries.
11	Fire Rate Doors	Sukriti, Synergy Thrislington, Signum, M.P.P. Godrej
12	Acoustical Fire Door	Green Ply, Century, Sukriti, Kutty
13	Plywood, Veneer	Green Ply, Century, Merino, Kitply, Duro, Durian
14	Melamine Polish	Asian Paints Melamine Gold, Wudfin of Pidilite, Timbertone of ICI Dulux.
15	Floor Spring & Door Closure	Geze, Dorma, Doorset, Kich
16	(a) Aluminium Section	Jindal, Mahavir, Bhoruka, BR Extrusion, Hindalco
17	(b) Anodised Aluminium Hardware (Heavy Duty)	Kinlong, Giessie, Assabloy, Savio, Sotralu
18	Stainless Steel Accessories etc.	JINDAL, Dorma, Kitch, GEZE, Hardwyn
19	S.S. Door & Window Fittings	JINDAL, Dorma, Kitch, Doorset, GEZE.
20	Silicon Based water repellent, weather sealant	GE, Dow Coming, Sikka, Wacker
21	Poly-Sulphide Sealant	Fosroc, Pidilite (Dr. Fixit), Sika, BASF, Bulwork
22	Mosaic Tiles, Chequered Tiles	Ultra-Tiles, NITCO, NTC Tiles
23	Ceramic Tiles	Somany, Kajaria, RAK, NITCO.
24	Vitrified Tiles (Antiskid, Matt, Glazed)	Somany, Kajaria, RAK, NITCO.
25	Paver Block & Kerb Stone	NTC, NITCO, unistone
26	Dash, Anchoring Fasteners	Fischer, Hilti Canon
27	Cement Based wall putty	Birla Wall care, JK white, Berger, Asian Paints

Sr. No.	Materials	List of Approved Make
28	Oil Bound Washable Acrylic Distemper	Asian Paints: Professional Acrylic Distemper Nerolac: Beauty Acrylic Distemper Berger: Bison Acrylic Distemper Dulux: Maxilite
29	1st Quality Acrylic Distemper (washable, Ready mix, Low VOC)	Asian Paints: Tractor Aqua Look Paint Berger: Commando or Equivalent paints of Nerolac or Dulux.
30	Acrylic Emulsion Paints Interior Emulsion Paint	Asian Paints: Professional Premium Nerolac: Beauty Gold Berger: Rangoli Total Care Dulux: Super Cover
31	Plastic Emulsion Paint Premium Emulsion Paint	Asian Paints: Apcolite Heavy Duty Nerolac: Impression Berger: Easy Clean Dulux: Super Clean 3 in 1
32	Premium Acrylic Paints (Interior)	Superclean, Royal Health Shield Advance Nerolac Impressions
33	Textured Exterior Paint	Asian Paints, Nerolac, Berger Paints, Ultratech, Paints Luxture.
34	Acrylic Smooth Exterior Paint	Asian Paints: Emulsion Apex Professional Nerolac: XL Berger: Weather Coat Dulux: Weather shield
35	Premium Acrylic paint with smooth silicon additives	Asian Paints: Apex Ultima Nerolac: XL Total Berger: Weather Coat all guard Dulux: Weather shield Max
36	Synthetic Enamel Paint	Asian: Apcolite gloss enamel Nerolac: Synthetic Hi gloss Berger: Luxol Hi gloss Dulux: Gloss Synthetic enamel
37	Cement Primer	Nerolac, Berger, Asian, Dulux
38	Steel Primer (Red Oxide Zinc Chromate Primer)	Asian, Nerolac, Berger, Dulux
39	Wood Primer	Asian, Nerolac, Berger, Dulux
40	Epoxy Paint	Asian, Nerolac, Berger, Akzo Nobel
41	Fire Paint	Asian Paints, Akzo Nobel, PROMAT, Jotun
42	Vitreous China Sanitary ware	HINDWARE, ROCA, KOHLER
43	Concealed Cistern	EURONICE, HINDWARE, ROCA, KOHLER
44	Plastic W.C. seats Covers	HINDWARE, ROCA, KOHLER
45	Stainless Steel Sinks	JAYNA, STAR, VIJAY SANITARY
46	C.P. Fittings & Accessories	HINDWARE, ROCA, EURONICS
47	Rubber Insulation	ARMAFLEX, VIDEOFLEX
48		JINDAL, HISSAR, TATA, PARKASH, SURYA
49	S.S. Hinged Grating	CHILLY, JAYNA, VIJAY SANITARY
50	Stoneware Pipes & Gully- IS 651	Locally IS approved
51	R.C.C Pipes IS:458	Locally IS approved

Sr. No.	Materials	List of Approved Make
52	FRP Manhole cover & frame and FRP Grating	PROLONG, THERMODRAIN, POOJA
53	SFRC Manhole COVERS ETC	KK, PRAGATI, SUPER WIRE, ISI
54	Anti-corrosive tape for pipe protection	PYPKOTE, MAKPOLYKOTE
55	Garden Irrigation System	JAIN, HARVEL
56	Anticorrosive Bitumastic Paint	ISI
57	Epoxy Paint	ISI
58	Paint	SHALIMAR, ASIAN
59	Post Tensioning work system and applicators	Utracon Structural System Pvt. Ltd. Tech 9 Engineering Solutions Pvt. Ltd CRUX Prestressing Systems Pvt. Ltd. VSL International
60	PT Strands	Tata Steel, Usha martin strands
61	Expansion Joint	Migua, VistaraM EJC, ASP
62	Powder Coating	Akzo Noble, Jotun, ASIAN, ORBIT
63	EPDM Gaskets	ALP, Mona, Hanu
64	SS Hardware for Alumin window and structural glazing	Kinglong, Assabloy, Giessie, Savio, Sotralu
65	Powder Coater	Agv fenestration, Micron coater, Radiant
66	Two-point Locking handle	Assabloy, Giessie, Alualpha, Savio, Sotralu
67	Friction stay	Assabloy, Securitystyle, Giessie, Savio, Sotralu
68	Clear, Float, Frosted, Refractive, Coated Glass, DGU	Guardian, Pikington, ASAHI, Saint Gobain
69	Thermal brake SYSTEM COMPANY	AGV SYSTEM, PONZIO SYSTEM, REYNEARS SYSTEM
70	Nut Bolts (S.S)	Atul, Kundan, Priya
71	Fabrication & Installation	Glass Wall System, AGV ALFAB LTD,
72	Specialised Glazing, window	ALKARMA, CEC
73	Fire Door Hardware	Dorma, Ingersoll Rands Briton, Marshall, Assa Abloy
74	Panic bar for fire Glass	Ingersoll Rand's Briton Assa Abloy, Marshall, Dorma
75	Fire Rated Glass	SCHOTT Germany, Asahi India, Plikington
76	Glass Reinforced Concrete (G.R.C) Panels and Jali, screen	Unistone, kingspan, Birla GRC
77	Fabric acoustical wall panel	Credence, Ecophon, Topakustik
78	Baffle Metal Ceiling	Durlum, Hunter Douglas, Credence, AMF
79	Acoustical clouds false ceiling Wooden slit Acoustical perforated wall paneling, Wooden groved Acoustical wall paneling	Ecophon, Credence, Saint Gobain, AMF
80	Flocked Carpet flooring	JCC/Modulyss/Flotex
81	Acoustical Wooden Stage Flooring, Wood Wool Acoustic Wall Panel for Stage	Hunter Douglas, Ecophon, Prolad, Viels
82	Suspended false ceiling (Gypsum Board, Calcium Silicate Board	Saint Gobain USG Boral Gypsum Boards (Thundersteel), Knauf

Sr. No.	Materials	List of Approved Make
83	Vinyl sheet flooring	Medintech Plus PUR, Armstrong
84	PC Base Concrete Additives as per 9103	Bulwark, Grace, BASF
85	Non-Metallic Floor Hardener	Pidilite, BASF, Bulwark
86	Epoxy Tile Grout	Bulwark, Latticrete, Bal Endura
87	Tile Adhesive	Bulwark, Latticrete, Bal Endura
88	Curing Compound (Wax Base)	Soprema, BASF, Bulwark
89	Formwork Release Agent	Fosroc, BASF, Bulwark
90	Repair Mortar (Epoxy Base)	Soprema / Fosroc / BASF
91	Repair Mortar (Cement Base)	Soprema / Fosroc / BASF
92	Integral Waterproofing Compound, Non-Shrink Grout Cementitious, Epoxy Injection Grouting, Anti-Corrosive Coating, Water Repellent Coating	Remmers / BASF / Soprema
93	PU Waterproofing Coating and Primer PU Base	Soprema / Remmers / Delta
94	Food Grade Epoxy, Waterproofing, Elastomeric Coating	Soprema, Fosroc, Bulwark
95	Bituminous Elastomeric PU Coating	Soprema / Remmers / Fosroc
96	Glass Fiber (Concrete Admix)	Fosroc, Bulwark, Recron
97	Crystalline (Admix)	Soprema / Grace / Baumerk
98	Water Swellable Bar	Remmers / Soprema / Hayakawa
99	Bonding Agent, Corrosion Inhibitor	Soprema / Remmers / Fosroc
100	EDPM Membrane	Sika / Soprema / BASF
101	Thermal Insulation XPS	Soprema / Lloyds / Metecno
102	SBR latex	Basf / Soprema / Fosroc
103	Metal Ceiling	Durlum, Credence, Hunter Douglas
104	Chemical to be used for 20% E.C. Anti-termite treatment	DE-NOCIL and Bayer
105	Anti-Termite Treatment Agency Control, Capital pest control (India)	Pest Control India Ltd, Godrej Pest
106	Medium Density Boards	Green Panelmax, Duratuff, Century, Action Tesa
107	WPC Doors	Ecote, Quite Extrusions, Echon
108	Aerocon panels	Birla Aerocon, NCL, Bhargav Infrastructure
109	ANTI STATIC FLOORING	Armstrong World Industries
110	Raised/false access flooring	Flexi Floor -Intosol, Tate, Kingspan, Lindner
111	Baffle Metal ceiling	Durlum, Harsons Green, Dampa, Dexune
112	Wall cladding Panels	Durlum, Harsons Green, Dampa, Dexune
113	False ceiling	USG Boral, Knauf, Saint Gobain
114	HDHMR Wall Panelling	Greenlam, Ecote, Merlin Ply-la
115	Cement-Composite Cladding	Equitone, Fibrec, Swisspearl, . Fabricator: ALKARMA, AGVALFAB, WINDORZ

Sr. No.	Materials	List of Approved Make
116	Alumin Louvers	Construction Specialties group Industrial Louvers, Airolite
117	EPDM Water Proofing	Firestone/ Genflex/Sealecs Sweden
118	Geo Textile	Balco USA / Ocean Global/Soprema
119	Solid Aluminium Panels	AlucoBond, Reynobond Alpoolite (fabricator: 4F, truewall, Asquare)
120	Fiber Cement Board	Equiton, Fibrec, Swisspearl (fabricator: Alkarma, AGV Alfab, Windorz)
121	Mineral Wool Tile	USG Boral, Knauf, Saint Gobain
122	Toilet Cubical	Marino, Green Ply, Century
123	Fire Rated Hardware	Marshall, IR Briton, Assa Abloy
124	Fire Rated Glass	Schott Germany, Asahi India, Pilkington
125	Green Wall	Wonderwall, Four Leaf, Bio-vertical
126	Metal False Ceiling & Panels	Durlum, Harsons Green, Dampa, Dexune
127	Vinyl Flooring	UPO Floors, Armstrong, mannington
128	Stone Plastic Composite	Mannington, Armstrong, Kahrs

Annexure-A1: Declaration of Acceptance of Terms & Conditions of RFP

DECLARATION OF ACCEPTANCE OF TERMS & CONDITIONS CONTAINED IN THE RFP

To,
Deputy Director (IT)
Gujarat Informatics Limited
Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,
Sector 10A, Gandhinagar, Gujarat 382010

Sir,

I have carefully gone through the Terms & Conditions contained in the Tender Document [____] regarding RFP for Selection of System Integrator for implementation (Design, Build, Commission and O&M) of Greenfield State Data Centre at Gandhinagar, Gujarat.

I declare that all the provisions of this tender document read along with the proposal submitted by my Company. I certify that I am an authorized signatory of my company and therefore, competent to make this declaration. I further certify that, interpretation made by DST/GIL technical committee is the final and binding on me.

Yours sincerely,

(Seal & Signature of the Authorized signatory of the bidder)

Name:

Place:

Designation:

Date:

Annexure-B1: SELF-DECLARATION (to be filled by the bidder)

To,
{Procuring entity},

In response to the RFP Ref. No. _____ dated _____ for {Project Title}, as an Owner/ Partner/ Director/ Auth. Sign. of _____, I/ We hereby declare that presently our Company/ firm _____, at the time of bidding: -

- a) possess the necessary professional, technical, financial and managerial resources and competence required by the Bidding Document issued by the Procuring Entity.
- b) have fulfilled my/ our obligation to pay such of the taxes payable to the Union and the State Government or any local authority as specified in the Bidding Document.
- c) is having unblemished record and is not declared ineligible for corrupt & fraudulent practices either indefinitely or for a particular period of time by any State/ Central government/ PSU/ UT.
- d) does not have any previous transgressions with any entity in India or any other country during the last three years
- e) does not have any debarment by any other procuring entity
- f) is not insolvent in receivership, bankrupt or being wound up, not have its affairs administered by a court or a judicial officer, not have its business activities suspended and is not the subject of legal proceedings for any of the foregoing reasons.
- g) does not have, and our directors and officers have not been convicted of any criminal offence related to their professional conduct or the making of false statements or misrepresentations as to their qualifications to enter into a procurement contract within a period of three years preceding the commencement of the procurement process, or not have been otherwise disqualified pursuant to debarment proceedings.
- h) does not have a conflict of interest as mentioned in the bidding document which materially affects the fair competition.
- i) will comply with the code of integrity as specified in the bidding document.

If this declaration is found to be incorrect then without prejudice to any other action that may be taken as per the provisions of the applicable Act and Rules thereto prescribed by GIL, my/ our security may be forfeited in full and our bid, to the extent accepted, may be cancelled.

Thanking you,

Name of the Bidder: -
Authorized Signatory: -
Seal of the Organization: -
Date: Place:

Annexure-C1: FORMAT FOR SUBMISSION OF PROJECT REFERENCES FOR PRE-QUALIFICATION

Project Name:	Value of Contract/Work Order (In INR):
Country: Location within country:	Project Duration:
Name of Customer:	Total No. of staff-months of the assignment:
Contact person with address, phone, fax and e-mail:	Approx. value of the services provided by your company under the contract (in INR):
Start date (month/year): Completion date (month/year):	
Name of associated Bidders, if any:	
Narrative description of Project:	
List of Services provided by your firm/company	

Please attach a copy of the work order/ completion certificate/ purchase order/ letter from the customer for each project reference

Annexure-D1: BIDDER'S AUTHORIZATION CERTIFICATE {to be filled by the bidder}

To,
{Procuring entity},

_____,

I/ We {Name/ Designation} hereby declare/ certify that {Name/ Designation} is hereby authorized to sign relevant documents on behalf of the company/ firm in dealing with RFP reference No. _____ dated _____. He/ She is also authorized to attend meetings & submit technical & commercial information/ clarifications as may be required by you in the course of processing the Bid. For the purpose of validation, his/ her verified signatures are as under.

Thanking you,

Name of the Bidder: -
Authorized Signatory: -
Seal of the Organization: -
Date: Place:

Verified Signature:

Annexure-E1: Authorization Letters from all OEMs

To,
Deputy Director (IT)
Gujarat Informatics Limited
Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,
Sector 10A, Gandhinagar, Gujarat 382010

Reference: Request for Proposal (RFP): Selection of System Integrator for implementation (Design, Build, Commission and O&M) of Greenfield State Data Centre

Sir,
We _____, (name and address of the manufacturer) who are established and reputed manufacturers of _____ having factories at _____ (addresses of manufacturing locations) do hereby authorize M/s _____ (name and address of the Bidder) to bid, negotiate and conclude the contract with you against the above mentioned tender for the above equipment manufactured by us.

Yours faithfully,

For and on behalf of M/s _____ (Name of the manufacturer)

Signature _____

Name :

Designation :

Address :

Date :

Directorate Seal

Note: This letter of authority should be on the letterhead of the concerned manufacturer and should be signed by a person competent and having the power of attorney to bind the manufacturer.

Annexure-F1: Warranty Certificate

(On Bidder's Letterhead)

To,
Deputy Director (IT)
Gujarat Informatics Limited
Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,
Sector 10A, Gandhinagar, Gujarat 382010

Sir,

We warrant that the equipment(s) supplied under the contract would be newly manufactured, free from all encumbrances, defects and faults in material or workmanship or manufacture, shall be of the highest grade and quality, shall be consistent with the established and generally accepted standards for materials of the type ordered, shall be in full conformity with the specifications, drawings of samples, if any, and shall operate as designed. We shall be fully responsible for its efficient and effective operation. We also warrant that the services provided under the contract shall be as per the Service Level Agreement (SLA) with DST/GIL.

The obligations under the warranty expressed above shall include all costs relating to labour, spares, maintenance (preventive as well as unscheduled), and transport charges from site to manufacturer's works / service facilities and back for repair or modification or replacement at site of the equipment or any part of the equipment, which under normal care and proper use and maintenance proves defective in design, material or workmanship or fails to operate effectively and efficiently or conform to the specifications and for which notice is promptly given by DST/GIL to us (Bidder). We shall provide on-site support for all the equipment and services supplied hereunder during the period of this warranty (7 years after acceptance for equipment (7 years for the date of final go-live) and entire service period for services).

Yours sincerely,

(Seal & Signature of the Authorized signatory of the System Integrator)

Name:

Place:

Designation:

Date:

Annexure-G1: Format for providing CV of Key Personnel

Curriculum Vitae of Key Personnel's

The bidder shall provide the summary table of details of the manpower that will be deployed on this project during the implementation.

Table-A

S No	Type of Resource	Name of Resources	Key Responsibilities	Highest Academic Qualifications and Certifications (e.g., PMP/CDCP /ATD/CCNA/ITIL)	Years of Relevant Experience
1	Project Manager				
2	---				
3	---				
4	---				
5	---				
6	Others				
...					

Table-B

Sl. No.	Particulars	Details	Supporting document
1.	Key resource / non-Key resource		
2.	Name of the Personal		
3.	Current Designation/Job title		
4.	Current job responsibilities		
5.	Proposed Role in this project		
6.	Total experience and relevant experience (in years)		
7.	Number of years with the organization and date of joining the firm		
8.	Whether resource is engaged by the firm in its own payrolls	YES/NO	

Sl. No.	Particulars	Details	Supporting document
9.	Summary of Professional / Domain Experience		
10.	Date of Birth		
11.	Academic Qualifications: • Degree • Academic institution graduated from • Year of graduation • Specialization (if any) • Key achievements and other relevant information (if any)		Attach certificate of highest qualification
12.	Professional Certifications/ Training		Attach relevant certificates
13.	Membership of Professional Associations		
14.	Employment Record*		
15.	• Details of similar project handled & the role assigned • Prior project experience • Project name • Customer • Key project features in brief • Location of the project • Designation • Role • Responsibilities and activities • Duration of the project		
16.	Detailed tasks Proposed to be assigned	Work already undertaken that best illustrates capability to handle the tasks assigned**	
17.	Signature of the representative		

I hereby declare that the above-mentioned resource would be available during the project phase of this RFP.

*Starting with present position, list in reverse order every employment held by the staff member since graduation

****Among the assignments in which the staff has been involved, indicate brief details of the project in which this responsibility was assigned (including nature and duration of duty)**

Yours sincerely,

(Seal & Signature of the Authorized signatory of the System Integrator)

Name:

Place:

Designation:

Date:

Annexure-H1: Undertaking on Exit Management

Undertaking on Exit Management and Transition

(On the Bidder's Letterhead)

BID Ref. No: _____/_____

Date:

To,

Deputy Director (IT)

Gujarat Informatics Limited
Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,
Sector 10A, Gandhinagar, Gujarat 382010

Dear Sir,

Sub: Undertaking on Exit Management and Transition

1. I/We hereby undertake that at the time of completion of our engagement with DST/GIL, either at the End of Contract or termination of Contract before planned Contract Period for any reason, we shall successfully carry out the exit management and transition of this Project to DST/GIL or to an agency identified by DST/GIL to the satisfaction of DST/GIL. I/We further undertake to complete the following as part of the Exit management and transition:
 - a. We undertake to complete the updation of all Project documents and other artefacts and handover the same to DST/GIL before transition.
 - b. We undertake to design standard operating procedures to manage O&M of Non-IT infrastructure, document the same and train DST/GIL personnel on the same.
 - c. If DST/GIL decides to take over the operations and maintenance of the Project on its own or identifies or selects any other agency for providing operations & maintenance services on this Project, then we shall provide necessary handholding and transition support, which shall include but not be limited to, conducting detailed walkthrough and demonstrations for the Civil, non- IT Infrastructure, handing over all relevant documentation, addressing the queries/clarifications of the new agency with respect to the working / performance levels of the ICT components , conducting Training sessions etc.
2. I/We also understand that the Exit management and transition will be considered complete on the basis of approval from DST/GIL.

Yours sincerely,

(Seal & Signature of the Authorized signatory of the System Integrator)

Name:

Place:

Designation:

Date:

Annexure-I1: O&M performance reporting

Sr. No.	Frequency of Reports	Types of reports
1	Daily reports	Following reports must be submitted to all respective stakeholders in softcopy on daily basis: 1. Summary of Complaints/Request/Change request with their current status- For all components (online/through written) 2. Daily MIS report containing Availability of all components, Resource utilization, Attendance summary, Daily SLA check list report, Temperature & Humidity compliance report, Daily check lists (as defined by DST/GIL) 3. Report on downtime with their reason and RCA for Priority 1 incidents. (For other priority, Bidder need to submit RCA base on demand basis).
2	Weekly reports	Following reports must be submitted to all respective stakeholders in softcopy on weekly basis: 1. Report for call trend, call history, etc. with Analysis and recommendation 2. Summary of changes undertaken in the Data Centre including major changes and minor changes
3	Monthly reports	Following reports must be submitted to all respective stakeholders in softcopy on Monthly basis: 1. All equipment/components wise Civil and Non-IT infrastructure availability and resource utilization. 2. Consolidated Complaint-Incident/Request/Change request report with their SLA / non-conformance status and justification of breached cases. 3. Summary of changes in the Data Centre. 5. Log of preventive / scheduled maintenance undertaken 6. Summary of Monthly attendance of bidder's staff at the Data Center.
4	Quarterly reports	Following reports must be submitted to all respective stakeholders in softcopy on Quarterly basis: 1. Consolidated Inventory report having detailed break up and current status of inventory. 2. Consolidated Complaint-Incident/Request/Change request report with their SLA / non-conformance status and justification of breached cases. 3. Summary of component wise Data Centre uptime reports for all components with their SLA status. 4. Quarterly reports containing Log preventive Maintenance, Summary of changes in the Data Center. Summary of quarterly attendance of manpower availability at the Data Center etc. 5. Summary of action taken by SI against Audit observation submitted by DST/GIL/any appointed agency by DST/GIL. 6. Closure of Audit finding reports and their status, resolution time for closed Audit observation, pending cases with reason.
5	Half-Yearly reports	Following reports must be submitted to all respective stakeholders in softcopy on Half Yearly basis (in addition to quarterly report of said period): 1. Security Audit reports with respect to CIVIL and Non-IT infra.

Sr. No.	Frequency of Reports	Types of reports
		2. Non-IT infrastructure Upgrade / Obsolescence Report as required. 3. Civil Infrastructure Maintenance report for all components 4. Performance Analysis report and gap report with respect to RFP and Action plan.
6	Yearly Reports	Following reports must be submitted to all respective stakeholders in softcopy on Yearly basis (in addition to quarterly & Yearly report of said period): 1. Exit readiness and Management report for SI 2. Consolidate As-IS report for all Infrastructure (CIVIL and NON-IT infra) with updated Drawings, Diagrams, configurations, Password/policy, SOPs etc.
7	MIS reports and deliverables	The SI shall be responsible for submitting reports, but not limited to, as specified above in a format decided by DST/GIL. The following is only an indicative list of MIS reports which should be in conjunction to the reporting features highlighted in RFP. The bidder should submit reports to respective stakeholders involved in the project and hardcopy may have to be submitted as when required or asked by DST/GIL.

Annexure-J1: Unpriced Bid Format

Unpriced Bill of Material

The Bidder should provide the proposed Bill of Material (BoM) here. Bidder should refer to the Indicative BoM provided in the Volume II of this tender and should reproduce the same here. Kindly note that any additional items required should be clearly mentioned under 'additional line items' category towards the end of this table. Also note that details of the make/brand and model against each line item, wherever applicable, should be mentioned. The Bidder may add any additional line item (with adequate details) in the proposed BoM table below (towards the end of the table), that may be required to fulfil the tender and project requirements in totality. Kindly note that the indicative/estimated quantity provided in the RFP would be used for evaluation purposes; however, the payment would be done on actual usage basis.

Unpriced Bill of Material for all components (Edge device, Hardware, network, security, etc.)

Unpriced Bill of Material						
#	BoM Line Item	Unit of measurement	Quantity Proposed	Make / Brand	Model Details	Full Compliance with RFP Requirements (Yes / No)
1						
n						

Information about all software components being proposed

#	Software Component	Product Name version and technology	Module	Sub-module	Function / Purpose of the line item
1					
n					
	Bidder to add lines as required				

Annexure-K1: Format for Advance Bank Guarantee for Mobilisation Advance

(To be submitted on Rs. 500/- (five hundred) non-judicial stamp paper)

Bank Guarantee No. _____ dated. _____

To
Deputy Director (IT)
Gujarat Informatics Limited
Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan,
Sector 10A, Gandhinagar, Gujarat 382010

Dear Sir,

In consideration of Deputy Director (IT), Gujarat Informatics Limited (**PURCHASER**) having its registered office at Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector 10A, Gandhinagar, Gujarat 382010 INDIA. [hereinafter referred to as '**PURCHASER**', which expression unless repugnant to the context and meaning thereof shall include its successors and assigns] having agreed to make an advance payment of Rs. _____ [Rupees _____] in one or more instalments to M/s _____ a company incorporated under _____ Act and having its registered office at _____ [hereinafter referred to as "**Contractor/Supplier Note (I)**" which expression unless repugnant to the context and meaning thereof shall include its successors and assigns], provided the **Contractor/Supplier Note (I)** furnishes a bank guarantee for the said sum of Rs. _____ [Rupees _____] as required under the terms and conditions of CONTRACT / Work Order / Purchase Order No. **Note (II)** _____ dated _____ [hereinafter referred to as "the Order"] placed by **PURCHASER** on the said **Contractor/Supplier Note (I)**, we _____, a banking company incorporated under the Banking Regulations Act, having our registered office at _____ [hereinafter referred to as "**the BANK**" which expression shall include its successors and assigns] do hereby undertake to pay **PURCHASER** an amount not exceeding Rs. _____ [Rupees _____] on demand made by **PURCHASER** on us due to default in repayment of the advance and/or applicable interest thereon by the said **Contractor/Supplier Note (I)**.

1. We _____, the bank, hereby undertake to pay the amount under the guarantee without demur merely on a demand received in writing from **PURCHASER** stating that there is a default in repayment of advance and/or interest by the **Contractor/Supplier Note (I)** or that, by the reasons of the **Contractor/Supplier Note (I)**'s failure to comply with the terms and conditions as stipulated in the Order or amendments(s) thereto, **PURCHASER** is of the opinion that the **Contractor/Supplier Note (I)** would not repay the said advance and/or interest thereon. The demand made on the **BANK** shall be conclusive as to the default and as to the amount due and payable by the **BANK** under this guarantee, notwithstanding any dispute or disputes raised by the said **Contractor/Supplier Note (I)** regarding the validity of such default and we agree to pay the amount so demanded by **PURCHASER** without any demur. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____ [Rupees _____].

2. We, _____, the bank, further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the recovery of the said advance along with interest thereon and that it shall continue to be enforceable till all the dues

of **PURCHASER** under or by virtue of the said Order have been fully paid and its claim satisfied or discharged.

3. We _____, the bank, undertake to pay to **PURCHASER** any money so demanded notwithstanding any dispute or disputes raised by the said **Contractor/Supplier Note (I)** in any suit or proceedings pending before any court or tribunal relating thereto, as our liability under this present being absolute and unequivocal. The payment so made by us under this guarantee shall be valid discharge of our liability for payment there under and the said **Contractor/Supplier Note (I)** shall have no claim against us for making such payment.

4. We _____, further agree that **PURCHASER** shall have full liberty, without our consent and without affecting in any manner our obligation hereunder, to vary any of the terms and conditions of the Order or to extend time for completion of the contractual obligation by the said **Contractor/Supplier Note (I)** from time to time or to postpone for any time or from time to time any of the powers exercisable by **PURCHASER** against the said **Contractor/Supplier Note (I)** and to forbear or enforce any of the terms and conditions relating to the order and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said **Contractor/Supplier Note (I)** or for any forbearance, act or omission on the part of **PURCHASER** or any indulgence by **PURCHASER** to the **Contractor/Supplier Note (I)** or by any such matter or thing whatsoever which under the law relating to sureties would but for this provisions have effect of so relieving us.

5. To give full effect to this guarantee, **PURCHASER** will be entitled to act as if the BANK were the principal debtor, and the **BANK** hereby waives all rights of surety ship.

6. Our liability under this bank guarantee is restricted to Rs. _____ [Rupees _____] and shall remain in force up to _____ and thereafter till the expiry of the extended period, if any, (hereinafter Validity period) **(the period should be additional six months from effective period of contract)**. Unless a demand is made under this guarantee on us in writing at any time from the date of issue of the guarantee till the expiry of the Validity period including additional period of six months over contractual/extended period, we shall be discharged from all liabilities under this guarantee thereafter.

7. The claim, if any, under this guarantee, shall be lodged at (address of **BANK & Branch**)

_____ .

8. This guarantee will not be discharged due to change in the constitution of the BANK or of the said **Contractor/Supplier Note (I)** or the provision of the contract between **Contractor/Supplier Note (I)** and **PURCHASER**.

The BANK hereby agrees that the Courts in Gandhinagar/Ahmedabad shall have exclusive jurisdiction in any matter of dispute between **PURCHASER** and the BANK and that all the future correspondence regarding this bank guarantee shall be addressed to **The Deputy Director (IT)**, Gujarat Informatics Limited (**PURCHASER**) having its registered office at Block No. 2, 2nd Floor, C & D Wing, Karmayogi Bhavan, Sector 10A, Gandhinagar, Gujarat 382010, India .

10. We have the power to issue this Guarantee in your favour under the Charter of our Bank and the undersigned has full power to execute this Guarantee under the Power of Attorney granted to him by the Bank.

11. We, _____, the bank, lastly undertake not to revoke this guarantee during its currency, without the previous consent of the **PURCHASER** in writing.

SIGNED AND DELIVERED ON THIS _____ DAY OF _____

Yours faithfully,

For and on behalf of _____. (Bank)

Signature of Authorized Official of bank

Name of the Official:

Designation of the Official:

Name of Bank:

Branch:

Address of Branch:

Telephone / Mobile No:

Fax No:

Email Id:

While issuing Bank Guarantee for advance payment,

(Note: Strikeout which is not applicable at all places is the format **Supplier/Contractor**

(I) For supply - the word supplier will remain

For contracts/work order - the word contractor Note (I) will remain

(II) For contracts/work order/purchase order only one applicable word will remain.

For example, for supply only purchase order no. will remain)

DISCLAIMER:

1. This tender document is not an offer by DST/GIL but an invitation to get bids/proposals from bidders
2. There shall be no contractual obligations to be arisen from this tendering process, unless a formal contract is signed between DST/GIL and the selected bidder
3. It may be noted that this tender may not contain exhaustive details as expected. Interested bidders are required to make their own inquiries, to get clarity of any ambiguity observed by them, in this tender document
4. If at the later stage of tendering process, post submission of bid, any such ambiguity is highlighted by the bidder, at that time, the final decision will be considered of DST/GIL and the bidders will have to oblige to consider the same.
5. The BOQ is only indicative. As it is a solution-based project, the final BOQ may differ from bidder to bidder as per their solution.
6. The design solution mentioned in this document is concept design/illustrative for the understanding of the bidder. The actual design of the Data Centre will be prepared by the bidder basis of actual site survey/requirements and current market technology available.
7. Manpower calculation is minimum indicative to maintain the facility for 24X7, however on actual, SI may put the additional resource to maintain agreed SLA.
8. The bidder(s) will be ultimately responsible for obtaining all certifications specified in the RFP and will be responsible for paying all associated fees. The DST will compensate the selected bidder for the costs associated with obtaining the necessary certifications.
9. Since this is a Greenfield project, the Implementation agency needs to consider/arrange for construction power and water arrangement at the site.
10. All site physical material storage security remains with the Implementation agency till final sign-off.
11. The Administrative cost like Municipal charges for all types of NOCs, Charges for new Electricity connections, Charges for new water connections, Charges for NOCs from Municipal, Airport authorities, and Fire, etc. charges for Site clearance and readiness Should be considered while submitted the financial bid.

**Request for Proposal
(RFP)
for the Selection of a
System Integrator
for implementation
(Design, Build,
Commission and
O&M) of
Greenfield State Data
Centre**

Volume 2: Scope of Work

Issued By:



**Gujarat Informatics Limited
(GIL)**

(A Government of Gujarat
Undertaking)
On behalf of

**Department of Science &
Technology (DST)**

GIL, Block No. 2, 2nd Floor, C & D
Wing, Karmayogi Bhavan Sector - 10
A, Gandhinagar -

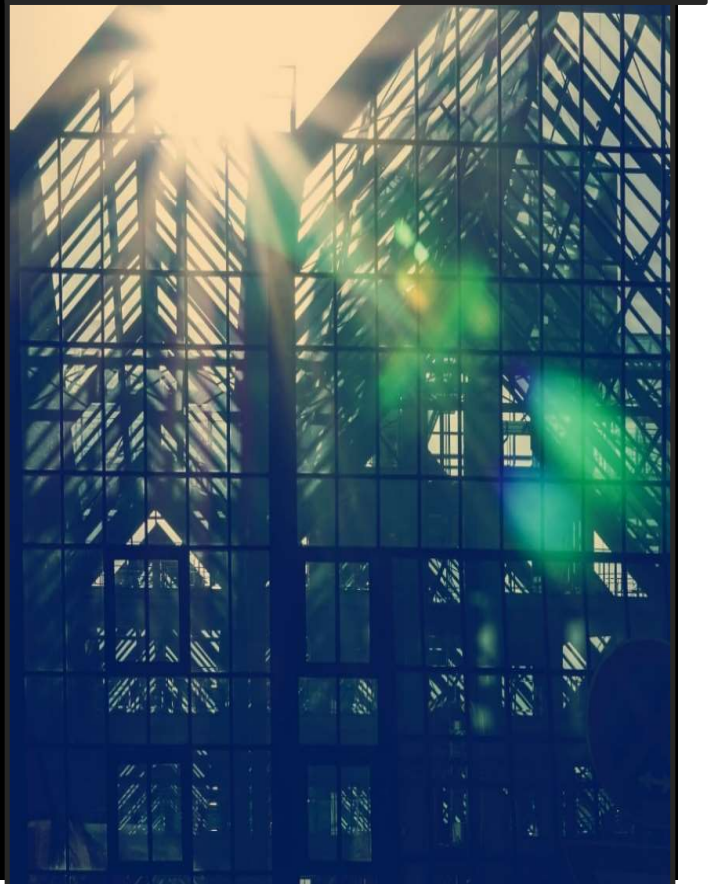


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Acronyms

S. No.	Abbreviations	Description/ Definitions
1.	GIL	Gujarat Informatics Limited
2.	DST	Department of Science and Technology
3.	GSDC	Gujarat State Data Centre
4.	BOM	Bill of Material
5.	BOQ	Bill of Quantity
6.	CAPEX	Capital Expenditure
7.	Cr.	Crores
8.	CCTV	Closed Circuit Television
9.	DC	Data Centre
10.	DG	Diesel Generator
11.	DOT	Department of Telecom
12.	DPR	Detailed Project Report
13.	DCOM	Data Centre Operation Management
14.	FAT	Final Acceptance Test
15.	G2B	Government to Business
16.	G2C	Government to Citizens
17.	G2G	Government to Government
18.	HLD	High-Level Design
19.	HPC	High-Performance Computing
20.	HVAC	Heating, Ventilation, and Air Conditioning
21.	HT	High Tension
22.	IBMS	Integrated Building Management Systems
23.	ISO	International Organization for Standardization
24.	LT	Low Tension
25.	MeitY	Ministry of Electronics and Information Technology
26.	NFPA	National Fire Protection Agency
27.	O&M	Operations and Maintenance
28.	OEM	Original Equipment Manufacturer
29.	OPEX	Operational Expenditure
30.	PAC	Precision Air Conditioning
31.	PAT	Partial Acceptance Test

S. No.	Abbreviations	Description/ Definitions
32.	PAHU	Precision Air Handling Unit
33.	POE	Power over Ethernet
34.	POI	Point of Interconnect
35.	PDU	Power Distribution Unit
36.	PUE	Power Usage Effectiveness
37.	QoS	Quality of Services
38.	SDC	State Data Centre
39.	SI	System Integrator
40.	SPV	Special Purpose Vehicle
41.	GoG	Government of Gujarat
42.	ToR	Terms of Reference
43.	UAT	User Acceptance Test
44.	UPS	Uninterrupted Power Supply
45.	VRF	Variable Refrigerant Flow
46.	VRV	Variable Refrigerant Volume
47.	VESDA	Very Early Smoke Detection Apparatus
48.	WAN	Wide Area Network
49.	WLD	Water Leak Detection System
50.	ATP	Advance Threat Protection
51.	EDR	Endpoint Detection & Response
52.	Core Team	GoG representative of GSDC
53.	MEP	Mechanical Electrical Plumbing

Definitions

In this connection, the following terms shall be interpreted as indicated below:

- "The DST/GIL" means Department of Science and Technology/Gujarat Informatics Limited owner of the project/Nodal implementation agency.
- "Bidder/SI/System Integrator/Managed Service Provider" means an eligible entity/firm submitting the Bid in response to this RFP.
- "Bid" means the written reply or submission of response to this RFP.
- "The Contract" means the agreement entered into between the DST/GIL and the SI, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
- "System Integrator (SI)" is the successful Bidder found eligible as per eligibility criteria set out in this RFP, whose technical Bid has been accepted, and who has emerged as TC1 (Technically Compliance) Bidder as per the selection criteria set out in the RFP and to whom notification of award has been given by DST/GIL.
- "The Contract Price/Project Cost" means the price payable to the SI under the Contract for the full and proper performance of its contractual obligations.
- "The Equipment/Product" means all the Non-IT/Civil components, including but not limited to Hardware / Software / Firmware/ Middleware/ services etc., which the SI is required to supply to the DST/GIL under this Contract.
- "Final Acceptance Test" means the date on which Final Acceptance Test certificate is issued shall be deemed to be the date of successful commissioning (Sign Off) of the Project. The final acceptance shall cover 100% of Phase Design, Supply, Built, Testing & Commission for this Project, after successful testing; a Final Acceptance Test Certificate (FAT) shall be issued by the DST/GIL to the selected SI.
- "The Services" means those services pertaining to the Planning, Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer of Tier III Complaint, certified Data Centre and other obligations such as transportation, transit insurance, customization, integration, provision of technical assistance, training, etc.; to be covered under the Contract by the SI.
- "The Project" means setting up a Tier III Complaint and Tier IV Ready Data Centre on Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer of Tier III Complaint and Tier IV Ready Data Centre for DST/GIL, at Sector- 18 adjacent to the State Emergency Operation Centre (SEOC), Gandhinagar- 382021.
- "The Project Site" means locations where supply and services as desired in this RFP document are to be provided.
- Defect Liability Period is Supervision of all equipment (including but not limited to Hardware / software / Firmware/ Middleware/ Services etc.). The SI will also be liable for any defects in this period and will take care of the remedial procedure. Defect liability Period starts one (1) year from the date of Final Acceptance Test (FAT).
- Term/Period of this Contract This period includes time taken to Design, Build, Supply, Installation, Testing, Commissioning and 7 years for Maintenance and operation of the Data Centre from the date of acceptance by the DST/GIL.
- "Data Centre" means complete campus facility including but not limited to Data Centre building, other ancillary building, facilities, utility areas, etc.

Disclaimer

- Department of Science & Technology, Govt. of Gujarat (herein after referred to as “DST”) invites proposals for Setting up of Tier III Compliant and Tier IV Ready Greenfield Gujarat State Data Centre (GSDC) on Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer model at ‘Sector- 18 adjacent to the State Emergency Operation Centre (SEOC), Gandhinagar- 382021’. of Department of Science & Technology, Govt. of Gujarat for a period of Seven years. The scope of work and other requirement of this project are specified in this RFP document.
- In order to meet the Data Centre's Design, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer requirement, the GIL proposes to invite tenders from eligible System Integrators (herein referred to as SI) to undertake Design, Build, Supply, Installation, Testing, Operation, Commissioning, Maintenance and Transfer of Data Centre for DST/GIL at Sector- 18 adjacent to the State Emergency Operation Centre (SEOC), Gandhinagar- 382021 as per details/Scope of Work mentioned in Section 4 of the RFP vol.2 Scope of work document.
- Bidder shall mean any entity (i.e., juristic person) who meets the eligibility criteria given in Section 4 of Instructions to Bidders of this RFP and willing to provide the goods and services as required in this bidding document. The interested Bidders who agree to all the terms and conditions contained in this document may submit their Bids with the information desired in this bidding document (Request for Proposal).
- Interested Bidders are advised to go through the entire document before submission of Bids to avoid any chance of elimination. The eligible Bidders desirous of taking up the project for DST/GIL are invited to submit their technical and commercial proposal in response to this RFP. The criteria and the actual process of evaluation of the responses to this RFP and subsequent selection of the successful Bidder will be entirely at the DST/GIL discretion. This RFP seeks proposals from Bidders who have the necessary experience, capability & expertise as per the DST/GIL requirements outlined in this RFP. Any clause's final interpretation rests with the tenderer if there is any ambiguity.
- This RFP document is not an agreement and is not an offer or invitation to any party. The purpose of this RFP is to provide the Bidders or any other person with information to assist the formulation of their technical and financial offers (“Bid”). This RFP includes statements, which reflect various assumptions and assessments arrived at by GIL in relation to this scope. This RFP document does not purport to contain all the information each Bidder may require. This RFP document may not be appropriate for all persons, and it is not possible for the GIL and their employees or advisors to consider the objectives, technical expertise and needs of each Bidder. The assumptions, assessments, statements and information contained in the RFP document, may not be complete, accurate, adequate or correct. Each Bidder must therefore conduct its own analysis of the information contained in this RFP and to seek its own professional advice from appropriate sources and proposed the entire solution according to the functional and technical specifications mentioned in this RFP.
- Information provided in this RFP document to the Bidder 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. GIL accepts no responsibility for the accuracy or otherwise for any interpretation of opinion on law expressed herein.
- GIL and their employees and advisors make no representation or warranty and shall incur no liability to any person, including the Bidder under law, statute, rules or regulations or tort, the principles of restitution or unjust enrichment or otherwise for any loss, cost, expense or damage which may arise from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, reliability or completeness of the RFP, and any assessment, assumption, statement or

information contained therein or deemed to form part of this RFP or arising in any way in this Selection Process.

- GIL 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 RFP. GIL may in its absolute discretion, but without being under any obligation to do so, can amend or supplement the information in this RFP.
- The issue of this RFP document does not imply that GIL is bound to select a Bidder or to appoint the Selected Bidder (as defined hereinafter), for implementation and GIL 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 GIL, or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and GIL 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 for submission of the Bid, regardless of the conduct or outcome of the selection process.
- The address for submission of Bids, contact details including email address for sending communications are given in Section 1.1 (Bid Control Sheet) of this RFP document.
- The purpose of DST/GIL behind this RFP is to seek a detailed technical and commercial proposal for Design, Build, Supply, Installation, Testing, Commissioning, Operation, Maintenance and Transfer of Tier III Compliant and Tier IV Ready Greenfield Gujarat State Data Centre (GSDC) as desired in this document.
- This document shall not be transferred, reproduced or otherwise used for purpose other than for which it is specifically issued.

1 About DST and GIL

Department of Science & Technology (DST):

Department of Science & Technology (DST) has been constituted vide General Administration Department G.R. No. DST/2002/398/ITD dated 21st June 2002 and it has been operational since 01.04.2003. This department mainly looks after the growth and development of new & emerging technology areas and is responsible for formulation and implementation of key policies in this sector in the State of Gujarat. As of now DST has been looking after the following areas of technology in the State.

- Information & Communication Technology including e-Governance
- Biotechnology
- Science & Technology
- Remote Sensing and Space Application
- Seismology

Objective:

- To position Gujarat as a key State in the knowledge economy sectors of the country.
- To create employment opportunities in the knowledge economy sectors including promotion of Semiconductor/micro/nano/Biotechnology based manufacturing units in the State.
- To improve the availability of skilled manpower in the emerging areas of technology through training / industry institute partnership.
- To make government citizen interface more effective, efficient and transparent

Gujarat Informatics Limited (GIL):

Gujarat Informatics Ltd. (GIL) was established as the nodal agency for IT development in the state in February 1999, by the Government. of Gujarat. The company was started with a clear objective to promote IT and accelerate the process of E- Governance in the state. Along with the announcement of the IT policy, the Government has enabled GIL to effectively implement IT projects in the state.

Since its inception, GIL has worked aggressively to make stunning forays in the implementation of IT in the state. Having made a promising beginning with projects like the INFOCITY, GSWAN and the GR BOOK, GIL is gaining significant ground with its endeavors for computerization of Government departments, training of CIO's, developing applications, forming mergers and signing MOUs with leading national and international companies.

2 Structure of RFP

The RFP document includes Two Volumes. Broad areas covered in these two volumes is given below:

Volume 1 – Instructions to Bidders

- a. Introduction and Background of the project
- b. Qualification Criteria(s) for the Bidders
- c. Instructions to Bidders
- d. General Conditions of Contract
- e. Bid Evaluation Process
- f. Delivery Milestones and Payment schedule
- g. Service Level Agreements (SLA)
- h. Bid Submission Formats

Volume 2- Scope of work

- a. Summary of the Scope of Work
- b. Functional Specifications
- c. Technical Specifications
- d. Manpower Requirement Details
- e. Special Conditions for Green Building.
- d. Operation & Maintenance

The bidders are expected to respond to the requirements as completely and in as much relevant detail as possible and focus on demonstrating bidders' suitability to be selected. The bidders are expected to examine all instructions, forms, terms, Project requirements and other information in the tender documents. Failure to furnish all information required as mentioned in the tender documents or submission of a proposal not responsive to the tender documents in every respect will be at the Bidders risk and may result in rejection of the proposal.

The whole project is required to be completed and maintained by the bidder. Accordingly, bidder is understood to have assessed and quoted for all the items required for successful completion of the Project. It will be the responsibility of the bidder to provide such items on free of cost basis, which are not quoted in the bid but otherwise required at the time of installation for completion and successful commissioning of the project.

3 Objective & Brief Scope of Work

3.1 Project Background and Objective

Project Background

State Data Centre are one of the three infrastructure pillars structured by the National e-Governance Plan (NeGP) to facilitate web-enabled Anytime, anywhere access. State Data Centres are conceptualized with the objective of providing a common enabling infrastructure to the States to cater to their e-governance applications hosting requirements of the entire State Government and its departments as well it was intended to make all Government Services accessible to the common man in his locality, through common service delivery outlet.

Following the guidelines of MeitY, the Government of Gujarat (GoG) had set up a Gujarat State Data Centre at Gandhinagar under Department of Science and Technology since 2008. The Data Centre is integrated and providing the services to the various Departments of the State. The existing State Data Centre (SDC) is a core infrastructure project under the National e-Governance Plan (NeGP) implemented by Gujarat Informatics Limited (GIL) with a server farm area including storage room of 3500 sq. ft.

The Data Centre provides a robust scalable, secured and state of art IT infrastructure for Gujarat to act as a catalyst of change from manual processes to fully automated and computer-driven processes, to support future endeavors of the State.

The existing Gujarat State Data Centre (GSDC) has been efficiently working since last decade in providing state of art IT Infrastructure hosting facility, with its own private cloud of 80 TB of RAM capacity.

The proposed Greenfield State Data Centre shall facilitate consolidation of services, applications and infrastructure including cloud services. It would provide many functionalities and some of the key functionalities such as Central Data Repository, Secure Data Storage, Online Delivery of Services, Citizen Information/ Services Portal, State Intranet Portal. The Greenfield State Data Centre will be a key supporting element of e-Government Initiatives for delivering services to the citizens with greater reliability, availability, and serviceability. The Greenfield State Data Centre will provide better operations and management control and minimize overall cost of Data Management, IT Management, Deployment, and other costs.

Greenfield State Data Centre will provide various departments of the State to host their services/ applications on a common infrastructure leading to ease of integration and efficient management, ensuring that computing resources and the support the connectivity infrastructure is adequately and optimally used.

Envisioned Project Objective

The Science and Technology Department under the Government of Gujarat (GoG) intends to extend the existing Data Centre service to the new level, for that purpose a new Greenfield State Data Centre will be built at a specific location Starting from selection of site and construction up to operation as a TIER-III compliant and TIER -IV ready Data Centre.

The technology used in the Existing Data Centre is almost eight to nine years old and most of the devices are EOS and EOL. For the continuation of the existing services and applications a new set of infrastructure are highly required with latest technology trends and as per industry standards.

For the purpose of design, supply, installation, configuration, integration, operation & maintenance of Civil, and Non-IT infrastructure of the proposed Tier-III compliant and Tier-IV ready Greenfield SDC, proposals will be getting invited from the prospective Bidders through open bidding process. Once the Greenfield SDC up and functional the existing GSDC can be utilized as NDR site, however the authority may decide the best use of existing GSDC.

The 'Electronic Governance' in the data Centre aims at an IT-driven system of Governance that equipped with the latest technology and secure environment in costs effective manner and is capable of servicing the decision-making machinery to the citizens' as never before. An urgent need was felt to have a central mechanism as many applications are hosted in existing Data Centre, and all systems are at its full utilization and most of non-IT/few compute equipment are almost eight to nine years old.

Therefore, Department of Science and Technology, GoG is planning to build a new Greenfield State Data Centre at Gandhinagar, sector-18, adjacent to SEOC Building.

3.2 Project Scope:

3.2.1 General

This section covers the scope of work (SOW) of the selected bidders (as "System Integrator (SI)") for creation of Gujarat Greenfield State Data Centre – GSDC). The selected bidder shall Design, Build, Commission, Operate, and Maintain the GSDC and auxiliary services for a period of 7 years from the date of signoff post successful completion of installation, commissioning, and acceptance testing. The SI shall be responsible for end-to-end implementation of this project and provide the solution accordingly.

The minimum specified work to be undertaken by the selected bidder for setting up and operating Greenfield SDC has been categorized as under:

- a. Project Kick-off Meeting
- b. Site clearance (in all aspects) and Design of the Greenfield Data Centre (for CIVIL and Non- IT work) supported by all required approval
- c. Civil Construction of building, MEP and Building Services
- d. Supply, Installation, Integration, Testing, Training and Commissioning Phase
- e. Operation and Maintenance phase

This document defines the requirements for the Data Centre Building to be constructed to house and support Data, Computing services and facilities at Gandhinagar, Gujarat.

Participants are expected to fully understand the scope and provide comprehensive proposal for the following requirements. The participant would need to deliver all the packages completely.

SI shall plan, design and develop, construct, test and commission a permanent, functional building and undertake an all-inclusive maintenance contract.

The General scope shall include, but not limited to, the following integrated component Systems:

- Foundations.
- Building structure.
- Architectural components.
- Internal and external finishing of floors, doors, walls, ceilings and roof.
- Furniture and building facilities, parking and access.
- Utility services and connections.
- Emergency diesel generator(s).
- UPS and batteries.
- AC and DC supplies
- Lighting / Emergency Lighting.
- Lightning and Grounding.
- HVAC, Chiller and PAC
- Fire Detection and Protection.
- Fire Suppression System.
- Plumbing, STP, WTP, Rainwater harvesting system
- Physical security systems, Access Control System & CCTV System
- Building Management System, DCIM System
- Solar Panel System
- Human resources support at all phases of Project

3.2.2 Key Scope of Work (Civil)

Data Centre Civil construction and related MEP facilities (Tier-III Comply Tier-IV ready)

1. Preparation of all structural Drawing, building footprint and Layout Design document
2. All prerequisite and statutory approval need to be taken.
3. All Fire and aviation approval need to be taken from the authority.
4. Design approval needs to be taken from the authority if required.
5. HT yard and power transformer need to place with all prerequisites.
6. HSD tank needs to be provisioned with all prerequisites.
7. Minimum two passengers and one freight lift need to be provisioned with adequate speed and capacity.
8. Separate ISP/telecom, power room needs to be provisioned.
9. Proper storeroom, loading and unloading bay needs to be provisioned.

10. Minimum one assembly area needs to be placed in case of an emergency evacuation.
11. Two separate staircase needs to be provisioned.
12. The building structure needs to be designed to stand for minimum Richter scale 7 earthquake.
13. Parking and local bylaws need to take care of during building design.
14. A chilled water-based cooling system needs to be provisioned for the server farm area.
15. Comfort air conditioning needs to be provisions for all the places other than the server area.
16. Proper cooling needs to be taken care of for all critical places like the UPS room, battery room and other utility areas as per the requirements.
17. Plumbing and Sanitary need to be provisioned for all floors.
18. Sewage Treatment needs to be provisioned.
19. Fire Fighting system for all the places, GAS based for the critical area and water sprinkler for others area. For water sprinkler system water storage tank plan on terrace. A gravity water flow principle will be applied.
20. Landscaping and Perimeter Security.

3.2.3 Key Scope of Work (Non-IT)

Data Centre Non-IT physical Infrastructure (Tier-III Comply Tier-IV ready)

1. Proper provisioning of utility power.
2. N + 1 configuration for UPS.
3. N + 1 configuration for Diesel generator.
4. Separate room for UPS and battery bank.
5. Adequate cooling for high and normal density racks.
6. Cold/Hot aisle containment needs to provide for efficient cooling.
7. Inter-rack and intra-rack network cabling for all racks need to be done.
8. Separate tray to be provisioned for fiber and copper network cabling.
9. Two separate power sources are to be placed in each server/network rack.
10. IPDU to be placed in each server/network rack.
11. DCIM to be placed for non-IT monitoring and operation.
12. CCTV to be placed for the entire facility for security.
13. Proper Safety, Security, Surveillance and Monitoring are to be provided.
14. Proper seating station and working terminal to be placed as per the requirement.

15. HSD tank to be provisioned for fuel storage and required licenses and approval to taken from the authority.
16. Asset management tool needs to be placed for asset management and better utilization of the rack space.
17. A chilled water-based cooling system needs to be provisioned for the server farm area.
18. Comfort air conditioning needs to be provisions for all the places other than the server area.
19. Proper cooling needs to be taken care of for all critical places like the UPS room, battery room and other utility areas as per the requirements.

3.2.4 Design, Implementation, Commissioning, Operation and Facility Management

1. Design of Data Centre Building-End to end solution for Civil & Non-IT.
2. Supply, installation, Commissioning, O&M support for Civil & Non-IT.
3. Annual Comprehensive Maintenance of all Products
4. Building Maintenance and all other associated peripherals.
5. Service Level Adherence.
6. Resource Deployment during entire Project lifecycle including Design, implementation, Commissioning, Testing and O&M phase as per the requirement mentioned in the RFP.
7. Additional manpower needs to be provided and deployment needs to be done as per the requirement during implementation and O&M.
8. Weekly project progress reports need to be prepared and shared with all stakeholders.
9. Fortrightly meeting needs to conduct with the support of the project consultant for the progress of the project.
10. System health and system utilization report and other reporting related to being published every three months.
11. Standard Operating Procedures (SOP) for all the activities need to prepare and share for review and approval by GIL
12. Periodic health Audit for Non-IT and other utility services.

3.3 Project Scope of Work- Key Phases

The key phases as a part of scope of work for the SI during the period of contract would include the following under Greenfield GSDC project:

- Pre-Bidding: Site Survey, Site Preparation
- Design and approval of Gujrat State Data Centre Building as per the DC standards (Uptime Institute).

- Design and integration of all the building blocks of new building for Gujrat State Data Centre.
- Complete Civil Construction and Interior works for Gujrat State Data Centre building
- Intermediary arrangement of Electricity, Water, Manpower, required equipment/tools etc. for complete period of building construction work.
- Design, Supply, Installation and Commissioning of complete Non-IT Infrastructure for the new building of Gujrat State Data Centre.
- Minimum Seven Years on-site comprehensive maintenance and provisioning of services of all the Civil and Non-IT Infrastructure and their components supplied must be provisioned of onsite spares on 24x7x365 basis after successful execution and acceptance by DST/GIL.
- SI to get following Data Centre Certification from designing phase to Go-Live and all related costs for the certification will be borne by the bidder:
 - a. Tier III Certification for Design, Facility & Operations from UPTIME
 - b. ISO/IEC 27001: 2017 or latest
 - c. ISO/IEC 20000-1: 2018 or latest
- Testing & Commissioning.
- Post-Implementation: Management & Maintenance.
- Physical Security Management.
- Training on Non- IT infrastructure, SLA, Various Data Centre related policies etc.
- Onsite support for Data Centre Operations on 24x7x365 basis by qualified and trained engineers/personnel for a period of minimum Seven Years to ensure more than 99.982% service availability.
- Operation and Maintenance of complete infrastructure under Greenfield GSDC for a period of minimum 7 years after Go-live.

3.3.1 Pre-Bidding: Site Survey

Bidders is required to survey before the submission of their technical & commercial proposal. All the Bidders shall perform Site-survey of the project location followed by the preparation & submission of Bid. The survey shall include the details of the location positioning of new building for data Centre and all prerequisite for final Solution for establishment of the Data Centre. The site survey shall also include the details of the Greenfield GSDC location and assessment of all prerequisites for new building civil construction work, Non-IT & Interior works, incorporation security measure and the complete implementation of proposed Solution for Greenfield GSDC.

3.3.2 Bid-submission and the selection of the Successful Bidder

The bidders are strongly advised to perform the site survey and study the environment at their own cost and to get first-hand information, so that the solution should fulfil future requirements of the supply, build, upgradation, implementation, and operation of Greenfield GSDC. Process of Selection of the successful bidder shall be as per the RFP.

The Bidder shall bear all costs associated with the preparation and submission of its bid including cost of presentation for the purposes of clarification of the bid, if so desired by DST/GIL. DST/GIL will in no case be responsible or liable for any cost, regardless of the outcome of the tendering process.

3.3.3 Site Preparation

DST/GIL shall provide the necessary vacant space for built the Greenfield GSDC including a parking space. Soil testing shall be done prior to site preparation work by selected bidder. Selected Bidder shall arrange for necessary clearances which shall enable them to undertake civil, electrical, and mechanical works including building construction, partitioning, installation of electrical component, cable laying etc. at the Greenfield GSDC site. Selected bidder shall arrangement of Electricity, Water, Manpower, required equipment/tools etc. for building construction and implementation & commissioning work.

3.3.4 Instruction to Bidder for Project Implementation

Design, supply, installation, commissioning for Civil and Non-IT Infrastructure for Greenfield GSDC. The selected bidder shall carry out the followings:

- The Selected Bidder has to carry out the complete Design, Supply, Installation and commissioning of required Non-IT and Civil Infrastructure at Greenfield GSDC as per the solution. During the project implementation period, the selected bidder has to submit Weekly and Monthly progress reports and it should be done strictly in accordance with the scope of work under this project.
- The Selected Bidder is expected to adhere to all technical and functional specification for Non-IT and Civil Infrastructure. Any change or additional design required as per guidelines, in proposed solution document has to be achieved as per established delivery timelines.
- A detailed project plan for the implementation of Greenfield GSDC is to be provided during the Kick-off meeting. A work breaks down structure with all the milestones for the entire commissioning timeline has to be provided by the selected bidder.
- The bidder would be required to submit detailed Design documents with all necessary design drawings for all Non-IT and Civil infrastructures and would be approved by DST/GIL before actual execution of the works.
- A supply schedule for all materials with make and model is to be prepared and submitted in line with the work break down structure of the project plan.
- All materials have to be dispatched as per expected delivery timelines with no additional dispatch or delivery costs. Any deviation from the expected timelines of delivery is to be intimated in advance for appropriate actions and reason.
- The materials should be brand new and as per the tender specifications/requirements. Bidder should take care of Insurance against the material loss during transit as well as during implementation & operation phase of seven years.
- All components of Greenfield GSDC must support scalability with adequate licensing, accessories and modules to provide continuous growth to meet the requirements and demand of various departments.
- Stage wise reports encapsulating the details of the work executed for all Civil and Non-IT components including Transformers, DG, UPS, Chillers, Elevators and necessary common infrastructure non-IT services as part of the scope.
- UAT test reports will be verified and approved by the Project Management Consultant following which the commissioning certificate will be issued by DST/GIL.
- All Civil and Non-IT systems have to be installed and tested as per the tender and weekly status reports are to be submitted. Consultant and DST/GIL will participate in the active project management and monitoring of timelines to ensure adherence to delivering on schedule. Commissioning certificate will be

issued by DST/GIL after completion of the project components as per scope of work.

- During installation of any equipment, SI shall not cause any damage to government buildings/ premises/ property. However, if any damage occurs, the bidder shall restore it to the original state at his own cost up to the satisfaction of the GoG. Trenches, Path/Road-cutting etc. should be back-filled and restored to the original condition immediately after laying of the conduit/cable at no extra cost. SI shall also plug conduits and entrance holes where the cabling has been installed with suitable sealing material. The Bidder shall lay all the cables power or networking with proper casing.
- Bidder shall perform the work in a conscientious manner as per the best industry practices and in compliance to the applicable regulatory norms. The bidder shall obtain all the required statutory approvals and NOCs, at his own cost.

3.3.5 Onsite Minimum Resources deployment during project execution (MEP)

Sr. No.	Role	Min. Qualification	Relevant Experience	Certification required / add. Qualification
1	Project Leader- 01 Nos	B.E. / B.Tech. in Electrical / Mechanical	15+ years' experience in MEP, ELV project execution. He must have a sound knowledge of Electrical, HVAC, Lift, DG Set, Fire & other security system, DCIM & other Data Centre services. He must have experience for Implementing Data Centre projects.	He must be certified of CDCP/ CDCS/CDCE/ATD certified. He must have completed Prince2/ PMP certification
2	Project Manager-2 Nos.	1. B.E. / B.Tech. in Electrical (01 Nos) 2. BE/B.Tech. in Mechanical (01 Nos)	10+ years' experience in experience in HVAC, refrigeration and Data Centre cooling technologies. He must have experience for working Data Centre projects	He must be certified of CDCP/ CDCS/CDCE/ similar certification
3	Sr. Engineer (Electrical)- 01 Nos	B.E. / B.Tech. in Electrical	8+ years' experience in Electrical Engineering having Experience in HT/LT Panels, Transformers. He must have experience for working Data Centre projects	He must be certified of CDCP/ CDCS/CDCE/ similar certification

4	Sr. Engineer-General-02 Nos.	B.E. / B.Tech. in Electrical / Mechanical	5+ years' experience in experience in experience of in Fire system, PA system, CCTV, Access control system, WLD, RR, DCIM, Sets, etc. He must have experience for working Data Centre projects	He must be certified of CDCP/ CDCS/CDCE/ similar certification
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* This is Minimum Indicative resource requirement. Bidder is responsible to deploy necessary resources at site in line with Scope of work to meet the Project timeline defined in this RFP

3.3.6 Onsite Minimum Resources deployment during project execution (Civil)

Sr. No.	Qualification & Experience	Minimum Number
1	Project Manager -Civil Engineer (BE/B Tech) with minimum 15 Years of experience	1 Nos
2	Site Engineer& Liaison Officer -Civil Engineer (BE/B Tech) with minimum 05 Years of experience	1 Nos
3	Site Engineer/Manager -Civil Engineer (Diploma Holder) with minimum 05 Years of experience	2 Nos
4	Quality Inspector and Lab Officer -Civil Engineer (BE/B Tech) with minimum 05 Years of experience	1 Nos
5	Safety and Security Officer: Graduate with 05 Years of Experience in Safety and Security Field	1 Nos

* This is Minimum Indicative resource requirement. Bidder is responsible to deploy necessary resources at site in line with Scope of work to meet the Project timeline defined in this RFP

3.3.7 Supply/ Installation

The Selected Bidder shall arrange for necessary clearances which shall enable them to undertake civil, electrical, and mechanical works including false ceiling, partitioning, installation of electrical components, cable laying etc. at the Greenfield GSDC site as per industry best practices and with highest category of input materials and as per the specification. Greenfield GSDC building site must be inspected by bidder for accessing the As-Is-conditions.

The selected bidder would be required to undertake all the necessary civil, electrical, instrumental, plumbing, and other related works under Civil and Non-IT for Greenfield GSDC.

The selected bidder shall procure and install all relative components, installation shall mean to install and configure / integrate every component and subsystem component, required for functioning of Greenfield GSDC site.

3.3.8 Testing & Commissioning

- Commissioning shall involve the completion of the Data Centre and entire building construction, supply and installation of the required components and making the

Data Centre available to DST/GIL for carrying out live Operations and getting the acceptance of the same from the respective agencies. Testing and Commissioning shall be carried out before the commencement of Operations. It should be noted that Selected Bidder has to arrange all the necessary equipment / tools / other resources like Power, Water, Manpower etc. which are required for carrying out such testing of the Greenfield GSDC. All the related cost for the testing and commissioning shall be borne by the selected bidder.

- After successful completion of Building construction, completion of non-IT works and installation, SI shall inform DST/GIL about the same and submit a report as work has been completed as per the standard and specification mention in the tender.

3.3.9 Partial Acceptance Test (PAT)

Partial Acceptance Testing (PAT): The SI shall request for Partial Acceptance Test (PAT), after completion of all activity under all the milestone before PAT, in connection with the timelines provided by the tender.

Inspection for Partial Acceptance Test (PAT) will be conducted by the Consultant / PMC in accordance with the timelines, scope of work as mentioned in the RFP and the solution documents proposed by the SI and accepted by DST/GIL.

The test shall include the following:

- All the Civil, Electrical, HVAC, Fire Fighting works etc. are completed as per the RFP specifications and solution documents proposed by the SI and accepted by DST/GIL.
- All hardware and software items must be delivered and installed at Greenfield GSDC as per RFP specifications and solution documents.
- Availability of all the defined services shall be verified. The SI shall be required to demonstrate all the features/facilities/functionalities as mentioned in the RFP and solution documents.
- The Project Management Consultant (PMC) in consultation with DST/GIL shall define the detailed test plan.
- The SI will arrange the test equipment required for performance verification and also provide documented test results.
- SI will prepare and submit the reports of PAT to PMC, further recommendation reports of FAT, PMC will submit to DST/GIL and subject to its acceptance, it shall be deemed as completion of Partial Acceptance Test (PAT).

3.3.10 Final Acceptance Testing (FAT)

The SI shall resolve the Punch Points /Observations raised during the PAT inspection and after completion of all rectification SI shall communicate to PMC and request for final acceptance test and Go-Live from DST/GIL.

After successful testing of the features, facilities, functionalities and integrity of the commissioned devices, equipment and services by SI, the PMC will submit the recommendation reports of FAT to DST/GIL and after acceptance of the reports from DST/GIL, a Final Acceptance Test (FAT) Certificate shall be issued by DST/GIL to the SI.

3.3.11 Operations and Maintenance

The selected Bidder will provide 24x7x365 operating and maintaining services for a period of 7 years from the date of Go-Live of Greenfield GSDC. The scope of the services

for overall Physical and Non-IT infrastructure management during this period shall include 24x7x365 Monitoring, Maintenance and Management of the entire Data Centre, along with providing Helpdesk services.

Comprehensive onsite maintenance for equipment & support service for all hardware and software, SI is required to provide the Comprehensive Onsite Maintenance with part replacement for all the Civil and Non-IT equipment's. To provide this service the selected bidder must have back-to-back arrangement with the respective OEM/ OEMs authorized partner. The selected bidder shall be responsible to ensure adequate and timely availability of spare parts needed for repairing the equipment's/ parts. The selected bidder has to make necessary arrangements of spares for catering maintenance needs of equipment's/parts during entire contract period at no extra cost to the DST/GIL.

The detail scope of work during the operations phase will be described more in later RFP for Greenfield GSDC for Non-IT infrastructure.

The scope of work during the operations phase is divided into following areas which are listed below:

- Physical Infrastructure Management and Maintenance Services.
- Preventive Maintenance Services.
- Administration, Maintenance and Management Services.
- Documentation related to Standard Operating Procedures (SOP), User manuals, etc.
- Corrective Maintenance Services.
- Asset Management Services.
- Vendor Management Services.
- Firmware Update management
- Helpdesk Services
- Required Certifications for Greenfield GSDC.

The scope of work would limit to equipment/ components procured as part of this Greenfield GSDC by SI for running of Greenfield GSDC and later if any additional hardware or software is required for smooth operation of Greenfield GSDC, SI has to take care the necessary action.

3.3.12 Tier Certification by Uptime Institutes

It is DST/GIL requirement that the completed Data Centre Facility to be constructed under this contract shall be Uptime Institute Tier III Certified. The successful Bidder shall obtain all Uptime certifications up to and including Tier Certification of Operational sustainability for all Phases of the Development and shall maintain them for the Contract period. Re-certifying as necessary either due to changes in installed capacity or expiry of certification.

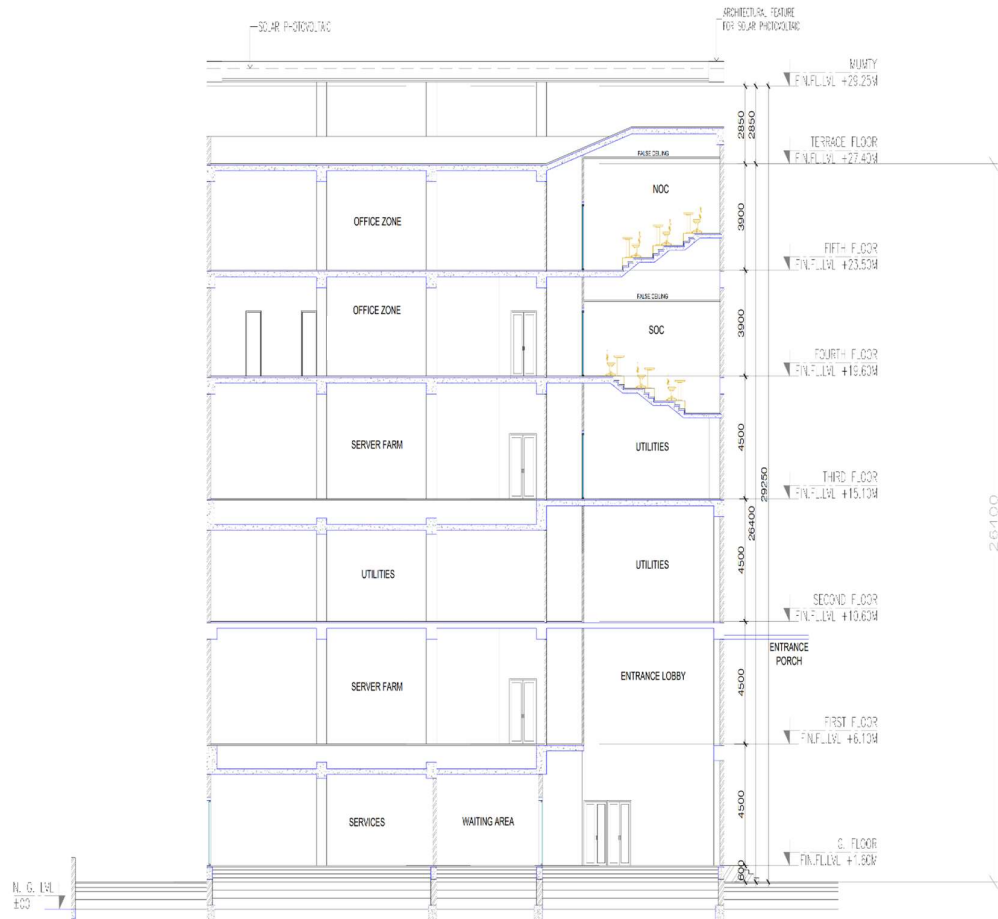
The Facility Design shall adhere to Uptime Institute's Tier III Fault Tolerant Criteria as detailed in the uptime Institute's Tier Standard:

Topology (available at <http://uptimeinstitute.com/tierpublication>) and effective as of date of the contract Award. No substitute will be accepted for uptime Institute certification(s) and experience with Uptime Institute certifications, as well as on-staff Accredited Tier Designers, will be a differentiating factor in evaluating respondents.

The successful bidder shall obtain:

- a. Uptime Institute Tier Certification III of Design Documents for the complete Data Centre Facility Design.
- b. Uptime Institute Tier Certification III of constructed Facility for all areas of the Data Centre Facility to be constructed under this contract.
- c. Uptime Institute Certification of operational sustainability for all areas of the Data Centre to be constructed under this contract.
- d. The necessary Certifications will be obtained on behalf of DST/GIL and passed to DST/GIL on its Award.
- e. All certifications shall be kept current/Live for the contract period.
- f. The successful Bidder shall be responsible for all costs associated with obtaining and maintaining these Certifications.
- g. Notwithstanding any technical or commercial clause in this tender, it is the duty of the bidder to ensure the certification at no extra cost.

3.4 Concept design consideration for Greenfield Data Centre Building:



SECTION - 1

Allotted land for Greenfield Data center is in the sector-18, Gandhinagar city. The plot has three side open and one side another department building located. The Data Centre building will have total five floors (Ground floor + 5 floors). There are one entry and one exit from the front side for people entry and material entry. The cross-sectional diagram of the building has been shown in the below figure.

*The Above Drawing is for indicative purpose only. Bidder needs to submit final layout for approval.

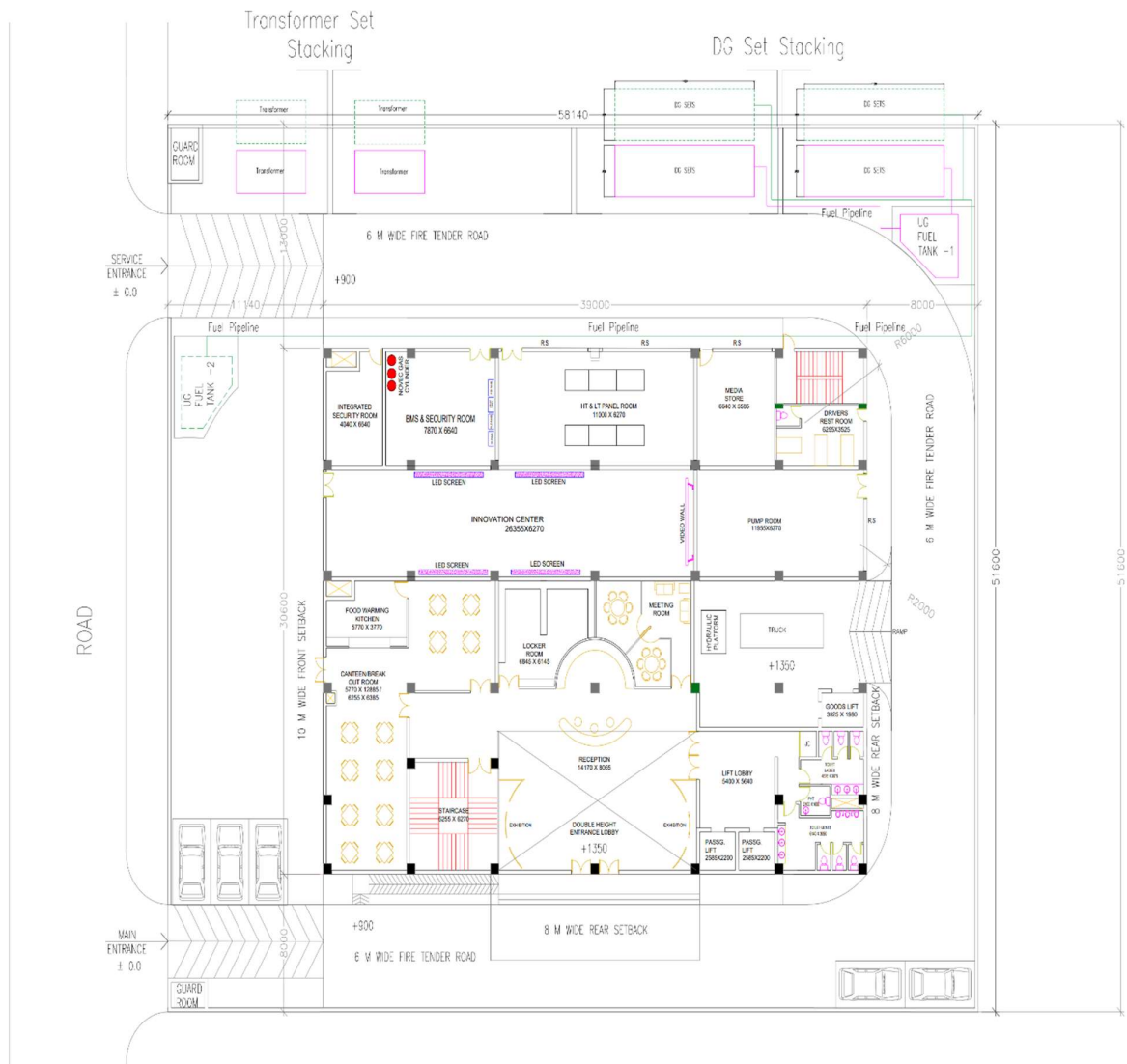
The Data Centre building will have the following areas placed in the floors as detailed below. (Tentative/ Indicative area):

Sr. No.	Floor	Area	Remarks
Main Building: Data Centre Building			
1	Ground Floor (G)	1193.40 sqm	Reception Area, Waiting Area, Canteen/Breakout Room, Facility Staff Room + Driver Rest Room, Media Storage Room, Utilities i.e., Pump Room, Emergency Power set, Main HT electrical room & Metering room, Experience cum training room.
2	First Floor (G+1)	1079.26 sqm	Server Farm Area + Staging Room for 150 Rack
3	Second Floor (G+2)	1193.40 sqm	Utility Area (Electrical Utility, UPS, Battery Banks, Panels, and other utility)
4	Third Floor (G+3)	1193.40 sqm	Server Farm Area + Staging Room for 150 Rack
5	Fourth Floor (G+4)	1193.40 Sqm	DC Support Area for SDC/GSWAN (NOC & Helpdesk) Resource or other O&M Resource, Meeting Room, Manager cabins
6	Fifth Floor (G+4)	1193.40 Sqm	GFGNL Resources & (SOC) + GISL Resource, Training Rooms.
7	Terrace Floor		Space for frame for the solar panels and service areas.
9.	Guard Room - 02 Nos		Guard room.
	Total Plinth Area	7046.26 sqm	

A) Ground Floor:

This floor will provide service support including transformers, DG set, HT panel rooms, media storage room, Pump room, unloading bays, staff flame less canteen, locker room, meeting room, DCIM room and Innovation Centre. The main entry for people is in the front side of the building through ground floor reception and shall be provided with 2nd

level of security checks before entry of Data Centre building. After the security checkpoint, there are various levels of access-controlled doors and entry inside will be based on different levels of authorization. The highest-level security zone corresponds to the smallest number of persons with access authorization and vice versa the lowest-level security zone corresponds to the maximum allowed number of persons.



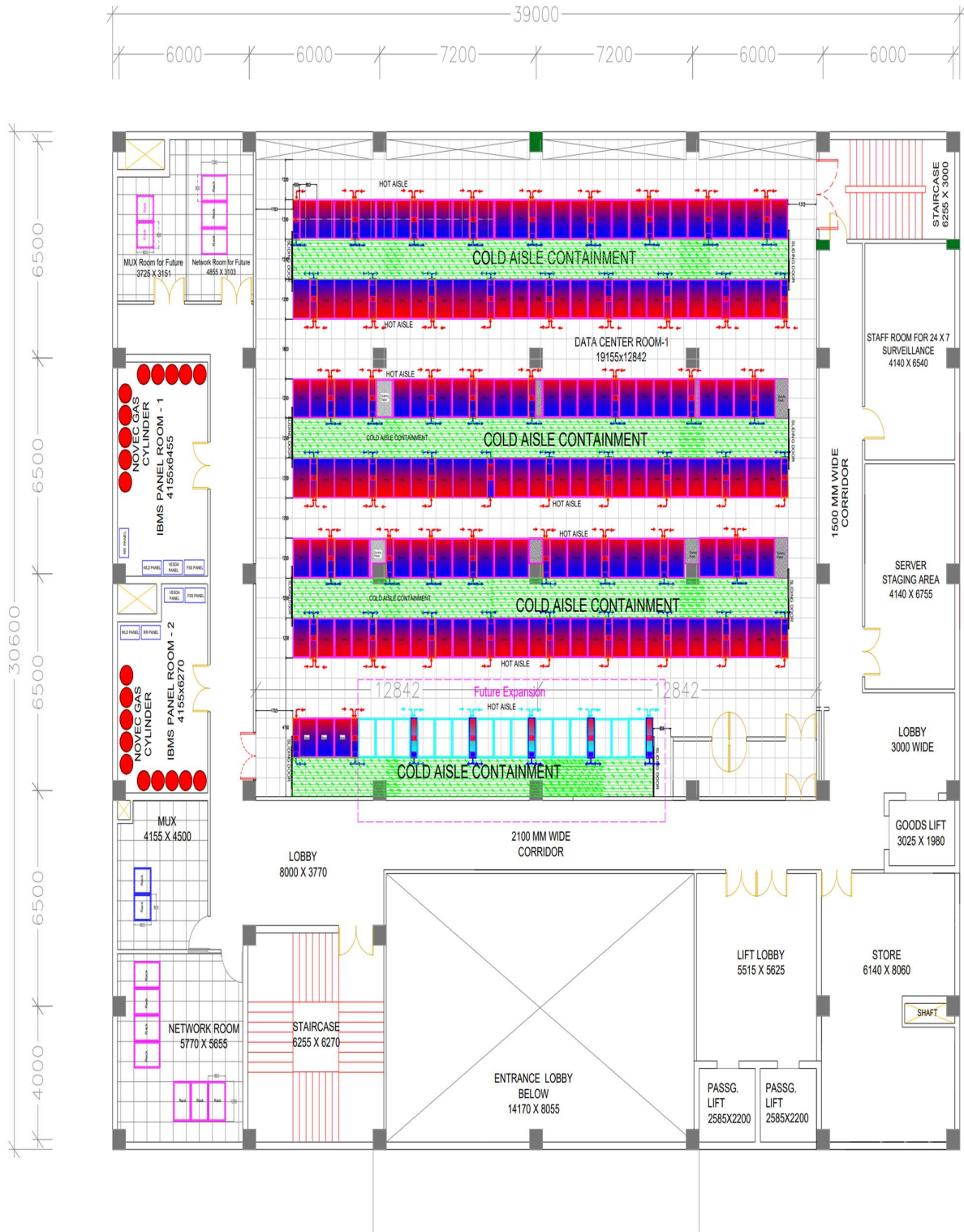
*The Above Drawing is for indicative purpose only. Bidder needs to submit final layout for approval.

B) First & Third Floor:

The 1st & 3rd floors have the following rooms supporting mainly server farm for the Data Centre Server rooms each housing 150 nos. Racks. Per floor.

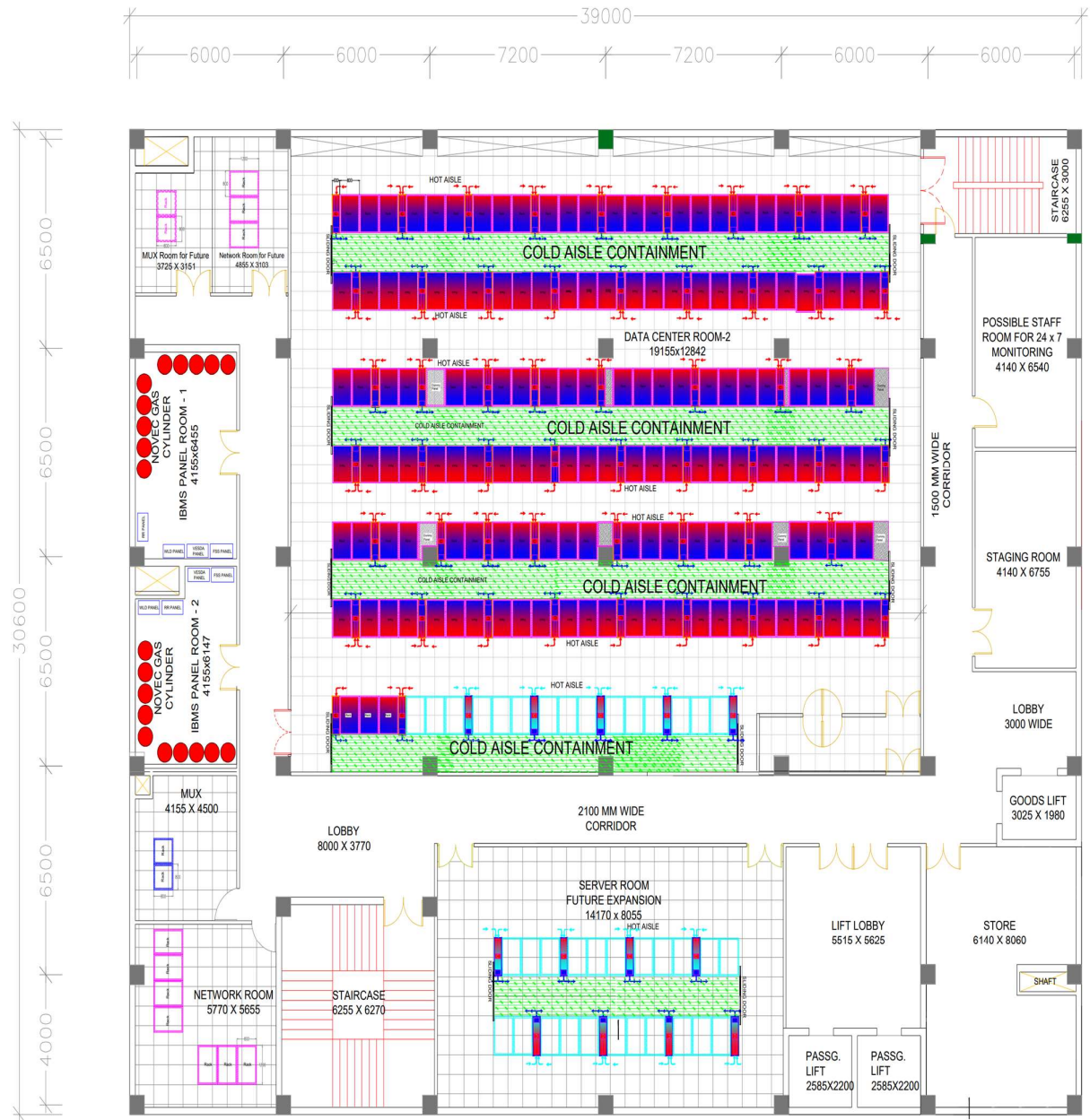
Telecom room, IBMS panel room, Network room (Hub room), Server staging room, Storage room. The area statement of the first floor & 3rd floor is mentioned above table. It is proposed to populate racks 1st floor down in phase-1 and subsequently 3rd floor below in later phases which will provide least disturbance.

First Floor Layout:



*The Above Drawing is for indicative purpose only. Bidder needs to submit final layout for approval.

Third Floor Layout:



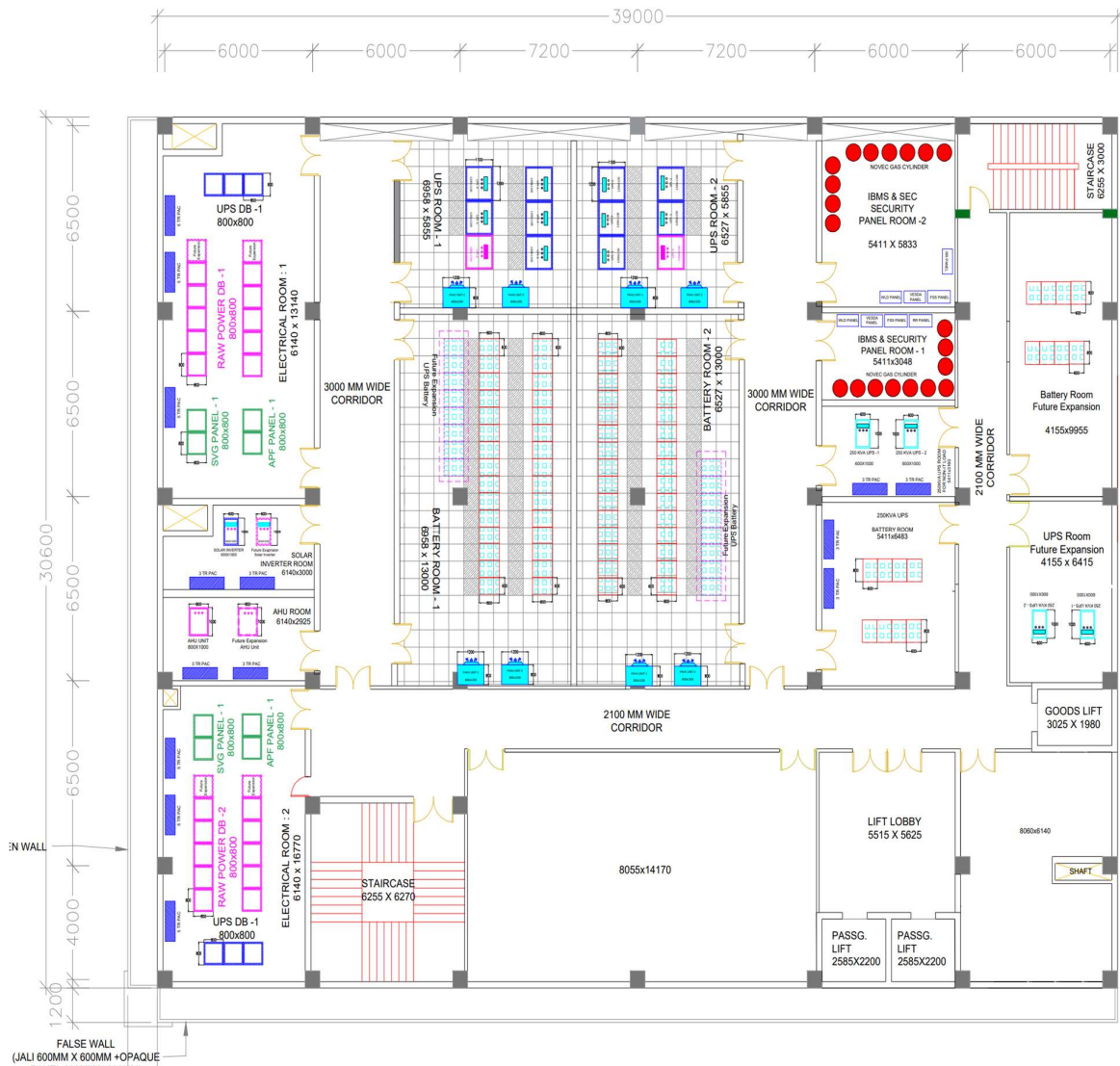
*The Above Drawing is for indicative purpose only. Bidder needs to submit final layout for approval.

C) Second Floor:

Second floor is proposed to provide following utility areas

- UPS rooms for critical load for both the phases
- Li-ion Battery Rooms for both the phases
- Electrical room with LT panel, SVG panel, Harmonics filter panel for both the phases
- IBMS room for both the phases
- Noncritical UPS room for both the phases
- Battery for Noncritical UPS for both the phases
- Solar inverter room

Locating UPS rooms and battery rooms sandwiched between server floors top and below will help power distributions and lowest potential drops.



*The Above Drawing is for indicative purpose only. Bidder needs to submit final layout for approval.

D) Fourth Floor:

Fourth floor is being created to provide space for followings.

- Staff / officials sitting area
- Conference room
- NOC room with video wall and other monitoring facilities
- Network Hub room for floor-to-floor connectivity

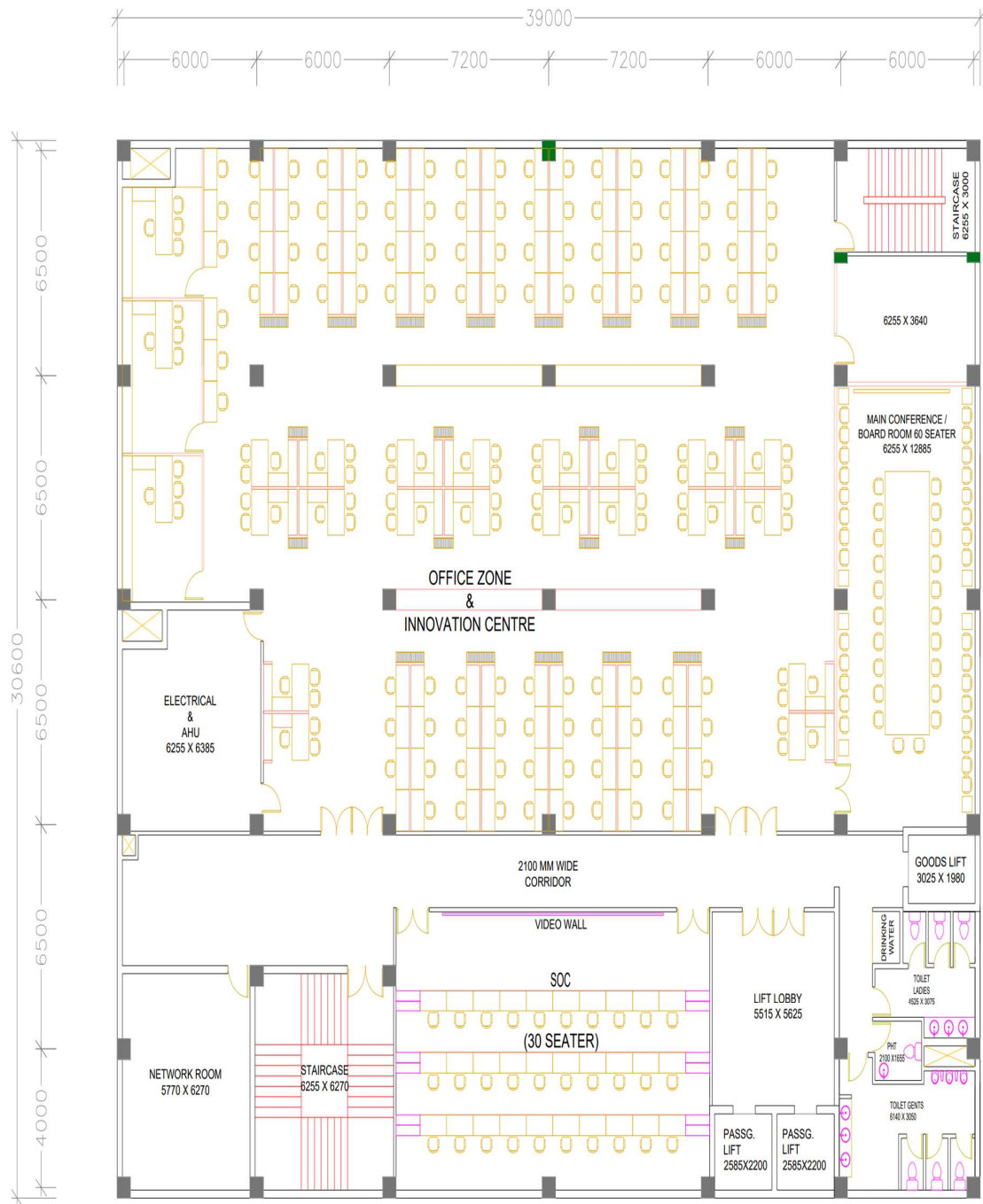


*The Above Drawing is for indicative purpose only. Bidder needs to submit final layout for approval.

E) Fifth Floor:

Fifth floor is being created to provide space for followings.

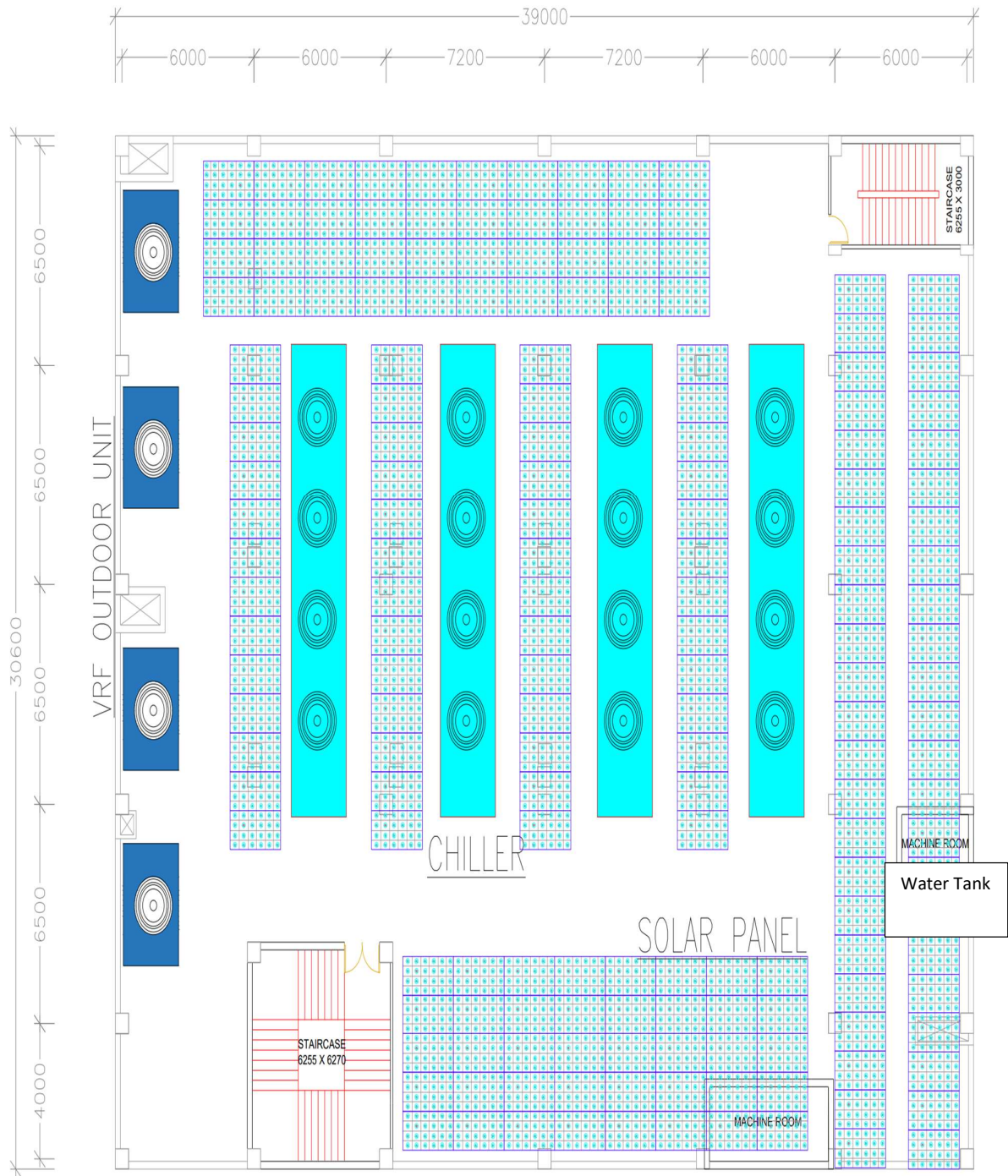
- Staff / officials sitting area
- Conference room
- SOC room with video wall
- Network Hub room for floor-to-floor connectivity



*The Above Drawing is for indicative purpose only. Bidder needs to submit final layout for approval.

F) Terrace floor:

The Air-Cooled Chillers shall be installed on the terrace. The service lift is planned to reach terrace level for ease of logistics. The solar panel will get installed at terrace in all vacant area of terrace apart from Chillers.



*The Above Drawing is for indicative purpose only. Bidder needs to submit final layout for approval.

3.4.1 Data Centre load / density details:

3.4.1.1 Details of Each Module and number of racks

1st and 3rd floor shall be of 300 racks (150 racks on each floor).

		Tier-III racks (Total Capacity)	Tier-III with racks (Phase-I)
Sr. No.	Rack Description	No's	No's
1	Server / Network racks (800 x 1200mm)	300	150
2	Telecom racks (800 x 1200mm)	10	5

Electrical Design Brief:

The Data Centre will be developed in phases. The power requirement is working out to be 8 MW approximately. The substation should be designed as per load requirement.

33kV/415V transformers & HT Panels:

Power from two nos. 33KV dedicated lines shall be fed to the Group operated switch to overhead power lines for switching ON/OFF between circuits then it will be further distributing to the HT panel. Two feeds shall be provided from the SEB/ Private electric company for maintaining the redundancy. The HT panel and the transformers are placed on ground floor of the Data Centre block. These transformers in N+1 shall be providing power to the racks of both the floors. N+1 provision is proposed to provide for maximum availability of economic grid power.

Transformer calculations					
	Tier-III with 300 racks		Tier-III with 150 racks		
Type of Load	Load	Unit	Load	Unit	
Total Power on transformer	7215	kW	4240	kW	
Load factor	0.9	kW	0.9	kW	
Total Power on Transformer	8016	kW	4711	kW	
Proposed Transformer Rating	5	MV	5	MV	

Nos of Transformers with Redundancy	N+1 (2+1 = 3 Unit required)	Nos	N+1 (1+1 = 2 Unit required)	Nos
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3.4.1.2 Outdoor DG:

The area has been marked in the master plan for placement of DG sets. The DGs shall be placed in acoustic enclosures in the plot area. All the DG'S shall be LT 415 V DG set.

The following capacities of DG sets have been envisaged in each phase: -

DG Set calculations					
	Tier-III with 300 racks			Tier-III with 150 racks	
Type of Load	Load	Unit		Load	Unit
Total Power on transformer	7215	kW		4240	kW
Power factor	0.9	kW		0.9	kW
Total Power on DG Set	8016	kW		4710	kW
Proposed DG set rating	5	MV		5	MV
Nos of DG Set Redundancy	N+1 (2+1 = 3 Units required)	Nos		N+1 (1+1 = 2 Units required)	Nos

3.4.1.3 HSD Storage:

HSD storage is placed in the side area of the plot. Approximately 12 hours of Diesel storage in multiple buried tanks is planned. Total requirement of diesels for 12-hour continuous operation should be calculated by bidder and it should match uptime criteria for Tier-III Data Centre. Total provision for 2 nos. HSD tanks with One current capacity with 12 hours operation and one future expansion stand-by tank is proposed to be installed.

3.4.1.4 Water storage area:

It should be plan as per local laws. The tanks will be either overhead on terrace or underground storage type which can be planned inside the landscaped area or Space provision for fire hydrant pump, domestic pumps will be made in the pump room.

3.4.1.5 General Design criteria for non-IT sizing:

1. The design is planned for of 150 racks on 1st floor and 150 racks on 3rd floor in 2nd phase.
2. The electrical system design is based on a maximum ambient temperature of 47-degree C. The operating voltage across the installation will be 415V, 3ph. 4 wires at 50Hz. Transformer should be K-13 class rated transformer
3. The system will be designed to limit the fault level to 100 kA (or less) on 415V.

4. Voltage drop in the electrical system shall not exceed to 5% or lower at low voltage side. VFDs shall be active front end design with less than 10% ITHD and more than 0.9 lag PF.
5. It is also proposed to provision uninterrupted power supply to all critical cooling components for the continuous cooling requirement of the Data Centre such as chiller primary pumps, DCIM, NOC and SOC room etc.
6. All the critical panels should have surge suppression device to arrest the switching surges. 100% power back up will be provided in the form of high-speed diesel generator sets at 415V voltage level for the easier distribution. DG sets will be rated for continuous duty.
7. The fuel storage shall be minimum duration of 12 hrs. (As per uptime institute guidelines) for continuous operation of engine generators at full load.
8. The DG sets will be housed in acoustic enclosure, to limit the noise level as per the local authority by law. Comprehensive local & remote monitoring and centralized monitoring & management will be planned.

3.4.1.6 Lighting design shall be with the following design specifications:

1. Energy efficient LED lamps
2. Extensive use of LED lights to limit energy requirement for server hall emergency lightings and office area below 0.7 watt/ square feet.
3. Lights will be placed above cold and hot aisles and shall be avoided over racks.
4. Occupancy sensor-controlled zone lighting raised floor area will be planned
5. For server floors three level of lighting is proposed to be implemented, Level-1 when server floor is not occupied, Level-2 based on motion sensors and level-3 during maintenance.

3.4.1.7 Electrical Load estimation (Approximate)

The peak electrical load of the Data Centre facility will be primarily governed by IT load, Air conditioning and the critical loads to the Data Centre, apart from the lighting and raw power loads. Total peak demand estimated for the Data Centre with the overall load calculation is as per the table indicated below.

Following are the power expected for the Data Centre building: -

UPS Power and Cooling design criteria										
Sr. No.	Rack Description	Tier-III with 300 racks				Tier-III with 150 racks				
		No's	kW rating	Total	Unit	No's	kW rating	Total	Unit	
1	Server / Network racks (800 x 1200mm)	300	10	3000.00	kW	150	10	1500.00	kW	
2	Telecom racks (800 x 1200mm)	10	2	20.00	kW	5	2	10.00	kW	

	Total in kW (Critical load)			3020.00	kW			1510.00	kW
	Lighting Load		1	46.54	46.54	kW	1	46.54	46.54 kW
	DC NOC and other loads		1	96.15	96.15	kW	1	96.15	96.15 kW
	Total in kW (non-Critical load)			142.69	kW			142.69	kW
	Chiller Pump Load		3	20	60	kW	2	20	40 kW
	Total load in kW for UPS Power			3222.69	kW			1692.69	kW
	Total in KVA (Output Power Unity factor)			3222.69	KVA			1692.69	KVA
	Proposed capacity			3600.00	KVA			1800.00	KVA
	Proposed UPS Capacity			600	KVA			600	KVA
	Total UPS systems (Redundancy Configuration)		N+1(6+1 Units required)	7	Sets		N+1(3+1 Units required)	4	Sets

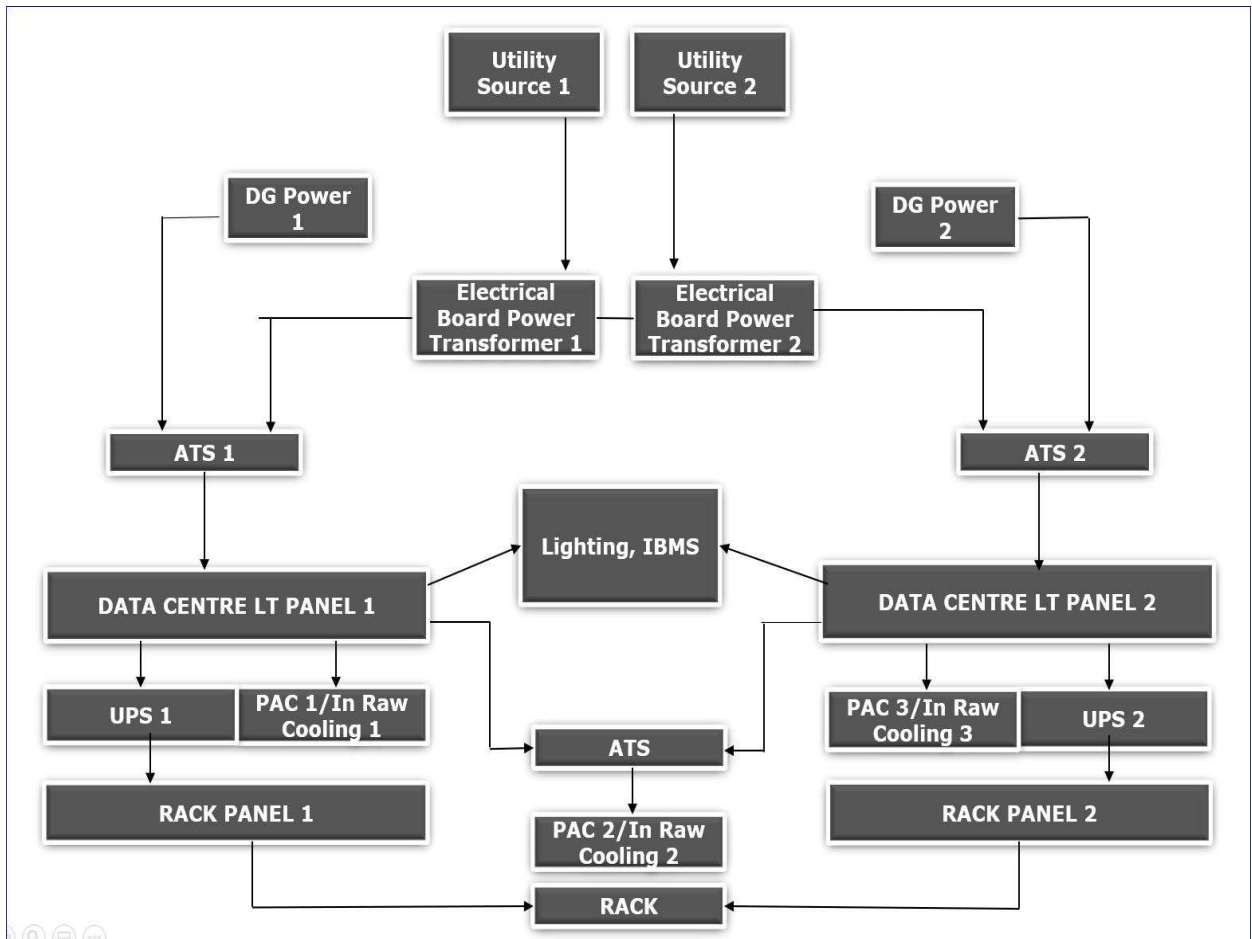
3.4.1.8 MV Power Distribution

The power demand of 10 MW is planned to be availed at 33kV VTG level.

Two dedicated express feeders are planned for the site. RMU panel receiving 2 feeds will feed power to the HT panel. The HT panel shall be placed on the ground floor for ease of maintenance and cable routing with the transformers.

A) Power Distribution

The detailed single line diagram indicating the power distribution from the substation with the Changeover provision to backup power along with the IT load distribution scheme is as indicated in the schematic diagram.



(In-Row Cooling in diagram)

B) Lighting System

Internal and external illumination system shall be designed keeping in view of following points:

- Office area, conference room, meeting room can be equipped with suitable automation like occupancy sensor for saving energy usage.
- human presence, Dimmer for lights, AC control for better energy efficiency.
- Daylight link control time switch / twilight switch for outdoor and landscaping illumination shall be provided. For external and terrace lighting, use of solar panel shall be investigated during detailed engineering.
- Proper illuminated marker / display board shall be provided for Exit / emergency Exit / lift and in outdoor to show
- route like – Reception, Office, and some strategic locations.
- Emergency lighting in all important locations like – Server room, electrical room, terrace, ground floor, workstation, meeting room etc. shall be provided which shall be feed from UPS. Emergency lighting shall be 50% of normal lighting.

C) Earthing / Lightning Protection

For equipment earthing the limit for the earth resistance shall be less than one ohm.

- The main equipment like DG sets, transformers will be connected to two separate earthing mat, one of copper for the neutral earthing and one of

GI for the body earthing. This will be connected to the Data Centre building mat earthing by a strip.

- The Data Centre building will have a separate equipotential copper mat earthing which will be connected to all the equipment in the Data Centre, pedestals, floor grid strips, PDUs etc. Each equipment shall have two distinct earth connections for the equipment earthing Raised floor pedestal to be grid bounded to ground with minimum distance of every two pedestal all throughout.
- All racks shall utilize a full-length rack ground strip, attached to the rear of the side rail with the thread-forming screws provided to ensure metal-to-metal contact
- Early Streamer Emission Lightning rod shall be provided for lightning protection system. Earthing pit for lightning protection system shall be segregated from main earth grid.

D) HVAC systems

General Design criteria

The design philosophy is to ensure fulfilment of all functional requirements, energy optimization & design compliance to relevant standards and codes. While fulfilling the functional requirements, special efforts have been made towards energy optimization while ensuring resiliency and reliability of the system. Through these collective measures, functional adequacy has been ensured while avoiding over sizing in equipment and systems.

- In order to improve PUE, separate HVAC system has been proposed for the Data Centre floor and the office areas, thus segregating high sensible cooling requirement for Data Centre floors i.e., in row cooling with CAC containment and latent cooling requirement of the comfort areas.
- For Data Centre floor to achieve lower PUE, non-condensable chilled water temperature range (in/out of 14 degree C/21 degree C) has been adopted, whereas for the comfort areas, either DX based VRF system has been recommended.
- A DX based system considering VRF condensing unit is proposed for treated fresh air unit for ground floor, 4th floor, and 5th floor.
- The design approach shall be sensitive to environmental issues. The main thrust shall be laid on energy conservation, safety and ease of maintenance and current progressive technological developments.
- Chillers shall use refrigerant with zero ozone depletion potential, which have the least impact on ozone layer as well as global warming. The chillers shall be based on R-134a (for screw chiller) only.
- Adequate fresh air quantity shall be provided to comfort areas to maintain indoor air quality (IAQ) as per ASHRAE standard 62.1-2004.
- Server areas shall be provided with treated fresh air provided with chemical filter for pressurization.

E) Mechanical Ventilation System:

- The Engineering Utilities area shall be provided with dedicated ventilation system with the number air changes, or based on equipment heat load as described below:
- HT panel rooms: - The based-on equipment load Supply an exhaust ventilation through tube axial flow fan shall be provided. Supply shall be through G4 filter
- Shaft: - Will be provided as per NBC guidelines.
- Lift lobby/staircase pressurization: - Will be provided as per NBC guidelines.

3.4.1.9 Approximately Load calculation & schedule of main HVAC equipment

- The detailed load matrix is attached below.

Cooling design criteria									
Sr · No.	Rack Description	Tier-III with 300 racks				Tier-III with 150 racks			
		No's	kW rating	Total	Unit	No's	kW rating	Total	Unit
1	Server / Network racks (800 x 1200mm)	300	10	3000	kW	150	10	1500	kW
2	Telecom racks (800 x 1200mm)	10	2	20	kW	5	2	10	kW
3	UPS Room-1	2	20	40	kW	2	20	40	kW
4	UPS Room-2	2	20	40	kW		20	0	kW
5	Battery Room-1	2	30	60	kW	2	30	60	kW
6	Battery Room-2	2	30	60	kW		30	0	kW
7	Solar Inverter room	2	15	30	kW	2	15	30	kW
8	Non-Critical load UPS Battery Room-1	2	12	24	kW	2	12	24	kW
9	Non-Critical load UPS Battery Room-2		12	0	kW		12	0	kW
	Total in kW			3274	kW			1664	kW

To meet above cooling requirement, is proposed total 3 nos. air cooled chillers of 570 TR capacity in N+1 redundancy. For the first phase, 2 nos. air cooled chillers of 570 TR capacity in N+1 redundancy is proposed for load of 150 nos. racks.

A) Detailed design brief Chiller configuration

- Data Centre: - As availability of continuous water for water cooled chiller is challenge, which would have been a right proposition for such cooling load, air cooled chillers with Variable drive feature have been proposed to meet the following duty requirements essentials for Data Centre applications.
 - Quick starting feature.
 - Energy saving.
 - Initial cooling requirement of Data Centre which can be as low as 30 %
- For achieving the lower PUE, a chilled water temperature of 21 / 14 degree C has been proposed.

- The variable drive chiller will be used for 24x7x365 days applications as it can utilize the annual variation of ambient for energy saving. While selecting this feature, energy saving benefit at part load operation also has been considered as any Data Centre is fully configured at a later part of its life.

Performance rating for Air cooled chillers shall be as follows: -

1. Capacity of chiller: 570TR (actual)
 2. Temperature of chilled water entering chiller: 21 degree C
 3. Temperature of chilled water leaving chiller: 14 degree C
 4. Ambient temperature: 47 degree C
 5. Refrigerant: R-134a
 6. Feature: Quick starting feature and 100% loading within 5 minutes.
- The chillers have been selected based on above conditions. However, chiller temperature can be further increased for higher operational PUE based on operating parameters.

B) Chilled Water distribution system

Adoption of primary variable system: Primary-secondary system is based on two sets of pumps, out of which one sets of pumps have constant flow through chiller (which is called primary pumps) and second set of pumps are required for distribution which is variable in nature. This concept is based on modern chillers have improved control system and do not require constant evaporator flow design basis on which primary- secondary variable system has been evolved. Adoption of only primary variable system allows removing one set of pumps thus improving overall efficiency of chilled water distribution system. The expected energy saving for adopting primary variable system shall be 5%. Thus, primary variable system has been adopted. To meet continuous cooling requirement for server floor, primary pumps in electrical distribution path need to be on UPS.

C) Distribution within Data Centre building

- Dual Chilled water distribution within the Data Centre have been proposed with two supply and return headers for increased reliability as per ASHRAE & Uptime Institute recommendation meeting Tier III comply Tier-IV ready requirement.
- The Tier III comply Tier-IV ready requires fault tolerant system with automation, compartmentalization, and continuous cooling. Hence to meet automation requirement for fault tolerant conditions, either valve connected with in row cooling machine need to be automatic
- The bidder must provide mechanical SLD.

D) In row cooling & Cold aisle containment for server floor

- Chilled water based in row cooling units are being proposed with cold aisle containment for network racks and server racks.
- In cold aisle containment room is higher temperature and cold air is contained in the containment area which provides limited inertia for cooling in case of power failure.
- All server halls shall be provided with in row cooling units with cold aisle containment units with energy efficient EC fans suitable for variable air flow

system. In row units shall be provided with supply air temperature logic, to maintain air inlet conditions as per ASHRAE.

- Precision air handling within floor EC fan technology is recommended for server floor for increased efficiency
- In row units for DC floor shall have connected with the SS 316 piping which will have two different supply and return loops. This will give a redundancy level to in row units too.

E) Precision air handling unit for UPS and battery rooms.

- A wall precision air conditioning system should design for cooling non-critical load UPS room, battery rooms, electrical room, IBMS room, solar inverter room etc. Precision Air Conditioning systems should provide high ratio of sensible to total cooling capacity. The unit selection should be as per heat ratio of the hardware and room size.
- A Precision Air Conditioning system should design for cooling Critical load UPS and battery rooms. Precision air Conditioning systems should provide high ratio of sensible to total cooling capacity. The unit selection should be as per heat ratio of the hardware and room size. These shall be discharge units with bottom discharge.

F) Energy conservation measures in Data Centre

- Following measures have been adopted for energy conservation: -
- Infrastructure power requirements can drive up operating costs. Data Centre managers can cut their utility bills. The customer needs to address power needs for CPUs, storage and cooling systems. As part of the push to address IT spending, Data Centre managers and organizations continue to look for ways to drive down Data Centre energy costs and increase overall energy efficiency. Some of these options include adjusting fan speeds, storage hardware, cloud infrastructure use and even operating temperature. These small changes can collectively reduce Data Centre power consumption, resulting in significant energy savings.
 1. Switch to EC fans with variable-speed capacity
 2. Chilled water based cooling system for server room
 3. Optimized supply air temperature
 4. Adoption of latest cloud architecture like HCI etc.
 5. Hardware technology need to be used latest one.
 6. Need to use right solution for correcting power factors as well as reduce loss of energy.

G) Optimization of chilled water temperatures: -

- Chiller COP, which is a measure of energy efficiency, depends on leaving chilled water temperature. Higher chilled water temperature results in higher COP which means lower input kW per TR cooling capacity. To sum up, higher chilled water temperatures would result in lower OPEX. Provision of supply air temperature control logic in CRAC and maintaining supply air temperature as per expanded environmental conditions of ASHRAE TC 9.9 will allow increasing chilled water temperature. Accordingly, all chillers will be selected based on higher leaving chilled water of 14-degree C.

3.4.1.10 Safety System

The details of the initial design considerations for fire safety systems are below:

- The local codes insist on providing wet risers and sprinklers in all the floors of the building. This needs to be finalized after discussion with the local authorities
- Fire detection and alarm system (FAS) with intelligent addressable detectors is considered in all the floors of the building installed in all voids of the rooms. Above ceiling, detectors will have response indicators in the ceiling for easy identification
- The fire detection system will be interlocked with the access control system to ensure that all the doors open in case of fire detection.
- Audible and visual notifications will be provided for the fire alarms.
- High sensitivity smoke detection systems will be installed in the server room area of the Data Centre.
- Gas based suppression systems are proposed in the Server rooms, electrical panel rooms, UPS & battery rooms. The gas-based suppression system will be using Novec 1230 as acceptable to client.
- Handheld fire extinguishers will be provided based on the safety requirements in all the rooms as per the local norms.

A) Design Overview for Fire Safety

Fire Safety System in Consideration for the proposed Data Centre facility has been divided in four major aspects,

- Detection system which includes
 1. Aspiration smoke detection system (VESDA) Smoke detection system
 2. Water Leak Detection System
- Protection / Suppression system including Sprinkler system
 1. Gas suppression system
 2. Handheld extinguishing system
- Fire rated enclosures and fire sealants.
- Safe Evacuation and addressing system.

Rodent repellent system has been proposed to avoid damage to communication cables and electrical cables by rodents. This is in addition to appropriate closure of cable / conduit access etc. by fire sealant materials.

3.4.1.11 Fire Detection System

A) Fire Alarm System (FAS)

The entire Data Centre building is covered under Fire detection and alarm system. The FAS will be addressable intelligent system where each detector has its own address and can be Identified or zoned or grouped as per the requirement. FAS System is a Firsthand safety Tool to detect the fire (if present) and raise an Alarm to initiate action. Every detector has its own individual address.

All the detectors are connected to an Addressable Fire Alarm Panel, which indicates the exact address of the Detector in case of Fire. Multi criteria smoke detectors will be provided for room void and photoelectric detectors for ceiling and floor voids. The other components in the FAS would have Sounders, Strobes, Manual Call Stations, Relays, control modules, response indicators, etc.

The following are the objectives to achieve.

- The FAS will provide alarm in the event of Fire detection.
- It is designed to implement a cross zoning function to obtain double confirmation before the fire suppression system is activated.
- The FAS will integrate with the public address and Access control system for effective and panic free evacuation of personnel in the building.
- The systems shall be maintainable without impacting the Data Centre operations. All systems shall be integral type and easy to interface with each other.
- The fire alarm panel and the detectors shall be listed by Underwriters Laboratory (UL) for fire protective signaling service under UL 864 or EN54 Complaint.
- Cross zoning will be programmed in the FACP, and suitable output signal will be connected through control module to integrate with gas-based fire protection system.
- Depending on number of voids in each room, the detectors are installed in all the voids if the void height is more than 400mm.
- In all the critical rooms like server rooms where gas-based fire protection is provided, 2 loops for cross zoning is proposed. If one of loop is under maintenance, the other remains active and functional. As far as Smoke Detection panel redundancy is considered, in case of failure of CPU/motherboard, the loop card itself act as CPU and the loop card takes over and panel remains functional. Secondly, if loop card fails then each individual detector is active and work as conventional system.

B) Aspiration Smoke Detection (ASD)

As the first level of fire detection in server areas where the high airflow is pre-set, it is recommended to provide ASD system via continuous air sampling and particle counting using a special detector.

- ASD is also called as High sensitivity smoke detection (HSSD) which provides the earliest warning of a potential fire and gives adequate time to investigate, intervene and potentially avoid business disruption.
- ASD is a high sensitivity; aspirating type laser based optical smoke detection system that continuously draws air within the protected area through a network of pipes where it is passed through a calibrated detection chamber. It is capable of providing very early warning of fire conditions thereby providing invaluable time to investigate and respond to a potential threat of fire.
- An ASD system can detect a fire within 70 seconds and activate alarms.
- ASD system could be installed in various combinations to provide the effective detection namely, Ceiling Protection, Floor and sub floor void protection, return air vent protection. Multi levels of ASD systems are considered keeping in view the Data Centre size and volume.
- One system would be provided at the ceiling void of the computer room as well as at the intake to computer room air handling units.
- A second system would cover the area under floor.
- Fast response can be achieved by designing and routing the HSSD sampling tubes near the AC suction inlet, since the air within the room is sucked through these units. 100% result on the performance of the system is achieved. Hence, return air- vent detection is provided.
- ASD shall detect fire at the earliest possible stage and measures very low to extremely high concentrations of smoke with high reliability. It shall have sensitivity range of 0.005 to 20% obscuration meter (0.0015 to 6% obs/ft). It also supports four configurable alarms, (Alert, Action, Fire 1 and Fire 2) and protects areas up to 2,000 square meters (20,000 square feet).

- It will be interfaced with systems external to the network, such as intelligent fire alarm panels and building management systems.

3.4.1.12 Protection / Suppression system

A) Gas Based Automatic Fire Suppression System

This system is proposed for all rooms at 1st floor, 2nd floor, and 3rd floor. This system works based on the detection of fire by the fire alarm & detection system.

- The agent should have less atmospheric lifetime, zero global warming potential or ozone depletion potential.
- The Fire Extinguishing agent storage Cylinder must have CCOE, India approval for the range of cylinders provided. The cylinder approval must be with clean agent for use in Indian conditions.
- It is proposed to provide NOVEC-1230 Gas agent for the hazardous area fire protection.

Features of a Suppression Agent:

The Fire Extinguishing system for the above purpose has to be Quick

- acting
- Reliable
- High Shelf Life
- Time tested and approved by Authority. Clean and safe for equipment
- People safe
- Environment friendly
- Versatile enough to take care of all Classes of Fire Long-term availability
- Space efficient
- No collateral damage to assets, which the system is meant to protect.

B) Handheld Fire Extinguishers

These extinguishers are proposed to extinguish the localized fire in early stages. Portable CO2 fire extinguishers are recommended for server room, application located within the areas maybe trolley mounted 9 kg extinguishers are recommended for every operation.

C) Fire Sealant and Fire Rated Enclosures

Enclosures such as partitions, walls etc. of the computer room, utility rooms and UPS rooms are proposed with 2 hours fire retardant materials. Proper sleeves for the entry/ exit points of the cables, chilled water and such utility are to be properly prepared with sleeves which are to be blocked with suitable fire sealant material.

3.4.1.13 Water Leak Detection System

A Water Leak Detection System is proposed to be installed under the raised floor and near the perimeter of the server room in the Data Centre. In the event of any water leakage, due to condensate of air conditioner blockage, this system will be able to detect the location of water and provide an alarm in the command center along with localized hooter. The design of control panel operating on 240V/1ph /50 Hz would cover

- LED screen displays alarm location in meters.
- Integral indication showing areas being protected
- Audible and visual alarm.
- Alarm mute/test/reset facilities. Battery backup
- Interface for remote monitoring. Standards & Approvals: UL, VDS

3.4.1.14 Security System

Electronic security systems considered in the Data Centre project are access control system, perimeter security & intrusion detection system and video surveillance systems. The complete facility shall be provided with an integrated security system that shall cover the following:

- Access Control System
- Perimeter Security & Intrusion Detection System including Panic Alarm & Remote Monitoring
- Video Surveillance System

A) Key Feature

- All these systems shall be integrated with each other to work in a cohesive and user- friendly manner.
- Onsite security personnel shall operate the facility on a 24 x 7 basis. The entire system shall be controlled from the DCIM Room.
- All exterior walls shall be of concrete for added security.
- The Fire Alarm System shall disable the Access Control System of specified doors for safety reasons

B) Access Control System

Being a highly sensitive area electronic access control system that allows only restricted access to different areas is considered in the design. It also logs the entry and exit for auditing later. This system assists in controlling any unauthorized movement within the Data Centre Facility. A few design considerations are listed below:

- To enter the facility, all personnel (including the customer) must present a valid Photo-ID Smart Card. Thereafter, the Access Control card readers shall allow access based on the individual privileges.
- Turnstile or flap one at a time access at the main / key entrances is proposed. No piggyback entry shall be allowed.
- The entire secured zone has only one access point for routine entry / exit from the security perspective. Additionally, there should be only emergency exits. There will be an additional access point for large material movement into the area. This will generally be secured, and entry allowed only under strict security control.
- The entry point of the secured zone will be manned by having a Security Guard desk. All entry/exit at this point should be after authentication only and a register needs to be maintained for logs of entry.
- The second point of access control is the main access control door.
- At individual floors, each of the room will have a separate man trap, which is controlled by face / biometric/ card access control. Only authorized persons will have access to each of these blocks.
- The access system will be configurable to restrict access to any particular room / partition, on any particular day / days and for particular time zone or zones

- Critical areas shall be secured with face + card based biometric readers in addition to the Smart Card readers.
- Strong (1000 N) electromagnetic locks with monitoring capability shall lock all access- controlled doors. In addition, Magnetic Contact sensors (all controlled doors) and Glass Break sensors (on glass doors only) shall be mounted. In case of a dual leaf door, both leaves shall be locked and monitored.
- The entire system shall be based on distributed processing i.e., no single point failure shall affect the complete system.
- Battery backups for Access Control System shall be greater than two hours.
- Doors are to be automatically opened in case of a fire by linking the Fire Detection System to the Access Control System.
- In addition to above, we propose following Physical Security Systems
- X-Ray baggage scanner at the main entry gate
- Door frame metal detector at the main entry gate
- Motorized boom barriers at the main entry gate

C) Perimeter Security & Intrusion Detection System

- The Perimeter of the building shall be protected with Video Motion Detection (VMD) system using fixed outdoor weatherproof cameras.
- The alarm system and the sensors shall be connected to both - the Access Control system as well as the CCTV system for logging of all alarms as well as for switching ON of CCTV recording to live mode.
- Telephone line for the Alarm System shall be provided in addition to a landline for automatic notification to concerned staff at local or remote (defined) locations.

D) Video Surveillance System

The design basis for the video surveillance system is as below:

- All areas of the Data Centre will be monitored and recorded using high-resolution digital color CCTV cameras capable to work at 2-lux light levels with night vision.
- IP based cameras are considered. Entry and exit will be monitored for main entrance, data halls, ISP rooms etc.
- The monitoring shall be extended to all the aisles inside the data halls.
- The video from the entire CCTV system shall be archived for 30 days on high quality Digital Video Recording System (on hard disks).
- The Digital Video Recorder will be fully capable of Simultaneous Viewing Live, Playback and Recording.
- The DVR will have Dual Hot Swappable Hard Disks for easy up gradation and storage without having to switch off the DVR.
- The Cameras will have a selectable Recording Frame Rate for Live Recording, Motion Based recording or time lapse recording.
- Selected indoor cameras shall be with variable focal length lens, in-built electronic iris and backlight compensation (BLC) and shall be housed in dust-proof housing.
- All camera video signals shall be fed to high quality duplex Multiplexer with advanced activity detector and alarm inputs for each camera. A Spot Monitor output shall be available for full screen call up, sequencing, activity and alarms.

3.4.1.15 Cabling for Voice connection for existing EPABX System

- Bidder is required to carry out necessary passive cabling with all the accessories for providing Voice connection from existing or new implemented EPABX system / VoIP system set up by GoG.
- All responsibilities for establishing the Voice connections (including integration with existing/new VOICE setup with necessary coordination with all stake holders) in line with Data Centre requirement is taken care by Bidder.

3.4.1.16 Infrastructure Monitoring Systems

The design considerations for the monitoring systems are listed below:

- A fully integrated building automation system will be planned to incorporate direct digital control for energy management, equipment monitoring and control, suitable for mission critical equipment monitoring via management station software.
- The DCIM system will be used to monitor the critical equipment in the Data Centre including the DG sets, LT panels, transformers, distribution boards, UPS, SMPS, PDUs, Chillers, Pumps, and in row cooling units etc.
- In raised floor areas where chilled water or any other liquid piping is installed, liquid leak detectors shall be installed.
- Critical instruments shall be isolatable for preventive maintenance without impacting Data Centre operation. Critical instruments are those without which the Data Centre has a potential of shutting down or is at risk.
- Critical I/Os for similar functions shall be distributed on separate DDC / PLC panels, integrators etc.
- Communication between Critical equipment and DCIM controllers will be via dedicated MODBUS/ SNMP/ BACnet communication Network.
- Major parameters monitored by DCIM are temperature, Humidity, CO, CO2, Pressure, flow etc.

A) Physical Site Security.

A DCIM can record who is entering secure areas of a facility via key cards or biometrics. Furthermore, it can implement various access-control measures, such as limiting access during certain times of the day or permitting certain personnel access to some areas but not others.

B) Lighting Control.

Servers may not need light to work, but people do. Unfortunately, owing to neglect or simply impracticality, lighting can become a major source of energy waste and thus decreased efficiency. A DCIM can ensure that lights are shut off during off hours or when no motion is detected in a given area for some specified span of time.

C) Effective, Efficient Cooling:

As Data Centre move toward free cooling, airside or water- side economizers and traditional mechanical cooling must function together in a manner that maximizes efficiency but still protects IT equipment. Here, a DCIM can balance these considerations for instance, to run in economizer mode when the outside temperature is sufficiently low but

to switch to in row units or water chillers when extra cooling is needed. Part of this capability owes to the DCIM recording and monitoring temperature and humidity data throughout the facility. If a hot spot develops, for instance, the DCIM could increase air circulation at that point (if possible) or simply increase cooling to the appropriate area (or the entire facility).

D) Power Distribution:

Ensuring steady, clean power reaches the IT equipment is critical to keeping the Data Centre running. The DCIM can monitor power conditions and provide alerts in the event of certain conditions that might indicate a failure at some point in the power distribution system. In addition, the DCIM can record data on power usage and conditions, enabling analysis for potential problems.

The monitoring and data collection capabilities of a building management system enable both real-time awareness of conditions in the Data Centre as well as analysis of collected data to identify problems before they affect uptime. Some features of a good DCIM include the following.

E) Alerts Indicating Conditions that Threaten Security, Safety or Uptime:

The presence of hot spots, fluctuating power conditions or unauthorized access to certain areas of a facility may call for immediate action. By keeping a virtual eye on the Data Centre, the DCIM can call attention to situations that either are problematic or that require review to prevent a problem from occurring.

F) Remote Monitoring Capability:

The Data Centre always eyeing a computer screen. When equipped with remote monitoring and alerts, the DCIM can enable a Data Centre manager to keep an eye on conditions from another location such as at home on a desktop computer or on the road via a laptop or tablet.

G) Data Collection:

The DCIM system, in addition to providing alerts, can collect data for analysis. By examining trends in collected data, such as power conditions or temperature readings, facility managers can identify areas that could cause problems in the future or that require maintenance. This approach can increase uptime by dealing with issues before they bring down the Data Centre.

H) Maintenance Scheduling:

Data Centre maintenance is critical to keeping systems functioning. A DCIM can indicate when infrastructure requires regularly scheduled maintenance, or when conditions merit pre-emptive maintenance to avoid a problem before it causes downtime. Automated maintenance reminders can prevent day-to-day tasks from causing employees and managers to forget periodic tasks that are necessary to the ongoing health of the facility.

I) Enable Planning and Upgrades:

The information that a DCIM collects, in addition to providing a basis for maintenance and troubleshooting, can aid in planning for Data Centre expansions or upgrades. For instance, power usage data relative to maximum capacity might indicate the need for greater capacity when additional IT equipment is installed.

J) Improve Efficiency:

Hardly the least concern of Data Centre managers is increasing the efficiency of their facilities. Data collected by the DCIM can be critical to determining which measures will increase efficiency and (potentially) by how much. The DCIM enables Data Centre managers to respond to problems more promptly as well as to identify, diagnose and address potential problems before they affect operations.

The system comprises the supply, engineering, testing and commissioning of an integrated building management system by a specialist manufacturer. The essential functions of the system are as follows:

- Centralized operation of the plant (remote control)
- Dynamic and Animated Graphic details of Plant and building
- Early recognition of faults
- Faults statistics for identification
- Trend register to identify discrepancies, energy consumption, etc.
- Preventive maintenance and plant servicing
- Optimum support of personnel
- Control optimization of all connected electrical and mechanical plant
- Prevention of unauthorized or unwanted access
- Own error diagnosis integrated system

DCIM software will be used to benchmark current space, cooling and power consumption with equipment temperature often using real-time feeds and equipment ratings, then model the effects of "green" initiatives on the Data Centre's power usage effectiveness (PUE) and Data Centre infrastructure efficiency before committing resources to an implementation. Implementations of DCIM Suites should be able to optimize server placement with regard to power, network, cooling and space requirements.

DCIM should include following Communication Interface, 3rd Party Integration Adapters & Software Modules:

S. No.	Features/ Modules:
1	Communication Interfaces:
	SNMP Interface
	MODBUS/TCP Interface
	BACnet/IP Interface
	Dry Contact Sensing Interface
2	Software Modules:
	Power Monitoring & Management
	Transformers (HT, LT)
	DG Systems,
	Electrical Feeder Panels (HT, LT, DG, Breakers, UPS, Floor PDU, In row/PAHU)

	UPS Systems
	Power Distribution Units (Floor & Rack)
	Rack Power Profile (Actual Load vs. Defined Load)
	DC Load - Real-time, Average (Total, IT, non-IT)
	PUE (Real-time from kVA, Average for hour, day, week, month from kWh)
	Multi-level PUE (L2 - UPS output, L3 - PDU output)
	DC Power Chain Visualization
	DC Power Cost (Utility + Fuel)
3	Environment Monitoring
	Rack inlet and outlet temperature & humidity
	Rack airflow
	Water leak
	Smoke, Fire
	PAHU/PAC parameters
	Chiller parameters
	Temperature & Humidity profile for data room and racks
	Cooling System Efficiency
	RCI, RTI
	CO2 level in server hall
4	Asset Management
	Device auto-discovery (SNMP & BACnet/IP) or Through Manual Entry
	Device Inventory Management
	Device Dependency/Relationship Management
	Manufacturer Repository for Facility
	Device Life Cycle Management
	Device Physical Location Tracking
	Device Ownership Management
	Device Group Management
	Device Availability Management
5	Capacity Management
	Graphical Management of Data Centre Capacities - physical infrastructure & whitespace
	DC Capacity Baseline & Profiling - Power, Space, Cooling & Rack Weight
	Identification of 'best-fit' rack & Auto-provisioning of IT devices based on available capacity
	Capacity Forecasting through 'What-if' Analysis using Manufacturer Repository
6	Alarm Management
	Tracking Real-time Alarms on all facility devices
	Tracking Alarm Recovery
	Alarm Analysis - Severity, Source, Recovery time, Status
	Alarm Suppression
	Alarm Dashboard
	Alarm Delivery (Email SMS SNMP Traps)
7	Software Modules:
	IT Power Monitoring
	Monitor power consumption of Servers, Network Devices & Storages
	Top power consumers
	Historical & Comparative trends of power/energy for devices
	Identification of under-utilized/ghost servers that can be retired/shutdown or consolidated to save power
	Identification of replacement candidates
8	DCIM Workflow Module for Data Centre provisioning (Named Users: 25 nos.)

3.5 Detailed Scope of work and Design Consideration for Non-IT infrastructure

3.5.1 Detailed Scope of Work

The scope of work to be undertaken by the selected bidder for Design, Supply, Installation, Testing, Commissioning, Operations and Maintenance of Non-IT infrastructure for the Gujarat State Data Centre, has been outlined below. The selected bidder shall ensure an uptime more than 99.982% on quarterly basis for the minimum period of Seven Years from the date of Go-Live. SI needs to enter into O&M agreement post Go-live. Design and Solution is completely Bidder's responsibility in this project. However, while doing so, the bidder must take into account the considerations/assumptions/suggestions as mentioned in this document. In case there is any discrepancy or contradiction, the same may be brought to the notice of the purchaser during pre-bid meeting only.

The minimum specified work to be undertaken by the bidder for setting up and operating the proposed Data Centre has been categorized as under:

- Design and propose solution for Tier III complied and TIER IV ready Data centre in line with requirement mentioned in this RFP.
- Supply, Installation, testing and commissioning of the Non-IT Infrastructure for proposed Gujarat State Data Centre.
- Operations and Maintenance services for the complete Infrastructure at for the period of 7 years from the date of Go live

Please refer Section at Annexure L for detailed Technical Specification and Function requirement of various non-IT components (but not limited to) to be supplied as a part of this RFP. However, to provide solution as defined in this document, Bidder is responsible to implement the end-to-end solutions to meet the RFP requirement. If any component/services are not mentioned in this document, Bidder has to take into consideration the same without any extra cost to GoG. The Non-IT Scope covers Design, Supply, Installation, testing & commissioning further operation of same for period of seven years post sign off. i.e., Final acceptance test (FAT)/Go Live.

A) Design Phase:

- In design phase SI needs to design the solution to meet all the requirement mentioned in this RFP.
- All equipment/components to be supplied by Bidders must be in compliance with the Technical Specification and Design consideration mentioned in this document.
- Approval on Design document and project plan must be submitted to DST/GIL and taken prior approval on the same before starting of the installation activity.
- All the approvals pertain to Supply, installation & commissioning of the equipment shall be taken by bidders only under intimation to DST/GIL.
- All the pre-requisites to be taken care in advance to obtain certification for Tier-III from Uptime institute and necessary design documents need to be submitted to DST/GIL. Bidder is responsible

to review the same during Installation, implementation and commissioning phase to ensure to meet all the compliances for

B) Supply Phase:

- SI needs to supply the equipment/material in line with the approved Make/Model proposed in their technical solution and approved by DST/GIL during Technical evaluation of BID.
- All the item delivery plan along with the inspection/ factory test schedule, needs to be submitted for approval to the Engineering In charge.
- Dispatch clearance will only initiate once the approval received from Engineering In charge.
- Material needs to be delivered DTD (Door to Door). It's SI duty to take utmost care of dispatched material during transit.
- All the material getting supplied against Project needs to be covered under Insurance. It's SI responsibility to ensure that without Insurance coverage no material is getting delivered at site.
- All the material getting delivered at the site will be under the custodian of SI till it's get Installed & acceptance sign off of the same getting issued by the Engineering In charge. Also post sign off (FAT), SI needs to take all asset Insurance till operation phase.

C) Installation Phase:

- SI needs to follow the OEM standards guideline while doing Installation of equipment.
- Installation report for all the equipment's needs to be sign by the committee/agency/officer appointed by DST/GIL.
- All the safety requirement needs to be followed by SI while Installation of equipment.
- All the required tools/accessories/other support for Installation needs to be arrange by SI only.
- All the require work permit needs to opt from Committee/agency/officer appointed by DST/GIL before starting of any Installation activity.
- SI needs to carry out all the Installation under the supervision of SME/ OEM & Committee/agency/officer appointed by DST/GIL.

D) Testing & Commissioning:

- Testing /commissioning of the equipment only be conducted of that equipment, which passed the IR (Installation Report).
- All the necessary testing equipment, require fuel, oil, load bank, power etc. needs to be arranged by SI only.
- Testing of the equipment for require time span, for load test, unload test needs to be conduct as per OEM standards.
- All the test certificates/ test results pertain to factory test, site test needs to be documented in soft as well as hardcopy format.

- If any deviation in test result from the benchmark parameters, SI needs to arrange another set of equipment for testing. Post test results acceptance, only equipment acceptance will be considered.

E) Operation & Maintenance:

- O&M phase will be start after the receipt of final sign off. (FAT)
- All the equipment delivered under the project will require to cover under CAMAC with OEM for period of 7 years from the date of Go Live.
- As per MSA (Master service Agreement) SI needs to follow SLA.
- Onsite manpower requirement needs to be fulfilled as per the criteria mentioned in this RFP.
- MIS reporting and SLA document submission as per agreed frequency needs to be done by SI.
- Preventive maintenance yearly planner needs to be submitted at the starting of the year.
- All the incident reports logs, RCA, etc. needs to be maintain in history book for equipment.
- Periodic health Audit for Non-IT and other utility services.
- Standard Operating Procedures (SOP) for all the activities need to prepare and share for review and approval by GIL
- System health and system utilization report and other reporting related to being published every three months.

3.5.2 Non-IT Infrastructure Design Consideration

4 Key Aspects of Non-IT Design consideration for Greenfield GSDC

- a) The Greenfield GSDC is planned to design for Tier III Compliant and Tier IV Ready, initially built for TIER-III which includes certification for Tier III.
- b) The design is planned for total 300 nos of Server Racks with 150 nos of Server Racks per floor in a two-Server farm floor design building.
- c) The indoor electrical system design is based on a maximum ambient temperature of 47°C.
- d) All the critical panels should have surge suppression device to arrest the switching surges.
- e) 100% power back up will be provided in the form of high-speed diesel generator, DG sets will be data Centre continuous rated.
- f) The fuel storage shall be minimum duration of 12 hrs. each, for two physically separated tank for continuous operation of engine generators at full load, with N capacity as per Uptime Tier IV standard.
- g) Comprehensive local & remote monitoring and centralized monitoring & management will be planned.

Note:

1. 150 racks will be populated on the first floor from day one. All the equipment sizing has been done for 150 Racks with Tier-III Standards.
2. The power cable/UPS cable and cooling system will be provided from day one for 150 Racks.
3. AHU, Network cabling, Network racks, Server racks and busways for power will be provided on the 3rd floor at the time of rack population.

4. UPS Installation for server farm 2 needs to be provided at the Utility floor (Second floor) at the time of 3rd-floor Rack population.
5. Electrical power Transformer must be provisioned for 300 racks from day one, however initially transformer will be installed as per load requirement of 150 racks
6. Chiller must be provisioned for 300 racks from day one, however, initially it will be installed for 150 racks.
7. All internal walls need to be built as 0.5 hrs. Fire rated and all external walls to be 2 hrs. Fire rated as well.
8. A minimum requirement of 30 min's power backup capacity shall be provided from UPS Battery Banks for all IT equipment's.
9. Power to PDUs and Power from PDUs to racks shall be with Bus Bar trunking.
10. Server Halls, UPS Rooms and Battery Rooms shall be provided with clean Gas Fire Suppression System.
11. Form of construction for the main distribution board shall comply with Form-4 requirements of IEC 60439-1.
12. UPS Loading shall not be more than 45% at any given time.
13. Server farm loading capacity should be maximum 1500 kg/sq. mt. and Battery, UPS, Panel rooms and Transformer loading should be minimum 2000 kg/sq. mt. live load and hanging load shall be 250 kg/sq.mt and remaining floor loading capacity should be maximum 1250 Kg/sq.mt.
14. Terrace floor loading capacity 2000 kg/sq.mt.
15. The DC Building should be supplied with dual redundant electrical power feeds from 33kV substation.
16. Diesel Storage capacity should be 12 hrs. for N Capacity for Continuously full load as per UPTIME Standard.
17. Raised floor tiles shall be made from high density calcium sulphate and provide Class 1 fire ratings and fire resistance up to 2 Hours as per Standard 75 of National Fire Protection Agency (NFPA). The raised floor should comply to European standards BS/EN 12825 & must withstand a uniform load of 1220 KG/Sq.mt
18. Installation of Utility equipment such as HT panel, Metering panel, Transformer, Transformer output panel, Bus bar trunking, Diesel Generators, Cabling etc.
19. Track busway system for rack power, UPS output panel, and equipotential grid.
20. Intelligent PDU.
21. Chilled water-based cooling, cold aisle containment etc.
22. Smart lighting system.
23. Addressable fire alarm system, Gas base suppression system, aspiration smoke detection system, CCTV, Access control system, Water leak detection system, Rodent repellent system, Data Centre infrastructure monitoring (DCIM), Rack access control and Asset tracking tool.
24. Flap barrier, Baggage scanner, Metal detector, Full height Capsule turnstile etc.
25. NOC screen, technical furniture, Glass partition etc.
26. Deliver reliable User Experience.

5 Design Standards for Non-IT equipment

The following standards are proposed to be followed during the designing Phase of the Data Centre.

Uptime Institute Certificate standard for Data Centre Design and TIA-942 for applicable non-IT Infrastructure, are the major standards to be followed.

A) HVAC

- Tier-IV Technical Standards and Guidance
- IEC / BS Codes
- ASHRAE Standards
- Building
- Motors, cabling, wiring, and accessories as per BS codes.
- National Building Code of India (NBC) 2016
- Energy Conservation Building Code (ECBC) (Revised version 2017)
- Indian Green Building Council (IGBC) new building ratings systems

B) Structured Cabling

- ANSI/TIA-568-C.0: Generic Telecommunications Cabling for Customer Premises
- ANSI/TIA-568-C.1: Commercial Building Telecommunications Cabling Standard
- ANSI/TIA-568-C.2: Balanced Twisted-Pair Telecommunications Cabling and Components Standard
- ANSI/TIA-568-C.3: Optical Fiber Cabling Components Standard
- ANSI/ITA-568 and ISO/IEC 11801 – Structured Cabling Standard

C) Transformer

- IEC 60076-11 Dry-type power transformers
- IEC 60905. Loading guide for dry-type power transformers
- IEC 60076 Series: Power transformers
- CENELEC HD 538 Three-phase dry-type distribution transformers
- IS 2026 Power Transformers
- IS 11171 Dry-type transformers
- ISO 9001

D) DG

- ISO 8528 – For sound vibration and temperature measurement
- Engine emission standards: 2004 and 2014 standard
- Local Standard of GPCB (Gujarat Pollution Control Board)

E) UPS

- IEC 62040-1-2, Uninterruptible power systems (UPS) – Part 1-2: General and safety requirements for UPS used in restricted access locations
- IEC 62040-2:1999, Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements
- IEC 62040-3:1999, Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements

F) Chiller

- The Air-Conditioning, Heating, and Refrigeration Institute (AHRI)

G) Fire

- Code of practice for fire safety of building (IS 1641 to IS 1646)
- NFPA (National Fire Protection Association) Standards
- NFPA 96 - Standard for Ventilation Control Fire Protection of Commercial Cooking Operations.
- NFPA 91 - Standard for Installation of Air-Conditioning & Ventilation Systems
- NFPA 92a – Recommended Practice for Smoke Control Systems

H) Gas based Fire Suppression System

- The design, installation, testing and maintenance of the Fire Suppression Systems, employing NOVEC 1230, shall be in accordance with the following codes, standards, and regulatory bodies:
 - a) NFPA 2001: Standard for Clean Agent Fire Extinguishing Systems.
 - b) UL 2166: Standard for Halocarbon Clean Agent Extinguishing System Units
 - c) IS: 15493: Gaseous Fire Extinguishing System - General Requirements
 - d) IS: 15496: Inspection and Maintenance of Gaseous Fire Extinguishing System - Code of Practice.
 - e) ANSI B1.20.1: Standard for pipe threads, General Purpose, 1992
 - f) NFPA 70 - NEC – National Electrical Code
 - g) NFPA 72 – National Fire Alarm Code
 - h) Requirements of the local Authorities Having Jurisdiction (AHJ)
- The agent should have less atmospheric lifetime, zero global warming potential or ozone depletion potential. However, NOVEC 1230 is recommended to use as fire suppression system.
- The manufacturer shall meet ISO 9001/14001 requirements for the design, production, and distribution of the engineered fire suppression system.

Raised Floor

- The raised floor should comply to European standards BS/EN 12825 & must withstand a uniform load of 1220 KG/Sq.mt
- Raised floor tiles shall be made from high density calcium sulphate and provide Class 1 fire ratings and fire resistance up to 2 Hours as per Standard 75 of National Fire Protection Agency (NFPA).

6 Critical Power and Cooling design criteria:

1. PS for IT loads of suitable Qty. shall be considered by SI as per their proposed solution. However, with the requirement for the proposed Greenfield SDC derived as 600 KVA (N+1) Nos. i.e., 4 Nos. UPS. Further SI needs to calculate the suitable capacity of the Lithium-Ion Battery.
2. Source A & Source B UPS and their associated batteries are placed in a separate room with a minimum fire-rated partition of two hours to meet fault tolerant and compartmentalization requirements of Tier IV data Centre Critical UPS batteries shall be Lithium Ion.
3. All UPS (i.e., Source A and Source B) shall be connected to 2 nos. UPS output panels, which will feed to PDUs through Bus bar Trunks (Track Busway System).
4. For IT critical loads, to comply with Tier III standard N+1 configuration of requisite rating UPS will be considered. Suitable size of Li-ion batteries for minimum 30 min backup on full-load shall be considered.
5. Each UPS must have battery backup for 30 minutes considering load power factor of 1.0 till end of 7th year.
6. The battery calculation to be done on Mid of life (MOL). Lithium-Ion chemistry to be used shall be LMO-NCM or LMO/NMC only.
7. Emergency Non-Critical loads shall include Emergency Lighting for server floor, Electrical rooms, passages, UPS, Network, and DCIM & utility rooms.
8. DST/GIL shall provide 33 kV feeders as primary electrical supply.
9. The main LT Panels shall be sized for full racks capacity.

7 Infrastructure Design Criteria:

The following Design Criteria are being considered for the design and must be taken care by the bidder while proposing design solution:

1. Total Racks space provisioned in the Data Centre is 300 Racks out of which, 150 Racks will be initially populated. Out of which proportionate rack space are identified as server & storage racks and network racks.
2. Dry type transformer, main LT panels, are to be installed in the facility for powering up the Data Centre.
3. The NOC & SOC will have a video wall with video management software.
4. Inside the DC in-row cooling is required to be there along with aisle containment. Cooling for other area other than the server farm will be from VRV/VRF based cooling architecture.
5. The outdoor unit of the Cooling units will be placed on the terrace of the building.
6. Raised floor is required in all technical area with a maximum finished floor height of 750mm from the existing tile floor level in the Server room
7. Vitrified tile with homogeneous flexible vitrified flooring of approved shade in roll forms and manufacturers specification over the existing floor. Before laying, the existing flooring should be made free from dust and undulations. The finished flooring should be free from air bubbles and thoroughly cleaned without undulations.
8. The entire facility will have captive backup power through Diesel Generators.
9. UPS systems and its batteries are required in both the power path.
10. Two separate redundant paths for power and cooling are required to be there.
11. The building will comply all require Building norms stated by the local and national authorities
12. Energy efficiency of the building must be taken care of.
13. All fire safety features must be installed in the building.
14. The Data Centre must follow UPTIME standard and TIA 942 to the maximum possible parameters as stated by the standard
15. Following features/packages/components (but not limited to) are mandatory to be there in the building
 - Addressable Fire alarm system
 - CCTV system
 - Gas based suppression system for technical area.
 - Fire hydrant system
 - Access control system
 - Attendance management system
 - Visitor management system
 - Water leak detection system
 - Aspiration smoke detection system for technical area
 - Integrated building management system
 - Data Centre Infrastructure management system

4 General Terms & Conditions of Civil

4.1 Key Design Criteria and Deliverables

4.1.1 Structural design should cover the following general requirements:

- a. The structural design shall be carried out in terms of latest editions and up-to-date correction/ amendment/ errata of BIS Codes (Bureau of Indian Standards), other relevant seismic/other codes for making Building Earthquake Resistant, sound engineering practices.
- b. It's SI duty to get the design proof checked with Reputed Engineering Institutes like IITs, NITs, Govt. Engineering College.
- c. Submission of all design calculations in hard and soft copies.
- d. Any other designing and detailing required for comprehensive planning and designing of the proposed buildings & campus.
- e. The required buildings along with internal and external services must be planned to achieve minimum cost of operation, minimum maintenance cost and lowest consumption of energy, water & electricity etc.
- f. One combined integrated drawing of all services will be prepared. (For internal & external services separately). For services being laid in false ceiling, an integrated plan of all services will also be prepared to avoid interference from each other.

4.1.2 External Water Supply & Sewerage:

- a. The works of sewerage system shall be done in view of Terrain. All sewer and drainage line shall be laid at minimum 1.0 meter below ground level. Work includes laying of sewer lines including excavations, pipelines, manholes, drop connections, drainage lines. Location of all manholes, etc. No drains or sewers shall be laid in the middle of road unless otherwise specifically shown on the drawings.
- b. Sewerage system shall be HDPE DWC pipe SN 8 Grade conforming to IS 16098. Collection of sewerage generated through manholes and connection to sewer line. Collection of effluent generated through manholes and connection to sewer line. The Main Distribution grid shall be HDPE pipes PE-100 (10kg/cm²) conforming to IS: 4984 and branch distribution system be with uPVC pressure pipes (10 kg/cm²) conforming to IS: 4985.
- c. Unless otherwise specified, minimum & maximum velocity of Sewer Pipe shall be 0.75 m/sec & 2.0 m/sec respectively. Unless otherwise specified, minimum & maximum velocity of Storm Water Pipe shall be 0.6 m/sec & 2.0 m/sec respectively. Manhole shall be built in brick masonry with Common burnt clay F.P.S. (non-modular) bricks class designation 7.5 with cover and frame (SFRC). Size and depth of manholes shall be as per NBC 2016/CPWD specifications.
- d. **Laying and jointing of HDPE pipes:** Pipes are liable to be damaged in transit and not withstanding tests that may have been made before dispatch each pipe shall be examined carefully on arrival at site. Each pipe shall be rung with a wooden hammer or mallet and those that do not ring true and clear shall be rejected. Sound pipes shall be carefully stacked to prevent damage. All defective pipes should be segregated, marked in a conspicuous manner and their use in the works prevented. The pipes shall be laid with sockets leading uphill and rest on

solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipe jointer room to work right round the pipe and as short as practicable to admit the socket and allow the joint to be made. Where pipes are not bedded on concrete the trench bottom shall be left slightly high and carefully bottomed up as pipe laying proceeds so that the pipe barrels rest on firm ground. If excavation has been carried too low it shall be made up with cement concrete at the SI's cost and Charges. If the bottom of the trench consists of rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on cement concrete bed to ensure even bearing.

- e. **Gully traps:** Gully traps shall be fixed in cement concrete 1:4:8 mix and a brick masonry chamber 30x30 cm inside in cement mortar 1:5 with 15x15 cm grating inside and 30x30 cm C.I sealed cover and frame weighing not less than 7.0 kg (approx.) to be constructed as per standard drawing.
- f. **Masonry Chamber:** All manholes, chambers and other such works shall be constructed in brick masonry in cement mortar 1:4 (1 cement: 4 coarse sand) or as specified in the CPWD Specification. All manholes and chambers, etc. shall be supported on base of cement concrete of such thickness and mix as given in the CPWD Specification or shown on the drawings. All manholes shall be provided with cement concrete benching in 1:2:4 mix. The benching shall have a slope of 10 cm towards the channel. The depth of the channel shall be full diameter of the pipe. Benching shall be finished with a floating coat of neat cement. (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal Size) as per standard details. All manholes shall be plastered with 12/15 mm thick cement mortar 1:3(1 cement: 3 coarse sand) and finished with a floating coat of neat cement inside. Manhole shall be plastered outside as above but with rough plaster mixed with water proofing compound. All manholes with depths greater than 1 meter shall be provided with plastic coated catch rings set in cement concrete vertically and staggered. All manholes shall be provided with steel Fibre reinforced plastic (SFRC) covers and frames and embedded in reinforced cement concrete slab. Weight of cover, frame and thickness of slab shall be as specified in the CPWD Specification.
- g. **Cement concrete for pipe support:** Wherever specified or shown on the drawings, all pipes shall be supported in bed all round or haunches. The thickness and mix of the concrete shall be given in the CPWD Specification.

4.1.3 Storm Water Drainage System and Drainage System:

Planning, Designing and Construction of Providing and laying precast storm water drain with perforated removable covers including necessary culverts etc.

The agency has to plan, design, prepare the drawings for Storm water drain. 300 mm (minimum wide) and 200 mm (minimum depth) varying size required to maintain slope along the Roads on both sides and parallel to boundary of campus including excavation of earth to the required profile, laying in position, and fixing with cement mortar 1: 3 (1cement: 3 coarse sand) in required gradient as per CPWD Specification. Wherever required in Storm water drainage system & Drainage system shall be done with required size of RCC NP3 class pipe conforming to IS 458.

4.1.4 Rainwater harvesting guidelines and details:

Planning, design, construction of retaining walls if required for leveling purposes including storm water catch drains for proper drainage of rainwater to the rainwater harvesting system.

Design and prepare working drawings for rainwater harvesting system including recharging of aquifer through bores, rainwater harvesting pits, trenches and perforated absorption drains.

Planning designing and execution of the roof top rainwater harvesting system for recharge of the sub-soil water including laying of pipelines and construction of substructure / super structures is included in the scope of work. The design, system shall be for minimum 25mm per hour.

***Note: The bidder must follow the guidelines set by UD & UHD of Govt. of Gujarat for Comprehensive development Control Regulations – 2017 and any amendment there to.**

4.1.5 Handling of Debris / Excavated earth:

The malba, rubbish & other unserviceable materials and wastes shall be disposed off to the notified/specified dumping ground and under no circumstances these shall be stacked / dumped even temporarily, outside the construction premises.

For construction works which are likely to generate malba / rubbish, shall be dispose of malba, rubbish & other unserviceable materials and wastes to the notified/specified dumping ground and under no circumstances these shall be stacked / dumped even temporarily, outside the construction premises.

The building material/ malba shall not be stacked on the road or on the land owned by any other authority.

The top soil excavated during construction works shall be neatly stacked and is not mixed with other excavated earth. Top soil should be stripped to a depth of 20 cm from the areas to be disturbed, for example proposed area for buildings, roads, paved areas, external services and area required for construction activities etc. It shall be stacked designated areas, covered or stabilized with temporary seeding for erosion prevention and shall be reapplied to site during plantation, landscaping etc. Top soil shall be separated from subsoil, debris and stones larger than 50 mm diameter. The stored top soil may be used as finished grade for planting areas.

No excavated earth or building material shall be stacked on areas where other buildings, roads, services of compound walls are to be constructed.

4.2 Materials & Quality assurance:

4.2.1 Test Laboratory at site:

A. External Laboratory:

These laboratories shall be in the Government sector, Semi Government or private sector. All govt. Institutes, Central and State research Centers, Central and State funded laboratories stands approved. No approval is required for testing in these laboratories/institutes

B. On Site Laboratory:

The field laboratory shall be established at site as specified in CPWD Specifications. (CPWD General condition of contract).

4.2.2 Maintenance of registers:

- All the registers of tests carried out at construction site or in outside laboratories shall be maintained.

4.3 Safety, Health and Environment:

4.3.1 Protection of Environment & Conditions of National Green Tribunal:

- In compliance to the Hon'ble National Green Tribunal (NGT) and Office Memorandum No. DG/SE/CM/CON/Misc./02 dated 16.03.2016 following preventive/corrective measures to be taken at site in order to control Air pollution from construction and demolition activity: –
 - i. The SI shall not store/dump construction material or debris on road.
 - ii. The SI shall get prior approval from Engineer-in-charge for the area where the construction material or debris can be stored. This area shall not cause any obstruction to the free flow of traffic/inconvenience to the pedestrians. It should be ensured by the SI that no accidents occur on account of such permissible storage.
 - iii. The SI shall take appropriate protection measures like raising wind breakers of appropriate height on all sides of the plot /area using CGI sheets or plastic and /or other similar material to ensure that no construction material dust fly outside the plot area.
 - iv. The SI shall ensure that all the trucks or vehicles of any kind which are used for construction purposes/or are carrying construction material like cement, sand and other allied material are fully covered. The SI shall take every necessary precaution that the vehicles are properly cleaned and dust free to ensure that enroute their destination, the dust, sand or any other particles are not released in air/contaminate air.
 - v. The SI shall provide mask to every worker working on the construction site and involved in loading, unloading and carriage of construction material and construction debris to prevent inhalation of dust particles.
 - vi. The SI shall provide all medical help, investigation and treatment to the workers involved in the construction of building and carry of construction material and debris relating to dust emission.
 - vii. The SI shall ensure that C&D waste is transported to the C&D Waste site only and due record shall be maintained by the SI.
 - viii. The SI shall compulsorily use of wet jet in grinding and stonecutting.
 - ix. The SI shall comply all the preventive and protective environmental steps as stated in the MoEF guidelines, 2010.
 - x. The SI shall carry out on-Road-Inspection for black smoke generating machinery. The SI shall use cleaner fuel.
 - xi. The SI shall ensure that all DG sets comply emission norms notified by MoEF.
 - xii. The SI shall use vehicles having pollution under control certificate. The emissions can be reduced by a large extent by reducing the speed of a vehicle to 20 kmph. Speed bumps shall be used to ensure speed reduction. In cases where speed reduction cannot effectively reduce fugitive dust, the SI shall divert traffic to nearby paved areas.
 - xiii. The SI shall ensure that the construction material is covered by

tarpaulin. The SI shall take all other precaution to ensure that no dust particles are permitted to pollute air quality as a result of such storage.

- xiv.** The paving of the path for plying of vehicles carrying construction material is more permanent solution to dust control and suitable for longer duration projects.

Any Penalty imposed by Civic bodies/ NGT for Non-Compliance of their guidelines issued by them from time to time shall be borne by the SI.

The SI shall comply with the safety procedures, norms and guidelines (as applicable) as outlined in the Part 7 of National Building code 2016 of India, Bureau of Indian Standards. A copy of all pertinent regulation sand notices concerning accidents, injury and first aid shall be prominently exhibited at the work site. Depending upon the scope & nature of work, a person qualified in first aid shall be available at work site to render and direct first aid to causalities. Complete reports of all accidents and action taken thereon shall be forwarded to the competent authorities.

The SI shall ensure the following activities for construction workers safety, among other measures:

- Guarding all parts of dangerous machinery.
 - Precautionary signs for working on machinery
 - Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
 - Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
 - Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.
 - Provide protective equipment, helmets etc.
 - Provide measures to prevent fires.
 - Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere.
 - Provide sufficient and suitable light for working during night time.
- i. Evidence for the implementation of the all the above required measures shall be provided to the Engineer-in-Charge in the form of photographs and templates as required which is required for the submission to the green building rating authority (GRIHA).
 - ii. Where possible, the SI shall select materials / vendors, harvested and manufactured regionally, within an 800-km radius of the project site. SI shall collect & submit the relevant material certificates for materials with high recycled (both post-industrial and post- consumer) content, including materials like RMC mix with fly-ash, glass with recycled content, calcium silicate boards etc. SI shall collect the relevant material certificates for rapidly renewable materials such as bamboo, wool, cotton insulation, Agri-fiber, linoleum, wheat board, straw board, and cork etc.
 - iii. Wherever required, SI shall meet and carry out of all activities on site, supplementation of information, and submittals in accordance with IGBC LEED India New Construction v1.0 & GRIHA program standards and guidelines. Towards meeting the aforementioned building environmental rating standard(s) expert assistance shall be provided to him up on request.

4.3.2 Prevention of Nuisance and pollution.

The SI shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupants of the adjacent properties and to the public in general. The SI shall take all care, as not to damage any other adjacent property or other services running adjacent to the plot. If any damage is done, the same shall be made good by the SI at his own cost and to the entire satisfaction of the Engineer-in-Charge. The SI shall use such methodology and equipment's for execution of the work, so as to cause minimum environmental pollution of any kind during construction, to have minimum construction time and minimum inconvenience to road users and to the occupants of the buildings on the adjacent plot and public in general, etc. He shall make good at his own cost and to the entire satisfaction of the Engineer in Charge any damage to roads, paths, cross drainage works or public or private property whatsoever caused, due to the execution of the work or by traffic brought thereon, by the SI. Further, the SI shall take all precautions to prevent any pollution of streams and waterways. All waste or superfluous materials shall be carted away by the SI, entirely to the satisfaction of the Engineer-in-Charge.

4.3.3 Security and Traffic Arrangements

Site is located in strategically sensitive area. Some restrictions/directions may be imposed/issued by the national/state/district administration/client with respect to working, safety, movement etc. of manpower (technical as well non-technical staff and labour), materials, machinery etc. in the campus/site and outside the campus/site. The SI shall be bound to follow all such restrictions/instructions. In the event of any restrictions being imposed by the national/state/district administration/client or by agencies responsible for national security, CPWD, Traffic or any other authority having jurisdiction in the area, the SI shall strictly follow such restrictions and nothing extra shall be payable to the SI on such accounts. The loss of time on these accounts, if any, shall have to be made up by augmenting additional resources whatever required.

- i. The site of work is in a restricted area with limited availability of space left out for accommodation, stores, field office, batching plant etc. The SI may be allowed to erect labour huts, site office, stores, field office and batching plant within site/plot without disturbing the construction area. However, the SI shall make his own arrangements to provide for additional requirement (in addition to available area at site), as per the rules of the local bodies. Before tendering, he shall visit the site and assess the manner in which he is able to arrange the above facilities. The Engineer-in-Charge shall in no way be responsible for any delay on this account and no claim, whatsoever, on this account shall be entertained.
- ii. No payment shall be made for any damage caused by rain, snowfall, flood or any other natural calamity, whatsoever during the execution of the work. The SI shall be fully responsible for any damage to the govt. property and the work for which payment has been advanced to him under the contract and he shall make good the same at his risk and cost. The SI shall be fully responsible for safety and security of his material, T&P/Machinery brought to the site by him. Nothing extra shall be payable on this account. Also, no claims for hindrance shall be entertained on this account.
- iii. Royalty at the prevalent rates shall be paid by the SI or the RMC supplier

as per the terms of supply between them on all materials such as boulders, metals, sand and bajri etc. collected by him for the execution of the work, directly to the revenue authority of the state government concerned. Nothing extra shall be payable on this account.

- iv. The SI shall keep himself fully informed of all acts/laws of the Central/State/Local Governments, orders of central/state/local government, decrees of statutory bodies, tribunals having any jurisdiction or authority, which in any manner may affect those engaged or employed and anything related to carrying out the work. All the rules & regulations and byelaws laid down by Collector / Municipal Corporation of area (where site is located) and any other statutory bodies shall be adhered to, by the SI, during the execution of work. The SI shall also adhere to all traffic restrictions notified by the national/state/local authorities. The SI shall abide and ensure compliances to terms and conditions of various approvals obtained for the project. He shall protect and indemnify the Department and its officials & employees against any claim and /or liability arising out of violations of any such laws, ordinances, orders, decrees, by himself or by his employees or his authorized representatives. The SI shall indemnify the Department against all claims in respect of patent rights, royalties, design, trademarks- of name or other protected rights, damages to adjacent buildings, roads or members of public, in course of execution of work or any other reasons whatsoever and shall himself defend all actions arising from such claims and shall indemnify the Department in all respect from such actions, costs and expenses. Nothing extra shall be payable on this account.
- v. The fee payable to statutory authorities for obtaining the various permanent service connections and occupancy certificate for the building shall be borne SI. Nothing extra to be paid against same. DST/GIL to help in getting all necessary approval & documentation work.

4.3.4 De-Watering:

- i. The dewatering is in the scope of the contract as per condition of this tender document. The SI shall arrange to have the entire dewatering system designed in detail, installed, maintained and operated by qualified and experienced personnel throughout the course of the work.
- ii. The name, qualifications, record of previous jobs of a similar nature of dewatering of sub-SI personnel to be employed on the work shall be submitted to the Project Engineer for approval.
- iii. Two weeks prior to commencement of installation of the dewatering system, SI shall submit to the Engineer in Charge for his technical approval, complete plans, details, and description of the dewatering system.
- iv. Approval of the dewatering system by the Engineer in Charge shall in no way relieve the SI from his responsibility of satisfying the entire dewatering requirements as specified herein
- v. Dewatering of the excavation shall be accomplished in a manner that will prevent seepage, boils, loss of fines, corrosion, softening of the strata, and that will maintain the stability of the bottom and slopes of excavation.
- vi. In case any damage is caused to the work, in the opinion of Engineer in charge, due to inadequacy or failure of the dewatering system, in part or in whole, then the supply of all labour, materials and plant, such damage shall be undertaken and redone by the SI at his own cost.
- vii. The cost of any damage caused to the structures or other equipment's due to the failure of the dewatering system shall be borne by the SI and shall

be covered by proper insurance to be provided by the SI, in accordance with insurance. The EPC SI will carry out the detailed investigation from geological expert in field to assess the impact of excavation of the site on the adjoining structures and will make all precautions at site and stabilize the cut slopes of the site to avoid sudden caving in, in order to safeguard adjoining structures located in the vicinity of the site at their own cost. The legal liability in case of any damage to the adjoining structure rest with the EPC SI only.

- viii. The Dewatering system shall be designed to operate on a continuous basis in such a manner that during excavation, the water level as observed in all piezometers installed near the periphery of the excavation with their tips located below the prevailing excavation level, is at least one meter below the prevailing excavation level. If the water level observed in any or all of the piezometers is higher than that specified, the excavation shall be halted until remedial measures to the dewatering system are done and the specified water levels in the piezometers attained or until the SI demonstrates to the satisfaction of the Engineer in charge that it is safe to proceed with excavation. Piezometers tips shall be installed near the bottom of the hole drilled for that purpose.
- ix. SI shall obtain necessary permissions from the competent authority of local body or regulatory body, traffic, irrigation department etc. at his own level to drain out of de-watering water. The arrangement is including cost of material in respect of laying pipes, making drains from site to the final disposal of dewatering pump out water shall be made by the SI at his own level and cost. No claim shall be entertained on this account by the department

4.3.5 Safety and Security Measures: Information to be provided by SI:

- i. Warning/ Caution Boards: All temporary warning / caution boards / glow signage display such as "Construction Work in Progress", "Keep Away", "No Parking", Diversions & protective Barricades, barricading as required from environmental protection view as per NGT etc. shall be provided and displayed by the SI, wherever required. These glow signage and red lights shall be suitably illuminated during night also. The SI shall be solely responsible for damage and accident caused, if any, due to negligence on his part. Also, he shall ensure that no hindrance, as far as possible, is caused to general traffic during execution of the work. Nothing extra shall be payable on this account. If the SI fails to provide the warning /caution boards within 7 days of written direction of Engineer In charge or his authorized representative, recovery of Rs. 10000/- on per day basis shall be made.
- ii. Sign Boards: The SI shall provide and erect a display board of size and shape as required and paint over it, in a legible and workman like manner, the details about the salient features of the project, as required by the Engineer-in-Charge. The SI shall fabricate and put up a sign board in an approved location and to an approved design indicating name of the project, Client/Owner, Engineer-in-charge, Structural Consultants, Department etc. besides providing space for names of other SIs, Sub- SIs, and specialized agencies within 15 days from issue of award letter. Nothing extra shall be payable on this account. In case of non-compliance/delay in compliance in this, a recovery @ Rs. 5000/- per day will be imposed which will be recovered from the immediate next R/A Bill of the SI.
- iii. Necessary protective and safety equipment's shall be provided to the Site

Engineer, Supervisory staff, labour and technical staff of the SI by the SI at his own cost and to be used at site.

- iv. All signage shall be dismantled and taken away by the SI after completion of the work with the approval of Engineer in charge. No payment shall be made on this account.
- v. No inflammable materials including P.O.L shall be allowed to be stored in huge quantity at site. Only limited quantity of P.O.L may be allowed to be stored at site subject to the compliance of all rules / instructions issued by the relevant authorities and as per the direction of Engineer -in- Charge in this regard. Also, all precautions and safety measures shall be taken by the SI for safe handling of the P.O.L products stored at site. All consequences on account of unsafe handling of P.O.L shall be borne by the SI.

4.3.6 Personal Safety, Hygiene Measures for Labour:

- i. SI will provide the following items for safety of workers employed by SI and associate agencies:
- ii. Protective footwear and gloves to all workers employed for the work on mixing, cement, lime mortars, concrete etc. and openings in water pipeline/sewer line.
- iii. Welder's protective eye-shields to workers who are engaged in welding works.
- iv. Safety helmet and Safety harness/belt.
- v. Provide adequate sanitation/safety facilities for construction workers to ensure the health and safety of the workers during construction, with effective provisions for the basic facilities such as sanitation, drinking water and safety equipment's or machinery.
- vi. All the workers should be wearing helmet and shoes all the time onsite.
- vii. Masks and gloves should be worn whenever and wherever required.
- viii. Adequate drinking water facility should be provided at site, adequate number of decentralized latrines and urinals to be provided for construction workers.
- ix. If allowed and full-time workers are residing on site, then they should be provided with clean and adequate temporary hutment.
- x. First aid facility should also be provided.
- xi. Overhead lifting of heavy materials should be avoided. Barrow wheel and hand-lift boxes should be used to transport materials onsite.
- xii. Tobacco and cigarette smoking should be prohibited onsite.
- xiii. All dangerous parts of machinery are well guarded and all precautions for working on machinery are taken.
- xiv. Maintain hoists and lifts, lifting machines, chains, ropes and other lifting tackles in good condition. Provide safety net of adequate strength to arrest falling material down below.
- xv. Use of durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
- xvi. Ensure that walking surfaces or boards at height are of sound construction and are provided with safety rails and belts. Provide protective equipment's such as helmets.
- xvii. Provide measure to prevent fire. Fire extinguisher and buckets of sand to be provided in fire- prone area and elsewhere.
- xviii. Provide sufficient and suitable light for working during night.
- xix. Ensure that measures to protect workers from materials of construction, transportation, storage and other dangers and health hazards are taken.
- xx. Ensure that the construction firm/division/company have sound safety policies.
- xxi. Comply with the safety procedure, norms and guidelines (as applicable)

as outlined in NBC 2016.

- xxii.** Adopt additional best practices and prescribed norms as in NBC2016.
- xxiii.** Agency has to follow the COVID – 19 SOP issued by the Government of Gujarat and Government of India time to time.

5 Additional Conditions & Particular Specifications for Civil Works:

- 5.1** The SIs are advised to inspect and examine the site and its surroundings and satisfy themselves with the nature of site, the means of access to the site, the constraints of space for stacking material / machinery, labour etc., constraints put by local regulations (if any), weather conditions at site (rainfall, snowfall, winter/summer temperatures etc.), general ground / subsoil conditions etc. or any other circumstances which may affect or influence their tenders. No claims, whatsoever, shall be entertained later for any errors found, on plea that the information supplied by the Department in the tender is insufficient or is at variance with the actual site conditions.
- 5.2** The work shall be carried out, all in accordance with true intent and meaning of the specifications and the drawings taken together, regardless of whether the same may or may not be particularly shown on the drawings and/or described in the specifications, provided that the same can be reasonably inferred. There may be several incidental works, which are not mentioned in the nomenclature of each item but will be necessary to complete the item in all respect. All these incidental works / costs which are not mentioned in specifications/drawings/tender document but are necessary to complete the item shall be deemed to have been included in the rates quoted by the SI. No adjustment of rates shall be made for any variation in quantum of incidental works due to variation / change in actual working drawings. Also, no adjustment of rates shall be made due to any change in incidental works or any other deviation in such element of work (which is incidental to the items of work and are necessary to complete such items in all respects) on account of the directions of Engineer-in-Charge. Nothing shall be payable on the account of incidental works.
- 5.3** The work shall generally be carried out in accordance with the "CPWD Specifications 2019 Vol. I & II" with correction slips up to last date of submission of bid (including any extension in last date of bid submission), additional/Particular Specifications, Architectural/Structural drawings and as per instructions of Engineer-in-Charge. Any additional item of work, if taken up subsequently, shall also conform to the relevant specifications mentioned above.
- 5.4** The several documents forming the tender are to be taken as mutually complementary to each other. Detailed drawings shall be followed in preference to small scale drawings and figured dimensions in preference to scale dimensions. Between two or more Clauses of this Contract, the provisions of a specific Clause relevant to the issue under consideration shall prevail over those in other Clauses.
- 5.5** The work shall be carried out in accordance with the Architectural drawings and Structural drawings, to be approved by the Engineer-in-Charge. Before commencement of any item of work, the SI shall correlate all the relevant architectural, structural and services drawings issued for the work and satisfy himself that the information available there from is complete and unambiguous. The discrepancy, if any, shall be brought to the notice of the Engineer-in-Charge before execution of the work. The SI alone shall be responsible for any loss or damage occurring by the commencement of work based on any erroneous and or in complete information.
- 5.6** Should there be any difference or discrepancy between the description of items as

given in the particular specifications for individual items of work, special conditions and I.S. Codes, drawings etc., the following order of preference shall be observed-

- a. Particular Specification
- b. Schedules (Door, Hardware, Finishing etc.)
- c. Special conditions
- d. Additional Conditions
- e. Architectural drawings /Structural drawings
- f. CPWD Specifications including up to date correction slips.
- g. CPWD General Conditions of Contract.
- h. Indian Standards Specifications of B.I.S.
- i. ASTM, BS, or other foreign origin code mentioned in tender document.
- j. Manufacturer's specifications and as decided by the Engineer-in-Charge.
- k. Sound Engineering practices or well-established local construction practices.

5.7 In the event of any variation/ discrepancy in the drawings, specifications and tender Documents etc. the decision of the Engineer-in-Charge shall be final binding and conclusive on the SI and in the case the SI have any doubt and the same should be got clarified immediately from the Engineer-in-charge and no claim of the SI shall be entertained thereafter. Moreover, the agency is not allowed to take benefit out of any clerical/ grammatical mistake in the standard clauses/Specifications etc. being used in the agreement.

5.8 The SI(s) shall give to the local body, police and other authorities all necessary notices etc. that may be required by law and obtain all requisite licenses for temporary obstructions, enclosures etc. and pay all fee, taxes and charges which may be levied on account of these operations in executing the contract. The charges to be paid by SI are not related to permanent constructed asset as per contract.

5.9 The SI shall ensure that there is no damage to adjoining property. If any such untoward incident happens, he shall be entirely responsible for any consequences besides making good any damages to the adjoining property whether public or private. He shall supply and maintain lights either for illumination or for cautioning the public at night. Proper temporary barricading by fencing with G.I. sheets, shall be carried out by the SI at the start of work to physically define the boundaries of the plot for restricted entry to only those involved in the work and also to prevent any accidents, at the same time without causing any inconvenience to the traffic and the users of the buildings in the adjacent plots.

5.10 The SI shall bear all incidental charges for cartage, storage and safe custody, insurance, erection, testing and commissioning of materials issued by department as well as to those materials also arranged by the SI. The SI shall also be responsible for the watch and ward / guard of the buildings, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the department. No extra payment shall be made on this account.

5.11 Wherever any reference to any Indian Standards occurs in the documents relating to this contract, the same shall be inclusive of all amendments issued there to or revisions thereof, if any, up to the last date of receipt of tenders (including extended date, if any).

5.12 No claim whatsoever on account of any discrepancy between the sub-surface strata conditions shall be entertained.

- 5.13** Any legal or financial implications resulting out of disposal of earth shall be sole responsibility of the SI. Nothing extra shall be paid on this account.
- 5.14** Wherever required for the execution of work, scaffolding shall be provided and suitably fixed, by the SI. The SI shall provide steel double scaffolding system, suitably braced for stability, with all the accessories, gangways, etc. with adjustable suitable working platforms to access the areas with ease for working and inspection. It shall be designed to take all incidental loads. It should cater to the safety features for workmen. Nothing extra shall be payable on this account. It shall be ensured that no damage is caused to any structure due to the scaffolding.
- 5.15** The SI may be allowed to erect labour huts on the plot without disturbing the construction area. However, the SI shall make his own arrangements to provide for additional accommodation, if required (in addition to available area at site), as per the rules of the local bodies. The Engineer-in-Charge shall in no way be responsible for any delay on this account and no claim, whatsoever, on this account shall be entertained. Nothing extra shall be payable on this account.
- 5.16** No tools and plants including any special T&P etc. shall be supplied by the Department and the SI shall have to make his own arrangements at his own cost. No claim of hindrance (or any other claim) shall be entertained on this account.
- 5.17** The SI shall take all precautions to abide by the environmental related restrictions imposed by any statutory body having jurisdiction in the Gujarat as well as prevent any pollution of streams, ravines, riverbed and waterways. All waste or superfluous materials shall be transported by the SI and disposed off at designated places only. Nothing extra shall be payable on this account.
- 5.18** No claim on account of site constraints mentioned in this document or any other site constraints such as lack of public transport, inadequate availability of skilled, semi-skilled or unskilled workers in the near vicinity, non-availability of construction machinery spare parts etc. or any other constraints not specifically stated here shall be entertained from the SI. Therefore, the tenderers are advised to visit site and get first-hand information of site constraints. Accordingly, they should quote their tenders. Nothing extra shall be payable on this account. Any hindrances claimed by the SI on this account shall not be considered.
- 5.19** Other agencies may also simultaneously execute and install the works of other civil and E&M services for the work. The SI shall afford necessary facilities for the same. The SI shall leave such recesses, holes, openings, trenches etc. as may be required for such related works and the SI shall fix the same at time of casting of concrete, stone work and brick work, if required, and nothing extra shall be payable on this account.
- 5.20** The SI(s) shall take all precautions to avoid accidents by exhibiting necessary caution boards day and night. The SI shall ensure entire necessary precaution during the entire period of work and site related activities to ensure full safety to workers and avoid any kind of accident. In case of any accident of labour's/ contractual staffs or any other human being the entire responsibility will rest on the part of the SI both legally and financially and any compensation under such circumstances, if becomes payable, shall be entirely borne by the SI.
- 5.21** Any construction joint binder added over base surface (or) for continuation of concreting for better bond is deemed to have been built in the items and nothing

extra shall be payable or extra cement considered in consumption on this account.

5.22 Setting Out

- a. The SI shall carry out survey of the work area, setting out the layout and fixing of alignment of the building as per architectural and Structural drawings in consultation with the Engineer-in-Charge and proceed further ensuring full structural continuity and integrated and monolithic construction. Any discrepancy between the architectural drawings and actual layout at site shall be brought to the notice of the Engineer-in-charge. It shall be responsibility of the SI to ensure correct setting out of alignment/layout using total station instrument. Nothing extra shall be payable on this account.
- b. The initial levels shown in the layout plan are indicative and the actual ground levels may vary with the levels shown in the layout plan. Though the site levels are indicated in the drawings the SI shall ascertain and confirm the site levels with respect to bench mark from the concerned authorities. No claim due to difference in ground levels as per layout plan and as per actual on ground shall be entertained.
- c. The SI shall establish, maintain and assume responsibility for grades, lines, levels and benchmarks. He shall report any errors or inconsistencies regarding grades, lines, levels, dimensions etc. to the Engineer -in-Charge before commencing work. Commencement of work shall be regarded as the SI's acceptance of such grades, lines, levels, and dimensions and no claim shall be entertained later for any errors found.
- d. If at any time, any error appears due to grades, lines, levels, and benchmarks during the progress of the work, the SI shall, at his own expense rectify such error, if so required, to the satisfaction of the Engineer -in-Charge. Nothing extra shall be payable on this account.
- e. The SI shall protect and maintain temporary/ permanent benchmarks at the site of work throughout the execution of work. These benchmarks shall be got checked by the Engineer-in-Charge or his authorized representatives. The work at different stages shall be checked with reference to bench marks maintained for the said purpose. Nothing extra shall be payable on this account.
- f. The approval by the Engineer-in-Charge, of the setting out by the SI, shall not relieve the SI of any of his responsibilities and obligation to rectify the errors/ defects, if any, which may be found at any stage during the progress of the work or after the completion of the work.

5.23 The SI shall be entirely and exclusively responsible for the horizontal, vertical, and other alignments, the level and correctness of every part of the work and shall effectively rectify any errors or imperfections therein. Such rectifications shall be carried out by the SI at his own cost to the entire satisfaction of the Engineer-in-Charge.

5.24 Integrated Service Drawings: Before taking up the work, the SI shall be provided with integrated drawings for various civil and electrical services showing details of lay out plan including sectional elevations and SI shall plan and mobilize his resources as per the Integrated drawings and as per the site conditions to facilitate convenient execution, installation as well as maintenance of these services. Nothing extra shall be payable on this account.

5.25 The SI shall do proper sequencing of the various activities by suitably staggering the activities within various pockets in the plot so as to achieve early completion. The agency to deploy adequate equipment, machinery and labour as required for

the completion of the entire work within the stipulated period specified. Also, ancillary facilities shall be provided by SI commensurate with requirement to complete the entire work within the stipulated period. Nothing extra shall be payable on this account. Adequate number/sets of equipment in working condition, along with adequate stand-by arrangements, shall be deployed during entire construction period. It shall be ensured by the SI that all the equipment, Tools & Plants, machineries etc. provided by him are maintained in proper working conditions at all times during the progress of the work and till the completion of the work. Further, all the construction tools, plants, equipment and machineries provided by the SI, on site of work or his workshop for this work, shall be exclusively intended for use in the construction of this work and they shall not be shifted/ removed from site without the permission of the Engineer-in-Charge.

- 5.26** The SI shall maintain all the work in good condition till the completion of entire work. The Engineer-in-Charge shall not be responsible for any claims for injuries to person/workmen or for structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the SI or of any other of his representatives, in his employment during the execution of the work. The compensation, if any, shall be paid directly to the Department/ authority / persons concerned, by the SI at his own cost.

5.27 Preservation And Conservation Measures:

- a. Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar services, if any, encountered in the course of the execution of work shall be protected against the damage by the SI at his own expense. Even in case of accidental damage, the responsibility of repair / replacement including removal of leaked/Spilled water sewage etc. will be on the SI at his own cost.
- b. Existing services shall not be diverted permanently until they are interfering directly with the layout. Notwithstanding anything to the contrary contained herein, the SI shall ensure that the respective entities owning the existing roads, right of way, level crossings, structures, or utilities on, under or above the Site are enabled by it to keep them in continuous satisfactory use, if necessary, by providing suitable temporary diversions with the Authority of the controlling body of that road, right of way or utility. All temporary supports and other measures required to protect and maintain the services during construction period as per direction of Employer, shall be deemed to be included in the quoted rate / amount of the SI and nothing extra shall be paid on this account. In case the same are to be removed and diverted, expenditure incurred in doing so shall be payable to the SI. The SI shall work out the cost, get the same approved by Engineer-in-Charge before taking up actual execution. The SI shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services.
- c. All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on project location during excavation/construction shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The SI will take reasonable precaution to prevent his work men or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer-in-charge of such discovery and carry out the official instructions of Engineer-in- charge for dealing with the same, till then all work shall be carried out in a way so as not to disturb/damage such article or thing.

- 5.28** A site laboratory with the minimum equipment's as specified in CPWD

specifications/in this tender document shall be established, made functional and maintained within three months from the commencement date or date of start without any extra cost to the department. In case of non-compliance / delay in compliance in this, **a recovery @ Rs. 10000/- per day** will be imposed which will be recovered from the immediate next R/A Bill of the SI.

5.29 Co-Operation With Specialized Agencies:

- a.** The SI shall cooperate with and provide the facilities to the sub-SIs and other agencies working at site for smooth execution of the work. The SI shall indemnify the Department (CPWD) against any claim(s) arising out of such disputes. The SI shall:
- i) Allow use of scaffolding, toilets, sheds etc.
 - ii) Properly co-ordinate their work with the work of other SIs.
 - iii) Provide control lines and benchmarks to his Sub-SIs and the other SIs.
 - iv) Provide electricity and water at mutually agreed rates.
 - v) Provide hoist and crane facilities for lifting material at mutually agreed rates.
 - vi) Co-ordinate with other SIs for leaving inserts, making chases, alignment of services etc. at site.
 - vii) Adjust work schedule and site activities in consultation with the Engineer-in- Charge and other SIs to suit the overall schedule completion.
 - viii) Resolve the disputes with other SIs/ sub-SIs amicably and the Engineer-in-Charge shall not be made intermediary or arbitrator
- b.** The work shall be plan in a systematic manner so as to ensure proper coordination of various disciplines viz. sanitary & water supply, drainage, rainwater harvesting, electrical, firefighting, information technology, communication & electronics and any other services.
- c.** The SI shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other SI(s) or by the Engineer-In- Charge and shall as far as possible arrange his work and shall place and dispose off the materials being used or removed so as not to interfere with the operations of other SI or he shall arrange his work with that of the others in an acceptable and in a proper coordination manner and shall perform it in proper sequence to the complete satisfaction of others.

5.30 Rates

- i) The rates quoted by the SI are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference bench mark(s), installing various signage, taking spot levels, survey, construction of all safety and protection devices, compulsory use of helmet and safety shoes, and other appropriate safety gadgets by workers, imparting continuous training for all the workers, barriers, preparatory works, working during monsoon or odd season, working beyond normal hours, working at all depths, height, lead, lift, levels and location, implementation of green building norms to achieve desired GRIHA Rating etc. and any other unforeseen but essential incidental works required to complete this work. Nothing extra shall be payable on this account and no extension of time for completion of work shall be granted on these accounts.
- ii) The rates quoted by the tenderer, shall be firm and inclusive of all taxes and levies.

- iii) No foreign exchange shall be made available by the Department for importing (purchase) of equipment, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the SI, on account of variation in the foreign exchange rate.
- iv) Ancillary and incidental facilities required for execution of work like labour accommodations, stores, fabrication yard, offices for SI, watch and ward, temporary ramp required to be made for working at the basement level, temporary structure for plants and machineries, water storage tanks, installation and consumption charges of temporary electricity, telephone, water etc. required for execution of the work, liaison and pursuing for obtaining various No Objection Certificates, completion certificates from local bodies etc., protection works, testing facilities / laboratory at site of work, facilities for all field tests and for taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by Engineer-in-Charge), shall be deemed to be included in rates quoted by the SI. Nothing extra shall be payable on these accounts. Before start of the work, the SI shall submit to the Engineer-in-Charge, a site / construction yard layout, specifying areas for construction, site office, positioning of machinery, material yard, cement and other storage, steel fabrication yard, site laboratory, water tank, etc.
- v) For completing the work in time, the SI might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account.
- vi) All material shall only be brought at site as per program finalized with the Engineer-in-Charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.

5.31 Quality Assurance

- i) The proposed building is a prestigious project and quality of work is of paramount importance. SI shall have to engage well-experienced skilled labour and deploy modern T&P and other equipment to execute the work. Many items like exposed finish form work, specialized flooring work, Polysulphide sealant and backer rod fixing in structural glazing works, factory made door- window shutters, proper slope maintaining in toilet units, sanitary-water supply installation, water proofing treatment will specially require engagement of skilled workers having experience particularly in execution of such items.
- ii) The SI shall ensure quality construction in a planned and time bound manner. Any sub-standard material/work beyond set out tolerance limit shall be summarily rejected by the Engineer-in-charge & SI shall be bound to replace/remove such sub-standard/defective work immediately. If any material, even though approved by Engineer-In-Charge is found defective or not conforming to specifications shall be replaced/removed by the SI at his own risk & cost.
- iii) The SI/ associated agency shall extend full cooperation to DST/GIL/ Any Third-party agency appointed by the DST or GIL for the quality assurance for the Project during their field visits for arranging the necessary quality assurance tests for materials and for the examination of construction works.
- iv) In addition to the supervision of work by Engineer- in-charge or his representatives carrying out regular and periodic inspection of the ongoing activities in the work and deficiencies, shortcomings, inferior workmanship pointed out by them shall be communicated by Engineer- in-charge or his representatives to the SI. Upon receipt of instructions from Engineer in Charge, these are also to be made good by necessary improvement, rectification, replacement up to

his complete satisfaction. Special attention shall be paid towards line and level of internal and external plastering, exposed smooth surface of RCC members by providing fresh shuttering plates, rubberized linings to all the shuttering joints, accurate joinery work in wooden doors and windows, thinnest joints in stone/tiling / cladding work, non- hollowness in floor and dado tiles work, protection of scratches over flooring by impounding layer of plaster of Paris, water tight pipe linings, absence of hollow vertical joints in brick masonry, proper compaction of filled up earth etc. to achieve an Institution of International standards and up keeping of quality assurance shall be of paramount importance, as such.

- v) The SI shall submit immediately after the award of work within 20 days, Minimum Quality Assurance Plan (a detailed and complete method statement for the execution, testing and Quality Assurance Plan/procedures for basic materials and such items, to be followed during the execution of the work), for approval of the Engineer-in- Charge. All the materials to be used in the work, to give the finished work complete in all respects, shall comply with the requirements of the specifications, and shall pass all the tests required as per specifications as applicable or such specifications / standards as directed by the Engineer-in-Charge. Further, **a recovery of Rs. 5000/-** shall be made on per day basis in case of delay in submission of the above Program/Plan.
- vi) All materials and fittings brought by the SI to the site for use shall conform to the samples approved by the Engineer-in-charge which shall be preserved till the completion of the work. If a particular brand of material is specified in the particular specification, the same shall be used after getting the same approved from Engineer-In-Charge. Wherever brand / quality of material is not specified in the particular specifications; the SI shall submit the sample as per list of preferred make given in tender documents. For all other items, materials and fittings of ISI Marked shall be used with the approval of Engineer-In-Charge. Wherever ISI Marked material / fittings are not available, the SI shall submit samples of materials / fittings manufactured by firms of repute conforming to relevant specifications or IS codes and use the same only after getting the approval of Engineer-In-Charge.
- vii) The SI shall procure and provide all the materials from the manufacturers / suppliers as per the item description and particular specifications for the work. The equivalent brand other than brand / make mentioned in particular specification for any item, shall be permitted to be used in the work, only when the specified make is not available. This is, however, subject to documentary evidence produced by the contactor for non-availability of the brand specified and also subject to independent verification by the Engineer-in-Charge. In exceptional cases, where such approval is required, the decision of Engineer-in-Charge as regards equivalent make of the material shall be final and binding on the SI. No claim, whatsoever, of any kind shall be entertained from the SI on this account. Nothing extra shall be payable on this account. Also, the material shall be procured only after written approval of the Engineer-in-Charge.
- viii) All materials whether obtained from Govt. stores or otherwise shall be got checked by the Engineer-in-Charge or his authorized supervisory staff on receipt of the same at site before use.
- ix) The tests, as necessary, shall be conducted in the laboratory approved by the Engineer-in- Charge. The samples shall be taken for carrying out all or any of the tests stipulated in the particular specifications and as directed by the Engineer-in-Charge or his authorized representative.
- x) All the registers of tests (carried out at Construction Site or in outside laboratories) and all material at site (MAS) registers including cement register

shall be maintained by the SI. All the entries in the registers will be made by the designated Engineering Staff of the SI and same should be regularly reviewed. SI shall be responsible for safe custody of all the registers.

- xi) The SI shall at his own risk and cost make all arrangements and shall provide all such facilities including material and labour, the Engineer-in-Charge may require for collecting, preparing, forwarding the required number of samples for testing as per the frequency of test stipulated in the contract specifications or as considered necessary by the Engineer-in-Charge, at such time and to such places, as directed by the Engineer-in-Charge. Nothing extra shall be payable for the above.
- xii) The SI or his authorized representative shall associate in collection, preparation, forwarding and testing of such samples. In case he or his authorized representative is not present or does not associate him, the result of such tests and consequences thereon shall be binding on the SI. The SI or his authorized representative shall remain in contact with the Engineer-in-Charge or his authorized representative associated for all such operations. No claim of payment or claim of any other kind, whatsoever, shall be entertained from the SI.
- xiii) Unless specified otherwise, all the testing charges shall be borne by the SI.
- xiv) All the hidden items such as water supply lines, drainage pipes, electrical conduits, sewers etc. are to be properly tested as per the design conditions before covering.
- xv) Water tanks, taps, sanitary, water supply and drainage pipes, fittings and accessories should conform to byelaws and municipal body / corporation where CPWD Specifications are not available. The SI should engage licensed plumbers for the work and get the materials (fixtures/fittings) tested by the Municipal Body/Corporation authorities wherever required at his own cost. Nothing extra shall be paid on this account.
- xvi) The SI shall give performance test of the entire installation(s) as per the standing specifications before the work is finally accepted and nothing extra whatsoever shall be payable to the SI for the test.
- xvii) The SI shall arrange electricity at his own cost for testing of the various electrical installations as directed by Engineer-in-Charge and for the consumption by the SI for executing the work. Also, all the water required for testing various electrical installations, fire pumps, wet riser / firefighting equipment's, fire sprinklers etc. and also testing water supply, sanitary and drainage lines, water proofing of underground sump, overhead tanks, water proofing treatment etc. shall be arranged by the SI at his own cost. Nothing extra shall be payable on this account.
- xviii) The SI shall make available, on request from the Department, the copies of challan, cash memos, receipts and other certificates, if any, vouchers towards the quantity and quality of various materials procured for the work. The SI shall also provide information and necessary documentation on the name of the manufacturer, manufacturer's product identification, manufacturer's instructions, warning, date of manufacturing and test certificates (from manufacturers for the product for each consignment delivered at site), shelf life, if any etc., for the department to ensure that the material have been procured from the approved source and is of the approved quality, as directed by the Engineer-in-Charge. Wherever specified, day-to-day account of receipt of such material shall be maintained at site of work.
- xix) If the SI does not provide adequate supporting staff or labour or both for carrying out field tests or collecting and forwarding samples to outside

laboratory or for maintaining test records, Engineer in charge may carry out field tests or collect and forward sample to outside laboratory or appoint any person to maintain the registers at risk and cost of SI. The charges so incurred shall be entirely borne by SI and shall be deducted from Running or final bill of SI. Further, **recovery of Rs. 2000/- for each default shall be levied to SI.**

- xx) In case there is any discrepancy in frequency of testing as given in list of mandatory tests and that in individual sub-heads of work as per CPWD Specifications, higher of the two frequencies of testing shall be followed and nothing extra shall be payable on this account.

5.32 Submission And Documentation

- i) The SI shall render all help and assistance in documenting the total sequences of this project by way of photography, slides, audio / video recording etc. Nothing extra shall be payable to SI on this account. The original films shall be the property of the Department. No copy shall be prepared without the prior approval of the Engineer- in – Charge.
- ii) The SI shall display all permissions, licenses, registration certificates, bar charts, other statements etc. under various labour laws and other regulations applicable to the works, at his site office. He should also keep at site at least one set of BIS Codes and other relevant codes at site and produce the same if asked for by Engineer-In-Charge. In case of non-compliance, these codes will be purchased from the Market and actual cost of purchase will be recovered from the next RA Bill of the SI.
- iii) The SI shall make available five (05) sets of completed Building Drawings (including soft copy of the same), "As Built Drawings" along with literatures, maintenance manuals, warranty certificates etc. of various installed fittings, fixtures and equipment for the completed projects. This shall be the prerequisite for payment of final bill.
- iv) The SI shall make available five (05) sets of all drawings (including soft copy of the same) of internal and external services i.e., Water Supply, Sanitary line and Drainage lines. This shall be the prerequisite for payment of final bill. These drawings shall have the following information:
 - a. Run off for all piping and their diameters including soil, waste pipes and vertical stacks.
 - b. Ground and invert level of all drainage pipes together with locations of all manholes and connections, up to outfall.
 - c. Run off for all water supply lines with diameters location of control valves, access panels etc.
- v) The SI shall make available four (04) sets of computerized Standard Measurement Books (SMBs) having measurement of all permanent buildings.
- vi) The Performance Guarantee shall not be released to the SI until the aforesaid drawings are submitted to the Engineer-in-Charge.
- vii) To avoid delay, SI should submit all samples well in advance so as to give timely orders for procurement.
- viii) The SI shall comply the conditions of various NOC, clearance obtained for the project and submit the necessary document mentioned in these statutory NOC /Clearance.

5.33 Program/ Schedule

The SI shall prepare an integrated program chart including civil, E & M, Medical activities for the execution of work, showing clearly all activities from the start of work to completion, with details of manpower, equipment and machinery required for the fulfillment of the program within the stipulated period and submit the same for approval of the Engineer-In-Charge within fifteen days of the award of the work. The integrated program chart so submitted should not have any discrepancy with the physical/financial milestones specified in this tender document. The program chart should include the following: -

- a. Descriptive note explaining sequence of various activities.
- b. Construction program prepared on PRIMAVERA/ M.S. Project etc.
- c. Software.
- d. Indicate resources in financial terms, manpower and specialized equipment for every important stage.
- e. Program for procurement of materials by the SI.
- f. Program for arranging and deployment of manpower both skilled and unskilled so as to achieve targeted progress.
- g. Program of procurement of machinery/equipment having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the SI.
- h. Program for achieving fortnightly micro milestones and periodic milestones. h. In case of non-compliance/delay in compliance in this, **a recovery @ Rs. 25000/- per week** or part thereof will be imposed which will be recovered from the immediate next R/A Bill of the SI.
- i. If at any time, it appears to the Engineer-In-Charge that the actual progress of work does not conform to the approved program referred above, the SI shall produce a revised program showing the modifications to the approved program by additional inputs to ensure completion of the work within the stipulated time.
- j. The submission for approval by the Engineer-In-Charge of such program or the furnishing of such particulars shall not relieve the SI of any of his duties or responsibilities under the contract. This is without prejudice to the right of Engineer-In-Charge to take action against the SI as per terms and conditions of the agreement.

5.34 Submission Of Progress Report:

Apart from the above integrated program chart, the SI shall be required to submit fortnightly progress report of the work in a computerized form on 5th and 20th of every month. The progress report shall contain the following -

- i) Construction schedule of the various components of the work through a bar chart for the next two fortnights (or as may be specified), showing the micro-milestone/milestones, targeted tasks (including material and labour requirement) and up to date progress. At least 20 digital photographs showing all the parts of construction site along with at least 10 minutes video of executions of different items in soft copy has to be submitted in every fortnightly progress report. Progress chart of the various components of the work that are planned and achieved, for the fortnight as well as cumulative up to the fortnight under reckoning, with reason for deviations, if any in a tabular format.
- ii) Plant and machinery statement, indicating those deployed in the work.
- iii) Man-power statement indicating:
 - a. Individually the names of all the staff deployed on the work, along with their designations.
 - b. No. of skilled workers (trade wise) and total no. of unskilled workers

deployed on the work and their location of deployment i.e., blocks.

- iv) Financial statement, indicating the broad details of all the running account payment received up to date, such as gross value of work done, advances taken, recoveries effected, amount withheld, net payments details of cheque payment received, extra/substituted/deviation items if any, etc.
- v) In case of non-compliance / delay in compliance in submission of fortnight progress report, **a recovery @ Rs. 10000/- per report** will be imposed which will be recovered from the immediate next R/A Bill of the SI.

5.35 Temporary Water/ Electricity/ Telephone Connection

- i) Arrangement of temporary telephone connection, water and electricity required by him, shall be made by the SI at his own cost and also necessary permissions shall be obtained by him directly from concerned authorities, under intimation to the Department. Also, all initial cost and running charges, and security deposit, if any, in this regard shall be borne by him. The SI shall abide by all the rules/ bye laws applicable in this regard and he shall be solely responsible for any penalty on account of violation of any of the rules / byelaws in this regard. Nothing extra shall be payable on this account.
- ii) The SI shall be responsible for maintenance and watch and ward of the complete installation and water / electricity meter and shall also be responsible for any pilferage, theft, damage, penalty etc. in this regard. The SI shall indemnify the Department against any claim arising out of pilferage, theft, damage, penalty etc. whatsoever on this account. Security deposit for the work shall be released only after No Dues Certificates are obtained from the local Authorities from whom temporary electric/ water / telephone connection have been obtained by the SI. Nothing extra shall be payable on this account.
- iii) The Department shall in no way be responsible for either any delay in getting electric and/or water and/or telephone connections for carrying out the work or not getting connections at all. No claim of delay or any other kind, whatsoever, on this account shall be entertained from the SI. Also, contingency arrangement of stand-by water & electric supply shall be made by the SI for commencement and smooth progress of the work so that work does not suffer on account of power failure or disconnection or not getting connection at all. No claim of any kind whatsoever shall be entertained on this account from the SI. Nothing extra shall be payable on this account.

5.36 Cleanliness of Site

- i) The SI shall not stack building material / malba / muck on the land or road of the local development authority or on the land owned by the others, as the case may be. So, the muck, rubbish etc. shall be removed periodically, from the site of work to the approved dumping grounds as per the local bye laws and regulations of the concerned authorities and all necessary permissions in this regard from the local bodies shall be obtained by the SI. Nothing extra shall be payable on this account. In case, the SI is found stacking the building material / malba as stated above, the SI shall be liable to pay the stacking charges / penalty as may be levied by the local body or any other authority and also to face penal action as per the rules, regulations and byelaws of such body or authority. The Engineer-in-Charge shall be at liberty to recover, such sums due but not paid to the concerned authorities on the above counts, from any sums due to the SI including amount of the Security Deposit and performance guarantee in respect of this contract agreement.
- ii) The SI shall take instructions from the Engineer-In-Charge regarding collection and stacking of materials at any place. No excavated earth or building rubbish shall

be stacked on areas where other buildings, roads, services and compound walls are to be constructed.

- iii) The site of work shall be always kept clean due to constraints of space and to avoid any nuisance to the users of buildings in the adjacent plots. The SI shall take all care to prevent any water- logging at site. The wastewater, slush etc. shall not be allowed to be collected at site. For discharge into public drainage system, necessary permission shall be obtained from relevant authorities after paying the necessary charges, if any, directly to the authorities. The work shall be carried out in such a way that the area is kept clean and tidy. All the fees/charges in this regard shall be borne by the SI. Nothing extra shall be payable on this account.
- iv) It is the responsibility of SI to keep building neat and clean. The SI shall spray the chemicals fumigate site area to check the mosquitoes at frequent interval or as directed by the Engineer in charge. The SI shall also make lighting and temporary ventilation arrangement in basement. The SI shall provide submersible pumps with automatic on/off system in each sump in basement to bail out the water accumulated. The SI shall quote rates after considering the above stated conditions and nothing extra shall be paid on this account.
- v) The SI shall not wash the drum of TM (transit mixture) at site and shall avoid the spread of leachate / cement slurry to be spread at the site of work and all care shall be taken to keep the site neat and clean at his own cost.

5.37 Inspection of Work

- i) In addition to the provisions of relevant clauses of the contract, the work shall also be open to inspection by authority & the representative of the Consultants. The SI shall at times during the usual working hours and at all times at which reasonable notices of the intention of the Engineer-in-charge or other officers as stated above to visit the works shall have been given to the SI, either himself be present to receive the orders and instructions or have a responsible representative duly accredited in writing, to be present for that purpose.
 - a. The consultant and third-party quality assurance agency appointed by tenderer if any, shall be inspecting the works including workshops and fabrication factory to ensure that the works are in general being executed according to the design, drawings and specifications laid down in the contract. Their observations shall be communicated by tenderer or Consultant to SI.
 - b. Tenderer/ Consultant shall be inspecting the on-going work at site at any time with or without prior intimation. The SI shall, therefore, keep updated the following requirements and detailing. Display Board showing detail of work, weekly progress achieved with respect to targets, reason of shortfall, status of manpower, wages being paid for different categories of workers.
- ii) Keep entrance and surrounding area clean.
- iii) Display layout plan key plan, building drawings including plans, elevations and sections.
- iv) Up to date displays of Bar chart, CPM and PERT etc.
- v) Keep details of quantities executed, balance quantities, deviations, possible Extra item, substituted Item etc.
- vi) Keep plastic / cloth mounted one sets of building drawings.
- vii) Set of Helmets and safety shoes for exclusive use for officers/dignitaries visiting at sit

5.38 Product Delivery, Storage and Handling of Chemicals

- i)** The SI shall construct storage space for Chemical's materials to ensure that the storage conditions are as recommended by the manufactures.
- ii)** All the materials shall be procured and delivered in sealed containers with labels legible and intact.
- iii)** All the chemicals polymers, epoxy, water proofing compound, plasticizer, Poly-sulphide, SBR based elastomeric, all exterior and interior paints, polish etc.) shall be procured in convenient packs (say 20 litres/Kgs.) capacity packing only or as approved by the Engineer-in-Charge, and not in bigger capacity containers, say 200 litres (kgs) drums unless otherwise specifically permitted by the Engineer-in-Charge. One sample from each lot of the chemical procured by the SI shall be tested in a laboratory as approved by the Engineer-in-charge.
- iv)** All material required for the execution of the work shall be got approved, procured and deposited with the Departmental supervisory staff. The materials shall be kept in custody of the SI. The watch and ward of such material shall, however, remain to be the responsibility of the SI and no claim, whatsoever, on this account shall be entertained. Different containers of each chemical shall be serially numbered on packing and also consumed in that order. Day-to-Day account of receipt, issue and balance shall be verified by the tenderer/ Consultant and proper account shall be maintained at site of work in the prescribed form as per the standard practice.
- v)** All the chemicals shall be procured by the SI directly from the manufacturer. In exceptional circumstances, the SI may be allowed to procure the materials from the authorized dealers of the manufacturers, if specifically permitted by the Engineer-in-Charge.
- vi)** The original copies of challan/cash memos towards the quantity of various chemicals procured shall be made available by the SI at the request from the Engineer-in- Charge and a copy of the same shall be kept in record.
- vii)** The Name of manufacturers, manufacturer's product identification and manufacturer's mixing instructions, warning for handling and toxicity and date of manufacturing and shelf life shall be clearly and legibly mentioned on the labels of each container.
- viii)** The SI shall submit for the chemicals procured, manufacturer's and / or authorized dealer's certificate regarding supplying and verifying conformance to the material specifications, as specified.
- ix)** All filled containers shall be handled in safe manner and in a way to avoid breaking container seals.
- x)** Empty containers of the chemicals should not be removed from site till the completion of work and shall be removed only with the written approval of the Engineer-in-Charge.
- xi)** All arrangements for measuring, dosing and mixing of material / chemicals at site have to be made by the SI.
- xii)** SI shall suitably advise his site Engineer and all the workers as regards safe handling of chemicals. Necessary protective and safety equipment's in form of hand gloves, goggles etc. shall be provided by the SI and be also used at site.
- xiii)** All incidental charges of any kind including cartage, storage and wastage and safe custody of material etc. shall be borne by the SI and no claim, whatsoever, shall be entertained on this account.
- xiv)** The chemicals shall be tested in an independent laboratory as approved by the Engineer-in- charge at the frequency as specified. If required, more samples may have to be tested as per the directions of the Engineer-in-Charge. Nothing extra shall be payable on this account. However, testing charges shall be borne by the SI.

5.39 Insurance Policies

Before commencing the execution of work, the SI shall, without in any way limiting his obligations and liabilities, insure at his own cost and expense against any damage or loss or injury, which may be caused to any person or property, at site of work. The SI shall obtain and submit to the Engineer-in-Charge proper SI All Risk Insurance Policy for an amount 1.25 times the contract amount for this work, with Engineer-in-Charge as the first beneficiary. The insurance shall be obtained in joint names of Engineer-in-Charge and the SI (who shall be second beneficiary). Also, he shall indemnify the Department from any liability during the execution of the work. **Further, he shall obtain and submit to the Engineer-in-Charge, a third-party insurance policy for maximum Rs.10 lakh for each accident, with the Engineer-in-Charge as the first beneficiary. The insurance shall be obtained in joint names of Engineer-in-Charge and the SI (who shall be second beneficiary).** The SI shall, from time to time, provide documentary evidence as regards payment of premium for all the Insurance Policies for keeping them valid till the completion of the work. The SI shall ensure that Insurance Policies are also taken for the workers of his Sub-SIs / specialized agencies also. Without prejudice to any of its obligations and responsibilities specified above, the SI shall within 10 days from the date of letter of acceptance of the tender and thereafter at the end of each quarter submit a report to the Department giving details of the Insurance Policies along with Certificate of these insurance policies being valid, along with documentary evidence as required by the Engineer-in-Charge. No work shall be commenced by the SI unless he obtains the Insurance Policies as mentioned above. Also, no payment shall be made to the SI on expiry of insurance policies unless renewed by the SI. Nothing extra shall be payable on this account. No claim of hindrance (or any other claim) shall be entertained from the SI on these accounts.

5.40 Preserve and Protect Landscape during Construction

- i) The SI shall ensure that no trees, existing or otherwise, shall be harmed and damage to roots should be prevented during trenching, placing backfill, driving or parking heavy equipment, dumping of trash, oil, paint, and other materials detrimental to plant health. These activities should be restricted to the areas outside of the canopy of the tree, or, from a safe distance from the tree/plant by means of barricading. Trees will not be used for support; their trunks shall not be damaged by cutting and carving or by nailing posters, advertisements, or other material. Lighting of fires or carrying out heat or gas emitting construction activity within the ground, covered by canopy of the tree is not to be permitted.
- ii) The SI shall take steps to protect trees or saplings identified for preservation within the construction site using tree guards of approved specification.
- iii) SI should limit all construction activity within the specified area as per the Construction Management Plan (CMP) approved by Engineer in Charge.
- iv) The SI shall avoid cut and fill in the root zones, through delineating and fencing the drip line (the spread limit of a canopy projected on the ground) of all the trees or group of trees. Separate the zones of movement of heavy equipment, parking, or excessive foot traffic from the fenced plant protection zones.
- v) The SI shall ensure that maintenance activities during construction period shall be performed as needed to ensure that the vegetation remains healthy.

5.41 Preparation of Sample (MOCKUP)

Samples of representative units shall be prepared by the SI well in advance before taking up the mass execution at the appropriate time as per milestones.

The SI shall invariably prepare the samples units of finishing items i.e., flooring of different types, external & internal finishing i/c colour scheme of paint, tiles in dado, flooring in platforms & staircase, water supply & sanitary fittings and any other item as per direction of Engineer-in-charge. The SI shall proceed with further finishing items only after getting the samples of these items approved in writing from Engineer-in-charge.

5.42 Specialized Agencies

- i) The SI shall engage specialized agency for carrying out specialized item such as Structural Glazing, Acoustic treatment, Waterproofing and insulation work etc. Before engaging such agency, the SI shall submit the name of the agency along with their working experience, presentation on method statement and materials being used for execution of such items etc. to Engineer-in-charge for approval. SI shall submit the proposal (along with work experience certificate issued by competent authority) of only those specialized agencies who have work experience of satisfactorily completion of similar works as per following criteria during last seven years–

Three works each costing not less than 40% of estimated cost of concerned similar work

Or

Two works each costing not less than 60% of estimated cost of concerned similar work

Or

One work costing not less than 80% of estimated cost of concerned similar work item.

- ii) Estimated cost of the specialized item/work for various items/schemes shall be as per schedule of stage payments or as determined by Engineer-in-charge. Unless specified otherwise, the SI shall be fully responsible for and shall guarantee proper design and performance of specialized works for a period of 7 years from the date of completion of work. All the Guarantees shall be submitted before final payment and shall not in any way limit any other rights to correct which the Employer may have under the contract. In addition, an amount of 5% of cost of specialized work shall be retained in interim/final payment. This amount to be withheld towards guarantee shall be in addition to the other amounts to be withheld as mentioned elsewhere in the contract agreement. However, this amount (withheld) would be released after guarantee period if the performance, as required, is satisfactory. If any defects are noticed during the guarantee period, it shall be rectified by the SI within seven days of issue of notice to the SI, temporarily, to the satisfaction of the tenderer or any other authorized representative of tenderer and within a period of one month the permanent rectification of the defects/replacement of defective should be carried out by the SI. If not attended to, the same shall be got done through other agency at the risk and cost of the SI and the cost, which shall be final and binding on the SI, shall be recovered from the amount withheld towards the guarantee as mentioned above or any other amount due to the SI. However, the amount withheld as guarantee can be released in full against irrevocable bank guarantee, from a Nationalized Banks, of the same amount, for the guarantee period is submitted by the SI. The defects, if any, shall be rectified in a workmanlike manner, retaining the same aesthetics and other functional parameters of the original work.
- iii) The main SI shall submit the credential of specialized agency well in advance as per the direction of Engineer-in-charge. After verification of the same, written approval will be conveyed to main SI in this regard. The main SI shall not change the specialized agency. However, if the change is warranted, he may do so, with permission of Engineer-in-charge. However, before making any such change, he

has to enter into similar agreement as with previous agency & submit the same to Engineer - in - Charge for approval. This shall however be without any change in the accepted rates of the contract agreement and without any cost implications to the Department. If the SI proposes name of specialized agencies from list of preferred makes, there is no need to comply eligibility criteria mentioned in Para - (i) above.

- iv)** The main SI (SI) cannot work as a specialized Agency unless his name is approved as specialized agency by Engineer-in-charge in accordance with Sr. No. - (i) above.
- v)** Approval of the specialized agencies for each specialized work shall be obtained from the Engineer-in-Charge within three months of award of work even if, such specialized items of work shall be executed by the specialized agencies at later date. The work shall be deemed to be executed by the tenderer for all purposes and the responsibility of the quality of items of works executed etc. shall continue to be that of the tenderer only. It is expressly agreed that the SI shall, at all times, be responsible and liable for all its obligations under this Contract notwithstanding anything contained in the contracts with its Sub-SIs or any other contract that may be entered into by the SI, and no default under any such contract shall excuse the SI from its obligations or liability here under.
- vi)** It shall be the responsibility of main SI (SI) to sort out any dispute / litigation with the Specialized Agencies without any time & cost overrun to the tenderer. The main SI(SI) shall be solely responsible for settling any dispute / litigation arising out of his agreement with the Specialized Agencies. The SI shall ensure that the work shall not suffer on account of litigation/ dispute between him and the specialized agencies / sub-SI(s). No claim of hindrance in the work shall be entertained from the SI on this account. No extension of time shall be granted and no claim whatsoever, of any kind, shall be entertained from the SI on account of delay attributable to the selection/rejection of the Specialized Agencies or any dispute amongst them.

5.43 Structural Safety

- i)** Following guidelines to be followed where height of casting of concrete is higher than 3.5 m or where higher loading are coming during casting of concrete or large span structure more than 5 meter long or some special structure like domes, vaults, steel structure etc.
- ii)** Centering/scaffolding/staging for casting of these structures should be properly designed by a qualified and experienced person/agency having past experience in design of false work (centering) for concrete structures and should be proof checked by similar experienced person/agency and it should be approved by Engineer-in-Charge. The provisions of clause 7 of IS: 14687 may be referred for design of false work(centering).
- iii)** A method statement for erection and dismantling of the centering/scaffolding/staging and process of concreting & process of anchor of steel structure shall be prepared by SI and submitted to Engineer-in-Charge for approval and the work shall be commenced only after approval of method statement by Engineer-in-Charge. The provisions of clause 9 of IS: 14687 may be referred for erection of false work (centering), safety precautions and other site operations, pertaining to false work (centering).
- iv)** Engineering form watcher shall be engaged during erection, concreting, and dismantling for early detection of any movement or instability in the system.
- v)** A detailed program of field safety inspection of centering/scaffolding/form work of such structures during different stages should be chalked out and strictly followed.
- vi)** The prime responsibility of safety of false work shall with SI for concrete and structural steelwork.

- vii)** Provision of safety net fall arresting system including other safety gears, for workers, working over these structures shall be followed strictly.

5.44 Other Conditions with Respect to Execution of Work

- i)** The work shall be carried out in accordance with the contract specification/terms, tendered drawings and detailed drawings including revised drawings, if any, issued/approved during execution of work by the Engineer-in-Charge.
- ii)** Before commencement of any item of work, the SI shall correlate all the relevant architectural, structural and MEP drawings, and specifications etc. issued/approved for the work and satisfy himself that the information available there from is complete and unambiguous. The figure and written dimension of the drawings shall be superseding the measurement by scale. The discrepancy, if any, shall be brought to the notice of the Engineer-in-charge before execution of the work. The SI alone shall be responsible for any loss or damage occurring by the commencement and execution of work based on any erroneous and or incomplete information and no claim whatsoever shall be entertained on this account.
- iii)** The SI is required to deploy resources as per availability of site. However, no claim will be entertained for idle labour, idle machinery, idle technical/no-technical staff, idle T&P etc.
- iv)** The work of services will be executed simultaneously. The SI shall minimize the scope of making recesses, holes, opening etc. as the same shall be planned in advance and necessary grooves/niches shall be provided in shuttering of RCC.
- v)** Gypsum plaster shall be executed using pneumatic spray machine of reputed make.
- vi)** Laminates on flush doors shall be machine pressed, preferably in factory. The design and pattern of laminates shall be as per the approval of Engineer in charge.
- vii)** The Aluminum door-windows-framework, lamination and lipping on flush doors shall be factory made.
- viii)** Unless otherwise specified, wherever mild steel / galvanized iron sections and pipes are provided in the work, priming coat of approved steel primer shall be done after removing rust from section if any and finally finished with low VOC synthetic enamel paint or as mentioned specifically in specification.
- ix)** Unless otherwise specified, Monkey ladder shall be provided for overhead water tanks and lift machine room doors with frame and steps of 40x40x6 mm angle iron, etc.
- x)** Wall mounted door stoppers shall be provided to protect the wall where the door handle would run into it.
- xi)** For avoiding of scratch marks or damage to the vitrified / ceramic floor tile, the necessary arrangement of hessian cloth with a coat of plaster of Paris over it shall be provided. Nothing shall be paid extra on this account.
- xii)** Fall nets and scaffolding nets for protection from debris / dusts and noise etc. are to be provided during the construction period. Nothing extra shall be paid on this account.
- xiii)** Wherever required should be fitted with SS grill of grade 316 (minimum weight 8 kg per sqm) as per approved drawings.
- xiv)** Wherever utility ducts, drains etc. are required, the same shall be provided with precast concrete elements made of M-25 grade concrete and reinforcement steel of Fe-500 DCRS.
- xv)** Wherever the doors are required to be fixed to AAC block masonry, the frame shall be fixed in RCC band or concrete block masonry.
- xvi)** If details for any area/space with respect to finishing schedule, door & window

schedule, sanitary fitting schedule, hardware schedule etc. are not mentioned in the particular specification/schedules/ drawings, the details of area/space having similar functionality shall be followed.

- 5.45** It is intended to make our built environment barrier free and accessible to all. Bidders are instructed to strictly adhere to the provision contained in Handbook on Barrier free and accessibility containing and corresponding provisions of NBC 2016 while incorporating such features in the building. Nothing extra shall be payable on this account.
- 5.46** In case of reduction in scope of work, no claim on account of reduction in value of work, loss of expected profit, consequential overheads etc. shall be entertained.

6 Special Conditions for Green Building

The Date Centre Building is targeted to obtain Green Building Gold Rating Certification and the SI shall ensure that they are using materials confirming the Green Building Specifications and shall carry out documentation for IGBC Green Data Centre gold Rating system. All necessary consideration shall be taken care by SI for all the compliance to get IGBC Green Data Centre gold rating certificate.

6.1 Construction Stage:

- i) All vehicles, equipment, and machinery to be procured/used for construction shall conform to the relevant Bureau of India Standard (BIS) norms.
- ii) Emission from the vehicles must conform to environmental norms.
- iii) Dust produced from the vehicular movement and other site activities is to be mitigated by sprinkling of water.
- iv) Noise limits for construction equipment's shall not exceed 75 dB(A), measured at one meter from the edge of the equipment in free area, as specified in the Environment Protection Act, 1986, schedule VI part E, as amended on 9th May, 1993. The maximum noise levels near the construction site should be limited to 65 dB (A) Leq (5 min) in project area.

6.2 Construction Wastes Disposal:

- i) The pre-identified dump locations will be a part of solid waste management plan to be prepared by the SI in consultation with Engineer-in-charge.
- ii) SI shall get approved the location of disposal site prior to commencement of the excavation on any section of the project location.
- iii) SI shall ensure that any spoils of material will not be disposed off in any municipality solid waste collection bins.

6.3 Procurement of Construction Materials:

- i) All vehicles delivering construction materials to the site shall be covered to avoid spillage of materials and maintain cleanliness of the roads.
- ii) Wheel Tyers of all vehicles used by of the SI or any of his sub SI or materials supplies shall be cleaned and washed clear of all dust/mud before leaving the project premises. This shall be done by routing the vehicles through tyre washing tracks.
- iii) SI shall arrange for regular water sprinkling at least twice a day (i.e., morning and evening) for dust suppression of the construction sites and unpaved roads used by his construction vehicles.

6.4 Water Pollution

- i) The SI shall take all precautionary measures to prevent the wastewater during construction to accumulate anywhere.
- ii) The wastewater arising from the project is to be disposed off in the manner that is acceptable to the Engineer-in-charge.

6.5 Air and Noise Pollution

- i) SI shall use dust screens and sprinkle water around the construction site to arrest spreading of dust in the air and surrounding areas.
- ii) SI shall ensure that all vehicles, equipment, and machinery used for construction are regularly maintained and confirm that emission levels comply with environmental emission standards/norms.
- iii) All vehicles and equipment used in construction will be fitted with exhaust silencers.
- iv) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.
- v) Noise emission from compactors (rollers) front loaders, concrete mixers, cranes (movable), vibrators and saws should be less than 75dB(A).
- vi) As per the standards/guidelines for control of Noise Pollution from Stationary Diesel Generator (DG) sets, noise emission in dB(A) from DG Set (15-500 KVA) should be less than $94 + 10 \log_{10} (\text{KVA})$. The standards also suggest construction of acoustic enclosure around the DG Set and provision of proper exhaust muffler with insertion loss of minimum 25 dB(A) as mandatory.

6.6 Identify roads on-site that would be used for vehicular traffic. Update vehicular roads (if these are unpaved) by increasing the surface strength by improving particle size, shape and mineral type that make up the surface base. Add surface gravel to reduce source of dust emission. Limit number of fine particles (smaller than 0.075mm) to 10 -20%. Limit vehicular speed on site 10km/h. Nothing extra will be payable for this.

6.7 All material storages should be adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust/particulate emissions.

6.8 Spills of dirt or dusty materials shall be cleaned up promptly, so the spilled material does not become a source of fugitive dust and also to prevent of seepage of pollutant laden water into the ground aquifers. When cleaning up the spill, ensure that the clean - up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained/cleaned up immediately before they can infiltrate into the soil/ground or runoff in nearby areas.

6.9 The SI shall ensure that water spraying is carried out by wetting the surface by spraying water on:

- i) Any dusty material.
- ii) Areas where demolition work is carried out.
- iii) Any unpaved main-haul road and
- iv) Areas where excavation or earth moving activities are to be carried out.

6.10 The SI shall ensure the following:

- i) Cover and enclose the site by providing dust screen, sheeting or netting to scaffold along the perimeter of a building.
- ii) Covering stockpiles of dusty material with impervious sheeting.
- iii) Covering dusty load on vehicles by impervious sheeting before they leave the site.

- iv)** Transferring, handling/storing dry loose materials like bulk cement and dry pulverized fly ash inside a totally enclosed system.
- v)** Clear vegetation only from areas where work will start right away.
- vi)** Vegetate/mulch areas where vehicles do not ply.

- 6.11** Apply gravel / landscaping rock to the areas where mulching/paving is impractical. Adopt measures to prevent air pollution in the vicinity of the site due to construction activities. There is no standard reference for this. The best practices should be followed (as adopted from international best practice documents and codes).
- 6.12** The SI shall provide experienced personnel with suitable training to ensure that these methods are implemented. Prior to the commencement of any work, the method of working, plant equipment and air pollution control system to be used on -site should be made available for the inspection and approval of the Engineer -in-Charge to ensure that these are suitable for the project.
- 6.13** Employ measures to segregate the waste on-site into inert, chemical, or hazardous wastes. Recycle the unused chemical/hazardous wastes such as oil, paint, batteries, and asbestos. The inert waste is to be disposed off to Municipal Corporation/local bodies dump yard and landfill sites.
- 6.14** To preserve the existing landscape and protect it from degradation during the process of construction. Proper timing for construction activity shall be selected to minimize the disturbance such as soil pollution due to spilling of the construction material and its mixing with rainwater. The construction management plan including soil erosion control management plan shall be prepared accordingly for each month. The application of erosion control measures includes construction of gravel pits and tyre washing bays of approved size and specification for all vehicular site entry/exits, protection of slopes greater than 10%. Sedimentation Collection System and run-off diversion systems shall be in place before the commencement of construction activity. Existing vegetation shall be preserved and protected by not disturbing or damaging to specified site areas during construction.
- 6.15** Spill prevention and control plans shall clearly state measures to stop the source of the spill. Measures to contain the spill and measures to dispose the contaminated material and hazardous wastes. It should also state the designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners and petroleum products.
- 6.16** The SI shall prepare and submit 'Spill prevention and control plans' before the start of construction, clearly stating measures to stop the source of the spill, to contain the spill, to dispose the contaminated material and hazardous wastes, and stating designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners, and petroleum products.
- 6.17** The SI shall ensure that no construction leaches (e.g., cement slurry) is allowed to percolate into the ground. Adequate precautions are to be taken to safeguard against this including reduction of wasteful curing processes, collection, basic filtering, and reuse. The SI shall follow requisite measures for collecting drainage water run-off from construction areas and material storage sites and diverting water flow away from such polluted areas. Temporary drainage channels, perimeter dike/swale, etc. shall be constructed to carry the pollutant -laden water directly to the treatment device or facility (municipal sewer line).
- 6.18** All lighting installed by the SI around the site and at the labour quarters during

construction shall be CFL/ LED bulbs of the appropriate illumination levels. This condition is a must, unless specifically prescribed otherwise.

- 6.19** All the building materials and systems used on site must be as per the specifications and approved makes by the Engineer-In-Charge.
- 6.20** All required certificates explaining the properties of the building material/system needs to be obtained from the manufacturer/vendor as required by the green building rating authority. The purchase orders of all the materials made with the manufacturers / authorized vendors should be maintained and shall be provided for the process with due diligence upon request.
- 6.21** All paints, adhesives and sealants should comply with the VOC limits prescribed by GRIHA, as follows:

Table 1- VOC limits for paints, adhesives, and sealants

Description	VOC Limit (g/l)	Description	VOC Limit (g/l)
PAINTS		ADHESIVE	
Non-flat	150	Wood flooring	100
Flat (Mat)	50	Tile	65
Anti-corrosive /anti-Rust	250	Indoor Carpet	50
COATINGS		Structural Glazing	100
Varnish	350	Multipurpose Construction	70
Lacquer	550		
Floor Coatings	100		
Stains	250		

- 6.22** Water saving measures need to be followed on site. If bore well water is used for construction, it must be metered. For wastewater use in construction, record must be maintained of all tankers used at site. All sources of water use during construction must be regularly monitored.
- 6.23** The SI /sub-SI shall prepare and submit a site Management Plan (SMP) within 10 days of start, for an approval by the Engineer -in-charge. This SMP shall indicate the locations of go down, stockpiles, barricading, waste storage, offices, vehicular movement routes etc. In short, this SMP would comprehensively represent how the site activities shall be managed conforming to GRIHA guidelines. SI will be penalized @ Rs. 1000 per day of delay on non-submission of SMP beyond due date to be recovered from next RA bill.
- 6.24** Any other site management measures suggested by the Engineer-in-charge shall be followed on site.
- 6.25** The SI & his team shall put adequate efforts to minimize construction waste generation at site. This shall include collection and segregation of all construction waste at site like broken bricks, tiles, glass, pavers, Steel scrap, Concrete debris, Plastic bags, drums, packaging cardboard, Timber scrap, Cement bags etc.
- 6.26** The SI must keep record of all the construction waste being recycled or reused at site and also maintain receipts/records of waste sold from site. The SI must ensure that no waste from the site is sent to landfill sites; either all waste is reused within the site or sent for recycling. Track the waste sent off the site to its

final destination. SI must keep record as gate passes/ challans for all the waste material sent out for selling.

6.27 The SI shall submit to the Engineer -in-Charge after construction of the buildings, a detailed as built quantification of the following within 10 days of recording of completion. SI will be penalized @ Rs. 10000 per day of delay on non-submission of SMP beyond due date to be recovered from the Final bill:

- Total materials used
- Total waste generated,
- Total waste reused,
- Total water used,
- Total electricity consumed, and
- Total diesel consumed.

6.28 Evidence for the implementation of the all the above required measures shall be provided in the form of photographs and templates as required which is required for the submission to the green building rating authority (GRIHA).

6.29 The SI shall provide potable water for all workers. The SI shall provide the minimum level of sanitation and safety facilities for the workers at site. The SI shall ensure cleanliness of workplace with regard to the disposal of waste and effluent; provide clean drinking water and latrines and urinals as per applicable standard. Adequate toilet facilities shall be provided for the workman within easy access of their place of work. The total no. to be provided shall not be less than 1 per 30 employees in any one shift. Toilet facilities shall be provided from the start of building operations, connection to a sewer shall be made as soon as practicable. Every toilet shall be so constructed that the occupant is sheltered from view and protected from the weather and falling objects. Toilet facilities shall be maintained in a sanitary condition. A sufficient quantity of disinfectant shall be provided. Natural or artificial illumination shall be provided.

6.30 Construction Waste:

6.30.1 The SI shall make himself conversant with the Site Waste Management Program Manual and actively contribute to its compilation by estimating the nature and volume of waste generated by the process/installation in question. The SI is ingenuity is especially called towards meeting this prerequisite/ credit (as per IGBC LEED India, New Construction v1.0 & GRIHA, MNRE) for recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet, and insulation.

6.30.2 SI shall ensure that wastage of construction material is within 3%. Subject to the suitability, all construction debris shall be used for road preparation, back filling, etc., as per the instructions of the Engineer in Charge, with necessary activities of sorting, crushing, etc. No construction debris shall be taken away from the site, without the prior approval of the Engineer in Charge. If and when construction debris is taken out of the site, after prior permissions from the Engineer in Charge, then the SI shall ensure the safe disposal of all wastes and will only dispose of any such construction waste in approved dumping sites.

6.30.3 SI shall collect all construction waste generated on site. Segregate these wastes based on their utility and examine means of sending such waste to manufacturing units which use them as raw material or other site which require it for specific purpose. All construction debris generated during construction shall be carefully segregated and stored in a demarcated waste yard. Clear, identifiable areas shall be provided for each waste type. Employ measures to segregate the waste on site into inert, chemical, or hazardous wastes. Typical construction debris could be broken bricks, steel bars, broken tiles, spilled

concrete, and mortar etc.

- 6.30.3.1** Water spray, through a simple hose for small projects, to keep dust under control. Fine mists should be used to control fine particulate. However, this should be done with care so as not to waste water. Heavy watering can also create mud, which when tracked onto paved public roadways, must be promptly removed. Also, there must be an adequate supply of clean water nearby to ensure that spray nozzles don't get plugged.
- 6.30.3.2** SI shall be required to provide an easily accessible area that serves the entire building and is dedicated to the separation, collection, and storage of materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastics, and metals. He shall coordinate the size and functionality of the recycling areas with the anticipated collections services for glass, plastic, office paper, newspaper, cardboard, and organic wastes to maximize the effectiveness of the dedicated areas. Consider employing cardboard balers, aluminum can crushers, recycling chutes, and collection bins at individual workstations to further enhance the recycling program.
- 6.30.3.3** Staging (dividing a construction area into two or more areas to minimize the area of soil that will be exposed at any given time) should be done to separate undisturbed land from land disturbed by construction activity and material storage.
- 6.30.3.4** The storage of material shall be as per standard good practices as specified in Part 7, Section 2 in Storage, Stacking and Handling practices, NBC 2016 and shall be to the satisfaction of the Engineer in Charge to ensure minimum wastage and to prevent any misuse, damage, inconvenience, or accident. There should be a proper planning of the layout for stacking and storage of different materials, components and equipment's with proper access and proper maneuverability of the vehicles carrying the materials. While planning the layout, the requirements of various materials, components, and equipment's at different stages of construction shall be considered.
- 6.30.3.5** The SI shall provide for adequate number of garbage bins around the construction site and the workers facilities and will be responsible for the proper utilization of these bins for any solid waste generated during the construction. The SI shall ensure that the site and the workers facilities are kept litter free. Separate bins should be provided for plastic, glass, metal, biological and paper waste and labelled in both Gujarati, Hindi or English with suitable symbols.
- 6.30.3.6** The SI shall remove from site all rubbish and debris generated by the Works and keep Works clean and tidy throughout the Contract Period. All the serviceable and non-serviceable (malba) material shall be segregated and stored separately. The malba obtained during construction shall be collected in well-formed heaps at properly selected places, keeping in a view safe condition for workmen in the area. Materials which are likely to cause dust nuisance or undue environmental pollution in any other way, shall be removed from the site at the earliest and till then they shall be suitable covered. Glass & steel should be dumped or buried separately to prevent injury. The work of removal of debris should be carried out during day. In case of poor visibility artificial light may be provided.

6.31 Documentation:

- 6.31.1** The SI shall submit a document after construction of the buildings, a brief description along with photographic records to show that other areas have not been disturbed during construction. The document should also include brief explanation and photographic records to show erosion and sedimentation

control measures adopted. (Document CAD drawing showing site plan details of existing vegetation, existing buildings, existing slopes and site drainage pattern, staging and spill prevention measures, erosion and sedimentation control measures and measures adopted for top soil preservation during construction.

- 6.31.2** The SI shall submit to the Engineer in Charge, before the start of construction, a site plan along with a narrative to demarcate areas on site from which top soil has to be gathered, designate area where it will be stored, measures adopted for top soil preservation and indicate areas where it will be reapplied after construction is complete.
- 6.31.3** The SI shall submit to the Engineer in Charge, a detailed narrative (not more than 250 words) on provision for safe drinking water and sanitation facility for construction workers and site personnel.\
- 6.31.4** Provide supporting document from the manufacturer of the pre-cast building blocks specifying the fly ash content of the blocks used in an infill wall system.
- 6.31.5** The SI shall, during the entire tenure of the construction phase, maintain the following records and submit to the Engineer in Charge on demand:
 - 6.31.6** Water consumption in liters.
 - 6.31.7** Electricity consumption in 'kwh' units.
 - 6.31.8** Diesel consumption in liters.
 - 6.31.9** Quantum of waste (volumetric/weight basis) generated at site and the segregated waste types divided into inert, chemical, and hazardous wastes.
 - 6.31.10** Digital photo documentation to demonstrate compliance of safety guidelines as specified herein.
 - 6.31.11** Quantities of construction debris (if at all) taken out of the site
 - 6.31.12** Digital photographs of the works at site, the workers facilities, the waste and other material storage yards, pre-fabrication, and block making works, etc. as guided by the Engineer in Charge
 - 6.31.13** The SI shall submit to the Engineer in Charge, following information, for all material brought to site for construction purposes, including manufacturer is certifications, verifying information, and test data, where Specifications sections require data relating to environmental issues including but not limited to:
 - a. Source of products:** Supplier details and location of the supplier.
 - b. Project Recyclability:** Submit information to assist Owner and SI in recycling materials involved in shipping, handling, and delivery, and for temporary materials necessary for installation of products.
 - c. Recycled Content:** Submit information regarding product post-industrial recycled and post- consumer recycled content.
 - d. Product Recyclability:** Submit information regarding product and product's component's recyclability including potential sources accepting recyclable materials wherever applicable.
 - 6.31.14** Provide Green Building Consultants in completing all Green Building Rating related formalities, including signing of forms, providing signed letters in the SI is letterhead whenever required.
 - 6.31.15** The SI is expected to go through all other conditions of the LEED & GRIHA rating stipulations. Failure to adhere to any of the above-mentioned items, without approval of the Engineer in Charge, shall be deemed as a violation of contract and the SI shall be held liable for penalty as per terms of the agreement.

7 Additional & Special Condition for Cement.

7.1 General

- i) The SI shall, at his own expense procure and provide all materials including cement and steel required for the work.
- ii) The SI shall procure all the materials in advance so that there is sufficient time to testing and approving of the materials and clearance of the same before use in work.
- iii) All materials brought by the SI for use in the work shall be got checked from the Engineer-in-Charge or his authorized representative of the work on receipt of the same at site before use.
- iv) The SI shall also employ necessary watch and ward establishment for the safe custody of materials at his own cost.
- v) SI has to produce manufacturers test certificate for each lot of cement & steel procured at site.

7.2 Conditions For Cement:

- i) The SI shall procure Portland Pozzolana Cement (PPC) [conforming to IS:1489 (Part-I)], as required in the work, from reputed manufacturers of grey having a production capacity not less than one million tons per annum. Supply of cement shall be taken in 50 Kg. bags bearing manufacturer's name and ISI marking. Samples of cement arranged by the SI shall be taken by the Engineer-in-charge and got tested in accordance with provisions of relevant BIS codes. In case test results indicate that the cement arranged by the SI does not conform to the relevant BIS codes, the same shall stand rejected and shall be removed from the site by the SI at his own cost within a week's time of written order from the Engineer-in-charge to do so.
- ii) PPC (Portland Pozzolana Cement) shall be used in RCC structures in accordance with the circular issued by the Directorate General of Works vide No. CDO/SE(RR)/Fly Ash (Main)/102 dt. 09.04.2009. The use of PPC shall be regulated as per the following conditions stipulated in the circular dt.09.04.2009: -
 - a. IS:456-2000 Code of Practice for Plain and Reinforced Concrete (as amended up to date) shall be followed in regard to Concrete Mix Portion and its production as under:
 - i. The concrete mix design shall be done as "Design Mix Concrete" as prescribed in clause-9 of IS: 456 mentioned above.
 - ii. Concrete shall be manufactured in accordance with clause 10 of above mentioned IS:456 covering quality assurance measures both technical and organizational, which shall also necessarily require a qualified Concrete Technologist to be available during manufacture of concrete for certification of quality of concrete.
 - b. Minimum M30 grade of concrete shall be used in all structural elements made with RCC both in load bearing and framed structure.
 - c. The mechanical properties such as modulus of elasticity, tensile strength, creep and shrinkage of fly ash mixed concrete or concrete using fly ash blended cements (PPCs) are not likely to be significantly different and their

values are to be taken same as those used for concrete made with OPC.

- d.** To control higher rate of carbonation in early ages of concrete both in fly ash admixed as well as PPC based concrete, water/binder ratio shall be kept as low as possible, which shall be closely monitored during concrete manufacture.
If necessitated due to low water/binder ratio, required workability shall be achieved by use of chloride free chemical admixtures conforming to IS: 9103. The compatibility of chemical admixtures and super plasticizers with each set OPC, fly ash and /or PPC received from different sources shall be ensured by trials.
 - e.** In environment subjected to aggressive chloride or sulphate attack in particular, use of flyash admixed or PPC based concrete is recommended. In case, where structural concrete is exposed to excessive magnesium sulphate, flyash substitution/content shall be limited to 18% by weight. Special type of cement with low C3A content may also be alternatively used. Durability criteria like minimum binder content and maximum water/binder ratio also need to be given due consideration in such environment.
 - f.** Wet curing period shall be enhanced to a minimum of 10 days or its equivalent. In hot & arid regions, the minimum curing period shall be 14 days or its equivalent.
 - g.** Subject to General Guidelines detailed out as above, PPC manufactured conforming to IS: 1489 (Part-I) shall be treated at par with OPC for manufacture of Design Mix Concrete for structural use in RCC.
 - h.** Till the time, BIS makes it mandatory to print the %age of flyash on each bag of cement, the certificate from the PPC manufacturer indicating the same shall be insisted upon before allowing use of such cements in works.
- iii)** While using PPC for structural concrete work, no further admixing of flyash shall be permitted.
 - iv)** The cement shall be brought at site in bulk supply of approximately 50 tons or as decided by the Engineer-in-charge. The cement godown of the capacity to store a minimum of 2000 bags of cement shall be constructed by the SI at the site of work for which no extra payment shall be made. The SI shall be responsible for the watch and ward and safety of the cement godown. The SI shall facilitate the inspection of the cement godown by the Engineer-in-charge at any time.
 - v)** The cement shall be got tested by SI and shall be used on work only after test results have been received. The SISI (SI) shall supply free of charge the cement required for testing. The cost of tests shall be borne by the SI (SI).
 - vi)** The actual issue and consumption of cement on work shall be regulated and proper accounts maintained.
 - vii)** Cement brought to site and cement remaining unused after completion of work shall not be removed from site without written permission of the Engineer-in-charge.
 - viii)** Damaged cement shall be removed from site immediately by the SI on receipt of notice in writing from the Engineer-in-charge. If he does not do so within three days of receipt of such notice, the Engineer-in-charge shall get it removed at the cost of the SI.
 - ix)** Cement should be kept in godowns and its consumption account invariably maintained, whether the cement is supplied departmentally or arranged by the SI. A register should be maintained at the site.

8 Additional & special conditions for Steel Reinforcement

8.1 The Steel manufacturers such as SAIL, Tata Steel Ltd, RINL, Jindal Steel Power Ltd, JSW Steel Ltd & ESL Steel Ltd. or their authorized dealers having valid BIS license for IS:1786:2008 (Amendment -1 November 2012)

8.2 The SI shall obtain manufacturers certificate stating the process of manufacture, chemical composition and test sheet giving results of each mechanical test applicable to the material purchased and submit it to Engineer-in-charge. Each test certificate shall indicate the number of the cast to which it applies, corresponding to the number or identification mark to be found on the material.

- i) The SI shall have to obtain and furnish test certificates to the Engineer-in-charge in respect of all supplies of steel brought by him to the site of work. The Engineer-in-charge shall get each consignment tested for both chemical composition and physical properties (including bend and re-bend test) as specified in IS:1786 from NABL accredited laboratory or any Government laboratory. In case the test results indicate that the steel arranged by the SI does not conform to the specifications, the same shall stand rejected, and it shall be removed from the site of work by the SI at his cost within a week time or written orders from the Engineer-in-Charge to do so.
- ii) The steel reinforcement bars shall be brought to the site in bulk supply of ten tons or more as decided by the Engineer-in-charge.
- iii) The steel reinforcement shall be stored by the SI at site of work in such a way as to prevent distortion and corrosion and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.
- iv) For checking nominal mass, tensile strength, bend test, re-bend test etc. specimen of sufficient length shall be cut from each size of the bar at random at frequency not less than that specified below:

Size of bar	For consignment below 100 tons	For consignment above 100 tons
Under 10mm dia. Bars	One sample for each 25 tons or part thereof	One sample for each 40 tons or part thereof
10mm to 16mm dia. Bars	One sample for each 35 tons or part thereof	One sample for each 45 tons or part thereof
Over 16mm dia. bars	One sample for each 45 tons or part thereof	One sample for each 50 tons or part thereof

- v) The SI shall supply free of charge the steel required for testing including transportation to testing laboratories. The cost of tests shall be borne by the SI.
- vi) The actual issue and consumption of steel on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of steel shall be worked out as procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein. In case the consumption is less than theoretical consumption including permissible variations recovery at the rate so prescribed shall be made. In case of excess consumption, no adjustment needs to be made.

- vii)** Steel brought to site and steel remaining unused shall not be removed from site without the written permission of the Engineer-in-charge.
- viii)** The following procedure should be followed in case of removal of rejected/sub-standard materials from the site of work.
 - a.** Whenever any material brought by the SI to the site of work is rejected, entry thereof should invariably be made in the site order book.
 - b.** As soon as the material is removed, a certificate to that effect may be recorded by the tenderer/ Consultant against the original entry, giving the date of removal a mode of removal i.e., whether by truck, carts or by manual labour. If removal is by truck, the registration number of the truck should be recorded.

9. Civil/Building Construction Design Consideration

9.1 Earthwork:

- 9.1.1** The work shall be done in accordance with CPWD Specifications - 2019 -Vol. I & Vol. II and National Building Code 2016 with up-to-date correction slips.
- 9.1.2** Excavation shall be undertaken to the width of the Basement / Retaining wall footing including necessary margins for construction operation as per drawing or directed otherwise. Where the nature of soil or the depth of the trench and season of the year, do not permit vertical sides, the SI at his own expense shall put up the necessary shoring, strutting, and planking or cut slopes with or without steps, to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer. Nothing extra shall be paid for making steps and slopes etc. as required.
- 9.1.3** As per approved structural and architectural drawings, foundation of the building shall be excavated with most secured and advance method. SI shall use all safety equipment and measures during excavation of the foundation. The SI shall make at his own cost all necessary arrangements for maintaining water level, in the area where works are under execution low enough so as not to cause any harm to the works or problems in carrying out with the execution and the rates for all items of work shall be considered as inclusive of pumping out or bailing out water, if required, for which no extra payment shall be made. This will include water coming from any source, such as rains, accumulated rain water, floods, leakages from sewer and water mains, subsoil water table being high or due to any other cause whatsoever. During and after excavation, if the sub soil water, rain water, and water from any source percolate in the foundation trench, then SI shall arrange most suitable method to bail out of this water to the nearest drain. The SI shall make necessary provision of pumping, dredging, and bailing out water coming from all above sources and excavation and other works shall be kept free of water by providing suitable system approved by the Engineer-in-charge.
- 9.1.4** The SI shall at his own cost make all necessary arrangements for stabilization of slope, construction of temporary retaining structure e.g., diaphragm wall, cofferdam, anchor pile, shoring or Shuttering required for retaining of earth during excavation.
- 9.1.5** All the major excavation shall be carried out by mechanical excavator. No extra payment shall be made for that.
- 9.1.6** The rates are inclusive for all lead & depths & nothing extra shall be paid for additional lift etc.

9.2 Concrete Works:

All concrete works shall be carried out in general as per CPWD Specifications 2019, Volume-I & II with up-to-date revisions/ amendments / correction slips issued till last date (including any extension, if any) of submission of bid. Unless specified otherwise, all the PCC work shall be of grade M-15 with minimum cement content of 220 kg and thickness of PCC shall be 100mm and 75 mm for foundations and grade slabs respectively. Unless specified otherwise, cement concrete of M30 grade may be used for Lintels, RCC bands etc.

9.3 Additional Conditions and Specifications for RCC WORK as per Design Mix concrete requirements:

9.3.1 Wherever letter M has been indicated, the same shall imply for the Design Mix Concrete. The Design Mix Concrete will be designated based on the principles given in IS: 456, 10262 & SP 23. The condition and specifications stated herein shall have precedence overall conditions and specifications stated in relevant I.S codes/CPWD specifications. **Foundation shall be pile foundation using specified grade of concrete.** The foundation level shown in the structural & architectural drawings are for supporting the foundation on firm strata as per SBC specified therein. However, care shall be taken to ensure to support the footings on firm strata as per minimum SBC specified in structural drawings. Geotechnical/soil investigation shall be performed by SI to establish the SBC of the soil. The mandatory tests required in accordance 115 with IS 10042 need to be carried out during construction by the SI. The SI shall carry out the soil investigation of entire site, as per relevant Indian standards, before taking up the foundation work. Subsurface conditions encountered during construction may vary somewhat from the conditions encountered during site investigation. There is likelihood of encountering localized clay seams in the type of formation that exists at site. Therefore, it is essential to examine the founding levels very carefully during excavation and remove the same if met with till firm strata is ensured prior to laying of PCC. It should be ensured that at foundation level, no voids are there, if voids are observed the same shall be grouted. Necessary soil stabilization measures shall be implemented by the SI to achieve the bearing capacity as specified in structural drawings. Any deviation in earth work, concrete work, RCC work, or any other items of works will be ignored and nothing extra shall be paid on account of varying foundation level (in order to ensure supporting of foundation on firm strata and at minimum SBC specified in structural drawings). The SI shall quote the rate accordingly. RCC retaining/breast wall shall be provided as per drawings and site condition. Unless specified otherwise, all structural members like footings, Columns, Beams, slabs etc. shall be provided with specified grades of concrete as

- 1) Coarse Aggregate: -As per CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips
- 2) Fine Aggregate: -As per CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips.
- 3) Water: - It shall confirm to requirements laid down in IS: 456-2000 / CPWD Specifications - 2019 - Vol. I & Vol. II with up-to-date correction slips.
- 4) Cement: - PPC shall be used for design mix concrete and shall conform to IS-1489 (part-I). However, if higher grade of cement is used by the SI nothing extra shall be paid on this account.
- 5) Admixtures/ Plasticizers: -The admixture shall confirm to IS: 9103, wherein required, the admixture of approved quality and approved make only shall be used to attain the required workability. Nothing extra shall be paid for use of admixtures.
- 6) Grade of Concrete: - The compressive strength of various grades of concrete shall be given as below: -

Grade Designation	Compressive strength on cubes min. 7 days (N/mm ²)	Specified Characteristic Compressive Strength At 28 Days At (N/mm ²)	Maximum Water Cement Ratio
M-20	As Per Design	20	0.50
M-25	As Per Design	25	0.50
M-30	As Per Design	30	0.45

Grade Designation	Compressive strength on cubes min. 7 days (N/mm ²)	Specified Characteristic Compressive Strength At 28 Days At (N/mm ²)	Maximum Water Cement Ratio
M-35	As Per Design	35	0.45
M-40	As Per Design	40	0.45

Water cement ratio and slump shall be as per IS: 456-2000

NOTE: -

a. In the designation of a Concrete mix letter M refers to the mix and the number of the specified characteristic compressive strength of 15 cm-Cube at 28 days expressed in N/mm².

9.2.2 The SI shall engage one of the following approved laboratories / test houses for designing the concrete mix in accordance with relevant IS Code and to conduct laboratory tests to ensure the target strength & workability criteria for a given grade of concrete: -

- i. IIT, Gandhinagar.
- ii. NTH (National Test House)
- iii. Any other laboratory with prior approval of the Engineer in Charge.
- iv. All Structural drawings shall be validated from ISR-Gandhinagar. (Institute of Seismological Research)

9.3.2 The various ingredients for mix design / laboratory tests shall be sent to the lab test houses through the Engineer-in-Charge and the samples of such aggregates sent shall be preserved at site by the department.

9.3.3 The SI shall submit the report on design mix from any of above approved laboratories for approval of Engineer-in-Charge within 45 days from the date of issue of letter of acceptance of the tender. No concreting shall be done until the design mix is approved. In case of white Portland cement and the likely use of admixtures in concrete with ordinary Portland/white Portland cement, the SI shall design and test the concrete mix by using trial mixes with white cement and / or admixtures also, for which nothing extra shall be payable.

9.3.4 In case of change of source or characteristic properties of the ingredients used in the concrete mix during the work, a revised laboratory mixes design report conducted at laboratory established at site shall be submitted by the SI as per the direction of the Engineer-in-Charge.

9.3.5 Trial Batches

- i) The designed mix proportion shall be checked for target mean compressive strength by means of trial batches.
- ii) The quantities of materials for each trial mix shall be sufficient for at least six specimens (cubes) and the concrete required for carrying out workability tests.
- iii) The workability of trial mix No. 1 shall be measured, and mix shall be carefully observed for freedom from segregation, bleeding, and its finishing characteristics. The water content, if required, shall be adjusted corresponding to the required changes in the workability.
- iv) With the modified water content, the mix proportions shall be recalculated by keeping with water cement ratio unchanged. The mix proportions, as modified, shall form the Trial Mix No. 2 and tested for the specified strength and workability.
- v) In addition, trial mix No. 3 and 4 shall be designed by keeping water contents same as that determined for trial mix 2 but varying the water cement ratio + 10 percent of the specified value and tested for their design characteristics.

9.3.6 All cost of mix designing, and testing connected therewith including charges payable to the laboratory shall be borne by the SI including redesigning of the concrete mix wherever required and directed by Engineer in-Charge.

9.3.7 Design mix concrete conditions and requirements: -

The mix design for a specified grade of concrete shall be done for a target mean compressive strength

$$T_{ck} = F_{ck} + 1.65s$$

Where F_{ck} = Characteristic compressive strength at 28 days.

S = Standard deviation which depends on degree of quality control.

The degree of quality control for this work is "good" for which the standard deviation (s) obtained for different grades of concrete shall be as follows: -

GRADE OF CONCRETE	STANDARD DEVIATION(S)
M-10	3.5
M-15	3.5
M-20	4.0
M-25	4.0
M-30	5.0
M-35	5.0
M-40	5.0

Minimum three sets of separate preliminary test shall be carried out for each trial batch of concrete mix. Each test shall comprise six specimens and only one test set of six specimens shall be made on any particular day. Out of the six specimens of each set, three shall be tested at seven days and remaining three at 28 days. The preliminary tests at seven days are intended only to indicate the strength to be attained at 28 days. The design mix shall be approved only on the basis of test strength of 28 days. The design mix shall be considered satisfactory and approval if at least three preliminary test-sets individually satisfy the following strength and workability criteria.

1. The average strength of each test sets is not less than the specified target means compressive strength (TCK).
2. The strength of any specimen cube is not less than 0.85 TCK.
3. The concrete mix is required degree of workability and acceptance concrete finish.

All cost of mix designing, and testing connected therewith including charges payable to the laboratory shall be borne by the SI.

9.3.8 Work Strength Test: -

1) Test Specimen: -

Work strength test shall be conducted in accordance with IS: 516 on random sampling. Each test shall be conducted on six specimens, three of which shall be tested at 7 days and remaining three at 28 days.

2) Test Results of Samples: -

The test results of the sample shall be the average of the strength of three specimens. The individual variation shall not be more than + 15% percent of the average. If variation is more, the test results shall be treated as invalid. 80% of the total tests shall be done at the laboratory established at site by the SI and remaining 20% in the

laboratory of IITs and NITs or in any other laboratory as directed by the Engineer-in-Charge.

3) Lot Size: -

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following: -

QUANTITY OF CONCRETE IN THE WORK (CUBIC METRE PER DAY).	NUMBER OF SAMPLES
1-5	1
6-15	2
16-30	3
31-50	4
51 & above	4 Plus one additional sample for each additional 50 cubic meters of part thereof

NOTE: At least one sample shall be taken from each shift.

9.3.9 Standard of Acceptance: -

- i) In case the test results of all the samples are above the characteristic compressive strength, the concrete shall be accepted.
- ii) In case the test result of one or more samples fails to meet the requirement (i) above, it shall be accepted if both the following conditions are met: -
 - a. Any individual test result is not less than $(F_{ck} - 4) \text{ N/mm}^2$.
 - b. The mean of test results from any group of four consecutive samples is more than $(F_{ck} + 4) \text{ N/mm}^2$.
- iii) Concrete of each grade shall be assessed separately.
- iv) Concrete is liable to be rejected, if it is porous or honeycombed, its placing has been interrupted without providing a proper construction joint, the reinforcement has been displaced beyond the tolerances specified, or construction tolerances have not been met.

9.3.10 Ultrasonic Pulse Velocity Method of Test for RCC

- i) The underlying principle of assessing the quality of concrete is that comparatively higher velocities are obtained when the quality of concrete in terms of density, homogeneity and uniformity is good. The consistency of the concrete as regards its general quality gets established. In case of poorer quality lower velocities are obtained. If there are cracks, voids or flaws inside the concrete which come in the way of transmission of pulse, lower velocities are obtained.
- ii) The quality of concrete in terms of uniformity, incidence or absence of internal flaws, cracks and segregation etc. indicative of the level of workmanship employed, can thus be assessed using the guidance given in table below, which have been evolved for characterizing the quality concrete in structure in term of the ultrasonic pulse velocity.
- iii) Velocity criterion for Concrete Quality Grading.

Sl. No.	Pulse velocity by Cross Probing	Concrete Quality Grading
1	Above 4.5	Excellent
2	4.5 to 3.5	Good
3	3.5 to 3.0	Medium
4	Below 3.0	Doubtful

- iv) Pulse velocity method of test of concrete is to be conducted for CPWD works as a routine test. The acceptance criteria as per the above table will be applicable which is as per IS 13311 (part 1): 1992. From the above "Good" and "Excellent" grading are acceptable and below these grading the concrete will not be acceptable.
- v) 5% of the total number of RCC members in each category i.e., beam, column, slab and footing may be tested by UPV test method for establishing quality of concrete. It is suggested that test be conducted on RCC beam near joint with column, on RCC column near joint with beam, on RCC footings and rafts. On RCC rafts a suitable grid can be worked out for determining number of tests. In addition, doubtful areas such as honeycombed locations, locations, where continuous seepage is observed, construction joints and visible loose pockets will also be tested.
- vi) The test results are to be examined in view of the above acceptance criteria "Good" and "Excellent" and wherever concrete is found with less than required quality as per acceptance criteria, repairs to concrete will be made. Honeycombed areas and loose pockets will be repaired by grouting using Portland Cement Mortar/Polymer Modified Cement Mortar /Epoxy Mortar, etc. after chipping loose concrete in appropriate manner. In areas where concrete is found below acceptance criteria and defects are not apparently visible on surface, injecting approved grout in appropriate proportion using epoxy grout /acrylic Polymer modified cements slurry made with shrinkage compensating cement / plain cement slurry etc. will be resorted to for repairs.(refer relevant chapters from CPWD Hand Book on Repairs and Rehabilitation of RCC Buildings).Repair to concrete will be done till satisfactory results are obtained as per the acceptance criteria by retesting of the repaired area. If satisfactory results are not obtained dismantling and relaying of concrete will be done.
- vii) The SI has to arrange at site centering and shuttering within two months from stipulated date of start of work. Only M.S. centering / shuttering and scaffolding material unless & otherwise specified shall be used for all R.C.C. work to give an even finish of concrete surface. However, marine-ply shuttering in exceptional cases as per site requirement may be used on specific request from SI as approved by the Engineer-in-Charge.
- viii) The rate quoted by the tenderer also include cost of special type of centering and shuttering e.g., circular in shape or of any other architectural design.
- ix) In order to keep the floor finish as per architectural drawings and to provide required thickness of the flooring as per specifications, the level of top surface of R.C.C. shall be accordingly adjusted at the time of its centering, shuttering and casting for which nothing extra shall be paid to the SI.
- x) **Production of Concrete:** - The site for the work is congested. The SI has to arrange the site / land for installation of batching plant outside the site. All concrete shall be produced through fully computerized weigh-batching plant of suitable capacity (not less than 30 cum/hr.) conforming to IS: 4925 with the arrangements

for automatic dispensing of admixture and having facility of giving print out indicating weight / details of all ingredients of concrete in each lot/ batch and variations from the approved design mix if any. Fully automatic batching and mixing plant having capacity not less than 30 cum/ hour shall be installed at the arranged site by the SI as the construction site is congested & space for installation for batching plant is not available at construction site. Nothing extra for installation of carriage of concrete from the batching plant shall be entertained. The batching and mixing plants shall be dedicated plants for this project. SI shall make his own arrangements for the necessary infrastructure for installation of batching plant and other machineries. However, if due to any reason, SI wishes to supplement the concrete from Ready Mix Concrete (RMC) supplier, he is permitted to procure the same from the source approved by the Engineer-in-charge at his own cost. In such a situation nothing extra shall be paid to the SI. All technical requirements such as cement type and minimum cement quantity, w/c ratio, slump, admixture etc. shall be conveyed to RMC supplier by the SI and SI shall be wholly responsible for ensuring the property of concrete as required at site, nothing extra shall be paid to the SI.

The SI may take some time to install his own batching plants at the arranged site and till the batching plants are installed, the SI is permitted to procure concrete from approved Ready-Mix Concrete (RMC) supplier for a period 3 months from date of start of work or the period as agreed by Engineer-in-Charge. Similarly, when the work is nearing completion and daily requirement of concrete is very less, if agreed by the Engineer-in-Charge, the SI may be permitted to **procure the concrete from approved Ready-Mix Concrete (RMC) supplier** and nothing extra shall be paid to the SI on this account.

9.3.11 Land for Temporary Use

The land for labour camps and batching plant shall be arranged by the SI. The lease/rent charges shall be borne by the SI. The Engineer-in-Charge shall extend necessary help and issue necessary recommendations etc. to the concerned department for temporary allotment of land during construction period.

The batching and mixing plant shall be fully automatic of suitable capacity not less than 30cum/hour. Automatic batcher shall be charged by devices which when actuated by a single starter switch will automatically start the weighing operation of each material and stop automatically when the designated weight of each material is fed in the mixer. The batching plant shall have automatic arrangement for dispensing the admixture and shall be capable of discharging water in more than one stage. A batching plant essentially shall consist of the following components:

Separate storage bins for different sizes of aggregates, silo for cement and fly-ash, water storage tank.

Batching equipment, Mixers, Control Panels, Mechanical material feeding and elevating arrangements

The compartments of storage bins for aggregates shall be approximately of equal size. The cement compartment shall be centrally located in the batching plant. It shall be watertight and provided with necessary air vent, aeration fittings for proper flow of cement & emergency cut off gate. The aggregate and sand shall be charged by power operated centrally revolving chute. The entire plant from mixer floor upward shall be enclosed and insulated. The batch bins shall be constructed so as to be self-cleansing during draw-down. The batch bins shall in general conform to the requirements of IS: 4925.

The batching equipment shall be capable of determining and controlling the prescribed quantities of various constituent materials for concrete accurately i.e., water, cement, sand, individual size of coarse aggregates etc. The accuracy of measuring devices shall fall within the following limits.

Measurement of Cement: + 2% of the quantity of cement in each batch

Measurement of Water: + 3% of the quantity of water in each batch

Measurement of Aggregate: + 3% of the quantity of aggregate in each batch

Measurement of Admixture: + 3% of the quantity of admixture in each batch

The batching and mixing plant shall have the provision of adjusting the plus / minus quantity of various ingredients in the next batch so that there is no variation in quantity of ingredients from design mix in a lot consisting of 5 to 6 batches.

The mixer in the batching plant shall be so arranged that mixing action in the mixer can be observed from the operator's station. The mixer shall be equipped with a mechanically or electrically operated timing, signaling and metering device which will indicate and assure completion of the required mixing period. The mixer shall have all other components as specified in IS: 4925.

9.3.12 Transportation, Placing and Compaction of Concrete

Mixed concrete from the RMC / Batching plant shall be transported to the point of placement by transit mixers and placed in position through concrete pumps and/or steel closed bottom buckets capable of carrying minimum 0.6 cum concrete. In case the concrete is proposed to be transported by transit mixer, the mixing speed shall not be less than 4 rev/min. of the drum nor greater than a speed resulting in a peripheral velocity of the drum 70 m/minutes at its largest diameter. The agitating speed of the agitator shall be not less than 2 rev/min nor more than 6 rev/min of the drum. The number of revolutions of the mixing drum or blades at mixing speed shall be 70 to 100 revolutions for uniform mixes, after all ingredients, have been charged into the drum. Unless tempering water is added, all rotation after 100 revolutions shall be at agitating speed of 2 to 6 rev/min and the number of such rotations shall not exceed 250. The general construction of transit mixer and another requirement shall conform to IS: 5892.

In case concrete is to be transported by pumping, the conduit shall be primed by pumping a batch of mortar through the line to lubricate it. Once the pumping is started, it shall not be interrupted (if at all possible) as concrete standing idle in the line is liable to cause a plug. The operator shall ensure that some concrete is always there in the pump receiving hopper during operation. The lines shall always be maintained clean and shall be free of dents at all stages. Special precaution shall be taken that surrounding temperature during concreting shall not exceed 30 degree centigrade.

Except where otherwise agreed to by the Engineer in Charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 450 mm. Unless agreed to by the Engineer in Charge, concrete shall not be dropped into place from a height exceeding 1.5m. In order to avoid such situations chutes, tremie pipe or closed bottom buckets shall be used. These shall be kept clean and used in such a way as to avoid segregation. Slope of the chute shall be so adjusted that concrete flows without the use of excessive quantity of water. The delivery end of

chute shall be as close as possible to the point of deposit. The chute shall be thoroughly flushed with water before and after each working period and the water used for this purpose shall be discharged outside the formwork. The concrete shall be compacted by using immersion type vibrators. When the concrete is being continuously deposited to a uniform depth along a member, vibrator shall not be operated within one meter of free end of the advancing concrete. Every effort shall be made to keep the surface of the previously placed layer of concrete alive so that the succeeding layer can be amalgamated with it by the vibration process. In case the concrete in underlying layer has hardened to such an extent that it cannot be penetrated by the vibrator but is still fresh (that is, just after initial set), un-imposed bond shall be achieved between the top and underlying layer by first scarifying the lower layer before the new concrete is placed by systematically and thoroughly vibrating the new concrete. The points of insertion of vibrator in the concrete shall be so spaced that the range of action overlap to some extent and the freshly filled concrete is sufficiently consolidated at all locations. The spacing between the dipping positions of vibrator shall be maintained uniformly throughout the surface of concrete so that concrete is uniformly vibrated. The vibrating head shall be regularly and uniformly inserted in the concrete so that it penetrates of its own accord and shall be withdrawn slowly whilst running so as to allow redistribution of concrete in its way and allow the concrete to flow back into the hole behind the vibrator. The vibrator head shall be kept in one position till the concrete within its influence is completely consolidated. Vibration shall be continued until the coarse aggregate particle have blended into the surface but have not disappeared. The SI shall keep at least one additional vibrator in serviceable condition to be used in the event of breakdowns and maintenance problems.

The vibrator head shall not be brought more than 200 mm near to the formwork as this may cause formation of water stagnations. The formwork shall be strong and great care shall be exercised in its assembly. It shall be designed to take up increased pressure of concrete and pressure variations caused in the neighborhood of vibrating head, which may result in excessive local stress on the formwork. The joints of the formwork shall be made and maintained tight and close enough to prevent the squeezing out slurry or sucking in of air during vibration. The formwork to receive concrete shall be cleaned and made free from standing water, dust, etc. The SI shall keep provision for screed and shutter vibrators at site.

No concrete shall be placed in any part of the structure until the approval of Engineer In-Charge has been obtained. If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again from the Engineer-in-Charge. Concreting shall be done continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a proper construction joint is formed. When concreting has to be resumed on a surface which has hardened, it shall be roughened, swept, clean, thoroughly wetted and covered with a 13 mm thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. The 13 mm layer of mortar shall be freshly mixed and placed immediately before placing of new concrete.

Where concrete is not fully hardened, all latency shall be removed by scrubbing the wet surface with wire or bristle brushes. Care shall be taken to avoid dislodgement of particles of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed and then coated with neat cement grout. Particular attention shall be given to corners and close spots.

In case of rejection of concrete on account of unacceptable compressive strength, governed by Para "Standard of Acceptance" as above, the work for which samples have failed shall be redone at the cost of SI. However, the Engineer-in-Charge may order for additional tests (like cutting cores, ultrasonic pulse velocity test, load test on structure on part of structure, etc.) to be carried out at the cost of SI to ascertain if the portion of structure wherein concrete represented by the sample has been used, can be retained on the basis of results of individual or combination of these tests. The SI shall take remedial measures necessary to retain the structure as approved by the Engineer-in-Charge without any extra cost.

9.3.13 Shuttering /Formwork:

The work shall be done in general as per CPWD Specifications 2019, Volume-I & II with date revisions/ amendments / correction slips issued up to last date of submission of bid.

Aluminum formwork (using grade 5052 aluminum for panel sheets of minimum 4 mm thick and grade 6061, Type-6 aluminum for extruded sections) or JET platforms (JET PLATFORM PANEL is an innovative prefabricated modular formwork system which is made from engineered Polypropylene (PP) material) joined by P Clamp or Pin and wedges) shall be used for monolithic construction RCC/composite members. Pins and wedges to be made of high-grade mild steel.

Double steel scaffolding having two sets of vertical supports shall be provided for external wall finish, cladding etc. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding platform shall be fixed. Scaffolding shall have steel staircase for inspection of works at upper levels.

In order to keep the floor finish as per architectural drawings and to provide required thickness of the flooring as per specifications, the level of top surface of R.C.C. shall be accordingly adjusted at the time of its centering, shuttering and casting for which nothing extra shall be paid to the SI.

As per general Engineering practice, the level of floors in toilet / bath, balconies, shall be kept lower than the general floors as required from waterproofing point of view. Shuttering should be adjusted accordingly. Nothing extra is payable on this account.

Dented, broken, cracked, twisted or rusted shuttering shall not be allowed to be used on the work.

The shuttering shall be cleaned properly with electrically driven sanders to remove any cement slurry or cement mortar or rust. Proper shuttering oil or de-bonding compound shall be applied on the surface of the shuttering in the requisite quantity before assembly of steel reinforcement.

For the execution of centering and shuttering, the SI shall use propriety shuttering oil as approved by Engineer-in-Charge and nothing extra shall be paid on this account.

All existing formwork that fails to meet the specifications mentioned above or do not qualify to meet the minimum standards in the view of Engineer-in-Charge shall have to be removed and stacked.

9.4 Reinforcement:

The reinforcement work shall be done as per CPWD Specifications 2019, Volume-I & II with revisions/ amendments / correction slips up to last date of bid submission (including extensions if any).

Reinforcement work includes all operations including straightening, cutting, bending, welding, binding with annealed steel or welding and placing in position at all the floors with all leads and lift complete as per CPWD Specifications.

The SI shall provide approved type of support for maintaining the bars in position and ensuring required spacing and correct cover of concrete to reinforcement as mentioned in the drawings. Spacer blocks of required shape and size, chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement. To ensure proper cover, factory made round / rectangular type cover blocks will be used to avoid displacement of bars in any. Couplers shall be used for splicing of reinforcement bars.

Reinforcement TMT bars, to be used for the work, shall be corrosion resistance TMT bars of grade Fe 500D CRS/ 550D CRS or more.

9.4.1 Bar Bending Schedule:

The agency shall prepare bar bending schedule as per structural drawings and submit to Engineer-in-Charge in advance for approval. The bar bending schedule shall conform to Indian Standard IS 2502-Code of Practice for Bending and Fixing of bars for Concrete Reinforcement. Before execution of work, two copies of these bar bending schedules including revision will be submitted to Engineer-in-Charge for approval. Keeping in view the quantum of the work, the BBS shall preferably be prepared with software and one person acquainted with preparing BBS with software shall be deputed at site to speed up the work.

9.5 Seismic/Expansion Joint:

The vertical & horizontal expansion joints shall be treated as per the relevant IS code and CPWD specifications. The system shall comply the specification mentioned herein.

9.5.1 Exterior Wall Expansion Joint System:

It includes providing & fixing of the Wall-to-Wall Expansion Joints system (WTC 400/300/250/200/150/100-Wall Model of MIGUA or equivalent) of width specified in structural drawings. It shall be manufactured from the Aluminum Alloy 6063 - T66. The Expansion Joint Covers/Profile shall be supplied in 3/ 4 Meter Cut – Length. Aluminum Covers/Profiles should have a Hard Wearing, Maintenance Free, long-lasting design. The Exposed surface of the model should have an Anodized/Mill Finish. The design of the Expansion Joint Cover System should have a Centering bar that allows and accommodate the multi-dimensional movement capabilities. The system must comply Cycle Movement Test as per ASTM – 1399 Part 4. Test Certificate has to be mandatorily submitted along with Supplies. The total & visible width of the Expansion Joint would be as per manufacturer's specifications. The Expansion Joint System will have side Profile/Mounting bracket allowing for secure fixing and Flexible anchoring of the system to the Vertical Surface. Fire Barrier (UL Certified) as specified and per the Manufacturer's Standards shall be used/Installed before installation of the Expansion Joint Cover. Exterior Wall Expansion Joint Covers/Models shall have a mandatory Installation of Moisture / Water Proofing of the Expansion Joint by the way of Sealing the Joint with the additional Membrane with Epoxy sealing agent & other means i.e., the Anchor fasteners in the Exterior elevation Wall or on the Exterior

Façade System of the building will have to be done in order to prevent of any water seepages during rain or by other possibilities.

9.5.2 Floor Expansion Joint System:

It includes providing & fixing of the floor expansion joint system (SPJ 400/300/250/200/150/100 Floor Pan joint system of MIGUA or Equivalent) of width specified in structural drawings. It shall be manufactured from the Aluminum Alloy 6063 - T66. The Expansion Joint Covers/Profile shall be supplied in 3/ 4 Meter cut – Length. Aluminum Covers Profiles should have a Hard Wearing, Maintenance Free, long-lasting design. The design of the Pan should be such that there is no requirement of the diagonal cutting of the infill i.e., stone & tiles. The Exposed surface/Edge of the pan model should have a visible width of 65 mm (+/-5%) & Serrated Surface, which should ensure to have a good Skid Resistance so that it avoids any kind of Slippages during its usage. The design of the Expansion Joint Cover System should be such that it should pop up with the infill in case of earthquake when the closure of Joint width happens during earthquake. The Expansion Joint Cover should have a Centering bar that allows and accommodate the Multidimensional movement capabilities. The system must comply Cycle Movement Test as per ASTM – 1399 Part 4. Test Certificate has to be mandatorily submitted along with the Supplies. The total width of the Expansion Joint shall be as per manufacturer's specifications. The system can be used for standard pedestrian loads & Cart-Wheel Loads if required. The Side Profile should have a MULTI HOLE mounting bracket allowing for secure fixing and Flexible anchoring and excellent bonding with given slab surface/masonry/epoxy bedding. For Precise Transitions, the factory supplied slid-in connection pins should be used during the installation of the cover system in multiple Cut-Lengths for achieving the Straight-line alignment. Water Proofing of the Expansion Joint by the way of sealing the Joint with the additional Membrane with Epoxy sealing agent will have to be done. Fire Barrier (UL Certified) as specified and per the Manufacturer's Standards shall be used/Installed before installation of the Expansion Joint Cover.

9.5.3 Roof Cover Expansion Joint System:

It includes providing & fixing Roof Top Expansion Joints (Earthquake-resistant Series Model RTC 400/300/250/200/150/100 of MIGUA or Equivalent) for width specified in structural drawings. It shall be manufactured from the Aluminum Alloy 6063 -T66. The Expansion Joint Covers/Profile shall be supplied in 3/ 4 Meters. Cut –Length. Aluminum Covers Profiles should have a Hard Wearing, Maintenance Free and long-lasting design having Smooth Surface. The Surface of the Exp. Joint Covers should have Smooth Surface, which should ensure to have a good water slippage so that it avoids any kind of hold of any water droplets on its top Surface when in use during rains or other times of any water spillage on the Cover Surface. Additionally, Moisture / Water Proofing of the Expansion Joint by the way of sealing the Joint with the Membrane with Epoxy sealing agent will have to be done mandatorily. The design of the Expansion Joint Cover System should be such that it should have a free horizontal movement in case of earthquake. The movement in the cover should be supported with a Centering Bar, which should return to its original position after each movement large or small. The system must comply Cycle Movement Test as per ASTM-1399 Part4. Test Certificate has to be mandatorily submitted along with the Supplies. The Side Profile should have a MULTI HOLE mounting bracket allowing for secure fixing and Flexible anchoring and excellent bonding with given slab surface/masonry/epoxy bedding. For Precise Transitions, the factory supplied slid-in connection pins should be used during the installation of the cover system for connecting one Cover Profile to another when being installed in one Continuation Joint Length in multiple Cut-Length for achieving the Straight-line alignment. Fire Barrier (UL Certified) as specified and per the Manufacturer Standards shall be used/Installed before

installation of the Expansion Joint Cover. Water Proofing of the Expansion Joint by the way of sealing the Joint with the additional Membrane with Epoxy sealing agent will have to be done.

9.5.4 Fire Barrier:

SI shall be responsible for providing & fixing of fire seal/barrier (of MIGUAS`S – MIGUFIRE Expansion Fire Barrier Series or equivalent) for all expansion joint systems. The Fire barrier should be constructed by the use Alkaline Earth Silicate wool product in Stainless Steel encasing which should have a UL Certification for minimum of 2 Hrs. The Fire Barrier shall be supplied in Various Cut-Length depending on the Joint Width in Roll Form. The Fire barrier should be Asbestos Free for health & safety reasons/standards. The ANSI/UL 2079 Standards should be followed i.e., "Tests for Fire Resistance of Building Joint System". Both the Edges of the Stainless Steel encase should be welded by the Seam Welding Process, so that it gives flexibility during the Installation. As per site condition Surface Mounting Flanges can be provided or the same can also be secured along with the Anchors / Fasteners of the Multi Hole Mounting Brackets of the Exp. Joint Covers. The Fire barrier should have a 100 % Movement of the Joint width (+)50 % / (-) 50 % at least in order to provide the Unhindered Expansion & Seismic Movement of the Mechanical/Metal Expansion Joint Covers. The system must comply Cycle Movement Test as per ASTM – 1399 Part 4. Test Certificate has to be mandatorily submitted along the with Supplies. The UL Certificate should be in the name of the Manufacturer of the Expansion Joint Cover System. It should be properly/safely stored in the Confined & shaded area so that it is well protected from the Sun & Rain/Water Contact & should be unboxed only before the Installation of them. Once Installed the Metal/Mechanical Expansion Joint Covers are to be Installed Immediately on above the Fire barrier in order to prevent any sort of damages from the Construction debris or otherwise.

9.6 Masonry Work:

The masonry work shall be done as per CPWD Specifications 2019, Volume-I & II with revisions / amendments / correction slips up to last date of bid submission (including extensions if any). In case of conflict or contradiction between detailing shown in drawings and specification mentioned herein under this subhead, the specification mentioned herein under this subhead will be followed.

Chicken mesh 85gsm or fibre mesh of good quality to be provided in plaster at the junction of Masonry and RCC or CC Member/band.

For masonry work above plinth level, RCC band at sill level and lintel level shall be provided. This thickness of the band shall be 100 mm or as approved by the Engineer-in-Charge.

All opening on masonry wall shall be provided with RCC lintels, RCC bands / lintel over top of parapet wall at corridors, balconies etc. with specified grade of concrete as shown in the drawing or as approved by Engineer-in-Charge.

Fly ash brick masonry of class designation 10, with cement mortar 1:6 (1 cement:6 coarse sand), shall be done in wet areas. FPS bricks of class designation 7.5 in cement mortar 1:6(1Cement: 6Coarse Sand) shall be used in brick work in foundation up to plinth level and other masonry work shown in drawings. All the walls of corridors shall be full brick wall or with 200mm thick AAC blocks.

AAC blocks masonry shall be of Grade I and of oven dry density 551-650 kg/cum with polymer modified adhesive mortar above plinth level except wet areas. The polymer modified adhesive (of make pidilite, ardexendura, weber) mortar shall be provided @

30 kg per cum. AAC Block confirming the IS Code – 2185 (Part-3) 1984 (Reaffirmed 2005) shall be used.

- i) Dimensions & Tolerances: Autoclave Aerated Concrete Block shall be made in sizes and shapes to fit different needs.
- ii) The maximum variation in the length of the Autoclave Aerated Concrete Block shall not be more than plus/minus 5mm and maximum variation in the height and width of Autoclave Aerated Concrete Block, not more than plus/minus 3mm.
- iii) The faces of Autoclave Aerated Concrete Block shall be flat & Rectangular, opposite faces shall be parallel and all arises shall be square. The bedding surfaces shall be at right angle to the face of the Blocks. The Autoclave Aerated Concrete Block with special faces shall be manufactured and supplied if so required.
- iv) The autoclaved Autoclave Aerated Concrete Block shall be classified in two grades according to their compressive strength as indicated in table below:

Sl. No.	Density in Oven dry Condition (Kg/m ³)	Compressive Strength(N/mm ²)		Thermal Conductivity in air dry condition (W/m. k)
		Grade I	Grade II	
1	451 to 550	2.00	1.50	0.21
2	551 to 650	4.00	3.00	0.24
3	651 to 750	5.00	4.00	0.30
4	751 to 850	6.00	5.00	0.37
5	851 to 1000	7.00	6.00	0.42

- v) All Autoclave Aerated Concrete Block shall be sound, free of cracks or other defects which interfere with the proper placing of block units impair the strength or performance of the construction. Where block units are to be used in exposed wall construction, the face or faces that are to be exposed shall be free of chips, cracks or other imperfections except that if not more than 5% of a consignment contains slight cracks or small chippings not larger than 25mm, this shall not be deemed grounds for rejection.
- vi) Block Density – The Block density shall conform to the requirements specified in above table, when tested accordance with IS 6441 (Part-1) -1972.
- vii) Compressive Strength – The min. compressive strength being the average of twelve block units shall be as prescribed in above table, when tested accordance with accordance with IS 6441 (Part-5)-1972.
- viii) Thermal Conductivity – The thermal conductivity shall not exceed the values specified in above table when tested accordance with IS 3346-1980.
- ix) Drying Shrinkage – The drying shrinkage shall be not more than 0.05% for grade –1 block and 0.10% for grade-2 block when tested accordance with IS 6441 (Part-2)-1972.
- x) Number of tests: A sample of 24 blocks shall be selected at random. All the 24 Blocks shall be checked for dimensions and inspected for visual defects. Out of the 24 blocks, 12 blocks shall be subjected to the test for compressive strength, 3 blocks to the test for density, 3 blocks to the test for thermal conductivity and 3 blocks to the test for drying shrinkage. The remaining 3 blocks shall be reserved for re-test for drying shrinkage if a need arises.

- xi)** The samples of AAC blocks (each sample consisting of 6 specimen) shall be chosen randomly from the lot procured and tested for various parameters specified as above. One samples shall be tested for every 200 cum or part thereof. However, minimum one sample shall be tested from each lot received at site if the quantity procured in the lot is less than 200 cum. If required, Engineer-in-Charge or his authorized representative shall inspect the factory during production of the material for this work and also collect samples (of materials used for making AAC blocks and precast AAC blocks) from the factory itself. The SI shall consider this contingency also while placing the order with one of the approved firms. Nothing extra shall be payable on this account.
- xii)** Criteria for conformity: The number of blocks with dimensions outside the tolerance limit and or with visual defects, among those inspected, shall not be more than two. For density, the mean value shall be within the range as specified in above Table. For compressive strength, the mean value, say X shall be determined. The test results shall be grouped into groups of 4, individual values of ranges shall be determined, the average range a calculated from these values and shall satisfy the following condition: $X - 0.6 R > \text{minimum value specified in above Table}$. For thermal conductivity, the mean value shall be equal to or less than the value specified in above Table. For drying shrinkage, all the test specimens shall satisfy the requirements of the test. If one or more specimens fail to satisfy the requirements, the remaining 3 blocks shall be subjected to these tests. All these blocks shall satisfy the requirements.
- xiii)** Manufacturer's Certificate: The manufacturer shall satisfy him that the masonry units conform to the requirements of this specification and, if requested, shall supply a certificate to this effect to the purchaser or his representative.
- xiv)** Marking: Each lot of concrete masonry units manufactured in accordance with this specification shall preferably be marked with information-

 - a. The identification of the manufacture.
 - b. The grade and block density of the unit.
 - c. The month and year of manufacturing.

9.7 Stone/Marble Work:

i) General:

- a. The execution of stones work shall be in general as per CPWD Specifications-2019 - Vol. I & Vol. II with up-to-date correction slips.
- b. All holes, rebates, recesses etc. for providing fixing and inserts shall be predrilled and precut and worked using precision machine tools. Nothing extra on this account shall be payable.

ii) Sample for Stone Work:

- a. Samples of each item of stone work either individually or in combination shall be prepared for approval of Engineer-in-Charge before commencement of work.
- b. Sequence of execution for cladding work shall be suggested by the SI for approval of Engineer-in-Charge.

iii) Scaffolding:

Double steel scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed.

9.8 Woodwork:

The woodwork in general shall be carried out as per CPWD Specifications 2019, Volume-I & II with revisions/ amendments / correction slips up to last date of bid submission (including extensions if any). In case of conflict or contradiction between detailing shown in drawings and specification mentioned herein under this subhead, the specification mentioned herein under this subhead will be followed. The detailing shown in door and window drawings is suggestive only. Before taking up any procurement/construction activity, shop drawings (for fixing of all kinds of doors, showing all hardware's) shall be prepared (on the basis of specification laid herein) and submitted by SI for obtaining approval from Engineer-in-Charge.

The samples of species of timber to be used shall be deposited by the SI with the Engineer- in-Charge before commencement of the work. The SI shall produce cash vouchers and certificates from standard kiln seasoning plant operator about the timber to be used on the work having been kiln seasoned by them, failing which it would not be accepted as kiln seasoned. Specified timber shall be of good quality and well-seasoned. It shall have uniform colour, reasonably straight grains and shall be free from dead knots, cracks, and sapwood.

Woodwork shall not be painted, oiled or otherwise treated before it has been approved by the Engineer-in-Charge. All portion of timber including architrave abutting against masonry concrete stone or embedded in ground shall be painted with approved wood preservative or with boiling coal tar.

Door/window schedules are provided with the tender document which shall be followed invariably. If any door type or tag is not mentioned in drawings or door & window schedule, decision shall be given by Engineer in charge based on door suggested in door & window schedule for similar functional area. Before taking up any procurement/construction activity, shop drawings (for fixing of all kinds of doors, showing all hardware's) shall be prepared and submitted for obtaining approval from Engineer-in-Charge.

i) Flush Door Shutters - Flush door shutters shall be of 35 mm thick or of thickness as specified/required/decided (in door & window schedule or in drawings) and conforming to IS: 2202 (Part I) decorative type, core of block board construction with frame of 1st class hard wood and well-matched teak 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters. Stainless Steel butt hinges with necessary screws shall be used for fixing. Lipping with 2nd class teak wood battens of 25 mm minimum depth on all edges of flush door shutters shall be provided. Rebate shall be cut (in frames/shutters) as specified and instructed by Engineer-in-charge.

ii) Vision panel of required and specified shape e.g., rectangular, square, circular etc. shall be provided.

iii) Laminates: Flush doors shall be provided with 1.5 mm thick Decorative high pressure laminated sheet (on both side) of plain / wood grain in gloss / matt/ suede finish with high density protective surface layer and reverse side

of adhesive bonding quality conforming to IS: 2046 Type S, including adhesive of approved quality. The laminates shall be resistant to fungal attack at the end of 28 days of incubation when tested as per ASTM: G 21 - 2015 test method.

Melamine Polish (Pidilite, Asian, Dulux make) shall be done (in 3 or more coats to achieve superior finish) on all teak wood & decorative veneered surfaces.

- iv) Lead Lined Door:** Metal Lead Lined door from ISO 9001-2015 certified manufacturer shall be provided at all levels as per door and window schedule or as specified in drawings. All hollow metal general doors shall be with or without vision panel as specified in door and window schedule or as specified in drawings. All doors and frames shall be finished Pure Polyester Powder coated and shall have passed minimum 500 hours of salt spray test.

Door frame shall be double rebate profile of size 143 x 57mm made out of 2.0mm (14gauge) thick galvanized steel sheet. Frames shall be butted, and field assembled with bolts. The inside face of the frame face trim to rebate height should be protected with lead line of minimum 2.0 mm thickness or as specified/required. All provision should be mortised, drilled and tapped for receiving appropriate hardware. Rubber door silencers should be provided on the strike jamb. Frames should be provided with back plate bracket and anchor fasteners for installation on a finished plastered masonry wall opening. Once frame installed should be grouted with cement & sand slurry necessary for doors on the clear masonry opening.

Door leaf shall be 48mm thick or of thickness as specified/required fully flush double skin door. Door leaf shall be manufactured from 1.6 mm (16gauge) thick galvanized steel sheet. The internal construction of the door should be rigid with lead line of minimum 2 mm thick or as specified/required all across the inside of the exposed surface. In addition, the door should have a basic infill steel stiffened special core with necessary reinforcement both on top and bottom. All doors should be factory prepared for receiving appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers suitable for Lead line doors like weight of lead doors are very high in comprising to normal doors & lead lining should not be break anywhere in the complete frame and shutter due to fixing of hardware or gap between frame shutter or by astragal so if such locations arises then its cover by any other way of lead lining (as per ANSI Standard). The edges should be interlocked with lock seam. For pair of doors integrated astragals has to be provided on the meeting stile for both active and inactive leaf.

Wall guard, corner guard and handrails shall be provided invariably in all corridors, Lobbies, internal ramps. Corner guards shall be provided at every corner. Wall guard and handrails shall be provided at 750 mm from FFL or at height specified in drawings or conforming to relevant standards.

- a. The wall guard should be superior impact resistance wall guard vinyl (Lead free) Snap on cover of 0.080" (2mm) thickness extruded from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth). Surface shall have a pebble texture for scratch and stain resistance mounting on continuous aluminum retainer of 0.080"(2mm) thickness shall be fabricated from 6063-T5 aluminum, with a mill finish having dimensions of 6"(152mm) height x 1"(25mm) depth. Inner snap- on vinyl impact black bumper should be of 0.080" (2mm) thickness x 3.930" (100mm) width x 21mm height, which shall be extruded from chemical and stain resistant un-plasticized polyvinyl chloride (uPVC). The system

shall resist an impact of 45.5 ft-lbs. /inch while producing no visual blemishes upon vinyl cover surface and no deformation in the aluminum retainers, as tested in accordance with applicable provision of ASTM F 476-84 for Impact test and shall not support fungal or bacterial growth in accordance with ASTM G-21 and G-22. The system shall also confirm to class 'A' fire rating and ASTM D-543 for chemical and stain resistance. It shall include injection molded and end caps with black reveal strip.

- b. Handrail should be having rigid vinyl Snap-On cover (Lead Free) of .080" (2mm) thickness extruded from chemical and stain resistant Un-plasticized Polyvinyl Chloride (uPVC) with the addition of impact modifiers. No plasticizers shall be added (Plasticizers may aid in bacterial growth). Surface shall have a pebble texture for scratch and stain resistance with rigid vinyl cover mounted on a sturdy continuous Aluminium Retainer of .080" (2mm) thickness that shall be fabricated from 6063-T5 Aluminium with a mill finish. Dimensions to be 4-5/16" (110mm) height x 1-5/8" (41mm) Gripping Diameter, extends 3-1/8" (79mm) from wall which has an oval gripping surface. The system shall resist an Impact of 30.2 ft-lbs./inch of thickness as tested in accordance with the procedures specified in ASTM D-256-90b, Impact Resistance of Plastics. The rigid vinyl shall not support fungal or bacterial growth in accordance with ASTM G-21 and G-22. The system shall also conform to class 'A' fire rating and ASTM D-543 for chemical and stain resistance. It includes molded end returns with black reveal strip and mounting brackets.
- c. Corner guard should be having Vinyl Snap on cover (Lead Free) of .080" (2mm) thickness extruded from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth). Surface shall have a pebble texture for scratch resistance and stain resistance and shall be mounted on continuous Aluminum Retainer of .070" thickness fabricated from 6063-T5 aluminum, with a mill finish. Dimensions to be of 3" (76mm) x 3" (76mm), 90 degree. The rigid vinyl profile shall resist an Impact Strength of 30.2 ft-lbs./inch as per ASTM D-256-90b and shall not support fungal or bacterial growth in accordance with ASTM G-21 and G-22. The system shall also conform to class 'A' fire rating and ASTM D-543 for chemical and stain resistance. It includes Top caps and bottom caps which shall be made of injection molded thermoplastics.
- d. Stainless Steel (Grade 304) Braille Labels of size 170mm x 35mm X 0.5 mm having Braille dots raised 0.5mm above base plate with one SS rivet of same grade and adhesive of approved make shall be provided on handrails.

v) HARDWARE FOR DOORS/WINDOWS:

- a. Butt Hinges: 5 Knuckle, 2 bearing butt hinges size 4" x 3" x 3mm, in SS 316 and in satin stainless steel as per EN 1935, CE Marked suitable for door weights up to 120kgs
- b. Vision Panel: Unless otherwise specified, toughened glass of 6 mm thickness.
- c. Gravity Coordinator: Door coordinator/sequencer for the double leaf doors of approved make
- d. Door Lock: 55mm backset, 20mm square for end prepared for euro profile cylinder including strike plate. and EPC 70mm Length both side key operation & Escutcheons in SS Finish
- e. Flush Bolt: Lever action flush bolt with 19mm projecting bolt (LENGTH 172 mm OR 300 Mm as per direction of Engineer in Charge) in satin chrome of approved make.

- f. Floor Socket: Spring loaded dust excluding floor socket with fixing accessories, in satin Chrome finish of approve make.
- g. Door Bottom Seal: Automatic Door Bottom Seal, Heavy Duty, Face Mounted Version, spring loaded to lift clear of the floor as soon as the door leaf is opened, suitable to be used on Fire and smoke check doors, Seal Material = Silicon, Finish= Anodized Satin Clear, Length = 48" In Satin Clear Finish of approve make.
- h. Delta Seal: Delta Seal for acoustic, fire and smoke protection, suitable for wooden and steel frames, self-adhesive, Finish = Black, Length = 1 x 2000mm, Height- 2 x 2750mm IN BLACK FINISH of approve make.
- i. PA Bracket: Parallel arm bracket suitable for surface mounted door closer for fixing of door closer in silver finish of approve make.
- j. Armor Plate: Armor plate with smoothened edges and rounded corners flush face fixing screws height 1000mm and thickness 1.2 mm in SS 304 grade in satin stainless steel. Length=5mm short of the shutter width of approve make.
- k. Push Plate: Push plate with smoothened edges and rounded corners flush face fixing screws size 150 x 400 x 1.2 mm in SS 304 grade in satin stainless steel of approve make.
- l. Sign Plates: Male/Female/Disable sign plate for WC application with fixing screws size 150x150x1.2 mm, rounded corners in SS 304 satin stainless-steel finish with marking in black of approve make.
- m. Mop Plate: Mop plate with smoothened edges and rounded corners flush face fixing screws height 150mm and thickness 0.9mm in SS 304 grade in satin stainless steel. Length=5mm short of the shutter width. Max door width =of approve make.
- n. Kick Plate: Kick plate with smoothened edges and rounded corners flush face fixing screws height 300mm and thickness 1.2 mm in SS 304 grade in satin stainless steel. Length=5mm short of the shutter width of approve make.
- o. D- Type Handle: D type 300mm long CTC, 22mm Dia. Pair of pull handle in SS 304 B/B fixing of approve make.
- p. Offset type D handle of 450mm long CTC, 25mm Dia. pair of handles in SS 304 B/B fixing of approve make.
- q. Flush Pull Handle: Stainless steel Flush Pull handle with fixing of screw at flush with surface of doors of approve make.
- r. Door Stoppers: Stainless Steel (grade 304) wall mounted or hanging floor door stoppers in stainless steel satin finish with necessary SS screws etc. of approve make.
- s. Door Closer: Aluminium die cast body tubular type universal hydraulic door closer (having brand logo with ISI mark, IS: 3564, embossed on the body, with necessary accessories and screws etc. of approve make.
- t. Stainless Steel handles: Bright /matt finished Stainless Steel handles (Window) of approved quality &of approve make with necessary screws etc.
- u. Pull Handle: 25mm diameter, 300 mm long in cranked / square shape stainless steel (Grade 316) of approve make satin finish pull handle with necessary screws etc.
- v. Sliding Door Bolt: 250x16mm Stainless steel (Grade 316) satin finish sliding door bolts of superior quality with necessary SS screws etc. of approve make.
- w. Mortice Latch: Brushed finished 100mm mortice latch in stainless steel satin/polished finish with euro deadlock (Coin release) with rose rings and pair of stainless steel (grade 316) lever handles with necessary SS screws etc. of approve make.

- x. Tower Bolt: Stainless steel (Grade 316) tower bolts with necessary SS screws etc. complete of approve make.

vi) Fire Check /Rated Door:

CPWD Specification 2019 Vol. I & II with revisions/ amendments / correction slips up to last date of bid submission (including extensions, if any), National Building Code (NBC) 2016 and manufacturer's specification will be followed. Fire Check doors shall be provided in buildings wherever necessary and required as per National Building Code 2016. Unless otherwise specified elsewhere in tender document, all fire doors should be fire rated for 120 minute and doors of fire exit corridor should meet the requirement of fire exit corridor specified in NBC 2016. **In general, all the services/electrical rooms/shafts shall be provided with Metal Fire Check/rated doors whereas all the lobbies, entry/exit to corridors shall be provided with the Glazed fire check/rated doors. Rooms opening in fire exit corridors may be provided with wooden fire check/rated doors.** In case of any deviation is found between general principle mentioned herein and Fire check doors shown in architectural drawings (or mentioned door & window schedule), the former i.e., general principle (mentioned herein) will be followed. If any door type or tag is not mentioned in drawings or door & window schedule, decision shall be given by Engineer in charge based on principles mentioned herein. Before taking up any procurement/construction activity, shop drawings (for fixing of all kinds of doors, showing all hardware's) shall be prepared and submitted for obtaining approval from Engineer-in-Charge.

The Fire check/rated Door should not collapse during the rated period of the fire under specified fire conditions. The fire door should not allow the passage of hot gases or the flames through the rebate or the gap between the door frame and shutter. The integrity or smoke sealing function is achieved by Fire Door by incorporating an "Intumescent Seal". This Intumescent Seal in the form of a strip, which under fire conditions expands many times its original size and forms a hard char which has high insulation properties and does not permit the smoke or flames to escape through the gap between the shutter and frame.

Observation, if any, made by the fire officer on the fire check/rated doors, shall be incorporated suitably. Nothing extra shall be paid on this account.

Execution of Fire Check Doors shall be carried out through the Specialized Agencies having sufficient work experience in the same field and shall be got approved from the Engineer-in-Charge well in advance. Specialized firm shall furnish all materials, labour, accessories, equipment, tool and plant and incidentals required for providing and installing the fire check/rated doors. SI has to select one specialized agency from list of preferred makes/brands and specialized agencies.

Fire resistance and smoke check doors shall be made of proper sizes and section as per the available opening at the site. The details shown on the drawings indicate generally the sizes of components parts and general standards. These may be varied slightly to suit the standard adopted by the manufactures. Before proceeding with manufacturing, the SI shall prepare and submit complete manufacture and installation drawing for approval of the Engineer-in-Charge and no work shall be performed until the approval of these drawings is obtained.

The term "Fire Rating" referred in tender documents means fire rating of complete assembly of fire check door e.g., frames, shutter, Vision Panel,

Glass, Hinges and other hard wares. Doors will be approved only after door passes the required tests from fire testing lab approved by the Engineer-in-Charge. Cost of sample door and testing shall be borne by SI.

Doors shall be fabricated to size in factory. Fabricated material shall be protected against any damage during transportation. Loading and unloading shall be carried out with utmost care. On receipt of material at site it shall be carefully examined to detect any damaged units/members. Arrangements shall be made for expeditious replacement of damage units or members. Materials found acceptable on inspection shall be repacked in crates and stored safely.

Just prior to installation, the doors shall be un-carted and stacked on edge on level bars and supported evenly. The frame shall be fixed into position true to line and level using adequate number of fasteners of approved size and manufacture and in an approved manner. The holes in concrete/masonry member for housing anchor bolts shall be drilled with an electric drilling machine only.

Stainless steel ball bearing hinges, panic bars, door trims, fire rated hydraulic door closers, handles, tower bolts, lock and other fittings shall be as per hardware schedule for doors & windows provided in tender document and shall be got approved from Engineer-in-Charge. All Hardware's should have a minimum 02 Years of manufacturer warrantee from the date of supply. Hard wares should pass European certificate "CE" of conformity / UL certified with required fire ratings and relevant documents to this effect shall be produced at the time of approval of samples.

The designs of fire check/rated doors and material to be used in their construction have to be such that the doors shall be capable of providing an effective barrier of desired rating.

vii) Glazed Fire Check/Rated Doors/Window/Partition

- a. Fire check/rated glazed door/window/fixed partition, shall be provided as per following specification.
- b. Non load bearing fixed frame for fire resistant glazed Partition for 120 min Fire Rating, should be made out to a profile of dimension 60mm x 70 mm of 1.6 mm thick galvanised steel sheet as per test evidence suitable for fixing fire rated glass for 120 min of both integrity & radiation control (EW120) & minimum 20 min of insulation (EI20). The profile has to be fixed to the supporting construction by means of anchor fasteners of size M10 x 80, every 150 mm from the edges and every 500 mm (approx.) c/c. The frame shall be filled with mineral wool insulation of density min 96kg/m³ and finished with an approved fire-resistant primer or Powder coating of not less than 30 micron in desired shade as per the directions of Engineer - in- charge.
- c. Fire resistant door frame of section 50 x 60 mm on horizontal side & 35 x 60 mm on vertical sides having built in rebate made out of 1.6 mm thick GI sheet (Zinc coating not less than 120gm/ m²) suitable for mounting 120 min Fire Rated Glazed Door Shutters. The frame shall be filled with Mineral wool Insulation having density min 96 Kg/m³. The frame will have a provision of G.I. Anchor fasteners 14 nos. (5each on vertical style & 4 on horizontal style of size M10 x 80) suitable for fixing in the opening along with Factory made Template for SS Ball Bearing Hinges of Size 100x89x3mm for fixing of fire rated glazed shutter. The frame shall be finished with an approved fire-resistant primer or Powder coating of not less than 30 microns in desired shade as per the directions of Engineer - in- charge.

- d. Glazed fire resistant door shutters should be 60 mm thick with suitable mounting on door frame, consisting of vertical styles, top rail & side rail 60 mm x 60 mm wide and bottom rail of 110 mm x 60 mm made out of 1.6mm thick G.I. sheet (zinc coating not less than 120gm/m²) duly filled mineral wool insulation having density min 96 kg/ m³ and fixing with necessary stainless steel ball bearing hinges of size 100x89x3mm of approved make, including applying a coat of approved fire resistant primer or powder coating not less than 30 micron etc. all complete as per direction of Engineer-in-charge. Glazed fire-resistant door shutters should be having 120 min Fire Rating confirming to IS:3614 (Part II) or EN1634-1:1999 tested and certified as per laboratory approved by Engineer-in-charge.
- e. Providing and fixing glazing in fire resistant door shutters, fixed panels & partitions etc., with G.I. beading made out of 1.6 mm thick G.I. sheet (zinc coating not less than 120 gm/m²) of size 20 x 33 mm screwed with M4 x 38 mm SS screws at distance 75 mm from the edges and 150 mm c/c , including applying a coat of approved fire resistant primer/ powder coating of not less than 30 micron on G.I. beading, & special ceramic tape of 5 x 20 mm size etc. complete in all respect as per NBC 2016, IS 16231 (Part 3):2016 and as per direction of Engineer-in-charge with bidirectional interlayer glass of required thickness having 120 minutes of fire resistance both integrity & radiation control (EW120) and minimum 20 minutes of insulation (EI20). The manufacturers have to give test report/certification of fire glass and the glass should have the stamp showing the value of E, EW & EI. The glass shall be tested in approved NABL accredited lab or by any other accreditation body which operates in accordance with ISO/IEC 17011 and accredits labs as per ISO/IEC 17025 for testing and calibration scopes shall be eligible.

viii) uPVC Window & Ventilators:

All openable and fixed window system shall have minimum 3 hollow chambers from front to back. The sliding system frames shall have minimum 3 chambers from front to back. The Sliding system Sashes shall have minimum 2 chambers from front to back. The outer profile shall not be less than 56 mm.

All sections of the frame and sash shall be reinforced in accordance with the system supplier's recommendations using galvanized mild steel in a single continuous length.

I. General Requirement:

a. Profile:

The profile is to be extruded from a compound that has been blended to ensure quality and consistency. The material shall be pristine white high impact modified window grade uPVC and shall be conform to BS EN 12608:2003 as below:

Description	Required Value
Flexural modulus of Elasticity Resistance to impact by falling mass at - 10°C for Class II (falling mass 1000g; falling height 1500mm – as per BSEN 12608:2003)	Shall not be less than 2200 N/mm ² not more than 1 test specimen shall show rupture in wall
Mean Stress for welded Breaking Corners	Shall not be less than 35N/mm ² for compression bending test or 25N/mm ² for tensile bending test

- i. The profile shall be a hollow 3-chamber (across depth) profile with an outer wall thickness not less than 2.2 mm. The profile shall be of first grade/quality uniform and free from foreign bodies, cracks or marks.

b. Fabrication of Window:

- i. The window units shall be designed with all corner joints, transom joints and mullion joints being mitred and fusion welded.
- ii. All excess material is to be neatly trimmed and neatly feature grooved/raised nib finish at corners, transom joints and mullion joints.
- iii. There will be no mechanical joining of the profile.
- iv. No polishing flush of any joints will be permitted.
- v. The window units shall be designed so that the route of drainage is prevented from passing through the reinforcement chamber.
- vi. The finished product shall be free from all sharp edges, burrs and the like that may be hazardous to the user.
- vii. The dimensional tolerances on the finished outer frame height and width shall be +3mm. Frame assemblies shall be such that they can be installed square within a maximum difference in the diagonals of 4mm. Minimum overlap of sash on frame shall be 8mm.
- viii. In all window units, adequate drainage should be provided to permit the escape of water from platforms or horizontal members beneath each sealed unit. The drainage slots shall not penetrate into the reinforcement chambers. Rainwater Stop to be provided wherever necessary to provide barrier to excess rainwater.

c. Reinforcement:

- i. Reinforcement shall be made from GI tube of not less than 1.5mm thickness as per strength requirement unless otherwise approved by Engineer in Charge.
- ii. Steel reinforcement shall conform to IS 277:2003 or equivalent. Base material of steel shall conform to IS 513:2008 – Drawing Grade.
- iii. The reinforcement shall be installed in accordance with the recommended actions. The reinforcement shall conform to the wind load requirements of IS 875: Part 3. The reinforcement shall be in one continuous length and should be installed minimum 5mm and maximum 10mm from the face of the profile to be welded.
- iv. The reinforcement shall be secured to the profile so that it does not move, or rattle and it maintains the structural integrity of the frame and satisfactory thermal separation. Reinforcement is to be fixed at a maximum of 100mm from the ends and then at a maximum of 300mm centers.

d. Glazing and Weather Seals:

Glazing

- i. Window shall be such that glazing or re-glazing on site is possible without the need to remove the outer frames from the structure of the building.
- ii. All glazing is to be packed in accordance with the system supplier's recommendations to prevent any kind of damage during handling.

Weather Seals:

- i. The weather seals shall be EPDM/ Silicone seals. ASTM- D412 and ASTM-D2240 are standard specifying test methods for Tensile strength and Hardness of the gasket whereas the required value shall be specified.
- ii. Ultimate tensile strength min $>7.5 \text{ N/mm}^2$
- iii. The weather seals are to be fitted in continuous lengths and grooves. The joints in the vent weather seal are to be positioned at the bottom and in the outer frames at the top.

Security and Safety:

- i. Fasteners shall be designed so that they cannot be released from the outside by the insertion of a thin blade.
- ii. No opening light shall be openable or removable from the outside, when it is fastened in the closed position, except by use of special tools or breaking part of the window.

II. Quality Control and Testing of Materials:

a. Raw Material:

The material from which the profiles are made shall consist substantially of white polyvinyl chloride as per BS EN 12608:20003. Only those additives and pigments may be used that are needed for the manufacture of the compound and its subsequent conversion into sound, durable extrusions of good surface finish and mechanical strength, as assessed by the requirements of this specification. Profile Properties:

b. Appearance and Finish:

The color of the profile shall be uniform and the color of all profiles in a system shall be uniform. The profile shall be free from foreign bodies, cracks or sink marks when viewed by normal corrected vision at 90° to the surface and at a distance of 1 meter in normal diffused north light.

c. Dimensions and Weights:

The profiles shall be straight such that the longitudinal axis of the profile, as measured on the face surfaces, may deviate from the straight line by no more than 1mm per meter.

The cross section of the profile shall conform in shape and dimensions and may deviate by no more than + 0.5mm; glazing channels and seal grooves may deviate by not more than + 0.3mm. The weight of the profile per meter shall not be more than 5% below the nominal value.

Window properties: U-Value: The total U_w – U value of complete window shall be $3.3 \text{ W/m}^2 \text{ K}$

Resistance to wind load: All load bearing members shall be adequately reinforced so as to resist the wind load requirements of IS 875: Part 3. Calculations shall be submitted for all window designs.

Air Tightness: The air infiltration for windows shall not exceed 1 litres/ second m^2 @ 75 Pa for both positive and negative pressures (certified for use in air-conditioned buildings)

Water Tightness: The water penetration for windows shall be minimum 15 minutes @ 150 Pa as per AS 4420.5.

d. Installation of Frame:

- i. Before installation the Installation Team is to make sure that the opening has been prepared and any repair work has been carried out. Allow a 5mm gap between the frame and the opening. The new window shall be set in the prepared opening. Allow for suitable packing blocks.
- ii. The window shall be fixed into the aperture, by drilling and fixing through the outer frame, to the existing structure using "Fischer" fixings, F8S type bolts.
- iii. The fixings shall be no less than 150mm from corners or transoms/mullions and at no more than 600mm centers.
- iv. When the frame is securely fixed in position then fit glass and glazing beads. Allow for any necessary glazing blocks and glass lock devices.
- v. Check windows for correct operation before proceeding with making good.
- vi. No fixings are to penetrate the drainage channels.
- vii. The windows shall be first treated with Polyurethane Foam (PU Foam) to enhance insulation against heat and Noise. The gap between masonry and the frame is to be filled with Neutral Cure Silicon (exposed to sun surface) and/or Acrylic Sealant (only for the internal surface). The windows shall be first treated with Polyurethane Foam (PU Foam) to enhance insulation against heat and Noise.
- viii. The silicone joints should be covered with Architraves/trims as per direction of Engineer-in-charge.

e. Making Good:

- i. Making good to the external surface of the window frame and finish with a compatible approved low modular silicone sealant to BS5889. All trims and quadrants are to be approved by the Engineer- in- Charge prior to fixing.
- ii. Allow for making good any disturbed plaster, brickwork and decorations internally and externally including color wash to brickwork.
- iii. Clean off excess material and check fittings and gearing.
- iv. Leave installation clean and in good working order.

III. General Items:

- i. This specification is to be read in conjunction with any other relevant documents and drawings.
- ii. Sizes are not to be scaled from any drawings or sketches but should be measured on site prior to manufacture.

a. Window Accessories:

- i. Window should be designed and reinforced such that it can withstand the wind load requirements by providing suitable strengthening accessories.
- ii. The window shall meet the requirements of water tightness.
- iii. Trims Shall be used to cover the window to masonry joints.

b. Window Hardware:

- i) All slider door/windows are to be provided with multi point locking arrangement with/without key locking facility as per the requirement. The hardware shall be provided as per preferred list attached. The slider locking mechanism handles are of projected/flush type.
- ii) Casement window friction stays are to be of G-U or Securistyle or equivalent make of appropriate size and weight bearing capacity, made

- of SS304. The stack height of friction stay is to be 16 + 0.5mm.
- iii) The casement windows are to be provided with multi point locking mechanism of shall be provided as per preferred list attached.

9.9 Stainless Steel Work:

Unless otherwise specified, that stainless steel generally shall be of Grade (SS 304) or 1.4401 (SS 316). Stainless Steel (SS) grade 316 shall be used for exposed / exterior work whereas grade SS 304 shall be used for interior works. Lower grades shall not be used. Before taking up any procurement/construction activity, shop drawings shall be prepared and submitted for obtaining approval from Engineer-in-Charge.

Stainless steel railing shall be provided with Factory made SS 316 grade stainless steel of minimum 18-gauge handrail with adequate rods parallel to handrail, balusters, flanges, end caps, newel posts with caps etc. complete as per approved drawing and direction of Engineer – in – charge.

Surface finish of all the stainless-steel materials will be in 240 grit satin finish / matt finish. All stainless-steel material will have to be coated by a solution of Inox to avoid finger in prints and avoidance of settlement of environment / atmospheric dust. Stainless steel railing, both sides in staircase and external ramp with double handrail shall be used for barrier free accessibility requirements with adequate SS balusters, runners etc. as per approved architectural drawing. Fixing shall be done by stainless steel expansion bolts of approved size and make as per Engineer-in-Charge and welding to be done by using organ welding rods and the surface being duly finished and cleaned by K2 passivation, which is nitric acid plus florid acid solution treatment by which the chances of corrosion will be eliminated, and any burn out makes on the metal will also be eliminated.

9.10 Flooring, Marble, Cladding Work:

All flooring work and cladding work in Granite, Tile, Marble, Stones, Wooden, PVC, Vinyl etc. in general shall be carried out as per CPWD Specifications 2019, Volume-I & II with revisions/ amendments / correction slips up to last date of bid submission (including extensions if any). The tiles / stones shall be as specified in the schedule of finishes and architectural drawings provided with tender document. The tiles / stones shall be of approved colours and shades and will be laid in pattern as per approved architectural drawings or shop drawings. Nothing extra shall be paid for laying tiles / different stones in specific design/pattern. The tiles shall be of first quality of approved make and nothing extra shall be paid for use of cut/sawn tiles in the work. Schedule of finishes mentioned in tender documents shall be followed in case of deviation/different detailing is shown in Architectural Drawings. Before taking up any procurement/construction activity, shop drawings shall be prepared and submitted for obtaining approval from Engineer-in-Charge.

Proper gradient shall be given to flooring for toilets, veranda, kitchen, courtyard, corridors etc. so that the wash water flows towards the direction of floor trap. Any reverse slop if found, these shall be made good by the SI by ripping open the floor/grading concrete and nothing shall be paid for such rectifications.

Samples of flooring material are to be deposited well in advance to the Engineer-in-Charge for approval. Approved samples should be kept at site with the Engineer-in-Charge and the same shall not be removed except with the written permission of Engineer-in-Charge.

The samples shall be submitted along with the following details:

- i) Three representative samples for each type of flooring/cladding specified.
- ii) Details of physical characteristics such as dimensional tolerances (within the specified limits), water absorption, compressive strength, Mohs Hardness, Specific gravity with reference to IS or International standards.
- iii) Source of supply and confirmation of availability in full quantity and uniformity of colour, tone and textures.
- iv) Company profile of Suppliers.

The Engineer-in-Charge or his representative may, if required, visit the source of supply of the various materials (Granite/Stones/Marble/Tiles/Cladding etc.) to assess the quality as well as availability of the material in the required quantities.

The entire supply for each type of granite/stone slabs shall be procured from one location (in one quarry), and supplied preferably, in one lot to keep variations to the minimum. The SI shall also segregate and sort the slabs according to colour, shade, texture and size of grains etc. to keep variation(s) in stones used at any one floor to the minimum. Any slab with variation in the colour, shade, texture and size of grains etc., not acceptable to the Engineer-in-Charge, shall not be used in the work and shall be removed and replaced by the SI. Nothing extra shall be payable on these accounts. Also, no claim of any kind shall be entertained from the SI on this account.

Based on the samples approved by the Engineer-in-Charge for various flooring and dado / cladding materials as specified hereinafter, the SI shall prepare mockup(s) at site of work for approval of quality of workmanship and material specified. If the quality of the workmanship and the material is as per the required standards and approved by the Engineer-in-Charge, the mockup shall be allowed as part of the work. Otherwise, it shall be dismantled by the SI as directed by the Engineer in-Charge and taken away from the site of the work at his own cost. The mockup(s) so made shall be kept till completion of respective works for reference.

The (Granite/Stones/Marble/Tiles/Cladding etc.) shall be transported to site well packed in boxes or otherwise. These shall be handled carefully to prevent any damage. Granite stone slabs shall be individually packed in cardboard paper. The various types of stones and tiles procured shall be free of any surface defect or any edge damage. The damaged (Stones/Marble/Tiles/Cladding etc.) shall not be allowed to be used in the work. So, the contractor shall procure additional quantity of the stone and tiles to cover such contingencies. The stone slabs shall not be waxed or touched up with dyes /colours.

The following tolerances shall be allowed in the dimension of granite stone slab:

- i. Length $\pm 1\text{mm}$
- ii. Width $\pm 1\text{mm}$
- iii. Thickness -1mm
- iv. Angularity at corners $\pm 0.25\%$

The stone (slab and tiles) not meeting the above tolerance limits shall be rejected and not permitted to be used in the work. Nothing extra shall be payable on this account.

Stones slabs shall have uniform thicknesses within the tolerance limits and linear items like treads, sills and jambs, coping, risers, urinal partitions, kitchen / wash

basin platforms, vanity counters, fascias and other similar locations etc. shall have edge polished calibrated thickness i.e., exposed edges shall have edge polished uniform thickness throughout the length of the work.

The flooring work shall be carried out as per the architectural drawings in design and pattern (geometric, abstract etc.) and in linear and / or curvilinear portions and in combination with stones of different colour and shade and ceramic tiles etc. For the flooring portions curved in plan, the stone slabs (at the edge) shall be cut to the required profile and shape as per the architectural drawings. Nothing extra shall be payable on this account and any consequent wastages and incidental charges on such accounts shall be deemed to be included in the cost.

The granite slabs used for providing and fixing in the sills, soffits and jambs of doors, windows, ventilators and similar locations shall be in single piece unless otherwise directed by the Engineer- in-Charge. Wherever stone slab other than in single piece is allowed to be fixed, the joints shall be provided as per the architectural drawings and as per the directions of the Engineer-in-Charge. In the cabin areas, the joints in sills shall preferably be provided in line with the partition wall. Depending on the number of joints, as far as possible, the stone slabs shall be procured and fixed in slabs of equal lengths as per the architectural drawings and as directed by Engineer-in-Charge.

The specifications for dressing, laying, curing, finishing etc. for the granite stone flooring shall be same as that of works for the Marble flooring, skirting and risers of steps under Flooring Sub Head of the CPWD Specifications. The wall lining / veneer work with granite stone shall be as per the CPWD Specifications for Marble work Sub Head.

All the tiles (flooring/wall lining/Skirting/dado) shall be fixed with quick set tile adhesive (of make pidilite, ardex endure, weber) of minimum thickness of 6 mm. Also joints of flooring tiles having 3 mm width shall be grouted using epoxy grout (of pidilite, ardex endure, weber) mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg).

Wet stone/granite wall cladding (in interior) shall be fixed in average 20 mm thick cement mortar in 1:3 (1 cement: 3 coarse sand), shear key of stone chips fixed with epoxy, with copper pins 7.5 cm long, 6 mm diameter, for securing adjacent stones in stone wall lining.

Unless specified otherwise, all stone/granite/marble in flooring shall be laid on 20 mm (average) thick base of cement mortar 1:4 (1 cement: 4 coarse sand) and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade.

Unless otherwise specified, all stone/granite/marble in skirting/wall lining/dado shall be fixed on 20 mm (average) thick base of cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade.

For flooring work, the joints between the different types of flooring shall be located as per the architectural drawings. Also, the SI shall maintain the uniform level of the finished flooring of the different types unless specifically mentioned on the architectural drawings.

All the flooring works specified under this sub-head shall be adequately protected by a layer of plaster of Paris which shall be laid over a 400-micron PVC film. The protective layer shall be maintained throughout the execution of works and removed just before handing over of the site.

One piece Granite stone for treads / risers in staircase shall be used including

rounding of nose.

POP protection layer shall be laid on all finished floors for protection from damage during execution of other items of work in that area which shall be removed and cleaned just before handing over of the premises.

For the skirting in the enclosures with curvilinear profiles, the (Stones/Marble/Tiles/Cladding etc.) shall be cut to the required size and the shape to match the profile and/ or the joints as per the architectural drawings.

Similarly, the skirting shall be fixed in a manner as to flush or project from the finished face of the wall as per the architectural drawings and as directed by the Engineer –in– Charge. Any chasing of the masonry works required for such fixing is deemed to be included in the cost of masonry.

Granite stone tiles and slabs shall be pre polished (mirror polished), eggshell polished, flame finished or given any other surface treatment as specified in finishing schedule or architectural drawings and as directed by the Engineer-in-Charge.

Machine polishing and cutting to required size shall be done with water (as lubricant) only. Sawing shall also be done preferably with water as lubricant but as a special case, the Engineer-in-Charge may permit, at his discretion, oil or kerosene as lubricant subject to all kerosene or oil in the body and surface of tiles / slabs being thoroughly dried in ovens. Tiles / slabs with stains or patches due to the use of oil or otherwise, either before or after installation, shall be rejected and shall be replaced by the SI at his own cost.

The exposed cut edges of the granite slab in risers and treads along its width (sides of the risers and treads of the steps i.e., along the shorter dimensions of the granite slab for the risers and treads) shall be polished in a workmanlike manner. The top exposed edge of the granite slab skirting shall also be polished in a workmanlike manner. Nosing / edge molding shall be provided to the front edge of the Granite slab treads along its length i.e., along the longer dimensions of the granite slab, as per the architectural drawings.

Tactile tile such as directional, warning or hazardous (for vision impaired persons as per standards) shall be of size 300x300x15 mm {10 mm base + (5mm ± 0.5mm) thick raised portion} having water absorption less than 0.5% and conforming to IS: 15622 of approved make in all colours (preferably yellow) and shades for indoor floors, should be laid on 20mm thick base of cement mortar 1:4 (1cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. as per harmonized guidelines and space standards for barrier free built environments for persons with disability and elderly persons issued by Ministry of Urban Development, Govt. of India.

50 mm wide Yellow colour, self-adhesive 'EDGE STRIPS' of approved make shall be provided on risers of staircase to help persons with visual disabilities and elderly. 25 mm wide high intensity Anti-Skid reflective tape of approved make on edges of treads of staircase shall be provided.

Vinyl flooring shall be having thickness of 2mm (minimum) as per EN 428, weight less than 2900 gms/sqm as per EN 430, Fire rating class Bfl-s1 as per EN 13 501-1 , Static electrical propensity < 2 kV as per EN 1815, Slip resistance wet : ramp test with oil (1) of class R10 as per DIN 51 130, Wear resistance of ≤2.0 as per EN 660.2, wear group 'T' as per NF189, binder content of type I as per ISO10582, dimensional stability of ≤0.4 as per EN434, Indentation ~0.03 (< 0.10) mm as per standard ISO 24343 – 1, impact sound insulation of 8 dB as

per EN ISO 712-2, thermal conductivity of 0.25 W/m.K as per EN 12524, color fastness rating of ≥ 6 degree as per EN20105-B02, Product should confirm to Floor Score® Indoor Air Quality Certified ($\leq 10\mu\text{g} / \text{m}^3$ as per ISO 16000-6), performance (ok) in castor chair test (type W) as per ISO 4918 (EN 425), anti-bacterial activity ($> 99\%$ inhibits growth as per ISO 22196). The thickness of wear layer would be 2mm. The product should be homogeneous and single layered. The product shall be classified as class 34-42 as per EN 685. Installation- It is important to ensure the subfloor on which the sheet is being laid is smooth, flat, hard and free from moisture, grease etc. In case of uneven subfloor, the same should be levelled using self-levelling compound. IPS Vitrified/ceramic/ mosaic tiles do not provide zero levelled sub floors. The moisture present in the subfloor should be less than 8% before installation of the floor. The vinyl flooring sheet should be installed with coving profile & adhesive recommended by Vinyl Flooring manufacturer. The floor finish should terminate at the room perimeter passing over a concealed coving profile and continuing up to the wall for 100mm and connected to copper strip for grounding; copper grounding strips (0.05mm thick, 50 mm width) should be laid on floor underneath conductive vinyl flooring roll. The joints in the flooring should be sealed by using a PVC welding rod of matching colour to be supplied by the manufacturer, using a hot air gun for fusion of welding rod with flooring for seamless installation.

Static-conductive Flexible Vinyl floor (non-directional homogeneous) covering shall be having thickness of 2 mm (minimum) as per EN 428, Weight ≤ 3100 gms/sqm as per EN 430, electrical resistance of $10^4 \leq R_t \leq 10^6$ Fire rating class Bfl-s1 as per EN 13 501-1, Static electrical propensity < 2 kV as per EN 1815 , Slip resistance wet : ramp test with oil (1) of class R10 as per DIN 51 130, Wear resistance of ≤ 2.0 as per EN 660.2, wear group 'P' as per NF189, binder content of type-I as per ISO10582, dimensional stability of ≤ 0.4 as per EN434, Indentation ~ 0.03 (< 0.10) mm as per standard ISO 24343 – 1, thermal conductivity of 0.25 W/m.K as per EN 12524, colour fastness rating of ≥ 6 degree as per EN 20105-B02, Product should confirm to Floor Score® Indoor Air Quality Certified ($\leq 10 \mu\text{g} / \text{m}^3$ as per ISO 16000-6), performance (ok) in castor chair test (type W) as per ISO 4918 (EN 425), antibacterial activity ($> 99\%$ inhibits growth as per ISO 22196). The product shall be classified as class 34-43 as per EN 685. Installation- It is important to ensure the subfloor on which the sheet is being laid is smooth, flat, hard, and free from moisture, grease etc. In case of uneven subfloor, the same should be levelled using self-levelling compound. IPS Vitrified/ceramic/ mosaic tiles do not provide zero levelled sub floor. The moisture present in the subfloor should be less than 8% before installation of the floor. The vinyl flooring sheet should be installed with coving profile & adhesive recommended by Vinyl Flooring manufacturer. The floor finish should terminate at the room perimeter passing over a concealed coving profile and continuing up to the wall for 100mm and connected to copper strip for grounding; copper grounding strips (0.05mm thick, 50 mm width) should be laid on floor underneath conductive vinyl flooring roll. The joints in the flooring should be sealed by using a PVC welding rod of matching colour to be supplied by the manufacturer, using a hot air gun for fusion of welding rod with flooring for seamless installation.

Homogeneous vinyl wall covering shall be in 1 mm thickness (minimum), weight less than 2000 gms/sqm as per EN 430, Fire rating class Bs2-d0 as per EN 13 501-1, binder content of type -I as per ISO 10582, dimensional stability of ≤ 0.4 as per EN 434, colour fastness rating of ≥ 6 degree as per EN20105- B02, Product should confirm to Floor Score® Indoor Air Quality Certified ($\leq 10\mu\text{g} / \text{m}^3$ as per ISO 16000-6), anti-bacterial activity ($> 99\%$ inhibits growth as per ISO 22196).

The product should be homogeneous and single layered. The product shall have excellent chemical resistance as per EN 423. Installation - Installation of Vinyl Wall Covering 1.00mm thick over smooth wall surface including fixing with adhesive complete as per drawing & as directed by Engineer-in-charge. It is important to ensure the Wall on which the sheet is being pasted is smooth, flat, hard and free from moisture, grease etc.

Wooden Flooring: It shall consist of 15mm thick Engineered Wooden Flooring with plank width of 185mm / 135mm and length of 1800mm / 2100mm and top layer up to 3mm Oak natural Veneer. Surface of Top layer is prefinished with several layer of UV hardened acrylic lacquer, free from Formaldehyde and solvents. Flooring plank shall be interlocked using Plank Loc locking system in a glue less floating manner. Engineered wood planks shall be a composition of 3 layer of Pine wood with direction of each layer oriented at right angle to the adjacent layer of natural strain in Lacquer and Non-Bevelled /Bevelled in length and width as specified by the Engineer-in-charge. Manufacturing Plant / Product should have FSC certificate and adhere to stringent emission standards.

At the time of handing over, flooring & dado / cladding shall be free of any scratches, stains etc. The flooring & dado / cladding shall be properly cleaned before handing over. However, abrasive cleaners shall not be used to clean the marks and other scratches.

9.11 Roofing Work:

All roofing work in general shall be carried out as per CPWD Specifications 2019, Volume-I & II with revisions/ amendments / correction slips up to last date of bid submission (including extensions if any). Schedule of finishes mentioned in tender documents shall be followed in case of deviation/different detailing is shown in Drawings. Before taking up any procurement/construction activity, shop drawings shall be prepared and submitted for obtaining approval from Engineer-in- Charge.

i) Metal False Ceiling Tile:

It shall be torsion spring tile ceiling system comprising of non-perforated Tile of 600mm wide and 1200mm long manufactured out of minimum 50-micron thick Powder coated Aluminium having and 20 % perforation area with 1.8 mm diameter holes and having NRC greater than 0.5, electro statically polyester powder coated of thickness 60 micron (minimum), including factory painted after bending and perforation, and backed with a black glass fibre acoustical fleece. The metal ceiling panels shall be downward accessible with a minimum of four (4) torsion springs which is made up of SS with 2.5mm diameter. The Tile will be manufactured on advanced CAD/CAM equipment that includes several levelling stages in the manufacturing process. Torsion Spring panel shall consist of two side legs die formed and two end legs die formed and punched to receive torsion springs (min two springs each end or side) for secure engagement into Tee Grid main runners which are factory punched to receive torsion springs. Tiles will be square edged. The Tile shall be Polyester powder coated with anti-bacterial coating in white colour. Panel will be pretreated in latest Nano-technology process and electro statically powder coated with automatic corona system and cured with gas catalytic technology. All ceiling shall be Green pro Certified: For LEED certification by Indian Green Building council (IGBC). Ceiling manufacturer should have in-house testing lab and powder coating line (with Nanotechnology & Catalytic Converter) in India. Main Runners shall be of 24mm wide, 38mm deep of 0.35mm thick inverted "Tee" sections of 3000mm long, with factory punched flanges to receive torsion spring assembly. Spacing of main

Tee shall match panel length. Cross Runners shall be of 24mm wide, 32mm deep of 0.30mm thick cross runner sections of 1200mm long, inverted "Tee" sections designed to interlock in to web of main tee section on designated spacing. Cross tee length to match panel length. Cross tees are spaced at 1200mm cc. Suspension System shall hang through anchor fastener with the help of 6mm threaded rod of 1200mm will be suspended from true ceiling / sub structure. T-Grid holding bracket of width 15mm, length 60mm and height 25mm of 2mm thickness is fixed to threaded rod and then main-T is fastened to bracket. T - Grid holding bracket is acting as a levelling system.

ii) Rain Water Pipes:

All the RWP pipes shall be PVC Pipes (including with required fittings and clamps) exposed on walls / in the shafts to be executed as per CPWD specification 2019. M.S. holder-bat clamps of approved design to maintain a minimum gap of 75mm from finished vertical outside wall face.

9.12 Finishing Work:

All internal AAC walls shall be finished with 12 mm (1:6) thick cement plaster applied on hacked / uneven background such as bare brick/ block/ RCC work on walls & ceiling at all floors and locations, finished in smooth line and level etc. complete.

All brick walls shall be finished with 12mm (1:6) thick cement plaster and 15mm (1:6) cement plaster on rough side. The SI is free to use ready-mix plaster of approved make in place of cement plaster and nothing extra shall be paid on this account. No plastering to be done at Ceiling.

All junctions of concrete and masonry work and other locations shall be provided with approved galvanized chicken wire mesh (24-gauge 12 mm sizes) fixing in position with galvanized wire nails as per specifications or providing grooves of required size at the junctions, all complete as per directed by Engineer-in-charge.

Necessary drip course shall be provided in Chajja, Balcony, Projecting Roof, Beams etc.

All the internal surfaces including exposed ceiling (non-false ceiling areas) shall be finished with 1 mm thick cement-based wall putty, one coat of cement primer and two or more coats of paints specified in finishing schedule.

Application of paints shall be done with mechanical equipment's. Mechanical sanding machine (for scrubbing & preparation of surface) shall be used by the SI.

In case of painting over old work / new work, the SI shall give proper notice to the Engineer-in-charge after the surface is prepared & before applying of primer coat / paint. The Engineer-in-charge shall either approve the surface thus prepared or ask the SI to rectify the defects pointed. Only after approval by Engineer-in-charge, the priming / painting coat shall be applied.

Anti-Bacterial Paint: Low VOC, highly washable, water based, abrasion resistant (over 4000 cycles) sanitizing and anti-bacterial coating Ultra satin (D-11205) shall be applied as per finishing schedule to all kind of surface and enhancing protection against bacteria for Hygienic environment and conforming to JIS Z 2801:2100 test Protocols for Anti- Bacterial Coatings test. The material should be reactive curing acrylic resin water-based coating. One coat of water based acrylic primer shall be applied before application of two coats of water based anti-bacterial coating. (Approved make: OIKOS/Liquid Plastic/Construction

Specialty).

All the steel work shall be applied two or more coats of synthetic enamel paint over a coat of suitable primer of approved brand and manufacture with ready mixed red oxide zinc chromatic on steel / iron works having VOC content less than 250grams/litre.

Water repellent coat: 2 to 3 coats of Silicone based water repellent, anti-algal paint of approved shade, complete as per manufacturer's specifications, shall be applied on stone cladding.

Other important notes on finishes:

- Tactile bands shall be made on top of granite flooring all as per universal access guidelines.
- All joints in granite/tiles/stone/marble etc. shall be filled with epoxy grout as approved by Engineer-In-Charge
- Skirting shall be flushed with dado.
- All hand hygiene stations should have hands free operations with splash guard on wall and sides if so required.
- Wherever vinyl is used cove formers should be used
- All exposed structural steel members shall be covered with adequate vermiculite cementitious cladding to ensure 3-hour fire protection.
- All AHU doors and openings shall be acoustically, and fire treated.
- Counter in toilets shall be polished, bevelled and edge molded 18 mm thick granite of approved shade.
- Waiting lobby/reception custom design counter to be made out of 12 mm thick solid acrylic sheet (Dupont Corian). Fixed furniture design to be made from inside with space provision for nursing needs, computer etc.

9.13 Road Work:

All roads will be cement concrete roads (as per drawings), as per MORTH specifications (fifth edition), laid over sub grade duly prepared with power roller of required thickness as per design. Irrespective of whether shown in drawings or mentioned in tender document, all the drainage, signage's (Informative, Mandatory, Regulatory etc.) other works associated with road works shall be provided as per relevant standards and specification MORTH Specifications for Road and bridge work (Fifth Revision). The edges of roads should be at least 20 cm above the adjoining ground level. The work shall be carried out using MORTH Specifications for Road and bridge work (Fifth Revision).

As far as possible cross drainage should be taken under the road and at right angle to it. NP-3 pipes of diameter not less than 300 mm and as per design requirement shall provide at an interval of not more than 60 meters with a longitudinal slope as per design slope. At the head of cross drain catch pits of adequate size to collect stones, soil and rubbish and to prevent scour has to be provided. The floor of the catch pit should be deeper than the sill of pipe culvert by at least 0.3meter.

Control of seepage flow below road: whenever seepage flow is expected /likely to exists, or seepage zone is at depth less than 0.9 m from sub grade level, longitudinal perforated pipe drains of adequate diameter of PVC in trench filled with filtered material and geo textile shall be constructed to intercept the seepage flow. Necessary arrangement to collect the water from perforated pipe drain and diverting by using pipes of PVC/RCC NP-3 of adequate diameter shall be made.

Sub grade: It shall be prepared and consolidated with power road roller of 8-to-12-ton capacity after excavating earth to an average of 22.5 cm depth, dressing to camber and consolidating with road roller including making well the undulations etc. and re-rolling the sub grade and disposal of surplus earth.

Granular Sub-Base: Construction of granular sub-base shall be, by providing close graded Material conforming to specifications, mixing in a mechanical mix plant at OMC, carriage of mixed material by tippers to work site, for all leads & lifts, spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge. With material conforming to Grade-I (size range 75 mm to 0.075 mm) having CBRValue-30.

Wet Mix Macadam: It shall consists providing, laying, spreading and compacting graded stone aggregate (size range 53 mm to 0.075 mm) to wet mix macadam (WMM) specification including premixing the material with water at OMC in mechanical mix plant, carriage of mixed material by tipper to site, for all leads & lifts, laying in uniform layers with mechanical paver finisher in sub- base / base course on well prepared surface and compacting with vibratory roller of 8 to 10 ton capacity to achieve the desired density.

Cement Concrete Pavement: Vacuum dewatered design mix cement concrete of M-30 grade shall be laid as per drawings, in roads/ taxi tracks/ runways, using coarse sand and graded stone aggregate of 40 mm nominal size in appropriate proportions as per approved & specified design criteria, providing dowel bars with sleeve/ tie bars wherever required, laying at site, spreading and compacting mechanically by using needle and surface vibrators, levelling to required slope/ camber, finishing with required texture, including steel form work with sturdy M.S. channel sections, curing, making provision for contraction/ expansion, construction & longitudinal joints (10 mm wide x 50 mm deep) by groove cutting machine, providing and filling joints with approved joint filler and sealants.

Factory made kerb stone: It shall be of M-30 grade cement (made by using ingredients from C & D waste) shall be provided at or near ground level in position to the required line, level and curvature jointed with cement mortar 1:3 (1cement: 3 coarse sand) as per drawings including making joints with or without grooves (thickness of joints except at Sharpe curve shall not to more than 5mm) including making drainage opening wherever required complete etc.

Cement Concrete (M30 grade) tactile tile: Such as directional, warning or hazardous (for vision impaired persons as per standards) of size 300x300x60 mm {60 mm base

+ (5mm $\pm$ 0.5mm) thick raised portion} having water absorption $\leq$ 6% and conforming to IS: 13801 of approved make in all colours (preferably yellow) and shades for footpath should be laid on 20mm thick base of cement mortar 1:4 (1cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. (The thickness of wearing layer should not be less than 8mm) and as per harmonized guidelines and space standards for barrier free built environments for persons with disability and elderly persons issued by Ministry of Urban Development, Govt. of India. Coloured, preferably yellow PU - Tactile Studs Warning/Positional) with 1 stem having stem diameter of 6.0 mm & stem length between 20 - 25 mm, as ground surface indicators shall be provided for the visually impaired persons, on the pedestrian pathway as per manufacturers design / specification and as per harmonised guidelines.

Coloured, preferably yellow PU - Tactile strips (Guiding) with 3 stems having

stem dia of 6.0 mm & stem length between 20 - 25 mm, as ground surface indicators shall be provided for the visually impaired persons on the pedestrian pathway as per manufacturers design / specification and as per harmonized guidelines.

Paver Block: It shall be 80mm thick factory-made cement concrete paver block of approved shape and colour of M -30 grade with vibratory compaction laid in required pattern and including over 50mm thick compacted bed of coarse sand, filling the joints with fine sand etc.

RCC Perforated Drain Covers: Factory made precast RCC perforated, or non-perforated drain covers having concrete of strength not less than M-30, of required sizes for road side drains/underground utility shaft or duct shall be provided. These should be properly reinforced to carry the desired load.

Drain Cell shall be of 20mm thickness (Weight Over 2Kg/sqmt) consisting of High strength Polypropylene module having size of 500mm x 250mm and 20mm height with interlocking tabs. The Drain Cell to have compressive strength of over 120 tons/sqm and weight of more than 2kg/sqm. Drain Cell to be laid by interlocking individual modules thereby covering the entire area. Drain Cell to be covered with Geotextile 150 GSM with 200mm overlap before laying planting soil. Laying to be done as per manufacturer instructions.

Grass Track Grass Pavers: It shall be green honeycomb panels with self-anchoring pegs, made of high impact resistant HDPE. Each grass paver should be of 330mm x 330 mm and 35 mm in height consisting of four floral shaped structure of 125mm open cell and nine round cells opening of 45 mm dia. Each of the open cells is connected with a web like structure for strength and stability. Base of the panel is equipped with a slot opening for drainage and four round struts for anchoring purpose. The Grass Paver to have interlock system to lock each other. The Grass Paver should have compressive strength of minimum 150 tons/sqmt, capable to take the load of the fire tender. The panel should have high level of porosity greater than 90%, porous for Grass, shrubs and low planters. Laying to be done on 50 mm sand bed over well compacted sub base/WBM as per manufacturer specifications.

Road Surface marking: it shall be done with two or more coats to give uniform finish with ready mixed road marking paint conforming to IS: 164, on white/yellow shade, including cleaning the surface of all dirt, scales, oil, grease and foreign material etc.

Retro Reflective Overhead Signage Boards: It shall consist manufacturing, supplying and fixing made up of 2 mm thick aluminium sheet, face to be fully covered with high intensity and encapsulated lens type heat activated retro reflective sheeting conforming to type - III of ASTM-D- 4956-01 as approved by Engineer-in-charge, letters, borders etc. as per IRC : 67-2001 in silver white with blue colour back ground and with high intensity grade, pasted on substrate by pressure sensitive adhesive backing which shall be activated by applying pressure conforming to class II of ASTM-D-4956-01 and fixing the same to the plate of structural frame work by means of suitable sized aluminium alloys, rivets or bolts & nuts @ 300 mm centre to centre all along the periphery as well as in two vertical rows along with theft resistant measures, including the cost of painting with two or more coats of epoxy paint in grey colour on the back side of aluminium sheet including appropriate priming coat. The process includes rounding off the corners, lowering down the structural framework from the gantry, fixing and erecting the same in position all complete as per drawings, specification.

9.14 Sanitary Installations and Water Supply:

1. General:

- i) All the work in general shall be carried out as per CPWD Specifications 2019, Volume-I & II with revisions/ amendments / correction slips up to last date of submission of bid. The work shall be in conformity with the Byelaws, Regulations and Standards of the local authorities concerned. The SI shall be responsible for the protection of the sanitary and water supply fittings, other fittings and fixtures against pilferage and breakage during the period of installation and thereafter until the building is handed over. The Plumbing / Sanitary System shall comprise of following:
 - a) Sanitary pipes, fittings, and fixtures.
 - b) Internal and external water supply.
 - c) Internal and external drainage.
 - d) Approval from local authorities, if any.
 - e) Balancing, testing & commissioning.
 - f) Test reports and completion drawings.
- ii) The provision of floor trap, floor drain, gully trap, manhole, valves etc. as specified in the tendered drawings and bid document are the minimum quantity. SI has to provide in the building(s) and campus, adequate quantity of these items for effective operation of services.
- iii) All concealed work shall include cutting chases and making good the walls etc.
- iv) All pipes shall be fixed with clamps at maximum 1.00 m spacing.

2. Internal water supply line-

- i) Fittings e.g., Pillar cocks, angle cocks, two-way bib cocks with health faucet, long body bib cocks, wall mixture, overhead shower, towel rod of 600mm, corner glass shelf along with other miscellaneous fittings like bottle trap, floor trap, waste couplings, liquid soap dispenser, toilet paper holder etc. shall be provided as per approved make and model and as per the direction of Engineer-in-Charge. The above are indicative only and the SI has to provide all fixtures and fittings for functional suitability.
- ii) **Terrace Tank-** RCC water storage tank for Service tank, Fire Fighting, Treated Water shall be provided of minimum 60000 liters capacity with suitable water proofing treatment with all the accessories e.g., float valve, scour valve, CI cover with locking arrangement etc. complete. The inlet of service tank shall be connected from this firefighting tank in such a way that the overflow firefighting shall flow to the service tank (this means firefighting storage tank remains always full). The system should be conducive to Hydro Pneumatic system to be provided for all buildings.
- iii) **Underground water storage tank** of minimum 2 days of daily water demand for facility shall be provided. Therefore, the capacity of UGT shall be minimum 400000 liters for Fire water tank and raw water tank.

Buildings shall be through gravity from overhead water tank. All Flushing OH Tanks shall be connected to Domestic Supply Line Trough Valve & NRV to fill the tanks during failure of STP or Other emergency situation.

3. Materials for Water Supply System:

- i) Internal Toilets for cold and hot water supply - Stainless steel 304 grade pipe and fittings.

- ii) Pipe under vertical in shaft and terrace for cold and hot water supply - Stainless steel 304 grade pipe and fittings.
- iii) SI shall provide adequate number of unions on all pipes to enable easy dismantling later when required. Unions shall be provided near each gunmetal valve, stop cock, or check valve and on straight runs as necessary at appropriate locations as required and/or directed by Engineer in charge. Flanged connections shall be provided on pipes as required or were shown on the drawings, all equipment connections as necessary and required or as directed by Connections shall be made by the correct number and size of GI nuts, bolts & washers with 3 mm thick gasket. Where hot water or steam connections are made insertion gasket shall be of suitable high temperature grade and quality approved by Bolt hole diameter for flanges shall conform to match the specification for C.I. sluice valve to I.S.780 and C.I. butterfly valve to IS: 13095
- iv) Valves up to 40 mm diameter shall be of screwed type Ball Valves with stainless steel balls, spindle, Teflon seating and gland packing tested to a hydraulic pressure of 20 kg/cm² and accompanying couplings and steel handles conforming to BS 5351. Valves 50 mm diameter and above shall be cast iron butterfly valve to be used for isolation. The valves shall be bubble tight, resilient seated suitable for flow in either direction and seal in both direction with accompanying flanges and steel handle. Butterfly valve shall be of best quality conforming to IS: 13095. Wherever specified non return valve (dual type check valve) shall be provided through which flow can occur in one direction only. It shall be single door swing check type of best quality. Each Butterfly and dual plate Check (NRV) Valve shall be provided with a pair of flanges screwed or welded to the main line and having the required number of galvanized nuts, bolts and washers of correct length.

4. Internal Sanitary Installation:

- i) **Soil, Waste, Vent & Rainwater Pipes & Fittings:** Two pipe system as recommended in code of practice for soil and waste pipes as per (IS: 5329). Separate vertical stacks for Soil pipes (to carry the wastes from WC's & urinals) and Waste pipes (to carry the wastes from waste appliances e.g., showers, lavatory basins, kitchen sinks etc.) shall be provided.
- ii) The soil, waste, vent pipes system shall include Horizontal soil, waste and vent pipes, and all fittings, joints, clamps, connections to fixtures, Floor, and urinal traps, cleanout plugs, inlet fittings, UPVC Rainwater Pipes, Testing of all pipelines.
- iii) **Materials for Soil, Waste, Vent and Rainwater Pipe System:** Pipes used for Soil, Waste and Vent system **shall be push fit uPVC pipe system.**
- iv) **Traps:** As per push fit uPVC pipe system.
- v) **Cleanout plugs:** Clean out plug for Soil, Waste or Rainwater pipes laid under floors shall be provided near pipe junctions bends, tees, "Ys" and on straight runs at such intervals as required as per site conditions. Cleanout plugs shall terminate flush with the floor levels. They shall be threaded and provided with key holes for opening.

5. Sanitary Fittings and Fixtures:

All Sanitary Ware & C.P Brass Fittings shall be low flow rate fixtures to confirm the GRIHA-4 Standards. **All CP brass fittings should be quarter turn with Ceramic disc.** Water closets with concealed dual flushing cistern shall be provided. Wash basin shall be countertop. Single lever basin mixer shall be provided with all wash basins. Urinal shall be provided with automatic sensor

based flushing system.

SI shall furnish without cost all such accessories and fixing devices that are necessary and required but not supplied along with the Plumbing Fixtures & CP Fittings by the manufacturers as a part of the original and standard supply. All fittings and fixtures shall be fixed in anent workmanlike manner true to level and heights shown on the drawings and in accordance with the manufacturer's recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions. Faulty locations shall be made good and any damage to the finished floor, tiling or terrace shall be made good at SI's cost. Fixing screws shall be half round head chromium plated brass screws with C.P. washers where necessary. SI shall seal all fixtures fixed near wall, marble, and edges. With an approved type of poly-sulphide sealant appropriate for its application.

Piping and drainage works shall be tested as specified under the relevant clauses of the specifications. Tests shall be performed in presence of the Engineer in charge. **Entire drainage system shall be tested for water tightness and smoke tightness during and after completion of the installation. No portion of the system shall remain untested.** SI must have adequate number of expandable rubber bellow plugs, manometers, smoke testing machines, pipe and fitting work test benches and any other equipment necessary and required to conduct the tests. All materials and equipment found defective shall be replaced at SI cost and whole work shall be tested to meet the requirements of the specifications. SI shall perform all such tests as may be necessary and required by the local authorities to meet municipal or other byelaws in force. All water supply system shall be tested to hydrostatic pressure test of at least one and a half (1.5) times the maximum pressure but not less than 10Kg/Sq.cm for a period of not less than 8 hours. All leaks and defects in joints revealed during the testing shall be rectified and got approved at site by retest. Piping required subsequent to the above pressure test shall be retested in the same manner. System may be tested in sections and such sections shall be entirely retested on completion. In addition to the sectional testing carried out during the construction, SI shall test the entire installation after connections to the overhead tanks or pumping system or mains. He shall rectify all leakages and shall replace all defective materials in the system. Any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the SI during the defect's liability period without any cost. After commissioning of the water supply system, SI shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above.

6. Jointing & fixing:

- i) All pipes shall be tested after installation for a pressure equal to twice the maximum working pressure in the line as per manufacturer's specifications.
- ii) Fittings shall conform to the same Indian Standard as for pipes. Pipes and fittings must be of matching IS Specification. Interchange of pipes of one standard with fittings on the other standard will not be permitted. Fittings shall be of the required degree of curvature with or without access door. Access door shall be made up with 3 mm thick insertion rubber washer and white lead. The bolts shall be lubricated with grease or white lead for easy removal later. The fixing shall be air and water tight. All vertical pipes shall be fixed by Galvanised clamps and galvanised angle brackets. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on

vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard). Horizontal pipes running along ceiling shall be fixed on galvanised structural adjustable clamps of special design shown on the drawings or as directed by engineer-in-charge. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully rest on them.

- iii) All pipe clamps, supports and hangers shall be galvanised. Factory made Pre-fabricated clamps shall be preferred. Contactor may fabricate the clamps of special nature and galvanise them after fabrication but before installation. All nuts, bolts, washers and other fasteners shall be factory galvanised. Clamps shall be of approved designs and fabricated from GI flats (which shall be galvanised after fabrication) of thickness and sizes as per drawings or SI's shop drawings. Clamps shall be fixed in accordance with manufacturer's details/shop drawings to be submitted by the SIs. When required to be fixed on RCC columns, walls or beam they shall be fixed with approved type of galvanised expansion anchor fasteners (Dash fasteners) of approved design and size according to load. Structural clamps e.g., trapeze or cluster hangers shall be fabricated by electro-welding from M.S. Structural members e.g., rods, angles, channels flats as per SIs shop drawing shall be galvanised after fabrication. All nuts, bolts and washers shall be galvanised. Galvanised slotted angle/channel supports on walls shall be provided wherever shown on drawings. Angles/channels shall be of sizes shown on drawings or specified in scope of work. Angles/channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with anchor fasteners mentioned above. The spacing of support bolts on support members fixed horizontally shall not exceed 1 m.

9.15 Aluminium Work:

- i) Before taking up any procurement/construction activity, shop drawings (for fixing of all kinds of Aluminium Works, showing all hard wares) shall be prepared and submitted for obtaining approval from Engineer-in-Charge.
- ii) Minimum weight of aluminium section for door, windows and ventilators shall be as per relevant standards.
- iii) Kiln seasoned hard wood shall be filled inside door frames on hinged side and top of frames wherever hydraulic door closers are to be provided.
- iv) Frames shall be fixed with dash fastener of minimum size 10 x 100 mm as per approved shop drawings.
- v) Gap between aluminium frame / uPVC window and adjacent RCC / masonry work shall be filled by providing weather silicon sealant over backer rod of approved quality as per direction of Engineer-in-Charge.
- vi) The material for the work shall be procured from the approved manufacturer as per preferred make list for materials in this contract agreement. The SI shall procure and submit samples of various materials to be used in the work for the approval of Engineer-in-Charge and no work shall commence before such samples are approved. Samples of un-anodized as well as polyester powder coated aluminium sections, microwave cured EPDM gaskets, glass, stainless steel screws, anchor fasteners, hardware and any other material or components requiring approval of samples, in opinion of Engineer-in-Charge, shall be submitted for the approval as mentioned above. The above samples shall be retained as standards of materials and workmanship.

- vii) Aluminium sections to be used for various works shall be appropriate to meet technical, structural, functional, and aesthetic considerations. Aluminium work for doors, windows, ventilators and partitions etc. shall be with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixing with dash fasteners of required dia. and size, including necessary filling up the gaps at junctions, i.e., at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / paneling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. Polyester powder coated aluminium (minimum thickness of polyester powder coating 50 micron) section shall be used. Hinges/ pivots, provision for fixing of fittings, EPDM rubber / neoprene gasket shall be provided wherever required. The polyester powder coating shall be carried out in a factory / workshop approved by Engineer-in-charge.
- viii) **Glass in Windows/Ventilators:** Glazing in aluminium windows, ventilators and partition etc. shall be Double glazed hermetically sealed with 6 mm thick toughened glass both sides, having 12 mm air gap, including providing EPDM gasket, perforated aluminium spacers, desiccants, sealant (Both primary and secondary sealant) etc. as per specifications, drawings and direction of Engineer in-charge complete. The DGU unit shall have visible Light transmittance (VLT) of minimum 65%, Light reflection internal - less than or equal to 23%, Light reflection external - less than or equal to 23 %, SHGC- less than or equal to 0.6 and U value - less than or equal to 2.5 W/m² degree K.
- ix) **Frameless glass partition and doors:** Frameless glass partition and doors shall be made out of 12 mm thick (minimum) toughened glass of approved brand and manufacture, including providing and fixing top & bottom pivot & double action hydraulic floor spring, fixing arrangement and making necessary holes etc. for fixing required fittings, all complete as per direction of Engineer-in-charge.
- x) **Hydraulic floor spring:** It shall be double action hydraulic floor spring (of approved make by the Engineer in Charge) conforming to IS: 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight up to 125 kg, for doors, cover plates with brass pivot and single piece M.S. sheet outer box with slide plate etc.
- xi) **Mortice Latch & lock:** It shall be of Brass 100 mm mortice latch and lock with 6 levers without pair of handles (best make of approved quality) for aluminium doors.
- xii) **Fabrication:** The factory for fabrication and coating of aluminium windows/doors/frameworks shall be got approved from Engineer-charge. The fabrication unit should have experience of having done similar work of similar cost in 7 years prior to date of submission of proposal by SI.
- xiii) All joints shall be accurately fabricated and be hairline in appearance. The finished surface shall be free from visible defects. All the aluminium windows/ventilators/doors shall be factory made and shall be brought to site for assembly and fixing.
- xiv) All hardware used shall conform to the relevant specifications mentioned in door window hardware schedule and as per samples approved by the Engineer-in-Charge. Design, quality, type, number and fixing of hardware shall be generally in accordance with shop drawings and as approved by the Engineer-in-Charge before use.

- xv) All doors, windows, ventilators and glazing etc. shall be made watertight with microwave cured EPDM gaskets and weather silicone sealants to the satisfaction of the Engineer-in- Charge.
- xvi) The frames shall be strictly as per architectural drawings, the corners of the frame being fabricated to the true right angles. Both the fixed frames and open able shutter frames shall be fabricated out of sections cut to required length, mitered and mechanically jointed for satisfactory performance. All members shall be accurately machine milled and fitted to form hairline joints. The jointing accessories such as aluminium cleats, stainless steel screws etc. shall not to cause any bi-metallic reaction by providing separators, wherever required. Vertical members of the aluminium framework shall be embedded in the floors, wherever required, by cutting and making good of the floor.

1. Fixing of Aluminium Framework

- i) The screws used for fixing fixed aluminium frames of the aluminium windows to masonry walls / RCC members and aluminium members to other aluminium members shall be of stainless steel of approved make and quality and of stainless-steel grade 304. Threads of machine screws used shall conform to requirement of I.S.4218.
- ii) For the aluminium windows, the gap between the aluminium frames and the R.C.C/ Masonry and also any gaps in the various sections shall be filled with weather silicone sealant DC 795 of Dow Corning or equivalent in the required bite size, to ensure water tightness including providing and fixing backer rod, wherever required. The weather silicone sealant shall be of such approved colour and composition that it would not stain or streak the masonry / R.C.C. work. It should not sag or flow and shall not set hard or dry out under any conditions of weather and shall be tooled properly. The weather silicone sealant shall be used as per the manufacturer's specifications and shall be of approved colour and shade. Any excess sealant shall be removed /cleared.
- iii) Fixing of glass panes shall be designed in such a way that replacing damaged / broken glass panes is easily possible without having to remove or damage any members or interior finishing materials.

2. Protections and Cleaning

- i) All glass panes shall be retained within aluminium framing by use of exterior grade microwave cured EPDM gaskets. Use of glazing or caulking compounds around the perimeter of glass will not be permitted. There shall be no whistling or rattling. Before installation of glass, SI shall ensure the following:
 - All glazing rebates shall be square, to plumb, true to plane, dry and free from dust.
 - Glass edge shall be clean and cut to exact size and grounded
- ii) Glass of specified thickness in doors, windows, ventilators, and fixed glazing etc. shall be of approved make and standard quality conforming to C.P.W.D. Specifications

9.16 Water Proofing & Insulation Work:

For waterproofing of works below plinth level such as Lift well, UG tank, etc., complete envelope/box shall be ensured with EPDM water proofing membrane.

Basically in all the buildings all the RCC works below plinth level (foundations, columns, slabs, shear walls, retaining walls, beams, lift well etc.), RCC work in

Terrace slab (Columns above it, if any), retaining walls (with or without weep holes), reservoir, U.G. Tanks, water retaining/carrying structures, sewage & water treatment plant, ETP etc.) shall be given waterproofing treatment by adding the cementitious integral crystalline admixture of make KRYTONE, PENETRON, XYPEX or equivalent @0.80% (minimum) to the weight of cement content per cubic meter of concrete) or higher as recommended by the manufacturer's specification in reinforced cement concrete at site of work. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e., by reducing permeability of concrete by more than 90%, compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure. The crystalline admixture shall be capable of self-healing of cracks up to a width of 0.50mm. The intension is to use integral cementitious crystalline admixture to all RCC works requiring the water proofing treatment. The product performance shall carry guarantee for 10 years against any leakage.

Waterproofing cum insulation on terrace slabs shall be with an average 90 mm thick spray applied CFC & HCFC free polyurethane foam of Pidilite, BASF or equivalent, conforming to CPWD GHAR, IGBC, & GRIHA standards. The material shall have a core density of 50-60 kg /m³ (as per ASTM 1622), thermal conductivity of 0.023 W/m.k at 25°C mean temperature (as per ASTM C518/91), U-value of 0.28 W/m² K as per ECBC standards for cold climate type, tensile strength of >400 kPa (as per ASTM D 1623/78), compressive strength >300 kPa (as per ASTM D 1621), closed cell content having apparent VOI of 96-98% (as per ASTM D 2856) and fire resistance property confirming to Class B2 as per DIN 4102. Before applying polyurethane foam, cracks shall be repaired by cutting V groove in 25x25 mm size and filling the same with polymer modified mortar (1:3 Cement Mortar having polymer @10% by weight of cement). Base coat of highly elastomeric two component polyurethane based waterproofing coating (elongation of 600% and tensile strength of 6Mpa) shall be applied at 1.5 kg/Sqm at the corners above the mother slab for a length of 150mm horizontally and 150mm vertically. Top of the polyurethane foam shall be applied with highly elastomeric two component polyurethane based waterproofing coating (elongation of 600%, tensile strength of 6MPa as per ASTM D 412) at 1.5 kg/Sqm. 150 gsm Geotextile (non-woven polyester) over the entire membrane maintaining proper overlaps shall be applied. A filler board of 10mm thickness for construction joints shall be placed vertically to form a rectangular bay does not exceed 12sqm. The treatment should be followed by protective layer of average 75 mm thick concrete screed (grade M-15) including control joints of 3M X 4M size and making angle fillet of 50mmX50mm using concrete at the corners. Exposed filler boards shall be cut by mechanical means and groove shall be filled with Polysulphide Sealant. The width of sealant fill shall not exceed 10mm. All systems shall be installed by authorized applicators (in house team of manufacturer) as per manufacturer's recommendations and includes all lead and lift for all materials and labour.

Water proofing treatment to vertical and horizontal surfaces in all internal wet areas of building (e.g., Toilets/Kitchens/AHU/balconies etc.) shall consist application of water based, anti-root, low VOC, single component, pure PU Polyurethane elastomeric water proofing membrane of make PIDILITE, GRACE, BASF or equivalent with 1.5 mm DFT, having solid % value > 90, tensile strength > 2 mpa, Elongation > 550%, shore 'A' hardness 60 ± 5 with a 150 gsm polyester geotextile membrane. The system includes base preparation of cleaning, brushing and removal of flaky materials, grouting the porous area with cementitious grout, proper covering between slab and wall junctions and priming the surface as per manufacturer's specification. The coating shall be continued to the entire horizontal area and should be terminated

at 300mm above the floor finish level complete as per manufacturer's specification. The treated horizontal surface shall be provided 40 mm (minimum) concrete screed (Grade M-15). The Vertical surface shall be provided with 15 mm thick Protective mortar of (1 Cement: 4 Coarse Sand) mixed with integral waterproofing compound of approved make as per manufacturer's specifications. All systems shall be installed by authorized applicators (In house team of manufacturer) as per manufacturer's recommendations and includes all lead and lift for all materials and labour.

9.17 Signages:

Signage's inside/outside building shall be as per NBC 2016 guidelines and of approved design and make with LED backlit. Each room shall be provided with Name Boards, Numbering of rooms, Signage's etc. The SI shall prepare the detailed shop drawing in compliance to the NBC 2016 guidelines and disable friendly building norms of MoHUA.

Name Boards for buildings shall be of approved design and make (like suitable gauge, 2 feet height SS 316 lettering) with LED backlit.

Signage works include providing and fixing Building Entrance signage / Tactile Layout

/ Emergency Evacuation Layout on the wall or with any other required structure, with provision of multilingual text integral with 4mm thick blue Acrylic base plate with min

0.5 mm Aluminium sheet at the back with Upper Case San Serif words made of white acrylic non glare cut out letters of height 15mm, raised above base plate by not less than 0.8mm and the equivalent word/s written in Hindi / any language as required with same specifications with Grade 1 Braille to be integral with the sign face and should be raised 0.5mm above Acrylic base plate. Each signboard to be fixed strictly as per the Harmonised Guidelines & Space Standards for Barrier Free Built Environment for persons with Disability, issued by MOUD, Govt. of India, and as per approved drawings and complete as per the directions of Engineer - In - Charge. Size of the Signboards shall be proportional to the layout plan of the particular building; Min Size of the above signboards shall not be less than 1200mm X 750mm.

Identification signage's like Room Names / Rooms Number / Toilet facility / Drinking Water / Staircase / Entry / Exit / Lift etc. of the size not less 200 x 200mm.

Floor Directories (Signboard Placed near the Lift / Staircase / Entry to the particular Floor indicating the facilities on that floor which are normally also called as Directional Signage's) shall be of minimum size not being less than 450 mm X 450mm.

Emergency Exit Sign Boards (Generally used Text as "In Case of Emergency, Do Not Use the Lift", "Emergency Exit" etc.)

9.18 Glass/Mesh Facade Civil Structure Requirements:

This specification covers the general requirements of external facade work (e.g., Structural Glazing, Curtain Wall, GRC Panel, ACP, Aluminium composite/Puff/sandwich Panels, Exterior Grade HPL etc.) including engineering design involving structural stability of system as a whole e.g., supply, fabrication, installation, testing, ensuring water tightness and maintenance etc.

Work under this section shall be performed by specialized agency, who is regularly engaged in the engineering, fabrication, finishing and installation of façade work including glazing and sealing of glass etc. and having experience in similar works. The SI shall submit full details and credentials of specialized agency for verification and to demonstrate to the satisfaction of the Engineer-in-charge that he has successfully completed similar works over as per the CPWD guidelines. Only after written approval of engineer in charge, the SI will engage such specialized agency for this work.

1. Scope of Work:

- i) The scope of work includes all labour, material, equipment and services as required for the complete design, engineering, testing, and fabrication, assembly, delivery, anchorage, installation and water tightness of the façade system. The façade system includes GRC/stone cladding with insulation/vapor barriers, Unitised/Semi-unitised structural glazing, curtain wall, curtain glazing, skylight, aluminium louvers, Aluminium composite/Puff/sandwich Panels, Exterior grade HPL etc. Anchorage includes all primary and secondary anchor assemblies and supportive structural framing as required for securing the facade to the building structure. The scope of work also includes complete design, engineering, testing, fabrication, assembly, delivery, anchorage and **installation of a suitable gondola/jib system for cleaning of the vertical glass and stone/GRC facade.**
- ii) The contract documents define only the design intent and general performance requirements. The SI is fully responsible for design, structural calculations, shop drawings, procurement of materials, fabrication, installation, warranties, certifications and related documentation. The entire work shall be carried out strictly in accordance with the true intent and meaning of the specification and drawings taken together regardless of whether the same may or may not be shown particularly on the drawings or described in the specification provided that the same can be reasonably inferred.
- iii) Only suggestive sizes and details are proposed by the Engineer-in-charge that has a visual impact on facade. SI's fabrication / shop drawing will seek these suggestions and design the final construction details. The complete design of façade system will be submitted by SI to engineer- in-charge for approval.
- iv) The facade shall be designed, fabricated at works, supplied, delivered and installed in accordance with the shop drawings and samples of materials approved by the Engineer-in- charge and shall be constructed to meet the performance requirements and standards.
- v) In general, the façade system should be designed to suit the aesthetics and performance requirements, taking into consideration the necessary factors to suit fabrication and the site conditions for erection.
- vi) The SI shall strictly follow, at all stages of work, the stipulations contained in the Indian standard safety code and the provisions of the safety rules for ensuring safety of men and material. The successful bidder shall submit a safety plan for approval of the Employer. On approval of the same, the same shall be followed during the currency of the contract.
- vii) The SI must comply with all applicable local-building regulations and all the safety guidelines particularly specified for facade work as per relevant I.S codes.
- viii) Shop and field materials and workmanship shall be subject to inspection of the Engineer-in- charge and his authorized representative at all times. Such

inspections do not relieve the SI from obligations to provide materials conforming to all requirements of the contract documents and industry standards for material quality.

- ix) All approvals, instructions, permission, checking, review etc. whatsoever by the Engineer-in-charge shall not relieve the SI of his responsibility and obligation regarding adequacy, correctness, completeness, safety, strength, quality, workmanship etc. of the façade system.
- x) Testing will be done as per nomenclature of the item of typical DGU Panel of approved size in factory and in field through an approved testing agency.

2. Facade System Description

- i) The SI shall devise a suitable framing system for vertical façade application keeping in view the performance characteristics and aesthetics requirements.
- ii) The vertical structural glazing system shall be fully unitized / Toggle based curtain wall (refer chart for various location-types) and shall be designed to suit sealed insulated glass units (hereafter referred to as "IG unit"). Aesthetically the design of the glazing system shall provide a filtering envelope to the building and provide a uniform appearance. The glazing system shall have flush glazed exterior joints both horizontal and vertical. The structural glazing system shall be designed to receive fixed glazing as well as structurally glazed open able vents with protection of the glass edges. The SI shall take adequate measures to ensure the thermal performance of the glazing system under the increased solar radiation prevalent in the region. No onsite sealant application will be permitted except for weather sealant in case of unitized system. The system shall comprise of factory prefabricated glazed vision and spandrel panels. The system should preferably permit re-glazing of vision panels from outside the building. The SI should choose an approved system also keeping in view the various requirements arising during future maintenance during the life span of the glazing system.
- iii) The structural glazing system shall be designed to allow for three-dimensional adjustments due to dead load, live load, wind load, seismic load, and thermal movement. The framing system must be designed to provide adequate support for the IG units to prevent transfer of loads to the glazing below and to provide uniform support to both lights of the IG unit. Intermediate mullions should be of same size as that of outer mullions.
- iv) The structural aspects of the structural glazing system must be carefully integrated with the glazing rabbet and drainage details to ensure proper performance. The structural glazing system shall be designed on the rain screen principle with provision for pressure equalization.
- v) The structural silicon sealant to be used in this structural glazing system shall be of such quality & designed to transfer wind, seismic, live and dead loads from the glass to the framed structure of the structural glazing.
- vi) The design shall incorporate floor-to-floor noise isolators, fire and smoke stops between the floor slabs and sill flashing etc. as per the NBC of India and also of the best international practices.
- vii) The façade system shall have spandrel panel (over solid surfaces e.g., columns, masonry wall etc.) of Aluminium composite panel (50 mm thick sandwich panel) or toughened glass backed by shadow box (made of Al assembly) as shown in drawings.
- viii) The façade system consists of GRC panels at height less than 10 meters from Plinth level as shown in drawings. If GRC panels are shown above 10 meters

in drawings, it shall stand replaced by Exterior Grade HPL.

- ix) The façade system consists of providing wall insulation with 50 mm thick polystyrene board on all solid surfaces e.g., Spandrel panel area, GRC panels area, HPL cladding area, Aluminium composite panel area etc.

3. Performance Requirements for Facade System

a. Facade System design parameters:

1. The façade system and its components shall be designed to withstand dead loads and live loads caused by positive and negative wind loads acting normal to the plane of the façade system. Design wind loads shall be 1.74 Kpa design and proof load of 2.61 KPa. The SI is required to submit the design calculation and weight of aluminium per meter. The system shall also be designed to withstand seismic forces as calculated in accordance with IS: 1893 (latest revision) under seismic zone V.
2. Apart from the above, the glass and the glazing system should also be designed to withstand a concentrated load of 100kg applied at any location so as to produce the maximum stresses in the glazing components. This load is envisaged to- be encountered during cleaning of the glass facade.
3. The stress on structural sealant shall not exceed 20 psi under any circumstances. Thermal breaks shall be considered unable to transfer shear stress for composite action of flexural members. Assume elements joined by thermal breaks to act separately.

b. Deflection:

- The deflection of any structural member in the plane normal to the glass surface when subjected to the specified loads shall not exceed $L/175$ of its clear span and shall be fully recoverable on withdrawal of the specified loads. Deflection of any framing member shall not exceed 19mm within any glass panel.
- Parallel to façade plane, deflection of a framing member when carrying full design load shall not exceed an amount reducing the glazing unit bite below 75% of the design dimension. It shall also not reduce the edge clearance to less than 3mm nor shall it damage or impair the function of any joint seals.
- The deflection of the horizontal member due to the weight of the glass shall be limited to 3mm or 25% of the design edge clearance of the glass or panel below whichever is less.
- Twisting or rotation of the horizontal member under dead load of glass shall be limited to 1° by calculation from the horizontal plane.
- There shall be no in plane raking.
- In case lite of the IG unit develops crack; the remaining lite should be capable of supporting the entire load. The overall strength and deflection behavior shall be calculated on the basis of the weakest lite.

c. System assembly:

- The system assembly should accommodate the following without damage to the system, components, or deterioration of seals.
- Movement within the system
- Movement between system and perimeter framing components.

- Dynamic loading and release of loads
- Deflection of structural support framing
- Tolerance of supporting components
- Shortening of building concrete structural columns
- Creep of concrete structural members
- Inter story drift
- A mid span slab edge deflection: of 25mm
- Accommodate building construction tolerance of +30mm. These tolerances are not cumulative.

d. Expansion/Contraction:

The system shall provide for expansion and contraction within system components caused by a cyclical temperature range of 800 Cover a 12hour period without causing any detrimental effect to the system components.

Test for structural performance: When tested in accordance with; ASTM E330, the glazing system shall conform to the performance requirements.

Special instructions: Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of the system will not be permitted.

Heat soaking of glass: To minimize nickel sulphide (NIS) fractures at site, heat soaking test is to be conducted within the factory. Minimizing NiS fractures at site is mainly about making sure that fractures happen within the factory rather than at site after installation. Heat soaking tempered glass is the most-common form of ensuring that the chances of NiS infected panes leaving the factory are minimized. The goal during heat soaking is to induce breakage at the factory to avoid on site breakage after installation. It is heat tempering of glass to 2800 C for 24 to 48 hours over temperature gradients to induce fracture. Due to inherent safety and security benefits, it is highly recommended for tempered glass to be heat soaked.

e. Products/Materials:

- i) **Glass/Mesh:** Standard certification requirements are as under:
 - a. **Float glass:** ASTM C1036
 - b. **Tempered/ Toughened Glass:** Toughened / Tempered glass shall be examined by the glass manufacturer to detect and discard any glass which exceed the following tolerance: 1.5mm bow in 600mm; 3mm bow in 1500mm; 6mm bow in 3000mm; 9mm bow in 4500mm. Where the strengthening process results in essentially parallel ripples or waves, the deviation from flatness at any peak shall not exceed 0.13mm and the difference between adjacent peaks shall not exceed 0.13mm. Where bow tolerance and wave tolerance differ, the stricter requirements shall govern. Direction of ripples shall be consistent and in conformance with architectural design. Following test shall be carried out by the glass processor at his own cost as per following provisions and the test report shall be submitted.

Thickness	Impact strength	Fragmentation	Surface Compression	Bending Strength
IS 2835-1987	IS-2553-PART-I	IS-2553-PART-1	ASTM C-1048-90	DIN 1249-PART:12

- c. **Laminated glass:** ASTM C 1172. The laminated glass shall comprise of two glasses of equal thickness as per design and bonded with a polyvinyl butyral (PVB) interlayer, meeting criteria of ANSI Z97.1 for safety glazing. The PVB interlayer shall be minimum 0.38mm thick. No deviation will be accepted with respect to the PVB interlayer. Laminated Glass Units shall comply with EN12543.
- d. Glazing unit for Insulated Glazed Unit for façade type WT-02, WT-06, WT-04 and WT-05 shall be as: Glass 1-(6mm external glass heat strengthened + 16mm air gap filled with Argon + 6mm clear fully tempered glass internal). Glass performance data for insulated glazed unit shall be:
 - Visible Light transmittance (VLT) of minimum 60%
 - Light reflection internal - less than or equal to 15%,
 - Light reflection external - less than or equal to 15%,
 - SHGC- less than or equal to 0.57 and
 - U value - less than or equal to 1.3 W/m² degree K
- e. Glazing unit for façade type WT-08 shall be: 8mm clear fully tempered glass + 1.52mm PVB + 8mm clear fully tempered glass. Glass performance shall be:
 - Visible Light transmittance (VLT) of minimum 65%
 - Light reflection internal - less than or equal to 23%,
 - Light reflection external - less than or equal to 23%,
 - SHGC- less than or equal to 0.64 and
 - U value - less than or equal to 5.4 W/m² degree K
- f. Single glazed unit in façade as specified in drawings, shall be 8 mm thick clear heat strengthened glass having following properties:
 - Visible Light transmittance (VLT) of minimum 55%
 - Light reflection internal - less than or equal to 15%,
 - Light reflection external - less than or equal to 15%,
 - U value - less than or equal to 5.6 W/m² degree K
- g. **General Requirements for all types of Glass:** All base supply float/coated glass are to comply with the requirement of BS EN 572 parts 1, 2 and 3 or ASTM C1036 and assessed for optical and visual faults as described in BS EN 572-2. Spot faults shall not be any worse than category C. There will be no linear / extended faults. Optical faults shall be within the limits set in BS EN 572-2.
- h. **Fully Toughened / Heat Strengthened Glass:** It shall comply with the requirements of EN12150 or ASTM 1048 or EN 1863 -1 for heat treated Soda Lime Silicate Safety Glass. The residual surface compressive stress in the heat strengthened glass shall be below 52N/mm² when measured by GASP in accordance with ASTM F218-95 (2000) or > 69 N/mm² for Fully Toughened glass.
- i. **Insulating glazed units:** Hermetically sealed insulated glazed unit shall comply with BS5713 or EN 1279. Primary seal shall be

of poly-isobutylene located between glass and spacer (Lisec / Alupro/ Profil glass or equivalent) providing a continuous vapor proof barrier of a minimum width of 2mm and a secondary two-part silicone sealant of approved make extending around the perimeter of the unit. The insulating glass unit shall be certified under a program approved by the sealed insulating glass manufacturer's association (SIGMA) providing third party validation of compliance to ASTM E 773 & E 774. All glass quality shall be glazing as per relevant ASTM standards.

- j. **Coating:** Method of coating shall be of vacuum (sputtering) deposition. This coating is applied to control the solar heat gain and enhance the energy performance and comfort level of the building. The coating shall meet the requirements of ASTM C 1376-97 or EN 1096 part 2 and satisfy the thermal performance of the facade.
 - k. To avoid change in glass thickness due to variation in pressure difference from site of manufacturing of glass to the delivery of glass in state of Jammu & Kashmir, pressure equalization approach shall be adopted by incorporating metal tube in all DGU panels for adjustment of pressure difference between glass panel and environment atmosphere. At the time of delivery, glass panels cannot have variation of more than 3mm in air gap due to pressure variation for seal evil difference of up-to 1400meter (between the site of glass manufacturing and project site). The variation in pressure shall be adjusted with the metal tube by the installer and fixing of required specified glass panels to be completed.
 - l. **Performance requirements:** Probability of breakage of glass shall not exceed 8/1000 for vertical glass upon first application of design pressures or due to anticipated thermal stresses.
- ii) **Louvers in external cladding:** Aluminium Louvers (of make Hunter Douglas, Gordon, SAS) shall be of "Z" shape spaced at equivalent distance supported on the Aluminium grid work as shown in drawing. Louvers profile shall be fixed in accordance with the manufacture's specifications on back up structure made of structural steel/Extruded Aluminium sections as suggested in drawings. Panel shall be stove enameled and finished with Luxate, a patented special three-layered coating system (consisting of first a conversion layer of thickness 800-2000mg/sqm, a polyurethane basecoat of 16-20 microns, and a special top coat of polyamide particles of 8-12 microns thick to provide excellent abrasion and damage resistance) in a continuous coil coating process of the approved colour on the exposed side and the reverse side with epoxy. The sizes of all the fixing assembly shall be worked out by SI by designing for performance criteria (wind load, snow load, seismic load, deflection, strength etc.) mentioned in this document or prescribed by various standard/codes. The brackets shall have provision for movement to accommodate the movements due to seismic, thermal expansion, composite construction tolerances. The purpose and intent of the louvers is to be functional with HVAC requirements. Hence the sealing of perimeter between the louvers and the carrying façade (part of façade above and below) should be airtight. Panels will have movable louvers, and fixed louvers. The SI shall provide a data to confirm compliance with specific requirements for resistance and fire properties. The guarantee should be for a 20-year period against peeling and fading.

- iii) Perforated Metal Screens:** It consists of screen panel (of make Hunter-Douglas, SAS, Lindnar) various sizes as per requirement and as per architectural drawings, manufactured from high corrosion resistant Aluminium Alloy of 2 mm thickness which shall be fixed to rigid and suitable substructures as per manufacturer's recommendations. The panel shall be coated on visible side with exterior Architectural highly durable "Qualicoat" coating in approved color, properties meeting as per AAMA 2603 and ROHS with minimum five years warranty. The panels shall be bending with the help of NC bending technology with six roller levelling process which ensures flatness of panels from all four sides and shall have extended flanges to accommodate clamps. There would be provision of expansion joint of 20 mm between two adjacent panels ends. The entire installation shall be carried out as per manufacturer's recommendations.
- iv) Open able panel (IGU),** side hung or top hung, shall be provided as mentioned in drawings or as per extant guidelines of NBC, Indian standards and local bodies. These panels shall be installed with all accessories and hard wares for the open able panels as specified/required and of approved make such as heavy-duty stainless steel friction hinges, minimum 4 points cremone locking sets with stainless steel plates, handles, buffers etc. including necessary stainless-steel screw, nuts, fasteners, bolts, washers etc.
- v) Galvalume roof cladding:** It consist of 0.65mm thick steel standing seam non-insulated single skin roofing of TATA blue scope or equivalent make in solid or metallic colours as approved by Engineer-in-charge. The sheet shall be made of 0.45 BMT with AZ150 coating with coating mass of 150g/m². The roofing sheet material shall accommodate the building movements, thermal expansion and seismic movements. Also, shall accommodate thermal expansion resulting from surface temperature of 80-90 degree Celsius on roofing system without creating any additional stress. The panels shall be fixed in accordance with manufacture's recommendations to back up structure made of structural steel/Extruded Aluminium sections as suggested in drawings. The sizes of all the fixing assembly shall be worked out by SI by designing for performance criteria (wind load, snow load, seismic load, deflection, strength etc.) mentioned in this document or prescribed by various standard/codes. The SI shall provide a data to confirm compliance with specific requirements for resistance and fire properties. The guarantee should be for a 20-year period against peeling, fading, blistering, flaking, chipping and fire properties.
- vi) Sealant:**
- a. The insulated glass unit shall have poly-Iso-butylene as primary sealant with low moisture vapour transmission rate and a structural silicone sealant for secondary seal. The secondary edge sealant shall conform to ASTM C 1369-97. The SI shall indicate the classification of the edge sealant as per clause 5.0 of the ASTM C 1369. Structural flush glazed joints shall be a neutral cure high performance silicone sealant applied in accordance with the sealant manufacturer's instructions. Weather seal joints shall be a neutral cure medium modulus silicone sealant applied in accordance with the sealant manufacturer's instructions. Sealants shall be black color. Unexposed, low movement flashing joints shall be non-drying, non-skimming, non-oxidizing, non-bleeding glazing sealant meeting MMA 809.2. The sealant proposed by the SI shall not bleed or

stain under any circumstances. SI shall identify the sealant to be used along with the structural glazing system and submit detailed technical parameters of the sealant by way of the sealant manufacturers printed data sheets. The SI will be responsible to carry out all the compatibility tests as listed below but not restricted to the following, with respect to the particular sealant from a laboratory approved by the engineer-in-charge. The following tests shall be carried out with respect to the sealant:

- ASTM C 794 Peel test
 - ASTM C1135 -Test method for determining Tensile-Adhesion Properties of elastomeric sealant
 - ASTM C-719 -Test method for adhesion and cohesion of elastomeric joint sealant under cyclic movement
 - ASTM C-1087 -Compatibility test between the proposed structural silicone sealant and the finished aluminium extrusions (mullions and transom)
- b. For all sealant proposed to be used for this project, the SI shall submit a letter of certification from the sealant manufacturer stating that the sealant has been tested for adhesion and compatibility on production of samples of metals, glass and other glazing components and that all sealant details and application procedures shown on the shop drawings are acceptable for use.
 - c. To prevent excessive shelf life and facilitate the correlation of batches of sealant with panel production, silicone sealant generally shall be used in the sequence of their manufacture.
 - d. The structural glazing SI shall obtain from the manufacturer and the supplier written confirmation of that the material has not been subjected to temperatures in excess of 27 degree centigrade between manufacture and delivery to the SI's factory. The SI shall store all silicone sealant at or below 27 degree centigrade up to the day of its application.
 - e. Silicones which cure by different chemical reactions, or which release different chemical by-products, e.g., acetic acid, alcohols, amines etc. during cure, should not come in contact to each other during fabrication, assembly, and erection of the glazing system.
 - f. All adjoining surfaces not to receive sealants' shall be protected against staining by masking tape.

vii) Other materials:

- a. The aluminium extrusions shall be 6063 alloy T6 temper conforming to ASTM 8221 or equivalent. They shall be clean, straight, with sharply defined edges and free from distortion and defects impairing appearance, strength and durability. It shall be of suitable wall thickness and profile for strength with respect to tension, shear and bending stresses, and lateral stability. The aluminium extrusions shall be coated with minimum 70% Kynar 500 based PVDF fluoropolymer resin coating (minimum 35micron thick) of approved color and shade to comply with AAMA605.2-1980.
- b. Fixing bolts, screws and nuts, where in contact with aluminium, will be of stainless steel 304 grade. Glazing tape for structural glazing shall be Norton or approved equivalent.
- c. All dissimilar metal surfaces shall be isolated to prevent anti galvanic action. Materials used for this purpose shall be non-absorptive. Metal

surfaces shall be separated in such a manner that metal does not move on metal.

- d. Aluminium surface in contact with mortar, concrete fireproofing, plaster, masonry and absorptive materials shall be coated with anti-galvanic moisture-barrier material and nothing extra will be paid for this.

viii) Accessories:

1. Extruded gaskets, weather stripping, extruded seals and spacers which do not come into contact with structural silicone sealant shall be of ethylene propylene diene monomer (EPDM). Where in parallel contact with structural silicone sealant, all gaskets, setting blocks and spacers other than foam glazing tapes shall be of heat-cured silicone rubber, chemically compatible with the silicone sealant and suitable for the specific purpose intended. All extruded gaskets, weather stripping and spacers other than foam glazing tapes shall have continuous mechanical engagement to framing members; any adhesive attachment is not acceptable. Unless otherwise approved, gaskets, weather stripping, extruded seals and spacers shall have a hardness of 40+5 durometer Shore A.
2. The cladding system shall be constructed with (and shall maintain during its design life) a standard of seal which shall not result in any reduction of sound insulation performance. Gaskets, weather stripping and seals used to achieve the required weatherproofing and/or air tightness shall be selected to accommodate fully the range of dimensional tolerances associated with fabrication and installation of the cladding system. Gaskets, weather stripping and seals shall be formed from materials capable of retaining their elastic qualities, dimensions and resistance to physical and chemical attack sufficient to maintain the full water tightness, air tightness and acoustic performance for the design life of the structural glazing system.
3. Extruded gaskets, weather stripping, seals and spacers mechanically engaged by flutes or pockets extruded in framing member shall be installed without residual tension or extension. Dry lubricants may be used to reduce drag during installation of synthetic rubber extrusions and to induce compression so as to prevent gradual elastic shrinkage and retraction from their ends. Wet lubricants containing detergent shall not be used in any location from which spillage onto glass and aluminium surfaces cannot be immediately and completely removed at the factory. Concentrated detergents shall not be used for any purpose which may bring the liquid into contact with the coated surfaces of vision and spandrel glass.
4. Setting blocks shall be dense heat-cured silicone rubber with a hardness of 80 to 90 durometer Shore A. Side block and anti-walking blocks shall be dense heat-cured silicone rubber with a hardness of 60 to 70 durometer Shore A.

ix) Flashing: To prevent leakage, flashing shall be formed from either stainless steel or aluminium or sheer neoprene of 1.5mm thickness with joints tapped and sealed 150mm minimum. Flashing shall be provided on all sides of glazing where external glazing terminates and wherever else required to provide a completely watertight installation. Wherever visible, it shall have the matching finish of Aluminium.

x) Column closers: The SI shall supply and install suitable closer section to seal up the gap between columns and / or walls, which abuts the

line of the external glazing. The principal function of the closer piece shall be to provide a neat connection with the external glazing as well as a means of cutting off stray artificial light from the outer face of the column / wall. The column closer shall be installed in such a way as to provide a flexible connection to allow for tolerances, building I external glazing movements and dimensional differences between the external glazing and the column and / or wall face. The column closer shall also be designed in such a way as to allow the following:

- Easy removal for maintenance.
- Installations after finishes are applied to the column /wall.
- Easy removal of internal glazing units for cleaning/ maintenance replacement.
- Compatibility with the requirements of the fire safety requirements.

xi) Fire Stop: At each floor edge, the required fire protection is to be maintained between elements of structure by using fire stop insulation to give a minimum of 2 hours fire protection between floors including in front of columns or blank walls. The fire stop material is to be installed to completely seal up the void between the face of the structure and the glazing and shall fully comply with local Codes and Regulations. The fire stop material must be flexible to allow movement between the structure and the external glazing. The fire stop material shall be located and held in position in such a way so as to ensure integrity of the fire protection as well as preventing accidental damage or loss of materials. The SI is required to provide full details of all fire stop material including fire test certificates and confirmation of local Fire Service Bureau approved material status. Shop drawings shall also be submitted for approval showing the full details of fire stops.

xii) Finishes: All exposed framing members shall be free of scratches and other blemishes. All aluminum **surfaces** shall be electrostatic powder coated in stainless steel colour or as approved by the Engineer-in-charge. The anodic coating shall conform to IS:1868 - 1968 / IS-5523:1983 and shall be of AC25 grade with minimum thickness of 20 microns when measured as per IS: 660/2-1970 and density shall be at least 32 Mg/sqm. The anodic coating shall be tested in an approved laboratory by eddy current method as per IS:6012 for thickness. Sulphuric acid shall be used as the electrolyte for the anodic process. Prior to anodizing, all aluminium shall be rendered uniform in appearance free from disfiguring scratches, stains or other blemishes and etched in caustic soda solution. Requisite tests shall also be carried out at the site as required by the Employer and the SI shall arrange all assistance and equipment required for the purpose.

f. Programmed of work:

The SI shall submit a detailed program of work along with time schedule indicating the various items of work pertaining to the structural glazing work as below-

- Design and approval
- Shop drawings
- Submission of samples
- Mock-up
- Test reports

- Material co-ordination, ordering and delivery
- Fabrication
- Installation
- Inspection and remedial measures.

i) Design calculations:

- a.** The SI shall be responsible' for the design of the facade system including all its various components like glass, sealant, framing system, gaskets, fixing, and anchorages proposed by respective specialists. The SI shall submit structural design calculations prepared in accordance with relevant Indian/International codes and standards as applicable. The design shall be carried out under the direct supervision of a professional engineer experienced in design of this type of work and licensed at the place where the project is located. Structural design shall include, but not limited to, computations for the justification of external facade sections and connections including fasteners, welds, and anchorage assemblies.
- b.** The SI shall submit for Engineer-in-charge's approval all structural calculations with reference to structural properties and physical characteristics and dimensional limitations of the framing members of the facade system. The SI shall also submit design calculations for all connections, the dimensions of all extrusions and complete data to be used for the project. Approval of structural calculations shall not relieve the SI from any of the responsibilities and requirements specified therein.
- c.** The SI shall submit the glass manufacturer's wind pressure analysis, seismic load analysis and thermal analysis showing that the specified maximum deflections and probabilities of breakage are not exceeded.

ii) Shop drawings:

- a.** The SI shall submit shop drawings clearly showing the relationship of the structural glazing facade to the building structure, Mechanical and electrical systems, floor slabs and any other related works. They shall show the arrangement of components, instructions and explanatory details for the sequence of fabrication, assembly, erection and installation of all materials including the glass and de-glazing procedures. They shall include the following:
 - Plan, elevation, and details required to fully describe the structural glazing system.
 - System dimensions framed opening requirements and tolerances for squareness, corner offset and bows.
 - Dimensional position of glass edge/face relative to the aluminium framing, full size junction details between mullion and transom and end details.
 - Isometric drawings of flashing, joints between transom and mullions, end details etc.
 - Expansion and contraction joint location and details.
 - Weep and condensation drainage network
 - Full size details including isometric drawing of sealing, flashing and jointing Methods

- Materials, type, size, location, spacing of all screws, bolts, weld; anchoring devices and all accessories.
 - Die drawings for, all gaskets, extrusions
 - Relationship of edge members with architectural stone/ wall finish and flashing at joints.
- b.** The SI shall submit a fully detailed program for the presentation of shop drawings to the Engineer-in-charge for approval, and in no case shall the SI proceed with any of these works without approved shop drawings.
- c.** The SI shall review and submit all shop drawings in a sequence consistent with the sequence of erection, installation, and assembly of the various elements of the work. He shall be deemed to have determined and verified all materials, site measurements and construction criteria related thereto and to have checked the shop drawings for complete dimensional accuracy.
- d.** Any approval by the Engineer-in-charge of the shop drawings shall not relieve the SI of his responsibility for any deviation from the requirements of the contract unless SI has specifically informed the engineer in writing of such deviation at the time of submission and the Engineer-in-charge has given written approval to the specific deviation.

iii) Samples

The SI shall submit all samples at his own cost. Samples shall be submitted for approval well in advance of the date, on which the particular work involving the use of materials for which samples are submitted, is scheduled to begin. The work shall be carried out in accordance with the approved samples. The following shall be submitted:

- a. samples of 600mm x 600mm in size illustrating pre-coated aluminium mullion and transom junction detail complete with glass skin and glazing materials illustrating edge and corner.
- b. nos. 12" x 12" samples of each type of glass.
- c. nos. 6" long samples of principal extrusions.
- d. nos. manufacturer's samples of each type of aluminium finish.
- e. nos. manufacturer's samples of each type of sealant
- f. nos. manufacturer's samples of all accessories and hardware envisaged to be used for the structural glazing system.

iv) Mock-up:

The SI shall construct a mock-up including intermediate and edge mullion, vision and spandrel panel. The mock-up should illustrate component assembly including framing, glass, glazing materials, weep drainage system, attachments, anchors and perimeter sealant. Location for mock-up will be at site approved in advance. Mock-up will not remain as part of the work.

v) Test reports:

The SI shall arrange for all testing required with regard to this work at his own cost, at such test laboratories in India or abroad as approved by the Engineer in-charge. Apart from the tests carried out, the SI shall substantiate engineering data and provide test results of

previous tests, which purport to meet performance criteria and any other supportive data.

vi) Sources:

The SI shall submit the name of the suppliers for the following items of work along with the shop drawings and samples.

- All components of the structural glazing system
- Aluminium extrusions
- Anodizing paint from manufacturer I authorized applicator
- Sealant
- Glass
- Hardware
- Gaskets
- Fasteners
- Anchorages

vii) Submittals:

The SI shall submit 4(four) copies of the following documents pertaining to the engineering of the structural glazing using structural glazing system to the engineer for approval, review etc.

- Shop drawings
- Structural design calculations for aluminium framing, glass thickness and sealant byte sizes
- Calculations for deflection
- Test reports as per the performance requirements
- Special installation requirements, special procedures, safety precautions and perimeter conditions requiring special attention as stated by the manufacturer.
- Samples
- As-built drawings

viii) Ordering and delivery:

Before commencement of any fabrication or ordering of any materials, goods or works, the SI shall be required to submit shop drawings, samples etc. with all relevant details as to materials, sizes, manufacturer's printed specifications and all other details and information as desired by the engineer in charge. Mock-up shall have to be approved by engineer-in-charge before placing final order for delivery of the approved products.

ix) Product handling:

Handling of glass and aluminium frame, to be incorporated in to the facade system, shall be done with utmost care to avoid any damage or surface scratch. Field cutting of anodized components shall not be permitted.

x) Lightning protection:

Each complete frame shall be provided with a single bolt, to which the bonding conductor may be connected by the electrical SI on site. The bolt shall be high tensile, size MB stainless steel, and shall be securely fastened to and in sound electrical connection with the frame. The bolt shall be supplied with two plain washers and locking washers and nuts, by which the bonding conductor will be connected to the bolt. The bolt shall be supplied and fixed at your works before delivery to site. The electrical connections from bolts which are to be supplied by

you including the lightning protection devices, inspection openings for test lamps etc.

xi) Fabrication & installation:

The façade work shall be fabricated and installed by experienced workmen having specialized skill in façade work/ structural glazing and strictly in accordance with the approved shop drawings. All welding shall be done by the heliarc process and all exposed welds ground to minimum 100 grit finish.

xii) Protection:

- a.** The SI shall be responsible for all materials against damage from mechanical abuse and foreign matter during installation. A layer of clear transparent lacquer-based methacrylates or cellulose butyrate shall be applied on anodized members before they are brought to site. The lacquer shall be removed on completion of erection. On virtual completion and receiving instruction from the Engineer-in-charge, the SI shall remove all protective coverings, manufacturer's seals, labels etc. The SI shall thoroughly clear the internal and external glazing area and members with cleaning solution recommended by the respective manufacturers. The SI shall ensure that the highest possible standards of material protection are maintained both in the fabrication and installation of the external glazing system. The SI shall ensure that all materials and completed panels are delivered to site without damage and that all components are fully protected. In this respect a method statement will be required describing the protection measures to be adopted when transporting material to site and hoisting it into the floors for final installation. Panels awaiting installation are to be stacked on pallets to a height to be stored separately on site for possible fabrication in- situ.
- b.** All materials stored at site are to be protected in such a manner as to prevent damage from falling objects, dust, water and dirt. The material must be safe from mishandling or damage by any SI I agency I sub-agency either in the pursuit or their own works or by their personnel.
- c.** During installation, the SI shall provide protection to the external glazing to prevent the ingress of water from either rain or any other reasons. This protection shall be strong enough to withstand adverse wind conditions and shall provide complete protection at the top level of the installation necessary to prevent the Ingress of water into or behind the cladding.
- d.** The external glazing shall be screened from weld splatter, spray-on fire proofing, concrete, alkaline masonry washes, paint, and other deleterious substances. Any such soiling shall be promptly and completely removed. The design of protective screening shall be such as to provide adequate ventilation of the space between the glass and the protective screen and not induce thermal stresses in the glass. In no case shall the protective screening be placed in contact with the glass.
- e.** The SI shall provide at each completed floor an internal protection of 1000 gauge heavy Polyethylene sheet suspended from the top of the external glazing at slab soffit and extending to the floor. These drop sheets must be maintained until all wet trades are completed

on each floor.

- f.** The fixing method for sheets is to be indicated in shop drawings and a sample approved by the Engineer-in-charge.

xiii) Cleaning

- a.** The SI shall ensure that all actions are taken during Installation to eliminate the effects of corrosive substances on the finishes of the external glazing.
- b.** The SI shall clean both internal and external surfaces to remove corrosive substances. The Internal surfaces of glass and aluminium frame are to be cleaned with compatible cleaning agents prior to the installation of the internal protective sheeting.
- c.** The SI shall provide written verification that cleaning agents are compatible with aluminium, stainless steel, glass coatings, granite, glazing materials and sealants. In no case shall alkaline or abrasive agent be used to clean the surface. Care shall be taken during cleaning to avoid scratching of the surface by dirt particles.
- d.** Prior to snagging inspections, the SI shall remove the internal protection sheets and carry out a thorough cleaning of all glass, aluminium and spandrel panels as per the direction of Engineer-in-charge.
- e.** The protective sheeting shall then be removed permanently provided that no other wet works or services works are required in the immediate vicinity of the external glazing. The SI shall also make good any physical drainage to the wall including scratches, dents, abrasions, pitting, etc., to the satisfaction of the Engineer-in-charge.
- f.** Manufacturer's delivery or job marking on glass and adhesive for manufacturers cables shall be either a neutral or slightly acidic material and in no case shall such material be alkaline. Any staining of glass by alkaline material will be cause to rejection of the glass.
- g.** After the installation of each panel of glass all markings and labels shall be carefully and completely removed from the panes. Thereafter no markings or labels of any sort shall be placed on the glass.
- h.** Glazed openings shall be identified by suitable warning tapes or flags attached with a non- staining adhesive or other suitable means to the framing of the opening. Tapes or flags shall not be in contact with glass.
- i.** Prior to the handing over of each floor to the Engineer-in-charge, the SI shall carry out a final cleaning of the external glazing. As soon as it is practically possible after the issuance of the occupation certificate for the building, the SI shall carry out a complete cleaning of the external face of the external glazing

xiv) Removal of improper work and materials:

Any materials/or works which, in the opinion of the Employer, are not in accordance with the specification, shop drawings and instructions shall be removed from the site immediately.

xv) Performance guarantee:

The SI shall be solely responsible for the design including shop drawings and performance of the installed façade system. The

installations shall be guaranteed by the SI during the guarantee period for materials used, workmanship, water tightness (wherever specified), structural design, performance requirements and other requirements as given in the specifications. The SI shall submit in the enclosed format a written guarantee for the same for a period of 10 years from the date of completion of the work.

xvi) Maintenance manual:

On completion of the works, the SI shall prepare a detailed maintenance manual for the structural glazing system. The manual should cover the following:

- a.** Complete and detailed explanation of operating principles of the structural glazing system Description of all the various components of the glazing system,
- b.** Recommended Inspection schedule and periodic inspection procedure,
- c.** Complete parts list,
- d.** Instructions for proper cleaning procedures and routine maintenance of the facade including frequency,
- e.** Cleaning products and their source
- f.** Method statement for re-glazing and replacement of component parts with appropriate drawings.

***Note: The bidders shall be submitting multiple options for façade design to the purchaser. The bidder is expected to design and build as per the approved option.**

9.19 Miscellaneous:

- i) Anti- termite treatment:** Providing and injecting chemical emulsion for post construction anti termite treatment along the external wall up to depth of 300mm as per CPWD specifications.
- ii) Anti-Termite Chemical Treatment:** Post Constructional anti-termite treatment shall be with Chloropyrriphos/ lindane emulsifiable concentrate 20% with 1% concentration as per CPWD specification.
- iii) Damp Proof Course:** Damp proof course shall be with 40 mm thick cement concrete 1:2:4 (1cement:2 coarse sand :4 graded stone aggregate 12.5mm nominal size) mixed with water proofing compound painted at top with a coat of residual petroleum bitumen of grade VG-10 of approved quality at 1.7kg/sqm.
- iv) Plinth Protection:** Plinth Protection (1000mm wide) shall be with 75 mm thick M-30 grade with nominal TMT reinforcement of 8mm diameter, @ 300mm spacing in both ways with floating coat of neat cement punning over 75mm thick bed of M-10 concrete with 75mm thick brick on edging laid lengthwise to 150mm depth and false squares on top and finishing the exposed brick work and concrete edge with cement plaster etc. complete.
- v) Acoustic Works:** The SI has to comply with the NBC/ IEC/ BIS/ CPWD & other relevant International & National Standards of codes. The SI shall provide copy of all relevant codes and standard to employer.

9.20 Foundation Requirements

The layers are Medium to Very Dense in consistency. Hence, open type of foundation can be recommended.

Conclusions for this report are summarized as,

- 1.** As per table in section 7.0 of this report; the allowable safe bearing capacity of soil, a Raft Foundation not less than 3.00 m depth is recommended since allowable Safe Bearing Capacity 20 T/m² is observed.
- 2.** Ground water table was not observed. (February 2022)
- 3.** Size and shape of footing at these depths, at or below 3.00 m can be adjusted according to the convenience and suggestion of structural engineer provided there is no disturbance to existing construction.
- 4.** Chemicals tests indicate that the Soil is not chemically aggressive. However, to increase the durability, especially of foundation concrete, slag cement should be used.
- 5.** There is no need of any anticorrosive treatment needed to perform for foundation reinforcement, yet if in monsoon water table increases up to foundation level, then water chemical test is required.
- 6.** The cement concreting work in the foundation should be done in accordance with the provision given in IS 456: 1978.
- 7.** By the evidence of N value, clay content, gradation, cohesion; there is NO potential for liquefaction in any of the layer/depth of this bore.
- 8.** Open excavation should be properly planned, and which is taking into consideration the existing local condition.
- 9.** The top soil is having NO swelling characteristics; hence it is suitable to use for backfilling or plinth purposes.

Field Test & Sub Soil Exploration was carried out by AERI Laboratory as per clients Instruction.

10 Technical Specification and Function Requirement for Non-IT Components (Minimum Requirement)

10.1 False Ceiling

False Ceiling		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope of bidder should be supply, installation, testing and commissioning of false flooring System, with 600 X 600 in mm. It should be capable and intended to directly support cable trays, utilities, HVAC registers, piping and other accessories as indicated in area of work.
2	Submittals	Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and structural suspension system required. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 6 inch long samples of exposed wall molding and suspension system, including main runner and 6 inch cross tees. Shop Drawings: Layout and details of structural ceilings show locations of items that are to be coordinated with, or supported by the ceilings. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.
3	Type of material	A Manufacturers will be given preference when they provide documentation to support sustainable requirements for the following: Material ingredient transparency, Life Cycle impact information, Low-Emitting Materials, and Clean Air performance. 1. The product should have minimum of 1000 ppm of known hazards in compliance with the Health Standard. 2. The product should have 100 ppm with a designation of Red List Free or Compliant (less than 1% proprietary ingredients). 3. It should be with low Emitting content.
4	Quality	1. The bidder should provide acoustical panel units and structural grid components of a single manufacturer/OEM. 2. The bidder should identify structural ceiling components with appropriate markings of applicable testing and inspecting organization for fire Performance. 3. It should be tested as per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories (UL) Fire resistance. 3. The bidder should consult a fire protection engineer, NFPA 13, or follow local codes for guidance where automatic fire detection

False Ceiling		
Sr. No.	Parameter	Minimum Requirement
		and suppression systems are present. 4. The bidder should coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.
5	Operational	• The bidder should deliver structural ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes. • The bidder are advisable to maintain room temperature and a stabilized moisture content before installing structural ceiling units. • The bidder should handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way. It is bidder responsibility to provide good, finished quality products and maintain the said quality till installation completion and handover signed off the project.
6	Standards	• American Society for Testing and Materials (ASTM): • International Building Code • ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality • NFPA 70 National Electrical Code • ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures • International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components • International Code Council-Evaluation Services Report - Seismic Engineer Report • International Association of Plumbing and Mechanical Officials - Seismic Engineer Report • LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

10.2 Raise flooring

Raise flooring		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The flooring should be design, supply, installation, testing and commission of the system, The scope also includes the supply, installation & commissioning of any material or equipment including civil works required, accessories, welding, and other activities that are not specifically mentioned in the specifications

Raise flooring		
Sr. No.	Parameter	Minimum Requirement
		and design details but are required for successful commissioning of the project.
2	Size	The access floor panel should be with of size 600 x 600 mm, it should be made from all steel welded construction with an enclosed bottom pan of hemispherical cones and the top plain sheet is fuse-welded at 144 locations to form a panel. The hollow panels should be pretreated and coated with electrostatically deposited epoxy raise 60 - 80 micron thick on all the exposed sides of the panel. The hollow core of the panel should be injected with a light weight, fire retardant, noncombustible cementitious compound at high pressure to ensure support of not less than 90% of the top surface area of the panel. The panel should be laminated with floor grade antistatic laminate of 1.2mm thickness on a semi-automated lamination line to ensure maximum bonding to the steel surface. The edges of the laminate should be with Integral trim.
3	Concentrated load	The concentrated load should be 567 Kgs (1250 lbf) placed on one square inch area using a round or square indenter at any location on the panel. Maximum top surface deflection not to exceed 2.54mm and permanent deformation not to exceed 0.25mm after removal of load.
4	Ultimate load	The Panel shall be capable of withstanding a concentrated load of 1418 Kgs (3125 lbf) applied to one square inch at any location on the panel without failure.
5	Uniformly distributed load	The UDL load should be 2450 kg/m ² with a maximum permissible deflection of not more than 2.5 mm as per definition of "Uniform load" of CISCA.
6	Rolling load	The rolling load should be 281 kgs (619 lbf) of the following magnitude, with a combination of local and overall deformation not to exceed 1.02 mm (0.040 inch) according to CISCA A/F, Section III "Rolling Loads" CISCA AF Rolling Load: 10000 Passes
7	Understructure support system	The Pedestals should be installed to support the panel shall be suitable to achieve a specific finished floor height from the existing floor level and shall be placed 1200 mm distance in both directions to form a rigid grid of 1200 x 1200 mm. The pedestal design shall confirm speedy assembly and removal for relocation and maintenance. The special Pedestal head assembly shall consist of an embossed Plus shape head mechanically riveted to a rolled formed stud of suitable length and 2 check nuts for level adjustment and arresting vertical movement to support the 1200 mm span. The assembly shall provide easy adjustment of leveling and accurately align panels for a maximum of + 25 mm in the vertical direction. Pedestal base shall be

Raise flooring		
Sr. No.	Parameter	Minimum Requirement
		permanently secured in position on the subfloor by effective glue or screw/anchor fasteners. To support the panel the grid shall comprise of a main runner of size 40 x 80 x 1198 mm (W x H x L) and secondary runner of size 40 x 80 x 1158 mm (W x H x L) which will form a grid of 1200 x 1200 mm. The main & secondary runner at 600 mm distance to form a grid of 600 x 600 mm to support the panel.
8	Stringers	The stringer size shall be 16mm x 33mm x 0.8 box type hot dipped galvanized steel, cold rolled construction for strength, lateral stability, and for enhanced rolling load performance and to support the panels on all four sides for alignment without leaving any gap at the pedestal head preventing air leakage. The stringer to have countersunk holes at both ends to accommodate bolting of M6 machine screws to the main and secondary runner.
9	Pedestal Axial Load Test	The axial load on the pedestal should be 22 kN according to CISCA A/F
10	Overturning moment	Pedestal assembly shall provide an average overturning moment of 1000 in-lbs. (113 N mtr) when glued to a clean, sound, uncoated concrete surface.
11	Structural Parameters	The system shall be with a load of 40 kgs dropped from a height of 1000 mm and shall comply to all the performance as specified in the test method (T12.03) of MOB PF2 PS Standards.
12	Performance	The system shall be with 4.5 kgs dropped from a height of 600 mm and shall comply to all the performance as specified in the test method (T13.03) of MOB PF2 PS Standards.
13	Panel	The Panels shall confirm to Class O & Class 1 Fire Ratings tested as per BS 476 Part 6 (Fire Propagation) & 7 (Surface spread of flame) as also ASTM E84 1998 (Flammability) and ASTM E136 (Combustibility)
14	Sub structure	The pedestal assembly should install to support the panel and it should be suitable to achieve a minimum finished floor height should be 600, 800, 900, 1000mm
15	Cable tray service support system	Supply and installation of heavy C strut channel made from Powder coated heavy duty slotted angle engineered to be clamped on the pedestal 100mm above from the concrete floor. The system shall be anchored / clamped (with suitable bolting arrange to avoid slippage of clamps from Pedestals) to the pedestals to take the load of cable trays service pipes, Industrial sockets and any other services required below the floor. The supporting Grid of the cable tray shall be 1200mm center to center in both directions and shall be leveled and in the same plane all throughout the facility.

Raise flooring		
Sr. No.	Parameter	Minimum Requirement
16	Grating Panel/Airflow grill	The bidder should Provide & Fix 600 x 600mm high CFM Grating Panel without volume control damper for monitoring airflow where CRAC units are get installed
		46% Opening Airflow grill
		55% Opening Airflow grill
		65% Opening Airflow grill
		80% Opening Airflow grill
		Volume Control Damper to control the CFM of the airflow
17	Service Panels	Providing and fixing of Ultra strong The Service panels should be with size of 600 X 1200 X 35mm thick it should be engineered to fine dimensional tolerances for modular control, accurate alignment of grids and inter-changeability of panels and for prevention of creep. A full depth ABS edge band should provide total encapsulation of chipboard and protects the edge of surface covering to prevent ingress of moisture. The electrical continuity should be maintained through providing conductive gasket, the positive positioning and location of the floor panel on to the understructure. The bidder should include installation and removal of Ultra strong service panels as per requirement of the project.
18	Air plug	The bidder should provide air plugs to enable Pipe, wire & cables to pass through floor panels. It should allow wires to penetrate from the cavity neatly & safely below the floor to the location. 1) Rectangular Air pug 2) Circular brush grommets 100mm dia
19	Panel Lifter	The bidder must supply minimum 1 Panel lifter for different utility rooms and 5 nos. for server room
20	Vision Panel	The vision panel should be with overall dimension of panel 600 mm x 600 mm. The viewing area should be made out of toughened glass of size 500 mm x 500 mm for viewing critical points that needs frequent monitoring. The panel should be laminated with floor grade Antistatic Laminate / PVC on a semi -automated lamination line to ensure maximum bonding to the steel surface. The edges of the laminate should be protected with conductive PVC edge trim 5 mm wide on all sides. This edge trim is mechanically locked and sealed in place to avoid detachment. The piping joints in the hot aisle should be visible through vision panel. The floor should be having with Blue LED lights to have clear vision without removing vision panel.
21	Multiply air	The cooling system designed to provide multi-fold cooling through an individual airflow grill that balances and ensures proper airflow to individual racks.

Raise flooring		
Sr. No.	Parameter	Minimum Requirement
22	Standard	Class 0 & Class 1 Fire Ratings tested as per BS 476 Part 6 (Fire Propagation) & 7 (Surface spread of flame) ASTM E84 1998 (Flammability) ASTM E136 (Combustibility) 10270 / 096900 (USA) CISCA A/F MOB PF2 PS Standards

10.3 Diesel Generator

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
1	Scope	This scope covers the Supply, installation, assembly, inspections, seismic qualification and testing at tenderer's works, packaging, supply transportation from place of manufacture to site and unloading at site, storage, handling and transportation of equipment from storage to erection site, complete erection, site testing after erection, commissioning, performance testing of seismically qualified emergency Diesel Generator (DG) units with each of 5000 KVA at 0.8 p.f lagging, 415 V, 3 phase, 3 wire, 50Hz along with all auxiliaries and accessories. It is not the intent to specify completely herein, all details of design and construction of components and their material.
2	General	The components and their material selected shall be suitable for intensive power plant service with high efficiency and necessitates minimum surveillance and maintenance.
		The materials and components not specifically stated in this specification, and which should be necessary for meeting the requirements of this specification. All technical specifications shall be included in the scope. Whether called for specifically or not, all accessories required for operation of DG should be deemed to be considered as part of the tenderer's scope of supply
		The diesel engine should be Reliable, rugged, durable design with four-stroke diesel engine combines consistent performance and excellent fuel economy with minimum weight
		It should be factory designed and tested. It should be with low brake-specific fuel consumption technology
		The DG should be fully prototype tested with certified torsional vibration analysis feature available for management

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
		The fuel oil system completes with fuel oil day tank, engine driven fuel oil feed pump, isolating valve on the fuel supply line to the day tank, necessary piping & fittings, duplex strainers, valves, filters, instruments and control required between day tank and engine.
		The lubricating oil system complete with lube oil sump, engine driven lube oil pump, AC motor driven standby lube oil pump, standby AC motor driven pre-lube oil pump (if the pre lube oil pump to be operated continuously), lube oil cooler, electrical lube oil preheater if envisaged, necessary piping, fittings, valves, filters, strainers, instruments, and control hardware as required.
		The air intake system should complete with filter, silencer (if required), pipes, fittings, supports and other necessary accessories as required.
		The engine exhaust gas system should be complete with turbocharger, exhaust manifold, silencer, exhaust piping up to discharge, insulation, expansion bellows, necessary pipes support, adopters etc. as required
		The design, fabrication, and erection of Exhaust stack / Chimney for each DG set with steel supporting structures should be as per local regulatory norms
		The charge air system should complete with turbocharger, charge air cooler, filter, silencer etc. as required.
		The governing system should complete with instrumentation and controls as required for safe and proper operation of DG set and as specified by the bidder
		The complete instrumentation and control system for DG set should require as specified.
		The alternator should directly couple with, brushless exciter, automatic voltage regulator, CTs, alarm initiating devices, indicating instruments and other accessories as required. Terminal arrangement shall be suitable for external cable connections.
		The relay-based control system shall be adopted. Control panels shall be hard wired with controls, relays, instruments, annunciators and other accessories in completely wired and ready to install conditions. Control cabling from instrument terminal block (TB) to DG set junction box (JB) and between DG junction box to LCP is included in the scope of Tenderer. The cabling (including cable trays) from field to control panel shall be in the scope of vendor. Field routing of the control cable shall be done through GI conduit pipes.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
		All electrical equipment shall be provided with required number of cable glands, lugs and other accessories for connection of cables.
3	Fuel Tank	The capacity fuel tank with 12 hours fuel requirement. The fuel requirement calculations need to be submitted along with technical bid
4	Battery	Dry Maintenance free batteries with leads and terminals.
5	AMF Panel	Inbuilt / Outdoor type AMF panel shall be provided complete protection to engine, alternator, starting & stopping DG set automatically on mains failure / resumption.
6	Monitoring	The DG set should be manageable via DCIM with MODBUS Protocol with RS 485 Communication Port so that all software features like DG Set Status - On/Off, Voltage, Current, Frequency, Power Factor, Alarms, Diesel Level etc. can be monitored on the DCIM through video wall screen.
		Monitoring Features required for below parameters: Phase Voltages & Currents, Frequency, Reverse power, Genset kVA, kW, kWh, kVAh, Power Factor, Canopy Temperature, Lube oil Pressure, Engine Temperature, RPM, Run Hours, number of starts, Fuel Level, Auto / Manual Stop, Battery charge condition, AMF feature
		The DG set should be with modular Control System to easily adapt to any configuration, viz standalone, interlocked, synchronized or grid connected
		The DG set should be with Modbus communication, Synchronization, Remote Monitoring facility through user can view Critical genset parameters on laptop or mobile
		It should give alarm in critical situation like Low fuel level, low lube oil pressure, fuel theft, Engine speed, High Engine temperature, Mains On/ Off, Low/ High battery voltage.
7	Air let	• Aftercooler, fresh water, corrosion resistant coated (air side) • Air inlet shutoff • Air Cleaner • Breather, crankcase, top-mounted • Turbocharger, engine oil lubricated
8	Cooling	• Engine coolant water drains • Front Mounted Turbos • Three-bundle oil cooler. • Water Temperature Regulator • Jacket Water Thermostats

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
9	Exhaust:	• 457 mm (18 in) Cat bolt pattern • Dry, gas tight, exhaust manifold • Includes adapter, flexible exhaust fitting
10	Fuel	Duplex
11	Governor	Electronic/ Actuators
12	Lube	Centrifugal oil filters with single shutoff • Service side engine mounted on cylinder block inspection covers • Wet oil sump. Includes engine-driven main lubrication pump, installed oil lines, engine-driven oil pump and oil pan. • Oil filler and dipstick • Valve, oil pressure regulating • Valves, crankcase explosion relief
13	Mounting	• Damper, torsional vibration • Engine and Generator Mounting
14	Starting / Charging	• Vane type air starter • Two motors, engine mounted at rear, on left side • Includes air silencer • Line Group for Single Point Custom Connection
15	Rating	Engine Power Generator Power Engine efficiency (ISO 3046/1) Engine efficiency (nominal)
16	Monitoring System Features	• inbuilt monitor to display all engine parameters and alarm annunciation • Annunciation of all engine shutdowns, alarms, and status points • Start/prelude control switch, fuel control switch and emergency stop buttons • Speed control switch with automatic changing to ball head control when a governor failure occurs, if ball head control is available. Contacts are available for customer use. • Selection of local/remote control of engine • Selection of idle/rated control of engine. • Equipped for remote communication • Four 4-20mA outputs (programmable) • Relay contract signals to the remote monitoring system (summary shutdown, summary alarm, local operation/remote, engine running, PLC failure, fuel control and idle /rated).

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
17	Engine	The engine shall be having following features : • Stationary, • Fully enclosed • Four (4) stroke direct injection • Generating Suitable BHP • Turbo charged and low temperature with after cooled Radiator cooled 1500 RPM in accordance with BS 5514 and IS: 10002 • Compression ignition • Radiator cooled, • Cold battery starting • should be provided with reverse active power protection. • Suitable for black start • Supplied with all accessories. Engine Design consideration: There is no limitations on the number and frequency of starts in any given period. As per Make/Model, the Controller PCC/DSE (Deepsea) / equivalent shall be mounted on Engine.
		Alarms/Trip (Audio and Visual) Minimum following Alarm/Trip indications shall be provided: - Over speed. - High water temperature. - Low lube oil pressure.
		Lube-Oil Priming Pump Intermittent operation lube-oil priming pump (an A.C. motor driven) shall be provided. All necessary accessories/component shall be included for lubrication system i.e. necessary piping, fitting instruments etc..
		Instrumentation on Engine Electronic Instrument panel shall be provided with following indications as minimum: - - RPM indication - Lube oil pressure indication. - Lube oil temperature indication. - Starting switch with key. - Water temperature indication. - Electrical Hour meter - Emergency stops.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
		Day Service Fuel Tank - Shall be provided with suitable calibration scale. - Made of 2 mm thick MS sheet for required fuel storage capacity for 12 hours DG power back up with all accessories such as inlet pipe connection, oil level indicator, outlet pipe connection, trough to collect spilt oil, air vent pipe with air filter, manhole with cover, low level and full level float valve arrangements with all fittings, interconnections between tanks and engine. - The Fuel to be used for trials and acceptance tests shall be high speed diesel. First fill HSD per DG set required coolant and lube oil is included in the scope of this contract at no. extra cost
		Crank Case - Having Steel construction with heavy steel plates to form water compartments around the cylinder. - Crank shaft and governor adequate detachable doors shall be provided on both side of the crank case, to facilitate access to the big end and main bearings. - Additional doors shall be provided to facilitate access for clearing of the water jacket. These doors shall also be detachable.
		Camshaft - Made of induction hardened steel alloy with gear drive, and one of this shall be provided for each block of cylinders. - Built up in replaceable sections of heat-treated precision machined steel with chromium plating. - The fuel injection cams of the split removable type shall be doweled for angular location. - All the cams shall have hardened profiles.
		Crank Shaft - Made of high tensile strength steel forging and shall have a suitable flange to which the flywheel shall be bolted. - The bearing journals and fillets shall be induction hardened; and fully balanced.
		Main and Big End Bearings Shall be detachable shells of high-grade bearing material

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
		- Shall be pre-finished. - The dimensions of the big end bearings shall be such that the connecting rods can be withdrawn through the cylinder liners.
		Connecting Rods - Made of high grade drop forged steel I - beam section, centre to centre length. - The rods shall be rifle drilled for pressure lubrication of piston pin. - The rod shall be tapered at piston pin end provided to reduce unit pressures. - The piston pin of suitable diameter shall be full floating and made of tubular steel and retained by a snap ring.
		Cylinder Liners Supported with replaceable wet liners, cast iron alloy, and provided with specially machined grooves in their bores to give an oil retaining surface. These liners shall be easily replaceable without reboring the block.
		Piston - Made of forged aluminium alloy, cam ground and machined on outer surface. - Shall be oil cooled - The piston shall be fitted with an oil scraper ring, and compression rings of hardened cast iron alloy.
		Bed Plate - Shall be Fabricated from M.S. channel of size 200 mm x 75 mm. or 300 mm x 90 mm. as required. - The welding shall be radiographed, and the entire fabrication shall be stress relieved after welding. - The bed plate shall have integral well ribbed diaphragms for supporting the main bearing housings. This plate shall have an integral lube oil pump and shall be mounted with the engine and exciter on a common steel sub-base.
		Exhaust Manifold The exhaust manifold shall be Multi-branch, of insulated design utilizing Ni-resist casting.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
		Flywheel The flywheel, which shall conform to requirements of NEMA/ASA/BS codes, shall be made of mild steel statically balanced after machining and shall have graduated markings around the periphery. This will facilitate checking of valves and fuel pump timing. Barring slots shall be provided around the flywheel rim for hand-barring.
		Other Auxiliary Equipment/Services These shall be complete, and shall inter-alia include the following: - a. Silencer: Exhaust Silencer (2 Nos. per Engine) shall be residential type to reduce the noise level. b. Cooling: The engine shall be Radiator cooled type. Adequate capacity Radiator shall be provided.
		Governing System - The governor shall be electronic type suitable for class A-1. This shall control the generator frequency and shall be suitable for operation as per the selected battery voltage (24 V DC). - The governor shall be provided with a manually adjustable over speed trip mechanism to automatically shut-off the engine or the fuel supply if the set reaches 120% of rated speed. - It shall also provide an engine mounted emergency push button/lever shall be provided. This shall trip the engine when depressed. This lever shall be suitably protected against accidental tripping.
		Painting - It shall be Bidder's responsibility to paint all exposed metal parts and equipment supplied by Bidder. - All sheet metal work shall undergo a process of phosphating, passivating and then sprayed with high corrosion resistant primer. - The finishing treatment shall be of two coats of synthetic enamel paint of approved colour. - All piping shall be colour coded.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
		Radiator - The Radiator for cooling lube oil and jacket water shall be as per the Engine requirement. - Fuel injection and valves shall not require frequent adjustment while in service. - All filters like fuel, lubrication oil, by pass etc. shall be provided in the engine and shall be dry, paper element type. - Starting system shall be 24V DC comprising of batteries (24 plates, 180 AH capacity), Voltage regulator and arrangement for initial charging of batteries.
18	Alternator	- Brushless synchronous and suitable for 3 phase 415 Volts, 4 wire, 50Hz, 0.8 p.f, 1500 RPM at 47 degree C ambient temperature. - Supporting Drip proof, screen protected as per IP 23. - Suitable for coupling directly to the diesel engines - Suitable for sustaining a 10% overload for 1 hour in any 12-hour period without injury. - The terminal arrangement for alternator shall be suitable for Cable connections of adequate size to deliver the full load of the alternator. - Include one set of suitably rated foot mounted anti - condensation heaters. The alternator shall be Single/double bearing type and self-ventilating. - The alternators shall be Continuous rated and shall have class 'H' insulation designed and built to withstand tropical conditions. It shall generally conform to BS: 5000 (part - 99). - The alternator shall also have a solid-state type of automatic voltage regulator (A.V.R.) suitable for single running with control limits of 1% from no load to full load under normal load changes. It shall be of static type and complete with cross current compensation. The regulator shall be provided with voltage adjusting potentiometer, and shall be complete with all alarm contacts, internal wiring, etc. - The Engine and Alternator shall be direct coupled and mounted on a common rigid fabricated steel base frame with suitable vibration isolation system.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
19	Exciter	It should be Self excited, self-regulated, providing alternator output regulation at plus or minus 2.5%.
20	Tests at Manufacturer's Work	On DG Set a. Maximum power load capacity. b. Maximum motor starting capacity c. Endurance test. d. Fuel consumption at full load, 50% load, 75% load and 25% load. e. Engine - Alternator cooling air flow.
		On the Alternator a. High voltage tests on stator and rotor windings. b. Insulation resistance of stator and rotor windings. c. Temperature rise test. d. Measurement of resistance of stator and rotor windings. e. Measurement of losses. f. Mechanical balance. g. Load rejection and over speed tests. h. Stator voltage and current tests. i. Stator phase sequence check.
		On the Exciter a. High voltage tests on stator and rotor winding. b. Insulation resistance of stator and rotor windings. c. Temperature rise test. d. Measurement of resistance of stator & rotor winding. e. Measurement of losses. f. Response ratio test. g. Over speed test. h. Mechanical Balance test.
		On the Automatic Voltage Regulator a. Sensitivity test. b. Response time test. c. Shop inspection All routine test as per IS/BS codes shall be conducted on alternator, exciter and AVR.
		The offered DG set rating shall be suitable for ISO 8528 confirming by the Engine Manufacturer.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
		The following testing shall be carried out for DG Sets at Manufacturer's work as per ISO 8528 standards, ✓ 75% load: 30 Min. ✓ 100% load: 15 Min. ✓ 110% overload: 15 Min. ✓ Total Testing Time: 1 Hrs. NOTE : All cost shall be borne by Bidders (including client/its representative visit to the SITE inclusive of travel, lodging/stay etc.). The bidder must test all controls/operating safeties will be checked and proper record will be maintained. The Cost of all Fuel, lubricants etc. required for performance testing as per above at Vendors works shall be borne by vendor. . Load for testing at site shall be arranged by bidder at their own cost
		The bidder should require keeping provision of lube oil and Fuel 12 hours with the DG sets. Load and Fuel required for site Tests shall be borne by bidder only. The costs of man power and arrangement of staff for trial run/running in period will be borne by the bidder.
21	Installations	General The work shall be executed and measured as per the instructions/guidelines given in this RFP. The work shall be carried out in compliance with the drawings and design as would be issued to the Bidder by the ENGINEER-INCHARGE duly signed and stamped by them. The Bidder shall not take cognizance of any drawings, designs, specifications etc. not bearing ENGINEER-INCHARGE representative's signature and stamp. Similarly, the Bidder shall not take cognizance of instructions given by any other Authority except the instructions given by the Project Manager in writing. The work shall be executed and measured as per metric dimensions given in this RFP. The Bidder shall acquaint himself fully with the partial provisions for supports that may be available in the structure and utilize them to the extent possible. In any case the Bidder shall provide all the supports regardless of provisions that they have been already made. Nothing extra shall be payable for situations where insert plates (for supports) are not available or are not useful.
		Measurements All measurements shall be taken in accordance with relevant IS codes, unless otherwise specified.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
22	DC Battery System	The bidder should consider batteries of 12 Volts lead acid shall be provided. 2 sets of two batteries, each connected in series, shall be connected in parallel according to capacity for each DG set. DG battery backup should be considered 30 minutes. The batteries shall be supplied duly filled charged and acid filled.
23	Pipes	Exhaust Silencer Piping • Heavy-duty MS pipes confirming to Class -B. • Exhaust pipe along with silencer inside the building shall be provided with mineral wool insulation with chicken mesh wrapping and 26 SWG aluminium cladding. • Suitable length of flexible piping shall be used for connecting the exhaust piping to the engine as per the recommendations of the manufacturer. • All terminal connections and pipes joint shall be of welded construction. The terminals of sizes 2" and above shall be butt welded, and of sizes 1.5" and below shall be socket welded, complete with flanges, jointing and fasteners. • All the welding shall be done as per relevant ASME/ASA codes. The Bidder will have to indicate beforehand the welding procedure he proposes to use. After confirmation by the ENGINEER-INCHARGE the procedure which is finalized shall be strictly adhered to.
24	Inspection and Testing at Site	The Bidder shall inform well in advance in written to the ENGINEER-INCHARGE before commencement of any site testing. All materials like consumable stores, fuel oil grease, lubricating oil etc. required for the trails shall be arranged by the bidder. All pre-commissioning and commissioning test and checks shall be carried out at site. The Bidder shall be required to produce manufacturer's test certificate for the particular batch of materials supplied to him by the manufacturers. The test carried out shall be as per the relevant standards. For examination and testing of materials and the works at site, the Bidder shall provide necessary testing and gauging equipment as required. All such testing and gauging equipment shall be tested for calibration at any approved laboratory as required by the ENGINEER-INCHARGE. The complete installation should be initially started and checked out for operational compliance by manufacturer's representative.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
25	Trials (At Site)	Preliminary Trials The bidder should do erection of generating sets and before carrying out main trials, preliminary site trials shall be conducted in the presence of the ENGINEER-INCHARGE. Such trials shall include the checking and adjustments of all instrument relays, timers, interlocks and meters. Insulation resistance of stator, rotor and exciter windings shall be checked and reading recorded. A check shall be made for the satisfactory working of all auxiliary motors and their starting accessories supplied with the set.
		Main Trials a) Bidder is required to provide first fill of lube oil and Fuel (Full day tank) with the DG sets. Actual Load and Fuel required for site Tests shall be borne by client. Duration of test shall be 2 hour or 4 hours can then be decided later by client. b) D.G. Panel shall be tested for automatic operation by injecting proper current and voltage by a separate source. The satisfactory working of automatic operation shall be tested, and necessary adjustments shall be done for relays in the presence of the ENGINEER-INCHARGE and the results shall be recorded in the test sheet at 30 minutes intervals. Alternator efficiencies as determined in works test shall be used as the basis of calculation for fuel consumption rate. A tolerance of 3% shall be allowed on the fuel oil consumption to cover possible errors in measurement. Tests providing the satisfactory performance of all safety and operating controls shall be carried out. Governor trials shall be carried out as laid down in BS: 5514. Alternator insulation resistance and commutation check shall be as per BS: 5000. c) Starting time of sets shall be tested at least five times after sufficient time intervals to allow for cold start. On completion of tests, inspection doors shall be removed and running gears inspected and alignment checked. d) Any further reasonable trial as suggested by the ENGINEER-INCHARGE shall be carried out with no extra charges. All instruments, materials and labour required for carrying out the trials shall be provided by the Bidder. e) Test sheets of trials shall be forwarded in quadruplicate to ENGINEER-INCHARGE.
26	Witness Test	The tests shall be performed in the presence of ENGINEER-INCHARGE. The bidder shall give at least thirty (30) days advance notice of the date when the tests are proposed to be carried out.

Diesel Generator		
Sr. No.	Parameter	Minimum Requirement
27	Performance Requirement	The D.G. set shall operate up to 110% of rated speed, without undue vibration and noise. The unit shall be capable of delivering rated output at 0.8 p.f. at the generator terminals (after derating of the engine due to site conditions). As soon as the set attains rated speed the transient voltage drop at the generator terminal shall not exceed 10% of rated value.
28	Underground Storage Tank	The underground storage tank shall be 32,000 litres capacity with all accessories such as oil level indicator, inlet pipe connection, outlet pipe connection, drain pipe, air vent pipe, manhole with cover and painting. The tank shall be made out of 8 mm thick MS sheet and shall be rested on concrete pedestals and anchored to prevent uplift when the tank is empty. Anti-corrosive painting shall be provided for the tank.
29	Acoustic Enclosure/Canopy for DG Set	The acoustic enclosure, fabricated from high quality sheet steel of minimum 1.6- or 2-mm thickness finished with powder coating shall be of weather proof construction, designed to reduce noise level to maximum 75 dB at 1 m distance. The enclosure shall be provided with a forced ventilation system to restrict the temperature rise within the enclosure to permissible limits.
30	Standards	The DG set should follow below standards: NEMA MG 1-33, UL508A, 72/23/EEC, 98/37/EC, 2004/108/EC; AS1359, CSA, IEC60034-1, ISO3046, ISO8528, NEMA MG 1-22, OEM should have ISO 9001, ISO 14001, ISO 18001 / ISO 45001 certified

10.4 33 KV Transformer

33 KV Transformer		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The bidder is responsible for complete scope of Supply, installation, testing and commissioning of three phase four wire 33 KV dry type outdoor three phase potential transformers common tank equipped with weatherproof bushing for outdoor use
2	General	The equipment shall be suitable for operation under climatic conditions
		The transformer should be with 33 KV three phase Current Transformer (3 Nos. for R, Y & B phases).
		The 33 KV current Transformer shall be dry type, three phase confirming to IS:2705/1992 with latest amendment

		Normal system voltage 33KV rms
		Highest system voltage 36KV rms
		Nos. of phases - 3 phase
		Impulse withstand voltage 170 KVP (on assembled CTPT set)
		i) One minute power frequency dry withstand voltage (on assembled CT-PT set) a) primary 70 KV r.m.s. b) secondary 3 KV r.m.s.
		ii) One minute frequency wet withstands voltage $\sqrt{2} \times 70$ r.m.s (KV Peak) (On assembled CT-PT set)
		Transformation PT ratio 33 KV/ 110V
		Rated output 30 VA (VA burden)
		Class of accuracy 0.5 S (As per IS :3156/1992)
		Rated continuous thermal current - 1.2 continuous and 1.9 for 30 secs.
		Winding connection - Star/Star
		Rated dynamic current - 2.5 times of short time thermal current rating.
		Temp. rise over max. ambient temp. Within limits of IS :3156/1992
		Max. Phase angle error - Within limits of IS :3156/1992
		Ratio error (Max.) - Within limits of IS :3156/1992
3	Structure	Electrically welded sheet steel tank/ enclosure for accommodating above instrument transformers with suitable bolted cover
4	Design and Performance Requirements	a) The distribution transformers shall be Dry type ANAN. The transformer shall compliance with Data sheet. Transformers shall operate without injurious heating at the rated capacity within +10 Percent of the rated voltage of that particular tap. b) Transformers shall be capable of delivering the rated current at a voltage equal to 105 percent of the rated voltage without exceeding the limiting temperature rise. c) Overloads shall be allowed within the conditions defined in the loading guide of the applicable standard. Under these conditions, no limitations by terminal bushings, or other auxiliary equipment shall apply. d) Transformers, complete with bushings / cable boxes, shall be designed and constructed to withstand without damage, the effects of external short circuits as per the specified standards.

5	Core	a) The magnetic circuit shall be constructed from prime grade cold rolled non ageing grain-oriented silicon steel laminations. It should be provided with a coat of varnish to protect against corrosion. b) The insulation structure for the core to bolts and core to lamination plates shall be such as to withstand a voltage of 2000 V for one minute. c) Complete design of the core must ensure permanency of the core losses with continuous working of the transformer
6	Internal Earthing	The framework and clamping arrangement of core and coil shall be securely earthed by a) HV Windings shall be casted with epoxy resin & should be pre mixed with active filler which should make the coil self-extinguishing and should comply with fire behavior CLASS F1 as per IEC 60076. b) LV winding shall be made from copper foil pre impregnated with Class F epoxy resin so as to have lower stray losses and higher with stand capacity under short circuit condition. c) Transformer shall comply to climatic test category environmental category E-3 as per IEC 60076 d) Winding shall be subjected to a shrinking and seasoning process so that no further shrinkage occurs during service. e) The insulation class of the winding shall be uniformly insulated and shall be of class-F. f) The winding shall withstand peak impulse voltage of 70KV and power frequency voltage withstand of 70KV/3KV for HV/LV Respectively. g) The temperature rise of the winding shall be limited to 85 degree Cover an ambient of 47degree C.

7	Automatic on Load Tap Changer (OLTC) with RTCC and AVR	a) The equipment shall be of high speed, transition resistance type conforming to IS: 846 and suitable for indoor installation. b) The OLTC shall employ rotary snap action switching with both selector and diverter duties combined. The OLTC shall have corrective step voltage at 1.25%. c) The OLTC must be suitable for mounting externally on a flange provided on the transformer. d) The OLTC operating mechanism shall be housed in a separate enclosure, which shall be totally dust and weatherproof with a cable entry gland plate the bottom. e) The control equipment shall comprise the following: a. Mechanical tap position indicator. i. Handle for manual operation. ii. Tap change operation counter. b. Mechanical stopper to prevent over cranking of mechanism beyond extreme tap positions. i. Driving mechanism chamber locking arrangement. ii. Terminal board with connector for transformer tap leads iii. Phase reversal protection relay iv. The control equipment shall further include the following for Auto operation. v. Incoming power supply ON-OFF TPN load break switch vi. Driving motor suitable to operate on 433V, 3phase, 50Hz, AC supply. The Motor shall be of the totally enclosed, horizontal foot mounted type with Class B insulation. vii. Overload and short circuit protections for the motor viii. Contactors for 'Forward' and 'Reserve' operation along with protective MCBs. ix. Anti-condensation heater. x. Selector switch for 'Lower' and 'Raise' operation xi. Safety limit switches for 'Lower' and 'Raise' extreme limits. xii. Directional sequence switch and stepping relay xiii. One PT of suitable VA burden for sensing the degree of correction.
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		f. Interlock between manual and electrical operations. g. Any other accessories as may be required for the satisfactory operation of the unit. h. The RTCC shall comprise the following: 1. Indoor, floor mounting, free standing, totally enclosed, dust and vermin proof cabinet abdicated out of 14SWG CRCA sheet with IP: 54 degrees of protection. 2. One automatic voltage sensing and tap changing relay (AVR) with Adjustable time gap between tap changers. 3. One digital tap position indicator. 4. One 16-window alarm annunciator and auxiliary contactors for fault contact multiplication. 5. One 100VA, Control Transformer for the AVR. 6. One auto-manual selector switch and one control supply `ON-</li> <li>7. One indicating lamp to show `Tap change in progress' with hooter and one lam for tap changer failure indication. Remote hooter provision to be made. 8. One Local / Remote Selector Switch 9. One spring return to neutral type raise/lower switch. 10. Set of Terminals for Incoming and Outgoing Cables. 11. One set of control MCBs, Elmex terminals, wiring, earthing etc. 12. Potential free contacts to be provided for monitoring the transformer tapping position in DCIM 13. Provision for communication of RTCC with DCIM shall be provided which is suitable for open protocol.
8	Bushings	a) Bushings shall be designed and tested to comply with IS: 3347 amended up to suit the current class. b) Bushings shall be so located on the transformers that full flashover strength will be utilized and minimum clearance as required for the BIL shall be realized between live parts and live parts to earthed structures. c) The bushing terminal shall be rated to carry the bushing rated current without exceeding a temperature rise of 90 deg. C in an ambient of 50 deg. C. The connector/clamp shall be designed to be d) Corona free at the Maximum line to ground voltage. e) For HV minimum clearance of 280 mm between phase to phase and 140 m between phases to earth should be maintained or as per the standard requirements.
9	Cable Boxes and Disconnecting Chambers	a) Disconnecting chambers suitable for Primary and secondary shall be provided b) Cable boxes shall be suitable for terminating the cables on HT side & bus ducts on LT Side. c) The degree of protection for cable boxes, disconnecting chambers & marshalling box shall be minimum specified as IP-55.

10	Fittings and Accessories	Following fittings shall be provided: a) Bushing Terminals complete with connectors for the cables b) Neutral bushing terminal complete with connector for earth conductor c) Inspection cover d) Rating and terminal marking plates e) Two earthing terminals for HV and LV cable boxes and marshalling box. f) Lifting lugs for lifting complete transformer g) WTI with alarm & trip contacts h) Jacking Lugs i) The under base shall be provided with Bi-directional plain roller for placing on platform or plinth as per site requirements. j) Sets of Neutral CTs as per Single line diagram shall be mounted in the Transformer Terminal box and wired to terminals for external connections for monitoring neutral current, REF protection relay 64R and earth fault relay 51G. Also refer SLD for the details.
11	Neutral Current	MEASUREMENT CT RATIO: 2000/1A CI-1
12	Tests	Transformers shall be completely assembled at Works to ascertain that all parts Fit correctly.
13	Routine Tests	Routine tests as per IS -11171 specified standards shall be performed on all transformers. The following additional points may be noted: a) Measurement of winding resistance of all taps b) Measurement of Voltage ratio & check of voltage vector relationship c) Measurement of impedance voltage, short circuit impedance and load loss. d) Measurement of insulation resistance. e) Dielectric tests. a. Separate source voltage withstand test b. Induced over voltage withstand test f) Measurement of no-load loss and current.
14	Type Tests	Type tests as per IS -11171 specified standards shall be performed on transformer. The following additional points may be noted: a) Measurement of winding resistance. b) Measurement of Voltage ratio & check of voltage vector relationship c) Measurement of impedance voltage, Short circuit impedance and load loss. d) Dielectric tests a. Separate source voltage withstand test b. Induced over voltage withstand test e) Measurement of No load loss and current f) Lightning impulse test. g) Temperature rise test Bidder shall furnish type test certificates along with the Tender.

		In the absence of the same, Bidder shall carry out the type tests without any cost implication to the Engineer-In charge.
15	Test Report	Test results shall be corrected to a reference temperature of 75 deg. C. Two copies of preliminary test results shall be submitted for the Engineer-In charge approval before dispatch of transformer. Additional bound copies of complete test results including all tests on transformers, auxiliaries, and current transformer characteristics shall be furnished with the transformer.
16	Losses	a. Tenders will be evaluated based as mentioned below: 1. No load losses: 3.0KW 2. 100% Load losses: 22 KW 3. However, transformer efficiency shall not be less than 98.8%. b. For the purpose of evaluation of Tenders, the quoted load losses and no-load losses will be increased to take into consideration tolerance as permitted by applicable standards, in the even the losses are indicated exclusive of tolerance. c. It Should the losses as measured on the transformer after manufacture be found in excess of the guaranteed losses with plus tolerance, the Bidder shall pay to the Engineer, penalty charges based on the capitalization of cost indicated above.
17	Rejection	Engineer-In charge may reject any transformer if during tests any of the following conditions arise 1. Load loss exceeds the guaranteed value by +10% or more. 2. Impedance value differs the guaranteed value by + 10% or more. 3. Winding temperature rise exceeds the specified value by 5oC. 4. Transformer fails on impulse test. 5. Transformer fails on power frequency voltage withstand test. 6. Transformer is proved to have been manufactured not in accordance with the agreed specification.
18	Guarantees	The items of performance on transformers shall be guaranteed either under penalty or under correction. The temperature rise guarantee shall have zero tolerance on the positive side.
19	Test Reports	Test results shall be corrected to a reference temperature of 75 Degree C. 1. Two copies of test results shall be submitted for ENGINEER-INCHARGE approval before dispatch of transformer. 2. Additional bound copies, as required by the ENGINEER-INCHARGE of complete test results including all tests on transformer, bushing, shall be furnished
20	Standards	Standards: IS:2705-1992; IS:3156-1992; IS:5621-1980; IS:2099-1986; IS:3347-1986; IS:335-1983; IS :5561

10.5 HT Panel

HT Panel		
Sr. No.	Parameters	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes HT panel installation work with all required accessories, cabling, and other activities that are not specifically mentioned in the specifications and design details but are required for successful commissioning of the project.
2	Type of Panel	(a) The bidder must use vacuum circuit breaker. (b) Gas filled Circuit Breaker: These breakers are new in the market and are being used for 33 KV and above in power distribution. These may be used on selective basis based on their availability, serviceability, and cost. (c) The bidder must use gas insulated compact switchgears
3	Panel Board	The HV Panel Board shall be metal clad, indoor, floor mounting, free standing type. It shall be totally enclosed dust, damp and vermin proof.
		The Panel shall be provided separately earthed compartments for circuit breakers, bus bars, relay & instruments, CT & PT and cable boxes, fully and effectively segregating these from one another so that fault in any one compartment do not cause damage to equipment(s) in other compartment(s).
		The housing shall be of bolted construction to ensure compact and rigid structure, presenting a neat and pleasing appearance. The sheet steel used should not be less than 2 mm thick.
		The panels shall be bolted together to form a continuous flush front switch gear suitable for front operation of board and for extension at both ends.
		The HV panel board shall be designed such that the switchgear, instruments, relays, bus bars, small wiring etc. are arranged and mounted with due consideration for the following:- (i) Facility for inspection, maintenance and repairs of testing terminals and terminal boards for ease of external connection. (ii) Minimum noise and vibrations. - Risk of accidental short circuits and open circuits. - Secured and vibration proof connections for power and control circuits. (iii) Risk of accidental contact and danger to personnel due to live connections. (iv) Mountings at approachable height.

HT Panel		
Sr. No.	Parameters	Minimum Requirement
4	Circuit breaker	The circuit breaker panels shall be complete with the following: (a) Racking in / Racking out mechanism. (b) Isolating plugs and sockets. (c) Mechanical inter-locks and safety shutters. (d) Mechanical ON/OFF indicator. (e) It should be with NO and NC Auxiliary contacts directly operated by the circuit breaker. Sufficient NO & NC contacts can be provided with auxiliary contractors. (f) Anti-condensation space heaters suitable for operation on 240V, 1 50 Hz A.C. for Suitable tripping arrangement. (g) Mechanical counter to assess the total number of operations of the breaker (if asked for specifically).
		The circuit breaker shall be of horizontal/ vertical isolation, horizontal draw out pattern.
5	Operating	Manually operated spring charged / motor wound spring charged with both mechanical and electrical release for closing. The operating mechanism shall be trip free.
		Manually operated spring charged / motor wound spring charged with both mechanical and electrical release for closing. The operating mechanism shall be trip free.
		External auxiliary supply shall be made available for charging motors & heaters operation.
		The switch board shall be single bus bar pattern with air insulated encapsulated bus bars housed in a separate compartment, segregated from other compartments.
6	Busbar	The bus bars shall be of high conductivity electrolytic copper. The bus bars shall be sized for carrying the rated and short circuit current without over-heating. Maximum bus bar temperature shall not exceed 95-degree C.
7	Quality	Accommodation shall be provided in the circuit breaker panel to mount one set of three numbers dual core dual ratio CTs for metering and protection purposes. Access to the CTs for cleaning, testing or changing shall be from the front, back or top of the panel.
		The CTs shall conform to relevant Indian Standards. The design and construction shall be robust to withstand thermal and dynamic stresses during short circuits. Secondary terminals of CTs shall be brought out suitably to a terminal block which will be easily accessible for testing and terminal connections. The protection CTs shall be of accuracy class 5 P 10 of IS 2705- Part III-1992

HT Panel		
Sr. No.	Parameters	Minimum Requirement
		The metering CTs shall conform to the metering ratio and accuracy class 0.5 of IS 2705-1992 for incomer and class 0.5 for outgoing panels.
		The accuracy class for the VT shall be class 0.5 as per IS 3156 Parts I to III for incomer and class 1 for outgoing panels.
		The Relays shall be microprocessor based numerical relays with O/L, E/F and S/C protection Tripping relay shall be used for tripping signal to the Shunt Trip Coil of Circuit Breaker operating on 24 V/ 30 V D C supply / Power pack / 110 V VT supply.
		The over current relays shall have adjustable setting for current from 50% to 200% and earth fault from 10% to 40% or 20% to 80%. These should be of manual reset type. All relays shall have a LED indicator which will indicate operation for each function. It shall be possible to reset it only by manual operation.
8	Metering Instrument	The Energy metering shall be done either on the incomers or on the feeders
		Where a bus coupler is incorporated and only one incomer feeder (out of two available) is intended to be operated at a time, a VT Transfer Relay shall be incorporated to provide necessary potential for metering. This will be necessary when energy metering is done on individual feeders or where VT supply is used for trip circuits. Alternatively, PTs shall be provided on both the bus sections (incomers) with individual metering on each incomer.
		The instrument panel shall form part of the housing. Relays, meters and instruments shall be mounted as per general arrangement drawings to be submitted by the tenderer. They shall be preferably of flush mounting type at a maximum height of 2000 mm.
		Instrumentation (a) A voltmeter of class 1.5 accuracy as per IS 1248 shall be provided at each incomer panel, with selector switch. The instrument shall be calibrated for the ranges specified. (b) Energy meters of class 1.0 conforming to IS 722 (Part IX) and power factor meter of class of accuracy of 2 shall be provided, if specified. (c) Ammeter of specified range of class 1.5 accuracy as per IS 1248 shall be provided at both incomer and outgoing panels along with necessary selector switches.

HT Panel		
Sr. No.	Parameters	Minimum Requirement
9	Assembly	The panel assembly shall also take care of the following requirements: (i) Lamp indication shall be provided to indicate ON/ OFF (by red, green respectively) of switch gear. (ii) Panel illuminating lamp. (iii) Mechanical indication for spring charged status. If possible an indicating lamp could be provided. (iv) Lamp indicating tripping at fault status. (v) Healthy trip supply shall be indicated by clear lamp. (vi) Separate fuses/ MCBs shall be provided for lamps, heaters, voltmeters and other instrumentation etc. on each panel. (vii) Anti-condensation space heaters shall be provided, and shall be suitable for operation on 240 V, 1 phase, 50 Hz A.C. for each panel if specified. (viii) Where there is more than one incomer and bus sections, these shall be castle key interlocked as per interlocking scheme
		Provision for top (bus ducts preferred for top entry) / bottom or such other side entry shall be made as per requirement with sufficient head room for cable termination. 3 mm thick removable gland plate shall be provided for cable termination.
		The earthing of the breaker body and moving portion shall be so arranged that the earthing of the non-current carrying structure to the frame earth bar is completed well before the main circuit breaker plugs enter the fixed house sockets.
		The entire panel board shall have a common tinned copper earth bar of suitable section with 2 earth terminals for effectively earthing metallic portion of the panels.
		The installation work shall cover assembly of panels lining up, grouting the units etc. In the case of multi panels switch boards after connecting up the bus bar all joint shall be insulated with HV insulation tape or with approved insulation compound. A common earth bar shall be run preferably at the back of the switch board connecting all the sections for connecting the earth system. All protection, indications & metering connections and wirings shall be completed.
10	Commissioning	Commissioning checks and tests shall include in addition to checking of all small wiring connections, relays calibration and setting tests by secondary injection method and primary injection method. Primary injection test will be preferred for operation of relay through CTs. Before panel board is commissioned, provision of the safety namely fire extinguishers, rubber mats and danger board shall be ensured. In addition, all routine megger tests shall be performed.

HT Panel		
Sr. No.	Parameters	Minimum Requirement
11	Testing	Checks and test shall include following: (a) Operation checks and lubrication of all moving parts. (b) Interlock function checks. (c) Continuity checks of wiring, fuses etc. as required. (d) Insulation tests. (e) Trip test and protection gear tests. (f) The complete panel shall be tested (g) Any other tests as may be required by the Licensee / Inspector shall be conducted. (h) Where specified, the entire switch board shall withstand high voltage test after installation. (i) Any other test required by the consignee/ inspecting officer.
12	Standards	The Panel shall be of indoor type, having the incoming sectionalization and outgoing switch gears as per IS 13118: 1991 of VCB, IEC 62271-100 for Breakers and -200 for Panels/ IS 3427 of switch board. The degree of enclosure protection shall be IP-4X.

10.6 LT Panels, ACB & MCCB

LT Panel, ACB & MCCB		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes LT panel installation work with all required accessories, cabling, and other activities that are not specifically mentioned in the specifications and design details but are required for successful commissioning of the project.
2	General	The Panel should be free standing, floor mounting, indoor type. The functional components should be mounted on non-perforated mounting plate. All components should be front accessible only
		The panel should be Symmetrical, stable profiled frame construction, consisting of rolled hollow section punched on DIN pitch pattern. Panels should have minimum Static Load capacity of 1.35 Tone and above. The enclosure should be also IEC 62208 certified
		The enclosure material should be CRCA "D" Grade / Galvanized shall be made in accordance with the worldwide standard IEC 61439-1/-2 & IEC61641 modular, easily extensible and buyable profiled enclosure systems with Horizontal and / or vertical bus bar and cable compartment.

LT Panel, ACB & MCCB		
Sr. No.	Parameter	Minimum Requirement
		The main frame should consist of top cover, rear bolted cover and bottom cover with standard gland plates. Cubicle Separation plate, cross members and equipment mounting plates are galvanized. Partial doors, covers are PU foamed integrated to ensure high degree (IP54) of ingress protection. Polyurethane foam gasket should be fungus resistant and rodent repellent (material composition and third part laboratory certificate should be produced). The panel and components (Door locks and hinges) should have mentioned in the IEC 61439 test certificate.
		Panel should have certified IK 10
3	Construction	Rear Panel: 1.5 mm sheet steel Roof Plate: 1.5 mm sheet steel Door: 2 mm sheet steel Mounting Plate: 2.0mm / 3.0 mm Side Panels: 1.5 mm sheet steel Gland Plate: 3.0 mm thick Aluminium cover gland plate
4	Protection category	The panel should be complete assembled enclosure without cut-out is conforming DOP IP54. All flat parts in the panel should be potentially equivalized
5	Enclosure	Enclosure Interior and exterior is powder coated with RAL 7035 Tex finish after proper sheet metal treatment.
		The painting process of the panels should follow the procedures for higher paint life to prevent against corrosion. Superior treatment paint process should be followed. The sheet should be uniformly coated with a special nano-ceramic coating, dip coat and powder coating of 90-120 microns thereby ensuring that RoHS standards compliance is achieved. It should comply WEEE standards.
6	Busbar	The installation of the main busbar system should be fitted in the roof, floor, or rear (top or bottom), the positioning of the distribution rail system should be fitted behind or in the function room. The elements of the installation should provide with the same installation framework (hole profile) as the industrial enclosure framework. For the mounting of partial doors, for the top and bottom of the module installation in protective type.
		The panel should be Arc fault tested as per IEC 61641 with 70kA for 300 msec.
		Copper Used shall be of Electrolytic Grade. No drilling shall be allowed on Main Busbar systems of LV Assemblies to avoid Heating on Joints.

LT Panel, ACB & MCCB		
Sr. No.	Parameter	Minimum Requirement
		All busbar support shall be non-hygroscopic, thermally modified hard PVC of high dielectric strength to provide a permanent high dielectric non-aging and non-tracking protection impervious to water, tropical condition and fungi. The insulation shall be non-inflammable and self-extinguishing and in fast colors to indicate phases. The continuous operating temperature max 90 deg C and fire protection corresponding to UL 94-V0 standards
7	Design	The complete verification should be comprised of an assembly cover sheet, the design verification and the routine verification. The assembly cover sheet should comprise the rating data and usage conditions of the respective switchgear and control gear assembly.
		The design verification should include the chosen verification method, the verification criteria, and the test report number or number of another report or the calculation. This document should be submitted with supply of the panel. These may only be inspected by a user/ consultant.
8	Site Conditions	For general climatic conditions, refer and comply the specified project site conditions. The main distribution boards shall comply and perform satisfactorily at the below listed special design conditions as minimum: Ambient temperature: 47°C Relative humidity: 95% (at 55°C) General Arrangement & Assembly L.V Panel shall comprise of free-standing enclosure, bus bar system, switching devices such as ACB/MCCB, metering equipment's, current transformers and all other necessary components as required. Panel shall be assembled in a systematic manner such as Transformer Incomer section, Generator Incomer section (if applicable), Bus coupler section (if applicable), Incomer Metering / Indication section and Outgoing section. Unless otherwise specified the panels shall be designed to accept bottom/top entry of cables. The rear access shall only be provided for termination of cables, all other equipment's shall be accessible / operable from the front of panel. If front access is specified, the panel shall be designed completely for front access only (with cable alley in front). Each panel section (cable compartment) shall be provided with thermostatically controlled space heater. Each section shall be arranged typically as described below and as per the details shown in the drawings:
9	Testing	Type test The main distribution board and the components as applicable shall be type tested in accordance with the IEC/IS standards to verify the specified fault level withstand capacity from a reputed

LT Panel, ACB & MCCB		
Sr. No.	Parameter	Minimum Requirement
		and approved type testing laboratory and certified by an competent authority. Type test certificates shall be submitted to the Engineer-In charge engineer for verification. Routine test The panel assembler shall perform the routine test and provide the test certificates as defined in IEC standards. The routine test shall include but not limited to the following: 1. Inspection of the assembly including inspection of wiring and electrical operational test. 2. Dielectric test & Insulation resistance test. 3. Checking of protective measures and of the electrical continuity of the protective circuits. 4. Functional test as per the approved test procedure. Routine test certificates and test readings shall be submitted to the Engineer-In charge engineer for verification.
10	Metering	MFM shall have LED display with I, V, Energy, Power, PF, Hz, Demand etc. THD % I and % V with individual harmonic up to 15th level. MFM shall have accuracy with Class 1 with sample rate of 64 samples per cycle and RS485 port. MFM shall also have provision to calculate neutral current.
11	Switchgear	The circuit breakers shall be of the air brake type, robust and compact design suitable for indoor mounting and shall comply with the requirement IEC 60947-1 and 2. Rupturing capacity shall be as stipulated in Schedule of quantities. Heat loss per pole shall be low. ACB with molded case design to ensure high endurance without maintenance, and the Ultimate breaking capacity (I_{cu}) = I_{cs} = I_{cw} as per SLD for 1 Sec. The breaker shall comply with the isolation function requirement of IEC 60 947-2 to be marked as suitable for isolation / disconnection to facilitate safety of operating personal while the breaker is in use. Protective devices, metering, CTs, PTs, push buttons and indicating lamps shall be provided as per schedule of quantities. Constructional Features The Circuit Breaker shall be flush front, metal clad, horizontal draw-out pattern, three/four pole as required and fully interlocked. Each Circuit Breaker shall be housed in a separate compartment enclosed on all sides. The Circuit Breaker cradle shall be designed and constructed to permit smooth withdrawal and insertion. The movement shall be free of jerks, easy to operate. Mechanical Latch to be provided to identify the isolated, test & service position of breaker to prevent over racking.

LT Panel, ACB & MCCB		
Sr. No.	Parameter	Minimum Requirement
		All current carrying parts in the breaker shall be silver plated and suitable arcing contacts shall be provided to protect the main contacts which shall be separate from the main contacts and easily replaceable. In addition, Arc chutes shall be provided for each pole, and these shall be suitable for being lifted out for the inspection of the main and the arcing contacts. Self-aligning cluster type isolating contacts shall be provided for the Circuit Breaker, with automatically operated shutters to screen live cluster contacts when the Breaker is withdrawn from the cubicle. Sliding connections including those for the auxiliary contacts and control wiring shall also be of the self-aligning type. The fixed portion of the sliding connections shall have easy access for maintenance purposes. The cubicle for housing the Breaker shall be free standing dead front pattern, fabricated from the best quality sheet steel.
		Operating Mechanism The Circuit Breaker shall be trip free with independent manual spring operated or motor wound spring operated mechanism as specified and with mechanical ON/OFF indication. The operating mechanism shall be such that the circuit breaker is at all times free to open immediately the trip coil is energized. The breaker shall be provided with in built antidumping mechanism. The operating handle and mechanical trip push button shall be at the front of and integral with the Circuit Breaker. The Circuit Breaker shall have the following four distinct and separate positions which shall be indicated on the face of the panel. The breaker shall get latched in each of three positions namely Service, Test and Isolated, operator to de latch before racking in/out to other position "Service" -- Both main and secondary isolating contacts closed "Test" -- Main isolating contacts open and secondary isolating contacts closed "Isolated" -- Both main and secondary isolating contacts open "Maintenance" -- Circuit Breaker fully outside the panel ready for maintenance

LT Panel, ACB & MCCB		
Sr. No.	Parameter	Minimum Requirement
		Circuit Breaker Interlocking Sequence type strain free interlocks shall be provided to ensure the following: It shall not be possible for the Breaker to be withdrawn from the cubicle when in the "ON" position. To achieve this, suitable mechanism shall be provided to lock the Breaker in the tripped position before the Breaker is isolated. It shall not be possible for the Breaker to be switched "ON" until it is either in the fully inserted position or, for testing purposes, it is in the fully isolated position. It shall not be possible for the Circuit Breaker to be plugged in unless it is in the OFF position. A safety latch shall be provided to ensure that the movement of the Breaker, as it is withdrawn, is checked before it is completely out of the cubicle, thus preventing its accidental fall due to its weight. Mechanical and electrical anti-pumping devices shall be incorporated in the ACB's as required.
		Circuit Breaker Auxiliary Contacts The Circuit Breaker shall have suitable free / minimum 6 NO/NC auxiliary contacts rated at 10 amps 415 volts 50 Hz. These contacts shall be approachable from the front for connecting all external wiring from the front. They shall close before the main contacts when the Circuit Breaker is plugged in and vice versa when the Circuit Breaker is Drawn Out of the cubicle.
		Electrical Auxiliaries All electrical auxiliaries, including the spring charging gear motor shall be installable on site without requiring adjustment or any tools other than a screw driver The auxiliaries shall be placed in a compartment which under normal operating conditions, shall not contain any conducting parts capable of entering into electrical contact with the circuit breaker poles. It shall be possible to connect all auxiliary wiring from the front of the circuit breaker.
		Circuit breaker Releases The Air Circuit Breakers should have microprocessor release. The circuit breaker to be equipped with the microprocessor-based release with adjustable short circuit protection with adjustable time delay, Overcurrent protection, and adjustable earth fault protection with adjustable time delay. The bar graph to show percentage loading of the breaker, Release should have LCD display with Phase currents.

LT Panel, ACB & MCCB		
Sr. No.	Parameter	Minimum Requirement
		It should be possible to store tripping history of last ten faults with time and date of fault and the type of fault with values. The control unit shall have thermal memory throughout the range to store temperature rise data in case of repetitive overload or earth fault for protecting the cables and loads. ACB should have built in Zone selective interlocking (ZSI) for logic discrimination to reduce thermal/electrodynamics stresses in the event of short circuit and earth fault. Individual fault trip LED indications (OL, SC & EF) shall be available on trip units for easy & faster identification of cause of fault. All ACB should have both side terminal adapter horizontal and vertical. On line setting of the parameters should be possible. The setting of the ACB should be possible digitally as well as with dial settings with the help of screwdriver. All ACB should have communication port for communication with BMS / EMS system on Ethernet communication.
12	Standard	IEC 61439-1-2 IEC 61641 (Panel should be completely design verified by OEM). The bidder should attach OEM confirmation letter along with compliance documents

10.7 Busbar trunking system for HT-LT Panel

Busbar trunking system for HT-LT Panel		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes busbar trunking system installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	Fully enclosed by insulated housing, the compact bus-bar trunking system shall be installed from ground floor electrical room low voltage and essential panels up to 6th floor roof level of the building to facilitate power distribution system to the all floor, lifts etc. There shall be two bus-bar trunking, one for normal power and the other for essential power supply, common for all floors.

Busbar trunking system for HT-LT Panel		
Sr. No.	Parameter	Minimum Requirement
		The low impedance prefabricated rising main bus-bar trunking shall be suitable for use in installation conforming to IEC-439.1.
		The bus-bar trunking system shall be comprising bus-bar riser, elbow, tee, expansion unit, tap off box connection, circuit breaker, bend, flange, maintenance plug, closed type transformer connection unit, and all other accessories complete for proper installation on wall, with roof and in bus-bar riser duct. The BBT system must have minimum 120 minutes fire barriers.
3	Construction and assembly of BBT	The Tap-off units must be designed in such a way that the units can be fitted or removed while the system i.e., the main bus-bar trunking is energized. The BBT shall have min. 120 minutes fire barrier.
		The Circuit breaker in the Tap-off units shall be of quick-make, quick break, trip-free, indicating type having adjustable thermal over-current and adjustable/instantaneous Electro-magnetic short circuit release having the rated interrupting capacity.
		All the components of the BBT i.e., main bus-bar reduction unit, fire barrier, fixing bracket, tap-off boxes, circuit breakers, elbow, tee, feed nut, end cover, expansion unit, reduction unit, etc. shall be from the same manufacturer.
4	Test	Manufacturers test certificate for manufacturing and assembly are to be attached along with valid type test certificate.
5	Installation	The BBT system shall be installed on floor, ceiling, walls, bus-duct etc., with all necessary cutting, breaking, cleaning, making good in all respect with nuts, bolts, lugs, isolation joint stacks, hangers etc. complete accessories. The bus-bar trunking shall be installed, tested & commissioned as per design standard, specification and instruction of the Engineer.
		The bidder shall be responsible for supplying all materials, equipment, tools, etc. required for installation, testing and commissioning of the bus-bar trunking system, starting from sub-station LT panel up to 6th floor roof level of the building.
		The bidder shall put their attention by keeping co-ordination with other Contractors of this project for installation of BBT system as per design and direction of Engineer, so that no conflict arises for BBT system installation.
6	Climatic test	Damp heat, constant, to IEC 68 Pt
7	Maximum ambient Temperature	47 degree C
8	Degree of protection	IP 54

Busbar trunking system for HT-LT Panel		
Sr. No.	Parameter	Minimum Requirement
9	Bus-bar materials	Copper (HDHC)
10	Fire withstand Capacity	minimum 120 min.
11	Clamping	Single bolt clamping
12	Standards	IEC 439-1 & VDE0660 Pt500

10.8 Electrical cabling & lightning work

10.8.1 Advanced Lightning Protection System

Lightning System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes electrical cabling installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	• The lightning protection system should comply in accordance with NFC 17-102 standard and shall be installed strictly to the instructions. • The advanced lightning protection system shall include components should be follow ESE air terminal mechanical supports down-conductors • Performance Recording Equipment a low impedance Grounding system • The design of the components shall be traceable to field research, laboratory testing, fundamental analysis, and statistical levels of the lightning event. The work to be done under this section comprises the supply & installation necessary for the complete installation of the lightning protection system. • The design of the components shall be traceable to long term practical field studies laboratory testing, fundamental scientific principles and statistical levels of the lightning event as documented in international standard.

Lightning System		
Sr. No.	Parameter	Minimum Requirement
3	Air terminal	• The materials of the air termination shall be non-corroding in normal atmosphere. • The air termination shall not be dependent upon batteries or external power supplies for any part of its operation. • The Height of the air terminal support mast should be minimum 2mtrs and the height will be increased as per the coverage design. • The support shall be securely installed and guy wires shall be used where necessary to enable the air termination and mast system to withstand maximum locally recorded wind velocities. • The air termination shall be of the type that responds dynamically to the appearance of a lightning down leader by creating free electrons between outer surfaces and an earthed central finial rod. • The Air terminal should work under Early Streamer Emission (ESE) Technology and the attractive radius of the air termination shall be traceable to known and acceptable lightning research and statistics. The Lightning conductor should deliver a unique gain time in efficiency, anticipating the natural formation of an upward leader. The Air terminal generates a leader that propagates rapidly to capture the Lightning stroke and conduct it towards the ground. • Arcing is not to be continuous and shall only occur during the progress of the lightning leader. • The air termination shall not cause high frequency radio interference except during the millisecond intervals associated with the progress of the lightning leader and during the main return strike of lightning events in the region.
4	Down conductor	• The down conductor should be used 25 x 3 mm copper strip. Two down conductors shall be used in case of the structure height is above 28mts and both should be connected with maintenance-free Grounding system. • The main copper conductor shall be connected directly to the air termination. • The down conductor shall be installed in accordance with the instructions and should not be subject to sharper bends. • The down conductor must be kept in constant physical contact with the structure via conductive mounting clamps.
5	Lightning flash counter	• The lightning flash counter shall be installed to the instructions in a readily accessible manner (2 mtrs above the Ground) so that reading can be taken at regular intervals. It shall be positioned such that its operating temperature is within the range -20'C to + 60'C. • Each protection system shall be supplied with Lightning strike counter. The counter shall have a register that activates one count for every discharge where the peak current exceeds 400A at the 8/20us standard. • The lightning flash counter shall be robust and easy to install. The counter shall operate from the energy of the lightning

Lightning System		
Sr. No.	Parameter	Minimum Requirement
		discharge and should not work on external or battery power to operate.
6	Grounding system	• The Grounding will be done by copper bonded steel core ground rods especially designed for electrical grounding. • Electrically conductive, non-soluble TEREC Powder should be used to achieve low ground resistance. Provided the materials are mixed and installed strictly in accordance with the manufacturer's instructions. • The Lightning arrestor grounding system reading shall not exceed < 0.2 ohms static impedance except with prior approval by the specifying engineer or manufacturer of the lightning protection system. • Bonding of the grounding system to metallic parts of the building, the structural reinforcing steel of the building to arriving services is recommended.
7	Standards	The details of the lightning protection system shall also confirm to the requirements of all relevant local codes, as applicable, together with the additional requirements referred to in this specification and drawings, whichever is more stringent and acceptable to the engineer. The complete installation shall be engineering and constructed in accordance with the latest revision of the following: • NFC-17-102 • IEC62305

10.8.2 LIGHTNING AND SURGE VOLTAGE PROTECTION

Lightning & Surge Protection		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The work required under this section shall include all material, labor and auxiliaries required to furnish and install complete Surge Protection Devices at main LT Panel incoming feeders (Stage I / Class B) & Distribution Boards (Stage II / Class C) for the protection of Building electrical and Electronics system from the effect of Lightning discharges, line induced transient surge voltage or switching surges as per the details mentioned in the BOQ.

Lightning & Surge Protection		
Sr. No.	Parameter	Minimum Requirement
2	Surge Protector	• The Protection unit shall be based on single arcs park gap technology and shall be able to with stand 10/350 microsecond surge currents associated with external lightning discharges. • The Surge Protection Device (SPD) manufacturer shall offer a complete line of Surge Protection Devices to support the requirements for Main LT Panel Incoming feeders. The surge protector at this stage shall be provided to protect the downstream electrical and electronics against any lightning discharges surges that may enter into the system through Mains panel. • Surge Protector should be at Stage I / Class B (LT Panel Protector) as per standard regulations.
3	Protection Network Configuration	• Protection shall be manufactured for the specific type and voltage of the electrical Service and shall provide clamping for both normal (L-N) and common (N-G) mode operation. • Protection shall be manufactured to withstand a maximum continuous operating voltage of not less than 115% of normal RMS Line voltage of 240 V. • Protection shall be a fail-safe type device, shall have a follow through current quenching capacity up to 25 KA r.m.s., shall have repeated surge capability state, shall be self-restoring and be fully automatic in all mode of operation. • Protection shall comply with IEC 61643 and shall be approved for the location in which they are listed. Protection shall have an operating temperature range from -20'C to + 65'C. • The work required under this section consists of furnishing, installing and connecting SPD device as specified and as asked for in BOQ. The SPD device shall be installed in a Network configuration, consisting of one set of SPD panel device at the service entrance of switchboard. All SPD device in this network configuration shall be of same manufacturer. All SPD devices shall be modular, mountable on 30-35 mm DIN rail. • Unit status indicator shall be provided to indicate the status of complete Protection unit. • neutral & neutral to earth as per the TNS configuration of wiring. It shall be testable online for routine maintenance, module failure and in order to prevent catastrophic failure modes.
4	Class B Protection parameters	The operating voltage for SPD devices connected to phase- neutral shall not be less than the values shown as below: • Listing: The surge protective device and associated hardware must comply with IEC61643-11. • Maximum Continuous Operating (Vrms): 320 • Nominal Voltage Rating per (Vrms): 240
5	Surge Protector at stage II with Class-C	• Protection Network Configuration. The work required under this section consists of furnishing, installing and connecting SPD device as specified and as shown in the drawings. The SPD device shall be installed in a network configuration, consist of one set of SPD

Lightning & Surge Protection		
Sr. No.	Parameter	Minimum Requirement
		panel device at the service entrance of switchboard. All SPD device in this network configuration shall be of same manufacturer. All SPD device shall be modular, mountable on 35 mm DIN rail and be field replaceable without interruption of electrical distribution circuit. • Unit status indicator shall be provided to indicate the status of complete Protection unit on the product as well as provision for remote indication must be provided. • Protection shall be manufactured for the specific type and voltage of the electrical Service and shall provide clamping for both normal (L-N) and common (N-G) mode operation. • Protection shall be manufactured to withstand a maximum continuous operating voltage of not less than 115% of normal RMS Line voltage of 240V AC. • The Protection shall be provided with internal safety fusing if required, to be connected in parallel between Line/s to neutral & neutral to earth as per the TNS configuration of wiring. It shall be testable on line for routine maintenance, module failure and in order to prevent catastrophic failure modes. • Protection shall be a fail-safe type of device, shall have no follow through current shall have repeated surge capability, shall be solid state, shall be self-restoring and be fully automatic in all mode of operation. It shall have thermal disconnection and indication against overloading of the device. • Protection shall comply with IEC 61643 standards. • Protection shall have an operating temperature range from -20 degree C to + 60-degree C. • The surge Protection manufacturer shall offer a complete line of surge Protection product to support the requirements for the Distribution Board. The surge protector at this stage shall be provided to protect the downstream electrical and electronics against any induced switching surges that may be passed on to the downstream electrical & electronic system. • The Protection unit shall be based on single high-capacity metal oxide varistors, capable failure and be pluggable to facilitate the in-service replacement without distributing the lines. One extra set of replacement module shall be furnished to the jobsite.
6	Standards	The following standards & publications as referred in the various parts of this Specification shall apply. • IEC-61643-11, IEC-61643-12 • IEC 60 364 - 5 - 5 53 • IEC 62 305 - 4

10.8.3 INTERNAL WIRING

INTERNAL WIRING		
Sr. No.	Parameter	Minimum Requirement
1	System of wiring	The system of wiring shall consist of PVC insulated copper stranded conductor flexible FRLS wires in metallic / non-metallic (Rigid Heavy-Duty ISI -marked fire retarded PVC Conduits of minimum 2mm Wall thickness and Sizes starting from 25 mm diameter) conduits and shall be concealed or surface mounted above false ceiling as called for.
2	General	• The cable should lay through conduits is important that not more than two right angle bends should provide for each circuit without a pull box. No junction box shall be provided in the entire length of conduit run for drawing of wires. Only switch outlets, lighting fixture outlets, equipment power outlets and socket outlets shall be considered for drawing of wires. • The bidder shall mark the conduit route prior to laying and fixing of conduits, and verify the working drawings prepared by him and approved by Engineer in charge / Customer representative indicating the layout, satisfy himself about the non-interference in the route, sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found shall be brought to the notice of the Engineer-in-charge. Any modifications suggested by the bidder should get written approval before the actual laying of conduits is commenced.
3	Conduit & accessories	
3.1	Conduit	• All Conduits shall be delivered to the site of construction in original bundles and each length of conduit shall bear the label of the manufacturer. • Any materials required to be billed by the bidder should come on site with proper Challan Numbers and quantity mentioned in each such Challan. • 16 gauge up to 32mm diameter & 14 gauge above 32 mm diameter gauge screwed GI or MS conduits as specified on schedule of quantities shall be used. Joints between conduits and accessories shall be securely made by standard accessories, as per IS-2667, IS-3837 and IS-5133 to ensure earth continuity. All conduit accessories shall be threaded type only. • All conduits and accessories shall confirm to latest edition of Indian Standards IS-9537 part 1 & 2.

INTERNAL WIRING		
Sr. No.	Parameter	Minimum Requirement
3.2	Flexible conduits	Flexible conduits shall be made of heavy gauge MS strip galvanized after making the spiral. Both edges of the strip to have interlocking to avoid opening up. Flexible conduit shall be heat resistant, lead coated steel, water leak, fire and rust proof. The flexible conduit shall be heat resistant on continuous temperature up to 150 deg. C and intermittent temperature up to 200 deg. C. The flexible conduit shall be corrosion resistant as per IS-3480 & BS-731.
3.3	Joints	• Rubberized bushes shall be used in the conduit entry and exit from DBs, switch boxes etc., so that wires are protected from damage to insulation of the incoming and outgoing wires. • All jointing shall be subject to the approval of the Engineer-in-charge. The threads and sockets shall be free from grease and oil. End termination of conduit on GI boxes shall be by means of hexagon check nuts & spring washer on both sides of the conduit. The joints in conduits shall be free of burrs to avoid damage to insulation of conductors while pulling them through the conduits.
4	PVC conduit and accessories	
4.1	PVC conduit	• PVC Conduits and accessories shall conform to latest edition of IS-9537 part 3 and shall be heavy duty with minimum wall thickness of 2.0 mm rigid tubes which are unscrewed without coupling and with plain ends. All conduits used shall be ISI-marked and shall not be less than 20 mm diameter. • PVC conduit shall be used for all concealed / embedded installation.
4.2	PVC Conduit Accessories	• Accessories used for conduit shall be of an approved brand and type complying with relevant IS code. All accessories used shall be of standard white or black color, identical to conduit used. • Plain Conduits shall be joined by slip type of couplers with manufacturer's standard sealing cement. • All conduit entries to outlet boxes, trunking and switchgear are to be made with adaptors female thread and screwed male bushes. PVC-switch and socket boxes with round knockouts are to be used. The colors of these boxes and the conduits shall be the same. • Standard PVC circular junction boxes are to be used with conduits for intersection, Tee-junction, angle- junction and terminal. For the drawing-in of cables, standard circular through boxes shall be used. Samples of accessories shall be submitted for approval prior to installation. All jointing of PVC conduits shall be by means of adhesive jointing. Adequate expansion joints shall be allowed to take up the expansion of PVC conduits.

INTERNAL WIRING		
Sr. No.	Parameter	Minimum Requirement
5	Bends in conduit	It should be necessary, bends or diversions achieved by the bidder means of bends and / or circular cast iron boxes with inspection cover and with adequate and suitable inlet and outlet screwed joints. In case of recessed system each junction box shall be provided with a cover properly secured and flush with the finished wall surface. No bends shall have radius less than 7.5 cms or three times the outside diameter of the conduits. For metallic conduits, bends of defined radius shall be made by compactly filling fine sand inside the conduit length, to avoid non-uniform shape, once the bend is done. Proper jigs shall be used to ensure that the Enamelling /Galvanising of the Conduit are not damaged.
6	Fixing of conduits	• All conduits shall be installed so as to avoid exposure to steam, hot water or any other process pipes. After the conduits, junction boxes, outlet boxes and switch boxes are installed in position, their outlets shall be properly plugged or covered so that water, mortar, rodents and insects, insects or any other foreign matter does not enter into the conduit system. Surface conduits shall be fixed by means of heavy gauge GI saddles secured at intervals not more than 1000 mm, and on either side of couplers or bends or similar fittings addles shall be fixed at a distance of 300 mm from centre of each fitting. For conduit fixing suitable PVC / Nylon fasteners shall be used. • Recessed conducting shall be done by making chase in the masonry by chase cutter; the conduit shall be fixed in the chase by means of GI hooks not more than 600 mm apart. After fixing of conduit the chase shall be filled with cement mortar after fixing of chicken mesh and brought to the original finish level of the surface to the entire satisfaction of Engineer-In charge
7	Switch outlet & Junction box	All outlet boxes for switches, sockets and other receptacles shall be rust proof and shall be of 1.6 mm thick mild steel sheets with HOT dipped galvanizing (or as specified in SOQ), having smooth external and internal surfaces to true finish. All outlet boxes for receiving plug sockets and switches shall be fabricated to approve sizes. All boxes shall have adequate number of knock out holes of required diameter and earthing terminal screws. Outlet boxes shall generally be of 50mm depth subject to maximum depth of 65 mm.
8	Inspection box	50 mm dia inspection boxes and pull boxes shall have smooth external and internal finish to facilitate removal and replacement of wires, where required.
9	Fish wire	To facilitate subsequent drawing of wires in the conduit, GI fish wires of 2.0 mm (14 SWG) shall be provided along with the laying of recessed conduit.
10	Conductors	All PVC insulated copper conductor flexible FR, as specified in SOQ, wires shall conform in all respects to Standards as listed under

INTERNAL WIRING		
Sr. No.	Parameter	Minimum Requirement
		sub-head Indian Standards and shall be IS approved and ISI marked.
11	Bunching of wires	All wires carrying current shall be so bunched that the outgoing and return wires are drawn into the same conduit. Wires originating from two different phases shall not run in the same conduit. All wires shall have ferrules for identification. Lighting and power circuits shall be separate. Each Power/ Light Circuits. Neutral shall be individual per Circuit and shall not be looped from any other Circuit.
12	Drawings of conductor	• All wires and cables shall be embossed with the label with ISI mark and shall be brought to site in original packing. For all internal wiring. PVC insulated wires of 1100 volts grade FRLS shall be used. • The sub-circuit wiring for point shall be carried out in loop system and no joints shall be allowed in the length of the conductors. No wire shall be drawn into any conduit until all defective work of conduit installation of any nature that may cause injury to wire is completed. Care shall be taken while pulling out the wires so that no damage occurs to conduits/wire itself, the conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction. The minimum size of PVC insulated copper conductor wires for all sub-circuit wiring for light points shall be minimum 1.5 sq.mm copper. Separate neutral to be pulled for each circuit. • The drawing and jointing of PVC insulated copper conductor wires shall be executed with due regard to the following precautions. While drawing wires through conduits, care shall be taken to avoid scratches and kinks which may cause breakage of conductors. There shall be no sharp bends. Wire reel stands to be used for pulling of wires to avoid kinks. Care shall be exercised while drawing the wires from reels, by taking appropriate measures to ensure that wires are not spread on ground, causing dust and dirt accumulation on the new wires. • Insulation shall be removed by insulation stripper only. Few Strands of wires shall not be cut/reduced for convenience in connecting into terminals. The terminals shall have sufficient cross-sectional area to take all strands and its connecting brass screws shall have flats ends. All looped joints shall be connected through terminal block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. All light points shall be terminated through a connector. • Conductors should have nominal cross-sectional areas exceeding 10 sq.mm shall always be provided with cable sockets. At all bolted terminals brass flat washer of large area and approved steel spring washer shall be used. Brass nuts and bolts with brass washers shall be used for all connections. • Only licensed wiremen (Before doing the work or before

INTERNAL WIRING		
Sr. No.	Parameter	Minimum Requirement
		appointing him on site bidder has to submit his wiring license to Engineer-In charge) and cable jointers shall be employed to do jointing work. Before entrusting cable jointing work to any technician, or before appointing Cable Jointers or / Cable license to Engineer-In charge.
13	Joints	All joints shall be made at main switches, distribution boards socket outlets, lighting outlets and switches boxes only. No joints shall be made in conduits and in junction boxes. Conductors shall be continuous from outlet to inlet.
14	Load balancing	Balancing of circuits in three phase installations shall be as planned by SDC in the tender drawings and shall be checked by the bidder before the commencement of wiring and shall be strictly adhered to.
15	Color code of conductor	Color code shall be maintained as indicated by PMC for the entire wiring installations. Red, yellow, blue shall be for three phases, black for neutral and green with yellow band shall be for earthing.
16	Mains & submains	• The earth wires shall be drawn along with circuit wires through conduit. Where mains and sub-mains cables are connected to switchgear, sufficient extra lengths of cable shall be provided to facilitate easy connections and maintenance. • If required more protection then, powder-coated 1.6 mm thick sheet steel covering (also called trunking) shall be provided to cover the group of conduits and cables entering and exiting the Wall mounted / Floor mounted Sub DBs, DBs and FDBs so that the Installation looks neat. The colour of such sheet steel covering (trunking) shall be matching with the colour of the SDBs, DBs and FDBs. • Mains and sub-mains cable or wires were called for shall be of the rated capacity and Preferred Makes. Every main and sub main wires shall be drawn into an independent adequate size of conduit. Earthing shall be in conformity with relevant IS codes and calculations shall be submitted for verification. An independent earth wire of the proper rating shall be provided for every single phase sub-main. For every 3-phase sub-main, 2 No. earth wires of proper rating shall be provided along with the sub-main.

10.8.4 EXTERNAL / STREET LIGHTING POLES

EXTERNAL / STREET LIGHTING POLES		
Sr. No.	Parameter	Minimum Requirement
1	MS Tubular Pole	
1.1	7- meter height pole with ladder bar	7 meter high (5.75 meters above and 1.25 meters below ground shall be M.S. step tubular pole in 3 steps (bottom part shall be 4 meters high, 114.3 mm outer dia. and 3.65 mm wall thickness, middle part shall be 1.5 meter high, 88.9 mm outer dia. and 3.25 mm wall thickness, top part shall be 1.5 meters high, 76.1 mm outer dia. and 3.25 mm wall thickness) with 300 mm x 300 mm x 6 mm thick base plate. Foundation for the pole shall be of cement concrete in 1:2:4 ratio. (1 part cement, 2 parts, coarse sand and 4 parts stone aggregate) IP-55 weather proof junction box shall also be provided to accommodate 1 No. 3 phase and neutral terminal block and 1 No. 6 amps SP MCB including 2.5 sq.mm PVC insulated copper conductor wire from the terminals block to the fixture and 2 Nos. 32 mm dia. GI sleeves of suitable length shall be provided to the junction box.
1.2	4.5-meter height pole	4.5 meter high (3.6 meter above and 0.9 meter below ground) shall be 75 mm dia., 3.25 mm wall thickness MS tubular straight pole with a cast aluminium adaptor for post top mounting. Pole shall be provided with 300 mm x 300 mm x 6 mm thick MS base plate. Foundation for the pole shall be of cement concrete in 1:2:4 rates (1 part cement, 2 parts coarse sand and 4 parts stone aggregate) IP-55 weather proof junction box shall also be provided to accommodate 1 No. 3 phase and neutral terminal block and 1 No. 6 amps SP MCB including 2.5 sq.mm PVC insulated copper conductor wires from the terminal block to the fixture and 2 Nos. 32 mm dia. GI sleeves of suitable length shall be provided to the junction box.
2	Cast aluminum Pole	
2.1	Design & Construction	Ornamental cast aluminium pole shall be made out of cast aluminium as per requirements of IS: 202 (1993). Casting of all pole Sections shall be accurately done from permanent molds and cores of the design submitted to Achieve uniformity in all design aspects in internal and external shape of the unit. All sections shall be free from defects like blow holes, porosity, hard spots, cracks, hot tears, cold shuts, distortion, sand and slag inclusion and other harmful defects. All the casted sections used in the pole shall be free from welding of any kind used to repair it. The casted sections shall be machined from all the locations used to insert the pieces into one another using either threading or socket method. Accuracy of all machined parts shall be maintained throughout a lot for random replacements of sections if and when required. All

EXTERNAL / STREET LIGHTING POLES		
Sr. No.	Parameter	Minimum Requirement
		the threaded joints shall be mechanically tightened and sealed using industrial tools to make the entire unit vandal resistant.
2.2	Aesthetic appearance	All the grooves and carvings of the pole unit shall be free from any kind of distortion for a pleasing aesthetic appearance.
2.3	Material	Cast aluminium material used for casting pole unit shall be Grade FG-220 type, as described in IS: 202 and shall have minimum tensile strength of the order of 200 N/mm sq.
2.4	Pre-treatment	Each and every casted piece shall be subject to Sand blasting at a pressure of 10-15 kgf to remove all its external dirt and sand remains etc..
2.5	Painting and Finishing	Entire unit shall be given an extensive three stage treatment with PU based two pack Zn-Ph primer and paint prescribed for CI surfaces to make it absolutely rust and corrosion proof, as well as giving it a pleasing appearance. PU based paint shall be standard make.
2.6	Thickness of the coating	A minimum of 80 microns of coating thickness shall be achieved on the final piece.
2.7	Mounting arrangement	Pole unit shall be grouted using 4 nos. anchor bolts of size M-16x450 mm confirming to 6.8 Gr. As per IS 2062. Pole unit shall be grouted on a foundation made out of 1:3:6 concrete cement after excavating the earth with proper cable sleeves etc... Laid in the foundation itself. Dimensions of the unit: • Total height = 3000mm • Dia. of baseplate = 380mm • Pitch Circle Dia. = 335mm
2.8	Description of top bracket / arms	Single double decorative arm shall be provided on the pole (as asked for in B.O.Q.), secured with the help of two nos. bolts outreach not less than 400 mm.
2.9	Service window	A service window of the size 150 mm x 100 mm shall be provided in the base of the pole to allow access to electrical connections and terminations. It shall be covered with MS plate and proper rubber gaskets shall be provided to prevent any ingress of water etc.
2.10	Electrical connections	Four-way connectors shall be provided along with Slide lock and 1 no. 6 amps Sp MCB including 2.5 sq. mm PVC insulated copper conductor wires from the terminal block to the fixture and 2 nos. 32 mm dia. GI sleeves of suitable length shall be provided up to the service window. An earth boss is provided on the control plate along with connectors and interrupters.
3	Galvanized Octagonal Pole	

EXTERNAL / STREET LIGHTING POLES		
Sr. No.	Parameter	Minimum Requirement
3.1	Design	The Octagonal poles shall be designed to withstand the maximum wind speed of 169 KM / Hr. as per IS 875. The top loading i.e., area and the weight of fixtures are to be considered to calculate maximum deflection of the pole and the same shall meet the requirement of BS: 5649 Part VI 1982.
3.2	Pole Shaft	• The pole shaft shall have octagonal cross section and shall be continuously tapered with single longitudinal welding. There shall not be any circumferential welding. The welding of pole shaft shall be done by submerged Arc Welding (SAW) process. • All octagonal pole shafts shall be provided with the rigid flange plate of suitable thickness with provision for fixing 4 foundation bolts. This base plate shall be fillet welded to the pole shaft at two locations i.e., from inside and outside. The welding shall be done as per qualified MMAW process approved by Third Party Inspection agency.
3.3	Door opening	• The octagonal poles shall have door of approximate 500 mm length at the elevation of 500 mm from the Base plate. The door shall be vandal resistance and shall be weatherproof to ensure safety of inside connections. The door shall be flush with the exterior surface and shall have suitable locking arrangement. There shall also be suitable arrangement for the purpose of earthing. • The pole shall be adequately strengthened at the location of the door to compensate for the loss in section.
3.4	Material	Octagonal Poles HT Steel Conforming to grade S355JO Base Plate Fe 410 conforming to IS 226 / IS 2062 Foundation Bolts EN.8 grade
3.5	Welding	The welding shall be carried out confirming to approve procedures duly qualified by third party inspection agency. The welders shall also be qualified for welding the octagonal shafts.
3.6	Pole sections	The Octagonal Poles shall be in single section (up to 11 mtr). There shall not be any circumferential weld joint.
3.7	Galvanization	The poles shall be hot dip galvanized as per IS 2629 / IS 2633 / IS 4759 standards with average coating thickness of 70 micron. The galvanizing shall be done in single dipping.
3.8	Xing type	The Octagonal Poles shall be bolted on a pre-cast foundation with a set of four foundation bolts for greater rigidity.
3.9	Top Mountings	The galvanized mounting bracket shall be supplied along with the Octagonal Poles for Installation of the luminaries.
3.10	Manufacturing	The pole manufacturing & galvanizing unit shall be ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

EXTERNAL / STREET LIGHTING POLES		
Sr. No.	Parameter	Minimum Requirement
3.11	Service window	A service window of the size 150 mm x 100 mm shall be provided in the base of the pole to allow access to electrical connections and terminations. It shall be covered with MS plate and proper rubber gaskets shall be provided to prevent any ingress of water etc..
3.12	Electrical connections	The bidder should provide four-way connectors along with slide lock and 1 no. 6 amps Sp. MCB including 2.5 sq. mm. PVC insulated copper conductor wires from the terminal block to the fixture and 2 nos. 32 mm dia. GI sleeves of suitable length shall be provided up to the service window. An earth boss is provided on the control plate along with connectors and interrupters.

10.8.5 HT CABLE: 33 KV GRADEXLPE

HT CABLE: 33 KV GRADEXLPE		
Sr. No.	Parameter	Minimum Requirement
1	General	The Cable shall be aluminium conductor, cross linked polyurethane construction and shall be supplied, inspected, laid, tested and commissioned in accordance with drawings, specifications, relevant Standard Specifications and cable instructions.
2	Material	
2.1	Conductor	The Conductor shall be made from electrical purity aluminium stranded wires compacted together.
2.2	Insulation	A High quality TROPOTHEX - X (XLPE) unfilled insulating compound of natural color shall be used for insulation. Insulation shall be applied by extrusion process and shall be chemically cross linked in continuous vulcanization process.
2.3	Shielding	The cable shall be provided with conductor shielding as well as insulation shielding and shall consist of extruded semi-conducting compound, additionally insulation shield shall be provided with semi-conducting and metallic tape shield over the extruded insulation shield. XLPE insulation and outer core shielding shall be extruded in one operation.
2.4	Armoring	An armoring shall be applied over the inner sheath and shall comprise of round steel wires (strips).
2.5	Outer Sheath	Tough outer sheath of heat resisting PVC compound shall be extruded over the armoring in case of armored cables or over inner sheath in the case of unarmored cables.

HT CABLE: 33 KV GRADEXLPE		
Sr. No.	Parameter	Minimum Requirement
3	Tests	The cable shall be type tested and routine tested in accordance with IS: 7098 (Part II). - Conductor resistance test. - Partial discharge test. - High Voltage test. The following tests shall be carried out at site for insulation between phases and between phase and earth before and after cable laying. - Insulation Resistance Test. - Continuity resistance test. - Sheathing continuity test. - Earth test. - High Voltage test. Cables shall be laid with a clearance of at least 75 mm between two cables.
4	End termination of the HT cable	Pre-molded cable terminations for XLPE cable shall be used as per instructions. The steel cone of M-seal Push-On shall consist of highly track resistant insulating section vulcanized to a semi-conducting section. The pad material shall have cold-flow properties and shall be flame retardant. Each end terminal shall undergo Hi Pot Test
5	Laying of the HT cable	Direct in Ground The work shall involve excavation of trench and laying of cable(s) as indicated in drawing and Schedule of Quantities. The depth of the excavation shall not be less than 900 mm for 33 KV plus radius of cable, from the upper surface of ground. Where more than one multicore cable is laid in the same trench, a horizontal inter spacing of 250 mm shall be left in order to reduce mutual heating and also to ensure that fault occurring on one cable will not damage the adjacent cable. Cable shall be laid in cement pipes encased in concrete or Hume pipes at all road crossing. Cables shall be laid in trenches over rollers placed inside the trenches. After the cable has been properly laid and straightened, it shall be covered with 80 mm thick layer of sand. Cable shall then be lifted and placed over this sand cushion. Again, the cable shall be covered with an 80 mm layer of sand. Over the sand a layer of cable protection tiles shall be placed by overlapping 50 mm on either side. Trenches shall then be back- filled with earth and shall be consolidated. Suitable cable markers made of cast iron with aluminium paint indicating

HT CABLE: 33 KV GRADEXLPE		
Sr. No.	Parameter	Minimum Requirement
		the voltage grade and direction of run of the cables shall be installed at regular intervals.
6	RCC/ Masonry Trench	For laying of HT cable in RCC/Masonry trench refer detail on sub-station layout drawing and IS-1255- 1983

10.8.6 MEDIUM VOLTAGE 1.1 KV GRADE XLPE / PVC CABLES

MEDIUM VOLTAGE 1.1 KV GRADE XLPE / PVC CABLES		
Sr. No.	Parameter	Minimum Requirement
1	General	The MV cables shall be supplied, inspected, laid, tested and commissioned in accordance with drawings, Specifications, relevant Standard Specifications and cable manufacturer's instruction.
2	Material	The MV cables shall be cross linked polyethylene (XLPE) insulated PVC sheathed of 1100 volts grade as asked for in the schedule of quantities. Cables up to 16 sq.mm shall be with copper conductor and 25 sq.mm and above shall be with aluminium conductor.
3	Technical requirement	All XLPE Aluminium/Copper Power cables shall be 1100 Volts grade, multi core constructed as per IS: 7098 Part-I of 1988 as follows: a) Stranded Aluminium /Copper conductor in case of 10 sq.mm. and above whereas solid conductor in case of 10 sq.mm. and below. b) Cores laid up c) The inner sheath should be bonded over with thermo-plastic material for protection against mechanical and electrical damage. d) Armoring should be provided over the inner sheath to guard against mechanical damage. Armoring should be Galvanized steel wires or galvanised steel strips. (In single core cables used in A.C. system armoring should be non-magnetic hard aluminium Wires/Strips. Round steel wires should be used where diameter over the inner sheath does not exceed 13 mm; above 13 mm flat steel armor should be used. Round wire of different sizes should be provided against specific request.) e) The outer sheath should be specially formulated heat resistant black PVC compound conforming to the requirement of type ST2 of IS: 5831-1984 extruded to form the outer sheath. Conductor shall be of electrolytic Aluminium/Copper conforming to IS: 8130 and are compact circular or compact shaped.

MEDIUM VOLTAGE 1.1 KV GRADE XLPE / PVC CABLES		
Sr. No.	Parameter	Minimum Requirement
		Insulation shall be of XLPE type as per latest IS general purpose insulation for maximum rated conductor temperature 70 degree centigrade.
		In Inner sheath laid up cores shall be bonded over with thermoplastic material for protection against mechanical and electrical damage.
		Insulation, inner sheath and outer sheath shall be applied by extrusion and lapping up process only.
		Armoring shall be of galvanised steel wire/ flat.
		Repaired cables shall not be used
		Current ratings of the cables shall be as per IS: 3961
		The XLPE insulated cables shall conform to latest revision of IS and shall be read along with this specification. The Conductor shall be stranded Aluminium/Copper circular/ sector shaped and compacted. In multi core cables the core shall be identified by red, yellow, blue and black colouring of insulation.
		The cables shall be suitable for laying in racks, ducts, trenches, conduits and underground buried installation with controlled back fill and chances offloading by water.
		Progressive automatic in line sequential marking of the length of cables in meters at every one meter shall be provided on the outer sheath of all cables.
		Cables shall be supplied in non-returnable wood end rums as per IS: 10418.
		Both ends of the cables shall be properly sealed with PVC/Rubber caps so as to eliminate ingress of water during transportation, storage and erection.
4	Inspection box	All cables shall be inspected by the bidder upon receipt at site and checked for any damage during transit.
5	Joints in cables	The Bidder shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoid cable jointing. This apportioning shall be got approved by the Engineer-In charge before the cables are cut to lengths. Where joints are unavoidable heat shrinkable type joints shall be made. The location of such joints shall be got approved from the Engineer-In charge and shall be identified through a marker.

MEDIUM VOLTAGE 1.1 KV GRADE XLPE / PVC CABLES		
Sr. No.	Parameter	Minimum Requirement
6	Jointing box for cable	Cable joint boxes shall be installed with heat shrinkable sleeve and of appropriate size, suitable for XLPE armored cables of particular voltage rating.
7	Jointing of cables	All cable joints shall be made in suitable, approved cable joint boxes and the filling in of compound shall be done in accordance with manufactures' instructions and in an approved manner. All straight through joints shall be done in epoxy mould boxes with epoxy resin.
		All cables shall be joined color to color and tested for continuity and insulation resistance before jointing commence. The seals of cables must not be removed until preparations for jointing are completed. Joints shall be finished on the same day as commenced and sufficient protection from the weather shall be arranged. The conductors shall be efficiently insulated with high voltage insulating tape and by using of spreaders of approved size and pattern. The joints shall be completely topped up with epoxy compound so as to ensure that the box is properly filled.
8	Cable and terminations	Cable end termination shall be done in cable terminal box using crimping sockets and proper size of glands of double compression type
9	Bonding of cables	Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armour clamp and gland. The clamps must grip the armoring firmly to the gland or casing, so that no undue stress is passed on to the cable conductors.
10	Cable installation	Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming kinks.

10.8.7 Cable Coating

Cable Coating		
Sr. No.	Parameter	Minimum Requirement
1	General	I. Quality of Zinc Zinc to be used shall conform to minimum Zn 98 grade as per requirement of IS: 209-1992.

Cable Coating		
Sr. No.	Parameter	Minimum Requirement
2	Fire retardant cable paint and Fire barrier	II. Coating Requirement Minimum weight of zinc coating for mild steel flats with thickness up to 6 mm in accordance with IS:6745-1972 shall be 400 g/sqm.
		The weight of coating expressed in grams per square meter shall be calculated by dividing the total weight of Zinc by total area (both sides) of the coated surface.
		The Zinc coating shall be uniform, smooth and free from imperfections as flux, ash and dross inclusions, bare patches black spots, pimples, lumpiness, runs, rust stains bulky white deposits, blisters. Mild steel flats / wires shall undergo a process of degreasing pickling in acid, cold rinsing and then galvanizing.
		The fire-retardant paint / barrier shall be listed by independent test agencies such as UL, FM or OPL and be tested to, and pass the criteria of ASTM E 814 (UL1479) standard test method for fire test through- penetration fire stops and ASTM E 1996 (UL 2079) standard test method for fire resistive joint system.
2	Fire retardant cable paint and Fire barrier	FIRE RETARDANT CABLE PAINT: The Fire-resistant cable coating / painting shall be in tumescent / ablative, water-based compound, the coating shall expand up to 10 times, supplied in a manufacturer seal container indicating manufacturing and expiry dates. The coating material shall be non-toxic, asbestos free, & halogen free and shall have good mechanical strength. The color of paint shall be white, and density of coating shall be 1.3kg/ltr, coating shall have a snap time of 30 minutes, the expansion shall begin at 230 deg. C, and it shall have an oxygen index of 41%.
		Coating shall be applied by ordinary paint brush after cleaning the cables of dust and oil deposition. A minimum textured finish of 3 mm wet film thickness shall be achieved by applying the material in 2-3 layers leaving intervals of 2 to 8 hours depending upon the moisture and thickness, moisture and temperature hours between each coat.
		FIRE BARRIER SHEET FOR FLOOR AND WALL SEALING The framing & fixing part of fire barrier sheet shall be very simple & directly fixed around walls & floors by help of anchored bolts & washer. For 2-hour fire rating the fire barrier sheet shall be minimum 7.62 mm thick and shall be cut as per the profile of penetration and opening. The small gap left around the penetration shall be closed with fire rated soft & moldable putty. Fire barrier must be design on the in tumescent technology to seal larger penetration through the fire rated walls & floors. Fire barrier must be a composite construction with the quality incorporated with organic/ inorganic fire resistive elastomeric sheet with specific gravity of 1.6gm / cubic centimeter.

Cable Coating		
Sr. No.	Parameter	Minimum Requirement
3	Testing	Cables shall be tested at works for all routine tests as per IS including the following tests before being dispatched to site by the project team. a) Insulation Resistance Test. b) Continuity resistance test. c) Sheathing continuity test. d) Earth test. (In armored cables) e) Hi Pot Test.
		Test shall also be conducted at site for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the Engineer-in-charge. a) Insulation Resistance Test (Sectional and overall) b) Continuity resistance test. c) Sheathing continuity test. d) Earth test.
		All tests shall be carried out in accordance with relevant Standard Code of Practice and Electricity Rules. The Bidder shall provide necessary instruments, equipment and labor for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Engineer-in-charge, results will be noted and signed by all present and record be maintained.

10.8.8 SWITCHES, RECEPTACLES (MODULAR), LIGHTING FIXTURES & LIGHTING CONTROL EQUIPMENT

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
1	Scope	Scope of work under this section shall include following responsibilities (but not limited to) of Bidder as per following: • Supply, Installation & Commissioning with support as mentioned in this document • Inspection at suppliers/ premises at site, • Receiving at site, • Safe storage, • Transportation from point of storage to point of erection, erection and commissioning of light fittings, f

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
		Fixtures and accessories including all necessary supports, brackets, down rods and painting etc. as required.
2	Switches	- Type: Enclosed type flush mounted suitable for 240 volts AC. - Installation : To be fixed inside the switch boxes on adjustable flat MS strips/plates with tapped holes and brass machine screws, leaving ample space at the back and sides for accommodating wires. - Switch controlling the light point shall be connected to the phase wire of the circuit and load on each switch shall be restricted to maximum 800 watts & maximum 1500 watts per circuit. All wiring accessories shall be BIS approved. Perfect alignment shall be maintained while fixing of the back boxes.
3	Wall socket Outlet	- The three-pin type Wall socket outlets shall consider. - The switch controlling the socket outlet shall be on the phase wire of the circuit and not more than two socket outlets of 16 amps shall be connected on one circuit. - An earth wire shall be provided along with the circuit wires and shall be connected to earthing screw inside the box. - The earth terminal of the socket shall be connected to the earth terminal provided inside the box. All sockets shall be shuttered type. - Every socket outlet shall be controlled by an individual switch unless mentioned otherwise. - Where socket outlets are placed at lower level, they shall be enclosed in a suitable metallic box with the system of wiring adopted or shutter type sockets shall be provided as specified. - Conductors connecting electrical appliance with socket outlet shall be flexible twin cord with an earthing cord which shall be secured by connecting between the earth terminal of plug and the metallic body of the electrical appliance. - The switch controlling the socket outlet shall be on the live side of the line. - In an earthed system of supply, a socket outlet and plug shall be of three pin types, the third terminal shall be connected to earth.

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
		6 amps and 16 amps socket outlet shall normally be fixed at any convenient height above the floor level as desired by the Engineer-In charge. The switch for 6 and 16 amps, socket outlet shall be kept along with the socket outlet. However, in special case, if desired by the Engineer-In charge the 6 amp. Socket outlet can be placed at the normal switch level. 16 amps socket outlet in the kitchen of the residential or commercial buildings shall be fixed at any convenient height above working platform or as specified in drawings / schedule of equipment. In a room containing a fixed bath or shower, there shall be no socket outlet and there shall be no provision for connecting a portable appliance. Any stationary appliance connected permanently in the bathroom shall be controlled by an isolator switch or circuit breaker having outlets at such location where water / moisture does not effect. - Where use of shutter type of interlocking type of socket is required for any special installation, the items should be separately and specifically listed in the Schedule of Quantities of that particular work.
4	Lightning fixture and accessories	The light fixtures and fittings shall be assembled and installed in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Project requirement/need.

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
5	Light fitting	- Fittings shall be designed for continuous trouble-free operation under atmospheric conditions without reduction in amplifier without deterioration of materials and internal wiring Degree of protection of enclosure shall be IP-65 for outdoor fittings except bulkhead fitting. Bulkhead fitting shall be provided with IP-54 protection. - Fittings shall be so designed as to facilitate easy maintenance including cleaning, replacement of lamps / ballasts. - All fittings shall be supplied complete with lamps. All mercury vapor and sodium vapors lamp fittings shall be complete with accessories like ballasts, power factor improvement capacitors, starters, etc. Outdoor type fittings shall be provided with weatherproof junction boxes (IP-55) and IP-54 Control gear boxes. All fluorescent and CFL fittings shall be provided with electronic ballast as per schedule of quantities. - Each fitting shall have a terminal block suitable for loop-out connection by 1100 V PVC insulated copper conductor wires up to 4 sq.mm. The internal wiring should be completed by the manufacturer by means of standard copper wire and terminated on the terminal block. - All used in the fitting shall be suitably plated or anodized and passivated. - Earthing: Each lighting fitting shall be provided with an earthing terminal. All metal or metal enclosed parts of the housing shall be bonded and connected to the earthing terminal so as to ensure satisfactory earthing continuity throughout the fixture. - Painting/Finish: All surfaces of the fittings shall be thoroughly cleaned and degreased, and the fittings shall be free from scale, rust, sharp-edges, and burns. - The housing shall be powder coated/stove-enameled or anodized as required. The surface shall be scratch resistant and shall show no sign of cracking or flaking when bent through 90 deg. over 12 mm dia mandrel. - Metal used in BODY of lighting fixtures shall be not less than 22 SWG or heavier if so required to comply with specification of standards. Sheet steel reflectors shall have a thickness of not less than 20 SWG. The metal parts of the fixtures shall be completely free from burns and tool marks. Solder shall not be used as mechanical fastening device on any part of the fixture.

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
6	Fitting criteria	Box Channel Type Industrial Fittings - Box type slim line channel : This must be in screw less construction manufactured from M.S. CRCA sheet steel powder coated with MS CRCA cover, powder coated white, Light reflection surface in Box/Channel type fittings shall be in a POLYESTER PRECOATED STEEL having a reflection factor of not less than 80%. - Due to their ease of maintenance, (especially for box / channel for box / channel type fixtures), SCREWLESS DESIGN & CONSTRUCTION Light fixtures shall be preferred - Surface mounted totally enclosed moisture proof fixtures must be in polycarbonate body and diffuser with transparent prismatic interior and smooth exterior and frosted end. Fixture must be completely sealed with polyurethane double gasket to achieve IP 65 protection. Fixture is complete with CRCA white steel powder coated / enameled finish reflector. 18 W / 36 W Fluorescent and 36 W CFL Low Glare Light Fittings Recessed mounted, modular fluorescent lighting fixture made of CRCA Sheet steel powder coated (white) housing, electro chemically brightened and anodize+C137d reflector, three dimensional cross louvers with concave contours, Fresnel top at louver saddle to increase efficiency. The luminance of <200 cd/M2 at 63 degree viewing angle in all directions so as to confirm Cat-2 classification of CIBSEL G3. - Industrial High Bay luminaries shall be provided with pressure die cast housing along with all accessories, wound construction ballast, and capacitor & semi parallel ignitor connected to terminal block and mounted on the gear plate. The gear shall have side entry for ease in maintenance. The spun aluminium reflector is suitable for narrows well as wide beam distribution as specified in schedule of quantities. The luminaire will be suitable for metal halide lamp HPI BU + 250 W which has 25500 lumens or similar 400 W lamp and 2.5 minutes restrike time (when operate with on gear).

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
7	Accessories for light fitting-Reflectors	- Made of CRCA sheet steel/aluminium /Silvered glass/Chromium plated sheet copper as specified. - It shall be free from scratches / blisters and shall have a smooth and glossy surface having optimum light reflecting coefficient. - The thickness of reflectors shall be as per relevant standards. Reflectors made of steel shall have stove enameled/ vitreous enameled/epoxy coating finish. Aluminium used for reflectors shall be anodized/epoxy stove enameled /mirror polished. The finish for the reflector shall be as specified. - Reflectors shall be readily removable from the housing for cleaning and maintenance without use of tools.
8	Lamps	The Lamp shall be environment friendly low pressure mercury discharge lamp with mercury content less than or equal to 5 mg. The lamp shall have minimum lumen maintenance of 85 and CRI of 85. The lamp must comply with ROSH (Restriction of Hazardous substances) and covered by WEEE. Lamp should be fully re-cyclable. The lamp should be low on maintenance with life of 40 K hours in case of electromagnetic ballast and 65 K hours in case of HF ballast up to 10% failure. The discharge glass shall be lead free. The Lamps shall be minimum tri-phosphor type and have bi-pin bases. Color spectrum of light shall be provided as per lux requirement. The lux requirement will be approved site engineer in charge. The Lamp should have cool daylight color designation. But Engineer-In charges reserve the right to prescribe either Cool Daylight or Bright White or Incandescent Color Designations for lamp. No extra payment will be made over the quoted rate of bidder for this. The 36 W fluorescent tubes will have Nominal Luminous Flux of not less than 3350 lumens whether so mentioned in the Schedule of Quantities or not. T-5 lamp shall be environment friendly low pressure mercury discharge lamp with mercury content less than or equal to 3 mg. lamp should have lowest CO2 emission compared to any other comparable light source (40% less than a TL-D standard lamp, 26% less than TL-D / 80). T-5 lamp shall be 100% lead free. T-5 lamp shall be designed for operation with electronic gear and well suited for dimming. Maximum lumen output to be reached at approx. 35oC in free burning position. T-5 lamp can be ignited from -15oC to + 50oC. Lamp should be fully recyclable and must comply with ROSH (Restriction of Hazardous substances) and

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
		shall be covered by WEEE. T-5 shall have 16 mm in diameter service life of TL-5 lamp should be 10% more than TL-D lamps. T-5 lamp shall have lumen efficacy of up to 104 Lumens / W and shall have excellent color rendering to En 12464 (Ra 80 to89). Compact fluorescent lamp shall have same luminous flux and power consumption as fluorescent tubes but less than half the length and more compact than U-shaped and circulator lamps.
9	High frequency electronic ballast	High frequency electronic ballast shall be used with fluorescent / Compact Fluorescent Lamps wherever specified in the schedule of quantities. High frequency electronic ballast shall comply with the following: •IEC 927, IEC 928 $\leq$ 10% TOTAL harmonic distortion. •EMI / RFI - Confirming to FCC / VDE Class-A/B. •Line Transient as per IEEE62.41. •Ballast Crest Factor$\leq$1.7%. No Stroboscopic Effect •Constant Wattage / Light output between 240 V $\pm$ 10 Circuit protection for surge current and inrush current. •Short circuits, open lamp protection •PF > 0.99 for fluorescent / T5 lamp and 0.95 for CFL. Deactivated lamp protection •Suitable for use with single and twin lamps •RFI <30 MHz EN 55015 •Total Harmonic Distortion(THD) •immunity to interference EN 61547 •Safety EN 60928 / IEC 928 / IS 13021 (PartI) •Performance EN 60929 / IEC 929 / IS 13021 (PartII) Vibrations &Bump tests IEC68-2-6FCIEC9001 •Quality Standard ISO9001 •Environmental Standard ISO14001 •DC Operation EN 60924 Emergency Lighting Operation VDE 0108 Total System consumption (lamps + ballast) for 1 x 36 W TLD, shall not exceed 36 W 1 x 28 W T-5, shall not exceed 28 W 1 x 35 W T-5, shall not exceed 35 W 1 x 14 W T-5, shall not exceed 14 W 1 x 18 W CFL, shall not exceed 18 W 1 x 36 W CFL, shall not exceed 36 W

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
10	Lightning control equipment	This unit shall allow control of four independent loads, with a total capacity of at least 40A, independent from supply. The individual channel load shall be rated at least 10A (inductive and resistive). In the event of power cycling, a non-volatile memory shall be incorporated to retain all address and switching information. The Relay Unit shall have the facility to program (via the software) a minimum threshold setting. The unit shall have an input voltage operating frequency range of 47-53Hz and 57-63Hz. The unit shall provide an Electrical Isolation Rating of 3500VAC RMS, 1 minute. In the event of power cycling, a non-volatile memory shall be incorporated to retain all address and switching information. The Power Supply shall provide safe extra low voltage (36V dc) to the control system bus. The Power Supply shall be capable of supporting at least 17 control system units (Key inputs, Relay Units, Dimmer Units etc.). Multiple Power Supplies shall be paralleled to support any system load. The output current of the Power Supply shall be 320mA (nominal). The Power Supplies shall be installed on dedicated 'control' Circuit Breakers, rather than general light and power circuits. The Supply Voltage to each PIR Sensor shall be 36VDC @ 18mA. No additional 240V supply shall be required for the unit to operate. The unit shall have suitable operating temperatures between 0-50 Degree C. The unit shall be suitable for wall or ceiling mounting, up to mounting heights of 2.4m. The Indoor unit shall have a field of view of 90 degrees. The outdoor unit shall have a field of view of 110degrees. The Indoor unit shall have an effective detection area of 6m x 6m. The outdoor unit shall have an effective detection area of 18m radius x 110degrees. The Indoor unit shall have 12 overlapping detection zones. The outdoor unit shall have 18 long range, 16 intermediate range, 10 short range and 4 ultra-short-range detection zones.

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
11	Testing	The insulation resistance shall be measured between earth and the whole system of conductors, or any section thereof, with all switches closed and except in concentric wiring all lamps in position of both poles of the installation otherwise electrically connected together, a direct current pressure of not less than twice the working pressure provided that it does not exceed 660 volts for medium voltage circuits. Where the supply is derived from AC three phase system, the neutral pole of which is connected to earth, either direct or through added resistance, pressure shall be deemed to be that which is maintained between the phase conductor and the neutral. The insulation resistance measured as above shall not be less than 50 divided by the number of points provided on the circuit; the whole installation shall have an insulation resistance greater than one mega ohms. The insulation resistance between the framework of housing of power appliances and all live parts of each appliance shall not be less than that specified in the relevant standard specification or where there is no such specification, shall not be less than one a mega ohm. All equipment's, cables shall be inspected at works by the Engineer-In charge as per relevant IS and testing commissioning of installation as per Appendix 'E' of IS: 732-1989 shall be done and all record to be maintained. The earth continuity conductor metallic envelopes of cables shall be tested for electric continuity and the electrical resistance of the same, along with the earthing lead but excluding any added resistance or earth leakage circuit breaker, measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation, shall not exceed one ohm. In a two wire installation a test shall be made to verify that all non-lined single pole switches have been connected to the same conductor throughout, and such conductor shall be labelled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply. In the three or four wire installation, a test shall be made to verify that every non-linked single pole switch is fitted to one of the outer or phase conductor of the supply. The entire electrical installation shall be subject to the final acceptance of the Engineer-In charge as well as the local authorities. 1. Getting load approvals and finalizing points of supply from the electricity department 2. Estimate preparation and submission from department 3. Getting demand notices from the departments on all official fees / deposits and co-ordination with SDC for payment though challan /DD. 4. Agreement between SDC and Department

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
		5. Preparation of drawings and necessary approvals from departments. 6. Getting pre-approvals/ final approvals/ certifications of equipment's/ system from EB/ PWD/ CEIG/ Safety departments. 7. Metering indent and connection from the metering department / authorities. 8. Switching ON power supply and sign off the contract as per scope. 9. Power feasibility report with along with power grid maps and substations 10. File submission with required documents, documents need to be collected from SDC office. 11. Getting road digging & cable laying / overhead cable laying approvals from local departments. The below application cost should be consider by the bidder: The bidder should consider cost for cash deposit while bidding this RFP., Security deposit, System loading charges, Development charges, Cost of metering system, Supervision charges, Drawing and safety approval charges, Transformer fees, Road digging (Right of way) charges, and mention if any other charges which need to be considered by bidder.
12	Standards	The lighting and their associated accessories such as lamps, reflectors, housings, ballasts etc., shall comply with the latest applicable standards, more specifically the following:
		General and safety requirements for Luminaries: Part-1 Tubular fluorescent lamps - IS-1913(Part-1)
		Particular requirement General purpose Luminaries- IS 10322(Part-5/Sec-1)
		Particular requirement Recessed Luminaries- IS 10322(Part-5/Sec-2)
		Particular requirement Luminaries for Road and Street lighting- IS 10322(Part-5/Sec-3)
		Particular requirement Portable General-purpose Luminaries- IS 10322(Part-5/Sec-4)
		Particular requirement Flood Lighting- IS 10322(Part-5/Sec-5)
		High pressure mercury vapors lamps- IS 9900(Part-1)
		Tungsten filament General Electric lamps- IS-418
		Industrial lighting fittings with metal reflectors-IS-1777

Switches, Receptacles (Modular), Lighting Fixtures & Lighting control		
Sr. No.	Parameter	Minimum Requirement
		Luminaries' General requirement- IS 10322(Part-1)
		Luminaries' Constructional requirement- IS 10322(Part-2)
		Luminaries Screw and Screw less termination- IS 10322(Part-3)
		Luminaries Methods of Tests- IS 10322(Part-4)
		Decorative lighting outfits- IS-5077
		Bayonet lamp holders-IS-1258
		Bi-pin lamp holders for tubular fluorescent lamps- IS-3323
		Electronic Ballasts for fluorescent lamps General & Safety requirement- IS-13021(Part-1)
		Electronic Ballasts for fluorescent lamps Performance requirement- IS 13021(Part-2)
		Ballast for HPMV lamps- IS-6616
		Tubular Fluorescent lamps- IS-2418 (Part-1 to 4)

10.8.9 Ceiling Fan, Wall Mount Fan and Office Areas Lights

Sr. No	Parameter	Specifications
Ceiling Fan specifications		
1	MOTOR TYPE	Dual Coat Copper Winding
2	AIR DELIVERY (IN CMM)	240 CMM
3	SWEEP	1200 mm
4	WATTAGE	125 W
5	RPM	280 RPM
6	Operating Voltage	A three-layered automotive finish gives the fan a stunning radiant finish Operating Voltage: 85 volts
7	Product Dimensions (W x D x H)	24.61 x 12.99 x 12.4 cm
8	Features	16 Pole High Torque 100% Copper Motor 3 Layered Automotive Radiant Finish High Air Delivery and Circulation Sleek Canopy Design Double Ball Bearings Aerodynamic Blade Design

Sr. No	Parameter	Specifications
Wall mount fan specifications		
1	Sweep size	400 mm
2	Adjustable upward and downward tilt mechanism	Yes
3	Guard	120 Spokes
4	Motor speeds (No.)	3
5	Motor type	Normal Speed
6	Oscillation	Yes
7	Oscillation degree	60 °
8	Remote control option	Yes
9	Switch	Yes
10	Blade design	Aerodynamically designed & Balanced Blade
11	Noise level	63.3 dB
12	Power Consumption	50 W
13	Rated frequency	50 Hz
14	Rated Voltage	230 V
15	Motor protection through thermal overload protection device	Yes
Sr. No	Parameter	Specifications
Hanging Light for office specifications		
1	System Lumen	4ft - 2200lm@22w, 2600lm@26W
2	CCT	6500K / 5700K / 4000K
3	CRI	>80
4	SDCM	<5
5	Efficacy	>~100 lumen/w
6	LED	SAMSUNG
7	Diffuser	PS
8	Operating Temp	Ambient : 45 Degrees
9	IP rating/ IK	20/02*
10	Life	L70B50@ 50K Hrs.
11	Driver	Fixed output / DALI
12	THD / PF	<10% / 0.95
13	Surge	4 KV
14	Operating Voltage Range	140-270V
15	EMI/EMC (B1)	Compliant
16	Housing	Extruded Aluminium
17	Dimensions (L x B x H)	2ft – 565 x 50 x 75mm 4ft – 1130 x 50 x 75mm 8ft – 2260 x 50 x 75mm
18	Serviceability	Class B

Sr. No	Parameter	Specifications
conference rooms / cafeteria Light specifications		
1	System Lumen	2500/3000/3600/4200 lm
2	CCT	4000 /6500K
3	CRI/ SDCM	80, <5
4	Electrical Insulation	Class -1
5	Serviceability	Class B
6	Ambient Temperature	450C
7	Efficacy	120 lm/W
8	Surge	4 KV Internal
9	Driver	Fixed Current output/ Dali / IA/ IAO*/POE*
10	Operating Voltage	140-270V
11	THD	≤10% (At Full Load)
12	Housing Material / Finishing	CRCA
13	Ripple	<5%
14	EMI/EMC	Complaint
15	Diffuser Material	Polystyrene (PS)
16	Look & feel	Fully Diffused Diffuser
17	Life class	L70B50 @ 50K Hrs.@ 45 Degree Ambient
18	Approbation	BIS
19	Dimensions	595 X 595 X35 mm
Sr. No	Parameter	Specifications
Street Light / Walk way light specifications		
1	General	Integrated solar streetlight with lithium ferro phosphate battery, solar panel and charger built into the luminaire. The light with pole / wall mounting bracket. Microwave-based motion sensor for optimizing battery autonomy
2	System wattage	24.7W
3	System efficacy (lm/W)	>160
4	Lumen output (lm)	4000
5	Housing	ABS
6	Color temperature (K)	6500k
7	CRI	>70
8	IP rating	IP65
9	Mounting	Available in two mounting options - pole and wall mounting Microwave motion sensor
10	Sensor	Infrared remote control to dim luminaires
11	Interface	with presets like 2H, 4H, 6H and auto

10.9 Earthing

Earthing		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes electrical earthing system installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	Earthing system shall comprise earth electrodes for Electrical Works. For every additional transformer 2 more separate and distinct earth electrodes shall be provided for neutral earthing. The body earthing for transformers, HT & LT panels shall be done to a common earth bus connected to two separate and distinct earth electrodes.
		Normally an earth electrode shall not be situated less than 1.5 m from any building. Care shall be taken that the excavation of earth electrode may not affect the column footings or foundation of the building. In such cases electrodes may be farther away from the building.
		The location of the electrode earth will be a place where the soil has reasonable chance of remaining moist. As far as possible, entrances, pavements and road ways, are to be definitely avoided for locating the earth electrode.
		The recommended sizes of copper earth bus lead in case of Sub-stations shall for Electrical Works. The suitable size of earth lead shall be copper or equivalent GI strip.
3	Joints	All joints shall be riveted and sweated. Joints in the earth bar shall be bolted and the joints faces tinned. Where the diameter of the bolt for connecting earth bar to apparatus exceeds one quarter of the width of the earth bar, the connection to the bolt shall be made with a wider piece of flange of copper jointed to earth bar. These shall be tinned at the point of connection to equipment and special care taken to ensure a permanent low resistance contact to iron or steel.
		The earthing lead shall be securely bolted and soldered to plate or pipe as the case may be. In the case of plate earthing the lead shall be connected by means of a cable socket with two bolts and nuts. All washers shall be of the same materials as the plate or pipe. All iron bolts, nuts and washers shall be galvanized.

Earthing		
Sr. No.	Parameter	Minimum Requirement
4	Molded case circuit breaker	The circuit breakers shall comply with the requirement of IEC 60 947 / IS 13947: 1993. MCCBs shall be suitable for nominal voltage of 3 phase 690 Volts AC 50 HZ supply. The circuit breaker shall comply with the isolation function requirement of IEC 60 947-2 to be marked as suitable for isolation / disconnection to facilitate safety of operating personnel while the breaker is in use. All MCCBs shall have rated service breaking capacity (I_{cs}) = I_{cu} = 100%) at defined operational voltage and should be rated for appropriate impulse withstand voltage. The MCCBs shall be of double break rotary contact mechanism, having current limiting feature to limit let through energy on the installation. Thermal magnetic release for MCCB up to 250A should provide with adjustable settings for O/L (70 to 100%) and Short circuit fixed and microprocessor release for MCCB above 320A to 630A should have both overload and short circuit adjustable. MCCB 800A & above should be provided with display adjustable overload, short circuit and earth fault protection time delay. MCCB should have zone selective interlocking, bar graph display of each phase loading. There should be total discrimination and coordination between upstream and downstream to switchgear and protection devices such as ACB, MCCB, MCB etc. up to service level breaking capacity.
5	Operating mechanism	The operating handle of the MCCBs shall be quick make / break, trip free type. The operating handle of the MCCBs shall have suitable, ON, OFF and TRIPPED indicators. The operating handle and mechanical trip push button shall be at the front of and integral with the circuit breaker MCCBs shall be capable of limiting the fault currents. The maximum thermal $I^2 t$ shall be indicated by the manufacturer. MCCBs shall comprise of the mechanism designed to trip the circuit breaker in the event of high value short circuit currents. The electrical endurance of MCCBs shall be more or equal to that specified by IEC 60 947-2 standard. Earth fault protection if specified should be provided by integral / add on module with time delay and earth fault differentiation, there should be fault differentiation of over current and earth fault on MCCB or panel door.
6	Circuit Breaker Interlocking	MCCBs shall be provided with following interlocking devices. Handle interlock to prevent unnecessary manipulations of the breaker. Door interlock to prevent door being opened when the breaker is in ON position De interlocking device to open the door even if the breaker is in ON position.
7	Circuit breaker auxiliaries	The circuit breaker shall be provided with following accessories, if specified in the drawing/schedule of quantities: Under voltage trip Shunt trip Alarm switch Auxiliary switch

10.10 Static Var Generator (SVG) Panel

Static Var Generator (SVG) Panel		
Sr. No.	Parameter	Minimum Requirement
1	Scope	SVG panel should be modular in design, and the SVG system consists of one or several SVG modules and an optional Liquid Crystal Monitor & Control Panel. Each SVG module should an independent reactive power compensation system, and users can change the SVG rating by adding or removing SVG modules
2	General	SVG modules and LCM panel should be embedded in SVG cabinet or in a customized cabinet. There should be breakers, cable terminals and Surge Protection Device in the SVG panel
		The load will be generated inductive or capacitive current, it should make load current lagging or leading the voltage. SVG should detect the phase angle difference and generates leading or lagging current into the grid, making the phase angle of current almost the same as that of voltage on the transformer side
		SVG should be capable of correcting load imbalance
		It should be multifunctional with reactive power and imbalance compensation
		It should be with excellent reactive compensation: High speed, Precise ($-0.99 \leq \cos\phi \leq 0.99$), Step-less, Bi-directional (capacitive and inductance) compensation
		It should have features of excellent imbalance correction: Both negative and zero sequence, mitigates neutral current
		It should have wide input voltage & frequency range, adapts to tough electrical environment
		SVG should have low thermal loss ($\leq 3\%$ of rated SVG capacity), efficiency $\geq 97\%$
		SVG should be with high stability: Infinite impedance to grid, avoids harmonic resonance problem
		It should be with easy installation for APF module replacement and expansion
		It should have Complete protection like Grid over/under voltage, SVG over current, over temperature, and others. All faults recorded in event log, convenient for failure analysis

Static Var Generator (SVG) Panel		
Sr. No.	Parameter	Minimum Requirement
3	Design Requirements	• The SVG system shall be modular designed, each SVG module shall be an independent Power Factor Correction system, and it should work normally even when other modules or LCD control panel (LCM) get failure. • Each SVG module shall be sized to provide a maximum reactive power of 100kvar. When two or above SVG modules work in parallel, each module's capacity shall not downgrade. • 100kvar SVG modules should be able to mix up in the same cabinet to make a flexible larger rating SVG system. Up to 5 pcs 100kvar modules should be able to be integrated into one SVG cabinet, so maximum SVG rating per cabinet can reach 500kvar. And up to 10 units of SVG cabinets should be able to work in parallel, making the maximum rating for one SVG system 5000kvar. • The SVG system should be able to improve fundamental displacement power factor (lead or lag) and correct load imbalance (compensate Negative and Zero sequence). • Front mounting SVG cabinet shall be front cabling structure, if 100kvar SVG module is selected, which makes it possible to install SVG cabinet against the wall. • SVG system shall be able to run in ECO mode, which puts SVG systems to sleep when the load PF is already very high, and activates SVG once PF drops.
4	Performance Requirements	Electrical Specification • Voltage Range: AC 400V +15%, -20%, L-L, should be able to operate under 380V or 415V L-L native voltage conditions, under its voltage boundaries. • Frequency Range: 50/60Hz±5Hz. • Switching Frequency: ≥20kHz, higher Switching Frequency can provide faster response speed. • Input Phase: should be able to operate for 3P4W system, for 3P4W system application, neutral cable should be connected and SVG should be able to compensate neutral current. • Power Scalability: One display & control panel (LCM) should be able to display running data and set parameters for up to 5 SVG modules, and up to 10 such sets shall be work in parallel to scale up the SVG system rating up to 5000kvar. • Capacity Rating: The SVG shall be able to maximize its operation for full rated Displacement Power Factor (DPF) correction and load unbalance correction. The vector sum of reactive, negative sequence and zero sequence absorption cannot exceed the SVG capacity. The maximum compensation capacity of one power module should be 100kvar, and they should be able to mix up in the same cabinet to make a flexible larger rating SVG system. • Parallel: Up to 5 pieces 100kvar should be able to be integrated into one SVG cabinet, so maximum SVG rating per cabinet can reach 500kvar. And up to 10 SVG cabinets should be able to word in parallel, making the maximum rating for one SVG system 5000kvar. • Current Limitation: The SVG shall have current limiting capability, settable up to its full rating to enable SVG safe running without shut down or malfunction, under over load condition. It should work in its full compensation mode under this situation.

Static Var Generator (SVG) Panel		
Sr. No.	Parameter	Minimum Requirement
		• Phase Sequence Self-adaption: The SVG shall be able to detect phase sequence, and it should be able to perform under both clockwise and anti-clockwise phase sequence without interchange actual phase connection. • Instant Response Time: $\leq 100\mu s$. • Complete Response Time: $\leq 20ms$. • Thermal Loss: $\leq 3\%$ of SVG rating. • Output Current Limitation: Automatic (100% Rated Capacity). • MTBF: $\geq 100,000$ Hours. • Current Transformer (CT): 1) CT Ratio: The primary current ratio from 100A to 10000A shall be programmable in the SVG to provide a flexible CT selection from the market. 2) CT Accuracy: class 1 or better accuracy is needed. 3) CT Location: SVG should be able to operate with the current transformer installed and connected at source side or load side. 4) Quantity: 3 CTs shall be needed if load is unbalanced, and only 1 CT is required if load is balanced. 5) CT Burden: The CT burden shall be greater than 1.5VA for each SVG module, and the CT burden consumption of cables should be taken into account, generally, the CT burden selection should be follow the suggestion below. SVG module quantity: CT Burden 5~7 modules: 20VA
		Power Factor Improvement The SVG shall be able to improve power factor for a lagging or leading displacement power factor. The displacement power factor can be set from lagging or leading 0.6 to UNITY (1.0). Load Imbalance Correction Every three-phase current can be divided into positive sequence, negative sequence and zero sequence, therein, positive sequence is balanced, while negative sequence and zero sequence create imbalance. 3P4W SVG shall be able to mitigate both negative and zero sequence. Earthing The AC input neutral shall be electrically isolated from the SVG chassis. The SVG chassis shall have an equipment earth terminal. Provisions for local bonding are to be provided.
		Environmental Conditions Operating Ambient Temperature -10°C to 50°C without de-rating. Storage/Transportation Ambient Temperature -40°C to 70°C. Relative Humidity 0 to 95%, non-condensing. Altitude SVG shall be operating without derating for altitude $\leq 1000m$ condition, for 1000m~2000m condition, SVG shall be working normally by derating 1% per 100m.

Static Var Generator (SVG) Panel		
Sr. No.	Parameter	Minimum Requirement
5	SVG Delivery Submittals	The specified SVG shall be supplied with one User Manual, including details of. A. Safety Precautions. B. Function description of the product with system block diagram. C. Installation and wiring instruction. D. SVG operation procedure. E. Setting menu tree. F. Maintenance and troubleshooting guideline. SVG should be supplied with a record of pre-shipment final factory test report.
6	Quality Assurance	Manufacturer Qualifications The manufacturer shall be certified to ISO 9001. Factory Testing Before shipment, the system shall be fully and completely tested to ensure compliance with the specification. These test results will be documented in the Factory Test Report. Materials All materials of the SVG shall be new, of current manufacture, high grade and shall not have been in prior service except as required during factory testing. All active electronic devices shall be solid-state. Control logic and fuses shall be physically isolated from power train components to ensure operator safety and protection from heat. Wiring Wiring practices, materials and coding shall be in accordance with the requirements of IEC. All electrical power connections shall be torqued to the required value and marked with a visual indicator. Provision shall be made in the cabinets to permit installation of input, output, and external control cabling. Provision shall be made for either top or bottom access, allowing for adequate cable bend radius, to the input and output connections. Construction The floor mounting SVG shall be housed in an IP30 enclosure, and its cabinet shall be structurally adequate and have provisions for hoisting, jacking, and forklift handling. The floor mounting cabinet height shall be 2.0 meters and 110° front door opening. SVG units will follow RAL7035, gray color scheme. Cabinet should have adequate rating of MCCB for SVG connection. Cooling SVG shall use intelligent air-cooling approach and adequate ventilation shall be provided to ensure that all components are operated well within temperature ratings. Temperature sensors shall be provided to monitor SVG module's internal temperature, and cooling fans' rotating speed shall be adjusted according to the detected internal temperature. Upon detection of temperatures in excess of manufacturer's recommendations, the sensors shall cause audible and visual alarms to be sounded at the SVG control panel. On request shall be available the Fan Failure Alarm indicator that provide the Alarm on SVG mimic and remotely when one or more fans are faulty.

Static Var Generator (SVG) Panel		
Sr. No.	Parameter	Minimum Requirement
		SVG System The SVG system shall consist of an LCD & control panel (LCM), multiple SVG modules, a cabinet to house all the materials and accessories as specified, each module is an independent Power Factor Correction system, failure of other module or LCM shall not stop it from running normally, and a malfunction of another SVG module shall cause the load to be transferred automatically, making the whole SVG system a nature Redundant system.
		System Protection The SVG shall have built-in protection against; surges, sags, over voltage and voltage surges from AC source, and load switching and circuit breaker operation in the distribution system. The SVG shall have built-in protection against permanent damage to itself for all predictable types of malfunctions. Fast-acting current limiting devices shall be used to protect against cascading failure of solid-state devices. Internal SVG malfunctions shall cause the power module to trip offline with minimum damage to the SVG and provide maximum information to maintenance personnel regarding the reason for tripping off line. The status of protective devices shall be indicated on a LED/LCD display on the front of the cabinet.
		Fuse Protection: The SVG module shall be fuse protected. Each AC phase shall be individually fused with fast acting fuses in each module so that loss of any semiconductor shall not cause cascading failures.
		Soft-start Circuit: The SVG shall have a soft start circuit to pre-charge the DC bus capacitors for avoid any inrush current while SVG start-up.
		Power Relay Each SVG module shall have a power relay between power converter and power system. The power relay makes the power converter truly connected with the power system after turning on the SVG. When the SVG shut down or malfunctions the power relay shall be open for disconnect the electric connection between power converter and power system. The power relay shall be of the frame size to supply full rated load of the SVG module.
		Ripple Current Filter The SVG shall have a ripple current filter to absorb the high frequency ripple current from IGBT power converter.
		Power Converter The power converter shall denote the equipment and controls to convert the energy provided by the power system to reactive power and imbalance compensated current, then feedback to the power system to improve power factor and correct load imbalance. For increased performance, the power converter shall be a pulse width modulated (PWM) design and utilize insulated gate bipolar transistors (IGBTs), switching at a frequency $\geq 20\text{kHz}$.

Static Var Generator (SVG) Panel		
Sr. No.	Parameter	Minimum Requirement
7	Standards	The SVG and all associated equipment and components shall be designed and manufactured in accordance with the following applicable standards: 1. EN 62477-1:2012/A11:2014 – Safety requirements for power electronic converter systems and equipment. 2. IEC/EN 61000-6-2:2005 – Generic Standards-Immunity for industrial environments. 3. IEC/EN 61000-6-4:2007 – Generic Standards-Emission standard for industrial environments. 4. EN 50581:2012 – Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances. 5. EN 60529 – Degrees of protection provided by enclosures (IP Code) The Quality System for the engineering and manufacturing facility shall be certificated to conform to Quality System Standard ISO 9001 for the design and manufacturing of power protection systems for computers and other sensitive electronics.

10.11 Active Power Filter (APF) Panel

Active Power Filter (APF) Panel		
Sr. No.	Parameter	Minimum Requirement
1	Scope	APF Panel should have modular design. Active power filter system should consist of one or several APF modules with liquid Crystal Monitor & Control Panel. Each APF module should work as an independent harmonic filtering system, and users can change the harmonic filtering system rating by adding or removing APF modules
2	General	APF modules and an LCM panel should be embedded in APF cabinet. There should be breakers, cable terminals and Surge Protection Device in the APF panel
		APF module should be modular and hot swappable
		APF should be connected in parallel with non-linear loads and uses one set of current transformers (CT) to detect the load current. It should have capacity to calculate each order harmonic current in intelligent way, and then generates a compensating current with the same amplitude but opposite phase angles to the detected harmonic current, which will be able to cancel out the original load harmonics.
		it should mitigate harmonic voltage caused by harmonic currents. The APF system should be able to improve power factor (PF) and correct load imbalances in the power system.
		The APF panel should ensure good compensation performance at full load condition. The Total Harmonic Distortion of Voltage (THDu) should not beyond < 3%. The total Harmonic Distortion of Current (THDi) should not beyond < 5%. The Power Factor should be maintained at highest level and improves both leading and lagging PF.

Active Power Filter (APF) Panel		
Sr. No.	Parameter	Minimum Requirement
		It should be multi-functional like Harmonic, reactive power and imbalance compensation
		It should have high harmonic filtering rate up to 98%
		It should have excellent reactive compensation; High speed, Precise step-less, Bi-directional (capacitive and inductance) compensation
		It should have imbalance correction on both negative and zero sequence to mitigates neutral current
		It should have wide input voltage & frequency range and adapts to tough electrical environments
		It should provide complete protection like grid Over/Under voltage, APF over current, over temperature, and more. All faults should be record in the event log, which is convenient for failure analysis and audit point of view
3	Design Requirements	A. The APF system shall be modular designed, each APF module shall be an independent harmonic filtering system, and it should work normally even when other modules or LCD & control panel (LCM) get failure. B. Non-hot-swappable connectors should be available for each APF module, makes it easy for APF installation and maintenance. C. Each APF module shall be sized to provide a maximum harmonic correction current of 50A / 75A / 100A. When two or above APF modules work in parallel, each module's maximum harmonic correction current shall not downgrade. D. 50A/75A/100A APF modules should be able to mix up in the same cabinet to make a flexible larger rating APF system. Up to 7 pcs 50A or 75A modules or 6pcs 100A modules should be able to be integrated into one APF cabinet, so maximum APF rating per cabinet can reach 525A or 600A. And up to 10 APF cabinets should be able to word in parallel, making the maximum rating for one APF system 5250A or 6000A. E. The APF system should be able to improve fundamental displacement power factor (lead or lag), eliminate harmonic current of 2nd to 51st order (selectable) and correct load imbalance (compensate Negative and Zero sequence).
4	Performance Requirement	Electrical Specification A. Voltage Range: AC 400V +15%, -20%, L-L, should be able to operate under 380V or 415V L-L native voltage conditions, under its voltage boundaries. B. Frequency Range: 50/60Hz±5Hz. C. Switching Frequency: ≥50kHz, higher Switching Frequency can provide better high order harmonic current compensation performance. D. Thermal Losses: ≤3% of APF rated capacity (kVA), max 20W/A. E. Input Phase: should be able to operate for 3P3W or 3P4W system, for 3P4W system application, neutral cable should be connected and APF should be able to compensate neutral harmonic current. F. Power Scalability: One display & control panel (LCM) should be able to display running data and set parameters for up to 7 APF modules, and up to 10 such sets shall be work in parallel to scale up the APF system rating up to 5250Amps.

Active Power Filter (APF) Panel		
Sr. No.	Parameter	Minimum Requirement
		G. Phase Current Rating: The APF shall be able to maximize its operation for full rated Displacement Power Factor (DPF) correction or full rated harmonic correction. The vector sum of reactive, harmonic, negative sequence and zero sequence absorption cannot exceed the APF rating. The maximum compensation current of one power module should be 50A/75A/100A, when 2 and above Power Modules work in power scalable configuration, each power module should not downgrade, and 50A/75A/100A modules should be able to mix up in the same cabinet to make a flexible larger rating APF system. H. Parallel: Up to 7 pcs 50A or 75A modules or 6pcs 100A modules should be able to be integrated into one APF cabinet, so maximum APF rating per cabinet can reach 525A or 500A. And up to 10 APF cabinets should be able to word in parallel, making the maximum rating for one APF system 5250A or 5000A. I. Current Limitation: The APF shall have current limiting capability, settable up to its full rating to enable APF safe running without shut down or malfunction, under over load condition. It should work in its full compensation mode under this situation. J. Instant Response Time: $\leq 100\mu s$. K. Complete Response Time: $\leq 20ms$. L. Current Transformer (CT): 1. CT Ratio: The primary current ratio from 1A to 10000A shall be programmable in the APF to provide a flexible CT selection from the market. 2. CT Accuracy: 0.5 class accuracy is needed. 3. CT Location: APF should be able to operate with the current transformer installed and connected at source side or load side. For source side CT connection application, the APF controller will use close loop control to compensate harmonic current. For load side application, open loop control will be used. 4. Quantity: 3 CTs shall be needed if open loop CT configuration is used, or 6 CTs shall be needed if close loop CT configuration is used. 5. CT Burden: The CT burden shall be greater than 1.5VA for each APF module, and the CT burden consumption of cables should be taken into account, generally, the CT burden selection should be following the suggestion below. Harmonic Elimination A. Harmonic Selection: APF should be able to eliminate harmonic currents from 2nd to 50th harmonics, which shall be individually selectable for maximum 12 harmonic orders simultaneously. B. Harmonic Reduction Ratio: Each selected harmonic order shall have settable reduction ratio. The settable reduction range of each order shall be from 0% to 100%. Power Factor Improvement The APF shall be able to improve power factor for a lagging or leading displacement power factor. The displacement power factor can be set from 0.6 lag / lead to UNITY (1.0). Load Imbalance Correction Every three-phase current can be divided into positive sequence, negative sequence and zero sequence, therein, positive sequence is balanced, while negative sequence and zero sequence create

Active Power Filter (APF) Panel		
Sr. No.	Parameter	Minimum Requirement
		imbalance. 3P4W APF shall be able to mitigate both negative and zero sequence, and 3P3W APF shall be able to mitigate negative sequence.
		Earthing The AC input neutral shall be electrically isolated from the APF chassis. The APF chassis shall have an equipment earth terminal. Provisions for local bonding are to be provided. Environmental Conditions Operating Ambient Temperature -10°C to 50°C without derating. Storage/Transportation Ambient Temperature -40°C to 70°C. Relative Humidity 0 to 95%, non-condensing. Altitude APF shall be operating without derating for altitude ≤ 1000m condition, for 1000m~2000m condition, APF shall be working normally by derating 1% per 100m.
5	APF Delivery Submittals	The specified APF shall be supplied with one User Manual, including details of. G. Safety Precautions. H. Function description of the product with system block diagram. I. Installation and wiring instruction. J. APF operation procedure. K. Setting menu tree. L. Maintenance and troubleshooting guideline. APF should be supplied with a record of pre-shipment final factory test report. Warranty The APF manufacturer shall warrant the product against defects in workmanship and materials for 12 months after initial start-up or 15 months after ship date, whichever comes first.
6	Quality Assurance	Manufacturer Qualifications The manufacturer shall be certified to ISO 9001.
		Factory Testing Before shipment, the system shall be fully and completely tested to ensure compliance with the specification. These test results will be documented in the Factory Test Report.
		Materials All materials of the APF shall be new, of current manufacture, high grade and shall not have been in prior service except as required during factory testing. All active electronic devices shall be solid-state. Control logic and fuses shall be physically isolated from power train components to ensure operator safety and protection from heat.
		Wiring Wiring practices, materials and coding shall be in accordance with the requirements of IEC. All electrical power connections shall be torqued to the required value and marked with a visual indicator. Provision shall be made in the cabinets to permit installation of input, output, and external control cabling. Provision shall be made

Active Power Filter (APF) Panel		
Sr. No.	Parameter	Minimum Requirement
		for either top or bottom access, allowing for adequate cable bend radius, to the input and output connections.
		Construction The floor mounting APF shall be housed in an IP20 enclosure, and its cabinet shall be structurally adequate and have provisions for hoisting, jacking, and forklift handling. The floor mounting cabinet height shall be 1.2 or 1.8 meters and 110° front door opening. Active filter units will follow RAL7035, gray color scheme.
		Cooling APF shall use intelligent air-cooling approach and adequate ventilation shall be provided to ensure that all components are operated well within temperature ratings. Temperature sensors shall be provided to monitor APF module's internal temperature, and cooling fans' rotating speed shall be adjusted according to the detected internal temperature. Upon detection of temperatures in excess of manufacturer's recommendations, the sensors shall cause audible and visual alarms to be sounded at the APF control panel. On request shall be available the Fan Failure Alarm indicator that provide the Alarm on APF mimic and remotely when one or more fans are faulty.
		APF System The APF system shall consist of an LCD & control panel (LCM), multiple APF modules, a cabinet to house all the materials and accessories as specified, each module is an independent harmonic filtering system, failure of other module or LCM shall not stop it from running normally, and a malfunction of another APF module shall cause the load to be transferred automatically, making the whole APF system a nature Redundant system.
		System Protection The APF shall have built-in protection against; surges, sags, over voltage and voltage surges from AC source, and load switching and circuit breaker operation in the distribution system. The APF shall have built-in protection against permanent damage to itself for all predictable types of malfunctions. Fast-acting current limiting devices shall be used to protect against cascading failure of solid-state devices. Internal APF malfunctions shall cause the power module to trip offline with minimum damage to the APF and provide maximum information to maintenance personnel regarding the reason for tripping off line. The status of protective devices shall be indicated on a LED/LCD display on the front of the cabinet.
		Fuse Protection: The APF module shall be fuse protected. Each AC phase shall be individually fused with fast acting fuses in each module so that loss of any semiconductor shall not cause cascading failures.
		Soft-start Circuit: The APF shall have a soft start circuit to pre-charge the DC bus capacitors for avoid any inrush current while APF start-up.

Active Power Filter (APF) Panel		
Sr. No.	Parameter	Minimum Requirement
		Power Relay Each APF module shall have a power relay between power converter and power system. The power relay makes the power converter truly connected with the power system after turning on the APF. When the APF shut down or malfunctions the power relay shall be open for disconnect the electric connection between power converter and power system. The power relay shall be of the frame size to supply full rated load of the APF module.
		Ripple Current Filter The APF shall have a ripple current filter to absorb the high frequency ripple current from IGBT power converter.
		Power Converter The power converter shall denote the equipment and controls to convert the energy provided by the power system to harmonic, reactive power and imbalance compensated current, then feedback to the power system to reduce harmonic current, improve the power factor and correct load imbalance. For increased performance, the power converter shall be a pulse width modulated (PWM) design and utilize insulated gate bipolar transistors (IGBTs), switching at a frequency $\geq 30\text{kHz}$.
7	Standards	The APF and all associated equipment and components shall be designed and manufactured in accordance with the following applicable standards: 1. EN 50178: General and Safety requirements. 2. IEC 61000-6-2: Generic standards — Immunity for industrial environments. 3. EN 60529: Degrees of protection provided by enclosures (IP Code) The Quality System for the engineering and manufacturing facility shall be certificated to conform to Quality System Standard ISO 9001 for the design and manufacturing of power protection systems for computers and other sensitive electronics.

10.12 Busbar trunking system for Rack

Busbar trunking system for Rack		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes busbar trunking system installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	Design	The system shall be designed primarily for overhead power distribution of electrical power. The system shall be designed to be installed at critical distribution points to power specific loads, servers room area.
3	Busbar	The Load fed from plug-in/tap off boxes, shall be added or removed without shutting down the busbar

Busbar trunking system for Rack		
Sr. No.	Parameter	Minimum Requirement
		The busbar should be compulsorily hot swappable and compulsorily should be an open channel busbar system which is continuous access and allows plug-in units/tap off boxes to be inserted and removed anywhere along its length
		The system installation, the completed system will provide a manageable, economical means for power distribution and communications
		The busbar/busway shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage, degradation, or derating of operating capability: - Ambient Temperature for electronic components: 0 to 40°C - Relative humidity: 0 to 95 percent, noncondensing
		The busbar/busway system shall perform as specified in this specification while supplying rated full-load current as shown on the project drawings.
		A busbar, accessories, and components will withstand seismic forces to include the following: - Basis of certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation. - The term "withstand" means "the units will remain in place without separation of any parts from the device when subjected to the seismic forces specified." - It should Identify center of gravity and locate and describe mounting and anchorage provisions. - Detailed description of equipment anchorage devices on which the certification is based and the installation requirements.
		The bidder should provide operation and maintenance data for busbar/busway system
		The lengths provided on the project shall be as recommended and selected by the manufacturer to meet the project requirements.
		The lengths shall be available in lengths up to 13 feet with option to extend
		The top of the busbar shall have a slot running the length of the busbar to provide attachment points for installation of the busbar
4	Hanger	The hangers provided with the system should not in any way interfere with the tap off installation
		Various hangers need to be available for different type of installations to meet individual site needs
5	Quality	The bottom of the busbar shall have a continuous opening to accept the tap off boxes. This opening shall pass the UL and IEC hypothetical finger probe test. The entire opening with the exception of the small area for the joint coupling, shall be available for plug-in/tap off unit insertion
		The busbar housing sections shall be constructed of extruded aluminum and provide 100% rated system earth path that meets UL 857 standard. Steel housings shall not be permitted
		All conductors for amperage ratings up to 600A shall be made of 100% copper. Manufacturer of busbar to have Aluminium conductor option for amperage ratings as per project requirement. All conductors sized to handle 100% of the busbar rating under continuous operation up to the maximum ambient temperature. The conductors shall be electrically isolated from the housing

Busbar trunking system for Rack		
Sr. No.	Parameter	Minimum Requirement
		Bus bars shall be fabricated from high strength electrical grade Copper (C101 BS 1432/1433) 99.99% purity to ETP 99.9. Option for aluminum alloy 6101
		An isolated earth is to be supplied if shown on the drawings. This is required for the system where earth isolation is required such as systems with heavy microprocessor-based loads or large computer-based installations
		An oversized neutral for systems with non-linear loads. It should have an additional capacity prevents overloading caused by zero sequence harmonic currents –available options are: 160A – 200% Oversized Neutral 250A – 170% Oversized Neutral 400A – 150% Oversized Neutral
		Internal conductor shall be electrically isolated from the housing using full length individual insulator of IEC & UL certified halogen free, non-flammable thermoplastic. The insulation must have excellent dielectric strength and is impact resistant
6	Tap off box	Tap off boxes shall be polarized to avoid incorrect installation. Tap off boxes should be capable of being inserted safely when the busbar will energize
		All tap off boxes should have mechanical/ electrical interlocks for safety feature
		All tap off boxes shall utilize a mechanical/ electrical interlock that will prevent an energized plug-in unit from insertion or removal from the busbar and will reduce the risk of arch flash to the operator
		The tap off box shall have the option of being hook operated at the user's request
		Tap off boxes shall use either a circuit breaker or a fuse for branch circuit protection as shown in the schedule on the project drawings and shall have the option of interlocking the MCB at the user's request
		Tap off boxes that include drop cords shall be manufactured with cord grips and receptacles as specified on the schedule on the project drawings submitted by the bidder
		Tap off boxes shall be configured by the manufacturer to balance the load based on quantity of tap off box types provided
		Tap off boxes shall have at least 125 amps of distribution capacity for all amperage systems
		Tap off boxes can be easily added or removed without shutting power down to the busbar. Tap off boxes shall have integral shutters. Verification of compliance shall be provided from OEM
		The tap off units shall be compatible for vertical and horizontal mounting of the busway
		The tap off units shall be compatible with all current ratings of the busbar/busway system
7	End feed	The end feed shall provide the connections from the incoming cables to the Busbar System.
		The end feed shall be an IP20/ IP21 enclosure with various access panels for incoming cabling.

Busbar trunking system for Rack		
Sr. No.	Parameter	Minimum Requirement
8	Monitoring	The end feed shall have an internal connection to a section of Busbar conductors.
		The end feed shall be available as an end feed or center feed box to accommodate existing or future site conditions.
		The final circuit monitoring should be integrated into the busway delivering the measurement of total load for individual tap off loads to the DCIM system. Modbus RTU or Modbus TCP or any other industry standard open protocol.
		The final circuit monitoring system shall be capable of monitoring and providing all power calculations for the total input power for each busway run at end feed level. Tap off box monitoring should be possible through DCIM
		The final circuit monitoring system shall be capable of complete integration with the DCIM
		The tap off boxes as indicated on the schedule on the project drawings shall have the following power measurements and remote monitoring interface
		The end feed should be provided with the following power measurements and remote monitoring interface. • Input voltage (L/L and L/N) • Current per phase (min/max) • Voltage per phase (min/max) • Neutral current • Power factor • Frequency • Power (active, reactive, apparent) • Demand (kWH) • Voltage and current THD% • Current peak demand • Accuracy is better than 0.5% • Communication is Modbus RTU or Modbus TCP and SNMP simultaneously • LED display
		End Feed Thermal Monitoring System shall provide real-time heat rise data for each cable landing. Heat rise data shall be provided to the DCIM system via Modbus TCP protocol
		Thermal sensors for bus connections and cables shall be non-contact, non-powered. Thermal sensors shall be monitored via a Modbus data concentrator, which in turn will be connected to the EPMS via Ethernet

Busbar trunking system for Rack		
Sr. No.	Parameter	Minimum Requirement
9	Installation	The bidder should follow below installation guideline: •The bidder shall install the busbar in accordance with OEM's instructions. •The busbar runs shall consist of lengths as shown on the drawings. The drawings should be approved by OEM. •The tap off boxes orientation shall be as indicated on the drawings. •Hanging of the busbar shall be done using the busbar hangers from a structure above the busbar. •The hangers shall connect to the busbar, and to an all-thread rod provided by the installing bidder. •The spacing of the hangers along the busbar is 5 feet or less as recommended by the manufacturer. •The end feed shall have connection provisions for the bidder supplied feeder cabling. • The end feed shall be connected to the busbar section using a joint kit. • The connection of sections of the busbar shall be done using a joint kit. The connection shall be made per the manufacturer's instructions. •An end cap shall be installed at the end of the busbar run. •As shown on the drawings elbow or tee connections may also be required. •The bidder should maintain minimum clearances and workspace at equipment according to manufacturer's written instructions. • The bidder shall make connections to supply circuits according to manufacturer's instructions and project drawings.
10	Tests	The bidder should follow infrared scanning and perform an additional follow-up infrared scan of each busway before date of substantial completion to final project close out. The bidder should prepare a certified report that identifies busways checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action The Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards. The OEM should provide certified copies of factory test reports upon request.
11	Busway System shall be designed and manufactured to the following standards	1. Low Voltage Directive (73/23/EEC) including Amendment (93/68/EEC) 2. Low Voltage Switchgear and Control gear Assemblies, Part 1: Type Tested and partially type tested Assemblies, IEC 61439-1: 1999 (amended up to date) 3. Low Voltage Switchgear and Control gear Assemblies, Part 2: Particular Requirements for Busbar Trunking systems (Busways), IEC 61439-6 4. Underwriters Laboratory Standard, UL 857 -The common UL, CSA, and ANCE Standard for Busways that is derived from the fifth edition of CSA Standard C22.2 No. 27, the twelfth edition of UL 857, and the second edition of NMX-J-148-1998-ANCE. 5.CUL Listing 6. National Electric Code (NEC) - Article 368 - Busways 7. NEMA AB1, Molded Case Circuit Breakers and Molded Case

Busbar trunking system for Rack		
Sr. No.	Parameter	Minimum Requirement
		Switches 8. NEMA KS-1, Enclosed and Miscellaneous Distribution Equipment Switches (600VAC) 9. NFPA 70 - National Fire Protection Agency
		The Busway System shall be designed primarily for overhead power distribution of electrical power. Loads fed from Plug-in units can be added or removed without shutting down the Busway.
12	Operational Requirements	Environmental Conditions: The Busway shall be capable of operating continuously in the given environmental conditions without mechanical or electrical damage, degradation or derating of operating capability.
13	Standards	UL 857, CSA, and ANCE Standard for Busbars that is derived from the fifth edition of CSA Standard C22.2 No. 27, the twelfth edition of UL 857, and the second edition of NMJ-J-148-1998-ANCE. CUL Listing, National Electric Code (NEC) – Article 364 – Busbar, NFPA 70 – National Fire Protection Agency

10.13 Chiller

Chiller		
Sr. No.	Parameter	Minimum Requirement
1	Scope	Supply, installation, testing & commissioning of air-cooled Water Chiller of 570 TR Actual capacity with Two screw compressor operating on refrigerant R-134a driven by suitable Semi-Hermetic motor. The Chiller should be suitable for operating at 415V + 10%, 3P, 50 Hz power supply. The scope also includes chiller system installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The chiller shall be factory insulated with 19 mm thick nitrile rubber / or equivalent thermal insulation with vapour barrier. The insulation shall be applied in such a manner that water boxes and covers shall be removable without damaging it
		The factory installed and wired, powder painted steel cabinets with tool lockable, hinged, latched, and gasket sealed outer doors equipped with wind struts for safer servicing. Provide main power connection(s), compressor starters and fan motor contactors, current overloads, and factory wiring
		The panel shall include control display access door. The chiller should be provided with single point power connection with dedicated isolation switch of 3 phase of scheduled voltage
		The terminal block connections shall be provided at the point of incoming single point connection for field connection and interconnecting wiring to the compressors
		The Power panel shall be supplied with a factory mounted and wired control transformer that will supply all unit control voltage from the main unit power supply. Transformer shall utilize scheduled line voltage on the primary side and provide 115V/1Ø on secondary

Chiller		
Sr. No.	Parameter	Minimum Requirement
3	Quality installation	The packaged chiller unit shall be placed on Anti Vibration mounts and be supplied fully assembled on a base frame of Zinc-dipped galvanized, factory piped, wired and tested requiring water and the electrical connections at site
4	Compressor	The Compressor shall be direct drive, semi hermetic, rotary twin-screw type with integrated lubrication system utilizing compressor differential pressure. Chiller compressor should have displacement power factor of 95% at all load conditions
		Each chiller should have minimum 2 compressors with independent refrigerant circuits. All compressors should be on VFD, having nil in rush current. More than two Compressors are not accepted due to space issue at site
		Refrigerant shall be R-134a/R-410a
		The Compressor casing shall be constructed from a high strength iron casting, having reinforced double wall construction to provide a rigid structure and minimize the transmission of noise. Multiple pressure lubricated rolling element bearing shall be used to absorb axial thrust as well as radial load. Minimum 80 mesh reinforced SS strainer shall be provided at the suction of compressor for protection. Rotors shall be precision made from ductile iron. Oil separator shall be provided at discharge side of compressor. Oil separator can be an integral part of compressor or alternatively, or it could be separate pressure vessel. Oil separator shall contain impingement plate, removable SS oil strainer and electrical oil heater. Drained oil from oil separator shall be piped back to the compressor
		Step-less capacity control to exactly match system load shall be provided. Compressor shall be able to unload up to 15% of load with stable running
		The refrigerant cooled accessible hermetic compressor motor should come in the chiller with inherent internal thermal overload protection and external current overload on all three phases
		The Compressor shall start at minimum load. It should provide microprocessor control to command compressor capacity to balance compressor capacity with cooling load
		The motor starter shall be zero electrical inrush current (Variable Frequency Drives). Not only all compressors with in chiller, but also all chillers must be capable of simultaneous starting
		The Chiller compressor should have displacement power factor of 95% at all load conditions.
5	Evaporator	The evaporator shall be horizontal shell and tube type, flooded / Hybrid falling film type evaporator suitable for given heat transfer capacity
		The evaporator shall be of rolled carbon steel plate with fusion welded seams. Removable compact water boxes of cast iron or welded steel with stub-out water connections shall be provided to permit access for tube cleaning and replacement

Chiller		
Sr. No.	Parameter	Minimum Requirement
		The evaporator shall be provided with following accessories in the chiller: - 2 liquid level sight glasses located on the side of the shell to aid in determining proper refrigerant charge. - Suction baffles / mist eliminator to prevent liquid carry over to the compressor. - Refrigerant relief device sized to meet the requirements of ASHRAE 15 Safety Code for mechanical Refrigeration.
		The tube material should be copper. Tubes shall be high-efficiency, internally and externally enhanced type having plain lands at all intermediate tube supports to provide maximum tube wall thickness at the support area. Intermediate steel tube supports should be provided at intervals not exceeding 1200 mm.
		Water boxes shall be designed for 150 psig working pressure and pneumatically tested at 225 psig
6	condenser	The condenser coils shall be either Micro Channel (All aluminum) or Copper-aluminum construction with factory applied post dipped e-coat (Spray coating is not acceptable) for increased resistance to corrosion
		The condenser fans should be direct driven VFD operated, heavy duty axial fans with aluminum blades.
7	control panel	The chiller should supply with factory mounted microprocessor-based control panel with at least the following features with automatic shutdown protection with manual reset for below issues: - Low evaporator refrigerant temperature and pressure, - High condenser refrigerant pressure. - Loss of condenser water flow - High motor temperature - Low Oil flow - Electrical distribution faults such as Phase reversal, phase loss, phase imbalance, motor current overload. - High compressor discharge temperature.
		The control panel shall be designed for outdoor duty and shall have enclosure with IP 54 protection min
		Individual feedback of compressor to be taken on controller/ display of chilled water panel
8	Testing	Factory testing for checking performance of chiller shall be witness by the Engineer- In charge/purchaser for one unit of each type for obtaining the dispatch clearance. Single Chiller of each type will be selected from the manufactured lot and will tested for performance. The chiller will be tested for varying percentage of cooling capacities of 100 %, 75 %, 50 % & 25 % for their performance. Client will witness performance testing of one each type of chiller at manufactures factory. The performance testing shall be carried out at four points as per AHRI/ Eurovent test standards.
9	Standard	UL 1995 – Heating and Cooling Equipment ASHRAE 15 – Safety Code for Mechanical Refrigeration ASHRAE Guideline – Reducing Emission of Halogenated Refrigerants in Refrigeration and Air-Conditioning Equipment and Systems

Chiller		
Sr. No.	Parameter	Minimum Requirement
		NEC – National Electrical Code OSHA – Occupational Safety and Health Act

10.14 Uninterrupted Power Supply & Lithium-ion System

UPS System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope covers supply, installation, testing and commissioning of online Modular UPS systems. Supply of Battery banks with battery mounting racks/cabinets, Supply of cables and inter connection between battery banks and UPS system.
		This specification describes the electrical, mechanical characteristics and requirements of three phases, on-line, double conversion, Modular Hot Swappable Uninterruptible Power Supply (UPS). The UPS should be having VFI (Voltage Frequency Independent) technology, fully DSP controlled power factor corrected rectifier and IGBT inverter capable of providing high quality AC power for sensitive electronic equipment loads. It should also supply clean power without any break in the supply. Under no conditions will the protected system get direct supply from the raw mains unless there is fault in the protected system. The description of the specification includes aspects related to design, manufacturing, fabrication and putting UPS Systems together with all necessary accessories and auxiliaries to make an operational UPS system in a condition acceptable to the end user.
2	General	1. Online Double Conversion – Transformer less Design with 3 Level Inverter Technology 2. Modular & Scalable UPS with hot swappable Power Modules & with hot swappable STS Module, controller & Aux Power Board 3. Redundant System with redundant controller with two controllers, Dual Aux Power Supply. 4. Dual CAN Bus within frame & redundant CAN Bus between parallel systems to enable UPS to be removed or inserted UPS in parallel configuration without need of transferring it to bypass mode 5. Integrated Parallel capability up to Eight UPS units for capacity 6. DSP (Digital Signal Processor) / Microprocessor based control, using IGBT devices and high switching frequency PWM 7. Efficiency Enhancement mode of operation to improve operational efficiency (>96%) on varying & dynamic loading conditions without compromising the redundancy required in the application. 8. Top & Bottom cable Entry options 9. Capability of independent or common battery bank operation of the UPS when operated in Parallel Redundant System 10. High Charging Current Capability of up to 15A per Power Modules.

UPS System		
Sr. No.	Parameter	Minimum Requirement
		11. UPS Compatibility & Integration with VRLA & Lithium-ion Batteries 12. Inbuilt Isolators for Input, Output, Static Bypass and Maintenance Bypass
3	Model of Operation	The UPS system shall continuously supply power to the critical load. Battery: Upon failure of the utility AC power source, the critical load shall be supplied by the inverter, which, without any interruption, shall obtain its power from the battery. Recharge: Upon restoration of the utility AC power source (prior to complete battery discharge), the PFC rectifier shall power the inverter and simultaneously recharge the battery. Static bypass: The static bypass switch shall be used to transfer the load to the bypass without interruption to the critical power load. This shall be accomplished by turning the inverter off. Automatic re-transfer or forward transfer of the load shall be accomplished by turning the inverter on. In maintenance bypass the load should supply with unconditioned power from the bypass input included in the UPS. The UPS system is configured to use static bypass operation as the preferred mode under predefined. Transfers to battery operation upon utility failure. Efficiency up to 99%. The UPS is configured for Efficiency Enhancement Mode to enable automatically transferring some modules to sleep mode in case of applied load is less than certain load percentage. Modules would be switched periodically & in rotational manner under this condition. Once load ramps up to full load or above some load percentage, Modules those were in sleep mode shift to active mode automatically without any command. The Efficiency Enhancement mode could be activated from front display to improve operational efficiency (>96%) on varying & dynamic loading conditions without compromising the redundancy required in the application The UPS should be configurable for Load Testing Mode that enables testing of the unit for load testing without external load to test & verify the UPS under site conditions & to help in Load simulation & decreasing the CAPEX, saving in energy cost for test to be done during maintenance. The two or more UPS units (up to 8) of same capacity should be capable of working in parallel mode N+1 and N+N of operation providing same voltage & frequency. The output of parallel UPS system should be shorted to provide common output. The UPS units working in parallel mode of operation should share the load equally. In case of failure of redundant UPS, rest of the UPS units should be able to support the critical load without any interruption.

UPS System		
Sr. No.	Parameter	Minimum Requirement
4	Measurements	The visual display shall include, but shall not be limited to, the following system parameters based on true RMS metering: 1. Measurements: 1) Input voltage (Ph-Ph and PH-N). 2) Input current per phase. 3) Bypass voltage. 4) Bypass input frequency. 5) UPS output voltage (Ph-Ph and Ph-N). 6) UPS output current per phase. 7) UPS output frequency. 8) UPS output percent load. 9) UPS output kVA. 10) UPS output power factor. 11) Battery voltage. 12) Battery current. 13) Battery backup time and remaining service life.
5	Events monitor	1) Load on battery. 2) Load on UPS. 3) Load on bypass. 4) Low battery warning. 5) General alarm. 6) Remaining back-up time during operation on battery power. 7) Bypass source outside tolerances. 8) Main input switch status 9) Reserve input switch status 10) Manual bypass switch status 11) Temperature Inverter & PFC-Warning & shutdown 12) DC Bus Abnormal 13) INV Output Voltage Abnormal 14) INV Overload Warning 15) INV Overload Shutdown 16) INV Short Circuit 17) INV Static Switch Abnormal 18) Emergency Power Off 19) Inner Communication Fault 20) Outer Communication Fault 21) Power Module Fan Fail
6	Li-ion Battery	The UPS shall use a Lithium-ion battery, designed for auxiliary power service in an UPS application. The primary battery cabinet shall be housed in a matching cabinet(s) next to the UPS. The battery system shall be sized to provide backup time as specified in the schedule of quantity when the UPS is supplying 100% rated load. The battery shall be sized as per BOQ considering DOD factor @ 90% & design margin of 10% to meet the back up. Lithium-ion Battery module shall have NMC chemistry. Each battery module shall be complied to Safety standards: UL 1973 and IEC 62619

UPS System		
Sr. No.	Parameter	Minimum Requirement
		A set of battery cabinets (or racks) shall be furnished with sufficient kilowatt hour rating to maintain the module rated output for a duration of 30 minutes at 25 Deg C and with a minimum end cell voltage as per offered make. Each battery string shall be housed in a dedicated cabinet.
		Each string shall consist of number of modules for required back up. Each cabinet shall be provided with individual battery circuit breaker. Each cabinet shall be provided with one rack battery monitoring system. The battery solution shall have battery-monitoring system that should be integrated with UPS thru Dry contact/BMS level integration so to have consolidated information of battery module and rack-level information for all battery cabinets on the UPS display.
		Battery solution should have communication interface of Modbus RS485 to building management system for remote monitoring of battery parameters as per details below: a. Battery strings charging /discharging current b. Battery strings bus voltage/rack voltage c. Maximum cell voltage d. Minimum cell voltage e. Maximum cell temperature f. Minimum Cell temperature g. System SOC h. Alarms for cell over voltage/undervoltage/over temperature/communication fail
7	Submittals	a. Vendor to provide UPS rating, configuration along with distribution scheme. b. UPS footprints including weights, dimensions, service access, and airflow requirements of each unit (GA drawings required). c. Footprints of battery racks, type of battery including overall weight of battery proposed for installation (typical layout diagram to be provided)
8	Material	The bidder should certify that all materials of the UPS is new, of current manufacture, high grade and free from all defects and will not have been in prior service except as required during factory testing.
9	Construction and Mounting	The UPS unit should comprise of rectifier/charger, inverter, static transfer switch, maintenance bypass switch, and static bypass input switch housed in a free-standing steel enclosure with key-lockable doors. Also, switch gears to be provided at input, output, static bypass & maintenance bypass of UPS. Front access only is required for servicing, adjustments, and installation. The enclosure should be built to comply with IP20. The UPS cabinet should be cleaned, primed, and painted with the manufacturer's standard colour.

10.14.1 600 KVA Modular UPS system with Li-ion battery

600 KVA Modular UPS System with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
1	Capacity (in kVA)	The Modular UPS should be with capacity of 600 kVA/600 KW at 40 Deg C, 3-Phase Input / 3-Phase Output UPS
		a) True Online configuration double conversion UPS with 3-Level Inverter Technology
		b) Modular & Scalable UPS with hot swappable Power Modules
		c) Hot Swappable STS Module & control Module
		d) Parallel capability up to eight UPS units for capacity.
		e) Redundant System with redundant controller with two controllers, Dual Aux Power Supply.
		f) Dual CAN Bus within frame & redundant CAN Bus between parallel systems to enable UPS to be removed or inserted UPS in parallel configuration without need of transferring it to bypass mode
		g) Efficiency Enhancement mode of operation to improve operational efficiency (>96%) on varying & dynamic loading conditions without compromising the redundancy required in the application.
2	Technology and Capability	h) Top & Bottom cable Entry options.
		i) DSP (Digital Signal Processor) / Microprocessor based control, using IGBT devices and high switching frequency PWM
		j) Capability of independent or common battery bank operation of the UPS when operated in Parallel Redundant System.
		k) Brushless DC Fans with speed control
		l) Load testing Mode that enables testing of the unit for load testing without external load & helps in Load simulation
3	Model Name & Number	The bidder should specify
4	Input	
4.1	Input facility - Phases / Wires	3-Phase / 4-Wire & Gnd (R, Y, B -Phases & Neutral + Ground)
4.2	Nominal Input Voltage	380 / 400 / 415V AC
4.3	Input Voltage Range	340 - 477 V AC
		250- 477 V AC (< 70% Loading)
4.4	Nominal Input Frequency	50 / 60 Hz (Auto selectable)
4.5	Input Frequency Range	40-70 Hz
4.6	Input Power Factor	> 0.99 on Full resistive load
4.7	Input Current Harmonic Distortion (THDi)	< 3% on Full Load (with Mains Vthd less than 1%)
5	Output	

600 KVA Modular UPS System with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
5.1	Nominal Output Voltage	380 / 400 / 415V AC (Selectable)
5.2	Output Voltage Regulation	+/- 1%
5.3	Nominal Output Frequency	50 / 60 Hz (Selectable)
5.4	Output Frequency Regulation	+/- 0.05 Hz (Free Running / Self Clocked Mode)
		+ / - 5 % (Synchronized to Mains Mode, Selectable)
5.5	Output Frequency Slew Rate	1 Hz / s
5.6	Output Wave Form	Pure sine wave
5.7	Output Voltage Distortion (Vthd)	<= 2% (For 100% Linear / Resistive Load)
		<= 5% (For 100% Non-Linear / RCD Load)
5.8	Crest Factor	3:1 On Full Load
5.9	Unbalanced load on phases	100% unbalanced load should be allowed
5.1	Displacement angle for 100% balanced Load	120 deg +/- 2 deg
6	Transient Response / Recovery	
6.1	Transient response: Dynamic regulation for 0% to 90 % step load	+/- 5%
7	Transfer Time	
7.1	Transfer Time (Mode of operation)	Nil from Mains mode to Battery Mode
		Nil from Battery Mode to Mains mode
7.2	Transfer Time (Inverter to Bypass / Bypass to Inverter)	< 1 ms (Synchronized Mode)
		< 10 ms (Asynchronized Mode)
7.3	Automatic & Bi-directional static by-pass (In-built)	Uninterrupted transfer of load from Inverter to bypass (under overload / fault conditions) & automatic retransfer from bypass to inverter (on removal of overload / fault conditions)
8	Efficiency	
8.1	Overall Peak Efficiency (AC to AC) - Online (Double Conversion) @50% Loading conditions	96.50%

600 KVA Modular UPS System with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
8.2	Overall Efficiency (AC to AC) - Online (Double Conversion) on 25% Loading	96%
8.3	Eco mode efficiency	99%
9	Overload	
9.1	Inverter Overload capacity	125% for 10 minutes
10	Display Panel (In-build Touch Display)	
10.1	Measurements (On Touch Display)	Input: Voltage /Current/ Frequency
		Bypass: Voltage /Current/ Frequency
		Output: Voltage / frequency / Current
		Battery: Voltage / Capacity
		Load: In kVA / kW / Percentage
		Temperature: STS/Inverter/PFC
10.2	Event Logging & Statistical Data (On LCD): UPS should capture and display up to 10000 events	Events Logs (10000 events) like: Over temperature / DC Bus Fail / Fan Fail / Fuse Fail / Overload / Short-circuit / Device Fail / Inverter Fail / Rectifier Fail / Bypass Fail, etc.
		Statistical Data: No. of power failures / Transfers to Bypass / Total Running time, etc.
10.3	User Programmable Parameters & Settings (On Touch Display)	Bypass: Voltage / Frequency Range
		Inverter: Voltage / Frequency / Eco Mode / Frequency converter
		Battery: Type / Banks / Chargers Current / Manual & Automatic Testing
		Mode selection: online Mode, Efficiency Enhancement Mode, ECO Mode, Load testing Mode & Frequency conversion mode
		Auto Equalize charge enable/disable option with selectable interval
		Alarms: Buzzer Test / Buzzer Mute
		Date & Time Setting
		Password: User / Administrator Setting
		Information: UPS Serial No. / Firmware
		Log & Statistical Data Reset & Firmware upgrade
11	Alarms	
11.1	Audible Alarms	Mains Failure / Battery Low Alarm / UPS Overload / Fault / Short-circuit
12	Battery Bank	
12.1	Backup Required	30 mins.
		The battery shall be sized as per BOQ
		considering DOD factor @ 90% & Design/Aging margin of 10%
		to meet the backup & Sizing sheet to be submitted by vendor should have these factors

600 KVA Modular UPS System with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
12.2	Make, Type, Model No. & Country of Origin	Vendor to Furnish
12.3	Model & Cell Type/Cell Configuration	Prismatic, 1 P Series Type Configuration Only
12.4	Chemistry of Cell composition	NCM
12.5	Nominal Capacity in Ah	50-100Ah
12.6	Nominal Energy per Cabinet	25kWhr-75kWhr
12.7	Cycle Life at 85% DOD at 25deg C	2500 cycles (at 85% DOD at 25degC)
12.8	Battery Management System (BMS)	Module BMS & Rack BMU
12.9	Mandatory Safety Certifications/ compliances	UL1973, IEC62619, UN38.3
12.1	Safety Features in LiB Cabinet	MCCB to be present. LiB solution Should have inbuilt protection for Overcurrent, short circuit, Overvoltage, under-voltage & over temperature
12.1	Communication/I ntegration with UPS	Dry contact/BMS level integration to have battery module/rack level parameters on UPS display
12.1	Remote Monitoring of LiB to Building Management system (BMS)	Modbus RS485 interface with parameters captured for Voltage/current/ Minimum & Maximum cell voltage, temperature/ SOC.
12.1	Nominal Operating Temperature	0 deg C to +47deg C
13	UPS Communication Interfaces	
13.1	Dry contact/ communication Ports	Output Dry contact :6 configurable for 21 events including Battery breaker shunt trip, back feed protection EPO activated Input Dry contact: 4, Parallel Port: 4, REPO, External battery Temperature sensor: 4, External switch Breaker status: 4, USB Port & RS232 Port, SMART slot for more no. of Dry contacts, Integrated MODBUS/SNMP card
13.2	Remote Monitoring of UPS to Building Management system (BMS)	Modbus/ SNMP Interface with parameters captured for Input/output/Battery voltage, current. Output Power KVA/KW/Loading% & Critical alarms
14	Restart / Testing Capability	

600 KVA Modular UPS System with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
14.1	Automatic Restart	UPS should start up automatically on mains resumption after battery low shutdown
14.2	Battery Self-Test	Manual / Scheduled battery test to ensure healthiness of batteries.
15	Physical	
15.1	Operating Temperature	0 to 40 deg C full load (specified for kVA=kW)
15.2	Storage Temperature	-25 to 70 deg C
15.3	Operating Humidity	0 to 95% RH (Non-condensing)
15.4	Operating Altitude	1000 m (meters above sea level) without derating, Derating 1% for each additional 100m.
15.5	Protection Class	IP – 20
15.6	Type of Cooling	Forced Air
15.7	Noise Level	< 80 dbA at 1 meter distance
15.8	Form Factor	Free Standing Floor Mounted UPS
15.9	Dimension (w x d x h) in mm	The bidder should specify
15.10	Weight - in kg	The bidder should specify
15.11	Reliability	MTBF greater than 150000 hours
15.12	Connections - Rectifier Input / Output / Bypass Input / Battery	Inbuilt 4 Switches for Input, Bypass, Output & Maintenance Bypass to isolate individual UPS in parallel configuration
16	Standards	QMS: As per ISO 9001: 2008
		EMS: As per ISO 14001: 2004
		OSHAS: As per ISO 18001: 2007
		Safety: As per IEC62040-1
		EMC: As per IEC62040-2
		Performance: As per IEC62040-3
		ESD: As per IEC61000-4-2 Level 4
		RF: As per IEC61000-4-3 Level 3
		FT/Burst: As per IEC61000-4-4 Level 4
		Surge: As per IEC61000-4-5 Level 4
		CE Declaration of Conformance

10.14.2 250 KVA Modular UPS system with Li-ion battery

250 KVA Modular UPS system with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
1	Capacity (in kVA)	The Modular UPS should be with capacity of 250 kVA/250 KW at 40 Deg C, 3-Phase Input / 3-Phase Output UPS
		a) True Online configuration double conversion UPS with 3-Level Inverter Technology
		b) Modular & Scalable UPS with hot swappable Power Modules
		c) Hot Swappable STS Module & control Module
		d) Parallel capability up to eight UPS units for capacity.
		e) Redundant System with redundant controller with two controllers, Dual Aux Power Supply.
		f) Dual CAN Bus within frame & redundant CAN Bus between parallel systems to enable UPS to be removed or inserted UPS in parallel configuration without need of transferring it to bypass mode
		g) Efficiency Enhancement mode of operation to improve operational efficiency (>96%) on varying & dynamic loading conditions without compromising the redundancy required in the application.
2	Technology and Capability	h) Top & Bottom cable Entry options.
		i) DSP (Digital Signal Processor) / Microprocessor based control, using IGBT devices and high switching frequency PWM
		j) Capability of independent or common battery bank operation of the UPS when operated in Parallel Redundant System.
		k) Brushless DC Fans with speed control
		l) Load testing Mode that enables testing of the unit for load testing without external load & helps in Load simulation
3	Model Name & Number	The bidder should specify
4	Input	
4.1	Input facility - Phases / Wires	3-Phase / 4-Wire & Gnd (R, Y, B -Phases & Neutral + Ground)
4.2	Nominal Input Voltage	380 / 400 / 415V AC
4.3	Input Voltage Range	340 - 477 V AC
		250- 477 V AC (< 70% Loading)
4.4	Nominal Input Frequency	50 / 60 Hz (Auto selectable)
4.5	Input Frequency Range	40-70 Hz
4.6	Input Power Factor	> 0.99 on Full resistive load
4.7	Input Current Harmonic Distortion (THDi)	< 3% on Full Load (with Mains Vthd less than 1%)
5	Output	
5.1	Nominal Output Voltage	380 / 400 / 415V AC (Selectable)
5.2	Output Voltage Regulation	+/- 1%

250 KVA Modular UPS system with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
5.3	Nominal Output Frequency	50 / 60 Hz (Selectable)
5.4	Output Frequency Regulation	+/- 0.05 Hz (Free Running / Self Clocked Mode)
		+ / - 5 % (Synchronized to Mains Mode, Selectable)
5.5	Output Frequency Slew Rate	1 Hz / s
5.6	Output Wave Form	Pure sine wave
5.7	Output Voltage Distortion (Vthd)	<= 2% (For 100% Linear / Resistive Load)
		<= 5% (For 100% Non-Linear / RCD Load)
5.8	Crest Factor	3:1 On Full Load
5.9	Unbalanced load on phases	100% unbalanced load should be allowed
5.10	Displacement angle for 100% balanced Load	120 deg +/- 2 deg
6	Transient Response / Recovery	
6.1	Transient response: Dynamic regulation for 0% to 90 % step load	+/- 5%
7	Transfer Time	
7.1	Transfer Time (Mode of operation)	Nil from Mains mode to Battery Mode
		Nil from Battery Mode to Mains mode
7.2	Transfer Time (Inverter to Bypass / Bypass to Inverter)	< 1 ms (Synchronized Mode)
		< 10 ms (Asynchronized Mode)
7.3	Automatic & Bi-directional static by-pass (In-built)	Uninterrupted transfer of load from Inverter to bypass (under overload / fault conditions) & automatic retransfer from bypass to inverter (on removal of overload / fault conditions)
8	Efficiency	
8.1	Overall Peak Efficiency (AC to AC) - Online (Double Conversion) @50% Loading conditions	96.50%
8.2	Overall Efficiency (AC to AC) - Online (Double Conversion) on 25% Loading	96%
8.3	Eco mode efficiency	99%
9	Overload	
9.1	Inverter Overload capacity	125% for 10 minutes
10	Display Panel (In-build Touch Display)	

250 KVA Modular UPS system with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
10.1	Measurements (On Touch Display)	Input: Voltage /Current/ Frequency
		Bypass: Voltage /Current/ Frequency
		Output: Voltage / frequency / Current
		Battery: Voltage / Capacity
		Load: In kVA / kW / Percentage
		Temperature: STS/Inverter/PFC
10.2	Event Logging & Statistical Data (On LCD): UPS should capture and display up to 10000 events	Events Logs (10000 events) like: Over temperature / DC Bus Fail / Fan Fail / Fuse Fail / Overload / Short-circuit / Device Fail / Inverter Fail / Rectifier Fail / Bypass Fail, etc.
		Statistical Data: No. of power failures / Transfers to Bypass / Total Running time, etc.
10.3	User Programmable Parameters & Settings (On Touch Display)	Bypass: Voltage / Frequency Range
		Inverter: Voltage / Frequency / Eco Mode / Frequency converter
		Battery: Type / Banks / Chargers Current / Manual & Automatic Testing
		Mode selection: online Mode, Efficiency Enhancement Mode, ECO Mode, Load testing Mode & Frequency conversion mode
		Auto Equalize charge enable/disable option with selectable interval
		Alarms: Buzzer Test / Buzzer Mute
		Date & Time Setting
		Password: User / Administrator Setting
		Information: UPS Serial No. / Firmware
		Log & Statistical Data Reset & Firmware upgrade
11	Alarms	
11.1	Audible Alarms	Mains Failure / Battery Low Alarm / UPS Overload / Fault / Short-circuit
12	Battery Bank	Lithium-Ion battery
12.1	Backup Required	30 mins.
		The battery shall be sized as per BOQ
		considering DOD factor @ 90% & Design/Aging margin of 10%
		to meet the backup & Sizing sheet to be submitted by vendor should have these factors
12.2	Make, Type, Model No. & Country of Origin	Vendor to Furnish
12.3	Model & Cell Type/Cell Configuration	Prismatic, 1 P Series Type Configuration Only
12.4	Chemistry of Cell composition	NCM
12.5	Nominal Capacity in Ah	50-100Ah
12.6	Nominal Energy per Cabinet	25kWhr-75kWhr
12.7	Cycle Life at 85% DOD at 25deg C	2500 cycles (at 85% DOD at 25degC)

250 KVA Modular UPS system with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
12.8	Battery Management System (BMS)	Module BMS & Rack BMU
12.9	Mandatory Safety Certifications/ compliances	UL1973, IEC62619, UN38.3
12.10	Safety Features in LiB Cabinet	MCCB to be present. LiB solution Should have inbuilt protection for Overcurrent, short circuit, Overvoltage, under-voltage & over temperature
12.11	Communication/Integration with UPS	Dry contact/BMS level integration to have battery module/rack level parameters on UPS display
12.12	Remote Monitoring of LiB to Building Management system (BMS)	Modbus RS485 interface with parameters captured for Voltage/current/ Minimum & Maximum cell voltage, temperature/ SOC.
12.13	Nominal Operating Temperature	0deg C to +47deg C
13	UPS Communication Interfaces	
13.1	Dry contact/ communication Ports	Output Dry contact :6 configurable for 21 events including Battery breaker shunt trip, back feed protection EPO activated Input Dry contact: 4, Parallel Port: 4, REPO, External battery Temperature sensor: 4, External switch Breaker status: 4, USB Port & RS232 Port, SMART slot for more no. of Dry contacts, Integrated MODBUS/SNMP card
13.2	Remote Monitoring of UPS to Building Management system (BMS)	Modbus/ SNMP Interface with parameters captured for Input/output/Battery voltage, current. Output Power KVA/KW>Loading% & Critical alarms
14	Restart / Testing Capability	
14.1	Automatic Restart	UPS should start up automatically on mains resumption after battery low shutdown
14.2	Battery Self-Test	Manual / Scheduled battery test to ensure healthiness of batteries.
15	Physical	
15.1	Operating Temperature	0 to 40 deg C full load (specified for kVA=kW)
15.2	Storage Temperature	-25 to 70 deg C
15.3	Operating Humidity	0 to 95% RH (Non-condensing)
15.4	Operating Altitude	1000 m (meters above sea level) without derating, Derating 1% for each additional 100m.
15.5	Protection Class	IP – 20
15.6	Type of Cooling	Forced Air
15.7	Noise Level	< 80 dbA at 1 meter distance
15.8	Form Factor	Free Standing Floor Mounted UPS
15.9	Dimension (w x d x h) in mm	The bidder should specify
15.10	Weight - in kg	The bidder should specify
15.11	Reliability	MTBF greater than 150000 hours

250 KVA Modular UPS system with Li-ion battery		
Sr. No.	Parameter	Minimum Requirement
15.12	Connections - Rectifier Input / Output / Bypass Input / Battery	Inbuilt 4 Switches for Input, Bypass, Output & Maintenance Bypass to isolate individual UPS in parallel configuration
16	Standards	QMS: As per ISO 9001: 2008
		EMS: As per ISO 14001: 2004
		OSHAS: As per ISO 18001: 2007
		Safety: As per IEC62040-1
		EMC: As per IEC62040-2
		Performance: As per IEC62040-3
		ESD: As per IEC61000-4-2 Level 4
		RF: As per IEC61000-4-3 Level 3
		FT/Burst: As per IEC61000-4-4 Level 4
		Surge: As per IEC61000-4-5 Level 4
		CE Declaration of Conformance

10.15 CABLE TRAY

CABLE TRAY		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes cable tray system installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The Cable tray shall be manufactured from steel wires, welded together and bent into final shape prior to surface treatment
		Steel Wire Cable Tray Widths & Depths
		Cable Tray dimensions are all internal.
		Depths of 30 mm, 54 mm, 80 mm, 105 mm & 150 mm.
		Widths of 50 mm, 100 mm, 150 mm, 200 mm, 300 mm, 400 mm, 450 mm, 500 mm & 600 mm for depths of 30 mm & 54mm.
		Widths of 100 mm, 150 mm, 200 mm, 300 mm, 400 mm & 500 mm for depths of 105 mm & 150 mm
		All trays are of 3000 mm long
3	Specification	Ladder and perforated type Cable Trays shall be of Hot dip Galvanized type and factory fabricated out of CRCA sheet with standard accessories like tee, bends, couplers etc.
		Steel Wire Cable Tray will be produced from lateral and longitudinal sidewall steel wires, with minimum diameters of: 4 mm for trays of widths up to 100 mm 4.5 mm for trays of widths of 300 mm 6.0 mm for trays of widths of 400 mm, 450 mm, 500 mm and 600 mm

CABLE TRAY		
Sr. No.	Parameter	Minimum Requirement
		Trays will be manufactured with a longitudinal "T-welded" safety edge along the top wire of the sidewall (excluding 30x50)
		Trays will be constructed with a 50 mm x 100 mm mesh configuration.
		All tray fittings (e.g., changes in direction, level and size) shall be constructed on site, to them instructions, using side action bolt croppers and fastened using 25 mm and 30 mm counter clamps with M6 bolts and nuts, all surface treated as the tray.
		Trays will be coupled together using either a fast-spring coupler or a 25 mm / 30 mm counter clamp combination with supporting lateral splice plate on trays over 300mm width. The coupling will have the same surface finish as the tray.
		Trays shall be supported at a maximum span of 2.5 m by trapeze, wall, floor or channel mounting methods and will not exceed maximum loads as specified by the manufacturer.
		All welds will be manufactured to an average minimum tensile strength of 500Kg per weld.
4	Testing	Loading and deflection characteristics of the tray should be tested, and the results published in accordance with the European Standard CEI61537.
		Suitability for the support of Cat 6 data cabling should be demonstrated by way of independent test verification.
		Fire test certification should be published in accordance with the E30 / E90 standard.
		Electrical continuity across a coupling should be demonstrated by means of a published test method and result.
		A degree of EMI protection is demonstrated by means of published test methods and results.
5	Size	1500 mm wide Runners 25 x 100 x 25 x 3 mm Rungs 2# 20 x 40 x 20 x 3 mm 250 mm C/C Suspenders 2 Nos. 40 x 40 x 5 mm GI angle 1500 mm C/C with base support of 40x 40 x 5mm GI angle.
		1200 mm wide Runners 25 x 100 x 25 x 3 mm Rungs 2# 20 x 40 x 20 x 3 mm 250 mm C/C Suspenders 2 Nos. 40 x 40 x 5 mm GI angle 1500 mm C/C with base support of 40x 40 x 5mm GI angle.
		1000 mm wide Runners 25 x 100 x 25 x 3 mm Rungs 2# 20 x 40 x 20 x 3 mm 250 mm C/C Suspenders 2 Nos. 40 x 40 x 5 mm GI angle 1500 mm C/C with base support of 40x 40 x 5mm GI angle.
		750 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm C/C Suspenders 2 Nos. 32 x 32 x 5 mm GI angle 1800 mm C/C with base support of 40x 40 x 5mm GI angle.

CABLE TRAY		
Sr. No.	Parameter	Minimum Requirement
		600 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm C/C Suspenders 2 Nos. 32 x 32 x 5 mm GI angle 1800 mm C/C with base support of 40x 40 x 5mm GI angle.
		450 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm C/C Suspenders 2 Nos. 25 x 25 x 4 mm GI angle 1800 mm C/C with base support of 40x 40 x 5mm GI angle.
		Supply and fixing of perforated type cable trays of the following sizes of pre-galvanized iron. i. 600 x 40 x 40 x 2 mm thick ii. 450 x 40 x 40 x 2 mm thick iii. 300 x 40 x 40 x 2 mm thick iv. 150 x 40 x 40 x 2 mm thick
		Note: Suitable length of 10 mm dia. GI rod suspenders at 1800 mm interval shall be included in the item for perforated type cable tray.
6	Standards	Surface Treatments: i. Electro zinc plated to EN 12329 for interiorize ii. Hot Dipped Galvanized to EN ISO 1461 (formally BS 729 since 1999). iii. Stainless Steel to EN 10088-2 - AISI316L

10.16 Intelligent rack PDU

Intelligent rack PDU		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes Intelligent iPDU system installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The vertical switched rack PDUs should provide a comprehensive view of critical IT equipment power usage, both at the rack and via remote access with the added ability to remotely turn on, turn off, or reboot power at each outlet.
		IPDU provided shall have minimum 30 number of C13 (24 nos.) or C19 (6 nos.) outlets. The IPDU should be 63A, 3-phase with IEC industrial plugs.
		The PDU should help to avoid potential circuit overloads with remote current metering and monitoring of connected loads.
		The PDU should be with power sequencing time delays which should allow users to define the order in which to power up or down connected equipment to avoid circuit overload.

Intelligent rack PDU		
Sr. No.	Parameter	Minimum Requirement
		The power distribution unit should be with remote power monitoring should offer quick access to critical power usage information to evaluate energy usage trends and maximize uptime.
		The PDU should have feature to lock receptacles to secure power cords and avoid accidental disconnections. It should also be able to provide Simplify circuit and phase balancing with color-code receptacles.
		The PDU should have lockable sockets which can help connection cable of hardware to lock with the power socket to avoid any kind of loose connection error
		The PDU should allow the user to monitor power consumption at the outlet-level for a detailed view of power distributed to specific equipment with the outlet level option.
3	Remote management	The Remote management of the PDU should provide facility to reboot outlets to power cycle unresponsive IT equipment or increase runtime of critical equipment upon power failure with outlet-level control.
4	Interface support	HTTP SNMP V1 SMTP Event Log MODBUS TCP/IP MODBUS RTU(RS-485) FTP DHCP IPV4 Support Telnet
5	Features	· Monitors and Tracks Individual power consumption.
		· Conforms to CLASS I measurement accuracy. · Socket level Monitoring and Metering of electric parameters: Voltage (V), Current (I), Energy (kWH) Power (kVA, kVAR), Power factor (cos Φ)
		· Current Threshold settings with warning LED on front panel and Buzzer alarm.
		· TFT Color Display.
		· Networking: 10/100 Base Ethernet Port.
		· Provision to connect Temperature - Humidity Sensor.
		· Hot Swappable Controller.
		· Daisy Chaining: One Master PDU can communicate up to 03 nos. of slave PDUs.
		· Branch Circuit Protection: Two (02) X Hydraulic Magnetic Circuit Breaker Per Phase
6	Standard	The PDU should be certified with UL/CE, IEC, EN, and RoHS certified

10.17 Server / Network Racks & Cold aisle containment system

Server / Network Racks & Cold aisle containment system		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes Server rack / Network rack system installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	Size	The Rack should be adaptive and scalable electronic equipment support cabinets. The Rack shall be a cabling and distribution enclosure or a complete server enclosure. The size of the rack should be 800W X 2000H X 1200D in mm.
3	Doors	The Racks shall include minimum 85% Perforated locking Front Door, Perforated Split locking Rear Doors, 2 pair 19" Mounting Rails with removeable top panel.
		Doors shall be tool-less lift off removable, and field reversible. Doors come standard with locks keyed, and (2) hinges per door allowing a maximum 130° door opening
		On front and rear doors bio metric with electromechanical handle lock required
4	Load bearing	The rack frame shall be constructed as a welded steel/bolted frame and promote flexible mounting options and fully adjustable rail positioning. Finished in powder-coat. • The frame shall include depth markings for ease of EIA rail alignment. • The frame shall support 1200kg static weight load, 1000kg dynamic weight load. • All cabinet components (doors, side panels, top panels, 19" rails, PDU brackets) shall be grounded directly to the frame. • Grounding points shall be provided on the cabinets frame to externally ground each unit to the building ground.
5	Material	All mounting rails shall be constructed of 14-gauge sheet steel, 19" rails, with maximum rigidity, finished in powder-coat. • full-height RU position labels on front/rear of each rail. • 19" Mounting Rails shall be spaced 29.1" (740mm) apart from the factory • The mounting rails shall support the EIA-310E standard hole-mounting pattern, shall be factory installed in the rack frame and be individually depth-adjustable within the useable space to allow for flexibility of mounting depth. • Integrated cable management features should provide with the rack. The bidder should consider the horizontal and vertical cable management accessories as per cable density.
6	Cable entry	The standard top panel shall be removable in the field, and include (2) 150mm x100mm rectangular cut outs with brush insert located in the front and rear of the top panel for cable entrance or exit
7	Baying management	The baying kit shall supply hardware necessary to bay rack frames and in row cooling units of the same height and depth.

Server / Network Racks & Cold aisle containment system		
Sr. No.	Parameter	Minimum Requirement
8	Standards for Server/ Network rack	The Server / Network rack shall be designed in accordance with the following standards or certifications. • EIA-310 • DIN 41494 • IEC 297 • UL • ISO 9001, ISO 14001, ISO 45001
9	Containment system	The Cold aisle Containment System Should be a rack-independent system with the flexibility to maximize efficiency and capacity from the core to the edge for raised floor and slab Data Centre. The adaptable cold aisle containment System should allow you to deploy containment before racks are installed to simplify installation and speed deployment of new Data Centre equipment It should be with ceiling heights adjustable, and a full range of blanking panels & height adapters, the Cold Aisle Containment System should support standard-size racks as well as auxiliary equipment, such as in-row cooling and any other equipment systems The horizontal beams telescope to adapt to any aisle length and the system support aisle widths from three to six feet. A variety of roof options should enable different approaches to fire suppression and airflow management. The system should also support above-rack cable management and busbar management The Vertical System should be a vinyl partition that hangs from a drop ceiling, and it should be available in kits that include high-grade aluminum track, UL and FM rated fire suppression links and with ESD fire resistant vinyl The door, ceiling or combined system shall use a vertical vinyl strip design to accommodate non-uniform rack heights and non-uniform rows. It should be flexible system to deploy, it should require a drop ceiling. The design should be a simple one that incorporates with fire detection and suppression. It can also be used in conjunction with 90° corner brackets The vertical roof partition shall be with minimum 0.40 mil thick vinyl, available linear width sections and drop-down lengths sections. The Vertical roof strips should work with standard or any non-standard/uneven rows. The vertical strip door material shall be with minimum 0.40 mil thick vinyl, available linear width sections and lengths sections. The Vertical System shall be with rounded corner pieces or using straight pieces to form a 90° corner. The bidder should consider all required accessories to complete installation of CAC system The CAC system should be with automation integrated, the ceiling part of the CAC should be open automatic while fire or smoke detected inside the containment system The Containment system shall be designed in accordance with the following standards. • RoHS compliant • Standard for testing fade resistance to UV light • ISO 9001, ISO 14001, ISO 45001

10.18 Precision Air-Conditioning Units (Wall mount type) for Electrical, Network, Security, Staging & Telecom / Mux Rooms

Precision Air-Conditioning Units (Wall mount type) for Electrical, Network, Security, Staging & Telecom / Mux Rooms		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes Precision air conditioning system installation work with all required piping, duct, insulation, accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	design	A wall precision air conditioning system should design for cooling no-critical load UPS room, battery rooms, electrical room, IBMS room, solar inverter room etc. Precision Air Conditioning systems should provide high ratio of sensible to total cooling capacity. The unit selection should be as per heat ration of the hardware and room size
3	General	The cooling unit should have below features: - High efficiency EC fan with high airflow (> 500 CFM/TR) - Advanced coil design delivering high SHR > 0.9 - It should be Sustain up to 48°C outdoor temperature - Hydrophilic coated coil - Metallic construction
		The unit should have easy to maintain ideology with below features: 1. Self-diagnostic feature inbuilt 2. The units should have ease of internal access to parts to service / maintenance 3. 24X 7 hours call center support from OEM 4. Global presence with experienced personnel in the services
4	Capacity	The bidder should propose net sensing capacity in TR and kW both as per the room volume
		capacity (in TR)
		capacity (in kW)
5	Sensible heat ration	Sensible heat ration should be >0.9
6	Air flow	Air flow should be minimum 2800 CMH
7	Condenser	Condenser type should Air cooled
8	Refrigerant	R410/ R407
9	Compressor	The compressor should be rotary / scroll
10	Controller	The controller should have an advance feature: 1. Sequencing up to 8 units 2. Monitoring & alarm generation 3. Auto-startup on power failure 4. Remote monitoring feature 5. Authorized access control
11	Communication interface	The unit should have communication protocol like SNMP/ RS485 Modbus to connect with DCIM

Precision Air-Conditioning Units (Wall mount type) for Electrical, Network, Security, Staging & Telecom / Mux Rooms		
Sr. No.	Parameter	Minimum Requirement
12	Standards	The Server / Network rack shall be designed in accordance with the following standards or certifications. • CE/ Similar • RoHS • ISO 9001, ISO 14001, ISO 45001

10.19 Precision Air-Conditioning Units / CRAC for Ups Room & Battery Room

Precision Air-Conditioning Units / CRAC for Ups Room & Battery Room		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes Precision air conditioning system installation work with all required piping, duct, insulation, accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	Design	A Precision Air Conditioning system should design for cooling Critical load UPS and battery rooms. Precision air Conditioning systems should provide high ratio of sensible to total cooling capacity. The unit selection should be as per heat ration of the hardware and room size
3	General	The cooling unit should have below features: - Energy efficient EC fan - Intelligent Communication and monitoring - System Supervision and management - Smallest Footprint - High Sensible Heat Ratio - Available in Up flow and Down flow version - with digital Scroll Compressors
		The bidder should consider all required accessories to complete installation of the cooling unit system
		The sequencing should be feature of the PAC units. The units shall be designed to work for equal no of run hours also in case of fault the standby unit should start.

Precision Air-Conditioning Units / CRAC for Ups Room & Battery Room		
Sr. No.	Parameter	Minimum Requirement
4	Microprocessor based control	Microprocessor control of the PAC unit should be provided below information on the monitoring display: 1. Room temperature and humidity. 2. fan working status. 3. Current date and time. 4. Electric heaters working status. 5. Manual / Auto unit status. 6. Temperature set point. 7. Humidity set point. 8. Working hours of main component i.e., fan, heater, humidifier Unit working hours. 9. Modes of operation (cooling, heating, humidification, de-humidification,). 10. The last 10 intervened alarms.
5	Capacity	The net capacity of the unit needs to specify in the TR and kW units:
		capacity (in TR)
		capacity (in kW)
6	EC fan technology	The unit should have energy efficient features via providing EC fan technology
		The EC Fans should be able to reduce motor energy usage, compared to standard AC motors and work on deliver cooling as per heat load methodology
7	Technology	The unit should be proposed by bidder should be Air -cooled dx based technology
8	Discharge mechanism	The unit should have bottom discharge mechanism for Data Centre application
9	Installation	The bidder should consider all required accessories to complete installation of the cooling unit system
10	Standards	The product shall be designed in accordance with the following standards. • RoHS compliant • ISO 9001, ISO 14001, ISO 27001, ISO 45001

10.20 In-row cooling units for Server Room

In row cooling units for Server Room		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes In-row cooling system installation work with all required piping, duct, insulation, accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The In-row cooling solution for Server room cooling solution which should integrated within a row of Data Centre racks. It's should design to address the major heat challenges seen in high density applications.

In row cooling units for Server Room		
Sr. No.	Parameter	Minimum Requirement
		The solution should be with adjustable airflow baffles and controls that independently manage airflow and temperature, In-row cooling should precisely deliver highly efficient cooling in the row where it's needed.
		It should be designed with a maximum footprint of 300 mm width with similar depth of the rack to have better aesthetic view and proper baying with the rack
		It should provide Highly efficient, scalable cooling capacity with lower energy consumption and operational costs
		It should be scalable cooling from 20-100% capacity with load matching controls provides lower energy consumption and operational costs
		The unit should have integrated monitoring which can be transmitted to the monitoring software over IP
		The cooling units should be mountable on the side of the rack, as the same is required to form bayed system
		For ensuring a closed system for efficient cooling the chilled water-based cooling should be closed at the front and rear of the rack as the same is required to form a flush joint with the rack.
		The chilled water-based cooling should be used to cool either one or two server racks on left and right both side with horizontal air flow in its maximum configuration. In case of multiple racks, the solutions should allow the flexibility to add additional cooling units based the requirement
		The chilled water-based cooling should support N+ N configurations for Cooling redundancy
		The warm server air should draw in from the rear of the rack from hot aisle and the cooled air is blown back in front of the 19" equipment level from the side, over the whole height of the enclosure.
		For maximum efficiency and minimal energy consumption the fans used in the cooling units should be Electronically Controlled (EC) type
		The heat exchanger and server rack should remain separate from each other. This should eliminate the risk of water penetrating into the server rack and improves the ease of installation and service. Condensate and leakage management should be integrated. The water connection should be realized optionally to the top or bottom by way of an accessory kit.
		An intelligent sensor network should be monitors the air and water temperatures, as well as the water flow rate and leakage management. The incorporation of multiple temperature / humidity / air flow sensors for the hot and cold air provides for redundancy. The temperature / Humidity sensors should be place 3 level of the rack top, middle and bottom level. It means total 6 sensors in the rack should be consider by bidder three sensors front side and three sensors rear side.
		The Cooling unit should have features for expandability and scalability for future to "N" number of racks depends on the available space in the server room. Cooling units should have modules of fans which can be added as per requirement and rack loads.

In row cooling units for Server Room		
Sr. No.	Parameter	Minimum Requirement
		The chilled water inlet temperature to cooling unit 14°C or higher for better efficiency level. The output of the cooling unit should not compromise and need to be achieve cooling capacity of minimum 50kW per cooling unit.
		Structure parts should galvanize coated with pure polyester, UV resistance powder coating in broken white shade to protect against corrosion resistance and tested to withstand 1000 hrs. salt spray test. Rigid base frames to take full load of chiller during handling & installation. The chiller should have liquid separator, electronic expansion valve, optimized heat exchanger, high and low-pressure sensors, Schrader valves, filter dryer, non-return valve, high-pressure switch and shutoff devices.
		The Condensate management should be integrated into the unit and any condensate that will be collected should go in the collecting tray in the base and from there it should discharged to the outside via a hose.
		The integrated controller, in the chilled water based cooling unit should operate autonomously. The set point for the same should be the server intake air temperature, which should be automatically held constant at the set value. Sensors should be there in each case for detection of the cold and warm air temperatures, providing for the appropriate redundancy.
		The architecture should provide the flexibility to maintain and configure the cooling unit with a display and operating keys. The same should be integrated on the front of the unit to display and set the physical parameters.
		The bidder should offer SITC services and include Installation and commissioning on site along with chilled water piping and accessories (pump, strainer, clamps, isolation valves, insulation on piping and proper support for the piping) to install 2 nos. chillers. Bidder should take approval of Piping layout before starting work at site.
3	Capacity	The integrated air/water heat exchanger should guarantee a cooling output of up to minimum 50 kW per cooling unit with full capacity
4	Medium	Chilled water
5	Maintenance	The chilled water based cooling unit and the server rack remain separate from each other.
		It should be with simple assembly and service work and also eliminate the need to unwanted access of server rack for maintenance purposes.
		The maintenance and service for all relevant components should be realised quickly and simple.
		The true hot swappable and tool-free fan replacement should be available to minimize downtime. The fans being used should be hot swappable in the live working condition
6	Communication interfaces	The unit should have Communication interfaces to connect DCIM software: •Digital inputs: 2x (terminal) •Protocols, Ethernet: TCP/IPv4, TCP/IPv6, SNMPv1, SNMPv2c, SNMPv3, Telnet, SSH, (S)FTP, HTTP (S), NTP, DHCP, DNS, SMTP (S), Syslog

In row cooling units for Server Room		
Sr. No.	Parameter	Minimum Requirement
7	Monitoring	The connectivity with DCIM need to be consider with required hardware and all accessories to monitor temperature; Humidity; and Water Leakage.
8	Standards	The product shall be designed in accordance with the following standards or certifications. • ISO 9001, ISO 14001, ISO 27001, ISO 45001

10.21 Fire Fighting System

Fire Fighting System			
Sr. No.	Parameter	Minimum Requirement	
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes firefighting system installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.	
2	Firefighting area wise Solution		
Sr. No.	Fire Solution	Applicable area	Floor location
1	Fire sprinkler system	Reception, building lobby, office sitting area, Cafeteria	Ground floor, 4th floor, 5th floor, Terrace, building surrounding area
2	Fire Novec 1230 based Gas system	Server room area, gallery of the 1st, 2nd and 3rd floors, all areas of the Utility room, Stagging area, NOC room, SOC room, DCIM room, Innovation center	Ground floor, 1st floor, 2nd floor, 3rd floor, 4th floor, 5th floor
3	Fire hand extinguisher with clean agent / NOVEC 1230 based	All building walls, corner, walk way of the building, cafeteria, material unloading area, security cabin, NOC, SOC, DCIM room, Innovation center and terrace, nearby all critical outdoor equipment like transformer, DG, HT panel rooms.	Ground floor, 1st floor, 2nd floor, 3rd floor, 4th floor, 5th floor, Terrace area
3	General	The fire protection system shall be provided in the entire GSDC Data Centre, Gandhinagar in accordance with latest Indian standards and national building code.	
		A. Work under this section shall consist of Design, Engineering, Fabrication, Transportation, unloading at site of materials, equipment and appliances and Installation, Testing & commissioning of complete Fire Fighting Systems as mentioned in this specifications & detailed in the Bill of Quantities. B. Without restricting to the generality of the foregoing, the work shall include but not limited to the following:	

Fire Fighting System		
Sr. No.	Parameter	Minimum Requirement
4	Fire Pumps, Motor, Engine and Accessories	a) Electrically operated and diesel driven firefighting pumps with motor & diesel engine as per relevant IS codes, base plate and accessories for Hydrant & sprinkler service. b) Valves, NRVs & Strainers in suction and discharge piping c) Pressure gauge with isolation valves. d) M.S./Galvanized Pipes, fittings, valves, suction strainers, suction & delivery headers & accessories. e) Foundations, vibration eliminator pads and foundation bolts. f) Pressure vessel, pressure switches etc. g) MCC cum control panel for fire water pump, Jockey pump & Booster Pump
5	Fire Hydrant System	a) Pipework including pipes, fitting, valves, supports etc. for wet riser hydrant systems and External Fire Hydrant System. b) Fire Hydrant valves, Landing valves, Water monitors, RRL hose pipes, hose reels, hose cabinets, connections to fire mains. c) Isolation & non-return valves, supervisory switches for valves, pipe supports/welding/Fire Brigade inlet connection/ Draw-out connection and accessories.
6	Fire Sprinkler System	a) Electrically operated and diesel driven sprinkler system pumps with motor & diesel engine as per relevant IS codes, base plate and accessories for sprinkler service. b) MCC cum control panel for sprinkler pumps. c) Pipe Work including pipes, fitting, valves, supports etc. for sprinkler systems. d) UL listed / FM approved Fire Alarm control valves/Installation Control Valve e) UL listed / FM approved Sprinkler heads, flow switch & spare Sprinkler. f) Inspection & Testing assemblies.
7	Fire Water Curtain System	a) Electrically operated pump with motor as per relevant IS codes, base plate and accessories for water curtain system. b) Pipe Work including pipes, fitting, valves, supports etc. for sprinkler systems. c) UL listed deluge control valves d) Water curtain nozzles, pressure switch e) Galvanised Pipes & fittings shall be used down stream of deluge valve.
8	Hand Appliances /Fire Extinguishers	Supply and installation of fully charged and tested fire extinguishers hand appliances water CO2, foam, dry chemical powder type, ABC stored pressure type, CO2 gas cartridge type as required by these specification and drawings.
9	Hydraulic Calculations	The tenderer shall be responsible for providing fully detailed hydraulic calculations of sprinkler and hydrant system to comply with IS / NFPA Standards and to the requirements of Gandhinagar fire Services.

Fire Fighting System		
Sr. No.	Parameter	Minimum Requirement
	Hydrant System Description	i. The Hydrants System shall consist of a main electric pump of 2850 LPM at 88 m head with suitable Motor, standby diesel engine driven pump of 2850 LPM at 88 m head and jockey pump of 180 LPM at 88 m head with suitable Motor. An underground tank for Hydrants / Sprinkler System of 3,00,000 liters capacity shall be provided. The system shall be complete with all required accessories including valves, strainers, special fittings, instrumentation, control panels and any other components required to complete the system in all respects. ii. In addition to Hydrant pumps electric motor driven booster pumps shall be provided on terrace of each building. Pump shall be having 900lpm capacity & 45mtr head. The system shall be complete with all required accessories including valves, strainers, special fittings, instrumentation, control panels and any other components required to complete the system in all respects. iii. Overhead tank of 20,000 liters capacity shall be provided on terrace of each building and the same shall fed to booster pump. iv. The hydrant ring mains shall be laid 1mtr below ground around all the buildings. Sectional valves shall be provided in hydrant network for isolating various sections during maintenance. v. Hydrant system shall be kept pressurized all the time. vi. In the event of fire when any of the hydrant valves in the network is opened, the resultant fall in the pressure shall start the jockey pump first through pressure switch automatically. In case jockey pump fails to maintain the pressure, hydrant pump shall start at the pre-set pressure. In case of further drop in pressure the diesel standby pump shall start. vii. The hydrant risers shall be terminated with air release valve at the highest points to release the trapped air in the pipe work. Each Riser shall be provided with a drain valve at the bottom for draining water from riser during maintenance. viii. To provide for an air cushion for counteracting pressure surges/ water hammer, an air vessel/pressure vessel shall be furnished in the pump room near the fire pumps. The air vessel shall normally be kept partly full of water. ix. One No. four-way Fire Brigade Inlet Connections shall be provided for filling of Underground Fire tank in case of emergency and in addition one no. four way Fire Brigade Inlet connection shall be made to internal wet riser Header in case fire pumps fail to start. x. External fire hydrant will be provided on the ring main. Hydrant shall be located at least 2M away from the building. 1 No. Four way Fire brigade inlet connection shall be provided on External Fire Hydrant Ring. xi. Hydrant stations and cabinet shall be provided at all designated location inside and along with external hydrants. The internal hydrant stations shall be located in M.S steel fire cabinet / masonry civil cabinets as per drawing and will contain all items described in BOQ.

Fire Fighting System		
Sr. No.	Parameter	Minimum Requirement
10	Sprinkler System Description	i. The automatic sprinkler system will be installed to protect the entire commercial building with permitted exception e.g., DC hall, passages in DC hall, electrical switch room, power transformer and DG room as identified. There shall be separate electric motor driven main sprinkler pump of 2850 LPM at 88 m head & standby diesel engine driven pump of same capacity of main pump in the pump house to be provided and other than that, Hydrant Pump and Diesel Engine shall also support the sprinkler system. ii. The Sprinkler System shall be fed both from an underground tank and also from the overhead. iii. Installation control valve shall be provided for alarming in case of fire. Installation control valve comprising of main stop valve, alarm valve with accessories, strainer and water motor gong. iv. Flow switch shall be provided on each floor tapping (for each zone) for generating feedback to Fire Alarm System v. For the sprinkler system the building shall have a rise of 150 mm dia, tapped on each floor to feed the sprinkler system. On each floor, at the tapping from the sprinkler riser, there shall be butterfly valve of suitable diameter and flow switch. The flow switch shall be connected to the Annunciation Panel through electrical cables.
11	Water curtain system	The water curtain system shall be installed for compartmentation of basement as per the Amendment No. 2 September 2015 to NBC 2005. There shall be a separate pump of 2280 LPM at 56 M head in the fire pump room. The Deluge valves shall be provided for the actuation of water curtain system by release of pressure on the upper side of deluge valve through solenoid valve which in turn gets signal from fire alarm or flow switch of the sprinkler system.
12	Water Mist System	a) Electrically operated high-pressure pump with motor as per relevant IS codes, base plate and accessories for Hydrant & sprinkler service. b) Stainless Steel, seamless pipe work including pipes, fitting, valves, supports etc. for water mist systems. c) Special nozzles for forming mist. d) The system shall be UL listed e) PLC based control panel for control and operating of water mist system. i. Fire pumps shall be manufactured as per relevant IS Standards and manufactured by an approved manufacturer. ii. Each pump shall have a capacity as shown in Pump Schedule, adjusted as necessary to suit the hydraulic calculations. iii. The pump head shown on the drawing schedule is an estimate. The fire protection Bidder shall select a pump head to satisfy the fire protection system requirements resulting from the system hydraulic calculations. iv. The pumps shall be single stage/multistage construction specially labelled for fire service and designed for continuous operation and shall have a continuously rising head characteristic without any zone

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		of instability. v. All pumps, motors & diesel engine shall fully comply with all the constructional, performance, operational requirements of Tariff Advisory Committee (TAC). vi. Pumps (excluding the jockey pump) shall be able to operate sequentially. The head vs. capacity, input power vs. capacity characteristics, etc. shall match to ensure load sharing and trouble-free operation throughout the range. vii. In case of accidental reverse flow through the pump the driver shall be capable of bringing the pump to its rated speed in the normal direction from the point of maximum possible reverse speed. viii. The Pump with motor, base plate, coupling device and coupling guard shall be coupled at the works of the manufacturer. ix. The motor shall have a 15% margin of power rating over the rated pump input power. x. The pumps shall be capable of delivering a minimum of 150 percent of rated capacity at a total head of not less than 65% of the total rated head. The total shut-off head shall not exceed 120 percent of total rated head on the pump. xi. The pump shall be tested at the factory and test curve shall be submitted showing the performance and horse power requirement based on this test before final acceptance. xii. Pumps coupled with motor or engine on a common platform shall perform smoothly without any excessive noise or vibration. xiii. Each pump shall be provided with a name plate giving, in the case of centrifugal pumps, the delivery head, capacity and the number of revolutions per minute, and in the case of reciprocating pumps, the diameter of the steam cylinders and water plungers and the length of the stroke, as also the ratios of the effective aggregate areas of the suction and the delivery valves to the area of the water plungers.
13	Pump	i. The pump shall be Horizontal centrifugal end suction, back pull-out type, as described in the Schedule of Quantities. ii. The impeller shall be secured to the shaft and shall be retained against circumferential movement by keying, piping or lock rings. iii. All screwed fasteners shall tighten in the direction of normal rotation. iv. Pump shall be provided with approved type of gland packing.
14	Pumps Casing	i. The casing of pumps shall be designed for hydrostatically tested to 1.5 times the working pressure but in no case less than 250 PSI. ii. Pressure classification of flange connections shall correspond to casing working pressures. iii. The Casing material shall be close grained, accurately machined, cast-iron, and precision manufactured for best performance and long-term duty and fitted with gunmetal wearing ring. iv. Water discharge diffusers shall be included to reduce radial torque to impellers.
15	Wearing Ring	i. Wearing rings shall be suitable for an individual application. Rings shall be replaceable, and positively keyed to prevent rotation.

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16	Bearing	i. Bearings shall be heavy-duty ball bearings with a minimum average life of 100,000 hours. The bearings shall be self-sealed and housed in malleable-iron housing aligned to bearing bracket by means of large precision registers. Bearings shall be removable without dismantling any rotating element or pumps.
17	Impeller	i. Impeller shall be one-piece, phosphor bronze, and the bush of gun metal. The impeller shall be hydraulically and dynamically balanced. ii. Impellers of pumps shall be fully enclosed suction type and hydraulically balanced. iii. Impellers shall be accurately keyed to the shaft and positioned axially by shaft sleeves and separate snap rings. iv. Impellers shall be fully protected against damage from reverse rotation.
18	Shaft	i. Shaft size shall be selected on the basis of maximum combined shear stress. ii. The shaft shall be of stainless-steel ground and polished to final dimensions and shall be adequately sized to withstand all stresses from rotor weight, hydraulic loads, vibrations and torques coming in during operation. iii. Length of the shaft sleeves must extend beyond the outer faces of the gland packing and plate so as to distinguish between the leakage between shaft and shaft sleeve. iv. Shaft sleeves shall be securely fastened to the shaft to prevent any leakage or loosening. Shaft and shaft sleeve assembly shall ensure concentric rotation. The sleeve shall be of stainless steel. v. The shaft sleeve be made of bronze ASTM B584-932 and shall be locked in place by threaded, bronze shaft sleeve nuts. And -ring shall be furnished under the sleeve to prevent leakage.
19	Pump Shaft-Motor Shaft Coupling:	All shafts shall be connected with adequately sized flexible couplings of suitable approved design. Necessary guards shall be provided for the couplings.
20	Base Plate	i. A common base plate mounting both for the pump and drive shall be provided. The base plate shall be rigid construction, suitably ribbed and reinforced. ii. Base plate and pump supports shall be so constructed, and the pumping unit so mounted as to minimize misalignment caused by mechanical forces such as normal piping strain, hydraulic piping thrust etc.
21	Vibration & balancing	The rotating elements shall be so designed to ensure least vibration during start and throughout the operation of the equipment. All rotating components shall be statically and dynamically balanced at workshop.
22	Installation	The Installation of the Fire Fighting Pump set shall be carried out exactly as per manufacturer recommendation.
23	Foundation	The foundation of Fire Fighting Pumps & Electrical motor shall be constructed as per the requirement/recommendation of manufacturer of Fire Fighting Pumps/motor/Diesel Engine.
24	Anti-vortex plates	The anti-vortex plates shall be installed at the end of the Fire Pump suction inside tanks.
25	Instruction Manual & Tools/Spares	A comprehensive instruction manual shall be provided by the bidder indicating detailed requirements for operation, dismantling and periodic operation and maintenance procedures.

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26	Electric Motors	A. The electric motor shall be a horizontal, open drip-proof type, IP-56, wound for 415V, 3 phase, 50 Hz (cycle) current. B. Motor shall be designed for a temperature rise not exceeding 60°C when carrying fully rated-load continuously, and shall be capable of operating continuously with an overload of 15% without stress or excessive rise in temperature. C. Bearings shall be anti-friction ball or roller type. D. Motors shall have a dust tight construction with suitable means of breathing. E. Motor for fire pump shall be at least equivalent to the horse power required to drive the pump at 150% of its rated discharge and shall be designed for continuous full load duty. F. All Components shall be of adequate mechanical strength and robustness and shall be constructed of metal unless otherwise approved. G. The motors shall be wound for Class-F insulation and the winding shall be vacuum impregnated with head and moisture resisting varnish and glass wool insulated to withstand tropical conditions. H. Two independent earthing points shall be provided on opposite sides of the motor for bolted connections. I. 415 Volt power terminals shall be suitable for receiving 1.1 kV grade armored power cables. J. The cable boxes and terminations shall be designed to enable easy disconnection and replacement of cables. K. The motor shall be mounted on a steel base common to the pump and shall be connected to the pump with a flexible coupling protected by a suitable guard. L. The fire pump manufacturer shall accurately align the pump and motor shafts prior to shipment.
27	Tank Accessories	The Electronic Water Level Indicator: Electronic water level indicator shall provide remote reading of water level into the pump control panel. An alarm facility shall be provided for connection to the fire pump control panel to indicate low water level and to provide a signal to shut down the pumps if the tank is empty.
28	Diesel Engine	General i. The engine rating shall be decided considering the de-rating factors which are based on Site condition. ii. The diesel engine shall be of multi cylinder type four/six stroke cycle with mechanical (airless) injection, cold starting type. iii. The Engine shall be turbo-charged, and water cooled (Radiator cooled) iv. The Engine shall be capable of operating continuously on full load at the site elevation for a period of 8 hours. v. The Engine shall be provided with an adjustable governor to control the Engine speed within 10% of its rated speed under any condition of load up to the full load rating. The governor shall be set to maintain rated pump speed at maximum pump load. vi. The Engine shall be provided with an in-built tachometer to indicate R.P.M. of the Engine. vii. Engine, after correction for altitude and ambient temperature, shall have bare engine horse power rating equivalent to the higher of the following two values: - 20% in excess of the maximum brake horsepower required to drive

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		the pump at its duty point. The brake horse power required to drive the pump at 150% of its rated discharge. viii. The coupling between the Engine and pump shall allow each unit to be removed without disturbing the other. ix. The engine shall be designed with regard to ease of maintenance, repair, cleaning and inspection. x. The engine shall be run tested with the pump by the pump manufacturer prior to shipment. xi. All parts susceptible to temperature changes shall have tolerance for expansion and contraction without resulting in leakage, misalignment of parts or injury to parts. Starting i. The engine shall be capable of both automatic and manual start. Generally, the engine shall start automatically, but in case of the auto-start system failure the engine shall be capable of manual start. ii. Provision shall be made for two separate methods of Engine starting viz. a) Automatic starting by means of a battery powered high torque D.C. electric starter motor incorporating the axial displacement type of pinion, having automatic repeat start facilities initiated by a fall in pressure in the water supply pipe to the hydrant installation. b) Manual starting by Electric Starter motor. Note: The starter motor used for automatic starting may also be used for manual starting provided there are separate batteries for manual starting. iii. Engine shall be able to start without any preliminary heating of combustion chamber, manual cranking mechanism shall also be provided. All controls/mechanisms, which have to be operated in the starting process, shall be within easy reach of the operator. iv. The high torque D.C motor charged by battery shall initiate automatic start of diesel engine. The battery shall hold adequate retainable charge to provide the starting of the diesel engine. Starting power will be supplied from storage batteries. The battery capacity shall be adequate for ten consecutive starts without recharging with a cold engine under full compression. Battery shall be lead acid type of 12 V, 180 Ah capacity. v. The battery banks shall be used for no other purpose other than starting of the engine and shall be fully charged at all times with provision for trickle & boost chargers. After start of the engine the charger shall be disconnected. The battery being fed from the engine alternator. Fuel System The Engine fuel oil shall be of quality and grade specified by the Engine manufacturer. ii. . The diesel engine shall be suitable to run-on High-Speed Diesel (HSD). Fuel system shall be provided as recommended TAC. Installation Installation of the Diesel Engine shall be carried out exactly as per manufacturer recommendation.

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		Foundation and Anti Vibration Mounting i. Foundation: The foundation shall be constructed as per the requirement of Diesel Engine Manufacturer. ii. Anti-Vibration Mounting: Suitable vibration mounting duly approved by the authorized representative shall be employed for mounting the unit so as to minimize transmission of vibration to the structure. The isolation efficiency achievable shall be clearly indicated. Accessories i. The engine shall be mounted on a base plate of fabricated steel construction. Adequate access shall be provided to the big end and main bearing, camshaft and governor drives, water jackets etc. ii. The engine shall be provided with inlet filter and silencer, outlet muffler, expansion joints, dampers etc. as necessary for efficient operation. Intake air shall be taken from inside the building in which the engine is located, but the exhaust shall be discharged into the air at location as desired by the Engineer-In charge. iii. The bidder shall provide all accessories, fittings and fixtures necessary and required for a complete operating engine set. Jockey Pumps The jockey pump capacity and pressure shall be as indicated in the pump schedule and on the drawings. Pump shall be 2900 rpm vertical inline multistage, electric and complete.
29	Codes and Standards	The following standard, bye-law, manual have been followed in designing the Fire Fighting System. • IS: 3844: 1989 code of practice for installation and maintenance of internal Fire hydrants and hose reels on premises. • IS: 13039: 1991 external hydrant systems provision and maintenance code of practice. • IS: 15105: 2002 design and installation of fixed automatic sprinkler fire extinguishing system code of practice. • IS: 2190:2010 code of practice for selection, installation and maintenance of internal portable first aid fire extinguisher. • NFPA :750 for water mist system for Corridors of other building floors apart from server room floors

10.22 Fire Alarm System

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1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes fire alarm system cabling, installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.

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2	General	The system should include the furnishing, installation, and connection of a microprocessor controlled; addressable fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciator, power supplies, and wiring as per shop drawings and specified herein
		The system shall be designed such that each loop shall limited to only 80% of its total capacity at initial installation
		All equipment/components shall be new & the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system
		All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the riser/connection diagram for all specific system installation/termination/wiring data
		All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load
		Addressable fire alarm system has to be design for all room of the Data Centre floor. It should cover main DC room, NOC room, UPS room, staff room, meeting room, lobby area, security staff cabin, fire cylinder room, and toilet area.
		Sufficient information shall be clearly presented and shall include manufacturer's name, model numbers, power requirements, equipment layout, device arrangement and complete wiring
		Sequence and description of operation
		Product Data for each type of equipment, initiating device, signal device, peripheral device and cable provided on the project
		Shop drawings shall include battery calculations, floor plans and wiring diagrams
3	Basic System	1. The system shall be a complete, electrically supervised fire detection and evacuation system using fire fighter telephone with microprocessor-based operating system having the following: capabilities, features and capacities
		2. Communication between network nodes, each supporting an interactive, self-standing, intelligent local control panel, with system wide displays. Any network node shall be capable of supporting a local system in excess of 4000 input/output points.

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		3. The local system shall provide status indicators and control switches for all of the following functions: a. Audible and visual notification alarm circuit zone control. b. Status indicators for sprinkling system water-flow and valve supervisory devices. (if any) c. Any additional status or control functions as indicated on the drawings, including but not limited to; emergency generator functions, fire pump functions, door unlocking and security with bypass capabilities. 4. Each intelligent addressable device or conventional zone on the system shall be displayed at the fire alarm control panel by a unique alphanumeric label identifying its location.
4	Quality Assurance	a) The manufacturer of the detection components shall have experience in the design and manufacture of similar types of detection systems and who refer to similar installations providing satisfactory service. b) The name of the manufacturer, part numbers and serial numbers shall appear on all major components. c) All detection devices, components and equipment shall be the products of the same manufacturer. d) All devices, components and equipment shall be new, standard products of the manufacturer's latest design and suitable to perform the functions intended. e) All products ranging from PANEL to Detectors & Devices should be manufactured under single source of manufacturer to usher continuous line of support round the year

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5	Fire Alarm Condition	1. Sound an audible alarm and display a custom screen/message defining the building in alarm and the specific alarm point initiating the alarm in a LCD display. 2. Up to 16 nodes shall be networkable in a peer-to-peer configuration. 3. Log to the system history archives all activity pertaining to the alarm condition. 4. Print to system printer (where required) alarm condition information. 5. Sound the ANSI 117-1 signal with synchronized audible and synchronized strobes. 6. Audible signals shall be silenced from the fire alarm control panel by an alarm silence switch. Visual signals shall be programmable to flash until system reset or alarm silencing, as required. 7. Activation of any detector in a single elevator lobby or an elevator equipment room shall indicate at fire alarm control panel, cause the recall of that bank of elevators to the ground/stilt floor and the lockout of controls. 8. HVAC shut down shall, be accomplished by system operated duct detectors as per local requirements. PAC units will be shut down by control relay modules in the loop. 9. Door closure devices shall operate by floor 10. Activation of stairwell pressurization fans, smoke purge and damper control shall be as required.
6	Performance Requirement	A. General Performance: Comply with NFPA 72 and all contract documents and specification requirements. B. All interconnections between this system and the monitoring system shall be arranged so that the entire system can be UL-Certificated. C. System shall be a complete, supervised, non-coded, addressable multiplex fire alarm system conforming to NFPA 72. The system shall have Style 6 circuits for each floor. The system shall operate in the alarm mode upon actuation of any alarm initiating device. The system shall remain in the alarm mode until all initiating device(s) are reset and the fire alarm control panel is manually reset and restored to normal. D. The system shall be capable of the following configurations. Both configurations are permitted on the same network. 1. The system shall support up to 252 addressable devices, which may be divided in any ratio on one, two, three, or four separate, isolated Class B circuits. 2. The system shall support two loops of 252 addressable devices, each of which may be divided in any ratio on one, two, three, or four separate, isolated Class B circuits. E. The system shall have an optional digital alarm communication

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		transmitter. F. The system shall provide an off-normal warning prior to reset for all active devices. G. The system shall be capable of remote monitoring, a proprietary software system that provides a graphical representation of the fire alarm control panel at a remote PC when connected via Ethernet to the system. The display will show the exact state of the panel, including blinking LEDs, and with menu buttons for control. H. The system shall be capable of being configured via a PC Tool. I. In networked systems, each of 4 control panels shall be configurable to be a global annunciator, capable of viewing all other control panels on the network. J. The system shall provide the following functions and operating features: 1. The FACP and auxiliary power panels shall provide power, annunciation, supervision and control for the system. 2. Provide Class A initiating device circuits. 3. Provide Style 7 signaling line circuits for the network. 4. Provide two Class A notification appliance circuits. Arrange circuits to allow individual, selective, and visual notification by zone. Notification appliance circuits shall be zoned to correspond with the building fire barriers and other building features. 5. Strobes shall be synchronized throughout the entire building. 6. Provide electrical supervision of the primary power (AC) supply, presence of the battery, battery voltage, and placement of system modules within the control panel. K. The system shall provide a field test function where one person can test the complete system or a specific area while maintaining full operational function of other areas not being tested. Alarms, supervisory signals, trouble signals shall be logged in system history during the walk-test. L. Alarm functions shall override trouble or supervisory functions. Supervisory functions shall override trouble functions.
7	Supervisory Condition	1. Display the origin of the supervisory condition report at the fire alarm control panel graphic LCD display. 2. Activate supervisory audible and dedicated visual signal. 3. Audible signals shall be silenced from the control panel by the supervisory acknowledge switch. 4. Record within system history the initiating device and time of occurrence of the event. 5. Print to the system printer (where required) the supervisory condition.

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8	Trouble Condition	1. Activate trouble audible and visual signals at the control panel and as indicated on the drawings. 2. Audible signals shall be silenced from the fire alarm control panel by a trouble acknowledge switch. 3. Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and nor require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file. 4. Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event. 5. Print to the system printer (where required) the trouble condition.
9	Security Condition	1. Display at the fire alarm control panel with LCD display, the origin of the security condition report. A dedicated security LED shall flash until the alarm has been acknowledged, then revert to a steady "ON" state. 2. The control system shall be capable of bypassing the alarms from an individual security system installed within selected areas. The pass code allowing this function shall be assignable to individual security personnel and each bypass action shall be logged to system history. Intrusion alarms occurring during a bypass period shall be logged to history and displayed but no audible alarm shall occur at the control panel. 3. Print to the system printer (where required) the security condition. 4. The Fire Control Panel shall be "UL" 1076 listed for security purposes.

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10	Control Panel	The fire alarm control panel shall be microprocessor based using multiple microprocessors throughout the system providing rapid processing of smoke detector and other initiation device information to control system output functions. a. There shall be a watchdog circuit, which shall verify the system processors and the software program. Problems with either the processors or the system program the panel shall activate a trouble signal and reset the panel. b. The system modules shall communicate with an RS 485 network communications protocol. All module wiring shall be to terminal blocks. c. The system shall be capable of the following configurations. Both configurations are permitted on the same network. d. The Cerberus Pro panel shall support two DLC of 252 addressable devices, each of which may be divided in any ratio on one, two, three, or four separate, isolated Class B circuits. e. The control panel shall have a 2"x4-3/4" Size VGA monochrome LCD display and having maximum 320 (8 x 40) Characters in the display. The panel shall have a built-in power supply of 170 Watts and battery charger. Battery charger shall be able to charge the system batteries up to 33 AH. The Panel shall have the capacity of connecting additional 15 panels or Network terminals using network card, with redundancy in the network, TCP/ IP connectivity for Central Monitoring station The system shall be capable of supporting unshielded wiring applications
11	System Components	i. The System Periphery board shall be capable of 252 intelligent devices distributed between one, two, three, or four Class B SLC circuits. Any trouble on one circuit shall not affect the other circuit. This module controls the signaling from the initiation devices reporting alarms and troubles to the control panel. This module shall also provide the signaling to the field devices for the controlling the output of specific initiation devices. The on-board microprocessor provides the periphery board with the ability to function even if the main microprocessor fails. LED's on the board shall provide annunciation for the following: Power, Gnd. Fault, Alarm, Trouble. This board is integral to the system. ii. The system periphery board shall be capable of supporting two system drivers of 252 intelligent devices distributed between one, two, three, or four Class B SLC circuits, for a total panel capacity of 504 addressable devices. Any trouble on one circuit shall not affect the other circuit. This module controls the signaling from the initiation devices reporting alarms and troubles to the control panel. This module shall also provide the signaling to the field devices for the controlling the output of specific initiation devices. The on-board microprocessor provides the periphery board with the ability to function even if the main microprocessor fails. LED's on the board shall provide annunciation for the following: Power, Gnd. Fault, Alarm, Trouble. This board is integral to the system.

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		iii. The Signal Line Circuits (SLC) shall be tested for opens, shorts and communications with all addressable devices installed before connection to the control panel. Systems without this capability shall have a test panel installed for initial testing to eliminate any possible damage short term or long term to the control panel. After initial testing replace the test panel and proceed with complete testing.
		iv. The standard Operator Interface shall have the ability to view events, acknowledge, silence, and reset the system and any networked Cerberus Pro control panels, when configured as a global PMI.
		v. The LED Operator Interface shall have the ability to view events, acknowledge, silence, and reset the system and any networked control panels, when configured as a global PMI. Additionally, the operator interface provides twelve multicolored configurable LEDs for annunciating system status
		vi. The Network Card shall provide internodes (SafeDLink) communication between enclosures. SafeDLink communication shall support Class B Style 4 or Class A Style 7 wiring (in a ring configuration). This card shall plug into the system operator interface.
		vii. The System Periphery Board shall contain 2 Class B NAC circuits rated at 3 amps each with power-limited outputs. The zones shall be isolated and independently supervised. There shall be at least 6 unique codes/signals for each circuit based on system logic. These signals shall be Temporal Code 3 (Evacuation), Steady (Such as "Recall"), Temporal Code 3 (for CO alarms), March Time 120ppm, March Time 60ppm, and March Time 30ppm. The card shall have the following LED's to provide trouble shooting and annunciation, Power, Gnd. Fault, Zone Activation or Trouble. This functionality shall be integral to the system.
		viii. The control panel shall be equipped with four Form C relays for alarm, trouble, supervisory, and programmable output. The system shall provide the mounting of all system cards, field wiring, and panel's inter-card wiring. All power limited field wiring shall be separated from all non-power limited internal wiring.

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12	Response time	The System response time from alarm to output shall be an average of three (3) seconds. a. All system cards and modules shall have Flash memory for downloading the latest module firmware. b. Passwords: Technician Level Password - There shall be a 4-character password that a user must enter into the control panel in order to perform such maintenance- and control-related functions at the panel as: Arming and disarming devices. 1. Activating and deactivating the History Log function and deleting obsolete entries. 2. Changing the system time and date. Maintenance Level Password - There shall be a 4 character password that a user must enter into the control panel in order to access the panel's reporting functions and walk test functions. Acknowledge Silence able Reset Access - There shall be a key required to open a locked cabinet that a system user must use in order to acknowledge events, turn silence able audible and visuals on and off, and perform panel resets.
13	Power Supply	a. The system Power Supply shall be a 170 Watt, 6-amp that provides 24VDC power for system operation. The power supply shall be filtered and regulated. The power supply provides power for all system operation, including signaling line circuits, notification appliance circuits, auxiliary power, battery charger, and all optional modules. The power supply shall be rated for 120/240 VAC 50/60 Hz. b. The power supply provides power for all system operation, including signaling line circuits, notification appliance circuits, auxiliary power, battery charger, and all optional modules. The power supply shall be rated for 120/240 VAC 50/60 Hz. c. The battery charger shall be able to charge the system batteries up to 100 AH batteries. Battery charging shall be microprocessor controlled and programmed to select battery sizes. d. Transfer from AC to battery power shall be instantaneous when AC voltage drops to a point where it is not sufficient for normal operation.
14	System Enclosures	Provide the enclosure needed to hold all the cards and modules as specified. The enclosures shall be either black or red. The outer doors shall be capable of being a left hand open or a right hand open. The inner door shall have a left-hand opening. System enclosure doors shall provide where required ventilation for the cards in the enclosure

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15	System Printer	1. The system printer shall be operated from a Remote Printer Module, which shall be mounts outside the enclosure. This module shall provide a parallel port and 2 serial ports for RS 232 protocol. One of the serial ports shall be able to be programmed for RS485 protocol. Supervised network connection shall be either Style 4 or 7 as directed. 2. This parallel printer shall be supervised for: On/Off line, out of paper, paper jam, power off, and connection the system. The printer shall be a; high speed, 24 dot matrix, wide carriage, and capable of using tractor or friction fed paper. The printer shall contain diagnostic LED's for ease in maintenance.
16	Intelligent Initiation Devices	All initiation devices shall be insensitive to initiating loop polarity. Polarity insensitive wiring allows fire detection devices to operate flawlessly even when detector and devices wiring polarity are inverted on the wrong screw terminals. When wiring polarity doesn't need to be observed, wiring troubleshooting is greatly reduced, this will also save time of installation Specifically, the devices shall be insensitive to plus/minus voltage connections on either Style 4 or Style 6 circuits
17	Smoke Detectors – Advanced Addressable type	The multi-criteria sensor detector shall be an intelligent digital photoelectric detector with a programmable heat detector. The detector must provide different environmental algorithms that allow the detector to provide superior false alarm immunity without the need for additional alarm verification delays. The detector shall have a multicolor LED to streamline system maintenance/inspection by plainly indicating detector status as follows: green for normal operation, amber for maintenance required, red for alarm. Detector shall have shock-resistant thermistor to sense temperature changes. The "on-board" Fire technology shall allow the detector to gather smoke and thermal data, and to analyze this information in the detector's "neural network Neural Network is a dynamic detection technology system. It simulates the work pattern of human brain. It can develop the knowledge as to refine the level of detection technology. It means, neural network can analyze, learn and adapt according to environmental or physical conditions of premises and trigger the output accordingly. The characteristics of fire are stored in the memory patterns in the microprocessor of detector. Hence, the microprocessor can adapt the characteristics of the environment and able to distinguish between actual fire and deceptive phenomena

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Sr. No.	Parameter	Minimum Requirement
		Detectors shall be listed for use as open area protective coverage, in duct installation and duct sampling assembly installation and shall be insensitive to air velocity changes. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system within four (4) seconds. Detectors shall be programmable as application specific, selected in software for a minimum of eleven environmental fire profiles unique to the installed location. These fire profiles shall eliminate the possibility of false indications caused by dust, moisture, RFI/EMI, chemical fumes and air movement while factoring in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report. The intelligent smoke detector shall be capable of providing three distinct outputs from the control panel. The system-controlled output functions shall be from an individual or unique input of smoke obscuration, a thermal condition or a combination of obscuration and thermal conditions. The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber. The detector shall support the use of a relay and LED remote indicator at the same time. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling. Detector wiring shall not require any special shielded cable. It should have a multi detector status LED: Green for normal and red for alarm
		Thermal Detectors shall be rated at 135 degrees for fixed temperature. Detectors shall be constructed to compensate for the thermal lag inherent in conventional type detectors due to the thermal mass, and alarm at the set point of 135 degrees Fahrenheit. The choice of alarm reporting as a fixed temperature detector shall be made in system software and be changeable at any time without the necessity of hardware replacement. The detectors shall be installed according to the requirements of NFPA 72 for open area coverage.
		The smoke detector shall be an intelligent digital photoelectric detector with a programmable heat detector. Detectors shall be listed for use as open area protective coverage, in duct installation and sampling assembly installation and shall be insensitive to air velocity changes. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system within four (4) seconds. The detector shall be mounted in a duct detector housing listed for that purpose. The duct detector shall support the use of a remote test switch, relay or LED remote indicator. The duct detector shall be supplied with the appropriate sampling tubes to fit the installation. Where duct detectors are exposed to the weather provide a weatherproof enclosure.
		Detector bases shall be low profile twist lock type with screw clamp terminals and self-wiping contacts. Bases shall be installed on an industry standard, 4" square or octagonal electrical outlet box.

Fire Alarm System		
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		The detector shall be guaranteed in writing not to false alarm when configured by the factory trained certified technician. The detector must provide up to 19 different environmental algorithms that allow the detector to provide superior false alarm immunity without the need for additional alarm verification delays.
		The detector shall have a tri-color LED to streamline system. Maintenance / inspection by plainly indicating detector status as follows: green for normal operation, amber for maintenance required, red for alarm.
		Detector shall utilize state of the art forward backward light scattering technology, with improved detection for smoldering and flaming fire signatures. The detector shall replace the need for ionization detectors due to improved response characteristics to flaming fires
		The forward backward light scattering technology shall provide improved immunity to spurious activation (deceptive phenomena). The detector shall have a "No False Alarm Guarantee"
		The detector shall be RoHS-compliant: it shall meet standards for Reduction of Hazardous Substances (RoHS) by reduction in lead content.
		Detector shall be UL 2075 compliant as a gas and vapor detector
		The multi-criteria fire detector shall be an intelligent digital photoelectric detector with a programmable heat detector. Detectors shall be listed for use as open area protective coverage, in duct installation and sampling assembly installation and shall be insensitive to air velocity changes. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system within four (4) seconds. So as to minimize the effort required by the installing and maintenance technician to appropriately configure the detector to ensure optimal system design, the detectors shall be programmable as application specific. Application settings shall be selected in software for a minimum of 19 environmental fire profiles unique to the devices installed location.
		The detector shall be designed to eliminate the possibility of false indications caused by dust, moisture, RFI/EMI, chemical fumes and air movement while factoring in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report
		The detector shall be UL listed for operation in a 95% relative humidity (RH) environment
		The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber
		The detector shall support the use of a relay, or LED remote indicator without requiring an additional software address. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling. The detector shall support the use of an ambient temperature warning signal at the panel. This temperature shall be user-configurable for the set temperature of the warning and the event type generated by the warning. This event can be used to trigger system logic. For the detector where required, there

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		shall be available a locking kit and detector guard to prevent unauthorized detector removal
		Detector shall be UL/FM approved
18	Intelligent Audible (Sounder) Base	Intelligent Audible (Sounder) Base [with Loop-Power Option shall be UL / ULC Listed – has the option of being powered directly from a signal line circuit (SLC) in a two-wire configuration. In turn, this connection feature gives each audible (sounder) base. The innovative loop-power option shall provide easier two-wire connection for new or expansion applications where additional wiring or power options are limited. Sounder base shall be capable of generating a 3,000 Hz tone that provides a signal up to 85dBA at 10 feet (3.1m) for localized annunciation
19	Device Programming Unit	Device Programming Unit: The programming tool shall program the intelligent devices with addresses. The unit shall test the device to respond to its address. Dipswitches and rotary switches shall not be acceptable
20	Field Programming	The system will be programmable, configurable and expandable in the field itself by use of dedicated programming software. In order to avoid unauthorized access programming via panel keyboard is not acceptable. The field programmability will allow changes in various system parameters as per their operation philosophy. All programming will be accomplished through DPU or Laptop. The program (software) used to configure the Fire Alarm Panel will be submitted in a CD along with other submittals during training and handover. All field defined programs will be stored in non-volatile memory to ensure no data is lost during the power loss.
21	Manual Call Points OR Pull stations	1. Provide addressable manual stations were shown on the drawings, to be flush or surface mounted as required. Manual stations shall contain the intelligence for reporting address, identity, alarm and trouble to the fire alarm control panel. The manual station communications shall allow the station to provide alarm input to the system and alarm output from the system within less than four (4) seconds. 2. The manual station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring. Surface mounted stations were indicated on the drawings shall be mounted using a manufacturer's prescribed matching red enamel outlet box. 3. The single action pull station shall be model number HMS-S. 4. Where required, there shall also be available pull stations with break glass, capable of explosion proof installation, capable of weatherproof installation, two stage operation, reset key operation, and metal housings

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Sr. No.	Parameter	Minimum Requirement
22	Addressable Control Module	1. Addressable control modules shall be provided to supervise and control the operation of one conventional device of compatible, 24 VDC powered polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay. 2. The control module shall mount in a standard 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box, or to a surface mounted back box. 3. The control module shall be wired with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay may be energized at the same time on the same pair of wires. 4. Audio/visual power shall be provided by a separate supervised power circuit from the main fire alarm control panel or from a supervised, UL listed remote power supply. 5. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.
23	Interface Module	Interface Module, which contains microcomputer-chip technology and is polarity insensitive, achieves the state of an 'intelligent device' through its highly advanced method of address programming and supervision – combined with its sophisticated, bi-directional FACP communication. The relays and contact device inputs are controlled at the same address. For the FACP, the relays and input contacts can be controlled as a separate function. The relay is typically used where control or shunting of external equipment is required. Four (4) independent in/out circuits are permissible. Interface module shall be designed to monitor Normally Open (N.O) or Normally Closed (N.C) dry contact Interface module has four (4) programmable outputs with four (4) potential free-latching-type 'Form A' (dry) relay contacts for fire-control installations. The panel's communication provides supervised, power-limited power supply. The four (4) input / (4) output interface module provides status indication per LED for each input / output, plus one (1) LED for device status.

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Sr. No.	Parameter	Minimum Requirement
		Four (4) inputs / four (4) outputs via one (1) address • Input lines can be supervised for open, short and ground-fault conditions • Light-emitting diode (LED) display of input / output status • Supports 'Class A' and 'Class B' input-circuit wiring • Polarity insensitive technology • Microprocessor-controlled signal evaluation • Two-wire installation, per addressable loop • Individual addressing • Four (4) AC-rated / DC-rated outputs • Mounts in one (1) electrical back box § Optional 12 cm. and 12.7 cm. square back boxes • Electronic address programming is easy and dependable • Easy front-end access to programming port and wiring terminals • Restriction of Hazardous Substances (RoHS compliant) • ULC Listed;
24	Monitor Module	1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device). 2. The two-wire monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box or with an optional surface back box. 3. The IDC zone shall be wired for operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
25	Addressable Relay Module	Addressable Relay Modules shall be available for HVAC control and other building functions. The relay shall be rated for a minimum of 2.0 Amps resistive or 1.0 Amps inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay may be energized at the same time on the same pair of wires
26	Isolator Module	1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on a loop Class A. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the loop segment or branch. At least one isolator module shall be provided for each set of detectors (max 19 numbers). 2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the loop. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section. 3. The isolator module shall not require any address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation. 4. The isolator module shall mount in a standard 4-inch (101.6 mm) deep electrical box or in a surface mounted back box. It shall

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Sr. No.	Parameter	Minimum Requirement
		provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.
27	Addressable Interface Devices	Addressable Interface Devices shall be provided to monitor contacts for such items as conventional gas/ agent release panels, water-flow, tamper, and PIV switches connected to the fire alarm system. These interface devices shall be able to monitor a single or dual contacts. An address will be provided for each device and all physical devices shall require only one address on a signaling line circuit regardless of the number of circuits on an individual module. Where remote supervised relay is required, the interface shall be equipped with a SPDT relay rated for 4 amps resistive and 3.5 amps inductive
29	Notification Appliances	a. The Horn or horn/strobe appliance as indicated on the drawings shall be a synchronized temporal horn with a synchronized strobe light with multiple candela taps to meet the intended application. The appliance shall be red or white as indicated on the drawings. The strobe light taps shall be adjustable for 15/75, 30/75, 75, and 110 candelas. The appliance shall be red for wall mounted and white for ceiling mounted. Ceiling mounted appliances shall be rated for that application. b. The electronic strobe as indicated on the drawings shall be a speaker with a tone card and have an adjustable range of 700 to 1300 Hz. The chime or chime/strobe shall be adjustable for either single stroke or continuous operation. The chime/strobe shall be available with adjustable strobe intensities of 15, 30, 75, and 110 candelas. The appliance shall be red for wall mounted and white for ceiling mounted. Ceiling mounted appliances shall be rated for that application.
30	Installations	Surface cabling should be neatly run and securely fixed at suitable intervals in accordance with the manufacturer's recommendations. Joints in cables, other than those within equipment enclosures should be avoided wherever possible. Where a cable passes through an external wall it should be contained in a smooth bore sleeve of metal or other non-hygroscopic material sealed into the wall. This material will slope downwards towards the outside and should be sealed with a suitable waterproof compound. Where cables, conduits or trunking pass through floors, walls, partitions or ceilings the surrounding hole shall be made good with a fire stopping material with sufficient fire resistance to maintain the integrity of the construction. Each junction box will include the legend "Fire Alarm System" on its cover. All wires shall be provided with an identifying permanent label within 25mm of its termination. A consistent color code for fire alarm conductors will be used throughout the installation. Wiring within enclosures will be arranged to allow accessibility to equipment for adjustment & maintenance

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31	Boxes, enclosures & wiring devices	Boxes shall be installed plumb and firmly in position. Extension rings with blank covers shall be installed on junction boxes where required. Junction boxes served by concealed conduit shall be flush mounted. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers, or devices are installed
32	Conductors	Each conductor shall be identified as shown on the drawings at each with wire markers at terminal points. Attach permanent wire markers within 5 cm of the wire termination. Marker legends shall be visible. All wiring shall be supplied and installed in compliance with the requirements of the Electrical Code and that of the manufacturer. All splices shall be made using solderless connectors. All connectors shall be installed in conformance with the manufacturer recommendations. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors. The installation contractor shall submit for approval prior to installation of wire, a proposed color code for system conductors to allow rapid identification of circuit types. Wiring within sub panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.
33	Commissioning	The entire system shall be inspected & tested to ensure that it operates in accordance with this specification and the country requirements. In particular that: All manual call points & automatic fire detectors function correctly. All devices carry an accurate identification label. All manual call points and automatic fire detectors when operated result in the correct text & zone indications at all necessary indicating equipment. That sound pressure levels meet as per requirements. That the systems cause and effects match the requirements of this specification. The sitting of all manual call points & automatic fire detectors meet the country requirements.
34	Standard	All the equipment shall have proper listing and/or approvals and shall comply to the requirements of the following recognized agencies. UL – Underwriters Laboratories Inc. and FM – Factory mutual The Fire Alarm Control Panel and all modules/devices shall meet the modular listing requirements of Underwriters Laboratories, Inc./ FM Factory Mutual Each subassembly, including all printed circuits, shall include the appropriate UL/ FM modular label. This includes all printed circuit board assemblies, power supplies, and enclosure parts. Systems that do not include modular labels may require return to the factory for system upgrades and are not acceptable.

10.23 Fire Suppression System

Fire Suppression System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes fire suppression system piping, installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project. The 1 st floor, 2 nd floor, and 3 rd floor will have only Novec 1230 based gas based addressable fire suppression system.
2	General	The bidder shall supply, install, test and put in operation NOVEC 1230 based fire suppression system.
		The work under this system shall consist of design, supply, installation, testing, training & handing over of all materials, equipment, hardware, software appliances and necessary labour to commission the said system, complete with all the required components strictly as per the enclosed tender specifications, design details. The scope also includes the supply, installation & commissioning of any material or equipment including civil works that are not specifically mentioned in the specifications and design details but are required for successful commissioning of the project.
		The system design should be based on the specifications contained herein, NFPA 2001 and in accordance with the requirements specified in the design manual of the agent. The bidder, shall confirm compliance to the above along with their bid.
3	NFPA 2001 standards	Have the approval from US EPA (Environmental Protection Agency) for use as a total flooding fire extinguishant for the protection of occupied space:
4	ODP	Must have zero ozone depletion potential (ODP)
		Be efficient, effective and does not require excessive space and high pressure for storage; Commercially available
		Contain the required key components such as valves and its accessories, actuators, flexible discharge and connection hoses, check valves, pressure switch, and nozzles
5	Design and Engineering	The system shall be designed taking the minimum design concentration as per NFPA 2001(Latest Edition) guidelines & as applicable to class 'A' & C risks. The Sinorix (NOVEC) 1230 agent shall be stored in seamless steel cylinders and dry nitrogen shall be added to provide additional energy to give the required rapid discharge. At the normal operating pressure of 42 bar at 21Deg C, the agent is a liquid in the container.
		The system design must consider the limitations caused by the void height. The vendor should clearly indicate the quantity of the gas in Kgs. to be used for the system. All voids within each hazard shall be discharged simultaneously. Each hazard shall have an independent system, unless otherwise specifically stated.
		The system shall have a working pressure of 42 bars. A fill density between 0.50 Kg /Lit. To 0.85 Kg/Lit or as recommended by the manufacturer should be considered for the agent to be discharged within the specified time of 10 seconds.

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		The system engineering company should carry out the piping Isometric design and validate the same with a hydraulic flow calculation generated by using the agent's design software. The appropriate fill density to be arrived at based on the same.
		The design & calculation shall be checked & certified by manufacturer /Consultant. You may note that the calculation is the only guarantee that the system will work, provided the system is installed exactly as per the design. The contractor has to take into consideration the routing available while designing the pipe network.
		The Vendor shall enclose their design sheet along with the offer & the offer/BOQ should be in line with their design. The dimensions of rooms to be protected are given in the BOQ. The vendor shall also consider the following
		The vendor shall consider simultaneous total flooding of all voids within the protected volume. The system shall be designed in accordance with the OEM's Design Manual.
		In order to extinguish a fire using clean agent, the concentration of agent delivered to each void shall be above the minimum design concentration. The following shall be considered while designing the system
		The minimum design concentration shall be 4.5%. Class A&C fire
		If the protected volume has a floor and / or ceiling void the spaces shall be included in the protected volume, employing a minimum design concentration not below that of the main room compartment.
		The discharge nozzles shall be located within the protected volume in compliance to limitations and with regard to spacing, floor and ceiling coverage, etc. The nozzles shall be positioned such that they would cover the entire area up to the extreme corners of the area under protection and the design concentration will be established in all parts of the protected volumes and it shall be ensured that the nozzles are NOT placed directly above the racks
		The final numbers of discharge nozzles shall be according to the OEM's product manual.
		The gas flow calculations shall be carried out on special software given by the OEM. The software should support usage of seamless cylinders which have a different design compared to the standard containers used worldwide. The system acceptance report shall show the resulting concentration in each independent void to be above 4.5% and the average pressure at each nozzle to be not less than 10 Bar.
		The agent discharge time shall not exceed 10 seconds.
		The design concentration shall follow at minimum NFPA 2001 for under floor, room and ceiling space. Unless otherwise approved, room temperature for air-conditioned space shall be taken around 20 - 23 Deg C. For non-air-conditioned space, the temperature shall be taken around ambient temperature. The system shall be designed with minimum design concentration of 4.5 % as applicable to Class A & C fire.

Fire Suppression System		
Sr. No.	Parameter	Minimum Requirement
		The system engineer company should carry out the piping Isometric design and validate the same with a hydraulic flow calculation generated by using the agent's design software. Appropriate fill density to be arrived at based on the same.
6	Refilling and Maintenance	In case of any leakage or accidental discharge of the agent, it should be possible to refill the cylinders in India itself in the CCOE approved filling station. The contractor should indicate the source of refilling and time that will be taken for refilling and replacement.
7	Discharge Time	As gas has to be fully discharged within 10 seconds for effective quenching of fire as per the relevant standards, the contractor has to ensure that the design meets this requirement. Once the discharge takes place there should be warning signs restricting personal from entering the protected area until the gas has been cleared from the area.
8	Materials and Equipment's	All materials and equipment's shall be from approved manufacturers and shall be suitable for the performance of their respective functions. The cylinders should be complete with all accessories. The contractor shall indicate the dimensions of the cylinders required for each area while quoting.
9	Cylinder	The cylinder shall be high pressure, seamless steel gas cylinder, flat type, concave bottom as per IS 7285 complete with neck ring. Welded and non-CCE approved cylinders will not be accepted.
		Each cylinder shall be seamless steel type manufactured from billets and tested in accordance with IS 7285.
		As per the regulations of the Chief Controller of Explosives (CCE) Nagpur, any system which has a working pressure above 19 bar (280 psi) will require the use of seamless cylinders that have been duly approved by the CCE, Nagpur.
		The maximum fill density of Sinorix (NOVEC) 1230 in a cylinder shall not exceed 0.85 Kg/Lit. Of internal volume. Appropriate fill density shall be chosen based on the cylinder location and piping. The hydraulic calculations should prove that the fill density is appropriate and total discharge will take place within 10 seconds.
		The cylinders shall be super-pressurized with dry nitrogen to 42 bars at 20°C. The cylinder shall be capable of withstanding any temperature between -30° C and 70°C. Cylinder shall be mounted according to manufacturer recommendations. The cylinder shall withstand Hydrostatic test pressure up to 250 bars and maximum working pressure at 15°C shall be 150 bars
		The cylinder/valve assembly shall have suitable metallic protection for the valve enabling transportation of the filled cylinders safely.
		All cylinders shall be distinctly and permanently marked with the quantity of agent contained, the empty cylinder weight, the pressurization pressure and the zones they are protecting.
10	Cylinder Valve	Each cylinder shall be provided with a valve of suitable size. Each cylinder valve shall have a provision for fixing a supervisory pressure switch and a safety burst disc to protect the cylinder from over pressure. The cylinder valve shall necessarily have a disabling plug (locking pin) to prevent accidental discharge of the valve during transportation and installation. The Valve assembly shall be mounted directly on the cylinder
		Each valve is to be fitted with a pressure gauge for monitoring loss of pressure.

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Sr. No.	Parameter	Minimum Requirement
		The master cylinder valve is to be released electrically which is performed by means of a solenoid valve arrangement. Pilot cylinder actuation and pyrotechnic devices shall not be used.
11	Cylinder valve Actuators	In a single cylinder system, the cylinder shall have a solenoid operated actuator and a manual actuator incorporating a strike knob mounted on top of the solenoid operated actuator. Multi cylinder systems shall have the same fitted on to the master cylinder and pressure operated actuators fitted on each slave cylinder. All actuators shall be original OEM make and locally manufactured actuators shall not be used.
12	Hoses	Each cylinder valve shall be provided with a plug-in type of flexible rubber discharge hose of minimum 40mm size and shall with stand a test pressure as at least 150 -200% of the cylinder stored pressure. Each hose shall be permanently marked with the test pressure and OEM's part number. Multi cylinder systems shall have an interconnect hose for each cylinder. The interconnect hose shall have a length not less than 700 mm and shall be labeled with the test pressure of 100 Bar and the OEM's part number. All hoses shall be original OEM make and locally manufactured hoses shall not be used.
13	Manifold with Check valve	The manifold shall be fabricated from ASTM A106 Schedule 40 seamless pipe and shall have integral check valves provided for each cylinder.
14	Other Accessories	Electric Control Head, Pressure operated control head, Master Cylinder Adapter Kit, Flexible discharge hose, discharge Nozzles, and other required accessories shall be approved or listed for use with (NOVEC) 1230 All the gaskets, O-ring, sealant and other components shall be constructed of materials compatible with the clean agent. The system should be engineered using hardware & accessories approved by the Engineering System Distributors of (NOVEC) 1230 as mentioned in the list of approved makes. The Vendor shall submit the detailed data sheets & drawings of each accessory with the required part Nos and also the common system data sheet containing these parts with part Nos.
15	Pipes & Fittings	All Pipes shall be of ASTM - A-106, Gr: B, schedule - 40 seamless Mild Steel Pipes and fittings shall be as per ASTM-A-105 standard. Distribution piping and fittings shall be installed in accordance with the manufacturer's requirements, NFPA 2001, and approved piping standards and guidelines. All distribution piping shall be installed by qualified individuals using accepted practices and quality procedures. All piping shall be adequately supported and anchored at all directional changes and nozzle locations.
		All piping shall be reamed, blown clear and swabbed with suitable solvents to remove burrs, mill varnish and cutting oils before assembly.
		All pipe threads shall be sealed with Teflon tape pipe sealant applied to the male thread only.
16	Discharge Nozzle	Engineered discharge nozzles shall be provided within the manufacturer's guidelines to distribute the (NOVEC) 1230 agent throughout the protected spaces Nozzle shall control the flow of (NOVEC) 1230 to ensure high velocity, proper mixing in the surrounding air and uniform distribution of the agent throughout the enclosure.

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Sr. No.	Parameter	Minimum Requirement
		The number of nozzles and their positions must be chosen so that the design concentration is maintained everywhere in the enclosure. Nozzle shall be located where they can be adequately supported on walls, ceiling or structural members. Software generated calculation supporting the nozzle design shall be submitted by the successful bidder before signing of contract.
17	Fire Detection & Gas Release Panel & operation process	Fire detection shall be achieved using the microprocessor-based fire detection cum gas release panel specifically used for each protected area. The detectors shall be in cross zone and the trigger from the panel shall be for 2 stage action.
		Some of the enhance features of the detection cum gas release panel shall be, • Easy on-site configuration • Upload / download of configuration data's • Event logging facilitates identifying origin of events • Display countdown timer before extinguishing release • Extinguishing automatic activation with various alarm combinations • 72h battery backup time • Various system test modes • Automatic calibration facility for actuators control lines (solenoid or pyrotechnical actuators) • Manual Release button for manual activation of extinguishing • Emergency hold button to temporary stop the extinguishing or abort button to cancel the • initiated extinguishing release as long as the pre-warning time is running • Remote transmission facility for transmitting alarms and faults
		If in case the fire detection part is handled by a separate fire control panel, the panel shall have the capability to integrate with larger fire detection system. Also, the panel shall have the facility to connect repeater panel for remote status indication and remote control.
18	Auto mode Operation	The sequence of operation of the gas release system shall be as follows.
		When the any one of the detectors connected to the building fire alarm panel goes into alarm, immediately the sounder cum strobe shall get activated.
		The fire detection cum gas release panel shall ensure that the access control shall get deactivated.
		The first stage activation in the gas release circuit shall happen only when any one of the detectors in the protected area goes into alarm.
		When the first stage gets activated, the specific zone numbers and the detectors location shall be displayed, and the panel buzzer shall start operating. The stage 1 bells shall be identified by the fact that they pulsate at the rate defined by timer 1.
		The panel shall also illuminate the "ALARM" lamp on the control panel face.
		The sounder cum strobe shall remain on until the alarm is silenced in the panel. The panel shall return to normal only after the fire alarm condition is cleared and a reset is performed in the panel.

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Sr. No.	Parameter	Minimum Requirement
		The second stage activation in the gas release panel shall happen when the second detector in the protected area goes into alarm in the second stage or vice versa.
		The PAC units shall be deactivated. The panel shall also illuminate the "PRE-DISCHARGE" lamp on the control panel face
		When the second stage is activated, the second zone number and the detector's location shall also be displayed on the panel and the sounder shall be activated which is identified by a continuous tone. The stage 2 bells indicate that area is to be evacuated.
		The timer shall start to trigger the signal for gas release. The delay set time shall NOT exceed 60 seconds. It shall be possible to program the delay timing at site
		During the delay time period, the Gas release can be aborted by activating the "Manual abort switch" mechanically. The countdown timer shall count down till 10 second and stop. Once if the abort switch is released, the timer shall start count down from 10 seconds. Releasing and pressing again the manual abort switch shall reset the count down time to 10 seconds. A buzzer shall be activated when the abort switch is operated.
		After the expiry of the timer, the output from the actuator output terminal of the panel shall activate and operate the solenoid valve in the master cylinder. It is important to note that the actuator output on the panel shall be enabled only if the automatic gas release mode is selected
		A Gas sign board with lamp (Located outside the protected area) shall also illuminate indicating that the gas discharge has taken place
		The gas shall discharge into the protected area within 10 seconds as stipulated in the NFPA 2001 guidelines (2004 edition). The gas shall permeate into all the voids in the desired quantity so that the fire shall be quenched.
		As long as both the stages remain in alarm, the output to solenoid shall be active. If at least one of the two stage returns to normal as explained above, the delay timer shall stop. The gas release shall not happen if the delay is set to zero.
19	Manual Mode Operation	The manual release shall happen in three ways. Manual Release through the panel, Manual release station & Manual Release directly from the cylinder
		The electric manual release (activated through the panel) shall be a dual action switch device which provides a means of manually discharging the suppression system from the panel
		The manual release station shall also be a dual action device requiring two distinct operations to initiate a system actuation.
		Manual actuation shall be capable of bypass the time delay or shall have the time delay depending upon the client requirements. It shall be possible to program both at site and abort functions and shall cause all release and shutdown devices to operate in the same manner as if the system had operated automatically.
		Manual release station shall be located at each entry from the protected hazard and the abort station shall be located at the exit side

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Sr. No.	Parameter	Minimum Requirement
		If the "Manual release lever on the master cylinder shall be activated by operating the lever, the gas shall get released immediately. Abort function cannot be performed after activating the manual release lever.
20	Connections details	The Addressable detectors shall be connected in loops which are independently addressed from the fire alarm panel. Or Conventional detectors shall be used and the same shall be connected to the conventional fire detection cum gas release panel.
		The manual abort station and manual release stations shall be connected to fire alarm cum gas release panel. In addition, the gas release panel shall have the manual mode switch as explained above
		The discharge pressure switch shall be connected to the gas release panel thro addressable monitor modules.
		The sounder cum strobes shall be connected gas release panel
		The solenoid actuator shall be connected to gas release panel in the Gas release terminal
		The fire trip input for the PAC units is looped and connected to through addressable control modules to the fire alarm cum gas release panel
		The Access controlled door release shall be connected to the fire alarm cum gas release panel thro addressable control modules
		The monitor module shall be connected from the building fire alarm panel to the gas release panel for alarm communication * fault status of the gas release panel.
21	Manual release station	Manual release units - Single action type shall be provided at each exit of the protected area and as indicated on the drawings. Manual release unit casings shall be coloured YELLOW and shall be inscribed with the lettering " AGENT (NAME) MANUAL RELEASE POINT". Mounting heights for manual release units shall be agreed on site.
22	Abort station	Abort switches, where provided, shall be located within the protected area and shall be located near the means of egress for the area. The abort switch shall be of a type that requires constant manual pressure to cause abort, in all cases the normal and manual emergency control shall override the abort function. The abort switch shall be clearly recognizable for the purpose intended.
		The abort units shall be momentary devices requiring constant pressure to maintain contact closure and shall be coloured RED and shall be inscribed with the lettering " AGENT (NAME) ABORT POINT". Mounting heights for abort units shall be agreed on site.
23	Remote lamp unit	Remote lamp units shall be provided to give indication of an activated smoke detector within a ceiling or floor void.
24	Documentation	The successful contractor should prepare & submit the piping Isometric drawing and support the same with a hydraulic flow calculation generated by using the agent's design software. The calculations shall validate the fill density assumed by the bidder.
		The bidder shall submit copies of the datasheets of the hardware used in the system.
		The bidder shall also submit calculations to evidence the qty of agent considered for the system.

Fire Suppression System		
Sr. No.	Parameter	Minimum Requirement
25	Testing	The System Company should provide, as part of handing over, the as-built drawing, operation manual and maintenance manual. The as-built drawing shall exactly match the Isometric drawing submitted with the flow calculation prior to commencement of work.
		The successful vendor must submit, along with the supply invoice, a certificate of authenticity, for the agent.
		The design & the installation shall be certified by principal system supplier
		Prior to placing the completed system in service, the installation should be inspected and tested by qualified personnel to confirm that the system has been properly installed and will function as specified below.
		1. Conformance to System design.
		2. Suitability of piping, its correctness to project design, and its supports.
		3. Operating Sequences.
		4. Suitable Hazard Environmental controls and Safety precautions and.
		5. Compliance with the norms of NFPA STD. 2001 (2008 Edition) and other applicable standard.
		Piping
		1. Verify that pipe sizes and layout are as indicated on the project working drawings.
		2. Verify the piping supports and ensure the pipes are secured and restrained from the movement.
		3. After the installation after system piping is completed, and prior to the connection of the cylinders, accessories, nozzles etc., the discharge piping should be blown out and then
		4. Pressure tested for leakage. Plug or cap all pipe outlets and apply 40 psi (3 bar) pressure with air for 10 minutes. At the end of 10 minutes, the pressure loss shall not exceed 20% of the test pressure. Under no conditions should water be used in testing.
		Cylinders
		1. Inspect cylinders and ensure bracketing and cylinders are secure.
		2. Check pressure gauge and ensure pressure is correct for temperature at cylinder location.
		3. Check cylinder discharge bends and check valves for proper orientation, connection and tightness.
		4. Ensure that the cylinder operating components and auxiliary control devices are installed in accordance with the project drawing.
		5. All the required labeling as done on the cylinders
		Nozzles
		1. Ensure each nozzle has an orifice drilled to suit the specific location and discharge flow requirements.

Fire Suppression System		
Sr. No.	Parameter	Minimum Requirement
		2. Verify that nozzle locations and orifice sizes are as indicated in the project drawing.
		Electrical
		1. All testing of the extinguishing system electrical circuits, Interlocks, Fire detectors and other electrical devices like solenoid actuators shall be carried out in accordance with the systems control panel. 2. The control panel should indicate normal supervisory condition. 3. Check the smoke detectors are in cross zone.
26	Standards	The fire suppression system shall include and not be limited to gas release control panel, CCOE approved seamless cylinders, discharge valve (with solenoid or pneumatic actuator), discharge pipe, non-return valve and all other accessories required to provide a complete operation system meeting applicable requirements of NFPA 2001 standards and installed in compliance with all applicable requirements of the local codes and standards.

10.24 Aspiration smoke detection (ASD) system

Aspiration smoke detection (ASD) system		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes aspiration smoke detection system piping, installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	As the first level of fire detection in server areas where the high airflow is pre-set, it is recommended to provide ASD system via continuous air sampling and particle counting using a special detector.
		The ASD system should provide the earliest warning of a potential fire and gives adequate time to investigate, intervene and <u>potentially avoid business disruption</u>
		The ASD system should continuously draws air within the protected area through a network of pipes where it is passed through a calibrated detection chamber. It is capable of providing very early warning of fire conditions thereby providing invaluable time to investigate and respond to a potential threat of fire.
		The ASD system shall install in various combinations to provide the effective detection namely, Ceiling Protection, Floor and sub floor void protection, return air vent protection. Multi levels of ASD systems should considered keeping in view the Data Centre/ utility room size and volume
		A fast response shall be achieved by designing and routing the ASD sampling tubes near the CRAC suction inlet, since the air within the room is sucked through these units. The 100% result on the performance of the system should achieved. Hence, return air- vent detection should provide.

Aspiration smoke detection (ASD) system		
Sr. No.	Parameter	Minimum Requirement
		The ASD panel should be connect with DCIM software to have detail monitoring from centralized level. The alert system can be generated as per user requirements.
3	Supply voltage range	EN 54 -10.5–30 VDC/14.0–30 VDC or FM/UL - 12.4–27 VDC/16.4–27 VDC
4	Power consumption	210 mA to 115 mA
5	Sampling tubes/smoke sensors	1
6	Autolearning, day/night switching	Configurable
7	Relays	3 (1alarm, 1fault, 1free)/ 2 (1alarm, 1fault)
8	Interfaces	O.C. outputs -See relays, PC tool -USB, Inputs -Reset, day/night/O.C. outputs -See relays, PC tool - Ethernet, Network - RS 485, Ethernet, Inputs -Reset, day/night
9	Connection to FACP	1–3, fault, reset
10	Number of samplings apertures (with ASD Pipe Flow)	EN 54-20 Class A-8 to 16, EN 54-20 Class B-12 to 50, EN 54-20 Class C 16 to 50
11	Monitoring area	1280 m2 to 1920 m2
12	System limits as per EN 54-20 Class C	Max. quantity sampling apertures-16, Max. length to Max. length to-70m, Max. overall length of all sampling tubes-120m
13	System limits without conformity to standards	Max. overall length of all sampling tubes-120mtr
14	Calculation of sampling tubes for all four types of aspirating smoke detectors	ASD Pipe Flow- • Calculation according EN-54-20 (Class A, B, C) or NFPA 72
15	Fan/sampling system	Suction pressure- > 400 Pa/200pa, Service life (MTTF)- > 65,000 h (at 40°C)/ > 65,000 h (at 40°C), Performance levels-13, Noise level (1m distance)- 34 dB (A) (fan level 1)/ 25 dB (A) (fan level 1), Soundproof housing- < 20 dB (A)
16	Airflow monitoring	1 air flow sensor (therm. Anemometer)
17	Housing	EN 60529 port Class-IP 54, Dimensions (W×H×D)- 195×290×140 mm, Cover, grey- RAL 280 70 05, Base, anthracite violet- RAL 300 20 05, Material- ABS blend, UL 94-V0, Weight (approx.)- 1950 g., 1950 g
18	Packaging	372×220×172 mm
19	Operating temperature/ humidity	-20 – +60°C/95% RH (amb. air max. +40°C)
20	Display and operation	Generally, per channel-red «alarm» LED,1 yellow «fault» LED, , 1 yellow soiling LED, 1
21	Event memory/ analogue values	1000 events, up to 1-year on-board option
22	Standards/approvals	EN 54-20-VdS G 212163/VdS G 215101, EN 54-27 (ventil. ducts)- yes, UL, FM-yes, Other-Active Fire, CCCF, ISO 7240-20, GOST, Compliance-EMC, CPR, RoHS, EAC

10.25 Public Address System

Public Address System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes Public Address System cabling, speaker & mike installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project. The scope of work under this head shall include designing, supplying, installation and commissioning of Public Address System. The PA system should design to serve the dual purpose of making general announcement and Voice Evacuation at the time of Fire alarm activation.
2	General	The contractor shall supply, install, test, and commission a high quality fast-acting Public Address and Voice Alarm System complying strictly with BS 5839 part8 and EN60849 and shall be TUV or Equivalent Agency approved. The Public Address and Voice Evacuation System shall comprise of Audio Matrix Units, High quality speakers, Audio rack all mounted on a 19" Rack and fully connected and integrated on the fire alarm loop. The system shall be used for Professional Sound Reproduction for all the areas where possible special events take place
3	Integration with fire system	The system shall be fully programmed to accommodate fire alarm and voice communication zones as indicated on the drawings and schematics. The system shall be configured to allow on site modifications with the minimum of disruption using the PC based software to facilitate future changes or alterations to the buildings
4	Speakers	• Speakers shall be especially designed for broadcasting high quality, integrated emergency fire alarm signals and voice communications and approved by an appropriate authority for use in such situations. • Speakers shall be ceiling, wall mounted, or Horn Speaker as shown in the schedule of work and shall be completed with mounting brackets accessories etc. Speakers shall be in metal enclosures only. • Speakers shall be interconnected in the zone configuration. • 6W Ceiling Mounted Speaker
5	Voice Alarm Controller	The network controller shall be a control unit for a public address and emergency sound system. It shall control and route audio channels on a CAT6/fiber network, with audio signals comprising e.g., announcements made via call stations or background music from a connected CD-player. The network controller shall have an RJ-45 Ethernet connection for connecting a configuration PC, directly or via an Ethernet network. After the configuration, the network controller shall be able to run stand-alone without PC, although it shall be possible to keep the network controller connected to the network or PC for additional functions, such as logging of call and fault events or remote control. The network controller shall provide power to connected equipment on the network. It shall provide 6 analog audio input channels.

Public Address System		
Sr. No.	Parameter	Minimum Requirement
6	Amplifier	All amplifiers shall be power amplifier with High quality speech and Music broadcast. The power amplifiers shall have adequate continuous (RMS) power output to meet the requirement of the configuration. The unit shall deliver the rated output power with better than 0.5% harmonic distortion in the design bandwidth. The amplifier shall have a broad band frequency response of 40 Hz to 15 KHz. The output voltage and impedance shall meet with the system requirements.
7	Software	The software should relate to CAT5/ CAT6 Cable/ LAN cable shall provide Zone control, status monitor, Offline Program, Event Recording, System Configuration, User Management. Software shall allow automatically playing and timing function to achieve timing programmed playing in the designated zones for unattended operation, Built-in Automatic Timing Corrector.
8	Standards	- EVAC Compliant with IEC/EN60849 - Loudspeakers -Rated power IEC 60286-Part 5 - Tested in accordance with BSEN60268-5 - Acoustic models ready for CATT, ULYSSES & EASE - Compliant with BS5839 Part 8 - Battery backup/charger compliant with EN54 part 4

10.26 WATER LEAK DETECTION (WLD) SYSTEM

WATER LEAK DETECTION (WLD) SYSTEM		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes water leak detection system cabling, installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The Water leak detection cable shall be the sensor cable used to detect water leaks in the sub floor and Data Centre area.
		The Cable shall be capable of water detection over its entire length. The construction of the cable shall be of PVC Twisted pair, with SS 316 elements, of diameter not exceeding 3.5 mm.
		The Cable shall draw excitation signal from a start of the line module. This module shall serve as the interface between the Water leak detection panel and the Sensor Cable.
		The Start of Line Interface Module shall be locally placed in the False Flooring of the Server area(s) and shall be connected to the WLD Panel through standard 2C x 1.5 mm ² Cu-Armored Cable.
		The WLD Panel shall be capable of supplying power to the interface modules and shall serve as the annunciator of alarms through facia mounted zonal LEDs. The panel shall activate sounders programmed Zone wise.
		The Testing procedure shall involve physical application of a wet cloth to the cable, to test the relay operation. The Panel should sound the Alarms, and notify the DCIM system

WATER LEAK DETECTION (WLD) SYSTEM		
Sr. No.	Parameter	Minimum Requirement
3	Supply Voltage	230VAC $\pm$ 10 % 50 Hz.
4	Battery Charging Voltage	15.9 VDC
5	Operating Nominal Voltage	12 V DC
6	Notification appliance circuit Output	0.25 Amp
7	Potential Free Contact Outputs	Fault – 01 Nos., Alarm – 01 Nos., Common NAC- 01 Nos., Individual alarm contact – 10 Nos.
8	Sensor cable length	1mtrs to 50 mtrs per zone
9	Master panel capability	10 Slave modules
10	Wire communication	2 wires
11	Monitoring and Controlling unit.	Single
12	Module connection	Loop
13	Pressure on the cable	not create any false alarm.
14	3 States	Normal
		Alarm
		Open
15	Dimension of cable	min. 4mm diameter.
16	Leader Cable	0.5 meter
17	Material	Nickel-Chrome Twisted Pair.
18	Sensor Cable	4 wires
		· 2 for sensing
		· 2 for continuity
		The Cable shall be FRLS twisted pair with SS 316 elements, be capable of water detection over its entire length.
19	Control Cabling	The Control Wiring shall be in NEC Article 760 and as recommended by the manufacturer of the Water Leak Detection System.
20	Installation	The cable sensor shall be fixed to the floor using nonconductive supports and will ensure that the cable will be firmly held on the floor throughout its length without any lagging of the cable.
21	Testing	It is proposed to get the system tested before commissioning by placing a wet cloth over the cable to simulate a water leak. The particular zone on the main water leak panel must be displayed and the alarm relay has to operate. This will confirm that the system is working fine. Extension of alarm to the BMS system is proposed. The panel will have to be reset manually once the cable dries up. The Controller or repeater shall be installed at BMS room to control & monitor the water leakage system.
22	Standards	CE, ISO 9001

10.27 Rodent Repellant System

Rodent Repellant System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The system should propose to protect all the equipment's, areas with relevant type of high frequency sound producing device called satellites or transducers. The scope also includes rodent repellant system cabling, installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The system should be able to protect the entire premises viz., all the voids against rodents. It should be able to keep the rodents away from the floor by generating very high frequency sound waves (above 20 KHz) which should not be legible to human ear but irritates rodents. It should be able to protect all the cables below floor, above ceiling & room void from damage caused by rodents.
		The powerful sound waves generated by the satellites of RR shall be within the hearing range of many pests and cause them pain and discomfort. RR's satellites should be quiet and inaudible to humans. The RR should be to add in daisy protocol for interfacing 64 controllers with controller ID with 6-digit password protection. The controller data can be transferred to computer and can be subsequently viewed by installed software of the same OEM. LCD display with on board controls for changing the parameter. Once powered up these transducers, it should produce very high frequency variable sound waves (above 20 KHz) continuously which irritate the rodents and force to evacuate the place.
		The system shall cover 6000 sq ft area per controller for dedicated connection or 7200 sq ft area per controller for a looped connection in Room Void & shall be able to connect minimum 20 transducers per controller in dedicated connection or 24 transducers per controller in a looped connection. The transducers shall cover 300 sq ft of area in Room Void and 150 sq ft of area in Ceiling and Floor Void.
		All transducers should be tested in an audible range by selecting Test Setup Menu with the help of Menu key on Keypad provided on Main Console.

Rodent Repellent System		
Sr. No.	Parameter	Minimum Requirement
		The Data Centre and all Hub rooms shall be provided with Rodent repellent system. The Rodent Repellent System shall consist of one master console & multiple satellites / transducers. The Master Console shall be proposed at one central location. It is proposed to have 1 zone of 300sqft each, Hub rooms and Data Centre. The satellites will produce powerful high frequency sound waves (well above the 20 K Hz frequency which is the upper limit of the hearing range of human ear, also called as ultrasonic) are within the hearing range of the many pests and cause them pain and discomfort and thereby, forcing them to abandon the protected area. Each Satellite shall cover an open area of 300sqft. When installed in false ceiling / false flooring it should cover an approximate area of 250sq.ft. Each satellite occupies very minimum space and can be mounted in any angle, they do not need any power connection, there will be no risk of sparking & they should be able to withstand high temperatures in the false ceilings, in a temperature range of 4 Deg. C to 60 Deg. C. The Rodent Repellent shall operate either on 230 V AC or 24 V DC based on make & only 230V AC supply at one point shall be given to the Panel.
3	satellites or Transducers	The satellites or Transducers shall be circular ceiling mounted low profile units that produce high decibel sound waves at very high frequency not less than 20 KHz. These satellites shall cover 300 sq ft of area for Room void application and 150 sq ft for ceiling Voids & floor void applications. These shall be powered thru Main Controller to 20 satellites in dedicated connection or 24 satellites in a single loop.
4	Circuit	Signal generator should have full wave rectification, regulated 12V DC power supply to withstand power fluctuations ranging from 170V AC to 270V AC. Amplifier should have a preamplifier stage coupled with signal generator for dual transistor amplification having a push-pull configuration.
5	Pressure	1. Uniform pressure output of 80 dB to 110 dB with 360° transmission angle. 2. Linear propagation of mixed / variable frequencies detectable at, or about 40 ft distance from the source (Transducer/ Satellite). 3. Spatial average intensity - 83mW per cm ²
6	controller	The controller shall support 20 Transducers in dedicated connection or 24 Transducers in a single loop and shall come with MS Powder Coated Stands. The controller is installed in the control / BMS room and the transducers in the problematic areas i.e., above and below false ceiling and below false flooring.
7	Frequency band	> 20 KHz and <60 KHz
8	Software Compatibility	Real Time Graphical Representation of the ultrasonic frequency band spectrum depicting the frequency oscillations within the current band. It can be connected with DCIM software to monitor real time status through SNMP, Modbus or any other interface
9	Standards	IDEMI CFTRI certification

10.28 Surveillance System

Surveillance System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes surveillance system with camera, cabling, installation and configuration work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The Surveillance system should require monitoring the Facility on continuous basis for the movement of people within and around the Facility. The primary purpose of the system is to sense the abnormal movement / behavior of the people so that the security and the concerned IT operation staff can be alerted in case of abnormal behavior. Apart from DCIM integration, one CCTV monitoring should be provided at DCIM room at ground floor.
		The system should be installed to monitor the facility on continuous basis for the movement of people within and around the Data Centre building for security purpose.
		The primary purpose of the system is to sense the abnormal movement / behavior of the people so that the security and the concerned Facility operation staff can be alerted in case of abnormal behavior. This also provides the recording of the abnormal events such as fire, intrusion, etc.
		To provide clear & accurate indication of an intruder or abnormal movement within and around the Facility
		The CCTV based monitoring and surveillance system shall be provided at the desired locations. This should cover the entire Data Centre building as well as Entry and Exit points.
		All activities to be recorded and the archival to be kept for at least 30 days. System should include automatic back up to suitable device at regular (configurable) interval. Such recording shall be kept for analysis at a later date
		The CCTV System shall be real time, true IP- based system consisting of day Night PTZ Cameras, indoor varifocal dome cameras, indoor varifocal fixed camera, outdoor varifocal dome cameras, outdoor bullet camera. It should have real time recording & data fetching feature using suitable capacity Network Video Recorder (NVR), switches, interfaces and monitors and all equipment necessary for functioning of the system. The bidder should select NVR as per quantities of the total camera
		All cameras should be connected with video management software (VMS) to have video analytics and retrieve reports in standard and professional format
		The bidder shall have to consider all required sub products like data cabling same as which has been considered for the server data LAN cabling work.
		The bidder should consider pole for outdoor PTZ camera for monitoring of periphery of the Data Centre building
		The camera which should be installed on the wall, pole or ceiling should have proper bracket. The bracket should supply of the same OEM of the camera to have better installation.

10.28.1 Bullet Camera

Bullet Camera		
Sr. No.	Parameter	Minimum Requirement
1	Image Sensor	1/2.8" progressive scan CMOS
2	Pixel Resolution	2560x1920@30fps
3	Compression method	H.265, H.264, MJPEG
4	Data Rate	128kbps~16Mbps
		Data rate should be independently configurable for each video stream
5	Video Streaming	3 video streams
6	Sensitivity	Color mode: 0.005 lux (IR OFF);
	a) Colour Mode	B/W mode: 0.0005 lux (IR OFF);
	b) Monochrome mode	0 lux (IR ON)
7	Exposure Control	Auto/Manual/Shutter
8	Shutter	1/1s~1/30000s
9	Wide Dynamic Range (WDR)	up to 128 dB or better
10	Day/Night Camera	The camera shall be Day/Night
11	Lens	Motorized zoom lens, F1.6, f=2.8~12mm
12	Infra-Red Night Vision Distance	50 m
13	IR wavelength	850 nm
14	Focus & Iris control	Auto
15	Privacy masking	up to 4 definable area
16	Housing	IP67
17	Edge Analytics	Motion detection, camera tampering, FOV Change, defocus detection, high brightness detection, low brightness detection
		Support density detection and crowd detection Support queue length monitoring and dwelling detection
		Wire crossing detection, intrusion detection, left object detection, object Removed detection, loitering detection
18	Signal to Noise ratio	≥65dB
19	Edge Storage	Supports a Micro SD/SDHC/SDXC card. Camera Shall be supplied with 128 GB card
20	Network Interface	One RJ45 10/100M self-adaptive Ethernet port
21	Camera discovery in local Network	required
22	Supported Protocols	IPv4/IPv6, TCP, UDP, IGMP, ICMP, IGMPv2/3, DHCP, SNMP (V1, V2, V3), FTP, SMTP, NTP, RTP, RTSP, RTCP, HTTP, HTTPS, SSL, 802.1x, QoS, PPPoE, DNS, DDNS, ARP, UPnP, IP Filter, TLS, Multicast, SIP
23	IP Address Filter	Blacklist and whitelist filtering for up to 1024 IP segments or better
24	Web Server	Embedded web server
25	Maximum Number of Users	64

Bullet Camera		
Sr. No.	Parameter	Minimum Requirement
26	User Privileges	Minimum 3 types of user's privileges required: administrator, normal user, and operator
27	Auto Gain Control	Auto, Manual
28	Back Light Compensation	required
29	White Balance	Auto, Manual, Outdoor
30	Alarm Inputs/ outputs	2 Alarm Inputs, 1 Output
31	Power options	PoE (IEEE 802.3af)/12VDC ($\pm 20\%$)/24VAC ($\pm 25\%$)
32	Power Consumption	<6W (IR off), <13W (IR on)
33	Operating Temperature	-40°C ~ 60°C
34	Storage Temp	-20°C ~ 60°C
35	Humidity	0%~95% RH (non-condensing)
36	Flicker control	required
37	Defog	required
38	Highlight Suppression	Required
39	Electronic Image Stabilization (EIS)	Required
40	Anti-Static	Air discharge up to 8KV or better, contact protection for ports 6KV
41	Surge Protection	Difference mode $\pm 2KV$, common mode $\pm 4KV$ (for network port and power port)
42	Camera Mount	Mounting bracket shall be part of the camera
43	ONVIF (Open Network Video Interface forum) Compliance	ONVIF Profile S/G/Q
44	Audio	Two-way audio
45	Audio Compression	G.711 A, G.711 U, G.726, AAC
46	Audio Sample Rate	8KHz (for G.711-A/G.711-U/G.726), 16KHz, 32KHz, 44.1KHz and 48KHz (for AAC)
47	Audio Interface	1 Linear input, 1 linear Output
48	Firmware upgrade	The camera shall support remote firmware upgrade
49	Regulatory Approvals/ Certifications	CE, FCC, BIS, IP66, IK10

10.28.2 Dome camera

Dome camera		
Sr. No.	Parameter	Minimum Requirement
1	Image Sensor	1/ 2 .8" progressive scan CMOS
2	Pixel Resolution	2560×1920@30fps
3	Compression method	H.265/H.264/M JPEG/SVC independent coding
4	Video Streaming	3 video streams
5	Data Rate	128kbps~16Mbps
		Data rate should be independently configurable for each video stream
6	Sensitivity	Color mode: 0.0 0 5 lux IR OFF
	a) Colour Mode	B/W mode: 0.0 0 0 5 lux IR OFF
	b) Monochrome mode	0 Lux (IR ON)
7	Exposure Control	Auto, Manual, Shutter
8	Shutter Speed	1/1s~1/30,000s
9	Wide Dynamic Range (WDR)	Up to 120 dB
10	Day/Night Camera	ICR
11	Lens	Motorized zoom lens f=2.8mm ~12mm, F 1.6
12	Angle of View (Near/Far)	Near: Horizontal 100°x Vertical 54°
		Far: Horizontal 33°x Vertical 18°
13	Lens Aperture	F1.6
14	Infra-Red	30m IR distance with Smart Management
15	IR wavelength	850 nm
16	Focus & Iris control	Auto
17	Privacy masking	up to 4 definable areas
18	Housing	IP66 and IK10
19	Edge Analytics	Motion detection, camera tampering, FOV Change, defocus detection, high brightness detection, low brightness detection
		Support density detection and crowd detection Support queue length monitoring and dwelling detection
		Wire crossing detection, intrusion detection, left object detection, object Removed detection, loitering detection
20	Signal to Noise ratio	≥65dB
21	Day/Night Camera	The camera shall support Day/Night functional
22	Edge Storage	SD/SDHC/SDXC card (up to 256G) for video and image storage.
23	Network Interface	1 RJ45 interface, 10M/100M self-adaptive Ethernet port
24	Camera discovery in local Network	Manufacturer shall supply the software for discovering the camera in the local network
25	Supported Protocols	IPv4/IPv6, TCP, UDP, IGMP, ICMP, IGMPv2/3, DHCP, SNMP (V1, V2, V3), FTP, SMTP, NTP, RTP, RTSP, RTCP, HTTP, HTTPS, SSL, 802.1x, QoS, PPPoE, DNS, DDNS,
		ARP, UPnP, IP Filter, TLS, Multicast, SIP

Dome camera		
Sr. No.	Parameter	Minimum Requirement
26	Web Server	The camera shall have embedded web server
27	Maximum Number of Users	64 users
28	User Privileges	Minimum 3 types of user's privileges required: administrator, normal user, and operator
29	Auto Gain Control	Auto, Manual
30	Back Light Compensation	The camera shall have Backlight compensation
31	White Balance	Auto, Manual, Outdoor
32	Alarm Inputs/ outputs	2 Alarm Inputs, 1 Output
33	Power options	PoE (IEEE 802.3af)/ 12VDC/24VAC
34	Power Consumption	IR OFF: 5 W
		IR ON: <13W
35	Operating Temperature	- 40°C~+ 55 °
36	Storage Temp	- 20°C~+ 55 °
37	Humidity	95% RH (non-condensing)
38	Flicker control	Required
39	Defog	Required
40	Highlight Suppression	Required
41	Electronic Image Stabilization (EIS)	Require
42	Camera Mount	The camera shall be mounted on surface or on wall with suitable OEM supplied mounting bracket
43	Anti-Static	Air discharge up to 6KV or better,
		contact protection for ports 6KV
44	Surge Protection	Difference mode 1 KV, common mode for network port and power port 2 KV
45	Audio	Two-way audio Support
46	Audio Compression	G.711 A, G.711 U, G.726, AAC
47	Audio Sample Rate	8KHz (for G.711-A/G.711-U/G.726),
		16KHz, 32KHz, 44.1KHz and 48KHz (for AAC)
48	Audio Interface	1 Linear input, 1 linear Output
49	ONVIF (Open Network Video Interface forum) Compliance	ONVIF Profile S/G/Q
50	Firmware upgrade	The camera shall support the remote firmware upgrade
51	Regulatory Approvals/ Certifications	CE, FCC, BIS, IP66, IK10

10.28.3 PTZ Camera

PTZ Camera		
Sr. No.	Parameter	Minimum Requirement
1	Image Sensor	1/1.8" CMOS
2	Pixel Resolution	5 megapixels
3	Data Rate	Constant Bit Rate
		Variable Bit Rate varying from 128kbps~10000kbps
		Each stream should be independently configurable bit rate
4	Compression method	H.265/H.264/M-JPEG/SVC
5	Video Streaming	4 independent configurable video streams
6	Sensitivity	Color mode: 0.01lux (IR OFF);
	a) Colour Mode	B/W mode: 0.001lux (IR OFF);
	b) Monochrome mode	0 Lux (IR ON)
7	Exposure Control	Auto/Manual/Shutter
8	Wide Dynamic Range (WDR)	120 dB or better
9	Noise Reduction	3D noise reduction
10	Day/Night Switch	ICR
11	Lens	30x
12	Angle of View	60° (W) ~ 2.2° (T)
13	Infra-Red Distance	150 m or better
14	IR wavelength	850nm
15	Focus & Iris control	Auto/Manual
16	Privacy masking	Up to 4 privacy areas
17	Environmental Rating	IP 66
18	Impact Resistance	IK10
19	Edge Analytics	Motion detection, camera tampering, FOV Change, defocus detection, high brightness detection, low brightness detection
		Support density detection and crowd detection Support queue length monitoring and dwelling detection
		Wire crossing detection, intrusion detection, left object detection, object Removed detection, loitering detection
20	Signal to Noise ratio	>60dB
21	Edge Storage	Support SD card, compatible with Micro
		SD/SDHC/SDXC card. Camera shall be supplied with 256 GB card
22	Network Interface	1 RJ45 interface, 10M/100M self-adaptive Ethernet
		Port
23	Supported Protocols	IPv4/IPv6, TCP, UDP, IGMP, ICMP, IGMPv2/3, DHCP,
		SNMP (V1, V2, V3), FTP, SMTP, NTP, RTP, RTSP, RTCP, HTTP, HTTPS, SSL, 802.1x, QoS, PPPoE, DNS, DDNS, ARP, UPnP, IP Filter, TLS, Multicast
24	IP Address filter	IP address filtering support

PTZ Camera		
Sr. No.	Parameter	Minimum Requirement
25	Web Server	Embedded web server
26	Maximum Number of Users	10
27	User Privileges	3 types of user privileges: administrator, operator, normal user
28	Auto Gain Control	Auto/Manual
29	Back Light Compensation	Required
30	White Balance	Auto/Manual/Outdoor
31	Alarm Inputs/ outputs	Alarm Inputs 2
		Alarm Output 1
32	Camera Presets	782 or more
33	Camera Pattern	10 or better
34	Auto pan	10 or better
35	Tour	14 groups or better
36	Home Return of PTZ	Required
37	Auto scan	Required
38	Area Zoom	Required
39	Timing Tour	Required
40	Manual Pan Speed	0.1°~850°/s
41	Manual Tilt Speed	0.1°~ 285°/s
42	Preset Speed	Up to 360°/s or better
43	Rotation Angle	Pan: 360°/s or better
		Tilt: -4°~ 90°(auto-flip)
44	Preset Accuracy	<±0.1°
45	Power options	PoE+ (IEEE802.3at type2 Class4/ 24VAC/
		24VDC
46	Power Consumption	Minimum <17W
		Maximum <55W (heater on, IR lamp manually adjusted to maximum)
		PoE+ <50W
47	Operating Temperature	-40°C ~ +70°C (outdoor)
48	Storage Temp	(-20°C~+60°C)
49	Humidity	0 ~ 95%RH (non-condensing)
50	Flicker control	Required
51	Defog	Required
52	Highlight Suppression	Required
53	Electronic Image Stabilization (EIS)	Required
54	Camera Mount	Wall, Pole mount should be supported as per site
55	ONVIF (Open Network Video	ONVIF Profile S/G/Q

PTZ Camera		
Sr. No.	Parameter	Minimum Requirement
	Interface forum) Compliance	
56	Audio	Two-way audio required
57	Audio Compression	G.711-A, G.711-U, G.726, AAC
58	Audio Sample Rate	8KHz (for G.711-A/G.711-U/G.726), 16KHz, 32KHz, 44.1KHz and 48KHz (for AAC)
59	Audio Input/Output	1 input and 1 output (linear ports)
60	Anti-static	Air discharge 6KV Contact protection 6KV
61	Surge Protection	Differential mode 4KV, common mode 6KV
62	Firmware upgrade	The camera shall support remote firmware upgrade over network
63	Regulatory Approvals/ Certifications	CE, FCC, BIS/UL, IP66, IK10

10.29 Video Management System (VMS)

Video Management System (VMS)		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes video management system software with mentioned analytics specified in the technical specifications installation and configuration work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General parameters	The system shall be open platform with integration with at least 64 IP camera leading brands in the world. The client OS platform shall be able to run with Microsoft Windows and MAC platforms. (List of integrated brands to be submitted) The system shall be Windows/ Linux platform. The OS can be embedded in device without extra installation. The central Management Server supports unlimited cameras, 3rd party access control systems (System tested: 1024 channels of cameras, within 32 pcs of Recording Server) System can manipulate camera views by changing its viewing angle and image size to allow for a seamless multi-pane panoramic view. Up to 10 independent cameras can be set up as single view Intelligent Search: Intuitive post-event motion search for suspicious areas on video and post- event 3rd party data keyword search then query related camera recording. The system can also search events and double clicking query associated recording Multi-View: Client PC can duplicate the same live view video onto multiple channels and digitally zoom in to see the details of different spots on cloned channels without losing the original live view video

Video Management System (VMS)		
Sr. No.	Parameter	Minimum Requirement
		Individuals recycle condition (IRC) for each video. Users can assign retention days for each server based on the importance of the critical storage needs
		System should support following IVS: (Object Classification, Camera Shake Elimination, Presence (Tripwire), Enter and exit, Appear and disappear, Dwell (loitering), Tailgating, Stop, wrong Direction, missing object detection, foreign object detection, counting)
		Multiple event-based and schedule-based recording modes, including continuous record, record on event, manual record, event-based and schedule-based boosting record. It also supports pre-event and post-event recording for continuous record to make sure ensure that the event is captured
		Failover support: N:M failover support
		The system shall support dual gigabit Ethernet ports.
		The system shall be able to synchronize time with NTP server (Internet Time Server)
		The system shall be able to centrally configure all devices and system settings on one interface.
		The system shall support system status watchdog and automatically restart the system when abnormal event happened.
		The system shall be Server-Client Architecture and centralizes all video data transaction only via server to remote clients.
		The system shall include management server, recording server, metadata server, and client for configuring and viewing
		The management server shall be able to centrally manage all servers in the system including configuration, license management, and event monitor.
		The system shall support user priority of locking PTZ, Preset point and Patrol control. When PTZ control lock, only user with higher or equal control priority can unlock it.
		The system shall be able to view event notification on e-map.
		The system shall support volume load balance, enabling user manually distributes cameras recording to different target volumes
		The system shall support individual recycle condition for every camera and 3rd party channel DB.
		The system shall support up to 4 monitors through client software.
		The instant playback shall enable user to sync the video to playback instantly.
		The playback system shall support up to 64channel playback simultaneously on one monitor, up to 100 ch live view on single client PC and it should be able to playback from different servers.
		The system shall support digital PTZ on recorded video.
		The system shall support multiple E-maps layers.
		All VMS components like VMS Software, storage, Management server, recording server, failover server, and storage should be suggested by VMS OEM is acceptable (preferred brands are HP, DELL, IBM)
		System should readily support perimeter protection system.
3	Recording Server	Type Rackmount 2U

Video Management System (VMS)		
Sr. No.	Parameter	Minimum Requirement
		CPU INTEL (suitable to handle up to 128 cameras in single server as per server OEM)
		Qty of recording server: 2 nos.
		OS LATEST WINDOWS / LINUX
		Camera Channels Support up to 128 ch in single unit or better
		Throughput Up to 500mbps or better
		RAM 2 GB or better
		Number of Drives 6 x SATA III or better
4	Storage for VMS	Type Rackmount 2U
		Number of Drives 8xSATA III or better
		Max Storage Per Drive 14TB (Surveillance / enterprise SATA/SAS drives)
		Max internal storage 112TB
		RAID Level RAID 0,1, 5, 10
		I/O Interface 2xUSB3.0, 2xUSB2.0, 1xeSATA (for DAS)
		Voltage 100-240V
		Power Consumption 500W is on max load
		Storage support: Each camera 2MP@25fps,
		Network File Protocol NFS
		Hardware watchdog Required
		Failover support N:M failover support
		Open Platform Storage, 8 bay, as per specs. Network Storage System - 7200 RPM 8Gbps SAS Hard Disks; Storage system is required with a capacity to store the content for up to 200 cameras from Day 1 for 24Hrs x 30days at 25fps, 720p for indoor cameras and at 25fps, 1080p for outdoor cameras. It should be scalable (should have sufficient expansion bays for HDDs) bidder shall submit bandwidth and storage calculations for the proposed camera models and shall propose model and the no. of HDDs for approval accordingly.
5	Management Server	Type: -Rack mount
		CPU: - Intel (suitable for management server)
		Storage:4xSATA II
		Max Storage Per Drive - 14TB
		Max - Internal Storage - 56TB
		RAID 0,1, 5, 10
		6xUSB 2.0 (for mouse, UPS); 1xeSATA (for DAS)
		Range - 100-240V
		Consumption - 200W
6	Failover Server	Yes required
		Any branded client PC with minimum specifications of Core i5 Processor, 4GB RAM,
7	Client PC	1TB HDD, 2GB Graphics Card).
8	Technical Support	OEM should provide support till warranty period for project support including but not limited to technical support, firmware upgrade,

Video Management System (VMS)		
Sr. No.	Parameter	Minimum Requirement
		features update, device pack and care packs and L1, L2, and L3 trouble shoot
9	Standard	ISO 9001 should be having by VMS OEM vendor

10.30 Access Control System

Access Control System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes access control system with cabling, installation and software configuration work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	access control device	The Device should support real time liveness detection The Device should support for human face tracking exposure in strong backlight The Device shall have Unique live face recognition algorithm to accurately recognize faces, face recognition time is less than 0.5s The Device shall have embedded / Linux / Windows operating system, better system stability The Device shall have Rich interface protocol, support TCP/IP, UDP, RTP, RTSP, RTCP, HTTP, DNS, DDNS, DHCP, SMTP, UPNP, MQTT protocol, support Windows/Linux Device shall have dual core processor with 1GB memory & 8G flash The Device Should Support 10,000+ face matching library and 80,000 face recognition records The Device should supports connect to an external access control host or Wiegand reader through the international standard Wiegand The Device should Support tamper alarm The Device should have provision for Built-in Mifare Card Reader The Device should have provision for Wi-Fi module for connectivity which is backup of Ethernet connectivity The Device should have Audio voice playback In Regional language for event The Device should have Rich hardware interface (I/O, WG26, WG34, RJ45, Door sensor, Doorbell, Egress, Alarm, RS485) The Device shall have 5-inch IPS full-view HD display, no streaking and delay The Device should have Most efficient Push Mechanism, for Multi Location Application, to push data from multiple locations to the central location almost in real time. Data download should be automatic & extremely User friendly Access Granted / unregistered events / Status messages should display the on LCD

Access Control System		
Sr. No.	Parameter	Minimum Requirement
		The Device should be highly secured so that it can communicate with the selected the IP only
		The employee name should be displayed on the LCD screen along with Access granted
		The machine should have inbuilt RTC. Provision for setting the time of all machines from a single location to maintain uniform time in all locations
		The connectivity of the devices should be detected remotely from remote machine, should have inbuilt capability for online firmware up gradation.
		Device should have Inbuilt Web Server so device can be managed remotely through inbuilt web Server using any web browser.
		Support automatic gain control and automatic white balance
		Device shall have Built-in video monitoring dedicated black light level sensor
		The camera uses H.265 Main Profile encoding, compatible with NVR and other storage devices through the ONVIF/GB28181 protocol
		Device shall have 3D noise reduction and fog-passing technology makes the monitoring picture under low illumination clearer and more delicate
		Device should support automatic white balance and manual white balance
		Device shall have Support 2D noise reduction, 3D noise reduction
		Device should have Support video brightness, contrast, hue, saturation, gamma adjustment
		Device shall Support face intelligent exposure, face smart enhancement settings
		Device shall work between an operating temperature: -30 °C - +60 °C & Relative humidity: -0-90% no condensation.
		Device shall have Mean time between failures MTBF>50,000H.
		The outer coating should be noncorrosive.
		Device shall work on a SMPS with rating 12vdc@2A.
		Device firmware should be compatible with application software for perform functions e.g., data downloading, master settings etc.
		Device shall have facility to communicate with Aadhar app (smart UIDAI) to upload Aadhar verified user image.
		Component level servicing should be possible in India.
		Total Indian Manufacturing Technology to enable better service and support.
3	Software	· Centralized software needs to be provided by OEM.
		· Software should have features to segregate the user's bases on their roll, location, company wise.
		· Software should have features to export report of attendance in the form of Excel / PDF.
		· Software should have re-sync feature to synchronize attendance with SAP.
		· Software should have windows / Linux platform to connect with SAP.
		· Software should have capability to capture and to record all transaction of Employee (Active/ De-active / Deleted) Users.

Access Control System		
Sr. No.	Parameter	Minimum Requirement
		· Software should have features to manage employee movement and accordingly access should be given. · Software should have features of Audit trail for transaction details of employee. · Access Control device should be POE Enable. · Door Locking mechanism should be in place integrated with biometric system. · Access control system should be integrated with Fire Safety/BMS system to operate automatically and open the door. · Access Control System should detect face in dark mode (Night Vision) also. · Software should have feature to download template at one location and can be upload to any location device. · Software should have feature to provide access to users based on the access right of admin portal.
4	Display	5 inches IPS HD screen
5	Processor	Dual Core Processor + 1GB memory + 8G flash
6	Operating System	Linux Operating System
7	Sensor	1/2.8" Progressive Scan CMOS
8	Viewing angle	Vertical viewing angle: 30°; Horizontal viewing angle: 30°
9	Camera	Dual cameras with 2MP, 1920x1080,6mm lens
10	Audio	Voice playback in regional language
11	Recognition height	1.2~2.2 meters
12	Recognition distance	1.2~2.2 meters
13	Recognition time	Less than 0.5 seconds
14	Storage capacity	60000 & 80000* capture records
15	Face capacity	10,000
16	Communicate Port	TCPIP/RS485/Wi-Fi*
17	Wiegand interface	Wiegand interface input/output
18	Input	3 I/P (Door Status, Egress, Fire)
19	Output	Door Lock
20	Reader	Mifare Smart Card Reader (13.56Mhz) *Optional
21	Operation mode	required
22	Tamper Alarm	required
23	Power Supply	12 V DC/ 2A
24	Operating Temp & Hum.	Temp: -30°C - +60°C, & Rh: 0~90%
25	Ingress Protection	IP42
26	Size in mm (LWH)	95mm*24.5mm*205mm
27	Mounting	Wall Mounting
28	Standard	BIS & CE certified.

10.31 Physical Security Systems

10.31.1 Turnstile System

Turnstile System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes turnstile system piping, wiring, installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project. The template of the turnstile system shall be embedded in the concrete floor. Concrete floor [high quality] need to be dug to embed the template. The turnstiles shall be installed directly on the template using flanges, screws and nuts. The fixing material shall also be included in the scope.
2	General	Each turnstile system shall have full height turnstiles, specially been developed to control simultaneous bi-directional pedestrian movement with low space requirements. The turnstile shall be designed in modular system and shall be easily assembled at site by hand and without the need of heavy lifting devices; the rotating center column in the middle of the cage consists of 4 x 90 degrees bars. The turnstile can be used for bi-directional access control applications.
		The turnstile shall consist of a center, a right/left side part and an upper part with cover. The whole assembly shall be made up of Stainless steel 304 grade. The upper part contains the locking mechanism and the controller. Suitable mounting plate [700 x 100 mm] approx. fixed at either of the turnstile enables the adaption of access control devices.
		It is planned to have emergency door on either side of the turnstiles. The emergency doors shall be made up of Stainless Steel (SS) 304. There shall be SS 304 plate, welded at the top of the door for fixing the electro-mechanical (EM) lock [250 mm x 50 mm]. In addition, it shall have SS pad lock for manual locking.
		All grills should made of SS 304, which used to cover the space between two sections of turnstile. The SS pipe shall be welded pipe, as per C22 or as rolled and welded. Moreover, SS pipes shall be matt finishing type.
		Each section shall have a SS [SS 304] plate attached to the static column of the turnstiles for mounting the RFID readers and Lane Indicators. The dimensions of the plate shall be 500 mm X 150 mm X 4.0 mm [Approximately] for housing the RFID reader and Lane Indicator.
		There shall be a vertical pipe between two turnstiles [SS 304 pipe of 41 mm diameter, 3.0 mm thickness]. This vertical pipe shall have a coupling with static column of the turnstiles on either side for every 1-meter height.

Turnstile System		
Sr. No.	Parameter	Minimum Requirement
		• The power supply available to the electrical loads of the system is 240 V AC $\pm$ 10%, 50 Hz $\pm$ 3% and sufficient isolation shall be provided from the loads. • The electronic circuits used in the system shall be of solid-state fail-safe design. The electronic circuits shall be provided with proper coating to have resistance to humidity and corrosion, which prevents the operation from being impaired by dust and dirt. • Turnstile control system shall be tampered proof and shall alarm during tampering • The supplier may quote for additional items if required for completion of the system under the heading as optional items. • All the hardware manuals, User manuals, training manuals related to the system shall be supplied both in hard copy format [two sets] and soft copy format [2 nos. in pen drive format]. • Training: The supplier shall provide training at GSDC premises for personnel of user department and security personnel on the operation, maintenance of turnstile-based Access control system. Training manuals [5 copies] towards this shall be prepared and handed over to the purchaser before starting of the training. • All the wires shall be terminated with proper lugs, ferrules at RFID readers, Lane indicators, Access controllers and Turnstile controllers
3	Operating Conditions	Temperature range: 15 C to 40 C. Humidity: $\leq$ 95%
4	Supply Voltage	240 V AC $\pm$ 10%, 50 Hz $\pm$ 3%
5	Material of construction including supporting bars & control unit box	SS304
6	Number of Arms	Four (90° apart)
7	Duty cycle	100%
8	Protection	IP 43
9	Dimensions (Length X width X Height)	2200 X 1300 X 2200 mm
10	Dual Turnstile Electro- Mechanical Systems	[approximately]
11	No of operation without failure:	Minimum 1 lakhs cycle
12	Operation during Power failure	Free Rotation on Exit, Lock condition on Entry where Entry and Exit may be configurable by User.

Turnstile System		
Sr. No.	Parameter	Minimum Requirement
13	Logic controller	The Logic controller controls all functions of the turnstile independently. It accepts opening commands from an external access-control system which comprises of a RFID card reader/Biometric reader (hand template based) or finger-print reader, third party access controller. Logic controller shall have the following features: • Controller shall provide feedback at 10°, 45° of the rotation of the turnstile by means of NO/NC contacts. • Functions: Open, direction of passage, Emergency, wrong direction, bi-directional counting, card-reader locking, door forced open and tamper • LED/LCD display for service and diagnosis purposes • DIP switches for simple selection of operating modes and functions • This controller shall preferably be placed on the top of the turnstiles • The Logic Controller shall be designed with standard Industrial Hardware Components. • Test certificates shall be submitted to the purchaser. • Interlocking of Entry and Exit Rotation such that only one event is permitted at any instant of time. • Adjustable Entry and Exit time period from 1 to 5 Sec by DIP switch or other mechanisms. • The bidder Shall be provided with suitable Surge arrestors so as to arrest the surges in the power supply. • Proper cabling structure / wiring inside the turnstile control unit with cable markings, terminations shall be provided with detailed wiring diagram after the receipt of purchase order. It is to be noted that the supplier can start the installation work only after the approval of the wiring scheme by the purchaser. • GI pipes are embedded into top ceiling of the building. Cables have to be routed from the Electronics room to the turnstiles using the concealed pipes.
14	Lane Indicators	• It Shall be mountable on the plate provided on the static column of the turnstiles. • Enclosure material shall be SS 304 with provisions for cable entry. • Lane Indicator Display: RED color and Green Color LED Array`s. • Display Indications: The display shall indicate the correct [] and incorrect entry[X] markings by enabling the LED Array. • Construction and Mounting Arrangements: The construction shall be rigid, and the enclosure shall be sealed on all sides with screws • Operating voltage: 24V DC/1A • Standard Industrial power adapter [24 VDC/1A] for Lane Indicator shall also be provided.
15	RFID Reader boxes	• It Shall be provided with acrylic sheet for mounting RFID readers and these sheets shall be mountable on the static column of the turnstiles. • This reader box shall be made up of SS 304 with provisions for cable entry. • The dimensions of the box shall be 100 mm X 180 mm x 50 mm (approx. dimension)

Turnstile System		
Sr. No.	Parameter	Minimum Requirement
16	Miniature Circuit breakers [MCBs]	• 6 A rating • Single pole type
17	Standards	ASTM A 312, ASTM A 358, ISO 9001

10.31.2 Boom barrier

Boom barrier		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes boom barrier system piping, wiring, installation work with all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project. Boom stands shall be made of heavy steel pipes and shall be embedded in reinforced concrete. All associated civil works including necessary foundation etc. shall also be included in the scope of the work.
2	General	The barrier shall be designed to withstand direct impact force, 5 tons vehicle travelling at a speed of 30 KM/hr., along with heavy duty operation mechanism. • Clear passage width required: 4 meters • Length of boom: not less than 4 meters • Height of pole above ground: 0.90 m (approx.) • Desirable operation time: 8 – 10 seconds (maximum)
		The barrier shall be activated by push button and remote control also. It would have microprocessor-based control panel capable of integrating with loop detectors, optical beam sensors, smart card readers, and biometric readers of all types. Moreover, barrier should be capable of getting integrated/ interlocked with the main entrance gate of the building. Push button controls for all functions shall also be provided in the security cabin
		The barrier shall have inbuilt optical beam sensors to act as anti-crash device. That shall be active only when the boom is closing. The barrier shall be equipped with suitable warning light. Warning light shall be lit during barrier operation. The lights have to be large and easily visible. The boom barrier should also be equipped with siren (with varying audio/sound intensity). This will indicate opening and closing of the barrier. The barrier shall have emergency operation facility for the boom to remain raised or lowered in the event of power failure
		The body case should be fabricated from 14 gauges or thicker MS galvanized sheet/stainless steel or better. The dimension of the body shall be quoted and the

Boom barrier		
Sr. No.	Parameter	Minimum Requirement
		entire exterior shall be epoxy coated/all-weather coating. The steel boom shall rest on stands placed at each end of the boom.
3	Boom	Boom barrier shall be fabricated from at least 3 mm thick MS/SS square/ rectangular/ circular pipe sections. The length of the boom should be custom fabricated to match the site requirement (4 meters). The boom shall be designed in shapes which give strength to the boom, or a similar high impact resistant design. The responsibility for the exactness of the length will be solely of the company responding to tender inquiry
4	Operating Mechanism	The operating mechanism shall be electromechanical drive unit or a suitable electro hydraulic mechanism for heavy duty operation (under all weather conditions). The drive unit motor shall be suitable for 230 Volt/400 Volt; 50 Hz single/3 phase power supply. The drive unit shall have all mechanical parts encapsulated in a weather resistant, watertight capsule filled with oil for silent and maintenance free operation. The exterior to be rust and weatherproof with at least power coated or epoxy coated High grade galvanized steel/stainless steel. The electrical/electronic components housing shall have protection Class IP-55.
5	Testing	The type test certificate for the model of the boom barrier from the manufacturer shall be submitted to the user for verification of crash rating etc. The bidder shall arrange and provide at his cost, the service of a competent, factory trained engineer or technician authorized by the manufacturer of boom barrier equipment to technically supervise and participate during all of the adjustments and tests for the system. The representative of the manufacturer of the equipment shall demonstrate that the systems function properly in every respect
6	Standards	ISO 9001, ISO 14001

10.32 Visitor Management System

Visitor Management System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes visitor management system software installation and configuration work with all required hardware, accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General Requirement	Visitor System should have below features: · Minimum 2 nos. tablet with size of 10" including stand, charger, and required accessories for self-check in

Visitor Management System		
Sr. No.	Parameter	Minimum Requirement
		· Self-Serviced Check-in
		· Provide check-in details via email even before the visitor arrives
		· VMS Software should be able to maintain separate data of visitors of both Data Centre
		· “remembers” previous guests & fetches information for faster Check-in
		· Showcase customer brand and guests with a modern first impression on tablet at front desk
		· Manually create visitor entries right from the dashboard for VIPs to skip the tablet
		· Integrate with wi-fi systems (CISCO, Aruba, standard OEM etc.) to share unique Wi-Fi credentials.
		· Provide Badges to Visitor for easy identifications and check-out
		· Automatically notify employees on visitor arrival via email /SMS /App notification
		· Mail / SMS notification should send to GSDC and Visitor both
3	Visitor Reports & Analytics	Available in Excel/CSV format. Multiple filters available for accurate & targeted reporting. Keep your management happy and provide them with detailed visitor flow reports. Real-time view also available with our powerful dashboard
4	Offline Mode	The system should automatically transition to offline mode during poor internet connectivity.
		The data should save temporarily on the device and synced in the background when the connection comes back
5	Print visitor badges	Automatically print badges that help you identify authorized visitors. An ask most relevant to large enterprises, multi-tenant facilities, schools and other high-security organizations
6	Click Visitor Picture	It should be able to take visitor photo on tablet. Photo should enable notification sent to hosts via email to help them identify the visitors they are meeting for the first time
7	Approval based Entry	It should restrict access to your premises with Invite only mode. The walk-in visitor should provide with an option to request a meeting with the host. 2-way communication should enable to approve/ deny meeting request or to communicate expected wait time
8	Manual entry	Manually visitor entries possible right from the dashboard for your VIPs to skip the tablet
9	Mobile app	VMS should have mobile application feature which should particularly be useful for frequent visitors and saves them a few minutes each time they visit the Data Centre
10	Checkout	VMS should have feature that visitors can check-out on tablet or admins can check them out via web dashboard
11	Security Workflows	VMS able to set approval policy for visitor invites based on hierarchy or group to ensure compliance and save time spent in coordination amongst teams. Fully automated workflows with SMS/ email/ app-based communication interface
12	NDA/Policy Signing during Check-In	VMS should make visitors to sign documents upon check-in. Signed NDAs/ security protocols etc. should available via dashboard. Hassle-free record keeping of all signed documents in case of an audit.

Visitor Management System		
Sr. No.	Parameter	Minimum Requirement
13	SLA	VMS vendor should provide consistent and quality support with a detailed SLA. It should match uptime as per tender requirement
14	Installation Support and Tutorials	On site installation has to be done by developer. VMS should support GSDC, and they should work to deliver as per process needs
15	Experience	VMS Software OEM should have experience to installed more than 200+ terminals / customers where VMS system has been installed successfully
16	Standard	ISO 9001

10.33 Data & Voice Network Cabling

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes cabling system with conduit, cable laying, installation and scan test of fluke or as per OEM standard testing methods for performance warranty. The bidder should consider all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	• All Copper cable and components should be from the same OEM. The OEM should submit ISO certificate for the manufacturing facilities related to all products involved in tender. • All Passive Components should be RoHS (Restriction of Certain Hazardous Substances) compliant. Declaration to be provided for RoHS Compliance • There should be 25-year extended performance warranty/Application Assurance for end -to-end channel. • All the components should comply with their respective specifications stated below. • Desired ETL/3P/GHMT certificates should be present on respective Lab website. • OEM should have its own intelligent solution. To make it intelligent OEM should not allow to use any third-party components. • The voice cabling needs to be considered by the bidder and need to connect with EPABX/ IPEBX system which will provide by DST/ GIL at the time of installation.
3	Cable management	The Cable management wire Basket solution should be able to meet all challenges of carrying the data communication cables meeting cabling standards TIA 568 C. The Cable management solution should support cabling for LAN/WAN/Voice network while ensuring bend radius requirements are met all along the lay of the cable .The system should be easy to install and easy to fit . The material of the wires should be Mild steel with zinc Blue Trivalent Plating duly welded.
4	LAN cable	Installation Cable, Category 8 S/FTP, 4P, LSFRZH

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		Pair-shielded 100 Ohm installation cable with overall braided screen, suitable for transmission frequencies of up to 2000 MHz, (AWG 22).
		All Ethernet applications including 10/100/1000Base-T, 1000Base-TX, 10GBase-T, 25GBase-T and 40GBase-T (per 802.3bq Draft 2.4), POE, POE+, POE++ (Draft)
		Low-smoke in acc. with IEC 61034, flame-retardant in acc. with IEC 60332-3-24 and halogen-free in acc. with IEC 60754-2. CPR fire class: EN50575
		Outer jacket color gray, RAL 7035.
		Foil shielding of pairs and overall tin-plated copper braid shield.
		Cable overall diameter: Ø 7.7 – 8.5 mm
		Fiber / conductor diameter: AWG 22
		Cable jacket material: LSFRZH
		Cable jacket characteristics: zero-halogen; flame-retardant
		Standards: ISO/IEC 11801-1 Ed 1.0 2017-11; IEC 61156-5; IEC 61156-7; EN 50173-1; EN 50288-4-1 Fire rating: IEC 60332-3-24; IEC 60754-2; IEC 61034, CPR fire class: EN50575, 25GBase-T and 40GBase-T over 30m (per 802.3bq Draft 2.4)
5	Trunk Cable, 12 Fibers	Number of fibers / conductors - 12F
		Cable jacket material - LSZH
		Fiber type - Multimode (MM) OM5
		Wiring diagram - type B
		Connector type - MTP12-Male
		Polishing connector - PC
		Attenuation grade IL - connector - Cm
		Return loss grade RL - connector - 4
		The MPO-QR connector shall be a multiple-fiber push-on/pull-off connector that is IEC-61754-7 and EIA/TIA-604-5 (FOCIS 5) compliant.
		The MPO-QR shall be designed in such a way that it can also be operated exclusively at the connector end, i.e., the bend protection. This allows the MPO adapters to be mounted closer together.
		The cordage comes with Method B MPO cord in accordance with ANSI/TIA-568.3-D. The boot shall be colored in the same logic as MPO adapters for an instant identification during installation and documentation.: o gray for polarity B o black for polarity A
		MPO connector shall have the option to be equipped with RFID tag for port monitoring purpose.
		Shall have maximum insertion loss of 0.3 dB with a minimum return loss of 35 dB for the multimode fiber solution and a minimum return loss of 55 dB for the single mode solution
		Have operational temperature range for trunks shall be +15°C to +55°C

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		Be constructed with MPO connectors at both ends with fiber count specified as 12, 24, 36, 48, 72 and 96 and subdivided into 12-fiber legs.
6	Fiber Panel	Unloaded Panel 1U with Front Cable Guide
		Material housing - Steel (DC01 electrogalvanized & HC420LA)
		Optical panel housing mounts in 19-in racks or cabinets and provide up to ultra-high-density 72 port connectivity when combined with modules and cassettes.
		The housings should include sliding trays enabling module or cassette installation from the rear of the housing. The split tray feature allows each half of the tray to be pulled out independently, protecting connections from disruption.
		Panel front shall come with integrated bend radius cable guide and a cable cover that protects and guides the patch cords and serves as documentation area. The panel shall come with a detachable hinged front cover.
		Adapter Cassette Specification
		The cassette for the 1U panel shall be
		Cassettes shall be pass-through inserts with either LC-Duplex, MPO or SC-simplex adapters. The trunk cables connect at the rear of the adapter cassettes.
		Cassettes shall be available with 6 ports and 4 ports versions for multimode and single mode applications.
		These adapter cassettes shall be compatible with the intelligent cabling system for enabling Automated Infrastructure Management (AIM) solution.
		Splice Cassette
		The cassette for the 1U panel shall be
		Splice cassettes shall accommodate up to 12 port of either MPO, LC Duplex or SC simplex connector providing up to 72 ports in a single rack unit height.
		The single rack unit housing panel shall have 3 level of drawers each drawer holding two splice cassettes side by side.
		Depending on the connector type, the splice cassette includes a one-meter ribbon, twelve or 24 x 250 µm single fiber pigtail, that is loaded within the cassette, and can be fusion spliced directly to either ribbon or loose fiber cable.
		Module
		MPO-to-LC modules shall provide the interface between the male MPO connectors on the trunk and the LC-Duplex patch cords that will then connect directly into the transceiver modules. It can either come as for containing six, four LC-Duplex ports respectively.
		The LC-Duplex ports feature integrated laser shutters that move out of the way when the connector is inserted. The internal wiring of the module is based on universal polarity to ensure the correct fiber polarity while requiring just one type of patch cord on both ends of the link.

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		The crossover of the fibers for duplex signal transmission takes place within the module. The connectivity diagram for the trunk cable and patch cord remains the same all the time.
		The MPO-to-LC modules are easily swappable with MPO cassettes to migrate to MPO ports for parallel optics.
7	Copper Patch Panel	1U Patch Panel 48-Port
		Material frame: Steel plate, galvanised and blue passivated
		Material module holder: PC+ABS, halogen free (UL-HB)
		Color module holder: Light grey (RAL 7035) or jet black (RAL 9005)
		Grounding: 6.4mm hole and normal mounting elliptic holes (conductive)
		Grounding spring: Bronze (CuSn6) tinned (only with shielded version)
		Module holding force: Min. 100N (insertion), min. 30N (extraction)
		Cable tray load: Max. 48x180g (8.64kg) for max. 1mm permanent deformation
		Dimensions: 483 x 113 x 44mm (L x W x H)
		Patch panel with integrated cable tie shelf, accommodating up to 48 shielded modules
		Should be able to accommodate modules like Cat.6, Cat.6A as well as adapters of FO LC- and SC-connectors.
		Should have provision for color coding and patch cord locking system.
		Should have provision for upgrading it to intelligent panel.
		Connection module Cat. 8.1, shielded, with EMC cover and dust cover
		RJ45 connection module of Cat. 8.1 for the setting up of transmission channels of Class I with up to 2 plugged connections acc. to ISO/IEC 11801, EN 50173-1 as well the U.S. standard Cat. 8 according to TIA/EIA 568.2-D, interoperable and backwards compatible with Category 6A, 6 and 5e. Suitable for 10GBASE-T applications in acc. with IEEE 802.3™ Section Four up to 500 MHz and 100 m.
		Suitable for 40GBASE-T applications in acc. with IEEE 802.3bq™ up to 2000 MHz and 30m.
		Should be tested under strict manufacturing control, performing 100% inspection.
		Compatible with standard plugs RJ45, connection with automatic wire cutting of installation cables AWG 26 – 22 (0.4 mm – 0.65 mm) and flexible cables AWG 26/7 – AWG 22/7 without special tools. X-Separator for individual pair shielding.
		Parallel pair termination without crossover in acc. with TIA 568-A/B, gold-plated bronze contacts for ≥750 mating cycles, IDC contacts with ≥20 insertion cycles, contact resistance ~5 mOhm, dielectric strength >1000 Veff.
		Supports PoE (IEEE 802.3af), PoEP (IEEE 802.3at), 4Ppoe (IEEE 802.3bt) and is compatible to IEC 60512-99-001/002 up to type 3. 90° wire orientation without bending cable.

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		With integral cable strain relief and including dust cover.
		Shield contacting by shield lance with integral cable strain relief, shield material tin-coated bronze, ground contacting through 1 contact finger for flat connectors 4.8 x 0.5 mm.
8	Fiber Patch cord	Duplex Patch cord, polarity A-B, with LSZH jacket, twin fiber 1.4mm Multimode (MM) OM5.
		Mounted on both sides with LC-QR connector, IEC 61754-20 compatible
		Zirconia (ceramic) ferrule with a PC polished (0°) end face geometry, connectors qualified in acc. with IEC 61753-1 for category C (controlled environment)
		Should have black connector housing (multimode) and lime green unlocking clip
		Attenuation Grade: Am
		Return loss (RL) Grade 2: ≥ 45 dB
		Mating cycles: delta IL < 0.2 dB after 500 mating cycles
		Pull-out force patch cord: ≥ 50 N
9	LAN Patch Cord	Category 8, Shielded S/FTP Grey LSZH Flexible cable, 4 x 2 x AWG 26/7, LSZH, color grey
		Low smoke in acc. With IEC 61034, and halogen-free in acc. with IEC 60754-1. Halogen-free and heavy-metal free in acc. with EU directives RoHS 2.
		Mounted on both sides with RJ45 connector compliant with Cat. 8.1 ISO component standard: IEC 60603-7-81 RJ45 category 8 ISO (2000 MHz), shielded. Strain-relief function in acc. with TIA/EIA 568.2-D.
		Transmission channels of Class I with up to 2 plugged connections acc. to ISO/IEC 11801, EN 50173-1, (DIN EN 50173-1)
		Complies with Category 8 ISO requirements of the standards ISO/IEC 11801, EN 50173-1, as well as TIA/EIA 568.2-D
		Interoperable and backwards compatible with Category 6A
		Suitable for 40GBASE-T applications in acc. with IEEE 802.3bq™
10	Hybrid Patch Panel with MPO connectivity- Fiber & Copper System	Unloaded Panel 1U
		Amount of height units - 1 U
		Capacity (ports) - 48
		Housing: Corrosion-protected sheet steel, black, RAL 9005, powder-coated, POM plastic bars. Dimensions: 482.8 x 157.7 x 43.7 mm (W x D x H)
		Operation temperature - -10 °C to +60 °C / +14 °F to +140 °F
		Standard - Protection class: IP20 acc. to IEC 60529
		Mixed-Media 19" 1 RU housing prepared to hold up to 8 cassettes for copper connection modules or fiber adapters and up to 4 splice cassettes.
		Cassette installation from the rear.
		Should be able to accommodate rear cable tray.
		Front cable management system available in two lengths, 80 mm FO optimized with separable bars as well as 100 mm for mixed operation.

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		Integrated grounding system for methods A, B and C plus two additional grounding points at the rear.
		Should have front removable door with internal labeling strip.
		Optional accessories such as blind lid with labeling field, color coding, label holder and automatic infrastructure management system can be attached.
		Copper Cassette Shielded
		The cassette for the 1U panel shall be
		Capacity (ports): 6
		Material: PC + ABS halogen-free, UL 94 V-0
		Standard: Protection class: IP20 acc. to IEC 60529
		Operation temperature: -10 °C to +60 °C / +14 °F to +140 °F
		Cassette should have locked system for modules, automatically shielded with integrated shield contacts and click-in cable guide.
		Connection module Category 8, shielded, with EMC cover and dust cover
		RJ45 connection module of Category 8 for the setting up of transmission channels of Class I with up to 2 plugged connections acc. to ISO/IEC 11801, EN 50173-1 as well the U.S. standard Cat. 8 according to TIA/EIA 568.2-D, interoperable and backwards compatible with Category 6A, 6 and 5e. Suitable for 10GBASE-T applications in acc. with IEEE 802.3™ Section Four up to 500 MHz and 100 m.
		Suitable for 40 GBASE-T applications in acc. with IEEE 802.3bq™ up to 2000 MHz and 30m.
		Should be tested under strict manufacturing control, performing 100% inspection.
		Compatible with standard plugs RJ45, connection with automatic wire cutting of installation cables AWG 26 – 22 (0.4 mm – 0.65 mm) and flexible cables AWG 26/7 – AWG 22/7 without special tools. X-Separator for individual pair shielding.
		Parallel pair termination without crossover in acc. with TIA 568-A/B, gold-plated bronze contacts for ≥750 mating cycles, IDC contacts with ≥20 insertion cycles, contact resistance ~5 mOhm, dielectric strength >1000 Veff.
		Supports PoE (IEEE 802.3af), PoEP (IEEE 802.3at), 4Ppoe (IEEE 802.3bt) and is compatible to IEC 60512-99-001/002 up to type 3. 90° wire orientation without bending cable.
		With integral cable strain relief and including dust cover.
		Shield contacting by shield lance with integral cable strain relief, shield material tin-coated bronze, ground contacting through 1 contact finger for flat connectors 4.8 x 0.5 mm.
		Fiber Cassette MPO-LC
		Module MPO-LC Module 6 Ports OM5 Type A
		MPO - LC module, front side 6 LC duplex adapters multimode OM5, lime green, rear side 1 x MPO adapter, polarity type A with 1 x 12 fiber fan out
		Housing: Polycarbonate fire class UL 94V-0,
		Connector front:

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		6 x LC duplex couplings according to IEC 61754-20, lime green, integrated laser protection flaps made of metal
		Semi-transparent dust protection cap
		Qualified according to IEC 61753-1 category U
		Mating cycles: min. 500
		Pull-out force: min. 70 N
		12 x LC connectors 50/125 μ m (OM5)
		LC connector according to IEC 61754-20
		Ferrule zirconia ceramic PC polish qualified according to IEC 61753-1 category U
		Pull-out force fiber pigtail: $\geq$ 5 N
		Connector back
		MPO adapter acc. to IEC 61754-7 Housing
		Color black Type A KeyUp/KeyDown
		MPO-12 connector according to IEC 61754-7 without guide pins (female) PC grinding
		IL $\leq$ 0.30 dB (max.)
		RL $\geq$ 35 dB
11	Fiber Patch cord	Duplex Patch cord, polarity A-B, with cable Single Jacket F8 2.0 x 4.1 mm ($\pm$ 0.15) FRLSZH, fiber Multimode (MM) OM5.
		Assembled side A with LC-Duplex / PC, connector housing beige, side B with LC-Duplex / PC, connector
		Zirconia (ceramic)ferrule, according to IEC 61755-3-1/2
		Patch cord qualified according to IEC 61753-1 category C (controlled environment), material UL 94 V-0.
		Attenuation Grade: Am
		Return Loss: Grade 2
		Mating cycles: delta IL < 0.2 dB after 500 mating cycles
		Pull-out force patch cord: $\geq$ 100 N
12	LAN Patch Cord	Category 8, Shielded S/FTP Grey LSZH Flexible cable, 4 x 2 x AWG 26/7, LSZH, color grey
		Low smoke in acc. With IEC 61034, and halogen-free in acc. with IEC 60754-1. Halogen-free and heavy-metal free in acc. with EU directives RoHS 2.
		Mounted on both sides with RJ45 connector compliant with Cat. 8.1 ISO component standard: IEC 60603-7-81 RJ45 category 8.1 ISO (2000 MHz), shielded. Strain-relief function in acc. with TIA/EIA 568.2-D.
		Transmission channels of Class I with up to 2 plugged connections acc. to ISO/IEC 11801, EN 50173-1, (DIN EN 50173-1)
		Complies with Category 8.1 ISO requirements of the standards ISO/IEC 11801, EN 50173-1, as well as TIA/EIA 568.2-D
		Interoperable and backwards compatible with Category 6A
		Suitable for 40GBASE-T applications in acc. with IEEE 802.3bq™
13	Intelligent Patch Panel Requirements	The Intelligent Patch Panels shall provide capabilities of recognizing patch connections made between Intelligent Patch

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		Panel ports and equipment ports. Both connect and disconnect operations shall be recognized.
		The Intelligent Patch Panels shall use contactless sensor technology based on RFID technology in compliance with ISO 15693.
		The Intelligent Patch Panels shall be standard patch panels which have been retrofitted with RFID Sensors.
		The RFID Sensors mounted on the Intelligent Patch Panel shall provide an LED indicator at every port to enable easy tracing and identification of patch connections.
		Upgrade from standard to Intelligent Patch Panels shall be possible in the field without need for any special tools.
		The Intelligent Patch Panel shall support up to 72 ports in a single rack height unit and up to 240 ports in 3 rack height units.
		Modular versions of the Intelligent Patch Panel shall be available that support both copper and fiber connectors in the same panel.
		The following connectors shall be supported:
		1. Copper RJ45 (Cat 5, Cat 6, Cat 6A)
		2. Fiber LC duplex
		3. Fiber E2000 simplex
		4. Fiber SC simplex
		5. Fiber MPO
		The Intelligent Patch Panels shall support both splice and pre-terminated backbone cables.
		The Intelligent Patch Panels shall support MPO-to-LC cassettes (transitions).
14	Intelligent Patch Cord Requirements	Standard patch cords shall be used that can be retrofitted with marking tags.
		Retrofit shall be possible in the field and shall not require any special tools.
		The marking tags shall contain RFID tags according to ISO 15693.
		The marking tags shall contain information about the connector type.
		The following connector types shall be supported:
		1. Copper RJ45 (Cat 5, Cat 6, Cat 6A)
		2. Fiber LC duplex
		3. Fiber E2000 simplex
		4. Fiber SC simplex
		5. Fiber MPO
15	Analyzer Requirements	The Analyzer shall communicate with the RFID Sensors on the Intelligent Patch Panels using a daisy-chain Bus.
		The Analyzer shall provide power to the RFID Sensors over the Bus. No additional power cabling shall be needed.
		The Analyzer shall be able to power up to 42 RFID Sensors on a Bus with a length of 2.5m.

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		It shall be possible to connect RFID Sensors in several racks to one Analyzer. The length of the Bus Cable shall extend up to 30 m (with a correspondingly reduced number of RFID Sensors to compensate for voltage drop along the Bus Cable).
		The Analyzer shall communicate with the Concentrator over standard Ethernet connections according to IEEE 802.3. The Communication protocol shall be SNMPv2 or SNMPv3.
		The Analyzer shall be configurable through a web-based graphical user interface built into the Analyzer.
		The Analyzer shall be available as 19" 1U hardware.
		The Analyzer shall have an LCD display for to display work order instructions and status / alarm messages.
		The Analyzer shall have LEDs for status display.
		The Analyzer shall provide a button to activate a to activate a test mode. If test mode is active, then the LEDs shall be lit on all ports of the Intelligent Patch Panels where an intelligent patch cord is recognized. The number of recognized connectors shall be shown in the LCD display of the Analyzer. Both Analyzer LCD display and the Analyzer status LEDs shall indicate that test mode is active.
		The Analyzer shall have a reset button. The reset button shall be recessed to avoid accidental operation and shall be only accessible using a small object such as a paper clip or a pen.
		A 0U version of the Analyzer shall be available that is DIN-rail mountable. The 0U version of the Analyzer shall have all functions of the 1U Analyzer as specified above with exception of the display.
		An Additional Display shall be available that makes the Analyzer display content available in racks that have Intelligent Patch Panels, but no Analyzer installed.
		The Additional Display shall have a powering input, allowing redundant powering of a bus from both the Analyzer and the Additional Display.
16	Concentrator Requirements	The Concentrator shall concentrate signals from several Analyzers and combine them to a single uplink to the DCIM / CMS Server.
		The Concentrator shall support an unlimited number of Analyzers.
		Multiple Concentrators shall be supported by one DCIM / CMS server
		The Concentrators shall run on a standard PC platform using the Windows® operating system (Windows 10 and above).
		The protocol to the Analyzers shall be SNMPv2 or SNMPv3.
		The protocol to DCIM / CMS Server shall be HTTP or HTTPS.
17	Software	The Software shall have a scalable system architecture. There shall be no technical limit on the number of objects managed by the Software.
		The Software shall have a Client-Server Architecture:
		The software Server which contains a digital representation of the IT infrastructure
		DCIM Clients which provide a graphical user interface (GUI) for access to the DCIM Server

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		The software Server shall support multiple simultaneous client sessions.
		The software shall be capable of supporting multiple sites.
		The software shall run on Windows based operating systems.
		The software shall support the Microsoft SQL database management system.
		The software shall display the network in a hierarchical tree structure and as geographical network maps.
		The software shall be capable of importing and displaying drawings and maps for accurate representation of geographies and building floor plans. As a minimum, bitmap file formats shall be supported.
		The software shall provide drag-and-drop capabilities for populating floor plans and maps with database objects. It shall be possible to define the position of objects by dragging them to the appropriate position on the map / floorplan.
		Objects that are placed onto a floorplan or a map shall be fully functional so that the administration of objects is possible directly from the map / floorplan using context menus.
		The software shall provide graphical representation of rack layouts with front, rear and side views of rack.
		The software shall provide the possibility to display rooms, racks and equipment in 3D views.
		The software shall model the network down to the individual port, cable and fiber level.
		The software shall be capable of visualizing connections in the network end-to-end i.e., with all intermediate installation cables, patch cables and patch panels.
		The software shall be capable of visualizing all connections that terminate on a selected device.
		The software shall be capable of creating synoptically network drawings showing devices and their connecting cables but omitting geographical data such as buildings, rooms and racks.
		The software shall be delivered with a complete library of object models.
		It shall be possible to import additional models into the library.
		A built-in model editor shall be available that permits the creation of new models from within the Client GUI.
		It shall be possible to augment object classes with custom fields such as asset tags, MAC addresses etc. Custom fields shall be available in queries and reports.
		The software shall provide import functions to populate the database.
		The Software shall provide the possibility to create reports on various aspects of the database. Reports shall be freely configurable from within the Client GUI. It shall be possible to export the reports.
		The Software shall be capable of creating graphical charts based on reports. The charts shall be freely configurable. As a minimum pie charts, line charts, bar charts and dial charts shall be available.

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		The Software shall be capable of running background queries and send generate alarms in case such a query returns a result (e.g., excessive power consumption in a rack). Alarms shall be displayed in the software Client GUI and shall be notified by email.
		The Software shall be capable of generating cable labels according to freely configurable labeling schemes. It shall be possible to export the cable labels to a labeling printer.
		The Software shall provide work order capabilities that include:
		▪ Work orders shall contain individual tasks and bill of materials required to execute the work order
		▪ Time planning of work orders (GANTT chart)
		▪ It shall be possible to create dependencies between work orders, e.g., a work order to install a server in a rack is dependent on the completion of another work order to install this rack.
		The Software shall provide for management of assets and organizations. It shall be possible to create links between assets / organizations and network objects, e.g., to identify the owner of a device or software applications being installed on a device.
		The Software shall have a capacity management function that provides means to search for free capacity in the infrastructure based on various criteria (rack space, power availability, network availability etc.)
		The Software shall have a storage management function allowing to place objects in storage locations and remove objects from storage to install it in the IT infrastructure. Comprehensive storage reports shall be available.
		The Software shall provide configurable multiple user access levels that are based on specific locations, access to objects and the capability to perform operations on these objects.
		The Software shall be capable to connect to external user directories using the LDAP protocol.
		The Software shall keep a system log where all changes to the IT infrastructure are recorded.
18	Software Client Requirements	The Software client GUI shall fully operate in a Web Browser without requiring installation of additional software on the client.
		Communication between the Software Server and the Software Client shall be encrypted using the HTTPS protocol.
		The Software Client shall enable full-featured remote access capabilities to the Software including electronic work orders, database access, etc.
		The Software Client shall have an easy-to-use Graphical User Interface (GUI). The GUI shall be customizable with various tabs, views and interfaces on a per-user basis.
		The Software Client shall be operating-system independent.
19	Data Cabling Infrastructure Management	The Software shall support the following AIM functions:
		Read connectivity status from Intelligent Patch Panels and display the port status (connected / disconnected) on the software Client.
		Recognize cable connections between Intelligent Patch Panel ports and update the digital representation on the software Server.

Data & Voice Network Cabling		
Sr. No.	Parameter	Minimum Requirement
		Continuously supervise the connectivity status on Intelligent Patch Panels and generate alarms in the case of unallowed changes. Alarms shall be displayed in the software Client GUI and shall be notified by email.
		Display work orders on Intelligent Patch Panels by activating LEDs on patch panel ports where the work order mandates a change (connection / disconnection)
		Reconcile differences between the cabling as it is sensed by the Intelligent Patch Panels and the cabling as it is documented in the Software
20	Cable management wire Basket solution	The Cable management wire Basket solution should be able to meet all challenges of carrying the data communication cables meeting cabling standards TIA 568 C. The Cable management solution should support cabling for LAN/WAN/Voice network while ensuring bend radius requirements are met all along the lay of the cable. The system should be easy to install and easy to fit . The material of the wires should be Mild steel with zinc Blue Trivalent Plating duly welded
21	Voice cabling	Installation Cable, Category 6A U/UTP, 4P, LSZH
		suitable for transmission frequencies of up to 500 MHz,
		All Ethernet applications including 10/100/1000Base-T, 1000Base-TX, 10GBase-T
		Outer jacket low smoke in acc. with IEC 61034
		Fiber / conductor diameter: AWG 23
		Cable jacket material: LSZH
		Cable jacket characteristics: zero-halogen; Low smoke
		Standards: ISO/IEC 11801-1 Ed 1.0 2017-11; IEC 61156-5; IEC 61156-7; EN 50173-1; EN 50288-4-1 Fire rating: IEC 60332-3-24; IEC 60754-2; IEC 61034

10.34 Fiber Runner (Fiber Cable management System)

Fiber Runner system		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes fiber runner system with installation bracket, different type of cable dropper, hanging rod, installation and testing. The bidder should consider all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.

Fiber Runner system		
Sr. No.	Parameter	Minimum Requirement
2	General	The cable guidance system shall be made of halogen-free, flame-retardant and self-extinguishing plastic, e.g., PC/ABS. Furthermore, it shall fulfill UL94V0. All plastic parts must comply with the requirements therein as to color degradation, resistance against weather and other impact factors such as alcohol, water, oil, salt. It should be with environmental compatibility. In the absence of halogen, no corrosive gases should be produced in case of fire.
		The Raceway System should be a cable guidance system specially designed for a separate and secure guidance of fiber optic cables outside protected areas. Guiding optical cables (patch cords) separately from copper lines achieves the highest levels of reliability and a failure-free operation in the entire fiber optic network.
		It should be with solid and compact design plus the Snap-On mounting system to provide an installation-friendly, modular structure, without needing any additional tools.
		The different sizes should be available to allow custom-tailored installation as per site requirements. The Raceway System should be installed above the racks to create top cabling architecture
		The Snap-on joints shall ensure a fast and easy connecting of all system components. There shall be no punching, drilling or additional tools necessary for any connection. The covers should be provided for all components. The cover should protect the patch cord fibers in the cable ducts from external influences and damages. The main duct cover shall feature a tool-free clip to ensure easy access to the cables. All other covers shall be attachable to the components anytime and tool-free.
3	design and construction	No sharp or other disturbing elements in the interior area of the cable guidance systems shall result from the installation of the Raceway System. This is to guarantee that the carrier components fastening the system to ceilings, walls or onto floors can be fitted to the main duct without any drilling, e.g., by means of T-slots. The Snap-on joint shall be attachable and removable anytime without additional tools and without affecting the re-usability of the components.
		The main duct should be cut to any desired length with a jigsaw or a handsaw. No punching at the main duct should be required to attach the Snap-on joint. The Raceway System should have protection class IP20, in acc. with EN 60529.
		The fiber guidance should provide that signal transmission in active installations should not interfered with by later expansions or patching work excessive patch cords should be separately positioned by a certain arranging of the elements between the racks or at the end of a rack line. All metal parts shall be resistant to corrosion.
4	Material requirements	It should made form PC/ABS with good formability and greater structural strength and stability than low-temperature material and metal plates. It should have a good material with all the important properties ideal for a plastic construction. The raceway should have an excellent mechanical and electrical characteristics, UV and heat resistance, the dimensional stability of PC

Fiber Runner system		
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		(polycarbonate) and the high quality of ABS such as its ideal workability and formability.
5	Temperature range	storage temp: -40* up to +70*C Installing temp: 0* up to +40*C operating temp: -40* up to +70*C
6	Standard	Halogen-free acc. to RoHS Heat-resistance, flame-retardant acc. to UL94/V0 Material approved by UL2024

10.35 Interior of NOC/ SOC/DCIM/ Innovation Centre Room

Interior of NOC/ SOC/DCIM/ Innovation Centre Room		
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1	Scope	1. The purpose of this document is to define the specifications of control room interiors & consoles for control room project. 2. As the Control room is a significant place where critical operations/monitoring takes place, it is imperative that it is designed properly in terms of aesthetics, safety, ergonomics and functionality. Various aspects shall be considered while designing control room area to create ideal workplace, considering physiological aspects such as line of sight and field of vision and cognitive factors such as concentration and perceptivity as per ISO 11064. 3. The scope of the project includes designing; engineering, supply & installation of 24X7 mission critical control Centre interiors. Being a project of national repute this state-of-the-art facility & all its components like ceiling, flooring, paneling/partition, glass partitions, control desks, ceiling light & luminaire's electrical etc. shall look integrated and therefore it shall be treated as a part of one single solution i.e., Control room interior solution provider. Main bidder to submit MAF (Manufacturer's Authorization Form) from professional Control Room Interior Solution provider. 4. To ensure an integrated solution, to qualify as per the international control room design & safety norms; main bidder shall bring one single professional control room interior solution provider on board with an experience of at least twenty control rooms interiors along with control desks. Corresponding purchase orders/work orders and their appreciation/completion letters to be submitted along with the bid. 5. It is mandatory for the main bidder that the control room interior solution provider supplies all elements & executes all the activities at site like ceiling, flooring, control desks, paneling, partitions & illumination to avoid interface & quality related issues. 6. All the certificates and reports mentioned shall be submitted along with the technical bid. 7. In broad, the scope of work and supply shall consist of the following parts a. Interior Design, engineering of Control room.

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		b. All related services for supply, installation & testing. c. Ergonomic compliance report as per ISO 11064.
2	Submittals	a. The project demands for a contemporary, aesthetically appealing, ergonomically designed, safe and 24X7 working facility. Conventional wooden cladding, Gypsum, Aluminium composite panels, Laminates, Fabric, Paint, Plaster of Paris (for Control room area) are prone to damages & ageing. These components shall not be used to ensure maintenance free working environment. Control room interior solution provider to submit an undertaking on letterhead to comply the same. b. Illumination: - Control room illumination shall be designed as per ISO 11064 norms. Valid lux level report to be submitted along with the bid.
3	Design Criteria	The metal ceiling, metal paneling and partition shall be of modular design, facilitating future equipment retrofits and full reconfigurations without requiring any major modification to the structure.
4	Quality Criteria	The critical components of the control room i.e., designer metal ceiling, carpet/laminated flooring, modular metal wall paneling/partitions shall not emit formaldehydes, TVOC beyond permissible limits i.e., 9 µg/m ³ , 0.22 mg/m ³ respectively. This is to ensure healthier air quality for the operators. Therefore, the control room interior shall be green guard gold certified (Modular metal ceiling, Acoustic flooring & Modular metal wall paneling) from UL/Intertek. Valid certificate to be submitted along with the technical bid. The Proposed console shall comply with the stringent/advanced version of BIFMA X7.1 standard. The Console (open plan) shall not emit TVOC (A), Formaldehyde, i.e., 152 µg/m ² *hr, 6.2 µg/m ² *hr respectively. This is to ensure healthier air quality for the operators. Proposed console shall be green guard gold certified (from UL / Intertek). Valid certificate to be submitted along with the technical bid. The control room solution provider shall have had this certificate for at-least four years prior to April 1st, 2022. Valid certificates shall be submitted along with bid.

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5	Modular rigid PVC metal paneling	a. Factory made removable type self inter lockable metal panels with front sheet of preformed textured hot dip galvanized sheet with rigid polyvinylchloride (PVC) film on one side and on the other side a coating to avoid rust (sheet thickness 0.6mm & PVC coating at least 0.11mm). The back cover of the panel shall be made up of 0.6mm thick CRCA/GI sheet of approved colour. The paneling design shall comprise of specially designed combination of perforated and non-perforated panels through CNC laser cutting, bending & punching. Panels shall be designed to achieve shape and design as per the design consultant and shall be fixed using GI/CRCA hook fitting on structure. Overall system thickness for paneling shall be 60mm to 90mm and for partition shall be 70mm to 120mm. b. Panel shall comprise of perforation for making the cladding and partitions acoustically sound. c. Tiles Perforation – To achieve acoustics without deteriorating the aesthetical appeal of the control room it is necessary that the wall paneling shall have micro-perforations (less than 1.6mm diameter each) all over the surface with a density of 5000 holes per square feet. UL audit certified design feature on modular wall paneling tile having clean perforations and providing smooth finish on front fascia of tiles. The tile shall have 5000 holes per square feet on front side of the tile. Valid UL audit certificate to be submitted along with the technical bid. d. As per design, panel shall comprise of perforation for making paneling and partitions acoustically sound. Acoustic grade fire retardant fabric (minimum 1mm thick) will be fixed (on the back side of perforated tiles) at some parts of the control room facility. e. There shall be possibility of wide variety of colours and images to be used on the wall elements to give the aesthetic and state of the art look to the control room interior. f. Panel design to support proper integration of large video screen. g. Gluing, screwing, ACP (Aluminium composite panels), Paint, Fabric, Gypsum, Wooden laminates shall be deemed unacceptable in control room interior. h. Structure shall allow uninterrupted flow of wires/cable/tubes of maximum diameter 25mm. i. Panel shall be designed in such a manner that it takes care of undulation of walls and gives perfect flat surface finish and compile easy service & maintenance procedure. j. To provide acoustically superior environment and ensure proper attenuation of airborne sound, it is necessary that the sound transmission class (STC) value of wall paneling, and partition shall be 35 (According to IS: 9901 (Part III) – 1981, DIN 52210 Part I-1989, ISO: 16283 (Part I) -2014, test report to be submitted along with the technical bid. k. The modular metal paneling shall comply to the lead-free directive to ensure restriction of hazardous substances so that the final product does not contaminate the environment. The final product i.e., modular metal paneling does not contain hazardous substances and we give a healthy life to our coming generations it is necessary that the modular metal paneling system shall be RoHS certified/tested (from UL / Intertek). Valid certificate/test report to be submitted along with the technical bid.

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		l. From fire safety point of view the metal wall paneling tiles shall be class A fire rated as per the norms of comparative measurements of surface flame spread and smoke density measurements with that of select grade red oak and fiber-cement board surfaces under the specific fire exposure conditions. The proposed wall paneling tiles shall be Class A certified/tested as per ASTM e84 (from UL/Intertek) for surface spread of flame and smoke generation. This is mandatory to ensure that the materials used in the interiors do not provoke fire. Valid certificate/test report to be submitted along with the technical bid. m. Seismic safety of user & control room equipment is a prime concern area. The metal paneling shall sustain the seismic vibrations as per design spectrum IS 1893 for zone 4 or better vibrations. The test shall be carried out by authorized government agency. Test Report to be submitted along with the technical bid. n. The wall paneling shall be robust & strong enough to sustain the routine loads/minor impacts of typical control room environment. The wall paneling/partition structure shall have UL audit certified feature of Load bearing capacity of 300 Kgs to hold any display unit on clamp having minimum length of 750mm. Valid UL audit certificate to be submitted along with the technical bid. o. As control room is a mission critical area and in an unlikely case of damage to the existing wall paneling tiles the same shall be replaceable within 20 seconds and thereby preventing loss of time of operators and ongoing operations. UL audit certified feature of modular wall paneling tile having secure locking arrangement for equidistant mounting. Locking arrangement enables easy replacement without using any tool within 20 seconds. The feature shall provide easy flexibility of locking all tiles in one column through gravity. Valid UL audit certificate to be submitted along with the technical bid. p. Design i. The cladding panels shall be made up of combination of two sheets locked and riveted together and polystyrene shall be used as infill to achieve strength and acoustics. The front tile (PVC pre-coated metal sheet) shall be perforated/ non-perforated as per the design requirement and the back tile (Powder coated 0.6mm CRCA steel sheet and powder coating thickness 0.06mm to 0.09mm) shall be designed in such a manner that it fits on the back portion of the front tile. Once the tiles are assembled then these will be riveted. These tiles shall be bent through CNC, machine punched & laser cut to achieve perfect accuracy. ii. Structure shall be made from modular, heavy-duty powder coated CRCA frame (minimum sheet thickness 1mm) and shall allow uninterrupted flow of wires/cable/tubes of maximum diameter 25mm. iii. Structure shall be securely connected from wall, roof and floor. It shall be made up of minimum 1mm thick vertical slotted rolled C sections (Upright) and horizontal rolled 'C' connectors. Grid of desired dimension shall be formed by vertical and horizontal sections having 20 to 50mm pitch. q. Surface Finish

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		r. For panels 1. Front Panel: PVC pre-coated GI sheet (sheet thickness: 0.6mm and PVC coating: at least 0.11mm) 2. Back Cover: Powder coated CRCA steel sheet. (Sheet thickness: 0.6mm) ii. Rigid PVC / Panel material shall provide better thermal and electrical insulation. It shall be non-reflective/glare free and be eligible for food contact. iii. For Structure 1. Powder coated CRCA steel sheet. (Sheet thickness minimum 1.0mm with powder coating) 2. The metal sheet shall have possibility of being formed mechanically per the specific needs of the project. s. Material Selection i. Available Width- 100mm to 1200mm (in multiples of 100 & 150mm). ii. Available Height- 100mm to 750mm (in multiples of 100 & 150mm). iii. Thickness- minimum 10mm for perforated tiles with acoustic fleece without back cover. iv. Minimum 25mm for perforated/non-perforated tiles with back covers. t. Material Testing/Certification: (Certificate to be submitted along with the technical bid) i. PVC pre-coated sheet: 1. Fire rating and Low flame spread: EN ISO 11925-2, EN 13823 and ASTM e-84 ii. Core material (compressed polystyrene): 1. Acoustic test: 9301/ ISO: 140/ASTM 413, ASTM C 578. iii. Powder coating 1. Adhesion test: EN ISO 2409 / ASTM: D 3359 2. Impact resistance test: ASTM D 2794 (5/9' ball) 3. Conical mandrel test: ASTM D522 4. Salt spray test: 1000 hours as per ASTM B117 5. Resistance to humid atmosphere test as per ISO 6270 u. Component Specification i. Floor Mounting 1. 'I' section made from pre-welded of minimum 2mm thick C channels, having minimum height of 150mm. This I section shall be firmly weld on 3mm thick grouting plate. 2. This assembly shall be grouted on the false floor with the help of M8/10 anchor fasteners. 3. These floor mountings shall be the base support to the vertical uprights spaced at a center-to-center distance of 1200mm maximum. 4. Bidder shall ensure proper marking and levelling before proceeding with any floor grouting. ii. C Section (Upright) fixing 1. 58mm wide slotted rolled C section (UPRIGHT) (1 to 1.6 mm thick CRCA steel sheet). Maximum single piece length shall not

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		exceed 2450mm. 2. All sections will be dual slotted with 20 to 50 mm pitch. 3. These uprights shall be mounted over the floor mountings and shall be connected by C connectors made up of 1.0mm to 1.6mm thick CRCA steel sheet 'C' sections. 4. The installation to be carried out with Uprights spaced at 1200 mm (center to center) securely fixed to the false floor by means floor mountings. 5. The uprights shall be firmly held with L-shaped wall mounts made up of minimum 1.6mm thick CRCA steel sheet duly powder coated. 6. The L clamp and the upright will be bolted together with M6 bolts iii. End Cap 1. 0.75mm thick PVC coated GI tile; (similar to panel tile) shall be bolted on the extreme end-uprights, corners to hide the grid structure. v. Panel i. The panels shall be hooked on the uprights. ii. Panels shall have metal hooks iii. The hooks of the panels shall have a length of minimum 90mm (for the upper hook) and 80mm (for the bottom hook). So that these panels are firmly held on the uprights. iv. The panel shall have hook in arrangement (With gravity lock). w. Door Profile i. Door frame shall be fixed with these profiles only to have proper integration of doors with the overall system. x. Feature i. Raw material for tile & powder coating shall not affect environment. ii. Colour shall not fade over 10 years iii. No sagging iv. Easy and quick installation v. Low cleaning effort vi. Vendor to demonstrate one portion at wall paneling & ceiling at their premises before dismantling & shipping to site. In short, a FAT (Factory acceptance test) to be carried out at vendors works for ceiling & paneling vii. 100 % modular design. At site, no cutting, chipping work is allowed. viii. The tile shall be bend resistant.

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6	Curve modular rigid PVC metal paneling	a. The material of construction and technical specification shall remain the same as per modular rigid PVC metal paneling (wall finishing - Sr No. 1 modular rigid PVC metal paneling) however, the shape shall be a perfect curve to provide more space for mounting of the LED. Paneling's curve shall be achieved by curved tiles only. Curvilinear arrangement using straight tiles shall be deemed unacceptable. b. Factory made removable type self inter lockable metal panels with front sheet of preformed textured hot dip galvanized sheet with rigid polyvinylchloride (PVC) film on one side and on the other side a coating to avoid rust (sheet thickness 0.6mm & PVC coating at least 0.11mm). The back cover of the panel shall be made up of 0.6mm thick CRCA/GI sheet of approved colour. The paneling design shall comprise of specially designed combination of perforated and non-perforated panels through CNC laser cutting, bending & punching. Panels shall be designed to achieve shape and design as per the design consultant and shall be fixed using GI/CRCA hook fitting on structure. Overall system thickness for paneling shall be 60mm to 90mm and for partition shall be 70mm to 120mm. c. Structure shall allow uninterrupted flow of wires/cable/tubes of maximum diameter 25mm. d. Panel shall be designed in such a manner that it takes care of undulation of walls and gives perfect flat surface finish and compile easy service & maintenance procedure. e. The modular metal paneling shall comply to the lead-free directive to ensure restriction of hazardous substances so that the final product does not contaminate the environment. The final product i.e., modular metal paneling does not contain hazardous substances and we give a healthy life to our coming generations it is necessary that the modular metal paneling system shall be RoHS certified/tested (from UL / Intertek). Valid certificate/test report to be submitted along with the technical bid. f. From fire safety point of view the metal wall paneling tiles shall be class A fire rated as per the norms of comparative measurements of surface flame spread and smoke density measurements with that of select grade red oak and fiber-cement board surfaces under the specific fire exposure conditions. The proposed wall paneling tiles shall be Class A certified/tested as per ASTM e84 (from UL/Intertek) for surface spread of flame and smoke generation. This is mandatory to ensure that the materials used in the interiors do not provoke fire. Valid certificate/test report to be submitted along with the technical bid. g. Seismic safety of user & control room equipment is a prime concern area. The metal paneling shall sustain the seismic vibrations as per design spectrum IS 1893 for zone 4 or better vibrations. The test shall be carried out by authorized government agency. Test Report to be submitted along with the technical bid. h. The wall paneling shall be robust & strong enough to sustain the routine loads/minor impacts of typical control room environment. The wall paneling/partition structure shall have UL audit certified feature of Load bearing capacity of 300 Kgs to hold any display unit on clamp having minimum length of 750mm. Valid UL audit certificate to be submitted along with the technical bid.

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Sr. No.	Parameter	Minimum Requirement
		i. As control room is a mission critical area and in an unlikely case of damage to the existing wall paneling tiles the same shall be replaceable within 20 seconds and thereby preventing loss of time of operators and ongoing operations. UL audit certified feature of modular wall paneling tile having secure locking arrangement for equidistant mounting. Locking arrangement enables easy replacement without using any tool within 20 seconds. The feature shall provide easy flexibility of locking all tiles in one column through gravity. Valid UL audit certificate to be submitted along with the technical bid. j. Structure shall be made from modular, heavy-duty powder coated CRCA frame (minimum sheet thickness 1mm) and shall allow uninterrupted flow of wires/cable/tubes of maximum diameter 25mm.
7	Doors	The doors should be with 12mm thick Frameless tempered clear glass door with fittings (Single / Double Doors) With door spring and locking arrangements and both way handle and patch fittings.
8	Ceiling	The Factory made acoustic modular metal false ceiling of powder coated panels. Make shall comprise of perforated and non-perforated metal panels made through CNC laser Cutting, bending & punching. Panel shall be of 0.6mm CRCA sheet of approved powder coating finish. Panels shall be designed to achieve shape and design as per the design consultant with the combination of acrylic panels with lights, designed to enhance visual feel, with provision for easy installation and maintenance, integrated lighting and scope for integration of building services like HVAC and fire detection/ fighting system. Metal modular false ceiling shall have noise absorption coefficient (NRC) value 0.60 according to IS:8225-1987, ISO: 354-1985 and ASTM 423-90. Test report to be submitted along with the technical bid. It is well known that metal is resistant to fire as compared to wood & fabric. However, from fire and safety point of view, to ensure that the used material is not subjected to any kind of surface treatment which provokes fire. The proposed ceiling tiles shall be Class A certified/tested as per ASTM e84 (from UL / Intertek) for surface spread of flame and smoke generation. This is mandatory to ensure that the materials used in the interiors do not provoke fire. Valid certificate/report to be submitted along with the technical bid. The bidder should ensure restriction of hazardous substances; so that the final product does not contaminate the environment and we give a healthy life to our coming generations it is necessary that the modular metal ceiling system shall be RoHS certified/tested (from UL / Intertek). Valid certificate/report to be submitted along with the technical bid. The bidder should avoid dark spots/areas in the control room it is necessary that continuous linear lights should use across the width/length of the control room. UL audit certified design feature of integrated channel in ceiling for quick installation & replaceability of continuous linear light: The ceiling system should have integrated inbuilt channel for installation of cove lights and shall permit quick and easy replacement of cove light without using any tools. Replacement to be carried out within 120 Seconds

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		per meter. Valid UL audit certificate to be submitted along with the technical bid.
		The metal ceiling shall sustain the seismic vibrations as per design spectrum IS 1893 for zone 4 vibrations or better. The test shall be carried out by authorized government agency. Valid test report to be submitted along with the technical bid.
		The structure shall be made from heavy duty powder coated CRCA steel sheet (minimum sheet thickness 0.8 to 1.6mm). It shall be securely grouted from roof with help of anchor fastener and GI self-threaded rods. It shall be formed with the help of slotted rolled W sections (stiffener) and Master C section with help of M6 cage nut and bolts.
		Component Specification 1. Master Section a. 1.2mm thick CRCA steel sheet section length 1200mm. the installation to be carried out with runner's spaces at 1200/1500/2100mm center to center securely fixed to the hanging W section by means at M6 Nut and bolts. 2. Hanging W Section a. Specially machine profiled W section 65x15x0.8mm.the section shall be 2400 mm long & shall run across the length at the room. b. Centre to Centre distance between W section shall be 1000mm. c. These sections are securely fixed to the slab by means of Metal fastener and 08mm GI rod fully threaded (with hex nut for precision level adjustment) d. The two-master section shall be attached to each other by means at fixing pate 45x34mm & M6 cage nut & bolts. 3. U Section a. Machine profiled 'U' Section 150x77x0.6mm section to accommodate continues running light b. It shall have provision for fixing acrylic sheet c. This whole assembly shall be hung from roof slab with help of anchor fastener and full threaded GI rod.
		Component Specification 1. Master Section a. 1.2mm thick CRCA steel sheet section length 1200mm. the installation to be carried out with runner's spaces at 1200/1500/2100mm center to center securely fixed to the hanging W section by means at M6 Nut and bolts. 2. Hanging W Section a. Specially machine profiled W section 65x15x0.8mm.the section shall be 2400 mm long & shall run across the length at the room. b. Centre to Centre distance between W section shall be 1000mm. c. These sections are securely fixed to the slab by means of Metal fastener and 08mm GI rod fully threaded (with hex nut for precision level adjustment) d. The two-master section shall be attached to each other by means at fixing pate 45x34mm & M6 cage nut & bolts. 3. U Section a. Machine profiled 'U' Section 150x77x0.6mm section to accommodate continues running light b. It shall have provision for fixing acrylic sheet

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		c. This whole assembly shall be hung from roof slab with help of anchor fastener and full threaded GI rod. Plain calcium silicate acoustic boards for false ceiling with 08mm approximately thick, Structure for underside of suspended grid formed of GI perimeter channels. Wood screws and metal expansion raw plugs for fixing with wall. Plastic emulsion paint of approved make and shade for finishing surface of Calcium Silicate Boards. Specification: Calcium Silicate Board is manufactured from a mixture of Portland cement, fine silica, special cellulose fibers and selected fillers to impart durability, toughness, fire and moisture resistance.
9	Lighting and Illumination	a. LED lights i. Brief: - The lights shall be available in flat panels. These shall be designed and developed with slim shape for stylish look. The product shall have better colour rendering index for interior illumination. ii. The LED shall have three basic choices of colours like cool white / warm white / neutral white. The LED lights shall have uniform light distribution without any spots on surface of panel, to make it highly luminous. b. Round LED Lights: - High performance LED downlighter with high system efficacy for good quality and uniform lighting. Conforms to general lighting norms for office and other indoor applications. i. Colour Temperature (K)- 3000 K / 4000 K / 5700K ii. LED Efficacy (lm/W) – 100 to 160 iii. CRI >70 iv. Power Consumption 6W to 24W v. LED's life >25,000 hours @ L70 c. LED based Strip Light for Ceiling: - It will be a continuous rail of LED light, high brightness, neutral, or warm white with wall washing applications. Its slim profile and simple daisy-chain system allows high design flexibility to form long. i. Light source: LED ii. Lumen output: 600 lm/m iii. Light color: 6500K iv. Power consumption: 3W/m to 5W/m v. Operating Voltage Range (V) 100 – 300 vi. Operating Frequency (Hz) 50 ± 3% vii. Colour: White viii. Lifetime: 15000 burning hrs. (At L70) d. Wiring for ceiling lights i. For ceiling wiring inter looping will be done and switches will be provided ii. The system of wiring shall consist of PVC insulated copper conductor stranded flexible FRLS wires of 1100 volts grade of insulation, in metallic conduits for all exposed wiring and PVC/ metallic conduits for all concealed wiring. Minimum size of copper conductor shall be 1.5 sq. mm for lighting and 2.5 sq mm for power. Colour code shall be maintained for the entire wiring

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		installation that is Red/Yellow/Blue (or as per Local Standards) for the all-single phases, Black for neutral and Green for earthing. iii. Appropriate ferrule will be used in both the side (LDB Side & Switch's Side). iv. Note – Each Light Fixture will have 3 Wires: Phase, Neutral & Earth individually. e. Switches and Sockets i. Compliance to stringent quality norms, Dual shutter mechanism for easy & better fitment Wide & flat switch knob for easy operation. FR grade polycarbonate with high impact resistance, shock proof & UV rays stabilized. f. MCBs i. For the control and protection of low voltage installations against overload and short circuits. ii. Ripping characteristic: C Curve – 5 to 10 x In iii. Rated at 25°C to -50°C iv. Isolation function v. Double entry points, separate bus bar entry, open mouthed terminal and lift clamps. g. Flooring a. Designer acoustic false flooring i. Mandatory – Top Surface shall be acoustic laminate flooring. Height above the RCC floor – from 150 to 300mm as per layout. ii. The flooring shall be manufactured of fiber reinforced calcium sulphate panels having edges finished with PVC edge band and top surface shall be finished with durable & environment friendly acoustic laminate pasted with special glue serving life of 5 years minimum. Tile Size shall be 600mm X 600mm. iii. The Panel shall 1. Have density of 1600KgM3. 2. Fire resistance DIN EN 1366-6 2005-02. 3. Core material thickness shall be minimum 30mm. iv. The acoustic laminate shall be made up of twin-layer linoleum built up from 2mm Laminate. v. This false floor panel shall rest on Edge support rigid grid system having Galvanized Iron base plate dimensions as 100mm X 100mm. The stringer shall be fixed on pedestal having height adjustment of ± 25mm.
10	Designer acoustic flooring	i. To avoid distraction of operators because of unwanted noise generated from movement of chairs/people in the control room it is necessary that the proposed flooring shall damp such impact noises. Acoustic flooring (shall reduce impact sound by 14dB (ISO 717-2)). It shall be twin-layer linoleum built up from minimum 2mm acoustic laminate and a 2mm corkment backing. Flooring shall be decorative type of approved shade, pattern, texture and design and of approved manufacturer. Dimensions shall be as per the final approved design and site requirement. Flooring shall be laid over concrete floor with laying compound strictly as per manufacturer's specification.

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11	Control Desk	a. Technical Specifications: -The control desk solution shall conform to high standard of engineering as mentioned in the document; meeting the specified codes, standards and designs. It shall be capable of performing 24X7 operations under the specified environmental condition in compliance to control room ergonomic norms i.e., ISO 11064. All the certificates and reports mentioned below and in BOQ shall be submitted along with bid. b. Structure i. Made of heavy duty extruded vertical and horizontal Aluminium profiles of 6005 grade. The Extrusions shall be duly powder coated with 40+ microns over all surfaces. All sheet metal parts shall be finished with a durable, black, electrostatic powder coating. The control desk manufacture shall have trademark registration certificate issued by Government of India for the console proposed in this tender. Trademark registration certificate shall be submitted along with bid. ii. To allow future extension and expansion, a weld free system shall be proposed. Interconnecting joints shall not be visible. The structure shall be rigid enough to withstand BIFMA X5.5 test. The control desk manufacture shall have had BIFMA X5.5 certificate. The structure shall allow easy assembly of hinged shutters, slat wall, gland plate, monitor arms in extremely rigid manner. Valid certificate of BIFMA X5.5 shall be submitted along with bid. c. The EPD (Environmental product declaration) of control desk shall be verified in accordance with ISO 14025 (from UL / Intertek) for Impacts on Environment by Console. d. Seismic safety of user & control room equipment is a prime concern area. Control Desk shall be tested and qualified to sustain Seismic vibrations as per design spectrum IS 1893 for zone 4 vibrations with monitor mounted on monitor arms of the console. This test shall be carried out by authorized government agency. Test report with images of control desk seismic test shall be submitted along with the bid. e. Ergonomic compliance report as per latest ergonomic norms of ISO 11064 to be submitted along with the bid. Being one of its kind facilities; the control room deserves a tested & proven product having genuine design. f. Table top: - The material of the working surface shall be minimum 25 mm thick MDF with High Pressure ANSI/NEMA LD3 certified scratch-resistant Laminate. The proposed console's life cycle shall be assessed (from approved LCA consultant) for environmental impacts associated with all the stages of a product's life for cradle to grave analysis. g. Modular removable PU nosing: In the control room the front edge of consoles is the component which comes in frequent contact of the operator. The soft polyurethane edge is an ergonomic requirement and is meant to prevent injury (accidental impact) to operator during emergency and it also reduces the contact stress. In case of damage to this edge the desk design

Interior of NOC/ SOC/DCIM/ Innovation Centre Room		
Sr. No.	Parameter	Minimum Requirement
		shall permit quick & easy replacement within half an hour without taking any shutdowns or removal of the tabletops. Audit certified design feature of modular PU Edge: High density poly-urethane foam molded on industrial grade aluminium core to form 50mm deep tapered edge to be installed on worktop. The edge shall be mechanically replaceable within 30 minutes, in case of damage or wear without opening or removing the worktop. Valid UL audit certificate to be submitted along with technical bid. Extruded PU edging/PVC T-beading shall be deemed unacceptable. h. Slat Wall: - Slat Wall shall be made of approx. 2mm thick Extruded Aluminium (HE9WP aluminium alloy). The proposed console shall be UL Listed and valid certificate to be submitted along with the bid. i. Monitor Arm: - The control desk shall feature ergonomic display mounting arms. It shall enable quick & easy replacement of VESA mounts & arm extensions as per the ergonomic requirement defined in ISO 11064. UL audit certified design feature of monitor arm assembly shall have auto lock, push & remove feature for quick release of VESA mounts and modular arm extensions for ease in maintenance and fixing of monitor by one technician within 30 seconds without using any tools. Valid UL audit certificate to be submitted along with the bid. j. Shutters & Side Legs: - Front, back shutters shall be of 18mm Laminated MDF Board with premium finish. Side leg shall be of 25mm of the same finish. Proposed console shall comply with the BIFMA X7.1 standard. The consoles (open plan) shall not emit TVOC(A), Formaldehyde i.e., 152 µg/m²*hr, 6.2 µg/m²*hr respectively. This is to ensure healthier air quality for the operators. Therefore, the proposed console shall be green guard Gold certified. The control room solution provider shall have had this certificate for at-least four years prior to April 1st, 2022. Valid certificates shall be submitted along with bid. k. Cable Trays and Wiring: - The desks shall be designed with vertical and horizontal cable trays to allow for continuous cable management between the cabinets. Wire shall be routed into the cabinet through gland plate. Proposed console shall be RoHS Certified/tested (from UL / Intertek) and the valid certificate/test report shall be submitted along with bid. l. Spill Edge - The Control desk cable manager opening, and rear edge of desktop shall be protected from minimum 5mm high no spill edge, it shall come above desktop surface to prevent liquid from spilling inside the CPU/Equipment Cabinet. Material of edge shall be Polyurethane. Valid UL audit certificate to be submitted along with technical bid. m. Hardware: - All bolts shall be of SS material to avoid rust due to environment. Remaining hardware shall be Nickel Plated MS.

10.36 Video Wall System

Video wall		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes video wall system with installation bracket, different type of cable, installation and testing. The bidder should consider all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The bidder shall provide and install a main video wall system consisting of flat panels with control software and power, controller and video interconnects
		The bidder shall provide and install HDMI cable video signal over long cable runs. The bidder shall provide and install power interconnect/loop cables for display to connect horizontally.
		The video wall shall be mounted on a custom mounting structure for the video wall. The structure shall be a self-supported design with floor to ceiling attachment points. The structure shall use a scissor mount with cladding design to enable them removal and installation of the display panels. The structure shall have suitable height as per NOC/ SOC/ DCIM room. The custom mounting structure must include an accompanying seismic stamp and drawings via a certified structural engineer
		The bidder shall program, install and/or provide, through the video scalers and touch panel control system, the ability of the main video wall users to setup and recall presets for the video wall display

10.36.1 Video Wall for NOC & SOC room

Video Wall for NOC & SOC room		
Sr. No.	Parameter	Minimum Requirement
1	Configuration	Video wall cubes of 70" diagonal 7 (C) X 2 (R) configuration with complete with base stand
2	Cube & Controller	Cube & controller should be from the same manufacturer
3	Reputed Company	The OEM should be an established multinational in the field of video walls and should have at least 1000 laser cube installations in India.
4	Native resolution	Full HD (1920x 1080)
5	Wall Resolutions	Minimum wall resolution should be minimum 13440 x 2160 pixels
6	Light Source Type	Laser light source
		Individual cube should be equipped with multiple laser banks and each laser bank should have an array of diodes.
7	Brightness of Projection engine	Typ. 2200 lumens
8	Brightness of Cube	Minimum 500 nits
9	Brightness Uniformity	up to 98 % certified / tested by 3rd party lab. Report to be submit at the time of bidding

Video Wall for NOC & SOC room		
Sr. No.	Parameter	Minimum Requirement
10	Dynamic Contrast	1000000:1 or more
11	Control	IP based control to be provided
12	Remote	IR remote control should also be provided for quick access
13	Screen to Screen Gap	≤ 0.2 mm at $23 \sim 25$ ° C (control room Temperature)
14	Screen Support	Screen should be minimum 3 layers with a Hard Backing to prevent bulging
15	Screen Type	Half viewing angles of H: $\pm 36^\circ$ and V: $\pm 34^\circ$
16	Control BD Input terminals	Input: 1 x Digital DVI
		Input: 1 x HDMI 2.0
		Input: 1 x Dsub-15
		Input: 1 x HDMI 2.0
		Input: 1 x Display port 1.2
17	Control BD Output terminals	Output: 2x HDMI 2.0
18	Pixel Clock	>500 MHz
19	Redundant Dual Power Supply	Cube should be equipped with a built in dual redundant power supply as integral part of projection system
20	Hot swappable power supply	Dual inbuilt power supply should be hot swappable.
21	Cooling Inside Cube	By Means of a heat pipe
22	Anti-dust design Criteria	Projection unit should be designed based on International Electrotechnical Commission-60529.standard
23	Certification of Anti dust design	Projection unit should be certified by 3rd party lab to conform the design meeting the requirement of IEC -60529 standard. Test certificate should be submitted as proof along with technical bid submission
24	Cube Depth	Total Cube depth should be less than 560 ± 5 % mm
25	Source Redundancy	System should be able to switch to secondary input if primary input is not available.
		System should also automatically switch back to primary input from secondary input as soon as the primary input is available again.
26	Monitoring of critical parameters	Internal Temperature
		Brightness
		Cooling
		Light Source Status
		Should be possible to demonstrate these parameters through active monitoring interface
27	Maintenance Access	Rear (Depth 560 ± 5 % mm)
28	Cube Size	Each cube should have a screen size of 1550 mm wide and 872 mm high
29	Cube control & Monitoring	Videowall should be equipped with a cube control & monitoring system
		System should be based on Python- Django framework with web browser architecture
		Should be able to control & monitor individual cube, multiple cubes and multiple video walls

Video Wall for NOC & SOC room		
Sr. No.	Parameter	Minimum Requirement
		Provide videowall status including Source, light source, temperature, fan and power information
		Should provide a virtual remote on the screen to control the videowall
		Input sources can be scheduled in " daily", "periodically" or "sequentially" mode per user convenience
		System should have a quick monitor area to access critical functions of the videowall
		User should be able to add or delete critical functions from quick monitor area
		Automatically launch alerts, warnings, error popup windows in case there is an error in the system
		User should be able to define the error messages as informational, serious or warning messages
		Automatically notify the error to the administrator or user through a pop-up window and email
		Status log file should be downloadable in CSV format as per user convenience
30	Controller	The Controller should be able to make complete videowall display behave as one logical area. It should be possible to display any or all the inputs on the video wall in any desired configuration. Should be possible to increase the no. of inputs if desired at a later stage
31	Controller & Display	Cube controller and wall management software should be from same OEM to avoid integration issue.
32	Architecture	Should be based on Server architecture
33	Operating System	Windows 10 or higher -64 bit
34	RAM	8 GB or higher
35	HDD	500 GB or higher
36	RAID	RAID should be provided
37	Chip	Intel Xeon/i5/i7 or better
38	Power Supply	Dual Redundant Power Supply
39	Outputs	to connect video wall of 7x2 configuration
40	Inputs	5 HDMI inputs & Dual LAN
41	Chassis	19" rack mount industrial chassis
42	Controller certification	Controller should have BIS certification
43	Scaling and display	Software to enable the user to display multiple sources in any size and anywhere on the display wall.
44	Auto Source Detection	Software should support for auto source detection
45	Layout Management	Should support for Video, RGB, DVI, Internet Explorer, Desktop Application and Remote Desktop Monitoring Layouts
46	Scenarios	Software should be able to Save and Load desktop layouts from Local or remote machines
47	Layout Scheduler	All the Layouts can be scheduled as per user convenience
		Software should support auto launch of Layouts according to specified time or event by user
48	Layout Preview	Software should support layout preview option

Video Wall for NOC & SOC room		
Sr. No.	Parameter	Minimum Requirement
49	Launch Application	Software should be able to support
	Integration with 3rd party devices	System should offer interface to enable control from 3rd party devices like Creston, AMX etc.
50	Live Preview	Software should be able to provide live preview of videowall
51	Work space allocation	System should provide functionality to the administrator to define and allocate work space for a particular operator or a group of operators when working on a Video wall
	Authentication	Software should offer 4 levels of Authentication (User accounts, Permissions for functionality & Roles etc.).
52	Offline Layouts	It should be possible to create offline layouts
53	User friendly	Software should be user friendly
	Ticker	Ticker message can be positioned anywhere on the display wall. Inside the ticker window, font size, colour and background can be set
54	Ticker Type	Software should be able to prepare various kinds of tickers: text ticker, RSS ticker, transparent and time ticker
55	SNTP	System should support SNTP function
56	Protection	System should have Hardware License key to protect the software from unauthorized access.
57	Source Carousel:	User can set multiple sources that can change sequence after some time interval without changing the layout.
58	Region management	Admin can assign Videowall workspace to user based on pixel map
59	Snap sensitivity	Enables the magnetic behavior to fit the sources automatically for easy alignment on the wall
60	Scalable GUI	Scalable GUI to scale to any size of Videowall screen.
61	Scheduler	User can schedule the layout on specific date & time, weekday, weekend, start & end date
62	Source positioning	User can position the source input on Videowall with single click

10.36.2 Video Wall for DCIM & Innovation Centre room

Video Wall for DCIM & Innovation Centre room		
Sr. No.	Parameter	Minimum Requirement
1	Configuration	Video wall cubes of 70" diagonal 4 (C) X 2 (R) configuration with complete with base stand
2	Cube & Controller	Cube & controller should be from the same manufacturer
3	Reputed Company	The OEM should be an established multinational in the field of video walls and should have at least 1000 laser cube installations in India.
4	Native resolution	Full HD (1920x 1080)
5	Wall Resolutions	Minimum wall resolution should be minimum 13440 x 2160 pixels
6	Light Source Type	Laser light source
		Individual cube should be equipped with multiple laser banks and each laser bank should have an array of diodes.

Video Wall for DCIM & Innovation Centre room		
Sr. No.	Parameter	Minimum Requirement
7	Brightness of Projection engine	Typ. 2200 lumens
8	Brightness of Cube	Minimum 500 nits
9	Brightness Uniformity	up to 98 % certified / tested by 3rd party lab. Report to be submit at the time of bidding
10	Dynamic Contrast	1000000:1 or more
11	Control	IP based control to be provided
12	Remote	IR remote control should also be provided for quick access
13	Screen to Screen Gap	≤ 0.2 mm at $23 \sim 25$ ° C (control room Temperature)
14	Screen Support	Screen should be minimum 3 layers with a Hard Backing to prevent bulging
15	Screen Type	Half viewing angles of H: $\pm 36^\circ$ and V: $\pm 34^\circ$
16	Control BD Input terminals	Input: 1 x Digital DVI
		Input: 1 x HDMI 2.0
		Input: 1 x Dsub-15
		Input: 1 x HDMI 2.0
		Input: 1 x Display port 1.2
17	Control BD Output terminals	Output: 2x HDMI 2.0
18	Pixel Clock	>500 MHz
19	Redundant Dual Power Supply	Cube should be equipped with a built in dual redundant power supply as integral part of projection system
20	Hot swappable power supply	Dual inbuilt power supply should be hot swappable.
21	Cooling Inside Cube	By Means of a heat pipe
22	Anti-dust design Criteria	Projection unit should be designed based on International Electrotechnical Commission-60529.standard
23	Certification of Anti dust design	Projection unit should be certified by 3rd party lab to conform the design meeting the requirement of IEC -60529 standard. Test certificate should be submitted as proof along with technical bid submission
24	Cube Depth	Total Cube depth should be less than 560 ± 5 % mm
25	Source Redundancy	System should be able to switch to secondary input if primary input is not available.
		System should also automatically switch back to primary input from secondary input as soon as the primary input is available again.
26	Monitoring of critical parameters	Internal Temperature
		Brightness
		Cooling
		Light Source Status
		Should be possible to demonstrate these parameters through active monitoring interface
27	Maintenance Access	Rear (Depth 560 ± 5 % mm)
28	Cube Size	Each cube should have a screen size of 1550 mm wide and 872 mm high

Video Wall for DCIM & Innovation Centre room		
Sr. No.	Parameter	Minimum Requirement
29	Cube control & Monitoring	Videowall should be equipped with a cube control & monitoring system
		System should be based on Python- Django framework with web browser architecture
		Should be able to control & monitor individual cube, multiple cubes and multiple video walls
		Provide videowall status including Source, light source, temperature, fan and power information
		Should provide a virtual remote on the screen to control the videowall
		Input sources can be scheduled in " daily", "periodically" or "sequentially" mode per user convenience
		System should have a quick monitor area to access critical functions of the videowall
		User should be able to add or delete critical functions from quick monitor area
		Automatically launch alerts, warnings, error popup windows in case there is an error in the system
		User should be able to define the error messages as informational, serious or warning messages
		Automatically notify the error to the administrator or user through a pop-up window and email
		Status log file should be downloadable in CSV format as per user convenience
30	Controller	The Controller should be able to make complete videowall display behave as one logical area. It should be possible to display any or all the inputs on the video wall in any desired configuration. Should be possible to increase the no. of inputs if desired at a later stage
31	Controller & Display	Cube controller and wall management software should be from same OEM to avoid integration issue.
32	Architecture	Should be based on Server architecture
33	Operating System	Windows 10 or higher -64 bit
34	RAM	8 GB or higher
35	HDD	500 GB or higher
36	RAID	RAID should be provided
37	Chip	Intel Xeon/i5/i7 or better
38	Power Supply	Dual Redundant Power Supply
39	Outputs	to connect video wall of 7x2 configuration
40	Inputs	5 HDMI inputs & Dual LAN
41	Chassis	19" rack mount industrial chassis
42	Controller certification	Controller should have BIS certification
43	Scaling and display	Software to enable the user to display multiple sources in any size and anywhere on the display wall.
44	Auto Source Detection	Software should support for auto source detection
45	Layout Management	Should support for Video, RGB, DVI, Internet Explorer, Desktop Application and Remote Desktop Monitoring Layouts

Video Wall for DCIM & Innovation Centre room		
Sr. No.	Parameter	Minimum Requirement
46	Scenarios	Software should be able to Save and Load desktop layouts from Local or remote machines
47	Layout Scheduler	All the Layouts can be scheduled as per user convenience
		Software should support auto launch of Layouts according to specified time or event by user
48	Layout Pre view	Software should support layout preview option
49	Launch Application	Software should be able to support
	Integration with 3rd party devices	System should offer interface to enable control from 3rd party devices like Creston, AMX etc.
50	Live Preview	Software should be able to provide live preview of videowall
51	Workspace allocation	System should provide functionality to the administrator to define and allocate workspace for a particular operator or a group of operators when working on a Video wall
	Authentication	Software should offer 4 levels of Authentication (User accounts, Permissions for functionality & Roles etc.).
52	Offline Layouts	It should be possible to create offline layouts
53	User friendly	Software should be user friendly
	Ticker	Ticker message can be positioned anywhere on the display wall. Inside the ticker window, font size, colour and background can be set
54	Ticker Type	Software should be able to prepare various kinds of tickers: text ticker, RSS ticker, transparent and time ticker
55	SNTP	System should support SNTP function
56	Protection	System should have Hardware License key to protect the software from unauthorized access.
57	Source Carousel:	User can set multiple sources that can change sequence after some time interval without changing the layout.
58	Region management	Admin can assign Videowall workspace to user based on pixel map
59	Snap sensitivity	Enables the magnetic behavior to fit the sources automatically for easy alignment on the wall
60	Scalable GUI	Scalable GUI to scale to any size of Videowall screen.
61	Scheduler	User can schedule the layout on specific date & time, weekday, weekend, start & end date
62	Source positioning	User can position the source input on Videowall with single click

10.37 Data Centre Infrastructure Management (DCIM)

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes DCIM software monitoring system installation work with all required accessories, hardware and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project. The Bidder should supply and implement proposed DCIM solution including hardware/Virtual server, DCIM application/OS, DCIM DB, DCIM software licenses for successful installation of DCIM application.
2	General	The DCIM must be able to provides insights and drives performance throughout the Data Centre, including Data Centre assets and physical infrastructure. The management system enables the monitoring and collection of low-level infrastructure data to enable intelligent analysis by individuals with domain expertise, as well as a holistic analysis of the overall infrastructure. The management system enables the integration of information technology (IT) and facility management to centralize monitoring and management of a Data Centre's critical devices. maintain, load management, space management, inventory, future projection and asset management within the Data Centre and provide visualization of the assets in floor layout, rack elevation, and individual asset views.
		The DCIM system should be able to display energy efficiency information such as PUE, DCiE and trend them in real time on daily, monthly and yearly basis.
		This specification describes the operation and functionality of a Data Centre Infrastructure Management system hereafter referred to as the management system. The management system is installed on a physical server or as a virtual appliance. The DCIM system should be able to create reports in at least .CSV formats.
		The Proposed DCIM platform should also be capable of pushing monitored device information using SNMP trap or restful API to any third-Party NMS system
		By this the DCIM system should ensure it integrates back to commonly needed Infrastructure devices like in row cooling, CRAC, Diesel Generators, Energy Meters, Branch Circuit Power meters, Rack mount Intelligent PDU and Rack Environmental Monitoring systems. To ensure a clear integration to the said devices is done as for Device connectivity is attached, please ensure that proposed DCIM covers licensing and integration requirements of all SNMP, Modbus, backnet and IP devices
		The installed system shall be able to use web services to products and systems.
		The DCIM shall be a web client architecture (web-based system that is accessed through a standard web browsing tool such as Internet Explorer, Chrome, or Firefox).
		DCIM server / VM system should allow integration of client email server via SMTP channel as well as it should support integration to SMS Gateway servers by utilizing the HTTP post Method.

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		The DCIM must keep a log of all changes within the Data Centre including the changes made to the DCIM system and all IMAC workflow information.
		All the features and functionalities or DCIM services mentioned in this tender scope should be expandable to manage future requirement as well and provide us a simplified and unified view of all the DCs on future need basis.
		Proposed DCIM system for present requirement should be modular in licensing nature and provide us flexibility to purchase and expand enhanced modules according to our future need. The DCIM should be able to run on a physical or virtualized server.
		The DCIM software licensing should be Perpetual in nature which means that license once bought for various polled devices/racks etc. never expire. However, the end client is free to buy extension of software warranties on yearly basis to keep up to date with new releases as and when they are launched.
3	Visualization	A. It should provide diverse layout components to design the floor plans in a single project for both of the web and Windows application interfaces. B. It should be with the windows application interface which can help to switch to the full screen mode to let the layout plans fit in the different screen resolution automatically. C. The layout components include static/dynamic/boundary type of text, line, oval, rectangle, progress bar, linear/analog meters, buttons, physical object, camera live streaming, history trend, pie chart, billboard, and other Data Centre components. The DCIM project designer needs not to write any program code to collect the data, design the plans and configure the system. D. The management system should be able to add devices to the Data Centre floor plan to represent the actual physical location in the Data Centre. E. The layout plans should be able to organize to different layout groups for different login accounts. That means only the account with the privilege can see the plans in the layout groups. F. The layout plans can show where the physical devices are installed and identify where the problem is from the location and device. G. Users can look up more than 1 received data and show the history trend from the DCIM server. The searched history trend can be exported to as a .csv file or copy to the system clipboard.

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
4	Event Management	A. The system provides a summary alarm toolbox for the users to understand the on-going event number and the level. Click on the tool box to pop up the monitoring device list to show all of the equipment operation status. B. The system also provides the event log query to search for the history event log. C. The history event log includes the device monitoring event, system operation event and the operators configure and control event. D. Event acknowledge: The system provides the event acknowledge button for the operator to acknowledge the on-going event. After the event is acknowledged then the system will not send any notification, but the layout plan still keeps the alarm until this event is complete recovered. E. Event escalation: Once the event is not recovered in a specified period of time then the system will escalate this event to another assigned event level. The system will start to notify based on the new event level rule.
5	Protocol Management	A. The management system can add, edit and remove Modbus, SNMP, OPC protocols to communicate with the devices. B. The implemented protocols can export to and be imported from files. C. All of the received data can be assigned to a transform formula to produce another value for the other application. And each received data can set more than 32 thresholds to trigger the notification event. D. The system protocol can be created off line or online for the DCIM engineer to well prepare in the office. And provide the design concept and simulate before the system install.
6	Camera Management	A. The management system can add, edit and remove an IP camera device. B. The management system enables you to watch the camera video in the layout plans directly without opening external applications. C. The management system can configure a trigger rule to record not only 1 camera video but also presents 3 types for recording: Full time, scheduling and event trigger. The event-triggered video files are integrated in the event log for you to play the video file at your fingertips. D. The trigger rule can combine any event in the management system. E. Provide the multiple video recorder's live show for you to trace the moving object between different cameras. F. The management system is able to control the camera actions by pan, tile and zoom through the network.
7	User Management	A. The management system can add, edit and remove user accounts. B. The users can be assigned to any user group. C. The user or user group can be assigned to a privilege level. D. The login user can modify his own password. E. The system can logout the user automatically when the user idle for a period of time.

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
8	Privilege Management	A. The management system can add, edit and remove a privilege level. B. The management system can set unlimited number of privilege levels, and each privilege level includes the functions read/write permission, available layout groups and devices controlling.
9	Organization Management	A. An organization can be a department, a customer or a building. The organizational tree can be customized to reflect the actual enterprise structure. B. Each organization can assign its own team members, monitoring devices, asset and power meters and electricity tariff formula. Those configuration can only be modified by the team members. C. The roles of the team member are Designer, manager, device manager and general user.
10	Notification Management	A. The management system is able to notify the users through e-mail, SMS and audio. B. The non-notify time can be configured to not send notification in a specified period of time. C. The system can configure up to 16 event levels with different title, color and icon. D. The system can define unlimited event tag, which associates with the notification method and whom should be notified. E. The first delay time and repeat interval time can be assigned for each notification method. F. The user can acknowledge the event to stop sending the notify message. G. The system can plan to report its own operating status to the administrator on daily basis.
11	Scheduling Management	A. The management system can assign holidays in the scheduling calendar. B. The scheduling action can be added, edited and deleted. C. The scheduling can be assigned by daily, per-N days, specific date, weekly and monthly. D. The scheduling action can send a control command through the protocol or popping out a message in the user interface.
12	Reaction Management	A. The management system can add, edit and remove a reaction rule. B. The reaction rule can be defined to check more than 1 condition and then base on the result to initiate not only 1 action. C. The condition check can be combined with logical and/or.
13	Report Management	A. The management system can add, edit and remove a report template. B. The report template can combine event log with history log value in one report file. C. The report template can integrate the date/time, text, image, list and graphical chart into one template file. D. The management system can add, edit and delete scheduling report task. E. The scheduling report can be generated by daily, weekly, monthly, quarterly and annually. F. The type of file can be generated as .txt, .csv and .xls. G. The report template can be generated manually.

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		H. The generated report files can be displayed and downloaded through the user interface.
14	PUE Energy Module:	The management system provides the following functionality from the point of view of Data Centre Energy Efficiency: A. The management system provides current and historical Power Usage Effectiveness (PUE) values and full insight into current and historical energy efficiency. B. The management system can design a dashboard view to display the PUE value on the layout plan. C. The PUE dashboard shows the current, this hour, today, month to date and year to date PUE value. D. It presents how much power is devoted to driving the installed IT-equipment compared with the total facility consumption. E. Provide insight into cost of energy at the subsystem level. F. The management system will have a dashboard view which includes efficiency data on current and historical PUE, as well as detailed subsystem cost analysis.
15	Asset Module:	The asset functional module is designed for the Data Centre application, which provides the device classification and looks for information about power, cooling, network, server, etc. Based on the asset information, it can generate the power path and network topology map automatically. Furthermore, the rack detail view and 3D navigation feature which can automatically be built up based on the real environment provide a more comprehensive view of assets inside a rack: A. The management system can add, edit and delete asset device. The asset information can be exported to and imported from a file. B. The management system can add, edit and delete device model information. The model information can be exported to and imported from a file. C. Users can classify or search the asset device by device type, asset ID, installation date, location, department, owner, dealer, etc. The result can be copied to the clipboard or saved as a file. D. The related asset document can be reserved in the system, such as specification, manual, purchase order and OI. E. The management system can analyze the device relationship in power and network connections. F. The management system has the ability to print the asset QR code and leverage the asset inspection functional module to manage the critical assets. G. The power path analysis function can trace back from the leaf device to list all of the power supply and power conversion nodes. This function can also list the impacted devices from one power supply or conversion device down to the related power usage device. H. The network path analysis function displays the relationship among the network, patch panel and the terminal device. I. 3D navigation system can automatically generate a 3D view based on the real location of each device in a room. Users can rotate, pan, zoom in and zoom out the camera to navigate the

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		room. J. Rack management: a. The rack can be grouped as a row, island and room. b. It can display images of the rack IT devices (e.g., server, switching hub) and power devices (e.g., PDU). c. User can easily configure the IT devices by dragging and dropping the asset component to the U position in a rack. d. The rack component can display the relative color based on the assigned temperature or humidity sensor.
16	Slide Show Module:	The management system provides the methodology to cooperate with the monitor screen, projector and video wall to project the designed layout plans to the assigned screens automatically: A. It provides transparency to Data Centre key performance indicators and business metrics, which displays customizable information for a high-level overview of Data Centre operations. B. It can operate without user intervention. The slide show module starts up automatically when the system boots up and projects the layout plans alternatively. C. It has the ability to run the slide show module in different PCs and project the different layout plans for different management purposes.
17	Architecture	The Proposed DCIM should be created in separate installations to maintain sanctity of data as follows: a. Gateway/Convertor Devices: Required for connecting to third party BMS/ third part etc. b. Monitoring layer: Responsible for polling all Monitoring Points c. Infra Mgmt. Layer: Responsible for Analytics and Insightful data analysis of DCIM data points. d. Cooling optimization AI Layer for Control of Perimeter coolers
18	VLAN	For all Data Centre Infrastructure components including all Field level devices, Third Party BMS/BMS controllers, Rack Mount PDU, Energy meters, VESDA, Panel Meters etc. the Subnet should be the same so that all the devices are able to ping each other and are easily discovered. If possible, they should be in the same VLAN along with complete DCIM solution.
19	Gateway/Convertor	The Gateway/Convertor so proposed to integrate third party BMS/BMS controllers and Field devices over Modbus /Modbus TCP, BACNET/BACNET-IP and Lon.
20	Hardware Specification	The Gateway/Convertor should employ a modular I/O design to allow expansion of the unit to incorporate more Field devices if so, required in future for AI /AO /DI /DO. This input and output capacity is to be provided through plug-in modules of various types.

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		DCIM solution shall have an inherent multi-protocol conversion gateway or DCIM vendor should provision for a similar hardware/software-based gateway as may be required as per client site requirements. To ensure no last-minute surprises and no cross-vendor device communication issues on site the gateway should be manufactured by same OEM whose DCIM is being proposed in this tender and integrated back to DCIM. The gateway so proposed should allow to run all protocols through it at the same time (through that one device the system should allow integration to a chain of LON devices, chain of Modbus Device and also a chain of BACNET devices at the same time). The gateway so proposed has to be DIN Rail mounted device and not a Rack mountable design. The field level devices will terminate in panels not inside Racks inside the Data Centre hence the device has to be mounted inside wall mounted panel. The Gateway shall support simultaneous exchanges on its various protocols, essentially meaning you can use all protocols at once and it should be able to run BACNET, LON and Modbus at the same time and also provide capability to convert BACNET to Modbus TCP which may be required for seamless Building side integrations. Every hardware input and output point, hosted within the Gateway and attached I/O modules, shall be trended automatically without the requirement for manual creation, and each of these logs shall log values based upon a change-of-value and store at least 500 trend samples before replacing the oldest sample with new data. The operating system of the NSC/AS, application programs, and all other portions of the configuration database, shall be stored in non-volatile, FLASH memory. AS/NSC shall contain enough memory for the current application, plus required history logging, plus a minimum of 20% additional free memory. This Gateway will support both script text-based programming language as well as the graphical function block programming language. For both languages, the programmer will be able to configure application software for custom program development and write global control programs. The Gateway so proposed should not have IPMI functionalities or IT Server access functionalities on the same box as that again contradicts the whole idea of having Field devices managed at Panel Level. Gateway so provided has to be dedicated for Field devices only. The Gateway so provided has to be compliant with ASHRAE 135-2004 and should be BTL-listed as a BACnet Building Controller (B-BC) at the least. The Gateway shall have a built in FTT-10 port to communicate to the TP/FT-10 Lon Works / SNMP / Mod-bus network. The Gateway shall comply to Emission Norms: EN 61000-6-3; FCC Part 15, Sub-part B, Class B

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		The Gateway shall include a battery-backed, real-time clock, accurate to 10 seconds per day. The RTC shall provide the following: time of day, day, month, year, and day of week. Each Gateway will allow for its own UTC offset, depending upon the time zone. When the time zone is set, the Gateway will also store the appropriate times for daylight savings time.
21	Monitoring Points	Proposed DCIM solution should be designed with a top- level 10/100bT Ethernet network, using the BACnet®/IP, Lon Works®/IP, SNMP, and/or Modbus® TCP protocol.
22	Third Party system Integration	DCIM platform should also be capable of pushing monitored device information to any Third-Party NMS system using SNMP INFORM / REQUEST procedures and to third party BMS system using Modbus / SNMP / SNMP Trap TCP out channel and also support Web services programming interface.
23	Email Server Integration	DCIM Monitoring Layer server/VM system should allow integration of client email server via SMTP channel.
24	Alarm Status Tracking	DCIM Monitoring layer should have Alarm filters in the Monitoring dashboard. The solution provides alert compression and advanced alerting algorithms including deviation from normal and time over threshold to help reduce false positive alarms.
25	Trend Analysis	Should offer Graphical trending analysis for historical data pertaining to day, week, month, year and user defined durations.
26	Rule Creations for Threshold Alert	Proposed DCIM solution should allow for custom logics for creating Rules of Escalation and Email alerts for various devices based on alarm severity and priority.
27	Auto Timed Reporting	DCIM Monitoring Layer should allow for Auto Timed/Scheduled Report Emailing to selected audience on required key performance indicators. These Reports should be mailed to relevant users as CSV format.
28	Low End UPS Monitoring	If in case client buys UPS from the DCIM OEM bidder which do not have SNMP cards but are managed through serial console cables connected directly to systems powered by the same UPS, the proposed DCIM shall allow integration of those devices as well. Any separate plugin so required shall be bought by client as and when required but DCIM should offer back integration to the same.
29	Virtual Machine Migration	DCIM should be scalable to offer plugins to allow safe shutdown for Virtual Machines and Virtual Machine Migration. The safe shutdown feature should support VMWARE and Microsoft HYPER-V formats. For sites where the UPS are also from the same OEM as the DCIM the functionality should be made available day one to the client. For sites where the UPS are not from the same OEM the functionality should be made available as and when client buys UPS from the same OEM for future integration. Non availability of such a capability will be considered as Non-Compliance as client reserves the right to opt for it or not (as per the availability and future scalability on UPS side)
		This Plugin for Safe shutdown of Virtualized Infrastructure should support the following UPS configurations for alerting: Single UPS, Redundant UPS and Parallel UPS.
		This Plugin for Safe shutdown of Virtualized Infrastructure should support Event logging - Pinpoint the timing and sequence of events leading up to an incident with the event log.

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
30	Converged management layer	This Plugin for Safe shutdown of Virtualized Infrastructure should help prevent possible data corruption by performing graceful, unattended operating system shutdown in the event of an extended power outage or computer power problem.
		It should allow the operator to run command file - Run command file on network shutdown sequence as well as start-up sequence.
		It should facilitate Sequenced Server Shutdown - Sequences the shutdown of multiple servers powered by the same UPS to extend runtime for higher priority servers.
		Converged Management Layer concept arise from the fact that irrespective of various underlying components like Power, Cooling, Network, U space all of them have to converge to a single unified system. This System should facilitate the complete Lifecycle approach for Data Centre involving:
		a. Analysis
		b. Design
		c. Implement
		d. Operate
		e. Evaluate
		DCIM Management Layer will have the capability to lay out in the Data Centre model accurately represents the real-world physical environment of the room. This includes any physical attributes of the room such as size, shape, doors, windows, aisles, containments, false floor creations, false ceiling creation and ability to duct the Racks, Containments and CRAC units to False ceiling as per site requirements.
		DCIM Management Layer should have an ability to import an AutoCAD 2013/other software .dwg floor drawing and display the floor layout. Rooms can be created based on wall detection on the AutoCAD drawing. This is different from the usual SVG / Raster Imaging used and should not be mixed with that which has been provisioned for Monitoring Layer only.
		User will have the capability to toggle on/off for each Layer of AutoCAD/other software imported inside DCIM.
		DCIM Management Layer should offer back export of the Data Centre design created or modified within DCIM in CAD/other format.
		DCIM Management Layer should have a combination of thick client and thin client version offering at least the following functionality:
		a. Web view should offer the capability to create User Access control for various views of the system.
		b. Thick client view (the downloadable client) should offer a more advance view of the complete Data Centre starting from birds eye view to reach component level view.
		The web client view of the DCIM should offer at least the following functionalities:
		a. Perform simple rack inventory edits.
		b. Perform quick search and view simultaneous rack front/rear view for the Data Centre.
		c. User Access Control and license management

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		d. User Experience customization like Logo and color themes.
		e. Customize the language of operation
		DCIM Management Layer will be able to provide a product catalog that contains up-to-date floor and rack mounted Data Centre equipment having drag & drop functionality to populate devices & design DC floor layout within the system as per physical layout/actuals.
		DCIM Management Layer should offer inventory and mapping of Direct Current Powered devices like Fuses, Rectifiers along with AC powered. This means that user should be able to create a Power path with both types of sources at the same time if required.
		The DCIM tool will have the capability to render the floor layout in both 2D and 3D view.
		DCIM Management Layer should offer extensive Visual network management and representation of cable route from server to switch. It will show free and occupied ports on servers, switches, and patch panels. See a graphical overview of available network capacity.
		DCIM Management Layer should offer capability to create Cages on Data Centre floor and visualize the same in both variants: a. Glass cage b. Mesh Cage c. Solid wall
		DCIM should offer complete information on the layout view for the following parameters: a. Empty Racks
		b. Filled Racks: stating the Racks are being used by a Process/Client
		c. Reserved: Racks reserved for a specific Process/Client
		d. Internal Use: Racks reserved for some Internal requirements
		With reference to Space Management in Data Centre, DCIM should offer following information on the layout view for the following parameters:
		a. Room Area
		b. Reserved Area: For specific Process/Client
		c. Closed: Area filled already and is not available
		d. Internal Use: Area used by Internal Racks
		e. Space Efficiency: Ratio between Room Area and sum of Reserved Area, Closed Area and Reserved Area.
		The proposed solution must offer intuitive, color-coded drawings in both plan and rack elevation views which allows users to:
		- View Rack U-space availability
		- View Rack Power availability
		- View Rack weight/Floor Loading
		- View Raised Floor & Rack space utilization

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
31	Sandbox Testing	DCIM Management Layer should offer a dedicated Test Environment within the same solution which can import the live Data Centre 3D layouts and all power, cooling, network and u space details into a separate Sandbox Test Model without impacting the live functionality of the Management Layer. This will be used to simulate to simulate different scenarios, for example, whether the design is strong enough to cover your future requirements. If you continue to add equipment at the current pace, would the power supply suffice, or would you need additional power supplies or cooling units; would you continue to have the necessary redundancy, etc. Changes to these lab models should not affect the model of the actual live environment in Core DCIM Management Layer.
32	Predictive Analysis	Predictive Analysis/What If Analysis & Hypothetical Provisioning/Modelling to ease decision making (such as: where is the best place to put new server, do my dc have sufficient power, cooling & space to occupy new equipment, etc.)
33	Power Path Map	Power Path: Ability to model power connections between the equipment supplying and delivering power and the equipment requiring power. This includes power path from switchgear, UPS, main PDU with modular circuit breaker mapping, rack RPDU and to individual servers.
34	Impact Simulation	Impact simulation: Generates a list of equipment that would be impacted if the selected piece of equipment, e.g., a UPS or cooling unit, about to fail or put in maintenance mode.
35	Tool	The DCIM tool shall have a dedicated Equipment browser view where device Fields can be customized and sorted as per user need. It should allow for export of these data fields in the same format in a CSV file which can be opened in Excel as set by the user in the Equipment browser and also to save these formats for later use inside the DCIM.
		The DCIM tool shall have an inbuilt Recommendation Engine that keeps on checking the various aspects of Data Centre design like:
		Max Rack Load exceeded
		Equipment weight Exceeds weight limit of floor Room doesn't have enough Airflow
		Amount of Rack PDU Power Outlets has not been Configured
		An Invalid Power Path has been Configured Associated Device Data has been Lost
		Capacity Group Equipment is Placed in Multiple Rooms Connection has not been Configured between PDU and Power Supply
		Connection has not been Configured between Power Panel and Power Supply Connection has not been Configured between Remote Distribution Panel (RDP) and Power Supply
		Equipment Connected to this PDU Draws more Power than is Supported by the Power Supply Breaker
		Equipment Connected to this Power Panel Draws more Power than is Supported by the Power Supply Breaker Equipment Connected to this Remote Distribution Panel (RDP) Draws more Power than is Supported by the Power Supply Breaker

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		Equipment in this Rack Receives Power from Multiple Power Supply Devices
		Equipment is Connected to a Rack PDU Outside this Rack Internal Redundancy Setup for UPS and Group Must Match PDU and Connected Rack PDU are Placed in Different Rooms
		PDU Output Voltage has not been Configured
		Power Connection Configuration is Invalid for Equipment in one or more Racks in the Group
		Power Feed Connection for UPS and Group must Match Power Panel Output Voltage has not been Configured
		Rack's Estimated Load Exceeds Group's Peak Load Settings
36	Data Centre Thermal Analysis & Design	The graphical floor plan of the configured Data Centre layout should include overlays showcasing capture index (CI), plenum pressure, plenum velocities, and 3D rendering of the temperature map, including airflow and temperature thresholds. As the design takes place, client will get a qualified estimation of the effect of changes in supply temperature, airflow, and number of cooling units and room-based cooling parameters. The data is expected to be
		simulated on the basis of plate rating of various cooling devices, racks, perforated tiles, grilles etc.
		The Cooling overlay of the Data Centre floor layout should show a color-coded overview of the Capture Index to give client an overview of the reasons why the tile airflow may not be the same across the room. Each rack in a well- formed hot aisle / cold aisle layout should show a capture index percentage.
		It should also offer dedicated Overlay to show Floor Plenum to help client drill down into looking at specific velocity issues in the plenum and estimate perforated tile airflow rates. In designing the layout whenever a client drags in a new cooling unit or moves a perforated tile, the flow vectors and perforated tile flow rates should update instantly on the Plenum view on the DCIM.
		In the 3D view, client should be able to see the room's simulated airflow above the raised floor. Velocity vector and temperature results should look like those from traditional CFD applications and provide the same ability to quickly locate problem spots and understand the underlying causes.
		DCIM application should provide design capability of hot aisle and cold aisle ducted to ceiling scenario creation. It should also incorporate other components like Blocking walls, pillars for creation of Data Centre design so that it comes as near to real scenario.
		placed on Rack Mounted Trays and at the same time CFD like Model should be able to detect airflow around those
		DCIM thermal model should incorporate Thermal calculations utilizing both mechanisms: Simulated and Real Time T/H sensor polling. User should have the ability to simulate his Data Centre on any of them at any time and see Thermal Maps in X, Y and Z Planes.
		placed on Rack Mounted Trays like Modems stacked on a Tray.

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		DCIM 3D model should allow for PAN, ZOOM, and Rotate the Data Centre views as per user requirement.
		DCIM thermal model should allow Third Party Building Management Rack T/H sensors also to be utilized for calculating Thermal Maps apart from the DCIM OEM's own T/H sensors.
		Commissioning: The solution should provide provisions to recommend the best location for a server in the rack layout, utilizing available space, cooling, and power capacity
37	Change Management	The DCIM tool should enable operators to gain control over the Data Centre environment by implementing organized moves, adds, and change work processes by providing workflow system that can develop and assign work orders, reserve space, track status, and provide a historical audit trail.
		Ability to assign deadline and person to each work order.
		Ability to create multiple tasks and track task status for each work order.
		Ability to create work order templates that can be used for recurring work types like maintenance activities or standard procedure for installation of a certain type of server.
		Support workflow management that should allow for easy implementation and tracking of organized moves, additions, and changes.
		Support audit trail reporting that would show asset moves, additions, and changes by date/time, owner, and work orders.
		DCIM should allow for Integration with Dedicated Change Management Systems like BMC Remedy and Service Now as and when required.
		Every network management change should be recorded in audit trail report
		It should allow for Auto Scheduled Work Orders which can regenerate certain Service Work orders like Service Schedules for CRAC units which must renew themselves every Quarter or Yearly etc.
38	Energy Management (PUE & DCiE)	The application should provide real time Power Usage Effectiveness (PUE), DCiE values and able to deliver Weekly, Monthly, Quarterly & Yearly PUE report.
		DCIM should be able to deliver the cost and CO2 emission per subsystem where subsystem data can either be measured (live) or computed (without power meters). It should showcase graphs for IT load, current PUE/DCiE, historical PUE/DCiE, costs and CO2 emission per subsystem.
39	Advance CRAC Automation with Control	DCIM should have provision for a closed-loop system that reacts to real-time data from the temperature sensors and is able to control existing client PAHU/ In row cooling units (DX/CW) irrespective of OEM. Data may be wirelessly transmitted to network gateways, aggregated, and sent to a purpose-built appliance where it is analyzed by control software which in this case would be one of the Modules of DCIM. Control commands are then delivered to the cooling equipment. As IT load changes, the built-in machine learning automatically adjusts cooling output of cooling units to match the dynamic Data Centre environment.

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		Utilizing Cooling Automation client will be able to automatically identify and eliminate hot spots and diagnose potential facility risks proactively and get a Hard Positive ROI.
		This Module will be able to control and put the HVAC units in Software driven and Manual Mode as required in certain instances.
		The Module will be responsible to create Cooling Influence Maps for the Data Centre, clearly showcasing the Influence of specific HVAC units on certain regions across the Data Centre. This would help the client in identifying which HVAC to run at any point of time.
40	Dashboard & Reporting	Reporting and Dashboard Proposed platform should offer Dashboard & Reporting on Data Centre key performance indicators, displaying customizable information for a high-level overview of Data Centre operations.
		We understand that certain DCIM systems may have restrictions to the number of points being Trended so to keep it logical the OEM will have to provision for trending and reporting parameters on site as per their mutual discussion during Pre-Installation Survey. At minimum DCIM should provide Trending and Reporting for the following:
		PUE
		Total Facility Load Total IT Load
		Total Cooling Load Row wise IT Load Rack wise IT load
		Average Temperature and Humidity for Cold Aisle (at Rack Inlet-3ft)
		Average Temperature and Humidity for Host Aisle (at Rack Exhale-3ft)
		Communication Status for Infrastructure devices being monitored
		Depending on the device for which EM has been installed: Energy Meter: Per Phase Input Current and Voltage Energy Meter: Per Phase Output Current and Voltage Energy Meter: Power Factor per Phase
		Energy Meter: Frequency
		Energy Meter: Active Energy (kWh/MWh)
		Especially for UPS:
		UPS Per Phase Load percentage UPS Input Power
		UPS Output Power
		UPS Time Running on Battery
		CRAC/Inrow: Supply Air Temperature CRAC/Inrow: Return Air Temperature CRAC/Inrow: Supply Air Temperature Set point CRAC/Inrow: Supply Air Humidity Set point
		For Diesel Generator:
		Diesel Generator: Per Phase Voltage Diesel Generator: Mains Frequency Diesel Generator: Genset Frequency Diesel Generator: Engine Speed (rpm) Diesel Generator: Oil Pressure Diesel Generator: Oil Temperature Diesel Generator: Fuel Level Diesel Generator: Running Time

Data Centre Infrastructure Management (DCIM)		
Sr. No.	Parameter	Minimum Requirement
		For Chiller: Chiller: Inlet water temperature Chiller: Outlet water temperature Chiller: Chilled water Inlet set point Chiller: Chilled water Outlet set point Chiller: Chilled water Pressure at Inlet Inventory Reports
		Audit Trail Report: that lists actions recorded in the application, whether those actions were in response to work orders, or changes made to the Data Centre model.
		Network Summary Report: with an overview of network connections per rack in the selected rooms. The report should list layer 2/3 network gear (such as switches) and layer 1 network gear (patch panels) as well as a summary per rack of mapped and unmapped routes equipment that is connected to a network (such as a server or PDU).
		Rack U Space Report: to review the amount of available positions in specified racks for equipment that takes up one or more U positions.
		Rack wise Power Cost Report: showcasing per Rack kWh, Unit Rate and the Cost of running per Rack basis.
		As an underlining to above parameters client expects to see these parameters and more provided the same are made available inside the DCIM through the field devices or through third party BMS which may have been integrated to DCIM.
41	Software	The management system should be centralized server appliance that can be accessed remotely from client workstations/servers via a HTTP/HTTPS connection or Windows client. Energy, Slide Show, Asset, Capacity, Work Order, Analytics, Asset Inspection and Incident Management modules are optionally offered by the management system. 1. On Demand Expendable Architecture of Modules on running DCIM without any downtime. 2. It should support perpetual License. 3. All the Modules Real Time Monitoring, Asset Management and PUE should be in same dashboard. 4. It should support the SNMP, Modbus TCP, Modbus RTU, OPC, Database, RTSP, ONVIF protocols directly. 5. Layout for Camera Monitoring should be on same interface of DCIM and should be configurable for reaction rules like camera popup for any Alarm. 6. Layout should be same for Application and Web UI. 7. Mobile monitoring application for Real time health monitoring and alerts of assets.

10.38 Roof Top Solar Power Generation System

Roof Top Solar Power Generation System		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope covers supply, installation, testing and commissioning of the solar system to generate power to save energy cost and utilized the maximum space of the terrace without affecting serviceability parameters of chiller and any other components which has been planned on terrace. *Note: The bidder must follow the guidelines set by UD & UHD of Govt. of Gujarat for Comprehensive development Control Regulations – 2017 and any amendment there to.
2	General	The average hours of operation/day of the inverter should be 12 hrs. per day as per climatic condition and irradiation for grid tie system The PV modules should convert the light reaching them into DC power. The amount of power they should produce roughly proportional to the intensity and the angle of the light reaching them. It should require positioning to take maximum advantage of available sunlight within string constraints. The bidder should position the PV modules in such a manner that the maximum power shall obtained with the sun's movements during the day. The Photovoltaic modules should be qualified as per IEC 61215 (revised) standard and in addition, the modules should conform to IEC 61730-1 requirements for construction & Part-2 requirements for testing, for safety qualification. The test certificates should be from any of the NABL/BIS Accredited Testing Calibration Laboratories Minimum Module efficiency shall be 15.2% Supplier shall follow the latest engineering practice; ensure long-term compatibility requirements and continuity of equipment supply and the safety of the operating staff. Stabilized net output of the Solar PV Array for the Solar Power System should not be less than the nominal design level for the System under Standard test Condition The PV module shall perform satisfactorily in humidity with temperature between -10 deg. C to +50 deg C and with stand wind dust as per MNRE norms from back side of the panel. Photo / electrical conversion efficiency of the modules of SPV module shall be greater than or equal to 15.2 %. Since the modules would be used in a low/medium voltage circuit, the insulation test shall be carried out on each module and a test certificate to that effect provided. The bidder shall indicate minimum efficiency The panel should have positive tolerance of 0 to +5 Wp, Maximum output voltage shall not exceed 1000V. The PV modules shall be suitable for continuous outdoor use. PV module shall be provided with frame of anodized channels for size and simplicity in installation offered as a single module or series parallel combination of modules. The PV module shall be provided with screen-less frame with solar cable and connector. The module frame, if any, shall be made of a corrosion-resistant

Roof Top Solar Power Generation System		
Sr. No.	Parameter	Minimum Requirement
		material which shall be electrolytic ally compatible with the structural material used for mounting the modules.
		The PV modules shall be made of light weight cells, resistant to abrasion, hail impact, rain, water and environmental pollution. The PV modules shall be provided with anti-reflection coating and back surface field (BSF) structure to increase conversion efficiency
		The PV module shall use lead wire with weatherproof connector for output terminal
		The power output of the PV system under Standard Test Conditions (STC) should be sufficient to meet the requirement and the required power made of suitable module size depending upon manufacturer prudent practice with required output voltage. The number of modules to be supplied shall be worked out accordingly
		The terminal box on the module should have a provision for opening for replacing the cable, if required. The module shall be provided with a junction box with provision of external screw terminal connection and with arrangement for provision for by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points. They should be proper, shock proof, corrosion resistant & safeties provision for cleaning, repair & maintains/ replacement around the array of modules installed
		The bidder should consider below parameters while designing the solar system: 1. PV array shall be installed in the proposed space free from any obstruction and/or shadow. 2. PV array shall be installed utilizing maximum space to minimize effects of shadows due to adjacent PV panel rows. 3. Adequate spacing shall be provided between two panel frames and rows of panel to facilitate personal protection ease of installation, replacement, cleaning of panels and electrical maintenance. 4. PV array shall be oriented in the south direction at a tilt angle of with maximum possibility of solar power harness. In order to maximize annual energy yield of the plant. 5. Ample clearance shall be provided in the layout of the inventor and DC/AC distribution boxes for adequate cooling and ease of maintenance.
		The design of placement of the chiller and solar should allow for ventilation for chillers, and also ease of cleaning and maintenance of panel as well as cleaning of terrace.
		The height of each PV panel structures shall not exceed 4m above the terrace ground level.
		Each array structure of the PV yard should be grounded properly as per IS: 3043-1987. In addition, the lighting arrester/masts should also be provided inside the array field. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian electricity Act. /IE Rules.

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Sr. No.	Parameter	Minimum Requirement
		The earth Resistance should be tested in presence of the representative of CLIENT/ENGINEER-INCHARGE after earthing by calibrated earth tester. PCU, ACDB, DCDB, supporting structures should also be earthed properly. The earth resistance shall not be more than 5ohms. It shall be ensured that all the earths are bonded together to make them at the same potential
3	Parameter of the PV panel	Rated Power at STC: 500 Wp and above
		Module Efficiency at STC: 20%
		Open Circuit Voltage - Voc (Volts): 51.7
		Short Circuit Current - Isc (Amps): 12.17
		Max Power Voltage - Vpm (Volts): 43.7
		Max Power Current - Ipm (Amps): 11.56
		Temperature Coefficient of P _{MAX} : 0.35%/deg C
		Temperature Coefficient of V _{OC} : -0.25%/deg C
		Temperature Coefficient Rated Power: 0.41%/ deg C
		Noct (Normal Operating Cell Temperature): 410 ± 30C
		Number of Cells and Cell Type: 72cells Poly crystalline solar cells (156 x 156 mm)
		Dimensions (LXWXH) in mm: 2187×1102×35 mm (approximately)
		Weight: 30.1 kg (approximately)
		Front Glass: 2.0 mm (0.08 inches), High Transmission, AR Coated Heat Strengthened Glass
		Embedding: EVA
		Back Sheet: 2.0 mm (0.08 inches), Heat Strengthened Glass (White Grid Glass)
		Junction Box: protection IP 68 rated
		Number of Bypass Diodes: 3
		Cables: As per OEM recommendation
		Connectors: MC4 EVO2 / TS4*
		Operating temperature range: -40~+85°C
		Max. System Voltage :1500 V DC (IEC)
		Max. Reverse Current: 25 A
4	Solar Inverter / Power Conditioning Unit (PCU)	The DC power produced from SPV module should fed to inverter for conversion into AC power. The output of the inverter must be pure sine wave AC voltage of 415V and frequency of 50Hz
		The inverter control unit shall be so designed so as to operate the PV system near its maximum Power Point (MPP), the operating point where the combined values of the current and voltage of the solar modules result in a maximum power output. The capacity of solar charge controller should be meet the efficient utilization of the total SPV module. In this case the bidder shall have the option to give a separate charge controller unit for obtaining maximum utilization of the SPV module. If the bidder chooses a separate

Roof Top Solar Power Generation System		
Sr. No.	Parameter	Minimum Requirement
		charge controller, then he should submit the supporting calculation and documentation including test certificates for approval along with technical bid
		The Unit shall be capable of synchronizing independently and automatically with grid power line frequency to attain synchronization and export power generated by solar plant to grid.
		The nuts & bolts enclosure and accessories shall have to be adequately protected taking into consideration the atmosphere and weather prevailing in the area and should be SS.
		All doors, covers, panels and cable exist shall be gasketed or otherwise designed to limit the entry of dust and moisture. All doors shall be equipped with locks
		An energy meter with AC distribution board (ACDB) shall be provided for accounting and also have to provide energy delivery for the customer as per the latest power company requirements. The MCB used in the ACDB should be sufficient to carry the full load current. The minimum rating of the above is 6 Amp
5	Software	The PV system software and control system shall be equipped with following protections such as under and over voltage conditions, surge protection, reverse power relays PV systems shall be provided with adequate rating MCB on inverter input side (DC) as well as output side (AC) side for overload and short circuit protection and disconnecting switches to isolate the DC and AC system for maintenances are needed. Fuses of adequate rating shall also be provided in each solar array module to protect them against short circuit. Suitable DC Distribution board (DCDB) with MCB etc. shall be provided on inverter input side (DC). The MCB used for this purpose should be sufficient to carry the full load DC current safely. Protection against lightning shall be provided and all the metal parts shall be earthed. RCCB of proper rating shall be provided.
6	Cables	Power Cables of adequate rating shall be required for interconnection of: o Modules/panels within array o Array & DCDB o DCDB & Charge Controller/inverter o Inverter & ACDB o ACDB & Switch boxes
		The permissible voltage drop from the SPV Generator to the Charge controller shall not be more than 2% of peak power voltage of the SPV power source (generating system).
		The cable with suitable rating from PV module to inverter and then to ACDBs shall be provided by the bidder as per the site requirement
7	Monitoring	The data logging provision should provide for plant control and monitoring, time and date stamped system data logs for analysis with the high quality. Metering and Instrumentation for display of

Roof Top Solar Power Generation System		
Sr. No.	Parameter	Minimum Requirement
		systems parameters and status indication to be provided by the bidder.
		The following parameters shall be accessible via the operating interface display in real time separately for solar power plant: AC Voltage, AC Output current, Output Power, Power factor, DC Input Voltage, DC Input Current, Time Active, Time disabled, Time Idle, Power produced, Protective function limits (Viz-AC Over voltage, AC Under voltage, over frequency, under frequency ground fault, PV starting voltage, PV stopping voltage).
		The bidder should consider digital energy meters to log the actual value of AC voltage, Current & Energy generated by the PV system provided. Energy meter along with CT/PT should be of 0.5 accuracy class
8	Standard	Standards: IEC61215/IEC61730/IEC61701/IEC62716/UL1703 ISO 9001: Quality Management System

10.39 Elevators

Elevators		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes elevator / Lift system with installation bracket, civil work, different type of cable, installation and testing. The bidder should consider all required accessories and other activities that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	The whole traction machine shall be mounted on appropriate anti-vibration supports to minimize noise and vibration
		The brake plunger, collar, sleeve, motor, sheaves and all bearings shall be mounted and assembled so that proper alignment of these parts is maintained. The assembly shall be reviewed and rectified when excessive noise is emitted during operation.
		The lift machine shall be suitable for 415-volt 3 phase 50 Hz AC supply with a voltage variation of +10% and -20% and shall be placed directly above the hoist way on steel beams resting on machine room floor slab. The lift machine shall have high efficiency and low power consumption and shall be designed to withstand peak currents in lift duties. Means for manual operation of the lift car shall be made by providing winding wheel suitably marked to indicate the direction of the movement to enable the lift car to be brought to the nearest landing. There shall be a warning display for switching off electrical supply before the manual operations.

Elevators		
Sr. No.	Parameter	Minimum Requirement
		The Lifts shall have state of art microprocessor-based AC variable voltage variable frequency drive. Some of the technical parameters required are innumerate below. a) Starting current 1.2 - 1.5 times full load running current b) Power saving 50 - 55% c) Leveling accuracy ± 3 mm d) Acceptable voltage fluctuation +10 to - 20%
		The lift shall be provided with attendant control facilities. A key switch for change of operation mode shall be provided in a lockable recess panel on the car operation panel. After gaining control on the lift, the attendant can direct the car to stop at any story. The attendant can also by pass the landing calls (but not cancel them) or reverse the direction of travelling.
		A Load weighing devices located either on car top or under the car cage shall be provided for all lifts. Whenever the load exceeds 60-70% of the capacity load of the lifts, the lifts shall ignore all landing calls and only respond to car calls.
		A load weighing devices shall operate when the load in the car exceeds the rated capacity. The operation of the device shall activate buzzer sound and flashing overload' signals. At the same time the car doors shall be prevented from closing. When the excess load has been removed from the car, the buzzer alarm shall be muted automatically, and the car shall function normally. The sensitivity shall be 30 kg for Passenger lift.
		All lifts shall be provided with automatic self-levelling feature that shall bring the lift car level to within ± 3 mm for passenger elevators of the landing floor regardless of load or direction of travel. The automatic self levelling feature shall correct for over travel and rope stretch.
3	Controller	The controller shall be mounted on the side of the top of lift shaft, vertical, totally enclosed cubicle type with hinged doors on the front provide easy access to all components in the controller. Cubicle shall be well ventilated such that the temperature inside never exceeds the safe limits of the components at ambient room conditions. The controller shall operate within the supply voltage variation of plus 10% to minus 20% of the nominal voltage. The Controller shall be including protection against the following abnormalities and shall cut off the power supply, apply the brake and bring the car to a rest in the event of any of the abnormalities occurring. a) Over current b) Under voltage c) Overvoltage d) Single phasing e) Phase reversal f) Earth leakage

Elevators		
Sr. No.	Parameter	Minimum Requirement
4	Standards	Code of Practice for installation, operation and maintenance of electric 1. passenger & goods lifts.IS-14665 (Part 2) Sec-1 :2000 2. Code of practice for installation, operation and maintenance of electric service lift.IS-14665 (Part 2) Sec-2: 2000 3. Safety Rules Section-1 Passenger and Good lifts IS-14665 (Part 3) Sec-1: 2000 4. Safety Rules Section-2 – Service Lifts IS-14665 (Part 3) Sec-2: 2000 5. Outline dimension for electric lifts. IS-14665 (Part-1): 2000 6. Inspection Manual for Electric Lifts IS-14665 (Part 5): 1999 7. Electric Traction Lifts – Components 8. Installation And Maintenance of Lifts for Handicapped Persons (Code of Practice) IS-14665 (Part 4) Sec-1 to 9 :2001IS 15330 :2003 9. Specification for lifts cables. IS-4289 (Par-1): 1984 Reaffirmed 1991 10. Specification for hot rolled and slit steel tee bars. IS-1173-1978 Reaffirmed 1987 11. Method of loading rating of worm gear. IS-7443-1974 Reaffirmed 1991 12. Code of practice for selection of standard worn and helical gear box.IS-7403-1974 Reaffirmed 1991 13. Isometrics screw threads. IS-4218-(Part-II)1976 Reaffirmed 1996 14. Degree of protection provided by enclosure for low voltage switchgear and control gear. IS-2147-1962

Elevators		
Sr. No.	Parameter	Minimum Requirement
		15. Classification of insulating materials for electrical machinery and apparatus in relation to their thermal stability in service. IS-1271- 1985 Reaffirmed 1990 16. Code of practice for earthing. IS-3043-1987 17. Electrical installation Fire Safety of Building. IS-1646-1997 18. PVC insulated electric cable for working voltage up to and including 1100 volts.IS-694-1990 19. Code of practice for electrical wiring and installation IS-732-1989 20. PVC insulated (Heavy Duty) electric cables for working voltage up to and including 1100 volts. IS-1554-1988 (Part-1) 21. Flexible steel conduits IS-3480-1966 22. Accessories for rigid steel conduit for electrical wiring IS-3837-1976 23. Boxes for the enclosure of electrical accessories IS-5133-1969 (Part 1) 24 Guide for safety procedures and practices in electrical work. IS-5216-1982 (Part-1) 25. Conductors for insulated electric cables and flexible cords IS-8130-1984 26. Miniature Circuit Breakers IS-8828-1996 27. Rigid steel conduits for electrical wiring (Second revisions) IS-9537- 1981 28 Methods of test for cables IS-10810-1998 29. Earth Leakage Circuit Breakers. IS-12640-1988 30. Molded Case Circuit Breakers IS-13947-1993 31. General requirement for switchgear and control gear for voltage not exceeding 1000 volts.IS-13947-1993 32. 1100volt grade XLPE insulated armored cables IS 7098 33. Specifications for hoist way door-locks IS 7754-1975 34. Rules for design, installation, testing and operation of lifts, escalators and moving parts.IS 1735-1975 In addition the relevant clauses of the following, as amended up to date shall apply. a. The Indian Electricity Rules 1956 b. The Indian Electricity Act 1910 c. Fire safety regulations pertaining to lifts

10.39.1 Passenger Lift

Passenger Lift		
Sr. No.	Parameter	Minimum Requirement
1	Type of lift	12 Passenger Gear less Machine Room Less Type Elevator
2	No. of lifts required	Three Nos. to feed 07 floors with the rise of 29 mtrs Approximately
3	No. of person & Load to be carried	12 Passenger (1050 Kgs)
4	Hoist way Available	As per civil architecture
5	Name of floors to be served	Ground, First, Second, Third, Fourth, Fifth and Sixth Floor (Terrace)
6	Operation	Microprocessor based Triplex collective full collective Selective operation with or without attendant
7	Speed	1.75 Meter/ Sec
8	Drive	Variable voltage variable frequency (V3F)
9	Entrance	One at each floor level and same side only.
10	Doors	Automatic Centre / side opening Door panel of 800mm Wide x 2100mm H of Stainless Steel in Hairline finish
11	Machine	Gearless Machine shall be placed directly in the overhead area above the lift shaft.
12	Location of machine	In the lift shaft as per Manufacturer design.
13	Size of car platform	1100 mm W x 2000 mm D x 2300 H / As per IS to suit the well sizes
14	Design of cars body	Constructed out of Stainless Steel in Etched Finish Car and Car Doors with Stainless Steel handrail.
15	Flooring	Granite Flooring
16	light and fan	Florescent tube light fitting to have daylight effect inside the Car cabin. Fan/blower as per manufacturing enriched design.
17	Car position indicator	Floor position indicator at all floors along with direction of travel indicator.
18	Power supply	Power supply shall be provided as under: A. 415 volts, 3 phase, 4 wires 50 Hz B. 230V, Single Phase, 50 Hz for lighting. C. All electric cables, controls switchgears should be strictly as per ISI.
19	Foundation	The machine will be placed directly above the Overhead area in the hoist way and machine resting arrangement will be provided by the tenderer.
20	Depth of lift pit	1600 mm.
21	Guide rails	The guide rails should be steel dually toughened and ground section to ensure position tract and smooth running of the elevator.
22	Over Head	4800 mm contracts surface of the correcting fishplates and back of the guide rails and sills should be accurately machined to form smooth joints and lading sills should be used for fastening guide rails.
23	Rope Fastening	Main hoist ropes with self-lubricating which shall be for safer and protective run and with adequate section and shall be provided into the sockets of spring-loaded self. Thumbless of spring permit adjustment of uniform rope tension for smooth operation of the elevator.

Passenger Lift		
Sr. No.	Parameter	Minimum Requirement
24	Signals	(A) Luminous hall buttons at all floors.
		(B) Digital hall position indicators at all floors.
		(C) Car operating panel with luminous floor buttons
		(D) Digital car position & Direction indicator.
		(E) AC/ DC VF Door Drive.
		(F) Emergency light & emergency alarm through inverter (Rechargeable batteries).
25	Type of buffers	Spring buffers or as per suppliers design
26	Specification	IS: 4666. 1968 for electric passenger lifts and shall further Comply to IS: 1860:1960, IS: 63831, 1971, IS: 732: 1963 and Bombay lift act 1943 amended up to date.
		a. In case of earth quake or seismic waves is found lift will go to the home floor and open the door.
		b. Automatic rescues device.
		c. Over speed safety system with testing at site facility.
		d. DC Alarm Bell
		e. Multi beam sensor
		f. Safety landing mason
		g. Next landing operation
		h. independent operation
		i. Hand winding operation for safety emergency purpose
		j. Hand operation (slow speed maintenance purpose)
		k. Emergency Stop Button and Emergency car lighting
		m. Re-open with hall call button operation
		n. Automatic door open time adjustment operation
		o. AC VVVF inverter control door operation
		p. Car call registered light
		q. Fireman emergency operation
		r. Hall Call registered light
		s. 2 hours Fire rated doors
		t. Handrail in Cabin
		u. Voice Announcing System
		v. Building Management System
		w. In case of emergency landing device is operated car will open the door and floor level should be matched
		x. Call cancel and next call registration for next floor.
		y. Triplex operation may be shifted to simplex operation of the lifts as and when required without making any extra efforts.
		z. In case of emergency car will go to the ground floor (home floor) and open the door.
27	Defect Liability Period	1 year from date of handing over of lifts as per details mentioned in terms & conditions attached herewith.
28	Minor Building Work	The lift suppliers include Cost of Scaffolding inside the hoist way for erection

Passenger Lift		
Sr. No.	Parameter	Minimum Requirement
		Cutting of walls with repair Including all of bolts members indicator and button boxes etc. in position.
		Sill angles, fascia plates, machine Beams and rolled steel section with bearing plates for support of the machine if required.
		Door frames
		Pit Ladder
29	Sanction and approvals	The supplier shall obtain all the sanctions required for the operation of lifts from local authorities if applicable on behalf of the Engineer-In charge. The Engineer-In charge will be reimbursed the actual fees, If any.
30	Tests	The supplier shall test the lift in the presence of lift inspector as well as department engineer/Engineer-In charge as per ISI if required.
31	Inclusion	Cost of voltage stabilizer (if required) and SMF Batteries.
		Vat, Service tax, excise duty, Freight, octroi etc.
		Insurance transit and up to handling over of lift.
32	Traction Hoist ropes with self-lubricating as per relevant ISI code.	
33	Car safety and Governor to control excessive descending speed.	
34	Counter balance to promote smooth and economic operation.	
35	Terminal and final limits.	
36	Terminal buffer.	
37	Controller to control starting speed of elevator motor and supply brake automatically in case of application of any of the safety device or power failure.	
38	Steel glides for the car and counter weight.	
39	The elevator should be equipped with the over speed governor safety system.	
40	Inspection unit shall be provided at the top of car.	
41	Rechargeable battery-based Emergency light & alarm.	
42	Fireman's Switch	
43	Door open & Door close button	
44	Full Height Infrared Curtain	
45	Auto On/Off for car light and fan	
46	The elevator should be equipped with the over speed governor safety system.	
47	Inspection unit shall be provided at the top of car.	
48	Rechargeable battery-based Emergency light & alarm.	
49	Fireman's Switch	
50	Door open & Door close button	
51	Full Height Infrared Curtain	
52	Auto On/Off for car light and fan	

10.39.2 Freight / Material Lift

Freight / Material Lift		
Sr. No.	Parameter	Minimum requirement
1	Type of lift	2000 Kgs Freight Gear less with Machine Room Type Elevator
2	No. of lifts required	One No. to feed 07 floors with the rise of 29 mtrs Approximately
3	No. of person & Load to be carried	2000 Kg.
4	Hoist way Available	As per civil architecture
5	Name of floors to be served	Ground, First, Second, Third, Fourth, Fifth and Sixth Floor (Terrace)
6	Operation	Microprocessor based Simplex collective full collective Selective operation with or without attendant
7	Speed	1.00 Meter/ Sec
8	Drive	Variable voltage variable frequency (V3F)
9	Entrance	One at each floor level and same side only.
10	Doors	Automatic Centre opening Door panel of 1100 x 2100 of Stainless Steel in Hairline finish
11	Machine	Gearless Machine shall be placed directly above the overhead area in the Machine Room.
12	Location of machine	Top of the elevator shaft.
13	Size of car platform	2100 mm W x 1600 mm D x 2100mm H / As per IS to suit the well sizes
14	Design of cars body	Constructed out of Stainless Steel in Etched Finish Car and Car Doors with Stainless Steel handrail.
15	Flooring	Granite Flooring
16	light and fan	Florescent tube light fitting to have daylight effect inside the Car cabin. Fan/blower as per manufacturing enriched design.
17	Car position indicator	Floor position indicator at all floors along with direction of travel indicator.
18	Power supply	Power supply shall be provided as under:
		A. 415 volts, 3 phase, 4 wires 50 Hz
		B 230V, Single Phase, 50 Hz for lighting.
		C. All electric cables, controls switchgears should be strictly as per ISI.
19	Foundation	The machine will be placed directly above the Overhead area in the Machine Room and machine resting arrangement will be provided by the tenderer.
20	Depth of lift pit	1600 mm.
21	Guide rails	The guide rails should be steel duly toughened and ground section to ensure position tract and smooth running of the elevator.
22	Over Head	4800 mm contracts surface of the correcting fishplates and back of the guide rails and sills should be accurately machined to form smooth joints and lading sills should be used for fastening guide rails.
23	Belt Drive	Main hoist ropes with self-lubricating which shall be for safer and protective run and with adequate section and shall be provided into the sockets of spring-loaded self. Thumbless of spring permit

Freight / Material Lift		
Sr. No.	Parameter	Minimum requirement
		adjustment of uniform rope tension for smooth operation of the elevator.
24	Signals	(A) Luminous hall buttons at all floors.
		(B) Digital hall position indicators at all floors.
		(C) Car operating panel with luminous floor buttons
		(D) Digital car position & Direction indicator.
		(E) AC/ DC VF Door Drive.
		(F) Emergency light & emergency alarm through inverter (Rechargeable batteries).
25	Type of buffers	Spring buffers or as per suppliers design
26	Specification	IS: 4666. 1968 for electric passenger lifts and shall further Comply to IS: 1860:1960, IS: 63831, 1971, IS: 732: 1963 and Bombay lift act 1943 amended up to date.
		a. In case of earth quake or seismic waves is found lift will go to the home floor and open the door.
		b. Automatic rescues device.
		c. Over speed safety system with testing at site facility.
		d. DC Alarm Bell
		e. Multi beam sensor
		f. Safety landing mason
		g. Next landing operation
		h. independent operation
		i. Hand winding operation for safety emergency purpose
		j. Hand operation (slow speed maintenance purpose)
		k. Emergency Stop Button and Emergency car lighting
		l. Emergency Interphone system incorporated on cabin operating panel
		m. Re-open with hall call button operation
		n. Automatic door open time adjustment operation
		o. AC VVVF inverter control door operation
		p. Car call registered light
		q. Fireman emergency operation
		r. Hall Call registered light
		s. 2 hours Fire rated doors
		t. Handrail in Cabin
		u. Voice Announcing System
		v. Building Management System
		w. In case of emergency landing device is operated car will open the door and floor level should be matched.
		x. Call cancel and next call registration for next floor.
		y. Duplex operation may be shifted to simplex operation of the lifts as and when required without making any extra efforts.
		z. In case of emergency car will go to the ground floor (home floor) and open the door.

Freight / Material Lift		
Sr. No.	Parameter	Minimum requirement
27	Defect Liability Period	handling over of lifts as per details mentioned in terms & conditions attached herewith.
28	Minor Building Work	The lift suppliers include cost of Scaffolding inside the hoist way for erection
		Cutting of walls with repair Including all of bolts members indicator and button boxes etc. in position.
		Sill angles, fascia plates, machine Beams and rolled steel section with bearing plates for support of the machine if required.
		Door frames.
		Pit Ladder
29	Sanction and approvals	The supplier shall obtain all the sanctions required for the operation of lifts from local authorities if applicable on behalf of the Engineer-In charge. The Engineer-In charge will be reimbursed the actual fees, If any.
30	Tests	The supplier shall test the lift in the presence of lift inspector as well as department engineer/Engineer-In charge as per ISI if required.
31	Inclusion	Cost of voltage stabilizer (if required) and SMF Batteries.
		Vat, Service tax, Excise duty, Freight, octroi etc.
		Insurance transit and up to handling over of lift.
32	Traction Hoist ropes with self-lubricating as per relevant ISI code.	
33	Car safety and Governor to control excessive descending speed.	
34	Counter balance to promote smooth and economic operation.	
35	Terminal and final limits.	
36	Terminal buffer.	
37	Controller to control starting speed of elevator motor and supply brake automatically in case of application of any of the safety device or power failure.	
38	Steel glides for the car and counter weight.	
39	The elevator should be equipped with the over speed governor safety system.	
40	Inspection unit shall be provided at the top of car.	
41	Rechargeable battery-based Emergency light & alarm.	
42	Fireman's Switch	
43	Door open & Door close button	
44	Full Height Infrared Curtain	
45	Auto On/Off for car light and fan	
46	The elevator should be equipped with the over speed governor safety system.	
47	Inspection unit shall be provided at the top of car.	
48	Rechargeable battery-based Emergency light & alarm.	
49	Fireman's Switch	
50	Door open & Door close button	
51	Full Height Infrared Curtain	
52	Auto On/Off for car light and fan	

10.40 Data Safe for Media Storage

Data Safe for Media Storage		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes data safe supply, installation work with all required accessories and other activities like loading, unloading at site that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	General	All these important data backup storage devices can be safeguard it from burglars as well as from inappropriate environment conditions
		It should provide resistance to static electrical interference
		It should be customizable with adjustable shelves, lockers, drawers & pull-out trays as per customer's data backup device requirement
		It should have two high precision 10-lever cylindrical locks for high security
		The safe should have additional biometric lock to have multiple security layer
		It should be tested at ERTL /CBRI/similar any global lab for 120 mins
3	Temperature	It shall provide protection against temperature up to 1000°C maintaining internal temperature within 52°C up to 120 min.
4	Capacity in Ltr	The capacity of the cabinet should be with 370 Ltr
5		This inner shell should be completely insulated apart from that, it should be featured with tongue and groove equipped high strength shooting bolt and Godrej double central locks.
6	Protection	The data safe should provide protection against below criterial: 1. Fire 2. Dust 3. Humidity 4. Magnetic field 5. Unauthorized access 6. Accidental damage 7. Electrostatics
7	Testing	It should be tested for 9-meter drop test
8	Color	Black / Grey
9	Standards	Certified at CBRI Roorkee for data protection as per IS: 14562 for 2 hour. Fire endurance and 2 hr. Fire & Impact test. UL-72 Class 125 specifications for 2-hour rating.

10.41 LED TV Screen

LED TV Screen		
Sr. No.	Parameter	Minimum Requirement
1	Scope	The scope includes the supply, installation, testing & commissioning. The scope also includes LED TV system supply, installation work with all required accessories and other activities at site that are not specifically mentioned in the specifications but are required for successful commissioning of the project.
2	85" LED TV specifications	The product should match with below minimum criteria: 85" 4K Professional LED Display with Wall Mount, Incredible 4K picture quality, Crystal Processor 4K, Built in Speaker (10W + 10W), 350 Nits Brightness, Contrast Ratio 4000:1, Viewing Angle(H/V) 178/178, HDMI 2.0 (2), DVI, USB, Display, Display port connectivity, RS232c (in/out) through stereo jack, RJ45 external control
3	55" LED TV specifications	The product should match with below minimum criteria: 55" 4K Professional LED Display with Wall Mount, Incredible 4K picture quality, Crystal Processor 4K, Built in Speaker (10W + 10W), AI Brightness control, Contrast Ratio 4000:1, Viewing Angle(H/V) 178/178, HDMI 2.0 (1), DVI, USB, Display, Display port connectivity, RJ45 external control
4	Accessories	HDMI cable, RJ 45 cable, power cable, LED mounting stand with installation accessories need to be consider by the bidder
5	Standards	It should be complied with electromagnetic compatibility (EMC) class B compliant for safety and reliability standards for operation.

11 Data Centre Civil Technical Specification

11.1 Schedule Of Finishes

SCHEDULE OF FINISHES - STATE DATA CENTRE, GUJARAT					
<i>Note: P = Paint, NA = Not Applicable</i>					
S.NO	SPACES	Flooring	Skirting	Wall	Ceiling
Ground Floor					
1	Exhibition Area	Flamed granite + Polished Granite composition	Granite	Granite cladding and washable acrylic emulsion (P)	Metal Baffle Ceiling curved
2	Main Entrance	Granite Flooring (900x1200mm)	Granite	Granite for ground, acoustic cladding/paneling on upper floors (matching to granite texture below)	Baffle False Ceiling
3	Reception	Flamed granite + Polished Granite composition	Granite	Acoustic Paneling	baffle False Ceiling
4	Canteen	Anti-Skid Full Body Vitrified tile (joint less) (600x1200mm)	Full Body Vitrified Tiles	ACP Cladding till false ceiling level with acoustic background	Curved Metal Baffle False Ceiling
5	Kitchen	Anti-Skid Full Body Vitrified tile (joint less) (600x1200mm)	Full Body Vitrified Tiles	Vitrified wall Tiles (Joint Less) (600x1200) till false ceiling level	600 x 600 Metal grid Ceiling
6	Vendor Meeting room	Carpet Tiles	Full Body Vitrified Tiles	Acoustic paneling	Mineral wool tiles (600x1200mm) + Gypsum False Ceiling
7	Toilet Female/PHT/Male	Anti-Skid Full Body Vitrified tile (joint less) (600x1200mm)	Full Body Vitrified Tiles	1 wall Ceramic tile highlighter + 3 wall with ceramic tiles (Joint Less) (600x1200mm), Modular Toilet Stalls	600 x 600 Metal grid Ceiling
8	Drivers Toilet	Anti-Skid Full Body Vitrified tile (300x600mm)	Full Body Vitrified Tiles	Ceramic tile (Joint Less) (300x450mm)	600 x 600 Metal grid Ceiling
9	Lift & common Lobbies	Flamed granite + Polished Granite composition	Granite	Granite on lift facing wall + P on other walls i.e., washable acrylic emulsion	Baffle Ceiling

SCHEDULE OF FINISHES - STATE DATA CENTRE, GUJARAT					
<i>Note: P = Paint, NA = Not Applicable</i>					
S.NO	SPACES	Flooring	Skirting	Wall	Ceiling
10	Security Room (LS)	Full Body Vitrified tile (joint less) (600x600mm)	Full Body Vitrified Tiles	Full Body Vitrified tile till 7' (Joint Less) (600x1200) + washable acrylic emulsion (P) above	NA. Painted
11	Pump Room (LS)	Heavy Duty Acid Proof Vitrified Tiles (Joint Less) (600x600mm)	Acid Proof Vitrified Tiles	Full Body Vitrified tile till 7' (Joint Less) (600x1200) + washable acrylic emulsion (P) above	NA. Painted
12	Locker room	Heavy Duty Vitrified Tiles (Joint Less) (600x600mm)	Full Body Vitrified Tiles	Acoustic Panelling	NA. Painted
13	BMS Team Room (HS)	Full Body Vitrified tile (joint less) (600x600mm)	Full Body Vitrified Tiles	Acoustic Panelling	600 x 600 Metal grid Ceiling
14	HT and LT Panel room	Anti-static Flooring (600x600)	Anti-static tile	Anti-Static Tile till 7' (Joint Less) (600x1200) + washable acrylic emulsion (P) above	NA. Painted
15	Staircase-1	Granite + Radium Anti-slip Flamed Strip	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
16	Staircase - 2	Granite Anti-slip Flamed stone	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
17	Open Stilt Area	Brown Kota stone	Brown Kota stone	Vitrified tile cladding (Joint Less) (600x1200)	NA. Painted
18	Innovation Center	Flamed granite + Polished Granite composition	Granite	Granite cladding and washable acrylic emulsion (P)	Metal Baffle Ceiling curved
First & Third Floor					
19	PAHU / Air Handling Units	False Floor System	NA	AHU Internal Insulated Cladding.	NA. Painted
20	GAS BANK / NOVEC BASED FIREFIGHTING	Heavy Duty Acid Proof Vitrified Tiles (Joint Less) (600x600mm)	Heavy Duty Vitrified Tiles	Full Body Vitrified tile till 7' (Joint Less) (600x1200) + washable	600 x 600 Metal grid Ceiling

SCHEDULE OF FINISHES - STATE DATA CENTRE, GUJARAT					
<i>Note: P = Paint, NA = Not Applicable</i>					
S.NO	SPACES	Flooring	Skirting	Wall	Ceiling
				acrylic emulsion (P) above	
21	MUX	False Floor System	Heavy Duty Vitrified Tiles	Full Body Vitrified tile till false ceiling level (Joint Less) (600x1200)	NA
22	Network room	Full Body Vitrified tile (joint less) (600x600mm)	Full Body Vitrified Tiles	Washable acrylic emulsion (P)	600 x 600 Metal grid Ceiling
23	Staff Room (LS) for 24 x7 surveillance	Full Body Vitrified tile (joint less) (600x600mm)	Full Body Vitrified Tiles	Full Body Vitrified tile till false ceiling level (Joint Less) (600x1200)	600 x 600 Metal grid Ceiling
24	Server Farm	False Floor System	NA	Aluminium Cage Jali partition, Fireproof glass partition, (P)	NA
25	Lift & common Lobbies	Flamed granite + Polished Granite composition	Granite	Granite on lift facing wall + P on other walls	Baffle Ceiling
26	Corridor	Flamed granite composition	Granite	Full Body ceramic tile till 7' (joint less) (600x1200mm) + washable acrylic emulsion (P) above	Metal Plank Ceiling
27	Staircase-1	Granite + Radium Anti-slip Flamed Strip	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
28	Staircase - 2	Granite Anti-slip Flamed stone	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
29	Storeroom	Heavy Duty Vitrified Tiles (Joint Less) (600x600mm)	Full Body Vitrified Tiles	Full Body Vitrified tile till false ceiling (Joint Less) (600x1200)	NA
30	Electrical room	Anti-static Flooring (600x600)	Anti-static tile	Anti-Static Tile till 7' (Joint Less) (600x1200) + washable acrylic emulsion (P) above	NA. Painted
31	Staging	False Floor System	NA	washable acrylic emulsion (P)	NA

SCHEDULE OF FINISHES - STATE DATA CENTRE, GUJARAT					
<i>Note: P = Paint, NA = Not Applicable</i>					
S.NO	SPACES	Flooring	Skirting	Wall	Ceiling
32	Future Expansion Area	As per Future Requirements.			
Second Floor					
33	Electrical room	Anti-static Flooring (600x600)	Anti-static tile	Anti-Static Tile till 7' (Joint Less) (600x1200) + washable acrylic emulsion (P) above	NA. Painted
34	Staircase-1	Granite + Radium Anti-slip Flamed Strip	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
35	Staircase - 2	Granite Anti-slip Flamed stone	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
36	Corridor	Flamed granite composition	Granite	Full Body ceramic tile till 7' (joint less) (600x1200mm) + washable acrylic emulsion (P) above	Metal Plank Ceiling
37	UPS Room	Heavy Duty Acid Proof Vitrified Tiles (Joint Less) (600x600mm)	Acid Proof Vitrified Tiles	Full Body Acid Proof Ceramic tile till 7' (Joint Less) (600x1200) + washable acrylic emulsion (P) above	600 x 600 Metal grid Ceiling
38	Staff Room (LS)	Full Body Vitrified tile (joint less) (600x600mm)	Full Body Vitrified Tiles	Full Body Vitrified tile till false ceiling level (Joint Less) (600x1200)	600 x 600 Metal grid Ceiling
39	PAHU / Air Handling Units	False Floor System / Kota Stone	Kota Stone	AHU Internal Insulated Cladding.	NA. Painted
40	Lift & common Lobbies	Flamed granite + Polished Granite composition	Granite	Granite on lift facing wall + P on other walls	Baffle Ceiling
Fourth Floor					
41	Office Zones	Full Body Vitrified tile (joint less) (600x600mm)	Full Body Vitrified Tiles	washable acrylic emulsion (P)	Mineral wool tiles (600x1200mm) + Gypsum
				Partitions & Paneling: Glass Partitions	False Ceiling System with linear lights /

SCHEDULE OF FINISHES - STATE DATA CENTRE, GUJARAT					
<i>Note: P = Paint, NA = Not Applicable</i>					
S.NO	SPACES	Flooring	Skirting	Wall	Ceiling
				Full Height Gypsum Partition with Aluminium Framing with rockwool insulation Half Height Gypsum Partition with Aluminium Framing	Profile Lighting System
42	Network room	Full Body Vitrified tile (joint less) (600x600mm)	Full Body Vitrified Tiles	Washable acrylic emulsion (P)	600 x 600 Metal grid Ceiling
43	Meeting room	Carpet Tiles	Full Body Vitrified Tiles	Acoustic paneling	Mineral wool tiles (600x1200mm) + Gypsum False Ceiling
44	Corridor	Flamed granite composition	Granite	Full Body ceramic tile till 7' (joint less) (600x1200mm) + washable acrylic emulsion (P) above	Metal Plank Ceiling
45	Lift & common Lobbies	Flamed granite + Polished Granite composition	Granite	Granite on lift facing wall + P on other walls	Metal Plank Ceiling
46	Toilets (Male + Female)	Anti-Skid Full Body Vitrified tile (joint less) (600x1200mm)	Full Body Vitrified Tiles	1 wall ceramic tile highlighter + 3 wall with ceramic tiles (Joint Less) (600x1200mm), Modular Toilet Stalls	600 x 600 Metal grid Ceiling
47	Staircase-1	Granite + Radium Anti-slip Flamed Strip	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
48	Staircase - 2	Granite Anti-slip Flamed stone	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
49	Drinking Water	Anti-Skid Full Body Vitrified tile (joint less) (600x1200mm)	Full Body Vitrified Tiles	Full Body Vitrified Tiles (Joint Less) (600x1200) till false ceiling level	600 x 600 Metal grid Ceiling
Fifth Floor					
50	Office Zones	Full Body Vitrified tile		washable acrylic emulsion (P)	Mineral wool tiles (600x1200mm) +

SCHEDULE OF FINISHES - STATE DATA CENTRE, GUJARAT					
<i>Note: P = Paint, NA = Not Applicable</i>					
S.NO	SPACES	Flooring	Skirting	Wall	Ceiling
		(joint less) (600x600mm)	Full Body Vitrified Tiles	Partitions & Paneling: Glass Partitions Full Height Gypsum Partition with Aluminium Framing with rockwool insulation Half Height Gypsum Partition with Aluminium Framing	Gypsum False Ceiling System with linear lights / Profile Lighting System
51	AHU Room	False Floor System / Kota Stone	Kota Stone	AHU Internal Insulated Cladding.	NA. Painted
52	Corridor	Flamed granite composition	Granite	Full Body ceramic tile till 7' (joint less) (600x1200mm) + washable acrylic emulsion (P) above	Metal Plank Ceiling
53	Network room	Full Body Vitrified tile (joint less) (600x600mm)	Full Body Vitrified Tiles	Washable acrylic emulsion (P)	600 x 600 Metal grid Ceiling
54	Staircase-1	Granite + Radium Anti- slip Flamed Strip	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
55	Staircase - 2	Granite Anti- slip Flamed stone	Granite	Granite till 3' Height for maintenance free. Washable acrylic emulsion (P)	NA. Painted
56	NOC	Anti-static Flooring + Wood boards on Iron frame Stepping	Anti-static tile	Acoustic paneling with Rockwool Insulation	Glass fibre false ceiling with high NRC
57	Lift & common Lobbies	Flamed granite + Polished Granite composition	Granite	Granite on lift facing wall + P on other walls	Metal Plank Ceiling
58	Conference Room	Carpet Tiles	Full Body Vitrified Tiles	Acoustic paneling with fabric covering and lacquered glass	Mineral wool tiles false ceiling(600x1200mm) + Gypsum borders False Ceiling
59	Media Storage	Heavy Duty Vitrified Tiles	Heavy Duty	Full Body Vitrified tile till false	600 x 600 Metal grid Ceiling

SCHEDULE OF FINISHES - STATE DATA CENTRE, GUJARAT					
<i>Note: P = Paint, NA = Not Applicable</i>					
S.NO	SPACES	Flooring	Skirting	Wall	Ceiling
		(Joint Less) (600x600mm)	Vitrified Tiles	ceiling (Joint Less) (600x1200)	
60	Drinking Water	Anti-Skid Full Body Vitrified tile (joint less) (600x1200mm)	Full Body Vitrified Tiles	Full Body Vitrified Tiles (Joint Less) (600x1200) till false ceiling level	600 x 600 Metal grid Ceiling
61	Toilets (Male + Female)	Anti-Skid Full Body Vitrified tile (joint less) (600x1200mm)	Full Body Vitrified Tiles	1 wall ceramic tile highlighter + 3 wall with ceramic tiles (Joint Less) (600x1200mm), Modular Toilet Stalls	600 x 600 Metal grid Ceiling

11.2 Preliminary Material Specifications

PRELIMINARY MATERIAL SPECIFICATIONS			
Sr. No	Item	Material option	Location
1	R.C.C. Work	Ready mix Concrete with P.P.C. with Superplasticizers	In R.C.C. Structural Frame
2	PCC, Mortar, Plaster etc.	P.P.C. Based cement	
3	Walling material	AAC Blocks (grade 1) / Concrete Blocks	External and other Walls
		AEC Aerocon Panels	
		Red Clay Bricks (first class) (Server Area & Utility area external shell wall needs to be 2hrs Fire rated.)	Toilets, Foundations
4	Structural Glazing	24mm thick, double-glazed unit (DGU) with outer glass as 6mm thick, double-silver layered reflective, low-e toughened glass having VLT = 59%, Internal Light Reflection = 17%, External Light Reflection = 16%, U-value = 1.5 W/sqm.K, SHGC = 0.32.	Façade of Double Height Entrance lobby Secondary Entry Staircase
5	Doors	Powder Coated Aluminum thermal break	External Doors
		WPC Door	Toilets, Pantry etc.
		Frameless Glass Door	Entrances of Offices and within Glass Partitions
		Automated Full Glass Door with Aluminium Channel, with sensors	Main Entrance Office Area Entrance on a particular Floor
		Steel Fire Door (2 Hrs. Fire Rated), Single Leaf / Double Leaf to be	Fire Exits Data Centre Doors

PRELIMINARY MATERIAL SPECIFICATIONS			
Sr. No	Item	Material option	Location
		mentioned.	AHU & Electrical Room Doors
6	Windows	Powder Coated Aluminum thermal break windows	External windows
7	Fenestration Glass	High Efficiency Toughened glass, 24mm thick, double-glazed unit (DGU) with outer glass as 6mm thick, double-silver layered reflective, low-e toughened glass having VLT = 59%, Internal Light Reflection = 17%, External Light Reflection = 16%, U-value = 1.5 W/sqm.K, SHGC = 0.32.	External Windows
		Fireproof glass	Internal partitioning to sensitive areas and on Glass Fire Doors
8	Add on Insulation	XPS sheeting	Roof Insulation
		Rockwool Insulation	Partition walls
9	Roof Finish	Heat Reflective Tiles (High SRI)-thermotek/ Rocotile or equivalent	Roof
10	Water Proofing	Elastomeric Coating compound / crystalline / acrylic	In toilets
		EPDM Sheetting (with equipment on raised platform	Isolated Footings, Terraces and Retaining walls, over Raft
11	Paints	Washable Acrylic Emulsion with low VOC content Inside Server & Utility Paint Needs to be 2 Hrs. Fire rated.	On Plastered Surface
12	Partitions	Particle Board (Double Laminated) (full& half height)	Office cabins
		Glass partition	Meeting rooms
		HDHMR Board (Flat or Grooved)	wall paneling
13	Jaalis	Aluminium jaali	Around Substation Around diesel storage and DG set
14	External Paving	Thick Tile Paving (Duragres, Durock-Kajaria etc.)	Pathways/ Driveways
		Concrete Road with Broom Finish	NE, SE and SW road
		Concrete Kerb	Edges of Road
		Grass Pavers (60:40)	Open Parking
15	Railing	S.S. Steel (304 grade) Railing with Glass as per requirement	All staircases
		M.S. Railing	Fire Staircase

PRELIMINARY MATERIAL SPECIFICATIONS			
Sr. No	Item	Material option	Location
16	Staircase	R.C.C Staircase	Main Entrance lobby
17	Solar Energy	Solar Panels on metal framing + edge framing	Terrace
18	Porch	MS Framing with ACP / FCB / Glass	Entrance porch

11.3 Technical Specifications Civil

Technical Specifications Civil		
Sl. No	Item Description	UOM
1.: EARTH WORK		
1	Surface dressing of the ground including removing vegetation and inequalities not exceeding 15 cm deep and disposal of rubbish, lead up to 50 m and lift up to 1.5 m.	
	All kinds of soil	Sqm
2	Earth work in excavation by mechanical means (Hydraulic excavator)/ manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including getting out and disposal of excavated earth lead up to 50 m and lift up to 1.5 m, as directed by Engineer-in charge.	
	All kinds of soil	Cum
3	Extra for every additional lift of 1.5 m or part thereof in excavation / banking excavated or stacked materials.	
	All kinds of soil	Cum
4	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.	Cum
5	Supplying chemical emulsion in sealed containers including delivery as specified.	
	Chlorpyriphos/ Lindane emulsifiable concentrate of 20%	Ltr
6	Diluting and injecting chemical emulsion for POST CONSTRUCTIONAL anti-termite treatment (excluding the cost of chemical emulsion):	
	Providing anti – termite treatment to buildings conforming to I.S.S. 6113-part II 1971 (revised) including adopting precautions for health hazards and safety measures as required therein with the cost of all labour, plants, equipment required for the treatment and furnishing a guarantee for a minimum period of 10 years from the date of completion including eradicating any infestation of termite free of cost during the guaranty period complete. (The payment will be made on plinth of the building. (Note: Guarantee to be furnished as per approved format on Rs 100/- stamp paper)	
	Labour Rate Only	Sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
2.: CEMENT CONCRETE WORK		
2.01	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:	
	1:4:8 (1 Cement: 4 coarse sand: 8 graded stone aggregate 40 mm nominal size)	Cum
2.02	Cement concrete in Roof padding for slope	
	Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain window sills, fillets, sunken floor etc., up to floor five level, excluding the cost of centering, shuttering and finishing:	
	1:1½:3 (1 cement: 1½ coarse sand (zone-III): 3 graded stone aggregate 20 mm nominal size).	Cum
2.03	Providing and laying in position ready mixed plain cement concrete, with cement content as per approved design mix and manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for plain cement concrete work, including pumping of R.M.C. from transit mixer to site of laying and curing, excluding the cost of centering, shuttering and finishing, including cost of curing, admixtures in recommended proportions as per IS : 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer in-charge.	
	All works above plinth and up to floor V level:	
	Cement concrete in platforms	
2.04	M-15 grade plain cement concrete (cement content considered @ 240 kg/cum)	Cum
	Cement concrete in sunken floor	
2.05	M-10 grade plain cement concrete (cement content considered @ 220 kg/cum)	Cum
2.06	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification.	Per 50 Kg bag
2.07	Making plinth protection 50 mm thick of cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) over 75mm thick bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including finishing the top smooth.	Sqm
3.: REINFORCED CEMENT CONCRETE WORK		
3.01	Centering and shuttering including strutting, propping etc. and removal of form work for:	
a	Foundations, footings, bases and foundations for shed columns	Sqm
b	Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.	Sqm
c	Suspended floors, roofs, landings, balconies and access platform.	Sqm
d	Shelves (Cast in situ)	Sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
e	Lintels, beams, plinth beams, girders, bressumers and cantilevers	Sqm
f	Columns, piers, abutments, pillars, posts and struts.	Sqm
g	Stairs, (excluding landings) except spiral-staircases	Sqm
h	Weather shade, Chajjas, corbels etc., including edges	Sqm
3.02	Extra for additional height in centering, shuttering wherever required with adequate bracing, propping etc., including cost of de-shuttering and decentering at all levels, over a height of 3.5 m, for every additional height of 1 meter or part thereof (Plan area to be measured).	
	Suspended floors, roofs, landing, beams and balconies (Plan area to be measured)	Sqm
3.03	Providing and laying in position ready mixed or site batched design mix cement concrete for reinforced cement concrete work; using coarse aggregate and fine aggregate derived from natural sources and using recycled concrete aggregate (RCA) as coarse aggregate and fine aggregate within permissible utilization of 20% each, Portland Pozzolana /Portland Slag cement, admixtures in recommended proportions as per IS: 9103 to accelerate / retard setting of concrete, to improve durability and workability without impairing strength; including	
	pumping of concrete to site of laying, curing, carriage for all leads; but excluding the cost of centering, shuttering, finishing and reinforcement as per direction of the engineer-in-charge; for the following grades of	
	concrete.	
	Note: Extra cement up to 10% of the minimum specified cement content in design mix shall be payable separately. In case the cement content in design mix is more than 110% of the specified minimum cement	
	content, the contractor shall have discretion to either re-design the mix or bear the cost of extra cement.	
	All works up to plinth level	
a	Concrete of M35 grade with minimum cement content of 370 kg /cum	Cum
b	All works above plinth level up to floor V level	
c	Concrete of M35 grade with minimum cement content of 370 kg /cum	Cum
3.04	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete up to Plinth level.	
	Thermomechanical Treated Reinforcement TMT	Kg
3.05	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level.	
	Thermomechanical Treated Reinforcement TMT	Kg
4.: BRICK WORK		
4.01	Brick work with common burnt clay F.P.S. (non-modular) bricks of class designation 7.5 in foundation and plinth in:	
	Cement mortar 1:6 (1 Cement: 6 coarse sand)	Cum

Technical Specifications Civil		
Sl. No	Item Description	UOM
4.02	Brick work with common burnt clay F.P.S. (non-modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in:	
	Cement mortar 1:6 (1 cement: 6 coarse sand)	Cum
4.03	Providing and laying autoclaved aerated cement blocks masonry with 250 mm thick AAC blocks in super structure above plinth level up to floor V level with RCC band at sill level and lintel level with approved block laying polymer modified adhesive mortar all complete as per direction of Engineer-in-Charge. (The payment of RCC band and reinforcement shall be made for separately).	Cum
4.04	Providing and laying Aerocon panels 100x600x3000mm with approved block laying polymer modified adhesive mortar all complete as per direction of Engineer-in-Charge. Make-Birla, AEROCON	Sqm
4.05	Providing and laying Aerocon panels 75x600x3000mm with approved block laying polymer modified adhesive mortar all complete as per direction of Engineer-in-Charge. Make-Birla, AEROCON	Sqm
4.06	Half brick masonry with common burnt clay F.P.S. (non-modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level.	
	Cement mortar 1:4 (1 cement: 4 coarse sand)	Sqm
4.07	Providing and laying autoclaved aerated cement blocks masonry with 100 mm thick AAC blocks in super structure above plinth level up to floor V level in cement mortar 1:4 (1 cement: 4 coarse sand). The rate includes providing and placing in position 2 Nos 6 mm dia M.S. bars at every third course of masonry work.	Cum
4.08	Extra for providing and placing in position 2 Nos 6mm dia. M.S. bars at every third course of half brick masonry.	Sqm
5.: WOODWORK		
5.01	Wooden door frames for staff room, faculty room and labs	
	Providing and laying wooden door frames in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia & length (hold fast lugs or dash fastener shall be paid for separately).	
	Second class teak wood	Cum
5.02	Flush door shutters for staff room, faculty room and labs	
	Providing and fixing ISI marked flush door shutters conforming to IS 2202 (Part I) decorative type, core of block board construction with frame of 1st class hard wood and well-matched teak 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters.	
	35 mm thick including ISI marked Stainless Steel butt hinges with necessary screws	sqm
5.03	Extra for providing lipping with 2nd class teak wood battens 25 mm minimum depth on all edges of flush door shutters (over all area of door shutter to be measured).	sqm
5.04	Extra for providing vision panel not exceeding 0.1 sqm in all type of flush doors (cost of glass excluded) (overall area of door shutter to be measured):	
	Rectangular or square	sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
5.05	Providing and fixing M.S. grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete	
	Fixed to openings /aluminium frames with rawl plugs screws etc.	Kg
	Fittings /Hardware for doors	
5.06	Providing and fixing aluminium die cast body tubular type universal hydraulic door closer (having brand logo with ISI, IS: 3564, embossed on the body, door weight up to 35 kg and door width up to 700 mm), with necessary accessories and screws etc. complete.	Each
5.07	Providing and fixing aluminium pull bolt lock, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed of required colour and shade, with necessary screws bolts, nut and washers etc. complete.	Each
5.08	Providing and fixing 50 cm long aluminium kicking plate of size 100x3.15 mm, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed to required colour or shade, with necessary	Each
5.09	Providing and fixing IS: 12817 marked stainless steel butt hinges with stainless steel screws etc. complete:	
	100X58X1.90 mm	Each
5.1	Providing and fixing aluminium tower bolts, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete :	
	150x10 mm	Each
5.11	Providing and fixing aluminium handles, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete:	
	100mm	Each
5.12	Providing and fixing aluminium casement stays, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete.	Each
5.13	Panelling in Aluminium door shutters/Partitions	
	Providing and fixing paneling or paneling and glazing in paneled or paneled and glazed shutters for doors, windows and clerestory windows (area of opening for panel inserts excluding portion inside grooves or rebated to be measured). Panelling for paneled and glazed shutters 25mm to 40mm thick: pre-laminated with decorative lamination on both	Sqm
	side exterior Grade - I MDF Board 12 mm thick confirming to IS:14587	
5.14	Wooden Fire door for (Fire Staircases, Corridors, AHU etc.)	
	Providing and fixing of non-metallic asbestos free composite fire cum smoke check door frame with hutter for 2 hrs. Fire Rating door system duly tested for Stability, Integrity and Insulation a criteria clause 9.4 as per IS 3614 Part -1 and BS 476 Part 22 for single and double leaf Doors tested from CBRI Roorkee with 2nd class teak wood Frame of section 145mm x 70mm with heat activated intumescent fire seal strip of size 10mm x 4mm (Astro flame/Marshall) and one coat of anti-termite fire retardant primer along with minimum 55mm thick fire/smoke check wooden shutters of 120 minute fire rating comprising of two Nos. 9mm thick only Starpan calcium silicate board only a 100% without asbestos, Brucite and Meerscham having density not more than 950 Kg/M3 and thermal conductivity 0.14 W/m*k sandwiching 31mm thick fire resistance	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	insulation filler coated with FR sealants and faced with 3mm thick commercial ply facing on both sides with heat activated intumescent fire seal strips of size 10mmx 4mm (Astro flame U.K.) mounted in the grooves of hardwood lipping on three sides except bottom. The door shall be finished with 1mm thick laminate on both sides.	
	The single/double leaf doors shall be provided with vision panel of minimum size 300 x 300 mm made out of 5 mm thick clear boro silicate fire rated glass (imported) for 120 minutes fire rating of Schott (Germany) /Pilkington/Aasahi(Japan) fully transparent in fire/non-fire conditions having minimum molding beading and filling the gap between molding /beading and glass with suitable sealant including fixing each shutter with hinges of size 102mm x 76mm x 3mm with SS screws Marshall/ IR Briton / Assa Abloy. The door frame in this item and edges of the door shutters shall be painted with fire retardant paint of 'BERGER'/' SUKRI' or equivalent to provide Class 1 surface spread of flame conforming to BS 476 Part 7, IS: 12777 in desired shade over a coat of fire resistant primer The manufacturer should have tested the entire assembly from CBRI Roorkee along with the fire rated vision panels, same brand of calcium silicate board and hardware for achieving 2 hrs. fire rating and shall submit the same for both single leaf and double leaf configurations prior to manufacturing to the Engineer-in-charge for approval of production. (Hardware to be paid for separately only vision panel cost is included in the item. Make-Sukriti doors, MPP doors, Signum doors, Godrej	Sqm
5.15	Fittings / Hardware for Fire doors	
	HINGES: Supply and fixing of Dorma's BB4330 /Ingersoll Rands' Briton's / Marshall's fire rated 304 grade stainless steel ball bearing hinges of size 102x76x3mm of approved make with 8 Nos. stainless steel screws for 2hrs. Wooden / metal fire doors and for Classroom acoustic doors. Make Marshall, IR Briton, Assa Abloy	Each
5.16	Providing and fixing of 2 hrs. fire rated stainless steel 304 grade push type panic bars for double leaf 2-hour fire rated door shutter tested and certified as per IS 3614 Part II and BS 476 Part 20 & 22 from CBRI Roorkee with necessary accessories and screws etc. all complete as per the specifications of the approved vendor and as per the direction of the Engineer – in-charge. Make and Catalogue No/Item Code: (Ingersoll Rand's Briton Exit Device Rim - BT F-600 - R- SS 3 SS 304 & Vertical Rod BT F - 600V - SS 3 X8 SS 304 (which strike), Assa Abloy s Yale - YPE RM501P + YPEVR506P SSS, Marshall's SSS MH-P- RM11002 and Dorma's PHA 2000 active leaf 1-point modular, inactive leaf 2 - point modular.(for double leaf doors).Make Marshall, IR Briton, Assa Abloy	Each
5.17	Providing and fixing of 2 hrs. fire rated stainless steel 304 grade push type panic bars for single leaf 2-hour fire rated door shutter tested and certified as per IS 3614 Part II and BS 476 Part 20 & 22 from CBRI Roorkee with necessary accessories and screws etc. all complete as per the specifications of the approved vendor and as per the direction of the Engineer – in-charge. Make and Catalogue No/Item Code: (Ingersoll Rand's Briton Exit Device Rim - BT F-600 - R- SS 3 SS 304 & Vertical Rod BT F - 600V - SS 3 X8 SS 304 (which strike), Assa Abloy s Yale - YPE RM501P + YPEVR506P SSS, Marshall's SSS MH-P- RM11002 and Dorma's PHA 2000 active leaf 1-point modular, inactive leaf 2 - point modular.(for single leaf doors).Make Marshall, IR Briton, Assa Abloy	Each

Technical Specifications Civil		
Sl. No	Item Description	UOM
5.18	OUTSIDE ACCESS DEVICE: Providing and fixing of stainless steel 304 grade outside access trim for single/double leaf door shutter with necessary accessories and screws etc. all complete as per the specifications of the approved vendor and as per the direction of the Engineer – in-charge. Make and Catalogue No/Item Code: (Ingersoll Rand's Briton -BT 600- BT 1600 L - SS including cylinder, Assa Abloy s Yale - YPE ACC004 , Marshall's MH- PB- ACC11003 and Dorma's PHX03 Trim. - for Staircase locations and Auditorium exit doors. Make Marshall, IR Briton, Assa Abloy	Each
5.19	D- TYPE HANDLE: Supply and fixing of 304 grade stainless steel D-type back-to-back pull handle of size 300mm long and 22 mm dia with complete screws for wooden, metal fire doors & classroom doors. Make and Catalogue No/Item Code: (Ingersoll Rand's Briton – C4721. 300B2B, Marshall - MHBTB-1000 & Dorma's -TGDID-9125407). Make Marshall, IR Briton, Assa Abloy	Each
5.2	DEAD LOCK: Providing and fixing 2 hours fire rated dead lock system with required 80mm thick pin cylinder with both sides key arrangement of approved makes in Wooden / Metal fire door shutters with necessary accessories and screws etc. all complete as per the specifications of the approved vendor and directions of the Engineer- in-charge. Make and Catalogue No./Item Code: (Briton- 5410 series / Dormakaba- 288a, Marshall: MH-L-13002 XX) for both metal & wooden fire doors and classroom doors. Make Marshall, IR Briton, Assa Abloy	Each
5.21	DOOR CLOSER: Providing and fixing of Dorma's TS 89, Ingersoll Rand's Briton's LCN 1460 and Marshall's MH DC S14016 C extruded aluminum body heavy duty 2 hours fire rated door closer with stainless steel full body cover. The door closers should be of size 1-6, non-handed having back check, and delayed action and shall be tested and certified along with the fire doors from CBRI Roorkee as per IS 3614 Part II & BS476 Part - 20 & 22 The door closer shall have 10 years mechanical warranty from the manufacturer and the same shall be submitted to the Engineer - in - Charge. The door closer complies with EN 1154 - for 100000 cycles and is ANSI/BHIMA certified. - for Staircase, Corridors, Auditorium Make Marshall, IR Briton, Assa Abloy, Lift lobby, Prefunction, Transformer, Electrical and all other mechanical rooms.	Each
5.22	FLUSH BOLT: Supply and fixing of Dorma's 9114306, Briton's DAL FBH 6, Marshall's MS 300 304 grade Stainless Steel exposed Tower Bolt of size 16mm dia rod and 250 mm long with complete screws. (Marshall Make) Make Marshall, IR Briton, Assa Abloy	Each
5.23	ALLENKEY: Providing and fixing of allen's key from Ingersoll Rand's Briton, Assabloy, Marshall & Dorma. - for Shaft doors. Make Marshall, IR Briton, Assa Abloy	Each
5.24	Stainless Steel Fire Resistant Glazed Door	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	FRAME: Providing and fixing non load bearing fixed frame for fire resistant glazed partition for 120 min fire rating, made out to a profile of dimension 60mmx70mm of 1.6-gauge stainless steel 304 grade steel sheet as per test evidence suitable for fixing fire rated glass for 120 min of stability & integrity and 20 minutes of insulation. The profile has to be fixed to supporting construction by means of Anchor fasteners of size M10x80, every 150 mm from the edges and every 500mm (approx.) c/c. Linear measurement of frame shall be measured for payment. The frame shall be filled with rockwool insulation of density not less than 96kg/m3. The fixed partition framing as a complete shall achieve 120 minutes Integrity & Stability and 20 minutes insulation criteria as per the requirements of NBC 2016 Make-Sukriti doors,MPP doors,Signum doors, Godrej	Rm
5.25	SHUTTER: Providing and fixing glazing in fire resistant door shutters, fixed panels & partitions etc., with Stainless Steel made out of 1.6 mm thick of size 20 x 33 mm screwed with M4 x 38 mm SS screws at distance 75 mm from the edges and 150 mm c/c & special ceramic tape of 5 x 20 mm size etc. complete in all respect as per direction of Engineer- in- charge. The glass shall be clear, toughened, single layered, clear glass panes minimum 10mm thickness for full glazing of approved brand having minimum 120 minutes fire resistance of various sizes and at required locations in the fire doors. The glasses shall be clear borosilicate fully transparent in firetesting non- fire condition (929% transparency) completely non- opaque, toughened from Schott (Germany)/ Pyro guard (France)/ Pilkington (U.K) glass of 120 minutes fire rating and fixing in position with S.S. beading and sealants at joints etc. complete as directed by the Engineer-in- Charge. The glass shall be tested from CBRI Roorkee/ Warrington's Fire Research Laboratory as per BS-EN 1364-1: 1999/ BS476 Part 2/ EN 13501-2: 2003 along with the complete assembly of the fire door with hardware. The manufacturer shall submit 3rd party the valid test reports for approval of the specialized agency. Make-Sukriti doors, MPP doors,Signum doors, Godrej Make of Fire Rated Glass SCHOTT Germany, Asahi India, Pilkington	Sqm
	Fittings /Hardware for Fire doors	
5.26	HINGES: Providing and fixing of Dorma's / Ingersoll Rands' Briton's / Marshall's fire rated 304 grade stainless steel ball bearing hinges of size 102x89x3mm of approved make with 8 Nos. stainless steel screws for glazed fire doors. Make Marshall, IR Briton,Assa Abloy	Each
5.27	Providing and fixing of stainless steel 304 grade Offset D-type Pull Handles (for Glazed Fire doors) of 350 mm x 25mm dia (minimum) of approved make with necessary accessories and screws etc. all complete as per the specifications of the approved vendor and directions of the Engineer-in-Charge. Make and Catalogue No/Item Code: (Briton – C4723.400/ Assa Abloy: AEH-06A/ Marshall - MHOD1001 & Dorma's - 9125422)	Each
5.28	NARROW STYLE DEAD LOCK: Supply and fixing of 2hrs fire rated Narrow Style dead lock with 80mm double cylinder one side key and other side knob with 1 years' mechanical warranty for glazed fire doors. Make and Catalogue No./Item Code: Ingersoll Rand's, Marshall's MH-MP 13004 SSS & Dorma's – 917	Each
5.29	FLUSH BOLT: Supply and fixing of Dorma's 9114306, Briton's DAL FBH 6, Marshall's MS 300 304 grade Stainless Steel exposed Tower Bolt of size 16mm dia rod and 250 mm long with complete screws. - for all lockable double leaf doors.	Each

Technical Specifications Civil		
Sl. No	Item Description	UOM
5.3	Wood polymer composite door frame for Toilet, Plumbing shafts and WC's	
	Providing and fixing factory made single extruded WPC (Wood Polymer composite) door frame comprising of virgin PVC polymer of K value 58-60(suspension grade) calcium carbonate and natural fibers (wood powder /rice husk/wheat husk) and nontoxic additives (maximum toxicity index of 12 for 100 gms) fabricated with mitred joints after applying PVC solvent cement and screwed with full body threaded star headed SS screws having minimum frame density of 850 Kg/Cum screw withdrawal strength of 2200 N Face and 1100 N Edge modulus of elasticity 900 N/mm ² and resistant to spread of flame of class a category with propriety of being termite/borer proof water/moister proof and fire retardant and fixed in position with MS hold fasts /lugs /SS dash fasteners of required dia and length complete as per direction of Engineer in Charge (MS Hold fasts/lugs or SS dash fasteners to be paid separately. Make of WPC Doors frames shall be Ecoste,Quite Extrusions,Echon	
	Note: -For WPC Solid door frames minus 5mm tolerance in dimensions i e depth and width of profile shall be acceptable . Variations in profile dimensions on plus side shall be acceptable but no extra payment on this account shall be made.	
	Frame size 63x125mm	Rm
5.31	Providing and fixing factory made single extruded WPC (Wood Polymer composite) door frame comprising of virgin PVC polymer of K value 58-60(suspension grade) calcium carbonate and natural fibers (wood powder /rice husk/wheat husk) and nontoxic additives (maximum toxicity index of 12 for 100 gms) fabricated with mitred joints after applying PVC solvent cement and screwed with full body threaded star headed SS screws having minimum frame density of 850 Kg/Cum screw withdrawal strength of 2200 N Face and 1100 N Edge modulus of elasticity 900 N/mm ² and resistant to spread of flame of class a category with propriety of being termite/borer proof water/moister proof and fire retardant and fixed in position with MS hold fasts /lugs /SS dash fasteners of required dia and length complete as per direction of Engineer in Charge (MS Hold fasts/lugs or SS dash fasteners to be paid separately. Make of WPC Doors frames shall be Ecoste,Quite Extrusions,Echon	
	Note:-For WPC Solid door frames minus 5mm tolerances in dimensions i e depth and width of profile shall be acceptable . Variations in profile dimensions on plus side shall be acceptable but no extra payment on this account shall be made.	
	Frame size 45x95mm	Rm
5.32	Wood polymer composite door shutter for Toilet, Plumbing shafts and WC's	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	Providing and fixing factory made single extruded WPC (Wood Polymer composite) solid decorative type flush door shutters of required size of K value 58-60(suspension grade) calcium carbonate and natural fibers (wood powder /rice husk/wheat husk) and non-toxic additives (maximum toxicity index of 12 for 100 gms) having minimum frame density of 650 Kg/Cum screw withdrawal strength of 1800 N Face and 900 N Edge modulus of elasticity 850 N/mm ² and resistant to spread of flame of class A category with propriety of being termite/borer proof water/moister proof and fire retardant . WPC to be laminated with PVC foil of 14 microns thick of approved design pasted with hot melted adhesive on both faces of shutter and fixing with stainless steel butt hinges of required size with necessary full body threaded star headed counter sunk SS screws as per direction of Engineer in Charge (Stainless steel butt hinges and SS screws shall be paid separately) Make of WPC Doors shall be Ecoste,Quite Extrusions,Echon	
	35 mm thick	Sqm
5.33	Wood polymer composite door shutter for Toilet, Plumbing shafts and WC's	
	Providing and fixing factory made single extruded WPC (Wood Polymer composite) solid decorative type flush door shutters of required size of K value 58-60(suspension grade) calcium carbonate and natural fibers (wood powder /rice husk/wheat husk) and non-toxic additives (maximum toxicity index of 12 for 100 gms) having minimum frame density of 650 Kg/Cum screw withdrawal strength of 1800 N Face and 900 N Edge modulus of elasticity 850 N/mm ² and resistant to spread of flame of class A category with propriety of being termite/borer proof water/moister proof and fire retardant . WPC to be laminated with PVC foil of 14 microns thick of approved design pasted with hot melted adhesive on both faces of shutter and fixing with stainless steel butt hinges of required size with necessary full body threaded star headed counter sunk SS screws as per direction of Engineer in Charge (Stainless steel butt hinges and SS screws shall be paid separately) Make of WPC Doors shall be Ecoste, Quite Extrusions, Echon	
	30 mm thick	Sqm
5.34	Storage full height	
	Providing and fixing factory made single extruded WPC (Wood Polymer Composite) solid board one side white color and other side of board laminated with PVC foil of minimum 14-micron thickness of approved design pasted with hot melt adhesive for cup boards, workstations and bathroom/kitchen cabinet etc. of required sizes comprising of virgin polymer of K value 58-60 (Suspension Grade), calcium carbonate and natural fibers (wood powder/ rice husk/wheat	
	husk) and non-toxic additives (maximum toxicity index of 12 for 100 gms) having minimum density of 650 kg/cum and screw withdrawal strength of 1800 N (Face) & 900 N (Edge), , modulus of elasticity 850 N/mm ² and resistance to spread of flame of Class A category with property of being termite/ borer proof, water/moisture proof and fire retardant and fixing with	
	stainless steel piano hinges/soft close clip-on concealed hinges of required size with necessary full body threaded star headed counter sunk S.S screws, all as per direction of Engineer-In- Charge. (Note: stainless steel piano hinges/soft close clip-on concealed hinges and	
	necessary S.S screws shall be paid separately) Make of WPC board shall be Ecoste,Quite Extrusions,Echon	
	18mm thick	Sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
5.35	S & F 18 mm thick block board with commercial ply veneering on both side	Sqm
5.36	Providing and fixing paneling or paneling and glazing in paneled or paneled and glazed shutters for doors, windows and clerestory windows (Area of opening for panel inserts excluding portion inside grooves or rebates to be measured). Panelling for paneled or paneled and glazed shutters 25 mm to 40 mm thick :	
	Float glass panes	
	5.0 mm thick glass panes (weight not less than 12.5 kg per sqm)	Sqm
	Fittings /Hardware for doors and cup boards	
5.37	Providing and fixing approved brand and manufacture SS304 Grade Tower bolt (TS1210SS -12" SS304) with screws etc. complete in all respects as per manufacturers' specifications & as directed by Engineer-in charge (Dorset)	
	300 x 10mm	Nos
5.38	Providing approved brand Stainless Steel 304 Grade -Sliding Bolt (250X16mm) along with necessary accessories and screws etc. complete. (Dorset)	
	250 x 16mm Make Dorset Item code no. ALD SM SS 304 (250x16)	Nos
	300 x 16mm Make Dorset Item code no. ALD SM SS 304 (300x16)	Nos
5.39	Providing and fixing Brass Door stopper - Door Mounted Hanging Type (Dorset DSHT) along with necessary accessories and screws etc. complete. (Dorset)	Nos
5.4	Providing approved brand and manufacture SS304 grade 250mm Pull Handle with 10 mm dia (SOP10SS (10MM)) fixed with Screws etc. Complete in all respects as per manufacturers' specifications & as directed by Engineer-in-charge	
	250 mm x10mm D-Shape Handle (Make; Dorset Item Code no. SOP 10 SS	Each
5.41	Providing approved brand and manufacture SS304 grade D type 300mm Pull Handle with 19 mm dia (SD12PSS (19MM)) fixed with SS screws etc. complete in all respects as per manufacturers' specifications & as directed by Engineer-in-charge	Nos
5.42	Providing & fixing special quality & design Centre patch lock with cylinder PSS :Polished lock for frame less 12 mm thick toughened glass shutters including necessary SS Screws etc. of make Dorset Item code no. DPF-325 complete as per the direction of Engineer-in-charge.	Nos
5.43	Alumin Sliding Rails top of Aluminium alloy of size 100x100mm with iron and Nylon wheel integral bearing rollers and sliding arrangement set complete	Nos
5.44	Providing approved brand and manufacture SS304 graded, or Buffer wall mounted 22 mm dia,75 mm long (DB(22)) without Cover fixed with SS screws etc. complete in all respects as per manufacturers' specifications & as directed by Engineer-in-charge (Dorset)	Nos
5.45	Providing and fixing IS : 12817 marked stainless steel butt hinges (heavy weight) with stainless steel screws etc. complete :	
	125x64x2.50 mm	Each
5.46	Providing Only 1 mm thick 35 mm wide bright finished stainless steel piano hinges complete :	Meter

Technical Specifications Civil		
Sl. No	Item Description	UOM
5.47	Providing and fixing special quality chromium plated brass cupboard locks with six levers of approved quality including necessary screws etc. complete.	
	Size 50mm	Each
5.48	Providing and fixing special quality chromium plated brass cupboard locks with six levers of approved quality including necessary screws etc. complete.	
	Size 75mm	Each
5.49	Providing and fixing approved brand and manufacture SS304 Grade Tower bolt (TS610SS -6" SS 304) with screws etc. complete in all respects as per manufacturers' specifications & as directed by Engineer-in charge (Dorset)	
	150 x 10mm (Cup Boards)	Nos
5.5	Providing approved brand and manufacture SS304 grade 200mm Pull Handle with 10 mm dia (SOP8SS (10MM)) fixed with SS screws etc. complete in all respects as per manufacturers' specifications & as directed by Engineer-in-charge	
	200 mm x10mm D-Shape Handle (Make; Dorset Item Code no. SOP 8 SS	Each
	Cup board	
5.51	Providing and fixing magnetic catcher of approved quality in cupboard / ward robe shutters, including fixing with necessary screws etc. complete.	
	Double strip (horizontal type)	Each
5.52	Supply and fixing 12mm thick compact laminate HPL Board cubicles for WC/Toilets with SS 304 foot sliding latch with indicator (corona Safety) with Accessories: Standard - Merino Make Aluminum, Stainless Steel - 304 Grade accessories), Aluminum "U" Channel, F Channel, door stopper channel , SS Coat Hook, SS Privacy Thumb turn c/w Occupancy Indicator, SS Door Knob, SS Spring Loaded Butt Hinges with Cover ,SS Adjustable Foot 316 Grade ,Rubber Door Stopper Lining, S.S. Screws 304 G & P.V.C Wall Plugs Make Marino	
	Size of Cubicle: 1000 X 1500X 2003mm (H)	Each
	Door Size : 1750mm (H) x 600mm (W)	
	Divider Size : 1775mm (H)	
	Overall Height of Cubicle : 2003mm (Including bottom Gap of 150mm)	
6.: STEEL WORK		
6.01	Calcium silicate partitions Frame	
	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.	Kg
6.02	Solar Panel and stair Frame	
	Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.	Kg
6.03	Providing and fixing 1mm thick M.S. sheet door with frame of 40x40x6 mm angle iron and 3 mm M.S. gusset plates at the junctions and corners, all necessary fittings complete, including applying a priming coat of approved steel primer.	
	Using M.S. angels 40x40x6 mm for diagonal braces	Sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
6.04	Supplying and fixing rolling shutters of approved make, made of required size M.S. laths, interlocked together through their entire length and jointed together at the end-by-end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete, including the cost of providing and fixing necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454 - part 1 and M.S. top cover of required thickness for rolling shutters.	Sqm
	80x1.25 mm M.S. laths with 1.25 mm thick top cover	
6.05	SS Railing	
	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless-steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless-steel dash fasteners , stainless steel bolts etc., of required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in charge, (for payment purpose only weight of stainless-steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.).	kg
7. : FLOORING WORK		
7.01	Under Anti-static, carpet and Vinyl flooring	
	Cement concrete flooring 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate) finished with a floating coat of neat cement, including cement slurry, but excluding the cost of nosing of steps etc. complete.	Sqm
	40 mm thick with 20 mm nominal size stone aggregate	
7.02	Providing and fixing 10 mm thick acid and/or alkali resistant tiles of approved make and colour using acid and/or alkali resisting mortar bedding, and joints filled with acid and/or alkali resisting cement as per IS: 4457, complete as per the direction of Engineer-in- Charge.	Sqm
	In flooring on a bed of 10 mm thick mortar 1:4 (1 acid proof cement: 4 coarse sand)	
7.03	Providing and fixing 10 mm thick acid and/or alkali resistant tiles of approved make and colour using acid and/or alkali resisting mortar bedding, and joints filled with acid and/or alkali resisting cement as per IS: 4457, complete as per the direction of Engineer-in- Charge.	Sqm
	In dado/skirting on 12 mm thick mortar 1:4 (1 acid proof cement: 4 coarse sand)	
7.04	ANTI STATIC FLOORING	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	Supply and installation of Simpurity PUR homogeneous vinyl sheet flooring manufactured by Armstrong World Industries, Inc, 2 meter wide and overall thickness of 2mm. The thickness of wear layer would be 2mm. The product should be homogeneous and single layered. The wear surface shall consist of impregnated polyurethane homogeneous mixture of PVC with TRUESHIELD & Diamond 10 technology, Plasticizers without DOP, Urethane, color pigments and filler calendered to form a sheet. Color and pattern details shall be dispersed throughout the thickness of the wear layer. Simpurity shall conform to group "T" wear resistance as per EN 649, Clean Room certified with class 'A' as per ASTM F5100, Flammability resistance of class Bfl-s1 as per EN13501-1, Dynamic coefficient of friction of class DS as per EN 13893, Impact sound reduction of 3dB as per ISO 10140, Slip Resistance of class R9 as per DIN 51130, Color fastness rating of ≥ 6 as per ISO 105-B02, total weight being 3.3kg/m ² as per EN430. The product shall be suitable for applications in class 23/34/43 areas as per EN685. Product shall exhibit antistatic behaviour, resistance to bacteria, resistance to chemical, resistance to staining, suitability to castor chair. The product shall be Floor Score certified with no SVHC content published by European Chemicals Agency (REACH). Product shall contribute to LEED points under Indoor environmental quality (LEED EQ) and Material & Resource (LEED MR) category.	Sqm
7.05	Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer) of 1st quality conforming to IS : 15622 of approved make in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), Jointing with grey cement slurry @ 3.3 kg/sqm including pointing the joints with white cement and matching pigment etc., complete.	Sqm
7.06	Deduct for not using 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) bedding in laying of floor tiles and jointing with grey cement slurry @ 3.3 kg/ sqm.	Sqm
7.07	Fixing glazed/ Ceramic/ Vitrified floor tiles with cement based high polymer modified quick-set tile adhesive (Water based) conforming to IS: 15477, in average 3mm thickness.	Sqm
7.08	Providing and fixing 1st quality ceramic glazed wall tiles conforming to IS: 15622 (thickness to be specified by the manufacturer), of approved make, in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer-in-Charge, in skirting, risers of steps and dados, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm, including pointing in white cement mixed with pigment of matching shade complete.	Sqm
7.09	Providing and laying Antiskid Vitrified tiles in floor with different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid with cement based high polymer modified quick set tile adhesive (water based) conforming to IS : 15477, in average 6 mm thickness, including grouting of joints (Payment for grouting of joints to be made separately).	
	Size of Tile 600x1200 mm	Sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
7.1	Providing and laying Vitrified tiles in floor with different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid with cement based high polymer modified quick set tile adhesive (water based) conforming to IS : 15477, in average	
	6 mm thickness, including grouting of joints (Payment for grouting of joints to be made separately).	
	Size of Tile 600x600 mm	Sqm
7.11	Providing and laying full body Vitrified tiles in floor with different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid with cement based high polymer modified quick set tile adhesive (water based) conforming to IS : 15477, in average	
	6 mm thickness, including grouting of joints (Payment for grouting of joints to be made separately).	
	Size of Tile 600x1200 mm	Sqm
	Size of Tile 600x1200 mm Corridor dado	Sqm
	Size of Tile 600x900 mm Fire Staircase dado	Sqm
7.12	Providing and laying Vitrified tiles in different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS: 15622 of approved brand & manufacturer, in all colours and shade, in skirting, riser of steps, laid with cement based high polymer modified quick set tile adhesive (water based) conforming	
	to IS: 15477, in average 6 mm thickness, including grouting of joints (Payment for grouting of joints to be made separately).	
	Size of Tile 600x600 mm	sqm
7.13	Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge.	
	Size of Tile 800x800 mm	sqm
7.14	Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge.	
	Size of Tile 600x600 mm	sqm
7.15	Providing and fixing removable raised/false access flooring with system and its components of approved make for different plenum height with possible height adjustment up to 50 mm, comprising of modular load bearing floor panels supported on G.I. rectangular stinger framework and G.I. Pedestal etc. all complete, as per the architectural drawings, as specified and as directed by Engineer-in-charge consisting of:	
	FLEXI CL64 800 Bare Panel	
	Flexi CL64 800 lbf Access Floor Panels having dimensions of 600 x 600 mm $\pm$ 0.20 mm shall be all Steel welded construction with an enclosed bottom pan of 64 hemispherical cones. The Top plain Sheet is fuse welded to the bottom pan at 144 Locations to form a Panel of an overall thickness of 28mm.	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	The Panel after required pre-treatment is epoxy coated to a thickness of 40 to 60 Microns epoxy coating to ensure corrosion resistance. The inner empty core of the Panel is injected with a light weight, non-combustible cementitious compound at high pressure to fill in all the crevices of the Panel and ensure support of not less than 90% of the top surface area of the Panel. Panel shall be capable of withstanding 800 lbf point load tested as per Cisca testing procedure and conforming to Master specs standard for Raised Flooring	
	SUB-STRUCTURE - PEDESTAL& STRINGER ASSEMBLY: Sub structure installed to support the panel shall be suitable to achieve a minimum finished floor height of 950 mm from the existing floor level. Pedestal design shall confirm speedy assembly and removal for relocation and maintenance. The assembly shall provide easy adjustment of levelling and accurately align panels for a maximum of ± 25 mm in the vertical direction. Pedestals shall support an axial load without permanent deflection and an ultimate load as laid out in System Performance requirement. The bottom of the Pipe is beaded to achieve perpendicularity & resistance to moment which will arise from lateral loading & also arresting the vertical movement before riveting the pipe to the base plate. The Sub structure assembly shall be anchored to the floor with Adhesive for FFH up to 450 mm, and above FFH 450 mm with suitable Adhesive and Machine Screw wherever necessary, as recommended by the Consultant / Manufactured by Flexi Floor -Intosol,Tate,Kingspan,Lindner	
	950 mm Finished Floor Height (FFH).	sqm
7.16	Flotex Carpet Sheet	
	Providing & Fixing of Flocked textile floor covering of Nylon 6.6 face fiber or equivalent of approved make with 100% Nylon and completely waterproof resilient backing. The flooring should be Anti-static with thickness of 4.3 mm and approximate weight of 1.8 kg./sqm of roll form. The carpet should be completely stained resistant and of a density approx. 80 million fibers/sq.mtr (70 million fiber/sq.yd) in the width of 2 mtr .The floor covering should have Fire Test EN-13501, Appearance Retention Hexapod ISO 140-8, Friction Slip Resistance Test EN14041 Class DS, SANITISED anti-microbial treatment, with resilient waterproof backing, antiallergic which is certified by British allergy foundation, with ten-year guarantee. The carpet should have permanent static control Make JCC/Modulyss/Flotex	sqm
7.17	Lobby/Exhibition and corridor	
	Providing and laying flamed finish Granite stone flooring in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing, curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge :	
	Flamed finish granite stone slab Jet Black, Cherry Red, Elite Brown, Cat Eye or equivalent.	sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
7.18	Providing and laying Polished Granite stone flooring in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing , curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge.	
	Polished Granite stone slab jet Black, Cherry Red, Elite Brown, Cat Eye or equivalent.	sqm
7.19	Providing and laying Polished Granite stone flooring in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing , curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge.	
	Polished Granite stone slab jet Black, Cherry Red, Elite Brown, Cat Eye or equivalent.	sqm
7.2	Staircase ,Lift lobbies, corridors, dado/skirting	
	Providing and laying Polished Granite stone dado/skirting in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing , curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge.	
	Polished Granite stone slab jet Black, Cherry Red, Elite Brown, Cat Eye or equivalent.	sqm
7.21	Providing and laying Polished Granite stone dado/skirting in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing , curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge.	
	Polished Granite stone slab jet Black, Cherry Red, Elite Brown, Cat Eye or equivalent.	sqm
7.22	Deduct for not using 20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand) bedding in laying of floor tiles and jointing with grey cement slurry @ 3.3 kg/ sqm.	Sqm
7.23	Add for 12 mm cement plaster of mix :1:4 (1 cement: 4 coarse sand)	Sqm
7.24	Tactile tile floor in corridor/entrance	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	Providing and laying tactile tile (for vision impaired persons as per standards) of size 300x300x9.8mm having with water absorption less than 0.5% and conforming to IS:15622 of approved make in all colours and shades in for outdoor floors such as footpath, court yard, multi modals location etc., laid on 20mm thick base of cement mortar 1:4 (1 cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. complete as per direction of Engineer-in-Charge.	sqm
7.25	Vinyl sheet flooring	
	Supply and installation of 2mm thick vinyl flooring laid over approved adhesive.	
	The installation shall be undertaken as per manufacturers installation instructions.	sqm
8. : ROOFING & FALSE CEILING		
8.01	Roof treatment	
	Surface Preparation: Cleaning the surface thoroughly with wire brush, soft brush and required tools to eliminate all defective materials and foreign matter. Repair all cracks joints and junctions with polymer modified cementitious mortar so as to achieve the sound surface for treatment.	
	Making fillet with polymer modified mortar at the junction of the slab and wall so as to achieve curvature and seal the junctions.(size- 75mm x 75mm)	
	Base Waterproofing Coating on RCC Slab :- Providing and applying Texgum Rubberise coating. To be applied in 2 coats a flexible waterproofing coating over the Priming coat. coating to be done as per manufacture specifications, while providing the intermediate layer of 30 gsm Geo mesh sandwiched between the two coats. Coating has a crack bridging capacity up to 1-2mm.	
	1) Providing and applying thermal insulation laying Sopra XPS 50mm thick XPS, extruded polystyrene. XPS polystyrene should have minimum thickness of 50mm and shall have closed cell structure so as to ideal for insulation of roofs. XPS should have compressive strength of 300 KPa (as per EN 826) ; Resistance to Fire of "E" Class; Water Absorption of <0.7% (as per EN 12087) ; Thermal resistance of 1.5 sqm.KW; Thermal Conductivity of 0.029- 0.034 W/m-k (as per EN 12667) and should be laid directly over the cured waterproofing layer as per manufacturer specification.	
	Third Part: Supplying and installing BBA Certified 1.2mm thick single ply waterproofing sheet membrane comprising of TPO membrane. Single ply TPO roof waterproofing membrane shall be asbestos free and should exceed /meet specifications of EN 13956:2012. Single Ply Flagon TPO Roof Membrane is a modified polyolefin membrane that accepts roof movement and thermal shock. It should be lapped and seamed using hot air heat welding equipment with an overlap of 80mm.	
	Joints shall be of 80mm overlap in case of covered roof system and shall be welded with automatic single seam machine such as Varimat V2 of Leister technologies and terminations by hand welding. Control tests of the welds with Welding tester shall be performed.	

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Sl. No	Item Description	UOM
	Termination strip to be used for fixing single ply TPO membrane at the final termination point for accommodating wind load impact; Such metal strip shall be sealed with PU Sealant. Conduct weld tests with Welding tester, and test of triple points with vacuum cap. Single Ply TPO membrane shall be from original product manufacturer and method statement shall be produced by original product manufacturer. Single Ply TPO membrane shall be asbestos free and should have CE (European Conformity for Quality) under original product manufacturer. 1.2mm thick single ply TPO membrane shall have following minimum properties , (i) Tensile Strength > 1100 N/5cm as per EN 12311-2; (ii) Elongation of > 15% as per EN 12311-2; (iii) Tear Strength > 300 N, as per EN 12310-2; (iv) Cold bending of minimum < (-) 25 deg as per EN 495-5 ; (v) Fire classification - Class E as per En 13501-1 & EN ISO 11925-2, (vi) Static Puncture Resistance - > 20 kg as per EN 12730. Flashings required should be included in rate for roof area.	
	Approved Product: Flagon EP/PR of Soprema, Sintec, Isoltema	
	Termination of Waterproofing:	
	Waterproofing shall be taken minimum 300mm above FFL. Terminated with TPO Termination strip & sealed with sealant.	
	Fourth Part: Providing and laying 200 GSM Polyester Geotextile with joints sealed with tape. Geotextile shall be 100mm overlapped Approved product: Rooftex Geotextile of Soprema, Sintec, Isoltema	Sqm
8.02	Providing and fixing Heat Resistant Terrace Tiles (300 mm x 300 mm x 20 mm) with SRI (solar refractive index) > 78, solar reflection > 0.70 and initial emittance > 0.75 on waterproof and sloped surface of terrace, laid on 20 mm thick cement sand mortar in the ratio of 1:4 (1 cement : 4 coarse sand) and grouting the joints with mix of white cement & marble powder in ratio of 1:1, including rubbing and polishing of the surface up to 3 cuts complete, including providing skirting up to 150 mm height along the parapet walls in the same manner.	Sqm
8.03	Baffle metal ceiling in Exhibition Hall	
	Supply of durlum POLYLAM® vertical Aluminium AA 3000 Series baffle system, exhibiting space-delineating characteristics. The system comprises baffles 50 mm width X 150mm deep manufactured out of 0.7mm Thick Aluminium, installed at 150mm C/C distance. The carrier rails run perpendicular to the baffles. Individual baffle lengths between 300 and 2400 mm can be selected. Baffle ceiling are supplied with the end cap matching the similar finish of baffle. Tolerances according to TAIM, DIN EN 13964 and quality controlled to ISO 9001:2015 approved by SIS. Substructure for durlum POLYLAM® Ver-tical baffle system consisting of U shaped galvanized slotted carriers minimum 1.2mm Thick installed perpendicularly to baffle ceiling at maximum 1200mm C/C using officially approved dowels. The primary profiles must be connected to one another with longitudinal splice connectors. The entire ceiling module shall be suspended with 6mm diameter galvanized steel threaded rods from the true ceiling officially approved anchor fasteners maximum at 1200mm Centers as per the requirements of DIN EN 13964 and the statics of the system. En-sure horizontal and flush alignment during installation. Baffle lengths less than 1500mm requires 2 carrier rails.	Sqm
	Surface: Baffles shall be in Wood Grain Finish	
	Mode of Measurements: Measurements shall be wall to wall without any deductions for lights, diffuses, columns etc.	

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Sl. No	Item Description	UOM
8.04	Supply of durlum Custom made Vertical curve Pullam Blades Ceilings as per the design intent. The vertically curve baffle system POLYLAM exhibiting space- delineating characteristics. The system comprises vertically curve baffle with 100-150mm deep curved rafters manufactured out of 1.2 mm Aluminium to provide wave effect. The module for fixing baffle shall be 150mm centers as per design requirement. The carrier rails run perpendicular to the baffles axis and can be mounted with M6 threaded rods using technical approved fasten-ers as per EN 13964 standards. The individual baffle lengths between 1200- 2400 mm can be selected. Baffles lengths less than 1500mm required two carrier rails mounted at the baffle ends. Baffle longer than 1500mm require additional carrier rails mounted in the centre. Finish RAL Powder Coated. No Pre-Coated products shall be accepted. The spacing of the grid angles is according to the requirements of DIN 18168 and DIN EN 13964 and quality controlled to ISO 9001:2015 approved by SIS & LEED certification by Indian Green Building council (IGBC). GMS 1.2 carrier and 1.2 L angle Make Durlum, Harsons, Green, Dampa, Dexune	Sqm
8.05	Supply of durlum S4 Hook On plank ceiling with form fitting & tension free planks 300 Wide, up to 1500- 1800 mm Long manufactured of 0.7 mm AL. Perforation 1.8 dia holes with acoustic fleece soundtex tissue for 0.7 NRC The ceiling planks shall be with square edges on 4 side. The substructure consisting of form punched angles as a lateral grid which is suspended pressure-rigid from the bare ceiling with M6 threaded rods using officially approved dowel plugs. The angles are to be connected at the ends by means of longitudinal connectors. The spacing of the grid angles is according to the requirements of DIN 18168 and DIN EN 13964 and quality controlled to ISO 9001:2008 ap-proved by TUV. On the grid angles, Z-shaped carrier profiles are attached as longitudinal profile with M6 bolts [secured against loosening]. The longitudinal connection of the Z-shaped carrier profiles is made by means of profile connectors. The planks shall be manufactured on advanced equipment which includes several levelling stages in manufacturing process. The plank ends will be raised with pips & stops to ensure ac-curate fixing & demounting of individual panel. Panels to be installed in segmented curve pattern to achieve the design orientation. Specification of sub structure will be as per the manufacturer recommend-ation. Make Durlum, Harsons, Green, Dampa, Dexune Finishes of ceiling planks shall be RAL powder coating with approved 3d printing on metal planks. The spacing of the grid angles is according to the requirements of DIN 18168 and DIN EN 13964 and quality controlled to ISO 9001:2015 approved by SIS & LEED certification by Indian Green Building council (IGBC). Finish Wood Grain 3D digital printing pattern	Sqm
8.06	Providing and fixing Microline grid Wall angle of 19mmx19mmx0.40mm shall be screw fixed to brick wall/partition with the help of approved screws at 600mm centres. Then suspending Microline Main T grid of 15mm x 35mmx 0.3mm of length 3600mm is hung with adjustable level clips 85 x 31 x 0.6mm with 4mm Dia Rod which are connected to Soffit Cleat 37mmx27mmx1.6mm and 8mm dia 40mm long Anchor Fasteners @1200mm centres or as approved from RCC Slab.. The Cross T of 15mm x 35mmx0.3mm of 1200mm length shall be interlocked between main T Grid at 600mm centres to form 1200 x 600mm modules.	

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Sl. No	Item Description	UOM
	Then USG BORAL Olympus Max™ ceiling panel having FLB edge of size 600x1200mm shall be placed into the above grid of size 600x1200mm. This ceiling panel confirms to ASTM E84 surface burning characteristics. (Class A, Flame Spread<25 & Smoke developed<50). The Ceiling panel provides NRC 0.7, CAC minimum: 35. Light Reflectance: 88%, can withstand Relative Humidity up to RH 99% (limiting conditions –Max 49 degree C/99%RH) and have Recycle content 61%. The tile contains a broad-spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Third party certified for low-emitting performance as per ASTM Standard Guide D5116 - 10.	
	USG Boral Microline 15mm T Grid System (600mm x 1200mm)	Sqm
8.07	USG Boral SECUROCK Glass mat sheathing Board	
	SECUROCK Glass mat sheathing Board(1220mm x 2440mm): This includes USG Boral Thundersteel Perimeter Channel 0.50 mm thick having one flange of 20 mm and another flange of 30 mm and a web of 28 mm) screw fixed to brick wall/partition with the help of approved screws at 600 mm centers Then suspending USG Boral Thundersteel intermediate section 45 mm x 0.90 mm thick with two flanges of 15 mm each) from the soffit at 1220 mm centers with USG Boral Thundersteel Ceiling L Angle 25 x 10 mmx 0.50 mm thick) fixed to RCC Slab with USG Boral Soffit Cleat 37 x 27 x 1.6 mm and 8 mm Dia 40 mm Long Anchor Fasteners 1200 mm Centers, respectively USG Boral Thundersteel profiles are rolled with AZ Steel 150 GSM 310 MPa Yield Strength) having base metal conforming to IS 513 2016 as per IS 15961 2017 AS 1397 2001 USG Boral Thundersteel Ceiling Section 51 mm x 0.50 mm thick with two flanges of 27 mm each) are then fixed to the USG Boral Intermediate channel with the help of 2.64 mm dia wire connecting in perpendicular direction to the intermediate channel at 400 mm centers 12.7 mm thick USG Boral SECUROCK Glass mat sheathing Board is screw fixed with 25 mm long Drywall screws at 230 mm centers The screw fixing of gypsum boards to the metal framing at the periphery, openings and cut edges should be at 150 mm centers All the boards must be staggered All joints to be taped finished with USGBORAL Paper tape All Purpose Joint Compound confirming to ASTM C 475 of Make USG Boral,Knauf,Saint Gobain	
	12.7 mm thick USG Boral SECUROCK Glass mat sheathing Board	sqm
8.08	Fabric acoustical wall paneling in SOC/NOC/Conference	
	Providing& fixing in position wall paneling at all heights of thickness 25 mm with Credence Fiber Glass Acoustical Wall Panels of size 600x1500 mm creda resin bonded square edges having NRC of 0.9 minimum. The panels should be manufactured from high density bio-soluble resin bonded glass wool absorber having density of 96 Kgs/m3 and wrapped on the front side with an acoustically transparent fabric having option of colours and fabric type like jute, etc. as per approved by architect/engineer-in-charge plain tissue backer and fabric wrapped hardened edges. Panels should have humidity resistance up to 90 %, thermal conductivity ≤ 0.03 (m ² k / w) thermal resistance ≥ 0.9 (m ² k / w) & moisture rate $\leq 1\%$ (JC/T670 – 2005). The panel should be fully recycled and fire retardant as per Class A. The installation comprises a GI framework for acoustic wall paneling as per design drawing (made from especially fabricated galvanized iron sheets 0.55 mm thick pressed section galvanizing @ 120 grams per sqm including both sides) consisting of floor channel of size 50X32X32X0.55 mm thick bottom and top fixed with nylon sleeves and screw. Further vertical GI studs of size 48X34X36X0.55 mm thick are placed at 600 mm center to center vertically on the wall using 12 mm dia 50 mm long wedged type	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	expanded zinc alloy dash fastener with 10 mm bolt, to avoid any undulations on the wall. The extra channel must be used at openings and junctions as required. Further, wooden batten/ply of 6mm thickness and a width of 5" to be placed at 600 mm center to center horizontally on the vertical GI Studs. Surface impalers of size 3"X4" having projecting element called spikes shall be fixed on the wooden batten surface at 1200 mm center to center horizontally and 600 mm center to center vertically, using self-tapping screws. Silica based construction adhesive to be dabbed on to the projecting elements (spikes) of the impalers. Silica based construction adhesive to be dabbed on to the projecting elements (spikes) of the impalers. Wall Panels shall be pierced through the spikes of the impalers ensuring line & level of panel are maintained.	
	The panels should be mounted on the impalers horizontally or vertically as per the approved design or as per the directions of the engineer-in-charge.	Sqm
8.09	GI Metal Ceiling Lay false ceiling in NOVAC	
	Supply of durlum aluminium perforated Clip in type ceiling system with swing down slide function of size 600X600mm of approved make, made up of 0.7 mm Aluminium, measured without RAL Non-metallic powder coating, beveled edge, finish of ceiling tiles should be electrostatically applied polyester powder coated finish of mini-mum 60 microns paint thickness, perforations with hole diameter 1.8 mm and open area 21%, with soundtex tissue at back of the panel to achieve 0.70 NRC as per EN ISO 354, applicable norms EN13964/10152/10346,supported by fully concealed clip in suspension system manufactured in accordance with European standards & technical regulation of TAIM e.V., the components of substructure to be manufactured from cold rolled zinc-galvanized steel in accordance with EN 13964/10152/10346/14195 and EN ISO 12944.The clip in profile made of galvanized steel 0.60 mm Installed at 600mm c/c and cross connected to the suspension channel connector made of galvanized 0.70 mm steel @ 1200 c/c for clip in swing down ceiling ,length 100 mm along with hanger lower section for suspension channel, hanger upper section for available ceiling void, including safety pin, self-tapping screws etc., The ceiling system elements, manufactured from zinc-galvanized steel , including powder coated surface in colour RAL non-metallic and bonded acoustic tissue on reverse side should be tested & approved according to EN 13501-1 building class A2-s1,d0, The installation & maintenance has to be carried out in accordance with manufacturers guidelines as well as technical standards issued by TAIM as approved by the Engineer-in-Charge. Finishes of ceiling tiles: RAL non-metallic polyester powder coat finish with minimum 60 microns paint thickness.	sqm
8.1	Durlum SW4.2 Custom Made Wall Panels:	
	Supply of durlum SW 4.2 Custom Made wall cladding Panels size 1200mm(L) x 300mm(W) manufactured out of 0.9 mm aluminum with Powder Coating. The Perforated and Non-PERFORATED wall panels shall be with square edges. All panels are fixed onto vertical C Chanel profiles 2.0mm Thick GMS installed with adjustable C Bracket 1.2mm GMS installed to the concrete/ prefixed sub frame (If re-quired).	sqm
	Tolerances and quality requirements according to TAIM, DIN EN 13964.All fixing accessories shall be external grade SS.	
	No additional framing, bridging, lateral supports considered in the quoted prices	
	Panel Thickness: 1.20mm Aluminum	
	Surface Finish: RAL Flexible PPC with Digital Printed 3D Pattern	

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Sl. No	Item Description	UOM
	Perforations: 2.1 mm dia holes. Sound Absorption: Soundtex tissue acoustic fleece for 0.7 NRC Dimensions: Up to 1200mm (L) X 300(W) mm Substructure: Proprietary hook-on vertical substructure SW02 manufactured out of 2.0mm Galvanized Steel, Wall Bracket SW01, other fixing accessories included. Additional back frame from wall to support the substructure of Durlum SW 4.2 wall paneling shall be in the Main contractor scope.	
8.11	Green Wall	
	Providing & Fixing wall planter base pots having minimum 5 years of warranty made in high quality unbreakable plastic in stackable mechanism which allows cascading irrigations method. The cost includes installation of different plant species as per direction of engg in charge or by architect. The whole integrated system shall include the installation of framework, plants, irrigation system, HDPE drip pipe, Lateral dipper, Filters , joints & Automation timer etc. Make Wonderwall, four leaf, Bio Vertical	sqm
8.12	HDHMR WALL PANELLING	
	Providing and fixing factory made 30MM (18MM Flutes + 12 MM Base) thick Homogeneous HDHMR pasted on a 12 MM thick HDHMR Plain Board with a second Generation MS polymer based hybrid All surface sealant, pressed in Temperature & Pressure controlled press, Solid Dark Green Colour board Fluting Panel, with CNC (Computer Numeric Control) Routed of approved design (Rectangular or Arched or both) by Engineer-in-charge which are machine cut for Panelling/Partitioning and acoustic Purposes comprising of Wood Fibre/Wood chips & synthetic thermosetting resin, having a minimum density of 820 kg/cum and screw Withdrawal strength of 1500 N (Face), 1250 N (Edge), Modulus of Elasticity average, 3200N/mm ² , Modulus of rupture average 3200N/mm ² with properties of being termite/borer proof, moisture/water Wall Paneling:	sqm
	Providing and fixing factory made 30MM (18MM Flutes + 12 MM Base) thick Homogeneous HDHMR pasted on a 12 MM thick HDHMR Plain Board with a second Generation MS polymer based hybrid All surface sealant, pressed in Temperature & Pressure controlled press, Solid Dark Green Colour board Fluting Panel, with CNC (Computer Numeric Control) Routed of approved design (Rectangular or Arched or both) by Engineer-in-charge which are machine cut for Panelling/Partitioning and acoustic Purposes comprising of Wood Fibre/Wood chips & synthetic thermosetting resin, having a minimum density of 820 kg/cum and screw Withdrawal strength of 1500 N (Face), 1250 N (Edge), Modulus of Elasticity average, 3200N/mm ² , Modulus of rupture average 3200N/mm ² with properties of being termite/borer proof, moisture/water proof and fixing on M.S. Frame (mild steel) made of 50 X 50 X 1.5 MM Square Hollow Box section including applying a priming coat of approved steel primer, with necessary stainless steel fasteners and SS Screws etc., all complete as per direction of Engineer – in – charge. (Note: MS (Mild Steel) or G.I. Framework with priming coat and necessary SS fasteners and SS screws shall be paid separately).Make Greenlam, Ecoste, Merlin Ply-la	
8.13	Making khurras 45x45 cm with average minimum thickness of 5 cm cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) over P.V.C. sheet 1 m x1 m x 400 micron, finished with 12 mm cement plaster 1:3 (1 cement : 3 coarse sand) and a coat of neat cement, rounding the edges and making and finishing the outlet complete.	Each

Technical Specifications Civil		
Sl. No	Item Description	UOM
9. : FINISHING WORKS		
	12 mm cement plaster of mix :	
9.01	1:6 (1 cement : 6 Fine sand) .	Sqm
9.02	15 mm cement plaster on the rough side of single or half brick wall of mix :	
a	1:6 (1 cement: 6 fine sand)	Sqm
9.03	20 mm cement plaster of mix	
a	1:4 (1 cement: 4 fine sand)	Sqm
9.04	6 mm cement plaster of mix : 1:3 (1 cement : 3 fine sand)	Sqm
9.05	Applying one coat of water thinkable cement primer of approved brand and manufacture on wall surface	
a	Water thinkable cement primer	sqm
9.06	Finishing walls with textured exterior paint of required shade :	
a	New work (Two or more coats applied @ 3.28 ltr/10 sqm) over and including priming coat of exterior primer applied @ 2.20kg/10 sqm)	sqm
	Stone granule paint finish	
9.07	Finishing walls with 100% Premium acrylic emulsion paint having VOC less than 50 gm/litre and UV resistance as per IS 15489:2004, Alkali & fungal resistance, dirt resistance exterior paint of required shade (Company Depot Tinted) with silicon additives.	
a	New work (Two or more coats applied @ 1.43 litre/ 10 sqm. Over and including priming coat of exterior primer applied @ 0.90 litre/10 sqm.	sqm
9.08	Wall painting with acrylic emulsion paint of approved brand and manufacture to give an even shade:	
a	Two or more coats on new work	sqm
9.09	Painting with synthetic enamel paint of approved brand and manufacture to give an even shade :	
a	Two or more coats on new work	sqm
9.1	Providing and applying white cement-based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete.	Sqm
9.11	Wall painting with premium acrylic emulsion paint of interior grade, having VOC (Volatile Organic Compound) content less than 50 grams/ litre of approved brand and manufacture, including applying additional coats wherever required to achieve even shade and colour.	
a	Two or more coats on new work	sqm
9.12	Wall painting with plastic emulsion paint of approved brand and manufacture to give an even shade:	
a	Two or more coats on new work.	Sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
10. : ALUMINIUM WORK		
10.01	Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e., at top, bottom and sides with required EPDM rubber/ neoprene gasket (thermal break profile) etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / paneling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. (Glazing, paneling and dash fasteners to be paid for separately) :	
a	For fixed portion	
	Polyester powder coated aluminium (minimum thickness of polyester powder coating 50 micron)	Kg
10.02	For shutters of doors, windows & ventilators including providing and fixing hinges/ pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber / neoprene gasket required (Fittings shall be paid for separately)	
b	Polyester powder coated aluminium (minimum thickness of polyester powder coating 50 micron)	Kg
10.03	Providing and fixing Insulated profiles of Polyamide for thermal separation of having U value not more than 3.3 w/m2 degree C, to minimize the thermal effect of the environment on the building's air conditioning in Aluminium profiles of approved door/window/ventilator systems, as per technical specifications, drawings and direction of Engineer-in charge complete.	Sqm
10.04	Providing & fixing for hardware in Aluminium thermal break windows/doors/ventilators with proper water drainage slots & gaps and wool pile for dust proof along with silicone at crimping joints in sliding and casement systems with hardware listed below (a&b) to withstand the weight of Insulated Glass panel, etc., as per technical specifications, drawings and direction of Engineer-in charge complete.	Sqm
	a) Hardware for casement window with 2 Locking Point shall be stainless steel 304 Grade and as under:	
	Unica Handle item code 01150FFF of GIESSE make or equivalent.	
	External Kit item code 2409 of GIESSE make or equivalent.	
	Rod drive item code 4099 of GIESSE make or equivalent	
	Adjustable Pawl item code 4030 of GIESSE make or equivalent	
	Striker item code 1343 of GIESSE make or equivalent	
	Polymide of Nylon item code 3524590 of GIESSE make or equivalent	
	Friction Stay Type C Plus 14" Arm item code 8224 of GIESSE make or equivalent.	

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Sl. No	Item Description	UOM
	b) Hardware for Top Hung window/Ventilator with 2 Locking Point shall be stainless steel 304 Grade and as under: Euro Cremone item code 01000FFF of GIESSE make or equivalent. Connection Block item code 2236 of GIESSE make or equivalent. Corner drive item code 4019 of GIESSE make or equivalent Adjustable Pawl item code 4030 of GIESSE make or equivalent C W Striker item code 1267 of GIESSE make or equivalent Polymide of Nylon item code 3524590 of GIESSE make or equivalent Friction Stay Type P Plus 20" Arm item code 8539 of GIESSE make or equivalent. Limiter Arm item code 8184 of GIESSE make or equivalent	
10.05	Designing, fabricating, testing, protection, installing and fixing in position semi (grid) curtain wall glazing using mechanically fixed DGU Glass with the support of aluminium pressure plate and cover plate.	
	(a) Functional design of the aluminum sections for fixing glazing panels of various thicknesses, aluminium cleats, sleeves and splice plates etc. gaskets, screws, nuts, bolts, clamps etc., structural and weather silicone sealants, microwave cured EPDM gaskets for ALP/Mona Make for water tightness, pressure equalization & drainage and protection against fire hazard including:	
	(b) All glazing panels will be prefabricated from factory & no fabrication & cutting will be done on site in order to have a tight quality control. Fabricating and supplying serrated M.S. hot dip galvanized brackets of required sizes, sections and profiles etc. to accommodate 3-Dimensional movement for achieving perfect verticality and fixing structural glazing system rigidly to the RCC/ masonry/structural steel framework of building structure using stainless steel anchor fasteners of Hilti / canon/ fisher Make.	
	(c) Making provision for drainage of moisture/ water that enters the curtain glazing system to make it watertight, by incorporating principles of pressure equalization, providing suitable gutter profiles at bottom (if required), making necessary holes of required sizes and of required numbers etc. complete. The item includes the cost of getting all the structural and functional design including shop drawings checked by a structural designer, dully approved by Engineer-in charge. (GLASS IS A SEPERATE ITEM) Providing and fixing Insulated profiles of Polyamide for thermal separation will be paid in item no. 10.6 extra over this item.	Sqm
	1.1	
10.06	Extra for openable side /top hung vision glass panels (DGUs) including providing and supplying at site all accessories and hardware for the openable panels as specified and of the approved make such as heavy duty stainless steel friction stay, 2 points cremone locking sets of Kinlong/ giessie/ Assabloy make with stainless steel plates, handles, buffers etc. including necessary stainless steel screws /fasteners, nuts, bolts, washers etc. all complete as Per the Architectural drawings, as per the approved shop drawings, as specified and as directed by the Engineer-in-Charge.	Sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
10.07	Providing, assembling and supplying vision glass panels (IGUs) comprising of hermetically-sealed 6-12- 6 mm insulated glass (double glazed) vision panel units of size and shape as required and specified, comprising of an outer heat strengthened float glass 6mm thick, of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade, an inner Heat strengthened clear float glass 6mm thick, spacer tube 12mm wide, dessicants, including primary seal and secondary seal (structural silicone sealant) etc. all complete for the required performances, as per the Architectural drawings, as per the approved shop drawings, as specified and as directed by the Engineer-in-Charge. The IGUs shall be assembled in the factory/ workshop of the glass processor. (Payment for fixing of IGU Panels in the curtain glazing is included in cost of item No.25.2) For payment, only the actual area of glass on face # 1 of the glass panels (excluding the areas of the grooves and weather silicone sealant) provided and fixed in position, shall be measured in sqm.	
	Coloured tinted float glass 6mm thick substrate with reflective soft coating on face # 2, + 12mm Airgap + 6mm Heat Strengthened clear Glass of approved make having properties as visible Light transmittance (VLT) of 25 to 35 %, Light reflection internal 10 to 15%, light reflection external 10 to 20 %, shading coefficient (0.25- 0.28) and U value of 3.0 to 3.3 W/ m2 degree K etc. The properties of performance glass shall be decided by technical sanctioning authority as per the site requirement.	sqm
	214.59+364.93	
10.08	Providing and fixing stainless steel (SS 304 grade) adjustable friction windows stays of approved quality with necessary stainless-steel screws etc. to the side hung windows as per direction of Engineer in- charge complete.	
	205 X 19 mm	Each
10.09	Providing and fixing Brass 100mm mortice latch and lock with 6 levers without pair of handles (best make of approved quality) for aluminium doors including necessary cutting and making good etc. complete.	Each
10.1	Providing and fixing 12 mm thick frameless toughened glass door shutter of approved brand and manufacture, including providing and fixing top & bottom pivot & double action hydraulic floor spring type fixing arrangement and making necessary holes etc. for fixing required door fittings, all complete as per direction of Engineer-in charge (Door handle, lock and stopper etc.to be paid separately).	sqm
10.11	Auto mated Glass door Supply and fixing of Automatic frameless sliding door by (GEZE, SIO or Equivalent) and operator, modular design including internal cover with operator dimensions (H X T) not exceeding 120mm x 175mm and of length required to suit the opening size given below: Clear opening of size 2500mm X 2400mm: GEZE EC Drive, compact linear sliding door automatic, with self-cleaning rollers, TUV type tested as per DIN 18650. In general, the sliding door consists of 16-bit Microprocessor Control unit, monitoring of closing force, automatic reverse on contact with obstruction, operator commissioning without any additional instrumentation and self-teaching. Operating Modes: Continuous open, automatic operation, closing time, night lock, multi-sensor detector(radar motion detector with direction detection and self-monitoring, (light barrier) for convenient safeguarding of the opening width),(Option: Electromagnetic locking, integrated in the drive unit, with manual emergency unlocking.)	Each

Technical Specifications Civil		
Sl. No	Item Description	UOM
	The operator will be provided with short circuit proof power supply unit 220 / 240 V, 50 / 60 hz (power point shall be made available at site by electrical contractor). Operator shall have opened speed adjustable from 10 to 60 cm / sec / leaf, closing speed adjustable from 10 to 55 cm / sec / leaf, adjustable creep speed 3 - 9 cm / sec / leaf and adjustable hold open time 0 - 180 seconds all confirming to manufacturers specification. Rate is not included for providing 12mm thick clear toughened glass sliding shutter as per design, handling, loading and unloading, installation, power required for erection, protecting the module and glass till handing over, testing, commissioning all necessary hardware's of GEZE make or equivalent and the module to be erected with the structural supports etc. complete and all as per manufacturers specifications as directed: (12 mm thick toughened glass shutter shall be paid extra.)	
10.12	Filling the gap in between aluminium/ stone/ wood frame and adjacent RCC/Brick/ Stone/ wood/ Ceramic/ Gypsum work by providing weather/structural non sag elastomeric PU sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-charge complete, complying to ASTM C920, DIN 18540- F & ISO 11600 Up to 5 mm depth and 5 mm width	meter
	PARTITIONS OFFICE 5TH FLOOR	
10.13	Providing and fixing in position factory made EPS cement sandwich wall/roof/floor light weight solid core panels made of core material of EPS granule balls/beads (conforming to IS 4671:1984 and shall have density not less than 15kg per cum) adhesive, cement, sand, flyash and other bonding material in mortar state processed to form in a preset mould. The outer face on both sides of the panels will be non-asbestos fiber cement board confirming to IS 14862:2000 or Calcium silicate board confirming to EN 14306:2009 of 5mm thick each. Panel shall be laid on 6mm thick cement mortar (1 cement: 2 fine sand) mixed with chemical adhesive of 0.5kg per 50kg of cement or shall be preferably fixed into 'C' channel made of 1.2mm thick MS plate screwed/fastened to the slab/column/ beam etc. The panel shall fix vertically with tongue and groove joint and horizontally locked with steel bar between each other and floors and filled with cement mortar and adhesive. Panels should be used as floor & roofing with additional structural support, steel or RCC depending upon the design. All the operation shall be completed in all respect as per drawings, Manufacturer's specifications and under the overall direction of Engineer-in-Charge (Cost of all the material is included except "C channel" which will be paid separately).	
	Non load bearing panels 75mm thick of required size	Sqm
10.14	Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge. (Cost of aluminium snap beading shall be paid in basic item):	
	With float glass panes of 8 mm thickness (weight not less than 20 kg/sqm)	Sqm
10.15	Reflective film on glass	Sqm

Technical Specifications Civil		
Sl. No	Item Description	UOM
11. : WATER PROOFING		
11.01	SUNKEN TREATMENT	
	Pipes being fixed for plumbing shall be fixed in holes which are mechanically core cut, more than the dia of the pipes. Pipes shall be fixed by grouting the annular space with Epoxy grout of proprietary make. Before grouting the pipes shall be wrapped with a two-way self-adhesive tape at least 2 inches wide and then grouted to fill in the grout, ensuring total watertight plumbing fittings. Application shall be carried out by approved applicator of manufacture and as per recommended by manufacturer.	Each
11.02	Surface Preparation: Cleaning the surface thoroughly with wire brush, soft brush and required tools to eliminate all defective materials and foreign matter. Repair all cracks joints and junctions with polymer modified cementitious mortar so as to achieve the sound surface for treatment.	
	Base Waterproofing Coating on RCC Slab:- Providing and applying BULWARK LM Bituminous PU coating. To be applied in 2 coats a flexible waterproofing coating over the Priming coat. coating to be done as per manufacture specifications, while providing the intermediate layer of 30 gsm Geo mesh sandwiched between the two coats.	
	Protection Plaster: - Providing and applying a protection plaster of avg. 15- 20mm thick 1:4 ratio, cement, sand mortar admixed with integral waterproofing compound.	Sqm
11.03	Water Tank Waterproofing work: - External	
	Treatment of old to New concrete Joints (While casting the concrete) Providing hydrophilic expanding swellable Water Bars fixed with adhesive on all construction joints before placing the shuttering for new concrete.	Rm
11.04	Sealing of Tie Rod Holes: Sealing the periphery of sockets, grooves with Non-Shrink Grout.	Each
11.05	Surface Preparation: Cleaning the surface thoroughly with wire brush, soft brush and required tools to eliminate all defective materials and foreign matter. Repair all cracks joints and junctions with polymer modified cementitious mortar so as to achieve the sound surface for treatment.	
	Base Waterproofing Coating on RCC Slab: - Providing and applying BULWARK LM Bituminous PU coating. To be applied in 2 coats a flexible waterproofing coating over the Priming coat. coating to be done as per manufacture specifications, while providing the intermediate layer of 30 gsm Geo mesh sandwiched between the two coats.	
	Protection Plaster: - Providing and applying a protection plaster of avg. 15 mm thick 1:4, cement sand mortar admixed with integral waterproofing compound.	Sqm
11.06	Water Tank Waterproofing work: - Internal	
	Injection Grouting:- Providing and applying NON- SHRINK POLYMERIC WATERPROOF GROUTING COMPOUND' admixed with Cement Slurry through the Nozzles under pressure by pump. The grout should flow through all pores and voids thereby sealing them.	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	Providing and laying water proofing treatment by chemical injection grout process in whole area vertical and horizontal. using 18mm dia MS nozzles fixing 1mtr c/c on horizontal surface and 1.5 mtr c/c on the vertical walls and 0.7m in construction joints, consisting of injecting cement slurries of different viscosities under pressure by pump using "BULWARK GROUT" Non-shrink chemical mixed with neat cement slurry and sealing off nozzles after the injection operation with polymeric mortar.	
	Epoxy injection grout in concrete/RCC work of approved make	Kg
11.07	Surface Preparation: Cleaning the surface thoroughly with wire brush, soft brush and required tools to eliminate all defective materials and foreign matter. Repair all cracks joints and junctions with polymer modified cementitious mortar so as to achieve the sound surface for treatment.	
	Elastomeric Coating: - Providing and Applying of a two-component heavy duty elastomeric coating, the waterproofing coating after the surface cleaning and surface preparation. First layer of the coating shall be provided over the structure and side walls up to the top level, after the complete coating. Second layer of waterproofing coating to be provided over the first layer after minimum 4-5 hours as per the prevailing temperature and allowing the treated surface to air cure for 4-5 hours followed with water curing for 24-48 hours as per the actual site conditions.	
	Conner Tape: - Providing and applying corner tape in the joint and junction.	
	Protection Plaster: - Providing and applying a protection plaster of avg. 15 mm thick 1:4, cement sand mortar admixed with integral waterproofing compound.	Sqm
11.08	Footing /Retaining wall Vertical area waterproofing Treatment	
	Technical parameters FIRESTONE Rubber Gard: MATERIAL: 1.1 mm thick non reinforced vulcanized EPDM RUBBERGARD meeting ASTM D 4637 requirement. The sheet should be as large as possible but not less than 3m unspliced width. Weight - 1.4 kg per sqm, Tensile strength - > 9 N/ mm ² , Elongation - > 300 %, Tear resistance - > 25kN/m, Brittleness point - < -45 ° C, Water absorption - < 2 % Provide EPDM membrane, splice tape, primer and bonding adhesive that are FM approved. Identify materials with FM Approvals markings. All the materials used should be from the same manufacturer. Artificial ageing compliance for more than 7500 hours as per EN 1297 EPDM RUBBERGARD: Laying 1.1 mm EPDM membrane confirming to above mentioned technical values is loose laid over the insulation boards. The width of Firestone EPDM sheet should be minimum 9 meter or large as possible to minimize the number of joints. Adjacent sheet shall be laid in similar fashion with an overlap of minimum 100 mm. Min 75mm wide rubber polymers butyl splice tape having 100% solid content together with synthetic-rubber polymer primer having 16-18% solids, Specific Gravity 0.793 and Flash point-17.8 degree centigrade, should be used to make watertight Quick Seam between 2 EPDM membranes. Vertical wall: The surface of wall shall be smooth, hard , dry and free from dust before applying treatment. 1.1mm thick EPDM RUBBERGARD confirming to above standards is fully bonded to the RCC substrate using FM approved solvent-based Neoprene Bonding adhesive. All the insertions shall be treated with Firestone uncured EPDM. The treatment to be terminated at least at the height of 300mm above the roof floor level using termination bar and appropriate fasteners. Water block sealant should be used on top edge behind membrane and lap sealant should be applied on	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	the edges of termination detail. Uncured EPDM flashing material factory laminated to splice tape should be used to flash inside and outside corners, pipes, drain outlets, scuppers and other penetrations or unusually shaped walls/details where the use of cured membrane flashing is not practical.	
	PROTECTION Geotextile: 300 gsm shall be laid all over EPDM Rubber Gard treatment. The geotextile membrane must be overlapped for 75mm. Make Firestone/ Genflex/Sealecs Sweden	
	Protection Plaster: - Providing and applying a protection plaster of avg. 15 mm thick 1:4, cement sand mortar admixed with integral waterproofing compound.	Sqm
11.09	PROMASTOP CEMENT/MORTAR FOR ELECTRIC SHAFTS	
	Providing and fixing 120 minutes Fire resistance fire stop with light weight cement specially formulated cement composition supplied as a pre-mixed dry powder for onsite addition of water to seal the openings in floors (as per NBC 2016) through which services are passing from one compartment to another in accordance with the criteria of BS 476 Parts 20 1987, AS 1530 Part 4 , and AS 4072 Part 1	
	For 120 min fire resistance the promstop mortar, 3M , Hilti is mixed with suitable amount of water and the mixture is cast uniformly , 40mm thick over mineral wool of minimum of 50mm x96 Kg/Cum when supported with metal shuttering of all around angle of minimum 25x25x3mm with intermediate angles at every 300mm complete in all respect for sealing of the shaft for 2 hrs. fire rating	Sqm
12.: MISCELLANEOUS		
12.01	Providing and fixing 8"x8" size 6MM acrylic with a layer of 1MM PVC material name plate having ADA lettering and graphics. 5/8" tall tactile letters in futura medium type face. 4.5" tall tactile symbols. Letters and symbols chemically welded to and raised 1/32 inch above plaque surface. ADA compliant Grade 2 doomed braille positioned 3/8 inch below text. All signs to comply with ADA specifications. Name plate of Title Name, Ladies Toilet, Gent's toilet and Handicap Toilet.	Each
12.02	Providing and fixing 36"x24" size 6MM acrylic with a layer of 1MM PVC material. Having ADA lettering and graphics. 5/8" tall tactile letters in futura medium typeface. 4.5" tall tactile symbols. Letters and symbols chemically welded to and raised 1/32 inch above plaque surface. ADA compliant Grade 2 doomed braille positioned 3/8 inch below text. All signs to comply with ADA specifications. Name plate of EVACUTION PLAN and FLOOR DIRECTORY. All signage is photoluminescent.	Each
12.03	Providing and fixing 8"x8" size 6MM acrylic with a layer of 1MM PVC material. Having ADA lettering and graphics. 5/8" tall tactile letters in futura medium typeface. 4.5" tall tactile symbols. Letters and symbols chemically welded to and raised 1/32 inch above plaque surface. ADA compliant Grade 2 doomed braille positioned 3/8 inch below text. All signs to comply with ADA specifications. Name plate of IN CASE OF FIRE (PL).All signage are photoluminescent.	Each

Technical Specifications Civil		
Sl. No	Item Description	UOM
12.04	Providing and fixing 18"x18" size 6MM acrylic with a layer of 1MM PVC material. Having ADA lettering and graphics. 5/8" tall tactile letters in futura medium typeface. 4.5" tall tactile symbols. Letters and symbols chemically welded to and raised 1/32 inch above plaque surface. ADA compliant Grade 2 doomed braille positioned 3/8 inch below text. All signs to comply with ADA specifications. Name plate of LIFT SIGNAGE SET. All signage is photoluminescent.	Each
12.05	Providing and fixing 18"x6" size 6MM acrylic with a layer of 1MM PVC material. Having ADA lettering and graphics. 5/8" tall tactile letters in futura medium typeface. 4.5" tall tactile symbols. Letters and symbols chemically welded to and raised 1/32 inch above plaque surface. ADA compliant Grade 2 doomed braille positioned 3/8 inch below text. All signs to comply with ADA specifications. Name plate of FINAL EXIT DOOR (PL) , EXIT ARROW DIRECTION (PL)and FIRE EXIT (PL).All signage are photoluminescent.	Each
12.06	Providing and fixing 24"x4" size 6MM acrylic with a layer of 1MM PVC material. Having ADA lettering and graphics. 5/8" tall tactile letters in futura medium typeface. 4.5" tall tactile symbols. Letters and symbols chemically welded to and raised 1/32 inch above plaque surface. ADA compliant Grade 2 doomed braille positioned 3/8 inch below text. All signs to comply with ADA specifications. Name plate of PUSH BAR TO OPEN (PL).All signage are photoluminescent.	Each
12.07	Providing and fixing 8"x10" size 6MM acrylic with a layer of 1MM PVC material. Having ADA lettering and graphics. 5/8" tall tactile letters in futura medium typeface. 4.5" tall tactile symbols. Letters and symbols chemically welded to and raised 1/32 inch above plaque surface. ADA compliant Grade 2 doomed braille positioned 3/8 inch below text. All signs to comply with ADA specifications. Name plate of FIRE HOSE REEL (PL) and FIRE EXTINGUISHER (PL). All signage is photoluminescent.	Each
12.08	Providing and fixing LOGO (69 LETTER'S)Halo Illuminated Letters of 18" height following :	Each
	Spec - INDIVIDUAL LETTERS READING 'MARKS & SPENCER'	
	RAL 9005 JET BLACK DESCALED ACRYLIC LETTERS WITH GLOSS FINISH	
	RETURN WITH BLACK ACRYLIC FOLLOWED BY EQUAL SIZE WHITE ACRYLIC	
	HALO ILLUMINATED	
	BLACK ACRYLIC LETTER RETURN WILL BE EQUAL TO WIDTH OF STROKE OF LETTER "M"	
	ACRYLIC SHEET TO BE USED TO FORM BLACK ACRYLIC LETTERS - SEAMLESS JOINT FINISH REQUIRED	
	ALL WIRES TO BE CONCEALED IN FLEXIBLE CONDUIT	
12.09	LIGHT COLOR TEMPERATURE - 5000K (Manufacturer's color temperature certificate required post execution)	Each
	Providing and fixing EXTERNAL DIRECTORIES of size 72"x10" Sign Panel, sides - front and back Illuminated, 1mm aluminium sheet with laser cut graphics, painted to required colour. Fixed to aluminium extrusion structure using VHB tapes. Acrylic sheet of 3mm, 040 opacity fixed in graphic space from inside. Illumination provided by LED modules from inside. Modules of 0.72W with 12V or 24V supply with 3 years life.	

Technical Specifications Civil		
Sl. No	Item Description	UOM
12.10	Providing and fixing EXTERNAL DIRECTORIES Support Structure: two poles of stainless-steel grade-304, square pipe of size-75mmX75mmX1mm of length- 10' fixed with use of SS 304 anchor plates of size - 200mmX2mmX4mm fixed to RCC base with anchor fasteners RCC Base: size - 24"x18"x18" grade - M25/30	Each
13.: Foundation		
13.01	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:	RM
	1:1½:3 (1 Cement: 1½ coarse sand (zone-III): 3 graded stone aggregate 20 mm nominal size)	
	1:2:4 (1 cement: 2 coarse sand (zone-III): 4 graded stone aggregate 20 mm nominal size)	Qila
	1:2:4 (1 Cement: 2 coarse sand (zone-III) : 4 graded stone aggregate 40 mm nominal size)	
	1:3:6 (1 Cement: 3 coarse sand (zone-III) : 6 graded stone aggregate 20 mm nominal size)	
	1:3:6 (1 Cement: 3 coarse sand (zone-III): 6 graded stone aggregate 40 mm nominal size)	Each
	1:4:8 (1 Cement: 4 coarse sand (zone-III): 8 graded stone aggregate 40 mm nominal size)	
	1:5:10 (1 Cement: 5 coarse sand (zone-III): 10 graded stone aggregate 40 mm nominal size)	
	1:5:10 (1 Cement: 5 fine sand: 10 graded stone aggregate 40 mm nominal size)	
	1:2:3½:9 (1 ordinary Portland cement: 2 Fly ash: 3½ coarse sand (zone-III): 9 graded stone aggregate 40 mm nominal size)	
	1:2½: 4:11 (1 ordinary Portland cement: 2½ fly ash: 4 coarse sand(zone-III): 11 graded stone aggregate 40 mm nominal size)	
	Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain windowsills, fillets, sunken floor etc., up to floor five level, excluding the cost of centering, shuttering and finishing:	
	1:1½:3 (1 Cement: 1½ coarse sand (zone-III): 3 graded stone aggregate 20 mm nominal size).	
	1:2:4 (1 Cement: 2 coarse sand (zone-III): 4 graded stone aggregate 20 mm nominal size)	
	1:3:6 (1 Cement: 3 coarse sand (zone-III): 6 graded stone aggregate 20 mm nominal size)	
	1:5:10 (1 Cement: 5 coarse sand (zone-III): 10 graded stone aggregate 40 mm nominal size).	
	Centering and shuttering including strutting, propping etc. and removal of form work for: Foundations, footings, bases for columns sqm	
	Retaining walls, return walls, walls (any thickness) including attached pilasters, buttresses, plinth and string courses fillets, kerbs and steps etc. sqm 609.30 Columns, piers, abutments, pillars, posts and struts	
	Providing and laying cement concrete in kerbs, steps and the like at or near ground level excluding the cost of centering, shuttering and finishing.	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	1:1½:3 (1 Cement: 1½ coarse sand(zone-III) : 3 graded stone aggregate 20 mm nominal size)	
	EARTH WORK / EXCAVATION	
	EXCAVATION	
	Earthwork in excavation in cutting and filling in all kinds of soil (i.e., soft loose soil / hard dense soil / murrum / gravel) and in debris at all depths for foundations of columns, walls, drains, etc., dressing of sides & ramming of bottom including strutting, shoring. And getting out the excavated soil, stacking, transportation and disposal of excavated soil as directed within the site, (both for filling and disposal) at all lifts and leads and locations as indicated by the engineer including levelling, dressing or stacking the same as directed, with all bye works complete as per specification manually / using hydraulic excavators, all tools, plant and labour complete in all respect. Depth of excavation to be measured from existing ground level. (Authorized working space, benching and side slopes for the excavation will be measured and paid under this item.)	
	Excavating soil up-to 1.5 m	
	Excavating soil up-to 1.5 – 3 m	
	BACK FILLING	
	Earth Filling with approved quality earth in below flooring, sides of foundation and elsewhere directed in layers of not exceeding 200 mm thick including breaking clods, watering, compacting each layer with vibratory compactor and at inaccessible places with wooden/steel rammers to achieve 90-95% proctor density at optimum moisture content, all leads & lifts machinery etc. complete	
	Earth available within the site	
	Supplying & filling of approved earth brought from outside the complex including all leads and lifts, cost of earth, royalty, excavation, transportation, loading, unloading and filling in layers not exceeding 20 cm in depth; the work also includes breaking clods, consolidating, watering, ramming and rolling every third and topmost layer with required capacity of roller and dressing all complete as directed by the Engineer-in-charge .	
	DISPOSAL	
	Transporting the surplus earth which cannot be reused at the site to any approved dumping place or as specified by the Engineer in charge and disposing the same in municipal approved dump yard all lead and lift.	
	SAND FILLING	
	Supplying and filling in plinth, under floors etc. with river sand and consolidation with watering and ramming	
	ANTI TERMITE TREATMENT	
	Providing & injecting chemical emulsions for pre-construction anti-termite treatment (all as per IS code 6313 part-II) in column foundation, wall trench foundation, back fill earth in stages as filling progresses for top surface of plinth foundation, junction of wall & floor along external perimeter of the building, surrounding pipes, waste lines & conduits. The rate shall include cost of labour, materials etc. required for work. Plinth area of the building at Ground Floor level only is to be measured for payment.	
	STONE SOILING	

Technical Specifications Civil		
Sl. No	Item Description	UOM
	Supplying and laying stone soiling using stone size 40-60 mm under floor etc. incl. filling the gaps with small pieces of stone/ river sand incl. packing; ramming etc. complete	
	Providing, Fixing & Removal of Centering, shuttering, form work etc. of any shape and design with required height of staging & supporting etc. for complete structure as per design, drawing & specifications, including all materials, labour complete as per directives by Engineer-In- Charge to his entire satisfaction for all floors/ levels	
	All shuttering shall be marine Plywood / MS shuttering sheets.	
	foundation, column pedestals, plinth beams, column etc.	
	superstructure: column, beams, slab etc.	

12 Operation & Maintenance

Scope of Work

SI is responsible to provide end to end O&M support for entire CIVIL and NON-IT infrastructure implemented for Greenfield Data Centre for 07 years from the date of Go-Live. This is suggested to maximize uptime efficiency minimum 99.982 in Greenfield GSDC and related information technology (IT) facilities managed by SI Team. This provides guarantee and accountability for the operations team, service providers and end users to meet the criteria for 24 x 7 service requirement. The goal is to achieve full uptime potential, obtain maximum leverage of the installed infrastructure or design, improve operations efficiency and realize opportunities for energy efficiency. This mainly provides the guidance and framework to drive best practices for the effective management and operations of the Gujarat State Greenfield GSDC. Following are the key areas, but not limited to, for O&M scope of work as part of this RFP :

- ✓ Operation and Maintenance of end-to-end Civil Infrastructure
- ✓ Operation and Maintenance of end-to-end Non-IT Infrastructure
- ✓ Facility Management services
- ✓ Human Resource
- ✓ Access Management
- ✓ Operations Monitoring and Management
- ✓ Preventive Maintenance Program
- ✓ Trainings and Induction
- ✓ Reports (As per frequency defined at Annexure I1 of this RFP)
- ✓ Documentation
- ✓ Certification
- ✓ Automation of Services

12.1 Key actions point for Greenfield GSDC O&M Phase (Civil & Non-IT)

The Successful bidder shall be responsible for the overall management of the Civil & Non-IT Infrastructure and enabling infrastructure maintenance services / facility management services at Greenfield GSDC for ensuring adherence of SLAs. Bidder shall integrate with the DCIM tool at the State Data Centre that monitors / manages the entire enterprise wide, infrastructure and related components. Bidder shall provide the Operations and Maintenance Services for a period of 7 years following the award of the contract/as per terms & condition defined in this RFP. The bidder shall be responsible for following:

- a. For 99.982% uptime for better availability, preventive maintenance activity is required to be carried out as per APMP (Annual preventive maintenance plan) for

all non-IT infrastructure/ Civil which includes, but not limited UPS, DG, Transformer but also covers Civil infrastructure solution.

- b. Successful Bidder is required to submit a APMP (Annual preventive maintenance plan) of all equipment to DST/GIL. Post successful completion of preventive maintenance activities, bidder is required to submit the report of the same. All such activities should be done preferably in non-working hours.
- c. As part of the Operations and Maintenance services, the bidder shall provide support for the support software, hardware, and other infrastructure provided/covered as part of this RFP. Bidder shall also provide 7 years onsite O&M support from Go-Live. The bidder shall also provide services comprising of but not limiting to the following:
 - i) Operations and maintenance services for Civil & Non- IT Infrastructure supplied & commissioned by the bidder at the GSDC for seven years from the Go-Live during the contract period.
 - ii) Other building infrastructure related support services for seven years as defined in this RFP.
 - iii) The services shall be rendered onsite from the designated premises. To provide the support at the locations where the infrastructure will be rolled out, bidder is expected to provide experienced and skilled personnel at site.
 - iv) Bidder is responsible to provide all required Hardware/software like Desktop/laptop, Hardware tools, OS, other software etc. to his resources (which are deployed under this project) to perform all the duties/works as a part of the deliverables under this RFP.
- d. Warranty Support: Successful bidder has to provide comprehensive Onsite support for all equipment/component/devices/infrastructure for 07 years from the date of Go-Live.

As part of the O&M solution, if bidder has upgraded/replaced the equipment /devices/solutions at Greenfield GSDC, Bidder is responsible to supply, install & commissioning of the said new equipment including 07 years warranty services from Go-Live. The bidder shall provide following Warranty services for all new equipment's:

- i) Bidder shall provide a comprehensive warranty and on-site free service warranty for 7 years from the date of FAT (Go-live date) for all equipment's.
- ii) Bidder shall obtain the 7 years product warranty and 7 year onsite free service warranty from OEM on all licensed software, computer hardware, peripherals, networking equipment and other equipment for providing warranty support.
- iii) Bidder shall provide the comprehensive manufacturer's warranty and support in respect of proper design, quality and workmanship of all hardware, equipment, accessories etc. covered by the RFP. Bidder must warrant all hardware, equipment, accessories, spare parts, software etc. procured and implemented as per this RFP against any manufacturing defects during the warranty period.
- iv) Bidder shall provide the performance warranty in respect of performance of the installed hardware and software to meet the performance requirements and service levels in the RFP.

- v) During the warranty period bidder shall maintain the systems and repair / replace at the installed site, at no charge, all defective components that are brought to the bidder's notice.
- vi) The bidder shall as far as possible repair/ replace the equipment at site.
- vii) Warranty should not become void, if TENDERER buys, any other supplemental hardware from a third party and installs it within these machines under intimation to the bidder. However, the warranty will not apply to such supplemental hardware items installed.
- viii) Bidder shall monitor warranties to check adherence to preventive and repair maintenance terms and conditions.
- ix) Bidder shall ensure that the warranty complies with the agreed Technical Standards, Security Requirements, Operating Procedures, and Recovery Procedures.
- x) Bidder shall have to stock and provide adequate onsite and offsite spare parts and spare component to ensure that the uptime commitment as per SLA is met.
- xi) Any component that is reported to be down on a given date should be either fully repaired or replaced by temporary substitute (of equivalent configuration) within the time frame indicated in the Service Level Agreement (SLA).
- xii) Bidder shall develop and maintain an inventory database to include the registered hardware warranties.
- xiii) The SI warrants that the equipment supplied under the Contract are new, unused, of the most recent or current model and they incorporate all recent improvements in design and / or features. The SI further warrants that all the equipment supplied under this Contract shall have no defect, arising from design or from any act of omission of the SI that may develop under normal use of the supplied Equipment/products in the conditions prevailing in India.
- xiv) Warranty for all equipment Components: Onsite comprehensive warranty for all the equipment components including free replacement of spares, parts, kits as and when necessary, will be 84 months from date of Go-live.
- xv) Warranty for the System Software/off-the-shelf Software will be provided to the DST/GIL as per the general conditions of sale of such software.
- xvi) The SI shall in addition comply with the performance guarantees specified under the Contract. If, for reasons attributable to the SI, these guarantees are not attained in whole or in part, the SI shall make such changes, modifications and / or additions to the Equipment/Products or any part thereof as may be necessary in order to attain the contractual guarantees specified in the Contract at its own cost and expense and to carry out further performance tests.
- xvii) On-site comprehensive warranty: The warranty would be on-site and comprehensive in nature and back-to-back support from the OEM. The SI will warrant all the equipment (Civil and Non-IT) against defects arising out of faulty design, materials and media workmanship etc. for a period of Eighty-Four (84) months from the date of acceptance of the equipment. The SI will provide support for all equipment during the warranty period. The SI shall repair or replace worn out or defective parts including all plastic parts of the equipment at his own cost including the cost of transport.
- xviii) During the term of the contract, the SI will maintain the equipment in perfect working order and condition and for this purpose will provide the following repairs and maintenance services:

- xix) Free maintenance services during the period of warranty. Professionally qualified personnel who have expertise in the hardware and system software supplied by the SI will provide these services.
- xx) The Bidder shall rectify any defects, faults and failures in the equipment and shall repair/replace worn out or defective parts of the equipment as per SLA defined in this RFP. In case any defects, faults and failures in the equipment could not be repaired or rectified during the said period, the engineers of the SI are required to accomplish their duties beyond the said schedules in case of any situation if it warrants. In cases where unserviceable parts of the equipment need replacement, the SI shall replace such parts, at no extra cost to the DST/GIL, with brand new parts or those equivalent to new parts in performance. For this purpose, the SI shall keep sufficient stock of spares at Greenfield GSDC premises and at the premises of
- xxi) The SI shall provide replacement equipment if any equipment is out of the premises for repairs.
- xxii) Any worn or defective parts withdrawn from the equipment and replaced by the SI shall become the property of the SI and the parts replacing the withdrawn parts shall become the property of DST/GIL.
- xxiii) The SI's maintenance personnel shall, be given access to the equipment, when necessary, for purpose of performing the repair and maintenance services indicated in this agreement.
- xxiv) However, if DST/GIL desires to shift the equipment to a new site withing Data Centre Building and install it thereof urgently, the SI shall be informed of the same immediately without any extra cost to GoG. The SI shall provide necessary arrangement to DST/GIL in doing so. The terms of this agreement, after such shifting to the alternate site and reinstallation thereof would continue to apply and binding on the SI.
- xxv) No term or provision hereof shall be deemed waived, and no breach excused, unless such waiver or consent shall be in writing and signed by the party claimed to have waived or consented. Any consent by any party to or waiver of a breach by other, whether express or implied, shall not constitute a consent to or waiver of or excuse for another different or subsequent breach.
- xxvi) On account of any negligence, commission or omission by the engineers of the SI and if any loss or damage caused to the Equipment, the SI shall indemnify/pay/reimburse the loss suffered by DST/GIL in a period of one month. In case of exceptional cases, DST/GIL reserves the rights to define timelines considering prevailing circumstances.
- xxvii) In the event of failure of the SI to render the Services or in the event of termination of agreement or expiry of term or otherwise, without prejudice to any other right, the DST/GIL at its sole discretion may make alternate arrangement for getting the Services contracted with another SI. In such case, the DST/GIL shall give notice to the existing SI at least 3 months beforehand and it is duty of the existing SI to provide services as per the terms of contract until a 'New SI' completely takes over the work. During the transition phase, the existing SI shall render all reasonable assistance to the new SI within such period prescribed by the DST/GIL, at no extra cost to the DST/GIL, for ensuring smooth switch over and continuity of services. If existing SI is in breach of this obligation, they shall be liable for paying a penalty of as provided in Section-15.1 (Liquidity Damage) on demand to the DST/GIL, which may be settled from the payment of invoices or Performance Bank Guarantee for the contracted period.

12.2 DCIM tool for SLA and Performance Reporting

The Successful bidder shall operate and maintain Data Centre Infrastructure management (DCIM) for SLA and Performance Monitoring System. The successful bidder is required to maintain the tools and to provide maintenance & warranty support during the entire contract period OR Bidder may replace this tool with appropriate equivalent to higher capabilities tool with necessary hardware, software and licenses during O&M Operations if any upgrade comes in tool. During the contract period, bidder has to provide additional licenses & required hardware and software without any cost at time of addition of new node if required. If any of the functionality/requirement listed below are not supported by proposed tool, bidder has to provide/fulfil the functionality through customized solution. The DCIM tool should provide Supervision and Call logging support for Greenfield GSDC. The selected bidder shall be responsible to install & provide support for DCIM. The DCIM tool will be used by O&M operator, and for Greenfield GSDC components the tool has to be managed and monitored by the bidder selected under this bid.

The DCIM tool should be managed by the Successful Bidder for the complete contract period and shall be used for regular monitoring of the infrastructure. Successful bidder shall configure/ provision the systems to be used by GoG for audits and also help in monitoring the service level parameters on an ongoing basis as defined in Service level agreements. The TENDERER or its designated agency shall have access to all generated reports for service levels audits and monitoring. Successful bidder shall deploy adequate access policy and security policy on the systems in consultation with TENDERER for ensuring authenticity and integrity of the reports. The system shall essentially have 3 components, Network (Passive node monitoring) and Data Centre Management component (Non-IT Infrastructure), Helpdesk & SLA Management component. The TENDERER should be able to view the SLA Management component. The detailed Technical Specification and Functional requirement of DCIM shall be as defined at **Annexure L**.

The essential functions of the system, but not limited to, are as follows:

- Centralized operation of the plant (remote control)
- Dynamic and Animated Graphic details of Plant and building
- Early recognition of faults
- Faults statistics for identification
- Trend register to identify discrepancies, energy consumption, etc.
- Preventive maintenance and plant servicing
- Optimum support of personnel
- Control optimization of all connected electrical and mechanical plant
- Prevention of unauthorized or unwanted access
- Own error diagnosis integrated system

12.2.1 The scope of work is not only limited to deployed Non-IT Infrastructure components at Gujarat State Data Centre but also includes O&M for any additional equipment/devices/hardware/software that is supposed to be deployed at Greenfield GSDC during the contract period of 7 years.

12.2.2 O&M team will be responsible for O&M for any additional equipment/devices/hardware/ software procured by DST and hosted at GSDC, 1% of the cost exclusive of applicable taxes for each additional

equipment/devices/hardware/ software component, per annum would be applicable for additional payment as part of O&M and SLA of 99.982% uptime and other applicable SLAs if any as defined by TENDERER will be enforced on additional equipment /devices /hardware /software.

12.3 Vendor Management Services

12.3.1 The activities shall include, but not limited to the following:

- (a) Onsite O&M team (Helpdesk) shall coordinate and follow-up with all the relevant vendors of the GSDC to ensure that call logged for issue reported are getting resolved in accordance with the SLAs agreed upon with them by updating the GIL / DST, GOG as and when deviation in the SLA is reported through Help desk tool.
- (b) Onsite O&M team shall also ensure that unresolved issues were support require from respective domain stakeholder, proper escalation matrix getting followed to respective user departments / GIL / DST, GOG.
- (c) Onsite O&M team shall draw a consolidated monthly SLA performance report as defined by the GIL / DST, GOG / Departments across vendors for consideration of the user departments. (Monthly & Quarterly - for GSDC)

12.3.2 O&M team will be responsible for preparing and carry out testing and execution of fail over plan. Creation & revision of SOP's and Disaster Recovery Plan.

12.3.3 O&M team will conduct periodic Workshops and Training sessions for all GSDC stake holders to create awareness of SOP'S, emergency prepared plan, ISMS implementation. GSDC stake owners will be made familiar with ISMS implementation and risk management approach selected for GSDC.

12.3.4 O&M team will be responsible to apply and maintain the latest relevant certification i.e., IGBC rating certificate/ Uptime Tier Certification for the contract duration.

12.4 O&M of Greenfield GSDC Physical Infrastructure

12.4.1 All the devices installed as part of the physical infrastructure should be remotely monitored and managed on a 24x7x365 basis. The physical infrastructure management and maintenance services shall include, but not limited to the following:

- 1) Operation and management of DCIM too/ Sensor. Proactive monitoring of the entire Physical infrastructure installed at through integrated DCIM Tool.
- 2) Management of Physical Access to the premises as per the policies set by the Department of Science and Technology.
- 3) Monitoring, recording and reporting usual and unusual movements in and around the premises.
- 4) Material inward/ outward control as per policies set by the Department of Science and Technology.
- 5) Monitoring and managing safety and surveillance equipment like CCTV, Access Control, Fire detection and Suppression etc.
- 6) Issuing access control as per approval from the Department of Science and Technology.
- 7) Reporting incidents to the Department of Science and Technology.

- 8)** Co-ordinate with respective trusted personnel and communicate with authorized maintenance personnel for various utilities at the Data Centre as required.
- 9)** Manage and monitor Diesel level/ requirements at its full capacity of the DG Set. Prevent the contamination of diesel-by-diesel bug or any other microorganisms. Diesel is consumable item, which will be charged on actual basis.
- 10)** The bidder shall install a mechanism which will generate logs for diesel consumed through the use of tamper proof automatic measurement.
- 11)** Component that is reported to be down on a given date should be either fully repaired or replaced by temporary substitute (of equivalent or higher configuration) within the time frame indicated in the Service Level Agreement (SLA). In case the selected bidder fails to meet the above standards of maintenance, there will be a penalty as specified in the SLA.
- 12)** The selected bidder shall also maintain records of all maintenance of the system and shall maintain a logbook on-site that may be inspected by TENDERER or authorized authority.
- 13)** CCTV footage is to be kept meeting legal, regulatory, ISO Policies compliance requirements and would be stored in GSDC SAN/NAS during the contract period. The record retention period shall be as per policies of TENDERER.
- 14)** The bidder should ensure high availability for power on 24x7x365 basis and should maintain all the systems/subsystems for power availability.
- 15)** Ensure availability of the physical Infrastructure including Power, include of DG, UPS, Cooling, CCTV, Access Control, Intelligent Racks, Fire detection and suppression systems, Rodent Repellent systems, Water leak Detection Systems and other components included as part of physical Infrastructure related services.
- 16)** O&M team will have to submit monthly/quarterly MIS reports of each component as per the SLA
- 17)** O&M team should log SR/Incidents calls in service desk related to each component.
- 18)** Proactive and reactive maintenance, repair or replacement of defective components (Non-IT/ Hardware and Software) related to Physical Infrastructure systems and sub-systems. The cost of repair and replacement shall be borne by the selected bidder. IT and Non-IT hardware here refers to systems such as IT and non-IT hardware and software being used for maintaining and monitoring Physical Infrastructure e.g., DCIM, Access control, etc.
- 19)** The selected bidder shall have back-to-back arrangement with the OEMs and shall provide a copy of the service level agreement signed with respective OEMs.
- 20)** The Bidder shall maintain documentation for installation, testing, commissioning of any system/sub-systems that is installed or upgraded.
- 21)** Acceptance test shall be carried out for any system that is installed and/or upgraded.
- 22)** The bidder shall carry out comprehensive fire drills as per Policy/Guidelines specified by DST and submit drill reports to TENDERER on regular intervals.
- 23)** Bidder shall record all the incidents/issues related to physical infrastructure services, security, systems and Sub-systems in the Helpdesk.

- 24)** The bidder shall carry out periodic Risk assessment of the Physical Infrastructure as per Policy/Guidelines specified by DST and provide a Risk Assessment report including recommendations. Assessments/Policies/Guidelines defined
- 25)** The bidder shall provide training to resources deployed at periodically.
- 26)** The bidder shall carry out current state assessment on an annual basis to determine the state of all the components installed and maintained, on completion the bidder shall submit a recommendation/up gradation report.
- 27)** Full compliance to all the policies, procedures, processes, guidelines, Government- Acts, Rules & Regulations, etc. The bidder shall provide full compliance/adherence of all activities performed by them, to the aforementioned statutes, without any additional cost to TENDERER.
- 28)** Maintenance and monitoring of CCTV System with IP base Cameras with high resolution and night vision cameras. The O&M Agency is responsible for the integration of the Cameras with the NVR/DVR/SAN Storage and ensure that at least 30 days 720p HD CCTV Footage is stored on the NVR and backup of CCTV footage beyond 30 days should be taken existing SAN/Tape Library, of GSDC. The bidder should ensure that the CCTV system is compatible with SAN/NAS/Tape Library of GSDC.

12.4.2 Transformer, Circuit Breaker, Electricity and DG Set Maintenance & Management

- i. The O&M agency shall be responsible for Operations, Management and Comprehensive Annual Maintenance of Transformer, Circuit Breaker, HT/LT Power Cables, Electricity and Diesel Management for the entire project period. The O&M agency shall ensure that diesel shall be there in the DG sets at its full capacity in case of power failure. O&M agency has to maintain register for monitoring and reimbursing the diesel consumption for the DG set. The DG set will be procured by Tenderer along with its maintenance support & the selected O&M agency will be responsible for its Operation & Maintenance only.
- ii. Procedure for monitoring and reimbursing the Diesel consumption for the DG set:
 - a) There will be a register maintained and kept with the O&M agency showing the following columns:

Sr. No	Date	Current Reading	Fuel Available	Date of filling	Qty. Filled	Total fuel available	Signature of DST, GoG	Signature of O&M agency
1								
2								

- b) Reimbursement of diesel cost will be done on Monthly basis along with Monthly/Quarterly Payment.
- c) TENDERER shall verify the diesel consumption from the logbook maintained and MIS generated.

- d) The O&M team will submit the bill (original bills of petrol/diesel pump) for every purchase along with their invoice for reimbursement.
- e) Payment will be processed by TENDERER based upon verification of bill with the register entry on Monthly basis.

12.5 Preventive Maintenance Services

- 1) Check, Repair/Replace any loose contacts in the cables/connectors & connections on a regular basis.
- 2) Conduct preventive maintenance every three months or as directed by the TENDERER (including inspection, testing, satisfactory execution of diagnostics and necessary repairing of the equipment).
- 3) Cleaning and removal of dust, dirt etc. from the interior and exterior of the equipment on a daily basis.
- 4) Preventive Maintenance Activities of components as per their manufactures' recommendation/advice.
- 5) The Data Centre operator will keep a web-based monitoring format and schedule of preventive maintenance services and shall provide reports to the DST, GoG as and when asked.
- 6) The Preventive Maintenance shall be carried out in Non-Prime Hours only under prior intimation and approval from TENDERER.

12.6 Corrective Maintenance Services

- 1) Warranty and maintenance/troubleshooting of hardware problem of all supplied Non-IT Infrastructure including infrastructure equipment UPS, AC, DG Set etc. and rectification of the same.
- 2) Troubleshooting of problems arising in the network and resolving the same.
- 3) Documentation of problems, isolation, cause and rectification procedures for building knowledge base for the known problems.

12.7 Asset Management Services

- 1) The O&M agency shall be required to create database of all the equipment/software procured/Installed under Project. The details of all assets like hardware, software, peripherals, manuals, media and other related peripherals, etc., shall be maintained by recording information like make, model, configuration details, serial numbers, licensing agreements, warranty, place of installation etc.
- 2) Record installation and removal of any equipment under the project and inform TENDERER even if it is temporary.
- 3) Create Software details with information such as Licenses, cost, Version Numbers, validity, support if any and Registration Details.
- 4) Perform software license management, notify TENDERER on licensing contract renewal and assist them in getting the license renewed.

- 5) Asset Management services of physical and IT infrastructure under the project must conform to ITIL framework.

12.8 Resource Requirement for Operation, Services and Maintenance

12.8.1 The minimum requirement of manpower resources, their qualification and responsibility of each resource is given below. This is minimum indicative list of resources and based on actual requirements, the bidder may deploy the necessary manpower to meet the SLA. TENDERER shall not pay any cost for additional resources required to operate, maintain, monitor & manage the GSDC as per the SLA. In case support staff is not available or is on leave, the bidder is required to provide the alternative personnel with same or higher technical capabilities of the non-available personnel.

Resources in Shift:

- General Shift - 10 AM to 6 PM
- 1st Shift – 6 AM to 2 PM
- 2nd Shift - 2 PM to 10 PM
- 3rd Shift – 10 Pm to 6 AM
- Min. Qualification – As specified under Manpower requirement
- Note: Below resources are indicative. GSDC is giving 24 x7 services. The Bidder should evaluate scope of work, workload, domain and subject expertise and SLA compliance and based on that consider the number of resources as per their proposed solutions and requirements.

Table 1: O&M Resource minimum qualification and count.

Sr. No.	Role	Min. Qualification, Relevant Experience & Certifications	Min. Indicative Count	G. Shift	1 st Shift	2 nd Shift	3 rd Shift
1	Program Manager	B.E./B.Tech. in Civil/Electrical/Mechanical with 10 Years of relevant experience in Data Centre domain managing, Civil, Electrical, AC, Lift, DG Set & Fire, DCIM & Infra. Security etc. He should be Prince2/PMP certified.	1	√	x	x	x
2	Electrical Engineer	B.E./B.Tech. in Electrical with 6 years relevant experience in HT/LT Panels, Transforms etc.	1	√	x	x	x

Sr. No.	Role	Min. Qualification, Relevant Experience & Certifications	Min. Indicative Count	G. Shift	1 st Shift	2 nd Shift	3 rd Shift
3	HVAC Engineer	B.E./ B.Tech. in Mechanical/Electrical/EC/Instrumentation with 6 Years relevant experience in relevant field like HVAC/Pumps/MEP Services etc.	1	√	x	x	x
4	DCIM Engineer	B.E./B.Tech. in Electrical/EC with 6 Years relevant experience in Data Centre Infrastructure management tools like BMS, Gas-based fire suppression, CCTV, Access Control System, etc.	1	√	x	x	x
5	Facility Management Services	Minimum 10 th Pass or Higher.	4	√	√	√	√
6	Electrical Technician (L1)	Diploma in Electrical with 5 Years relevant experience in Electrical Engineering having Experience in HT/LT Panels, Transforms etc.	3	x	√	√	√
7	HVAC Technician (L1)	Diploma / ITI in AC/Refrigeration or equivalent with 5 Years of relevant experience in AC domain/ Refrigeration etc.	3	x	√	√	√
8	Fire men	ITI/Diploma in Fire and Safety or equivalent degree with 3 Years relevant experience in Fire maintenance or Equivalent.	1	√	x	x	x
9	Helpers	Class 12th Passed or Equivalent.	3	√	x	x	x
10	Security Staff	Class 12th Passed with relevant experience of 02 years in Security services. Security Staff including female staff should be able to Read, write and understand the English Language.	12	√	√	√	√
11	Receptionist	Graduate With 2 Years of relevant experience in reception service	1	√	x	x	x

Table 2: O&M Resource minimum roles and responsibilities.

Sr. No.	Role	Role & Responsibilities
1	Program Manager	Responsible for overall management of the Data Centre, upkeeping committed uptime, managing mission critical facility as per user define SLA, performance monitoring in terms of PUE, availability, response time, problem resolution. • Should be responsible for optimum Resource utilisation, planning & management. • Overall in-charge of Mission Critical Data Centre facility of the Civil & Non-IT

Sr. No.	Role	Role & Responsibilities
		Infrastructure of SDC. • Coordinating with third party OEM/partners, Stakeholders for smooth operation of Data Centre. • Should be the single point contact (SPOC) for managerial responsibilities and direct interface with stakeholders. • Management & compliance of upkeeping certification status live ,Require ISO Policies, Process, Procedures and other applicable legislations, policies, guidelines...etc. • Carry out MIS reporting, documentation, technical report writing...etc. • Interface & co-ordinate with stakeholders for the Critical Tickets raised in the Help Desk, i.e. P1 incident. • Should have very strong communication skills and technical writing skills. • Should possess working knowledge of ITIL, IGBC rating, Uptime Certification, ISO 20000 & ISO 27001 • Prepare/review/update BCP Plan for approval to committee • Run through mock drills of approved DR and BCP periodically • Adopt and develop DR and BCP guideline and other industry best practices
2	Electrical Engineer	Ensuring all work carried out in relation to electrical equipment and installations in their area of responsibility is adequately supervised — this includes electrical staff, contractors and labour hire employees • Responsible to ensure electrical equipment or installations in their area of responsibility are installed and tested in accordance with the IS standards and Inspection Regulations and maintained in a safe working condition • Responsible to ensuring electrical installations and equipment maintenance are in accordance with IS Standards and follow safety measures. • Responsible to inspect test reports of PM activity carried out on DG, UPS, Transformer, HT switch board etc. • Responsible to ensure electrical conservation plan getting implemented & ensuring benefits of same. • Responsible to take care for solar generation plant & keep calculating ROI of same. • Responsible to coordinate with EB Dept for any outage or breakdown activity. • Responsible to trained all under Dept resource for skill updation.
3	HVAC Engineer	• Responsible to keep chiller plant up & running without & outage. • Responsible to take care for Low side work for trouble-free running. • Responsible to monitor all parameter pertain to chiller plant, undertake routine maintenance & break down maintenance. • Responsible for energy conservation in chiller plant, & helping in improving in PUE. • Responsible for spare management for Chiller & low side equipment. • Responsible to adjust setting & fine tuning of parameters as per seasonal effect. • Responsible for AHU, FCU, low side performance monitoring.
4	DCIM Engineer	Operates and maintains Data Centre Infrastructure Management (DCIM) for proper function and monitors against approved benchmarks to include; HVAC, Lighting, Integrated Security, Fire Suppression, Power Generation, Plumbing, and Electrical, etc. • Responsible to carry out routine checks for correct operation of all control equipment as directed by Program manager. • Responsible to performs routine checks and upgrades software as provided by the Manufacturer to ensure optimal functioning of the DCIM system. • Responsible to performs add/ remove any equipment under DCIM

Sr. No.	Role	Role & Responsibilities
		monitoring. • Responsible to performs patch/firmware/ version updation as per Latest version release. • Responsible to keep & manage spares require for DCIM i.e. sensor, jointers, converter etc. • Responsible to checks routinely for correct operation of all equipment in locations that include DCIM control of systems. • Responsible to Adjust variables and provide adjustment as required to ensure systems are operating correctly within parameters
5	Facility Management Services	FMS technician. Soft services/ Cleaning etc.
6	Electrical Technician (L1)	• Responsible for regular maintenance and break fix maintenance. • Responsible for daily check-up of DG Set, Transformer and HT Circuit Breaker, Power Cables, LT switch gear check-up and meter readings, Lighting Maintenance. • Responsible for keeping all events, history records of critical equipment. • Responsible for checking earthing parameters & resolving the earthing, grounding issue.
7	HVAC Technician (L1)	• Installing, maintaining and repairing ventilation and air conditioning systems and equipment. • Identifying maintenance risks on equipment. • Diagnosing electrical and mechanical faults for HVAC systems. • Cleaning, adjusting and repairing systems, and performing services. • Performing emergency repairs promptly and efficiently. • Providing technical direction and on-the-job training for operation of Low side equipment • Keeping daily logs and records of all maintenance functions. • Ensuring compliance with appliance standards and with Occupational Health and Safety Act. • Complying with service standards, work instructions and customers' requirements. • Assisting with customers' queries.
8	Fire men	• Respond to fire alarms quickly to regulate and extinguish building/ electrical etc fires • Operate firefighting and rescuing equipment's / human etc. • Provide emergency medical services with compliance to established standards • Inspect scenes of fire or accidents to identify causes or discover significant findings • Clean up fire scenes by removing debris and burned items • Respond to other emergency situations and assist those in need • Write accurate reports after incidents and submit them to superiors • Clean and maintain personal equipment and keep it ready for use • Participate in fire drills as a way to stay alert and up-to-date with job duties • Assist in fire training educational programs to help prevent dangerous fire accidents
9	Helpers	• Responsible for non-Critical Office/ admin related work.
10	Security Staff	• Responsible to be vigilant & ensuring no trespassing in premise. • Responsible to do frisking of all visiting person & escort them till work completion.

Sr. No.	Role	Role & Responsibilities
11	Receptionist	• Greet and welcome guests as soon as they arrive at the office. • Notify company personnel of visitor arrival. • Maintain security and telecommunications systems. • Provide visitors with an appropriate answer for all their inquiries. • The answer, screen, and forward incoming phone calls as necessary. • Maintain employee and department directories. • Receive, sort, and distribute daily mail/deliveries. • Maintain security by following procedures; monitoring logbooks, and issuing visitor badges. • Operate telecommunication system by following the manufacturer's instructions for house phone and console operation. • Ensure reception area is tidy and presentable, with all necessary stationery and material. • Order front office supplies and keep the inventory of stock. • Update calendars and schedule meetings. • Perform other clerical receptionist duties such as filing, photocopying, transcribing, and faxing.

12.9 O&M Performance Reporting

SI shall be responsible for submitting MIS reports as specified at Annexure I1, but not limited to, of this RFP document in a format decided by DST/GIL. This is only an indicative list of MIS reports which should be in line with the reporting features highlighted in the RFP and as per the O&M phase requirement. The bidder should submit reports to respective stakeholders involved in the project and hardcopy may have to be submitted as when required or asked by DST/GI

DISCLAIMER:

1. This tender document is not an offer by DST/GIL but an invitation to get bids/proposals from bidders
2. There shall be no contractual obligations to be arisen from this tendering process, unless a formal contract is signed between DST/GIL and the selected bidder
3. It may be noted that this tender may not contain exhaustive details as expected. Interested bidders are required to make their own inquiries, to get clarity of any ambiguity observed by them, in this tender document
4. If at the later stage of tendering process, post submission of bid, any such ambiguity is highlighted by the bidder, at that time, the final decision will be considered of DST/GIL and the bidders will have to oblige to consider the same.
5. The BOQ is only indicative. As it is a solution-based project, the final BOQ may differ from bidder to bidder as per their solution.
6. The design solution mentioned in this document is concept design/illustrative for the understanding of the bidder. The actual design of the Data Centre will be prepared by the bidder basis of actual site survey/requirements and current market technology available.
7. Manpower calculation is minimum indicative to maintain the facility for 24X7, however on actual, SI may put the additional resource to maintain agreed SLA.
8. The bidder(s) will be ultimately responsible for obtaining all certifications specified in the RFP and will be responsible for paying all associated fees. The DST will compensate the selected bidder for the costs associated with obtaining the necessary certifications.
9. Since this is a Greenfield project, the Implementation agency needs to consider/arrange for construction power and water arrangement at the site.
10. All site physical material storage security remains with the Implementation agency till final sign-off.
11. The Administrative cost like Municipal charges for all types of NOCs, Charges for new Electricity connections, Charges for new water connections, Charges for NOCs from Municipal, Airport authorities, and Fire, etc. charges for Site clearance and readiness Should be considered while submitted the financial bid.