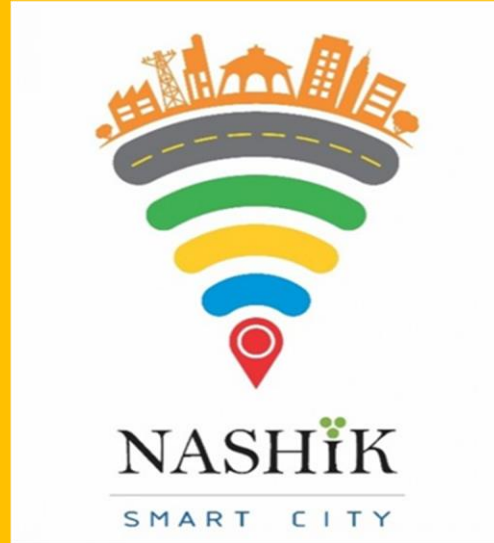




Selection of Implementation Agency (IA) for CCTV Surveillance System and Other Smart Elements for Nashik and Trimbakeshwar Kumbh 2027

**VOLUME II – Scope of Work and Requirement
Specifications**

**Tender Ref Number - NMSCDCL/52/2025-26
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This is Volume 2 of the RFP

Abbreviations

Acronym	Description
ANPR	Automatic Number Plate Recognition
BOM	Bill of Material
BoD	Board of Directors
BOQ	Bill of Quantities
CAPEX	Capital Expenditure
CCC	Control Command Centre
CCTV	Closed Circuit Television Camera
CDC	City Data Centre, at ICCC Panchwati location
DC	Data Centre
EMD	Earnest Money Deposit
EMS	Enterprise Management System
FRS	Facial Recognition System
FY	Financial Year
GIS	Geographical Information System
Gol	Government of India
GoM	Government of Maharashtra
GST	Goods and Services Tax
IA	Implementation Agency
ICT	Information and Communication Technology
ISO	International Organization for Standardization
LIU	Light Interface Units
LLP	Limited Liability Partnership
LOA	Letter of Acceptance
LOI	Letter of Intent
MSV	Mobile Surveillance Vehicle
MTBF	Mean Time Between Failure
MTTR	Mean Time to Repair
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer

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Acronym	Description
OPEX	Operational Expenditure
OS	Operating System
PA	Public Address
PAN	Permanent Account Number
PBG	Performance Bank Guarantee
NMSCDCL	Nashik Municipal Smart City Development Corporation Limited
PMP	Project Management Professional
PO	Purchase Order
POC	Proof of Concept
PSU	Public Sector Undertaking
PS	Police Station
PTZ	Pan tilt zoom
RFP	Request for Proposal
SITC	Supply, Installation, Testing and Commissioning
SOP	Standard Operating Procedure
SRS	System Requirement Specifications
TCCC	Trimbakeshwar Command and Control Centre
TCV	Total Contract Value
UAT	User Acceptance Test
UPS	Uninterruptible Power Supply
VMS	Video Management System

1. Introduction

1.1. Introduction to Nashik Municipal Smart City Development Corporation Limited

The **Nashik Municipal Smart City Development Corporation Limited (NMSCDCL)** is a Special Purpose Vehicle (SPV) established under the Smart Cities Mission of the Government of India for the implementation of smart city projects in Nashik. Functioning as the nodal agency, NMSCDCL is responsible for planning, developing, and executing projects aimed at enhancing urban infrastructure, leveraging technology-driven solutions, and improving the quality of life of citizens. The corporation works in close coordination with the Nashik Municipal Corporation (NMC), various government departments, and technology partners to ensure sustainable, resilient, and citizen-centric urban development.

Under the **Nashik Smart City initiative**, NMSCDCL has undertaken several transformative projects across domains such as Intelligent Transport Systems, Integrated Command and Control Centres (ICCC), Solid Waste Management, e-governance platforms, environmental monitoring, and digital citizen services. The city is progressively adopting ICT-enabled solutions for traffic management, surveillance, water supply management, and energy efficiency. With its strategic importance as a religious, cultural, and industrial hub, Nashik Smart City is envisioned to be a model of modern urban governance – focusing on safety, efficiency, transparency, and sustainability while preserving the heritage and identity of the city.

1.2. Project Background

In preparation for the Nashik Kumbh Mela 2027, Nashik Municipal Smart City Development Corporation Ltd. (NMSCDCL) has undertaken a series of ICT-led Smart City initiatives to create a secure, resilient, and technology-enabled environment for citizens and pilgrims. The project is guided by the Technology-Led Blueprint prepared for Kumbh 2027, which aims to enhance service delivery, improve pilgrim experience, strengthen public safety and security, facilitate ease of mobility, and establish a connected ecosystem through smart technologies.

The proposed initiative shall encompass the Supply, Installation, Testing, Commissioning (SITC) and Operation & Maintenance (O&M) of ICT infrastructure and systems, including active field and centralized equipment for the CCTV Surveillance System and other smart elements. The project will leverage digital networks, smart sensors, advanced analytics, IoT-based solutions, and video management platforms to deliver real-time monitoring, alerts,

forecasting, and informed decision-making, thereby supporting effective city management during the Kumbh Mela.

The scope includes the deployment of a city-wide surveillance system with advanced video analytics, operationalization of the Trimbakeshwar Command and Control Centre (TCCC), Automatic Number Plate Recognition (ANPR) systems, and integration of various ICT elements. The surveillance ecosystem will assist law enforcement agencies in combating crime, managing large crowds, ensuring road safety, and improving emergency response capabilities.

The Command-and-Control Centres will serve as centralized operational hubs, integrating live camera feeds, IoT devices, and data from multiple applications into a unified platform. They will act as the primary response and enforcement mechanism for real-time events and provide a collaborative environment for government stakeholders in a fully automated and integrated ecosystem.

NMSCDCL planned to implement its ICT led Smart City Initiatives through various project, as mentioned below:

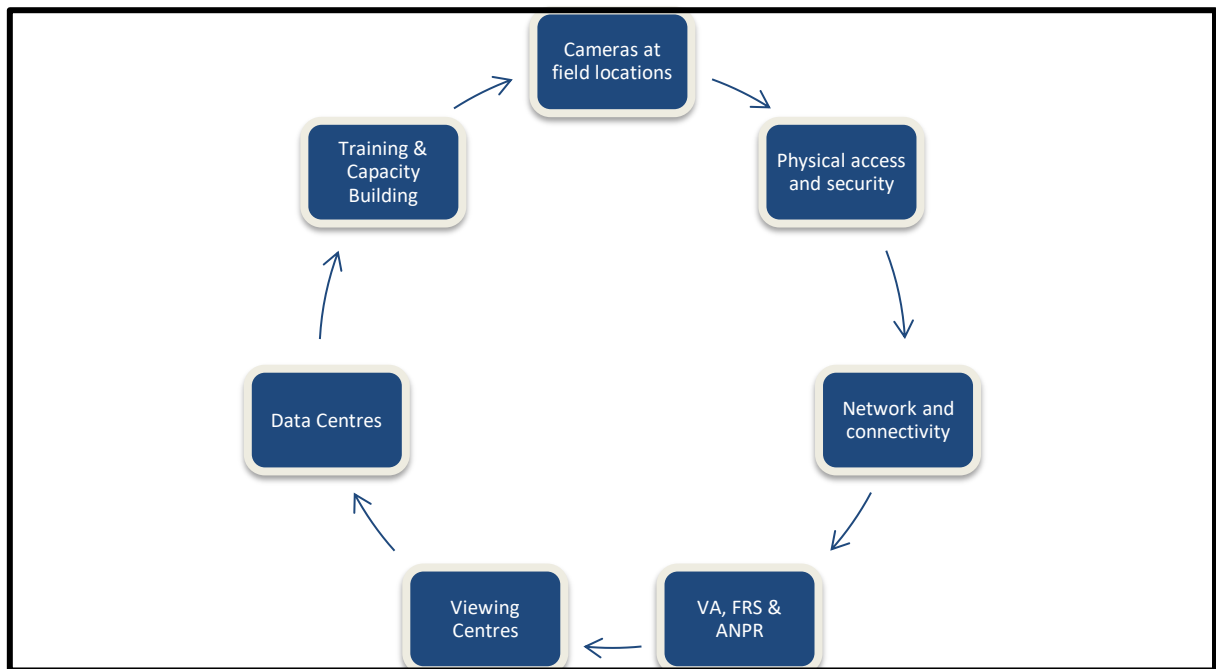
- ▶ Project 1 – Supply, Laying Installation, Testing and Commissioning of Nashik and Trimbakeshwar City Network Backbone.
- ▶ Project 2 – SITC and O&M for remaining ICT led Smart City Initiatives (IT Infrastructure & systems) along with active equipment (field as well as centralised) for CCTV System and other smart elements.

1.3. Benefits envisaged

The proposed ICT-led smart city infrastructure will enable the integration of diverse digital assets, applications, sensors, and platforms onto a unified ecosystem, ensuring seamless data convergence and real-time information flow. This initiative will provide the city administration with a high-quality, reliable, cost-effective, and sustainable framework for surveillance and service delivery, while ensuring scalable connectivity to data centres, control rooms, and operational hubs. In addition to strengthening public safety and improving governance efficiency, the infrastructure will enhance transparency, support future expansion, and create opportunities for innovation and revenue generation, thereby delivering multifaceted benefits to government departments and tangible improvements in safety, mobility, and quality of life for citizens.

2. Solution overview

The overall project requirements have been classified into seven (07) main components for better understanding of bidders. These components would form an integrated solution for this project and have been diagrammatically represented in the figure below:



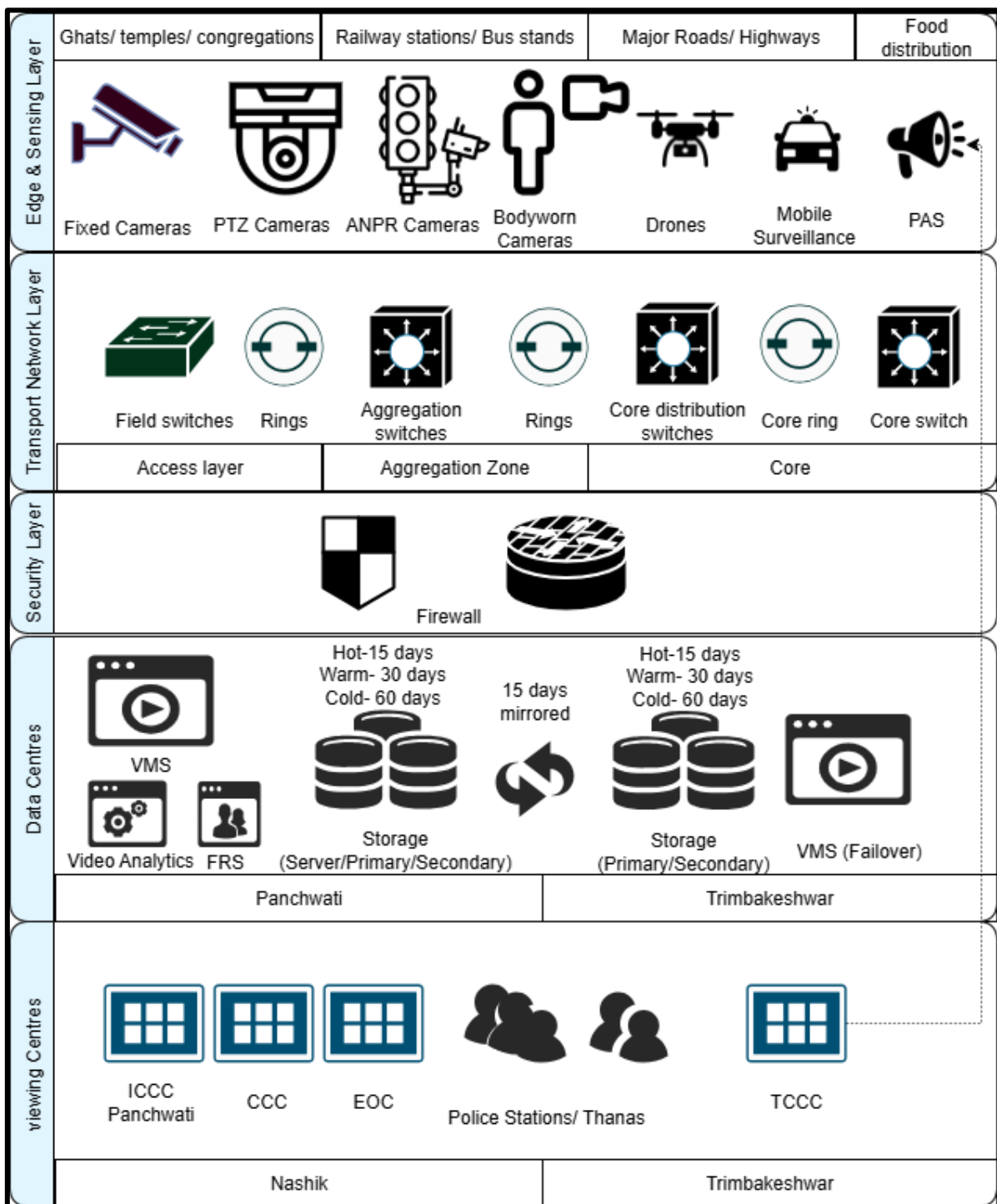
The Key components of the project are focused for the following prime purpose:

1. 24x7 CCTV monitoring of public areas identified as hotspots for Nashik Kumbh 2027.
2. Analysis of real-time video and creation of actionable warnings/alerts for preventive and curative actions.
3. Training and Capacity Building of departmental staff.

2.1. Solution Architecture

The solution should be designed considering the high-level architecture and design principles mentioned in this RFP. The following section presents the overall solution architecture and description of the components shown in the design diagrams provided below. IA is required to propose a solution which best fits the requirements for Purchaser considering the following indicative architecture diagram:

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2.2. Architectural principles

1. The proposed solution will ensure business continuity and capabilities by achieving the objectives of NMSDCL.
2. Each incident will be registered in the unified command system. All critical feeds from installed surveillance infrastructure and mobile deployments will be relayed

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to the Integrated Command & Control Centres (ICCC). ICCC Panchwati will act as the primary incident manager, responsible for triage, escalation, and coordination with designated response agencies including Nashik Police, NDRF/SDRF, Fire & Emergency Services, Health & Ambulance Units, and Quick Response Teams.

3. There shall be no single point of failure in the system.
4. IT solution will have the ability to scale-up quickly to meet the increasing number of incidents from various sources.
5. Storage of the feed will be as follows:
 - a. Primary storage will be for 30 days, out of which: -
 - i. Seven days of primary storage of Nashik cameras will be at TCCC Server room.
 - ii. Seven days of primary storage of Trimbakeshwar cameras will be at CDC
 - b. Kumbh Backup storage (non-re-write) will be created for 60 days. Duration will be informed by the Authority to the successful bidder.
 - c. Critical incident/flagged data will be stored for up to six months.
6. The system will have user friendly and easy to use features.
7. Scalability, manageability must be present in the solution to handle huge data volumes.
8. All the system components must follow open standards.

2.3. Security: Guiding Principles

The Nashik Kumbh Surveillance System shall be designed and implemented in accordance with the guiding principles of defence-in-depth, resilience, and compliance. Security will be embedded into every layer of the solution — from field devices and communication channels to data centre infrastructure and operator access. In line with guidelines issued by the Ministry of Urban Development (MoUD), MeitY, and CERT-In, the system shall: -

1. Maintain a comprehensive inventory of all digital assets and technologies deployed for the event.
2. Ensure cyber security hardening of all network components using suitable security protocols and data protection mechanisms.
3. Conduct continuous risk evaluation and prioritization to mitigate threats targeting critical systems.
4. Conduct periodic vulnerability assessments and identifying unique event-specific cyber threats.
5. Enforce strict access controls through multi-factor authentication and role-based permissions and protecting endpoints.

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6. Safeguard all sensitive data through strong encryption methods, securing communication channels, implementing robust backup systems and ensuring compliance with data privacy laws.
7. Ensure continuous monitoring and incident handling.

2.4. Data Flow

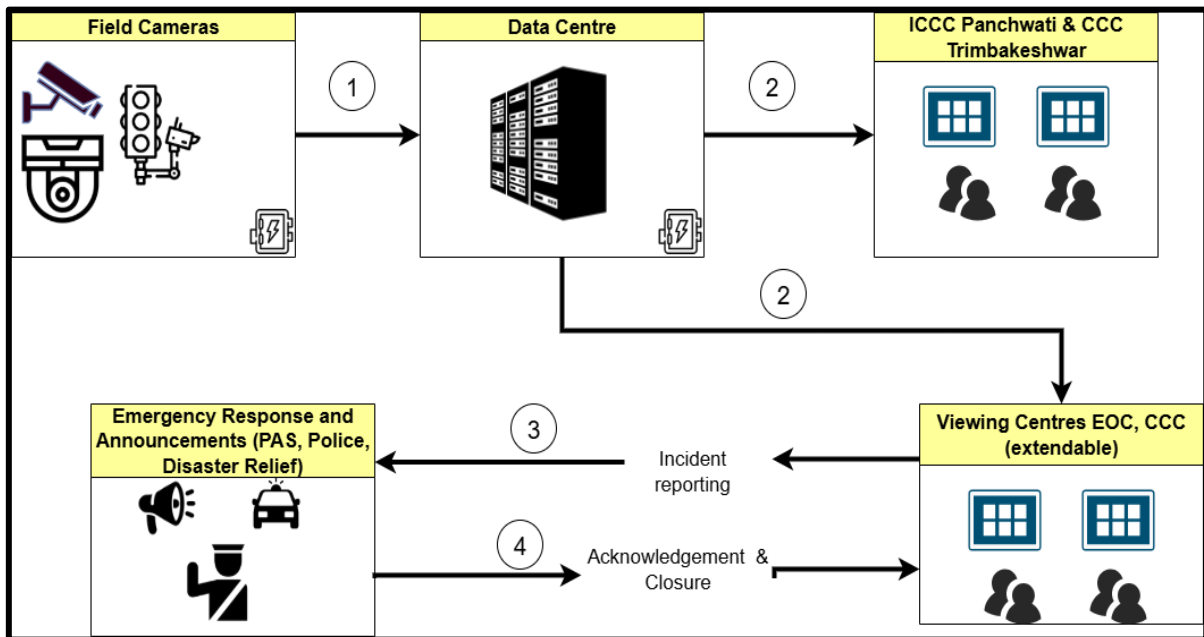
The proposed solution shall ensure secure and seamless flow of data from field devices to Command, Control and Communication Centres, enabling real-time monitoring, analytics, and incident response. Video feeds and alerts generated by field cameras and sensors shall be transmitted to the Data Centre for processing, storage, and integration with the Video Management System (VMS) and analytics platform.

Authorized operators at the Integrated City Command Centre (ICCC), Panchwati, and the Trimbakeshwar City Command Centre (TCCC) shall have access to live and recorded video feeds, analytics dashboards, and incident alerts through designated workstations. The video feeds will also be viewed at CCC and EOC. The system shall also support configurable extensions for providing selective viewing access to police stations or other designated agencies, if required by the authorities.

Incident notifications shall be routed from the Command Centres to Emergency Response Teams (ERTs) through integrated communication channels, ensuring timely acknowledgement, action, and closure. The end-to-end data flow will cover the following stages:

1. Field Capture – Video and sensor data from fixed, PTZ, ANPR, and body-worn cameras.
2. Data Centre Processing – Storage, analytics, and alert generation.
3. Command Centre Viewing – Authorized access at ICCC Panchwati and TCCC Trimbakeshwar
4. Incident Reporting – Alerts relayed to Emergency Response Teams via communication systems.
5. Closure – Acknowledgement and resolution of incidents logged in the system.

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2.5. Video Analytics Platform

The proposed system shall leverage AI-enabled video analytics to enhance safety, security, and event management during the Nashik Kumbh. The analytics platform shall provide real-time insights, anomaly detection, and actionable intelligence to support operators in proactive decision-making. The architecture shall be modular, scalable, and capable of integration with the central Command & Control Centre as well as other subsystems (e.g., access control, emergency response, traffic management).

2.5.1. Use Cases to be Incorporated

The following use cases/ features will be incorporated as per the BOQ: -

- a. **Crowd safety and movement**, to include: -
 - i. Crowd estimation.
 - ii. Crowd count and statistics with direction
 - iii. Heat map
 - iv. Entry Exit Count
- b. **Investigation and search**, to include: -
 - i. Person attribute and analysis (clothes/bag/colour)
 - ii. Abandoned bag / unattended object
- c. **Public order and perimeter protection**, to include: -
 - i. Intruder alert (line/zone)
 - ii. Violence detection

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- iii. Gesture
- d. **Safety, Environment and Ghats**, to include: -
 - i. Fire & smoke detection
- e. **Traffic and Road safety**, to include: -
 - i. Helmet violation
 - ii. Triple riding
 - iii. Seat-belt detection
 - iv. Wrong way
 - v. No-parking / illegal stop (dwell)
 - vi. Animal on route (stray cattle/dogs)
 - vii. Debris on road
 - viii. Queue management
 - ix. Stolen vehicle

2.5.2. Facial Recognition System (FRS)

The Facial Recognition System shall be designed to perform accurately under diverse demographic conditions, including variations in facial features, skin tone, lighting, and crowd density. The solution shall be trained on large, diverse datasets to minimize bias and ensure reliable performance. It shall:

- Detect and recognize faces in real time.
- Support integration with watchlists for identification of wanted or missing persons.
- Generate alerts for matches based on operator-defined rules.
- Be modular and integrable with access control and other event systems.

2.5.3. Automatic Number Plate Recognition (ANPR)

The ANPR system shall:

- Automatically capture and recognize license plates of vehicles within the camera field of view, across single or multiple lanes.
- Accurately process diverse vehicle categories (private cars, buses, trucks, autos, two-wheelers, etc.) regardless of plate color, font, or background.
- Store recognized license plates in a searchable database with related video footage.
- Enable searches by timestamp, number plate, vehicle type, or color.
- Generate automated alerts for vehicles tagged as “suspicious,” “wanted,” or “restricted.”
- Be deployable at entry/exit points, parking areas, traffic enforcement zones, and key check-posts.

2.5.4. PTZ Tracking

For high-security and sensitive areas of the Kumbh, the system shall enable PTZ (Pan-Tilt-Zoom) tracking to enable: -

- Locking onto and tracking persons, objects, or vehicles within a field of view.
- Enable seamless tracking across multiple cameras based on attributes (appearance, location, time).
- Provide close-up capture of intruders or persons of interest and generate real-time alerts at the Command & Control Centre.

3. Scope of Work

The selected Service Provider shall have overall responsibility for the design, supply, installation, integration, commissioning, and maintenance of the Surveillance and Crowd Management System for the Nashik Kumbh Mela 2027, for a period of five years post go-live. The assignment shall be executed on a turnkey basis, with the Service Provider ensuring delivery of a complete and functional solution, including any incidental components not explicitly itemized in the Bill of Materials.

The solution will provide an **intelligent, multi-layered and integrated public safety ecosystem**, covering fixed and mobile surveillance, advanced video analytics, traffic enforcement, and public communication. In addition to IP-based outdoor security cameras, the system will incorporate: -

- ▶ Advanced analytics such as Facial Recognition (FRS), Automatic Number Plate Recognition (ANPR), and crowd management algorithms and other listed algorithms along with alerts on the dashboard.
- ▶ Public order and safety tools for monitoring crowd density, perimeter control, ghats and environmental zones, traffic movement, and incident investigation.
- ▶ Field and mobile assets including body-worn cameras, drones, and mobile surveillance system for flexible and rapid response.
- ▶ Public Announcement System (PAS) integration to enable real-time advisories and emergency communication.
- ▶ Data centre infrastructure with resilient storage, processing, and integration capabilities, ensuring interoperability with ICCC, EOC, and other stakeholder systems.

This integrated system will provide NMSCDCL with a robust framework to ensure preventive security, crowd safety, and effective management throughout the Kumbh Mela 2027.

3.1. Broad components of Scope of Work

Refer Section 10 for details of functional and technical specifications for products and solutions. The broad components of the scope of work for the IA are given below for quick reference:

Sl. No.	Component type	Deliverable description
1.	Edge devices	a. Cameras. SITC of edge devices at Nashik and Trimbakeshwar at identified locations: -

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Sl. No.	Component type	Deliverable description
		- Approx. 3240 cameras at Nashik, across 900 locations. (IP bullet cameras: 2650; PTZ cameras: 400, ANPR cameras: 190) - Approx. 771 cameras at Trimbakeshwar, across 220 locations (IP bullet cameras: 661, PTZ cameras: 100; ANPR cameras: 10) b. Body worn cameras SITC of 180 body worn cameras c. Drones SITC of 18 drones for surveillance.
2.	Network	- Field access switches at each of the identified approx. 1120 locations. - Field access switches in rings for redundancy - Aggregation at approx. two locations at Trimbakeshwar and 9 locations at Nashik - Core Ring consisting of Core Distribution switches connecting CCC, EOC and ICCC Panchwati Optimal Design to be finalized by IA
3.	CDC Interior, TCCC Interior, & Existing ICCC expansion & refurbishing	- CDC-DC Interior, Furniture & fixtures, Civil works, Electrical work, AC, UPS and accessories. - TCCC-SR Interior, Furniture & fixtures, Civil works, Electrical work, AC, UPS and accessories. - ICCC Expansion (Additional viewing/monitoring dual screen desktops, video wall extension, viewing screens, war room/sitting room furniture - Office working area interior, civil, electrical, furniture & fixtures
4.	Data Centres	a. Setting up of In-Premise Data Centre at ICCC Panchwati. b. Server Room at TCCC. c. Scope to include installation and commissioning of various hardware components (storage, security, network, compute) together with required software applications.
5.	Storage	a. Dual architecture. Apart from local storage of video feeds in storage card within cameras, the storage of video feeds of Nashik to be stored at CDC, and video feeds of Trimbakeshwar to be stored at TCCC Server Room - Primary storage will be for 30 days, out of which: - - Seven days of primary storage of Nashik cameras will be at TCCC Server room. - Seven days of primary storage of Trimbakeshwar cameras will be at CDC - Kumbh Backup storage (non-re-write) will be created for 60 days at Nashik and Trimbakeshwar respectively. d. Critical incident/flagged data will be stored for up to six months.

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Sl. No.	Component type	Deliverable description
6.	Viewing Centres	- New: Trimbakeshwar CCC (TCCC) - Existing: ICCC Panchwati, CCC - Local Mini Viewing hubs at Ramkund and Sadhugram
7.	Video Analytics (Edge & Server based)	a. FRS b. ANPR (LPU based) c. Video analytics use cases as per Clause 2.5.1.
8.	Integration	a. Integration of already existing camera feeds: 1132 cameras at ICCC Panchwati and 205 cameras at EOC b. Viewing of combined cameras (new and already existing) at TCCC, ICCC Panchwati, and CCC. • New camera feeds should be seen on the already existing video wall of ICCC vice-versa irrespective on the OEMs of video wall, the controller should be able to integrate with each other.
9.	Field components	a. Industrial access switches (for outdoor environment) b. Outdoor equipment enclosures to install all field components c. Self-Supported poles with cantilever arms/ gantries etc, with necessary civil work including earthing, surge protectors, lightning arrestors and other protective devices d. Cabling for electricity, following guidelines of electricity department. e. Safety awareness stickers/ signages

3.2. Key Activities under the Scope of IA

The System Integrator (SI) shall be responsible for the design, supply, installation, integration, commissioning, and comprehensive operations & maintenance of the Surveillance & Crowd Management System for the Nashik Kumbh Mela 2027, including all associated ICT, field infrastructure, and services. The work shall be executed in accordance with applicable Government of India and State guidelines, ensuring interoperability, scalability, and cybersecurity compliance.

1. Project Planning and Survey

- Mobilization of project management, engineering, and field execution teams.
- Implementing a project management/Monitoring tool and updating the same on regular basis by IA's PM
- Defining the status reporting template
- Preparation of a detailed project execution plan with milestones, dependencies, and risk management measures.

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- e. Conduct of detailed topographical and functional site surveys for finalization of field device locations, network nodes, power sources, civil infrastructure, and drone deployment nodes in conjunction with the Department.
- f. Assessment and relevant required data of all existing assets and infrastructure proposed for integration or reuse, including evaluation of their functional adequacy and compliance with project standards.
- g. Preparation of survey reports, geo-tagged imagery, and draft layouts for approval.
- h. Vehicle on NMSCDCL Duty: The IA shall also provide 2 nos. of New 7-Seater Air-conditioned vehicle with 3000 km each running per month including operation and maintenance during the Contract period to NMSCDCL use only till completion of Operation and Maintenance Period. Contractor shall provide the vehicles within 1 month of issue of Work Order. The penalty of Rs. 2,000/- per vehicle per day will be levied by NMSCDCL on the Contractor, if the vehicle is not made available.

2. System Design and Engineering: The IA shall be responsible for preparing the detailed engineering and implementation design for all components of the Surveillance & Crowd Management System. The scope shall include:

- a. System Architecture.
 - i. Preparation of the high-level system architecture covering VMS, Video Analytics (VA), Automatic Number Plate Recognition (ANPR), and Facial Recognition System (FRS), along with database, storage, and integration with ICCC.
 - ii. Documentation of functional data flows, alarm/event handling, and integration touchpoints with third-party systems.
- b. Low-level Deployment designs
 - i. Camera and field device placement drawings with GIS/KML mapping of exact locations.
 - ii. Network design including IP addressing, VLAN segmentation, redundancy paths, and security configurations (firewall, TLS/SSL, VPNs).
 - iii. Server and storage sizing design, including virtualization/containerization layout, tiered storage strategy, and backup/retention policies.
 - iv. Integration design covering APIs, SDKs, and middleware required for interoperability with ICCC and external agencies.
- c. Civil and Engineering Plans
 - i. Drawings and BoQs for poles, gantries, mounts, junction boxes, cabling, trenching, ducting, earthing/grounding, and power supply.

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- ii. Layouts for control rooms and equipment rooms at ICCC, CDC, and TCCC & Server Room, in coordination with the Purchaser.
- d. Design Validation
 - i. Conduct of design review with stakeholders.
 - ii. Submission of design documentation (HLD, LLD, network diagrams, device placement drawings, engineering layouts, BoQs) for approval prior to execution.

3. Procurement and Supply Chain Management

- a. Procurement of all hardware, software, and networking equipment in compliance with technical specifications and approved makes/models.
- b. Vendor coordination, logistics planning, warehousing, and inventory control for timely delivery of equipment to site.
- c. Ensuring certification, warranty, and OEM support documentation for all procured components.
- d. Implementation of quality assurance/quality control (QA/QC) protocols across the procurement cycle.

4. Installation and Integration

- a. Installation of field infrastructure including poles, gantries, junction boxes, cabling, and power systems.
- b. Mounting, alignment, and commissioning of cameras, sensors, and edge devices.
- c. Deployment of active network components (switches, routers, firewalls, Wi-Fi access points, etc.) and establishment of secure connectivity.
- d. Integration of the Video Management System (VMS) and Video Analytics (VA) with ICCC platforms.
- e. Conduct of Factory Acceptance Tests (FAT), Site Acceptance Tests (SAT), and integration testing as per approved protocols.

5. Commissioning and Go-Live Support

- a. End-to-end system validation including performance benchmarks, failover checks, interoperability, and audit
- b. User Acceptance Testing (UAT) with Departmental representatives.
- c. Preparation of Standard Operating Procedures (SOPs) for field operations, monitoring, and emergency response workflows.
- d. Training of Department staff, operators, and administrators on system usage and troubleshooting.
- e. Support during initial go-live and stabilization period.

6. Operations and Maintenance (O&M)

- a. Provision of comprehensive O&M services including preventive, predictive, and corrective maintenance.
- b. 24x7 Operations Centre (NOC) and Helpdesk support.
- c. Availability monitoring of field devices, servers, and applications with real-time dashboards.
- d. Replacement/repair of faulty equipment within defined SLAs.
- e. Periodic firmware, patch, and version upgrades for hardware/software, ensuring cybersecurity compliance.
- f. Maintenance of spares inventory and logistics for critical components.
- g. Periodic audits, performance reports, and SLA compliance reviews.

7. Documentation and Handover

- a. Preparation of As-Built Documentation including updated drawings, GIS/KML layers, and system manuals.
- b. Licenses of all the software, hardware
- c. Insurance copies of all the smart elements, hardware and any accessories
- d. Trainings to the stake holders as required and on periodic basis.
- e. Audit certificates/reports
- f. Comprehensive assets register with tagging and geo-referencing.
- g. Submission of test reports, certification records, and audit logs.
- h. Final handover of the system with knowledge transfer to designated Department teams.

3.3. Geographical Scope

The geographical scope of the Nashik Kumbh Mela 2027 is divided into two segments:

- **Segment I – Nashik City:** Approximately 3,240 cameras to be deployed approximately across 900 designated locations, as identified by NMSCDCL.
 - ▶ IA shall allocate requisite multiple parallel teams to execute all independent parallel deliverables/tasks in this Segment to complete the project on time.
- **Segment II – Trimbakeshwar:** Approximately 771 cameras to be deployed approximately across 220 designated locations, as identified by NMSCDCL.
 - ▶ IA shall allocate requisite multiple parallel teams to execute all independent parallel deliverables/tasks in this Segment to complete the project on time.

The proposed surveillance and monitoring infrastructure shall comprehensively cover both segments to ensure effective crowd management, security monitoring, emergency response, and overall operational efficiency during the Nashik Kumbh Mela 2027.

3.4. Network Architecture

3.4.1. Overview

Network connectivity is a critical component of the project and requires detailed assessment, planning, and implementation. It is essential not only to provision connectivity within the required timelines but also to ensure that it is reliable, secure, and able to meet the defined SLA parameters.

3.4.2. Fibre Backbone

A dedicated optical fibre backbone is being provisioned under a parallel initiative of “fibre backbone project” (RFP-1: Supply, Laying, Installation, Testing and Commissioning of Nashik and Trimbakeshwar City Network Backbone). The Implementing Agency for “fibre backbone project” (IA-1) shall execute the passive fibre build. IA/IA-2 (of this project) shall focus on active equipment, logical routing, redundancy, and integration.

The selected Implementing Agency for this project (IA/IA-2) shall be responsible for:

- ▶ Defining the **core and aggregation rings** and providing logical routing schemes over the IA-1 fibre backbone.
- ▶ Installing, configuring, and commissioning all **active components** (Layer-2/Layer-3 switches, firewalls, and NMS tools).
- ▶ Designing the **network segmentation** to ensure performance, resilience, and security.
- ▶ Ensuring **redundancy** through ring topology and automatic failover mechanisms.
- ▶ Integrating the network with **Data Centres, ICCC Panchwati, Trimbakeshwar CCC, and Viewing Centres at EOC/CCC and mini viewing hubs (Ramkund, Sadhugram).**

3.4.3. Connectivity Principles

1. The fibre backbone shall be dedicated to this project.
2. IA-1 shall lay the physical fibre routes. IA/IA-2 (Selected SI for this Project) shall provide the logical routing plan, which IA-1 will implement during fibre rollout. Where required, logical configurations may be applied subsequently to achieve redundancy and load balancing.
3. The system shall support a multicast-enabled network design to optimize video distribution from cameras to servers and viewing centres.

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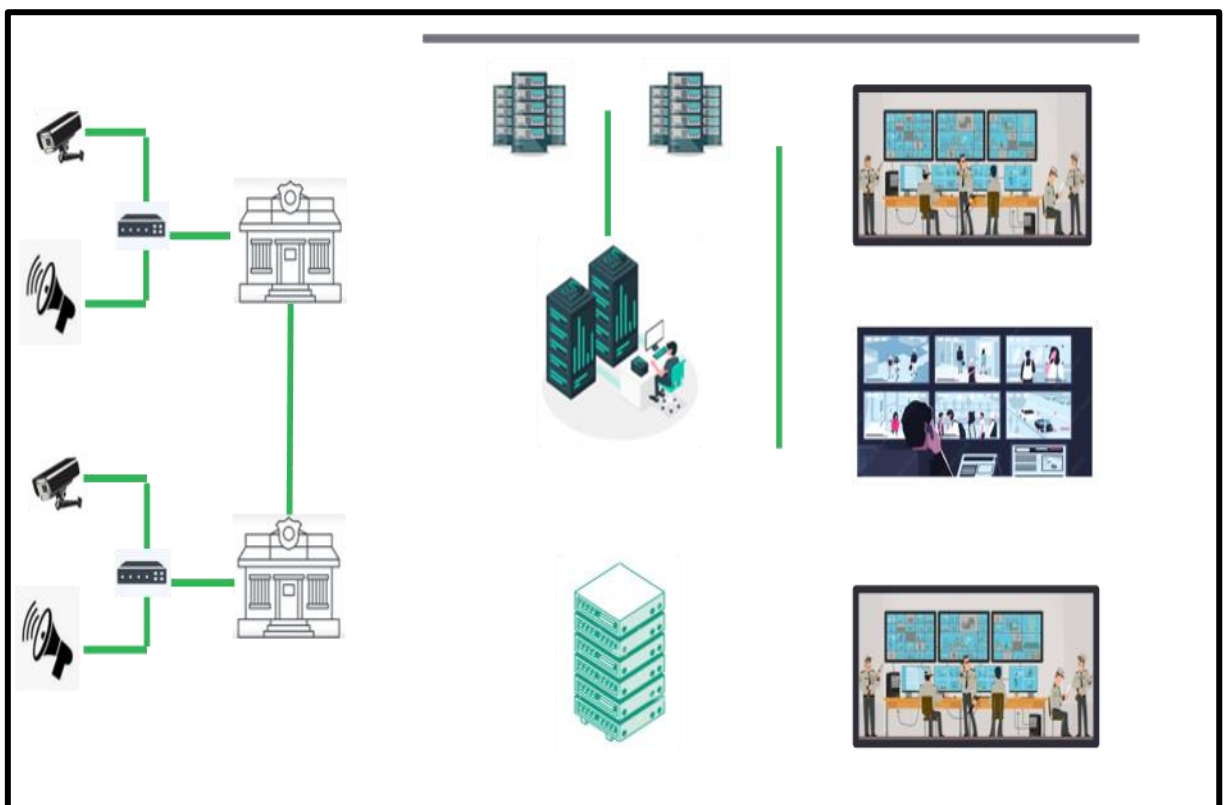
4. All network elements shall comply with recognized security standards and shall include role-based access, encryption protocols, and network monitoring.
5. The design shall be scalable to accommodate future growth, including additional field cameras, IoT sensors, and viewing points at police stations or mobile command units if required.

3.4.4. Key Features

1. End-to-end fibre connectivity from camera field locations to ICCC Panchwati, Trimbakeshwar CCC, and designated viewing centres.
2. High availability with minimum network uptime of 99.95% at the core.
3. Segregation of traffic (video, control, management) for performance and security.
4. Centralized monitoring of the entire network through a Network Management System (NMS).
5. Provision for secure storage and retrieval of video data via Data Centres.

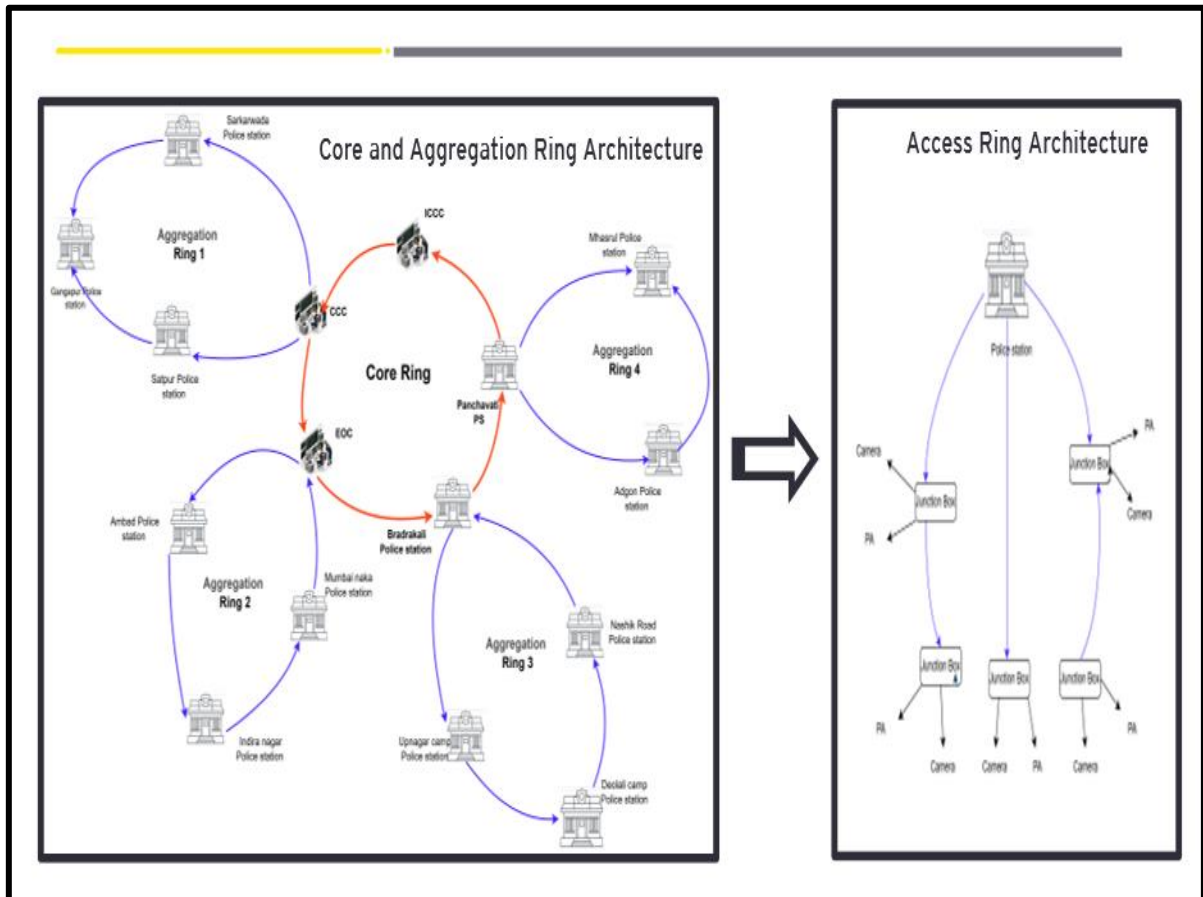
3.4.5. Indicative Deployment Architecture

The fibre backbone being provisioned under RFP-1: Supply, Laying, Installation, Testing and Commissioning of Nashik and Trimbakeshwar City Network Backbone shall form the foundation of the transport network for this project. The deployment architecture, as defined in RFP-1, is reproduced below for reference.



3.4.6. Indicative Core and Aggregation Network Architecture

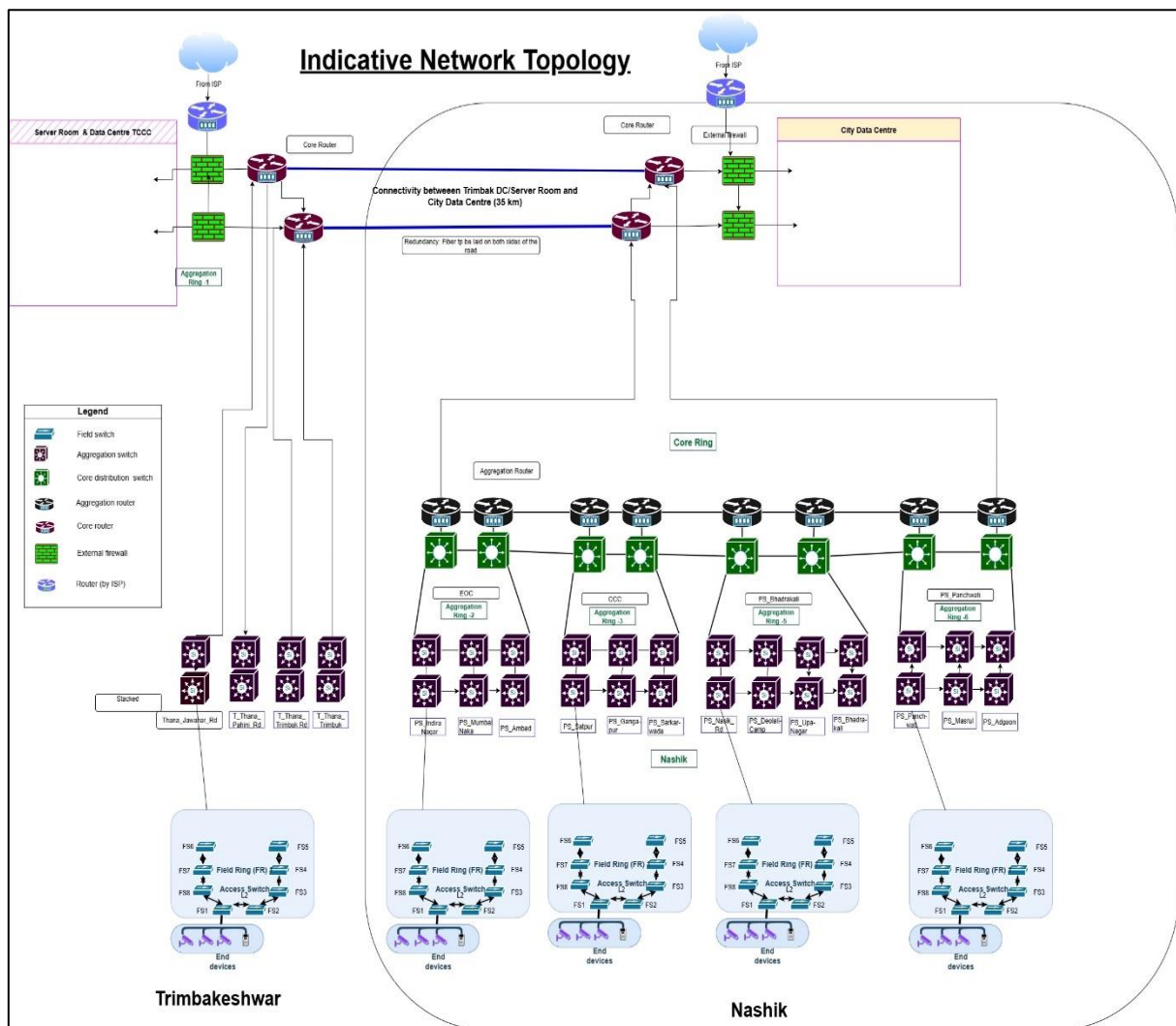
An indicative core and aggregation network architecture is given below. IA will finalize the core and aggregation network post their survey.



3.4.7. Indicative Network Topology

An indicative network topology is given below. The diagram illustrates the fiber optic network topology comprising of a backbone / Core and aggregation design along with the access layers in ring topology. The optimal design will be finalized by IA.

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3.4.8. Salient aspect of Core, Aggregation and Access layers

Following key aspects have been enumerated in RFP 1: Supply, Laying, Installation, Testing and Commissioning of Nashik and Trimbakeshwar City Network Backbone for IA1. The detailed technical specifications for the passive fibre (duct sizes, chamber intervals, splicing, OFC slack, etc.) shall be as defined under RFP-1:

1. **Core Layer.** The Core backbone ring topology shall meet the following minimum requirements:
 - a. The Core backbone ring topology shall be constructed using 96 Core armoured Single mode Optical Fiber Cables (OFC).
 - b. The Core architecture shall be formed in full ring topology to handle single point of failures

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- c. The proposed ring architecture shall ensure high availability and faster convergence for service continuity.
- d. A loop of 20 meters of OFC shall be left in every Hand Hole/ Manhole.

2. Aggregation Layer

- a. The aggregation layer comprising of ring topology will be connected to 2 different POP locations. Each POP location will have one end of multiple access rings getting terminated from both directions.
- b. The Aggregation ring shall be constructed using a 96 Core armoured Single mode Optical Fiber Cables (OFC).
- c. The aggregation architecture shall be formed using ring topology.
- d. Different physical aggregation rings will utilize different fibre tubes of Core layer to reach to 2 PoPs.
- e. The distance between two Hand Holes/RCC Chamber should not exceed 200 meters.
- f. A loop of 20 meters of OFC shall be left in every Hand Hole/ Manhole.

3. Access Layer

- a. 96 core armoured cable will be laid separately in a duct for last mile connectivity at all locations to be connected on either Core or Access layer fibre. Last mile connectivity will be implemented in ring for all locations.
- b. The access layer shall be constructed using 96 Core armoured Single mode Optical Fiber Cables (OFC).
- c. The proposed ring architecture shall ensure high availability and faster convergence for service continuity.
- d. A loop of 20 meters of OFC shall be left in every Hand Hole/ Manhole/ Last mile drop.

3.5. Security Architecture

3.5.1. Security Controls and Enforcement

To operationalize the guiding principles outlined in Section 2.3, the solution shall implement the following security controls and enforcement mechanisms: -

- 1. **Encryption at rest and in transit:** All databases, storage systems, and video streams shall be encrypted and compliant to STQC/MeitY standards.
- 2. **Access control and Authentication:** Operator and administrator access shall be enforced strict RBAC by duty role (surveillance, analytics, investigations, maintenance), and shall prohibit shared accounts. The system shall enable time-bound

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elevated sessions with full session recording for admins. User access control shall be managed through multi-factor authentication, role-based permissions and protecting endpoints to prevent unauthorized system access and maintain device integrity.

3. **Network & Endpoint Protection:** Operator consoles, servers, and storage shall be protected using endpoint antivirus & Next-Generation Firewalls solutions.
4. **Dedicated Backbone & Secure Remote Access:** The surveillance network shall operate on a failsafe optical fibre backbone, with VLAN segmentation to isolate cameras, servers, and operator consoles. Remote access (for integrators/OEMs) shall be permitted only via secure VPN tunnels with strong authentication.
5. **Monitoring & Threat Detection:** The solution shall include a Security Information & Event Management (SIEM) platform for centralized log correlation and incident alerting.
6. **Lifecycle Security:** All assets shall be hardened at deployment, regularly patched during operations, and securely wiped or disposed of at end-of-life.
7. **Resilience & Availability:** To ensure resiliency and availability of the services throughout the event, the critical infrastructure will have redundancies at device, data, communication media and power level.

3.5.2. Security Architecture Design

The security architecture adopts a defence-in-depth model over a **dedicated surveillance backbone**, structured into five trust zones: (i) Field/Edge, (ii) Transport/Backbone, (iii) Data Centre, (iv) Operations, and (v) Governance & Monitoring. Controls specified in Section 3.4.1 are placed to protect data flows, restrict lateral movement, and ensure availability during peak operations.

1. Trust Zones and Segmentation

- a. **Field/ Edge Zone:** All STQC-compliant cameras shall be deployed on dedicated camera VLANs. Devices shall undergo hardening, MAC binding, and time synchronisation, and shall only communicate with authorised VMS endpoints.
- b. **Transport/Backbone Zone:** The backbone shall use optical carriage protected by Next-Generation Firewalls shall be applied upstream. Only approved protocols (e.g., H.265 secure transport, ONVIF over TLS, HTTPS management) shall be permitted.
- c. **Data Centre Zone:** The Data Centre shall host VMS, ANPR, and FRS application tiers, databases, and encrypted storage. Management and storage networks shall be logically segregated using VLANs.
- d. **Operations Zone:** Operator consoles and video wall endpoints shall be secured with endpoint antivirus and configured with least-privilege roles. All operator

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access shall be restricted to the application layer; direct device or database access is prohibited.

- e. **Governance & Monitoring Zone:** The system should be based on various deployment of various policies and processes that are being monitored continuously. Centralised AAA/MFA shall manage user identities. A SIEM platform shall provide log correlation and compliance reporting. All logs shall be time-synchronised across systems.

2. Control Placement (Compliance checklist). The following controls shall be implemented to enforce the above architecture: -

- a. **Edge Devices:** Shall be hardened & MAC-bound .
- b. **Perimeter/Backbone:** NGFWs to be used.
- c. **Remote Access (DMZ):** Restricted to secure VPN gateways, with MFA, time-bound vendor accounts, and full session logging.
- d. **Compute/Storage:** Shall enforce encryption at rest, with defined backup and retention policies.
- e. **Identity & Access:** AAA/MFA shall be integrated with all core applications (VMS, analytics, and administration).
- f. **Monitoring:** SIEM shall aggregate logs from all zones; NBAD (optional/future-ready) may be applied to monitor flows at backbone and data centre core.

3. Secure Data Flows: The solution shall enforce the following secure data flows: -

- a. **Camera Streams:** All video streams shall originate from cameras, traverse PoE switches on dedicated camera VLANs, and pass through NGFW/Backbone security layers before reaching the VMS and encrypted storage.
- b. **Operator Access:** Operators shall only access video and analytics systems through the application layer (VMS/FRS/ANPR) with mandatory MFA and based on privileges defined as per RBAC. Direct camera or database logins shall not be permitted.
- c. **Admin Remote Support:** Remote access for administrators shall be provided only through a secure VPN gateway, with connections terminated at a bastion/jump host before reaching approved services.
- d. **Logs & Metrics:** All system logs shall be forwarded to the SIEM platform, with NBAD (optional/future-ready) for anomaly detection.

4. Resilience and Availability: The architecture shall ensure service continuity through the following measures:

- a. Deployment of NGFWs.
- b. Redundant core and distribution switching to avoid single points of failure.

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- c. Redundancy in communication media.
 - d. Clustered VMS and storage systems for fault tolerance.
 - e. The system shall maintain swapped recording retention between the CDC and the Server Room (TCCC), such that each site retains seven days of recordings from the other, ensuring continuity of evidence in case of localised failure.
 - f. Documented RTO and RPO for all critical services.
- 5. Monitoring and Incident Response:** The solution shall incorporate: -
- a. Defined SIEM correlation rules and baselines for proactive detection.
 - b. Integration with a SOC may be considered in future phases.
 - c. Regular assessments will be instituted from CERT-IN.
 - d. CERT-In compliant incident reporting, including mandatory reporting within six (6) hours of detection or as required.
- 6. Lifecycle and Configuration Baselines:** All ICT assets shall comply with lifecycle security requirements, including: -
- a. Secure build standards and hardening at deployment.
 - b. Regular patching and firmware updates during operation.
 - c. Periodic credential and certificate rotation.
 - d. Vulnerability scanning prior to go-live and at least quarterly thereafter.
 - e. Certified secure disposal or wiping of devices and storage media at end-of-life.

3.6. City Data Centre (CDC) and Server Room (TCCC)

3.6.1. Overview

The Data Centre shall serve as the central facility for video storage, processing, and management of surveillance and analytics applications during the Nashik Kumbh Mela 2027. The primary Data Centre shall be established at the ICCC Panchwati. Additional capacity shall be provisioned at the Server Room of Trimbakeshwar CCC, which shall be configured for cameras deployed in the Trimbakeshwar jurisdiction.

3.6.2. Storage and Retention Policy

The City Data Centre (CDC) and Server room at TCCC shall be provisioned with tiered storage to ensure cost efficiency and compliance with operational requirements as follows: -

- a. Camera feeds from Trimbakeshwar will be stored at TCCC server room.
- b. Camera feeds from Nashik will be stored at CDC.
- c. Primary storage will be for 30 days, out of which: -
 - i. Seven days of primary storage of Nashik cameras will be at TCCC Server room.
 - ii. Seven days of primary storage of Trimbakeshwar cameras will be at CDC.

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- d. Secondary storage will be for sixty days, dedicated for camera feeds captured during Kumbh period.
 - i. Secondary storage will be operationalized to span the Kumbh period over sixty days, spanning 02 Aug 2027 and 11 Sep 2027.
 - ii. At the end of every day, data from primary storage will be backed up to secondary storage.
 - iii. There will be no over-writing of data on the secondary storage.
 - iv. At the end of the Kumbh period, the sixty-day secondary storage will be retained separately for investigation/ research purposes.
- e. Critical incident/flagged data will be stored for up to six months.

3.6.3. Storage Design: CDC (Nashik City Data Centre)

a. Primary SAN Storage:

- i. The Storage Solution to be provided needs to Cater for 30 days of Nashik & 7 days of Trimbakeshwar .
- ii. The Storage design should support:
 - I. 6 months of Flagged Data
 - II. 30 days of CCTV data at 2MP, 25 FPS, dual recording (Nashik & Trimbakeshwar) with H.265 or better compression.
 - III. The Primary SAN shall also support concurrent analytics workloads, including:
 - ANPR (≥ 190 streams at Nashik)
 - FRS (≥ 150 streams at Nashik)
 - AI based video analytics (≥ 1000 streams at Nashik)
 - IV. The storage design shall provide HDD/flash/SSD or equivalent mechanisms to support metadata-intensive analytics workloads (e.g., FRS templates, ANPR cropped images, VA event metadata, heatmaps, and overlays), while simultaneously serving bulk video recording and retrieval.

b. Secondary SAN Storage:

- i. The Storage Solution to be provided needs to Cater for 30 days of Trimbakeshwar & 7 days of Nashik.
- ii. Storage design should support 60 days of flagged CCTV data at 2MP, 25 FPS, 24x7 recording with H.265 or better compression.
- iii. The Secondary SAN shall not be limited to cold/archive data. It shall also support on-demand retrieval of video and analytics data for investigation and research purposes and therefore must sustain read-intensive workloads in addition to long-term storage.
- c. **Backup:** 7 days of Nashik data at 2MP, 25 FPS, 24x7 recording with H.265 or better compression shall also be stored at Trimbakeshwar.

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- d. The recording and viewing streams of the camera shall have the same configuration. The Implementing Agency (IA) shall size the servers accordingly. While the RFP specifies the minimum server sizing of VMS and GPU requirements, The IA shall provision server sizing as per their solution and requirements, and no additional cost will be provided for the same.
- e. **Data Protection and Ransomware Resilience:** The design shall incorporate native or tightly integrated mechanisms for ransomware protection and data immutability enabled from Day 1 and licensed to full capacity, including: -
 - i. Immutable/Write-Once snapshots for Entire systems.
 - ii. detection to identify unusual access or encryption patterns.
 - iii. Secure restore to ensure data can be recovered rapidly without paying ransom.

3.6.4. Infrastructure Requirements

The Data Centre infrastructure shall include:

- ▶ Compute and storage systems sized to support 100% of the deployed camera load (new and integrated).
- ▶ Both primary and secondary storage will be NAS based.
- ▶ Redundant server, network, and storage racks to eliminate single points of failure.
- ▶ Virtualization and clustering for high availability and workload balancing.
- ▶ Fire detection and suppression systems.
- ▶ Redundant power supply (UPS and DG backup).
- ▶ Air conditioning and environmental monitoring for optimal operations.
- ▶ Role-based access control and physical security measures.

3.6.5. System Hosting

The Data Centre shall host: -

- ▶ Video Management System (VMS) and all licensed video analytics applications (FRS, ANPR, PTZ tracking, use-case analytics)
- ▶ Associated databases for event logging, metadata, and video indexing.
- ▶ Monitoring and reporting dashboards.

Note: Detailed VMS and subsystem integration requirements shall be covered under the System Integration section of this RFP.

3.6.6. Key Requirements

The Data Centre shall:

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- ▶ Ensure high availability with minimum uptime of 99.95%.
- ▶ Be scalable to accommodate increased camera counts and extended data retention.
- ▶ Provide secure storage with encryption for all video and metadata.
- ▶ Enforce access through the application layer only, ensuring no direct access to databases.
- ▶ Enable centralized monitoring of system health and performance.
- ▶ Support recovery through back up software data across Nashik and Trimbakeshwar.

3.6.7. Enterprise Management System

For effective operations and management of IT Operations, there is a need for an industry-standard Enterprise Management System (EMS). Given the expanse and scope of the project, EMS becomes very critical for Operations and SLA Measurement. The IT asset (Devices, Servers & Networking Components) that are IP based and envisaged in the project can be monitored and managed by using Enterprise Management System (EMS). The Monitoring system shall be able to provide automated consolidated SLA reports.

Various key components of EMS are:

- ▶ SLA & Contract management System
- ▶ Network Monitoring System
- ▶ Server Monitoring System
- ▶ Helpdesk System
- ▶ Application Performance Management
- ▶ Centralized Log Management
- ▶ Centralized and Unified Dashboard
- ▶ Centralized and Customizable Service Level Reporting

The Monitoring Solution should provide seamless common functions including but not limited to:

- ▶ Event and Alarm management
- ▶ Auto-discovery of the IT environment
- ▶ Availability and Performance monitoring
- ▶ Correlation and root cause analysis
- ▶ Service Level Management, notifications

- ▶ Reporting and analytics
- ▶ Automation and Customization

3.6.8. Dashboard (Multi-Dashboard Feature) Management System

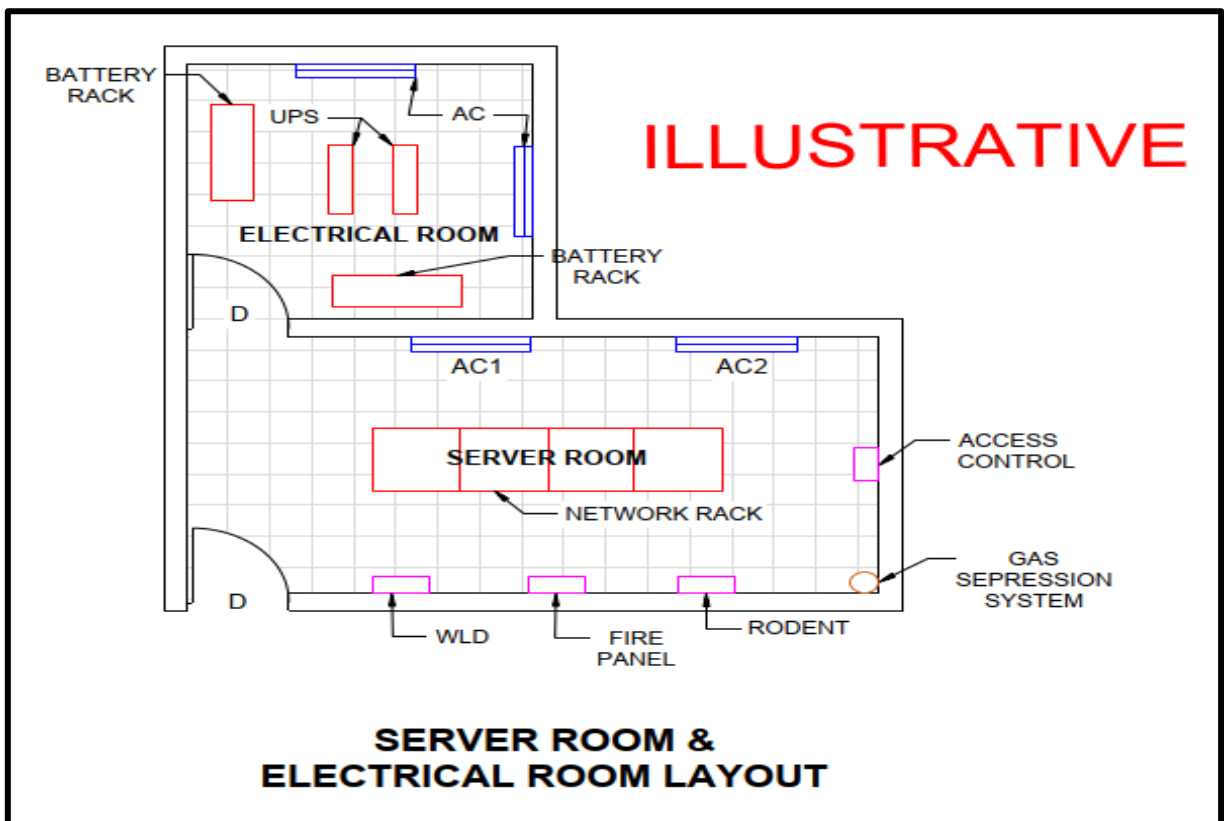
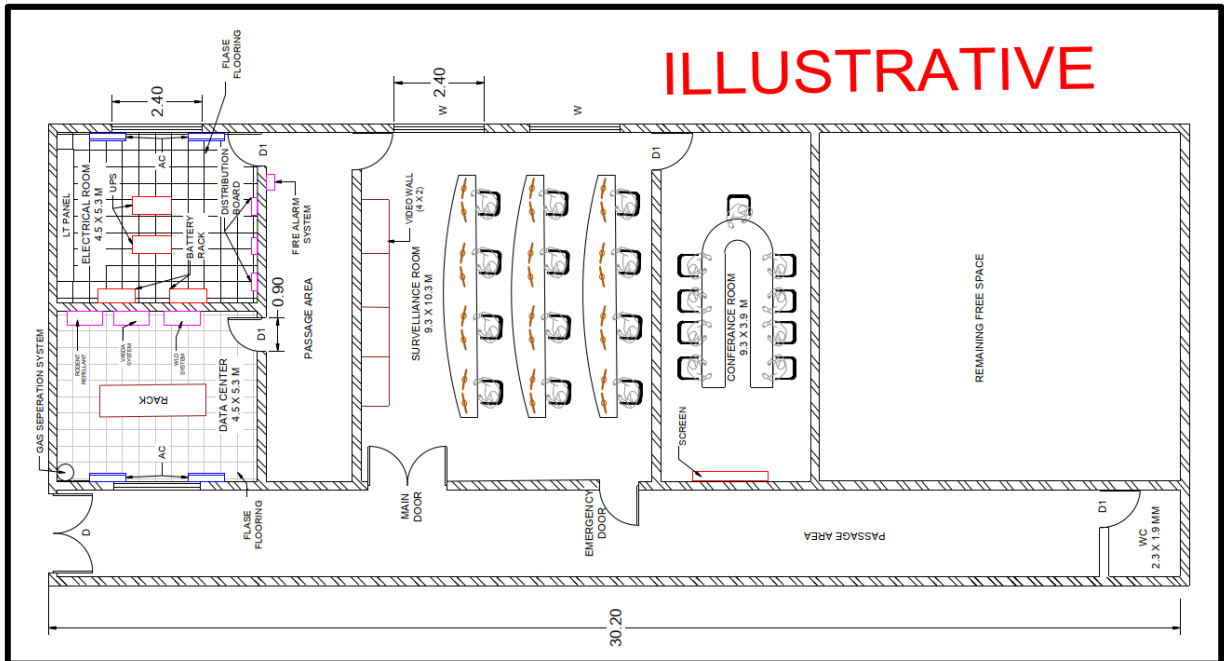
There will be dedicated monitoring and action teams involved during the Kumbh Mela period. For effective monitoring operations and management of the CCTV camera video streams, there is a need for the multi-dashboard monitoring system in addition to a main dashboard. This shall enable the dedicated teams to manage effectively and take necessary actions. The multiple dash boards that may be required in addition to main dashboard are as follows:

- ▶ Ghat-specific dashboard (Nashik City & Trimbakeshwar)
- ▶ Parking-specific dashboard (Nashik City & Trimbakeshwar)
- ▶ Bus Stations/Bus Stands-specific dashboard
- ▶ Shahi Marg dashboard
- ▶ Railway Station-specific dashboard
- ▶ Sadhu gram-specific Dashboard
- ▶ All six vehicle entry points to Nashik/ Trimbakeshwar

IA shall provide feasible dashboard options for the above-mentioned dashboards for dedicated monitoring to the specific action teams involved during the Kumbh Mela period. These dashboards should be available at the desktop viewing screens, viewing hubs/station screens and also on video wall screen as and when required.

3.7. Trimbakeshwar Command and Control Centre (TCCC)

3.7.1. Layout of Proposed TCCC and Server Room



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The Implementing Agency (IA) shall be responsible for the removal of existing furniture and other accessories from the CDC and TCCC sites and shall hand over the same to the Client at the location specified by the Client.

3.7.2. Storage Design: TCCC Server Room

a. Primary SAN Storage:

i. The Storage Solution to be provided needs to Cater for 30 days of Trimbakeshwar & 7 days of Nashik.

ii. The Storage design should support:

I. 6 months of flagged Data

II. 30 days of CCTV data at 2MP, 25 FPS, 24x7 dual recording (Trimbakeshwar & Nashik) with H.265 or better compression.

III. The Primary SAN shall also support concurrent analytics workloads, including:

- ANPR (≥ 10 streams at Trimbakeshwar)
- FRS (≥ 100 streams at Trimbakeshwar)
- AI based video analytics (≥ 300 streams at Trimbakeshwar)

IV. The storage design shall provide HDD/flash/SSD or equivalent mechanisms to support metadata-intensive analytics workloads (e.g., FRS templates, ANPR cropped images, VA event metadata, heatmaps, and overlays), while simultaneously serving bulk video recording and retrieval

b. Secondary SAN Storage:

The Storage Solution to be provided needs to Cater for 30 days of Nashik & 7 days of Trimbakeshwar.

i. Storage design should support 60 days of CCTV data at 2MP, 25 FPS, 24x7 recording with H.265 or better compression.

ii. The Secondary SAN shall not be limited to cold/archive data. It shall also support on-demand retrieval of video and analytics data for investigation and research purposes and therefore must sustain read-intensive workloads in addition to long-term storage.

c. **Backup:** 7 days of Trimbakeshwar data of 2MP, 25 FPS, 24x7 recording with H.265 or better compression, shall also be stored at Nashik Primary SAN storage.

d. The recording and viewing streams of the camera shall have the same configuration. The Implementing Agency (IA) shall size the servers accordingly. While the RFP specifies the minimum server sizing of VMS and GPU requirements, The IA shall provision server sizing as per their solution and requirements, and no additional cost will be provided for the same.

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- e. **Data Protection and Ransomware Resilience:** The design shall incorporate native or tightly integrated mechanisms for ransomware protection and data immutability enabled from Day 1 and licensed to full capacity, including: -
- i. Immutable/Write-Once snapshots for Entire systems.
 - ii. detection to identify unusual access or encryption patterns.
 - iii. Secure restore to ensure data can be recovered rapidly without paying ransom.

3.8. ICCC Panchwati Expansion

Existing ICCC Panchwati will be expanded to adequately expanded to accommodate command and operational elements Nashik Kumbh. This will include addition to existing/New videowall. The IA shall ensure that the additional videowall is compatible with the existing/New videowall. The ICCC expansion, refurbishing activities/tasks/deliverables shall include:

- SITC of additional 2 Nos of extended video wall and controller. This unit in totality has to be integrated with the existing/New video wall, exiting/New controller, existing /New video wall and its controller

3.9. Infrastructure Components: City Data Centre/ Server Room & TCCC

3.9.1. Diesel Generator Set

The Implementation Agency shall be responsible for provisioning, commissioning and regular operations maintenance of the DG set.

The Implementation Agency shall be responsible for but not limited to:

- ▶ Preventive maintenance
- ▶ Corrective maintenance
- ▶ 5 Years AMC
- ▶ Buy Back of existing in lieu of the new DG set proposed at Nashik CDC if required (to be decided on mutual consideration between Purchaser and IA)
- ▶ Replacement of any parts etc
- ▶ **IA shall be responsible for purchase of fuel and maintenance for the diesel generators being envisaged for this project throughout the project lifecycle (including implementation period and for entire O&M Phase, i.e. till five years post go-live).**

3.9.2. Air Conditioning and Natural Convection

Precision air conditioning system shall be exclusively installed to maintain the required temperature at Data Centre / Server Room. The AC should be capable of providing sensible cooling capacities at ambient temperature and humidity with adequate air flow.

The task of the Implementation Agency shall include (but not limited to):

- ▶ Connecting the indoor unit with the mains electrical point
- ▶ Connecting indoor and outdoor units mechanically (with appropriate size of hard gauge copper piping)
- ▶ Connecting indoor and outdoor unit electrically
- ▶ Installation of AC in pairs “Cassette AC Pair” OR “Cassette AC plus Wall Split AC” as redundancy/operational redundancy (12hr+12hr switchable automatic AC operations)

The air conditioner should be linked to secondary power supply (DG set) as well to prevent them from shutting down in case of power outage.

The AC Units should have high sensible heat ratios, to match high sensible loads of Computer/Data Centre/Server Rooms/Switch room/UPS. A Microprocessor controlled Precision package AC system with R-410a refrigerant shall be suitable to take thermal and air quantity inputs from the server and adjust its operation accordingly to achieve highest levels of performance and efficiency.

The Indoor unit shall comprise of Variable Capacity Digital Scroll Compressor, EC fans, Evaporator DX Cooling Coil with hydrophilic coating, Microprocessor controllers, Thermostatic valves, Driers, Filter, Suction and Discharge piping, Internal power and Control wiring, Crankcase heaters, Humidifier, Heaters, HP/LP Cutouts, Power and Control contactors, water leak detectors and Other Electrical accessories.

Fixed capacity compressor technology like multiple scrolls or tandem scrolls are strictly not allowed. Systems should be having variable capacity compressors and performance as per above specifications.

Units should be able to provide 1 SHR at part load

- **Monitoring**

Suitable provision to be made for SNMP/ModBus connectivity.

- **Humidifier**

The unit to be fitted with a canister type steam humidifier suitable for use with water of varying degrees of hardness, provided that the water is not treated or demineralized (Conductivity range 125-500S/cm). The humidifier is complete with a water inlet valve, water

outlet valve and a maximum water level sensor, disposable cylinder, steam distributor and electronic controls. Humidifier control is of the ON-OFF type, can be also disabled by remote contact.

3.9.3. Fire Detection and Suppression System

The server room / data centre shall be equipped with adequate and advanced Fire Detection and Suppression system. The system should raise an alarm in the event of smoke detection. The system should have proper signage, response indicators and hooters in case of an emergency. The system should be based as per NFPA standards.

The system shall include but not be limited to, a Control Panel with Display, Detector Assembly and properly designed sampling pipe network.

3.9.4. Access Control System

The Biometric based Access Control System shall be deployed with the objective of allowing entry and exit to and from the premises to authorized personnel only with appropriate door locks and controller assemble connected.

3.9.5. IP-PBX System

IA shall be responsible for procuring SIP/PRI trunk connectivity from a DoT-licensed Telecom Service Provider (TSP) for integration with the proposed IP-PBX system. All necessary documentation, authorization letters, and coordination support required for such procurement shall be provided by the Client. IA shall ensure successful provisioning, configuration, testing, and SIP/PRI trunk with the IP-PBX system.

3.9.6. Indoor Surveillance System

Indoor surveillance system shall be installed within the CDC and TCCC on 24 x 7 basis. All important areas along with the non-critical areas like locations for DG sets, entry and exit of Server Room / Data Centre and TCCC, Entry and Exit of building premises need to be under video surveillance. Monitoring cameras shall be installed strategically to cover all the critical areas of all the respective locations.

3.9.7. Water Leak Detection System

The Water Leak Detection System shall be installed to detect any seepage of water into the critical area and alert the security control room for such leakage. It shall consist of water leak detection cable and alarm module. The cable shall be installed in the ceiling and floor areas around the periphery.

3.9.8. Rodent Repellent

The entry of rodents and other unwanted pests shall be controlled using non-chemical, non-toxic devices. Ultrasonic pest repellents shall be provided in the false flooring and ceiling to repel the pests without killing them. Further, the Implementation Agency shall conduct periodic pest control using chemical spray once in a six monthly as a contingency measure to effectively fight pests in the following areas:

- CDC Area
- TCC Area, TCC conference rooms
- ICCC Area
- Additional refurbished sitting area executed under this project
- Battery room

3.10. Field Components and Surveillance Cameras

This section of the RFP covers planning & implementation of the cameras and other field equipment at identified locations. Actual place for placement of pole & number of cameras at each location, type of cameras, fixation of height & angle for the cameras to ensure maximum coverage would be done in discussion with NMSCDCL.

3.10.1. Site Survey

A detailed survey shall be conducted by the Implementation Agency along with the team of Nashik Police at each of the strategic location. This survey shall finalize the orientation / field of view and the position of all field equipment. Appropriate field of view snapshot shall be taken by a handheld camera for future reference at the time of survey. The surveyors shall also finalize the approximate location of foundation for Outdoor Enclosure and camera poles.

The survey should include consideration of the following aspects:

- ▶ Location of proposed installation of poles/ cantilevers/ gantries.
- ▶ Orientation of and numbers of cameras/ PAS units to be mounted.
- ▶ GIS Mapping along with location name, latitude/longitude, pole type, camera type, camera quantity on pole, type, PAS quantity on pole, distance from the ICCC/TCCC.

For FRS to be effective, IA shall recommended suitable height of cantilever arm at respective locations where FRS is to be implemented as per the suggestion by NMSCDCL / Police officials as obtained during survey.

The detailed survey report shall be submitted by IA to NMSCDCL along with other details for approval.

IA shall prepare the detailed report for field level requirements e.g. Cameras (types & numbers), Camera Mounting requirements, Power Requirements, Connectivity

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Requirements, etc. for perusal of Purchaser. Indicative list of the field level hardware to be provided by Implementation Agency is as follows:

- ▶ Cameras (Fixed Cameras, PTZ Cameras, High Resolution Cameras, etc.)
- ▶ Public Announcement System (PAS)
- ▶ IR Illuminators (based on requirement)
- ▶ Managed Industrial Switches
- ▶ Outdoor Cabinets/Junction Boxes/Enclosure/Panels
- ▶ LPU
- ▶ Pole for cameras / Mast/Cantilevers & Arms/Gantries
- ▶ UPS with 1/2-hour battery backup
- ▶ Electric Meters

The Implementation Agency shall establish a comprehensive network of cameras to be installed at the indicative list of landmarks identified across Nashik and Trimbakeshwar. The indicative list of landmarks is provided in Section 12 of the Vol 2 of the RFP.

3.10.2. Survey for Drone coverage

Drone coverage will form a critical element of the surveillance plan, enabling real-time situational awareness and rapid response during the event. As part of the survey exercise, suitable points for drone operators and tethered drone deployments will be identified in consultation with the Purchaser and Police officials to ensure seamless integration with the overall command-and-control framework.

Drone Operator points

The Implementing Agency (IA) will liaise with the Purchaser and Police officials to determine optimal locations for positioning drone operators. These points will serve as the bases for drone-based surveillance, with live video feeds enabled at the ICCC/TCCC. A grid of such operator locations will be identified. Planning parameters for finalizing drone operator points shall include: -

1. The location should be within 50–100 meters of a planned network aggregation switch.
2. Each aggregation switch location should have adequate space for drone battery charging and installation of the drone data receiver unit.
3. During operations, live video data from the drone will be streamed to the receiver unit located at the identified switch site, from where it will be transmitted onward for live viewing at the ICCC/TCCC.

Tethered Drones

In addition to free-flying drones, suitable sites will be identified at Nashik and Trimbakeshwar for the deployment of tethered drones. These will provide continuous aerial coverage at critical zones. Planning parameters for tethered drone sites shall include: -

1. Two sites in Nashik and one site in Trimbakeshwar will be identified, in consultation with the Purchaser and their nominated representatives, to ensure uninterrupted coverage.
2. The identified site should provide a secured space for deploying a generator and stationing the drone operator, while remaining free from public interference or obstruction by traffic flow.

The outcome of this survey will provide a comprehensive grid of drone coverage points, ensuring uninterrupted visibility and enhanced situational control across priority areas of the Kumbh Mela.

3.10.3. Installation of Surveillance Cameras

Implementation Agency should follow the industry best practice during the implementation w.r.t positioning and mounting the cameras. Some of the checkpoints which need to be adhered to by the Implementation Agency while installing / commissioning cameras are as follows:

- ▶ Ensure surveillance objective is met while positioning the camera such that the required field of view is being captured as finalized in primary survey.
- ▶ Ensure camera is protected from the on-field challenges of weather, physical damage and theft.
- ▶ Make proper adjustments to have the best possible image / video captured.
- ▶ Ensure that the pole is well placed for vibration resistance adhering to the road safety norms.
- ▶ Collusion preventive barriers around the outdoor enclosure & pole foundation in case its installed in collision prone place.

3.10.4. Installation of Poles/Cantilevers/Gantry

- ▶ The Implementation Agency shall ensure that all the installations to be as per satisfaction of NMSCDCL. The Service Provider to obtain applicable NOC from respective agencies / Municipal bodies.
- ▶ For installation of various types of Surveillance Cameras, Implementation Agency shall provide appropriate poles & cantilevers and any supporting equipment.

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- ▶ Implementation Agency shall ensure that the poles erected to mount cameras are good, both qualitatively and aesthetically.
- ▶ The poles shall be installed with base plate, pole door, pole distributor block and cover.
- ▶ Base frames and screws shall be delivered together with poles and installed by the Implementation Agency.
- ▶ Implementation Agency should ensure that poles should be heavy duty, galvanized metal and must be completely stable. Placement of camera need to be high enough to prevent tampering or physical damage without affecting FOV.
- ▶ In case the cameras need to be installed besides or above the signal heads, suitable stainless-steel extensions for poles must be provided and installed by the Implementation Agency, so that there is clear line of sight.
- ▶ Implementation Agency shall be responsible to perform the required structural analysis regarding the regulated load conditions and considering the respective wind velocity while installing the poles / cantilevers for surveillance cameras or related equipment. Modalities are enumerated at Section 3.10.8.
- ▶ The Implementation Agency shall ensure the physical look of the installation area returns to neat & tidy conditions, after installation of the poles, cantilevers, etc. The placement shall be designed keeping in mind that the normal flow of vehicular traffic and pedestrian movement are not disturbed.
- ▶ IA will be responsible that post any trenching/ducting activity, all reinstatement activity will be carried out.
- ▶ The maintenance of Poles should be undertaken by Implementation Agency irrespective of its height providing high reach vehicles / equipment for maintenance.
- ▶ Implementation Agency shall follow the industry best practice while positioning and mounting the cameras and ensure that the pole / mast implementation is vibration resistant. Arrangements for bird scare spikes on top of camera shall be made to prevent birds from sitting on top of camera box.
- ▶ Implementation Agency shall coordinate with all stakeholders / departments involved for installation.

3.10.5. Automatic Number Plate Recognition System

Implementation Agency shall provide Automatic Number Plate Recognition (ANPR) system at the identified locations. Implementation Agency shall demonstrate compliance of the ANPR System as per the requirements specified in RFP.

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The placement of the camera (for ANPR functionality) shall ensure that no blind spot is left on the lanes being covered, thus ensuring capture of details of all the vehicles, passing through the demarcated lanes. The placement and orientation of the cameras shall consider covering some distance on either side of the verge of the road as well.

The system should be able to detect, normalize and enhance the image of the number plate for detection of alpha numerical characters. System should be able to identify stolen/suspected vehicles by cross checking the numbers with vehicle database. ANPR software should be integrated with Video Management System and Command Control System software.

The ANPR system shall provide a user interface with live view of vehicle entry / exit points 24x7, event notification, image captured, number detection and recognition, event reports customized report generation, etc.

The analysis of the image captured should be done in real-time. The database so created from the images captured & analysis, shall store the following (minimum):

- ▶ Details of vehicle
- ▶ Number and time of entries and exits
- ▶ License plate numbers
- ▶ Validation / Analysis results

3.10.6. UPS installation for field locations

- ▶ UPS shall serve as a backup for commercially available utility power at the intersections and shall ensure no-break functioning of all field components at each intersection in event of failure of utility power supply.
- ▶ Implementation Agency shall install UPS at the defined intersections in secure, tamper-proof housing in corrosion resistant cabinets.
- ▶ Implementation Agency shall ensure that the UPS is suitably protected against storms, power surges and lightning.
- ▶ Implementation Agency shall supply and install the UPS for efficient heat dissipation without air conditioning. It should be able to withstand temperatures prevalent in outdoor condition throughout the year.

3.10.7. Outdoor Cabinets / Junction Box / Enclosures

- ▶ Each location shall be fitted with outdoor cabinets dimensioned to host all equipment necessary to operate enforcement systems and traffic surveillance systems as defined in this RFP.

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- ▶ The Implementation Agency shall reserve additional room availability in the locations controller cabinet to accommodate the future system requirements.
- ▶ The size of outdoor cabinet / enclosures shall be enough to accommodate all the system components, which might be installed at the location or nearby. The cabinet / enclosures shall be dust proof and impermeable to splash-water. It must be suitable for outdoor environmental conditions. It shall have sections for:
 - ▶ **Power cabinet:** This cabinet will house all power supply and power management equipment.
 - ▶ **Control cabinet:** This cabinet will house all data processing and network field components at that location e.g. Switch, Telecom equipment, etc.
- ▶ The cabinets shall be of robust construction and shall include security-locking mechanisms to prevent unauthorized access to the field equipment.
- ▶ Temperature and Humidity Control: All enclosure compartments shall be equipped with a natural convection air circulation system via the provision of air circulation filters which shall require no maintenance, and which shall allow the free circulation of air inside the enclosures, to prevent overheating as well as the build-up and effects of humidity and heat, without permitting the entry of elements which might endanger system operation.
- ▶ Implementation Agency shall ensure all the hardware to be placed inside the outdoor enclosures can withstand temperatures prevalent in outdoor condition throughout the year.

3.10.8. Civil and Electrical Works

- ▶ Implementation Agency shall carryout all the civil work required for setting up all the field component of the system including:
 - **Structural Analysis.** Civil drawing design/Layout Design for “single pole foundation”, “Cantilever pole foundation” and “gantry pole foundation”. The drawings, design for this foundation provided should be certified by a recognised 3rd party consultant and should be provided as a part of survey for approval. The design should be capable to hold the weight of the pole under different weather conditions.
 - Preparation of concrete foundation for MS-Poles & cantilevers
 - Laying of GI Pipes (B Class) complete with GI fitting
 - Excavation of hard / soft soil and backfilling after cabling
 - Chambers with metal cover at every outdoor enclosure, pole and at road crossings
 - Concrete foundation from the Ground for junction box / enclosures

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- ▶ Implementation Agency shall provide electricity to the cameras through the electricity feeder aggregation point/nearest meter box/nearest meter junction box/nearest substation etc. Since this component has dependency on approval from local authorities, IA should plan this requirement well in advance & submit the application to the concerned electricity distribution agency with requisite fees if applicable.
- ▶ The Implementing agency should work with the MSEB provisioning consultant and define junction boxes falling under 6 different city zones for Nashik city and if feasible try to work on the possibilities towards making a Meter-Submeter topology (one city zone will have one meter and all the junction boxes falling under this zone would be connected on sub-meters, this will reduce/optimize the number of bills to 6 effectively). Nashik City is divided into 6 zones (New Nashik, Satpur, Panchvati, Old Nashik, Nashik Road, Ambad)
- ▶ The meter security deposit, cabling cost and labour charges shall be borne by the Implementing Agency.
- ▶ Implementing agency shall be responsible to execute all the documentation work for securing the electric meters through its MSEB provisional agency/consultant. NMSCDCL will provide all the support required like (meter owner name, signatures, letters etc. as required).
- ▶ Registration of electrical connections at all field sites shall be done in the name of NMSCDCL/NMC/ Trimbak Council as agreed. The same will be informed to the implementing agency before the start of the meter application work.
- ▶ **Electricity Bills. The recurring Electricity charges and installation of electric meters (installed at CDC, TCC and field junctions) will be borne by the Implementation Agency.**
 - IA will pay electricity bill and quarterly claim for reimbursement with actual payment documents against Priced Bill of Material (II)
 - Once the mentioned price in Priced Bill of Material (II) gets exhausted IA will be responsible for payment of electricity bill till completion of O&M Period
- ▶ Implementation Agency shall carry out study and identify locations to provide UPS backup, depending upon power situation across Nashik and Trimbakeshwar, to meet the camera uptime requirements.
- ▶ Implementation Agency is responsible for carrying out all the electrical work required for powering all the components of the system
- ▶ Electrical installation and wiring shall conform to the electrical standard of India.

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- ▶ Implementation Agency shall arrange for alternate or redundant power supply in form of UPS, etc. in case the primary source of power fails for all surveillance equipment as described in the RFP.
- ▶ Implementation Agency to lay the cable for power connectivity underground only. However in locations where underground cabling is not feasible, over-head cabling can be done with prior approval from the client.
- ▶ B) Since majority of the locations shall be having existing ducts, bidder is encouraged to use these ducts for cable connectivity and avoid extra T & D works.

3.10.9. Earthing and Lighting Protection

- ▶ Implementation Agency shall comply with the technical specifications, considering lightning-proof and anti-interference measures for system structure, equipment type selection, equipment earthing, power and signal cable laying. Implementation Agency shall describe the planned lightning-proof and anti-interference measures in the bidding documents.
- ▶ Corresponding lightning arrester shall be erected for the entrance cables of power line, video line, data transmission cables, etc.
- ▶ All interface board and function board, interfaces of equipment shall adopt high speed photoelectric isolation to reduce the damage to Low Voltage devices due to the surge suppression.
- ▶ Install the earthing devices for the equipment, including lightning earthing, protection earthing and shielded earthing. All earthing shall meet the industry standards.
- ▶ Given the large scope of ~1330 earthing pits, the vendor shall be responsible for end-to-end documentation and compliance demonstration. For each pit, geo-tagged photographs (pre-backfill, connection, final JB) and digital test records shall be submitted. PMC will verify through random sampling ($\geq 10\%$ pits per batch of 50) and sector combined tests. If failure rate exceeds 5%, the entire batch shall be reworked at vendor's cost. Third-party NABL lab test reports/ reports by any govt approved certified structural engineer/ consultant shall be provided for every 50 pits. Acceptance and payments will be based on documented evidence, random sample compliance, and sector performance.
- ▶ The earthing cable shall be installed in a secure manner to prevent theft, and it shall be rust proof. The earthing down lead and the earthing electrode shall be galvanized, and the earthing value shall meet the requirements. Earthing test report shall be produced by the Implementation Agency.

3.10.10. Site Debris Removal and Reinstatement

IA shall ensure the removal and proper disposal of all site debris from all junctions and other sites as specified in the RFP.

3.11. Mobile Surveillance and Other Security Equipment

3.11.1. Drone Surveillance System

A Drone Surveillance System shall be deployed as part of the event surveillance framework to provide real-time aerial coverage and situational awareness. A total of eighteen (18) drones shall be used, of which ten (10) shall be deployed at Nashik and eight (8) at Trimbakeshwar. Out of these, six (6) tethered drones shall be positioned at Nashik and five (5) tethered drone at Trimbakeshwar to ensure continuous coverage of designated critical locations.

The Drone Surveillance System shall conform to the following requirements: -

1. **Compliance & Permissions:** All drone operators (Police personnel and IA-provided pilots) shall ensure that operations comply with DGCA Drone Rules, 2021 (as amended) and event-specific directives. Operators shall be responsible for obtaining necessary flight permissions, coordinating with Police command and relevant airspace authorities, and adhering to notified airspace restrictions and no-fly zones.
2. **Operational Coverage:** Free-flying drones shall be deployed for dynamic patrols, incident verification, and surge coverage; tethered drones shall provide uninterrupted, long-duration vantage at critical zones. Deployment shall align with operator locations and field receiver points identified under Section 3.7.2 (Survey for Drone Coverage).
3. **Integration with ICCC/TCCC:** Live video feeds shall be streamed to the ICCC/TCCC via designated field receiver units and network aggregation switches identified during the survey. The system shall support concurrent viewing & recording at the ICCC/TCCC.
4. **Support Infrastructure:** Arrangements shall be made for drone battery charging, battery swaps, and secure storage at designated aggregation switch/operator points.
5. **Staffing & Governance:** The IA shall provide two (2) certified drone pilots. The remaining drone operations shall be undertaken by Police personnel, who will be trained and certified by the OEM through an authorised RPTO, as per Section 4 of the Vol 2 of this RFP. Standard pre-flight checklists, risk assessments, and daily reporting protocols shall be implemented under the supervision of the Purchaser or their nominated representatives.

3.11.2. Mobile Surveillance System

The Implementation Agency (IA) shall be responsible for deploying the Mobile Surveillance System, for which the vehicle/van shall be provided by the Department. The Mobile Surveillance Unit shall be a five (5) seater vehicle, to be customized by IA with a rooftop

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platform designed to mount surveillance cameras and a Public Address (PA) system. The Mobile Surveillance Unit shall conform to all technical specifications and requirements as defined in this RFP.

3.11.3. Body Worn Camera and Docking Station

The Body Worn Camera (BWC) shall be equipped with an in-built LCD touchscreen, storage, and speaker, and shall be worn by police officials during operations. Each BWC shall be supported by an 8-channel charging unit and a Docking Station. The recorded feed from the BWC shall be uploaded to the Data Centre/Server Room through the Docking Station. The BWC shall also be equipped with an integrated GPS module for positioning and shall support communication over a GSM-based network.

The Docking Station shall facilitate automatic uploading of camera data to the designated storage infrastructure and shall also ensure automatic clearing of the device storage once the data transfer is completed. IA will create a platform for ingesting the feed of the BWC at CDC and Server Room (TCCC) respectively.

3.12. Integration with Existing Infrastructure

The operational control centres for Nashik Kumbh Mela 2027 are planned to be established at two locations, namely ICCC Panchwati and Trimbakeshwar Command, Control and Communication Centre (TCCC). These operational Control centres shall be required to integrate with the following existing infrastructure:

1. **Integrated Command and Control Centre (ICCC), NMSCDCL, Panchvati, Nashik**, currently operational with video feeds from **1,132 cameras**.
2. **Command and Control Centre (CCC), CP Office, Nashik**, functioning as a mirror facility of the Panchvati ICCC, with access to the same video feeds from ICCC, Panchvati.
3. **Emergency Operations Centre (EOC), Rajiv Gandhi Bhawan, Nashik**, currently operational with video feeds from **205 cameras**

At present, the centres operate as independent silos without unified integration. Under the proposed framework, the new Control Centres shall ensure seamless interoperability with the three existing centres. The integration shall **enable bi-directional data and video feed exchange**, wherein:

1. The proposed Control Centres shall have real-time access to the feeds from the existing ICCC, CCC, and EOC.
2. Conversely, the existing ICCC, CCC, and EOC shall also have access to the feeds from the proposed ICCCs.

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3. As required, the area specific CCTV feeds should be made available to the viewing hubs/stations viewing screens, ICCC desktop dual screens, war room screens, ICCC refurbished area screens.

Viewing license of new OEM to be integrated with the VMS licenses of existing OEM for existing cameras; or IA to obtain viewing licenses from existing OEM, to integrate into new OEM dashboard. This integration will facilitate the establishment of a **unified, collaborative, and resilient monitoring ecosystem** to support effective management and coordination during the Nashik Kumbh Mela 2027.

3.13. Help Desk Management

It is envisaged that the centralized helpdesk, functioning as proposed below, would be managed by the IA and shall serve following objectives:

- ▶ IA shall set up a helpdesk at existing ICCC to support users in resolving concerns and challenged related to IT and non-IT infrastructure.
- ▶ The IA shall create a support matrix including establishment of Helpdesk at ICCC for all hardware, software, third party services or any other external support for seamless operation of complete solution.
- ▶ The IA shall establish a Support Centre (Helpdesk Support) which shall handle fault reporting by 24 x 7 based, Trouble Ticketing and related enquiries during this contract.
- ▶ Act as the Point of Contact for the users of Surveillance System
- ▶ Own an Incident throughout its Lifecycle
- ▶ Communicate effectively with concerned departments and IT support teams.
- ▶ Maintain high user satisfaction levels
- ▶ Maintain the SLA statistics & submit quarterly report to NMSCDCL.

4. Training and Capacity Building

The IA shall conduct training programs periodically throughout the contract tenure for different stakeholders of NMSCDCL. These training programs may be conducted at locations identified by NMSCDCL. The IA shall also prepare and submit the yearly training plan. NMSCDCL expects the IA to undertake it in a very professional manner. IA must conduct a proper Training Needs Analysis of all the concerned staff and draw up a systematic training plan in line with the overall project plan. For all these training programs the bidder must provide necessary course material and reference manuals (user/maintenance/administration).

Trainings would be of following types:

- 1. Training of Drone Pilots:** The IA shall be responsible through the OEM for conducting a comprehensive training program for drone operations. It shall be mandatory for the OEM to train a minimum of thirty (30) operators and ensure that at least twenty (20) operators are duly certified by a DGCA compliant RPTO (Remote Pilot Training Organization) upon successful completion of the training. The training and certification shall be conducted as a one-time exercise in accordance with applicable standards and best practices. Additionally, the OEM shall be required to provide a minimum of two (2) trained drone operators on a need basis for a period ranging from seven (7) to fifteen (15) days, during emergencies, upon receipt of one (1) week's prior notice from the Purchaser.
- 2. Functional Training:** This training would focus on the use of the surveillance software at Command & Control Rooms, so that the users are aware of all the operations of the surveillance systems and are able to implement the overall process defined by the Police Department for optimum use of the system. Broad training requirement defined for the purpose of calculation of effort is as follows:

Operations	Personnel / operator per shift	Extra Trainee	Shift / Day	Total Manpower
TCCC	15	10	1	25
ICCC	15	10	1	25
Drone Operator	30	10	1	40
Total Manpower to be trained (min.)			90	

- ▶ IA will obtain approval of Purchaser to finalize the batches for training.
 - ▶ Expected training time for above mentioned personnel's to be provided by IA at the time of training schedule submission.
 - ▶ IA shall also provision for refresher training on every 6-month basis for newly joined/deployed NMSCDCL personnels (1 batch of 30 personnel).
- 3. Administrative Training:** This training would focus on the administration of Surveillance System and Server Infrastructure and would be imparted to about 4 – 6 staff identified by the NMSCDCL for Administration of the System. IA shall also provide

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additional training Programme of 1 batch (of 4 - 6 personnel) of 2 days every 6 months. Expected training time would be 16 hrs. (2 days of 8 hrs. each).

Note: Additional Training requirements will be assessed by NMSCDCL along with IA when such requirements arise.

Other requirements to be fulfilled by the Successful Bidder with respect to Training are as follows:

- a. Prepare the training material in consultation with NMSCDCL & its consultant. Detailed Training manuals would be prepared by the IA prior to the start of the training.
- b. One Hard Copy & One Soft Copy of the training material shall be given by the IA to all the trainees.
- c. Successful Bidder should ensure that the knowledge transfer to the NMSCDCL staff happens effectively post training.

5. Acceptance, Testing and Certification

5.1. User Acceptance Test (UAT)

- ▶ User Acceptance consists of formal testing conducted by the end user group according to the scope of the work, technical specification & operational scenarios. Acceptance test plan and analysis of the test results to determine whether the system satisfies its acceptance criteria.
- ▶ IA shall prepare a plan to coordinate the User Acceptance activity. The UAT will be conducted and facilitated by the IA.
- ▶ IA shall prepare a detailed note that contains stepwise instructions for NMSCDCL on how to use software deployed.
- ▶ The Primary responsibility for acceptance testing lies with NMSCDCL.
- ▶ IA shall provide support to document the User Acceptance Test results along with Defect statistics. IA shall ensure that defects found are corrected and is retested by the end user group.
- ▶ On successful completion of User Acceptance Testing, IA shall obtain a formal acceptance sign-off from NMSCDCL. Each of the milestones defined in this RFP will be subject to acceptance criterion of NMSCDCL.
- ▶ Service Provider will provide necessary commission/installation certificate from the respective component.

Acceptance of IT Infrastructure and solutions	
Field Equipment	a. Testing of all the field equipment i. IP Cameras, Power Supply, Outdoor Enclosure, Pole, UPS, Network Switch, Router, Active / Passive components of the system etc.
Servers & GPU Servers & Storage commissioned	a. Demonstrate high availability of servers (as per RFP requirements) b. Demonstrate redundancy and hot swap of power supplies and Hard Disk Drive (HDD) (as per RFP requirements) c. Verify that none of the servers are populated with any writeable media.

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Acceptance of IT Infrastructure and solutions	
Application/ Software solutions implemented	a. User acceptance of the requirement specifications of components mentioned in the respective specifications. b. User acceptance of the functional requirements as mentioned in the respective technical specification.
Testing of integrated solution	a. All the equipment at Command & Control Centre, Field Locations, Viewing Centre and other Offices, Data Centre to function in sync as per the technical specification & Scope of work.
Health Monitoring Software	a. Demonstrate functioning of all the relevant components of Health Monitoring software.
Information Security Solution	a. Conduct a comprehensive penetration testing covering all the solutions implemented. A penetration testing report shall be submitted to the NMSCDCL as part of security audit to be conducted by the Service Provider using its tools/applications. b. Conduct a threat and vulnerability assessment with a view to demonstrate that the infrastructure is adequately secured against internal and external attacks. The assessment report shall be submitted by the IA as part of the security audit. c. Close mutually agreed issues observed during Security Audit. d. IA to conduct such tests annually or on deployment of any major release of the software / solution platform during the contract period.
Network Testing	a. Demonstrate flow of data from DC to access of applications / solutions at TCCC, ICCC and Viewing Centres, in conjunction with IA-1 responsible for laying fiber project.

User Acceptance stage will be deemed to be successful on the timely completion of the following User Acceptance activities:

- ▶ IA is responsible to create datasets required to carry out the acceptance testing.
- ▶ IA shall resolve the defects / bugs users identified during testing.
- ▶ Users shall re-test the solution to ensure closure of identified defects / bugs.
- ▶ IA shall assist the users during acceptance testing.

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- ▶ After the defects are resolved, IA shall deploy the solutions on the production environment.
- ▶ In case of any performance issues during this period, IA shall resolve the issues identified on a priority basis

Indicative Documents and Reports required for each Phase of the Project:

- i. Delivery Note acknowledged by consignee
- ii. Purchase Order and Invoice copy
- iii. Installation Report
- iv. Installation Layout Report
- v. Location wise installation details (TCCC, Data Centre / Server Room, Camera Location details etc.)
- vi. Cable route plan of camera locations, ICCC Panchvati, TCCC etc.
- vii. Connectivity Layout Report
- viii. Device Connectivity test report
- ix. Latency test report

6. Project Implementation Timelines, Deliverables and Payment Terms

The project would be executed under the following timeframes:

Sr. No.	Milestone	Deliverables	Timelines	Payment % of Total Contract Value
1	Project Inception Phase	Inception Report Project Plan Technical Architecture Document Implementation plan	T + 15 Days	0%
2	Project Technical Design Documents Phase	• Design documents (FRS, SRS, SDD) • High-Level Design documents • Low-Level Design documents • Technical / Deployment Architecture • Network Architecture • Design Basis Report (DBR) for CDC, TCCC Server Room, TCCC Conference Room and Meeting Room (including integration aspects)	T + 30 Days	2%
3	Joint Site Survey & Requirement Gathering Phase	I. Detailed Site Survey Report covering: * Field location feasibility assessment, site readiness status, Infrastructure assessment (IT & non- IT) * ICCC, TCCC, CDC & Trimbak DC site location feasibility assessment, site readiness status, Infrastructure (IT & non-IT) assessment, etc. * GIS coordinates to be captured for all the above-mentioned sites/locations * Respective site/location finalization by the Concerned entity & submission of survey	T + 3 Months	3%

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Sr. No.	Milestone	Deliverables	Timelines	Payment % of Total Contract Value
		report II. Revised Project Plan III. Poles, Gantries, Cantilever Arms & Junction Box Design Finalization		
4	Supply (IT and non-IT Infra & Systems) Phase			
4.1	Supply of IT & non-IT Infra of Field Equipment 50% of the total quantity of cameras, PAS	* Infra & Systems Delivery Report (delivery challans) * Material Inspection Report * Warranty Certificates for the items supplied * FAT Report (as applicable)	T + 4 Months	10%
4.2	Supply of IT & non-IT Infra of Field Equipment 100% of the total quantity of cameras, PAS		T + 5 Months	15%
4.3	Supply of 100% of following items: Drones, Mobile Surveillance, Body Worn Camera, Mega Phone, Nashik & Trimbak Data Centre Hardware, Field Level Access, Aggregate & Core Rings Hardware		T + 6 Months	15%
5	Installation Phase			
5.1	Installation of IT & non-IT Infra & Systems of Nashik & Trimbak Data Centre, ICCC expansion and TCCC	* Site Readiness Report * Site Acceptance Certificate from NMSCDCL & PMC	T + 8 Months	5%

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Sr. No.	Milestone	Deliverables	Timelines	Payment % of Total Contract Value
5.2	Installation of IT & non-IT Infra of Field Equipment 50% of the total quantity of cameras, PA System		T+10 Months	5%
5.3	Installation of IT & non-IT Infra of Field Equipment 100% of the total quantity of following items: Drones, Mobile Surveillance, Body Worn Camera, Mega Phone, Field Level Access, Aggregate & Core Rings Hardware		T+12 Months	5%
6	Integration and Testing Phase			
6.1	Integration of existing surveillance system	* Application Integration Reports * Integration Report	T + 13 Months	5%
6.2	Integration, Testing & Operationalization of following items: * Nashik & Trimbak Data Centre Hardware and Software * Integration and testing of Nashik & Trimbakeshwar Surveillance System * Integration and testing for Video Analytics for Nasik and Trimbakeshwar * Integration of Drones, Mobile Surveillance, Body Worn Camera,	* Test Report * User Acceptance / Operationalisation Report	T + 14 Months	5%

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Sr. No.	Milestone	Deliverables	Timelines	Payment % of Total Contract Value
	* Testing of Access, Aggregate & Core Rings Redundancy			
7	Training & System Go-Live with 30-days of Stability Report	* Training Completion Certificate * Acceptance / Go Live/ Completion Certificate from the NMC/ Concerned entity	T + 15 Months (T1)	5%
	Total			75%
8	Phase 2: Operation & Maintenance Phase (OPEX)		T1 + 60 Months	5% in equated quarterly instalments (20 quarters)
8.1	Year 1	* SLA Compliance Report * Satisfactory Performance Report for respective solution component's operations * Electricity bill payment reconciliations		5.00%
8.2	Year 2			5.00%
8.3	Year 3			5.00%
8.4	Year 4			5.00%
8.5	Year 5			5.00%
	Total			25%

Note:

- T is the date of issuance Work Order / LoA and T1 is the date of Go Live.
- Due payments shall be made promptly by the NMSCDCL, generally within forty-five (45) days after submission of an invoice along with requisite document. The contractor shall not hold a work and adversely affect the project progress while the payments are being processed by NMSCDCL. NMSCDCL reserves the right to levy appropriate penalty in the event the contractor delays execution of work for want of payment. Further NMSCDCL shall not pay any interest towards delay in release of payments for reasons attributable to either of the parties.

- NMSCDCL shall have power to make any alterations in or additions to the original specifications, drawings, designs and instructions that may appear to him to be a necessary or advisable during the progress of the work, and the IA shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in writing signed by NMSCDCL and such alterations should not invalidate the contract and any additional work which the IA may be directed to do in the manner above specified as part of the work shall be carried out by the IA on the same condition in all respects on which he agreed to do the main work and at the same rates as are specified in the tender of main work. And if the additional and altered work includes any class of work for which no rate is specified in this contract, such class of work shall be carried out at the sanctioned rates of the D.S.R / S.S.R / C.S.R., etc.
- The currency or currencies in which payments shall be made to the IA under this Contract shall be Indian Rupees (INR) only.
- Reference of payment to the IA on actual basis, anywhere in the RFP, shall apply to the BoQ's line items basis the respective unit cost quoted by the bidder, as part of its financial bid or as per the agreement, provided its variation is within 10-20% vis a vis published rates like DSR/MGP/City's RA etc. else for those line items published rates (DSR/MJP/City's RA etc.) shall apply for making the payment on actual basis.
- Any penalties/ liquidated damages, as applicable, for delay and non-performance, as mentioned in this RFP document, shall be deducted from the due payments of the respective milestones.
- Taxes, as applicable, shall be deducted / paid, as per the prevalent rules and regulations.

7. Service Level Agreement

7.1. Purpose

The purpose of Service Levels is to define the levels of service provided by the IA to the NMSCDCL for the duration of the contract. The benefits of this are:

- ▶ Help NMSCDCL control the levels and performance of IA 's services.
- ▶ Create clear requirements for measurement of the performance of the system and help in monitoring the same during the Contract duration.
- ▶ Start a process that applies to NMSCDCL and IA attention to some aspect of performance, only when that aspect drops below the threshold defined by the NMSCDCL.

The Service Levels are between the NMSCDCL and IA.

7.2. Service Level Agreement & Target

The section 7.7, 7.8 & 7.9 reflects the measurements to be used to track and report system's performance on a regular basis. The targets shown in that section's tables are for the period of Contract.

7.3. General Principles of Service Level Agreement

The Service Level agreements have been logically segregated in the following categories:

- Commencement of Work
- Camera, Video Feed Uptime and Quality
- Video Analytics Performance
- End-User Equipment Uptime
- Uptime/Availability at Data Centre (DC)
- Security /Patch Services for IT Infrastructure
- Additional SLA Parameters/Requirements
- Matrix for manpower availability
- Matrix for spares

SLA shall be applicable in implementation as well as operations and maintenance phase of the project. The penalties shall be applicable on Operations & Maintenance cost of the solution component calculated quarterly.

7.4. Service Level Agreement

- Service Level Agreement (SLA) shall become the part of the Contract between the NMSCDCL, and the IA. SLA defines the terms of IA's responsibility in ensuring the timely delivery of the deliverables and the correctness of the deliverables based on the agreed performance indicators as detailed in this section.
- The IA shall comply with the SLAs to ensure adherence to project timelines, quality and availability of services throughout the duration of the Contract. For the purpose of the SLA, definitions and terms as specified in the document along with the following terms shall have the meanings set forth below:
 - **"Total Time"** – Total number of hours in consideration for evaluation of SLA performance.
 - **"Downtime"** – Time period for which the specified services/components/system are not available with the user department in the concerned period, being considered for evaluation of SLA, which shall exclude downtime owing to Force Majeure and reasons beyond control of the IA.
 - **"Scheduled Maintenance Time"** – Time period for which the specified services / components / system with specified technical and service standards are not available due to scheduled maintenance activity. The IA shall take at least 15 days prior approval from the Purchaser for any such activity. The scheduled maintenance shall be carried out during non-peak hours.
 - **"Uptime"** – Time period for which the specified services are available with the user department in the period being considered for evaluation of SLA.
 - **Uptime (%)** = $[1 - \{(Total\ Downtime) / (Total\ Time - Scheduled\ Maintenance\ Time)\}] * 100$.
 - Penalties shall be applied for each criteria / solution individually and then added together for the total penalty for a particular quarter.
 - **"Incident"** – Any event/abnormalities in the service/system being provided that may lead to disruption in regular/normal operations and services to the end user.
 - **"Response Time"** – Time elapsed from the moment an incident is reported to the Helpdesk either manually or automatically through the system, to the time when a resource is assigned for the resolution of the same.
 - **"Resolution Time"** – Time elapsed from the moment incident is reported to the Helpdesk either manually or automatically through system, to the time by which the incident is resolved completely and services as per the contract are restored.

7.5. Service Levels Monitoring

- The Service Level parameters as defined below, shall be monitored on a periodic basis, as per the individual parameter requirements. IA shall provide the Enterprise

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Management System Tool for the SLA measurement and monitoring; IA shall be required to configure the desired solution component wise SLA in the same.

- IA shall be expected to take immediate corrective action for any breach in SLA. In case issues are not rectified to the complete satisfaction of NMSCDCL, within a reasonable period of time defined in this RFP, then the NMSCDCL shall have the right to take appropriate penalizing actions, or termination of the contract.

7.6. Penalties

- Performance Penalty for not meeting a measurement parameter for any two months in consecutive quarters shall result in twice the penalty percentage of that respective measurement parameter in the third quarter for all the three months.
- Total penalties are subject to a **maximum of 10% of value of the quarterly payments** after which Purchaser may invoke the annulment of the contract and forfeiture of the PBG. The penalty will be levied in case of delay for reasons attributable to the successful bidder.
- The payment to the Implementation Agency shall be on Quarterly basis; however, the penalty shall be calculated on monthly basis as per the SLAs stated in the RFP.
- The Purchaser reserves the right to waive off penalty at their own discretion.
- IA must ensure that SLA reports are generated according to the reporting intervals specified in Section 7.7, 7.8 and 7.9. Failure to generate any SLA reports on time will be regarded as a breach of that SLA.
- While the SLA reports are generated as per defined intervals, penalty will be calculated on quarterly basis as per the severity applicable. For example, for the SLA of Uptime of DC, if the uptime for three months are as follows:
Month 1 – 98.3%
Month 2 – 98.7%
Month 3 – 99.0%

Then average of three months = $(98.3\% + 98.7\% + 99.0\%) / 3 = 98.67\%$

Therefore, while the reporting frequency would be affected monthly, the calculation and applicability of penalty will be at quarterly intervals.

7.7. Implementation phase related SLA

S. No.	Measurement	Definition	Target	Penalty
Commencement of Work				
1	Team mobilization and Commencement of Work	IA is expected to mobilize project team for commencement of work Commencement of work would mean reporting and availability of IA 's resources at the NMSCDCL's office for the project within defined period of 15 days and remaining period of implementation period	Within 15 days of issuance of Work Order or Contract Agreement, whichever is earliest.	Penalty shall be 0.5% (half percent) of the Capex Value per week of delay or part thereof, subject to a maximum of 10% of contract value. Delay beyond 45 days may lead to Termination of the Contract at the discretion of the NMSCDCL

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S. No.	Measurement	Definition	Target	Penalty
2	Local presence of Bidder	The Bidder should have Support Centre or local office AND a warehousing facility in Nashik OR Bidder to make Local Presence at Nashik available within 45 days from the date of Issuance of LoA AND Bidder to have a warehousing facility within 60 days from the date of issuance of Work Order.	Bidder should have a local office or support centre at Nashik location within 45 days of issuance of LoA. AND Bidder should have a local warehouse facility at Nashik location within 75 days of issuance of LoA	For local office / support centre: Delay beyond the 45 calendar days post issuance of LoA = INR 1,00,000 per month / part thereof For local warehouse facility: Delay beyond the 75 calendar days post issuance of LoA = INR 2,00,000 per month/ part thereof

Note : Pre-Implementation SLA (Penalty for non-achievement of SLA Requirement): Any delay in the delivery of the project deliverables, for the reasons solely attributable to the SI would attract a penalty of 1% of the milestone payment per week for the first 4 weeks and 2% per week for every subsequent week. Total penalty to be capped at 10% of the CAPEX of the project. If the delay in the project continues to be beyond 8 weeks after the penalty cap is reached, for the reasons solely attributable to the SI, Department would have right to invoke termination clause.

7.8. SLA Matrix for Surveillance System including IP Camera, ANPR, Face Recognition and Related Component

S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
Camera, Video Feed Uptime and Quality						
1	Uptime per camera (live feed available irrespective of network/power/etc. issues)	Reports generated from the Video Management Software	Monthly report from VMS will be averaged to calculate the Quarterly measured value	> 98%	0	0
				≥ 97% to < 98%	1	1% of Quarterly OPEX Payment
				≥ 95% to < 96%	2	1.5% of Quarterly OPEX Payment
				< 95%	3	2% of Quarterly OPEX Payment
2	CCTV video feed recording (policy at Clause 3.6.2)	Reports generated from the Video Management Software	Monthly report from VMS will be averaged to	> 98%	0	0

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
3	Application(s) availability - Video management	EMS / NMS	calculate the Quarterly measured value	≥ 97% to < 98%	1	0.50% of Quarterly OPEX Payment
				≥ 95% to < 96%	2	0.70% of Quarterly OPEX Payment
				< 95%	3	1% of Quarterly OPEX Payment
			Quarterly	> 99%	0	0
				≥ 97.5% to < 99%	1	1% of Quarterly OPEX Payment
				≥ 96.5% to < 97.5%	2	1.5% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
				< 96.5%	3	2% of Quarterly OPEX Payment
Video Analytics Performance						
1	ANPR system availability	EMS/NMS	Monthly report will be averaged to calculate the Quarterly measured value	> 98.5%	0	0
				≥ 97.5% to < 98.5%	1	1% of Quarterly OPEX Payment
				≥ 96.5% to < 97.5%	2	1.5% of Quarterly OPEX Payment
				< 96.5%	3	2% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
2	Accuracy of ANPR for Standard Number plates	Reports from C&C in charge/person or agency nominated by Competent authority. Average of 20 manual sample checked per month	Quarterly	> 95%	0	0
				≥ 90% to < 95%	1	0.50% of Quarterly OPEX Payment
				≥ 85% to < 90%	2	0.70% of Quarterly OPEX Payment
				< 85%	3	1% of Quarterly OPEX Payment
3	Accuracy of ANPR for Non-Standard Number plates	Reports from C&C in charge/ person or agency nominated by Competent authority. Average of 20 manual sample checked per month	Quarterly	> 75%	0	0
				≥ 70% to < 75%	1	0.30% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
4	Accuracy of Facial Recognition System – Day time	Reports from C&C in charge/ person or agency nominated by Competent authority. Average of 20 manual sample checked per month	Quarterly	≥ 65% to < 70%	2	0.40% of Quarterly OPEX Payment
				< 65%	3	0.50%% of Quarterly OPEX Payment
				> 80%	0	0
				≥ 70% to < 80%	1	0.50% of Quarterly OPEX Payment
				≥ 60% to < 70%	2	0.70% of Quarterly OPEX Payment
				< 60%	3	1% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
5	Accuracy of Facial Recognition System – Night time	Reports from C&C in charge/ person or agency nominated by Competent authority. Average of 20 manual sample checked per month	Quarterly	> 70%	0	0
				≥ 60% to < 70%	1	0.30% of Quarterly OPEX Payment
				≥ 50% to < 60%	2	0.40% of Quarterly OPEX Payment
				< 50%	3	0.50% of Quarterly OPEX Payment
6	Accuracy of any other analytics (SLA detailing to be defined in discussion with Implementation Agency)	Reports from C&C in charge/ person or agency nominated by Competent authority. Average of 20 manual sample checked per month	Quarterly	> 80%	0	0
				≥ 70% to < 80%	1	0.30% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
				≥ 60% to < 70%	2	0.40% of Quarterly OPEX Payment
				< 60%	3	0.50% of Quarterly OPEX Payment
				End-User & other equipment Uptime		
1	Monitoring workstations at Command Centres and other location under this project	NMS/EMS	Quarterly	> 99%	0	0
				≥ 97% to < 99%	1	1% of Quarterly OPEX Payment
				≥ 95% to < 97%	2	2% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
				< 95%	3	4% of Quarterly OPEX Payment
2	Video walls	NMS/EMS	Quarterly	> 99%	0	0
				≥ 97% to < 99%	1	1% of Quarterly OPEX Payment
				≥ 95% to < 97%	2	2% of Quarterly OPEX Payment
				< 95%	3	4% of Quarterly OPEX Payment
3	UPS power backup availability (for all type of sites - field sites,	Reports from person or agency nominated by Competent authority.	Quarterly	> 99.5%	0	0

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
	viewing centres, DC & CCC)	Average of 10 sample attempts checked randomly for each type of project sites will be considered per month		≥ 97% to < 99.5%	1	1% of Quarterly OPEX Payment
				≥ 95% to < 97%	2	2% of Quarterly OPEX Payment
				< 95%	3	4% of Quarterly OPEX Payment
Uptime/Availability at Data Centres (DC)						
1	Availability of Enterprise Management System (EMS)	EMS	Quarterly	> 99.5%	0	0
				≥ 98.5% to < 99.5%	1	1% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
2	Production Servers Uptime Application Servers Data base Servers	NMS / EMS	Quarterly	≥ 98% to < 98.5%	2	2% of Quarterly OPEX Payment
				< 98%	3	4% of Quarterly OPEX Payment
				> 99.5%	0	0
				≥ 98.5% to < 99.5%	1	1% of Quarterly OPEX Payment
				≥ 98% to < 98.5%	2	2% of Quarterly OPEX Payment
				< 98%	3	4% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
3	Storage System Uptime	NMS/EMS	Quarterly	> 99.5%	0	0
				≥ 98.5% to < 99.5%	1	1% of Quarterly OPEX Payment
				≥ 98% to < 98.5%	2	2% of Quarterly OPEX Payment
				< 98%	3	4% of Quarterly OPEX Payment
4	Fire detection and suppression system uptime	NMS/EMS/ helpdesk	Quarterly	> 99.5%	0	0
				≥ 98.5% to < 99.5%	1	1% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
				≥ 98% to < 98.5%	2	1.5% of Quarterly OPEX Payment
				< 98%	3	2% of Quarterly OPEX Payment
				Security /Patch Services for IT Infrastructure		
1	Firewall and any other security appliance Uptime	NMS/EMS	Quarterly	> 99.5%	0	0
				≥ 98.5% to < 99.5%	1	1% of Quarterly OPEX Payment
				≥ 98% to < 98.5%	2	1.5% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
				< 98%	3	2% of Quarterly OPEX Payment
2	Security rules update within 2 hours of approved change management request	NMS/EMS/helpdesk	Quarterly	< 2 violations	0	0
				≤ 4 to > 2 violations	1	0.50% of Quarterly OPEX Payment
				≤ 5 to > 4 violations	2	0.70% of Quarterly OPEX Payment
				> 5 violations	3	1% of Quarterly OPEX Payment
3	Anti-virus, Anti- spyware, Anti-spam	NMS/EMS/helpdesk	Quarterly	< 2 violations	0	0

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
	updates within 24 hrs of request			≤ 4 to > 2 violations	1	0.50% of Quarterly OPEX Payment
				≤ 5 to > 4 violations	2	0.70% of Quarterly OPEX Payment
				> 5 violations	3	1% of Quarterly OPEX Payment
4	Critical Patches – within 48 hours of patch release	Report from all OEM for latest version of patch for respective OEM and last updated patch report from SI	Quarterly	< 2 violations	0	0
				≤ 4 to > 2 violations	1	1% of Quarterly OPEX Payment
				≤ 5 to > 4 violations	2	1.5% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
				> 5 violations	3	2% of Quarterly OPEX Payment
5	Non-Critical Patches - within 15 days of patch release.	Report from all OEM for latest version of patch for respective OEM and last updated patch report from SI	Quarterly	< 1 violation	0	0
				≤ 4 to > 2 violations	1	0.30% of Quarterly OPEX Payment
				≤ 5 to > 4 violations	2	0.40% of Quarterly OPEX Payment
				> 5 violations	3	0.50% of Quarterly OPEX Payment

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
SLA Matrix for Helpdesk and ticketing System						
1	Help desk resolution time	Severity level (Refer 'Severity for Bugs / Defects' Table below)	Reports generated from the system	≤ 5 violations per month	Critical / High Severity	INR 200,000 per week for every ticket which is expected to be resolved as per expected SLA timelines which can't spill over a month in any case.
				Violations are more than 5, penalty will be applicable for all the violation / Tickets)	Medium / Low Severity	INR 10,000 per week for every ticket for first month INR 20,000 per week for every ticket for

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
						second month onwards
2	Severity for Bugs / Defects: The severity of a bugs / defects would be based on the business impact of the problem. Severity is defined as follows:					
	Severity level	Definition			Expected SLA Timeline (Max.)	
	Critical	Complete non availability of sensor / system / solution as reported in the helpdesk ticket or in writing from department. Affects majority of the users (more than 25%).			8 hours	
	High	Partial availability of sensor/system/solution with limited functionality as reported in the helpdesk ticket or in writing from department. Users face severe functional restrictions irrespective of the cause. Affects majority of the users (more than 25%).			16 hours	
	Medium	Moderate functional restrictions irrespective of the cause. Has a convenient and readily available workaround. Affects a few users (less than 10%).			24 hours	
	Low	Requiring cosmetic/ functional changes. Does not require any workaround. It may include user query / suggestions but has no business impact.			48 hours	

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S. No.	Measurement	Validation data source	Frequency/ Calculation method	Resolution Target	Severity Level	Penalty Amount
SLA Matrix for manpower availability						
1	Required and designated manpower should be available for various defined tasks [(Actual number of man-days deployed for a quarter) / (Agreed Total number of man-days in a quarter)] *100	Reports from attendance system / report by nodal officers.	Quarterly	> 98%	0	0
				≥ 95% to < 98%	1	INR 100,000 per quarter
				≥ 90% to < 95%	2	INR 150,000 per quarter
				< 90%	3	INR 200,000 per quarter

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SLA Matrix of Spares					
S. No.	Service Category	Parameter	Validation	Target	Penalty
1	Availability of Spare quantity for Repair / replacement of infrastructure equipment including: a. Cameras b. Network Equipment c. UPS and its batteries d. Desktops/Workstations in CCC/field e. LED screens/TV screens f. Poles/cantilevers g. Junction boxes/enclosures h. All other field devices	Service Provider should keep minimum 5% spare at any given point of project execution. Infrastructure equipment should be replaced or repaired after complaint logging from Purchaser	EMS System generated call log at Helpdesk Service Provider will link Help desk and EMS such a way that it'll maintain inventory of spare equipment all the time.	All spare component available Or Availability of spare component Within 3 calendar days of logging complaints/spare equipment used for any replacement	NIL
				>3 to <=7 calendar days of logging complaint/spare component used	INR 250 per day for each component
				More than 7 calendar days of logging complaint / spare component used	INR 1000 per day for each component

7.9. Penalty for non-restoration of the Site

In case of damage to the other existing utilities or infrastructure, IA shall be wholly responsible for taking remedial actions on urgent basis and shall bear all the repair cost, consequential damage cost as well.

Causing damage to other existing utilities & infrastructure	
Restoration of the utilities & site infrastructure	Penalty
Up to 2 / month	INR 5,000 per damage
3 to 5 / month	INR 10,000 per damage
Above 5 / month	INR 15,000 per damage
Any damage to any existing utilities or infrastructure	INR 20,000 per damage per day, if not restored within 24hrs.

Note: restoration of damaged utilities & infra should be completed on priority.

7.10. Exclusion for SLA penalties

- There is a Force Majeure event effecting the SLA which is beyond the control of the Service Provider.
- The non-compliance to the SLA has been due to reasons beyond the control of the Service Provider (Approval delays from agencies/stake holder agencies beyond the approval SLA time, Delay due to IA-1, Delay due to local interruption etc) .
- Theft cases by default would not be considered as "beyond the control of Service Provider". However, certain cases, based on circumstances & certain locations, the Purchaser may agree to qualify as "beyond the control of Service Provider".
- Power shut down beyond the UPS and Generator back up, will be considered as "beyond the control of Service Provider".
- Damages due to Road Accident / Mishap / Theft shall be considered as "beyond the control of Service Provider". However, Deliberate damage to camera / Pole would not be considered as "beyond the control of Service Provider". Service Provider is advised to have stronger poles & proper housing to protect from such damages.

7.11. Reporting Procedures

- IA representative shall prepare and distribute Service level performance reports in a mutually agreed format by the **5th working day of subsequent month**. The reports shall include **“actual versus target”** Service Level Performance, a variance analysis and discussion of appropriate issues or significant events. Performance reports shall be distributed to NMSCDCL management personnel as directed by NMSCDCL.
- IA shall prepare a standard and agree on the “SLA performance report template”, “Project Status Report Template”, “Project Management/Monitoring Tool” well before the start of the project during the project initiation phase/document preparation phase/survey phase.
- Also, IA may be required to get the Service Level performance report audited by a third-party Auditor appointed by the NMSCDCL.

7.12. Issue Management Procedures

- This process provides an appropriate management structure for the orderly consideration and resolution of business and operational issues in the event that quick consensus is not reached between NMSCDCL and Bidder.
- Implementing such a process at the beginning of the outsourcing engagement significantly improves the probability of successful issue resolution. It is expected that this pre-defined process shall only be used on an exception basis if issues are not resolved at lower management levels.

7.13. Issue Management Process

- Either NMSCDCL or IA may raise an issue by documenting the business or technical problem, which presents a reasonably objective summary of both points of view and identifies specific points of disagreement with possible solutions.
- Any unresolved issues/disputes concerning the Project/Contract between the Parties shall first be referred in writing to the Project Manager for his consideration and resolution. If the Project Manager is unable to resolve any issue/dispute within 5 days of reference to them, the Project Manager shall refer the matter to the Project Management Committee / authorized person. If the issues are still unresolved then it shall be referred to NMSCDCL for resolution.
- If NMSCDCL fails to resolve a dispute as per the above clause, the same shall be referred to the NMSCDCL BoD.

7.14. Service Level Change Control

General

It is acknowledged that this **Service levels may change as NMSCDCL's business needs evolve over the course of the contract period**. As such, this document also defines the following management procedures:

- a. A process for negotiating changes to the Service Levels
- b. An issue management process for documenting and resolving particularly difficult issues.
- c. NMSCDCL and Bidder management escalation process to be used in the event that an issue is not being resolved in a timely manner by the lowest possible level of management.

Any changes to the levels of service provided during the term of this Agreement shall be requested, documented and negotiated in good faith by both parties. Either party can request a change.

Service Level Change Process: The parties may amend Service Level by mutual agreement in accordance. Changes can be proposed by either party. Unresolved issues shall also be addressed. IA 's representative shall maintain and distribute current copies of the Service Level document as directed by NMSCDCL. Additional copies of the current Service Levels shall be available at all times to authorized parties.

Version Control / Release Management: All negotiated changes shall require changing the version control number. As appropriate, minor changes may be accumulated for periodic release or for release when a critical threshold of change has occurred.

8. Risk Assessment and Mitigation

Risk management is one of the most critical processes within any project regardless of size, activity or sector. The Project Risk Management team allows the project team to identify, categorize, prioritize, mitigate or avoid any risk ahead of time. Risk Assessment is the determination of quantitatively, or qualitative value of risk related to a concrete situation and a recognized threat. It is the process whereby decisions are made to accept a known or assessed risk and / or the implementation of actions to reduce the consequences or probability of occurrence.

Some of the objectives of Risk Management are mentioned below:

- ▶ Provide visibility within the project of the time and cost impact of an issue and the cost of any corrective actions.
- ▶ Ensure that the project issues are identified and managed appropriately
- ▶ Reduce and eliminate harmful threats.
- ▶ Better communication of risk within the organization
- ▶ Provide prominence of project issues, ensuring they are escalated appropriately
- ▶ Support continuity of project and organization as whole
- ▶ Provides a standard framework for risk assessment and risk mitigation.
- ▶ Provide cost benefit analysis of risk mitigation strategies with respect to various levels of identified risks.
- ▶ Provides a standard framework for risk assessment and risk mitigation.

Implementation Agency shall identify and document the risk in delivering the services. IA shall identify the methodology to monitor and prevent the risk and shall also document the steps taken to manage the impact of the risks. Given the complexity of project, it is Important that IA to evaluate in advance and develop strategies to effectually counter them over time. IA should focus on the envisaged risks associated with the project and to mitigate the same

- ▶ IT specific risk
- ▶ System Specific risk
- ▶ O & M Specific risk
- ▶ Common Strategy risk
- ▶ Common people risk
- ▶ Common processes risk
- ▶ Common Implementation risk
- ▶ Location specific risks

9. Delivery of Goods

- ▶ The IA shall bear the cost for packing, transport, insurance and delivery of all the goods as applicable for this project at all locations identified by the Purchaser.
- ▶ The Goods supplied under this Contract shall conform to the standards mentioned in the RFP, and, when no applicable standard is mentioned, to the authoritative standards; such standard shall be approved by Purchaser.
- ▶ IA shall only procure the hardware and software after approvals from Competent Authority.

10. Insurance

- ▶ The Goods supplied under this Contract shall be comprehensively insured by IA at its own cost, against any loss or damage due to factors including but not limited to theft, riots, fire, manmade disaster or natural disaster for the entire period of the contract. Service Provider shall submit to the Purchaser, documentary evidence issued by the insurance company, indicating that such insurance has been taken.
- ▶ IA shall bear all the statutory levies like customs, insurance, freight, etc. applicable on the goods and the charges like transportation, packaging, delivery etc. that may be applicable till the goods are delivered at the respective sites of installation.
- ▶ IA shall take out and maintain at its own cost, on terms and conditions approved by the Purchaser, insurance against the risks, and for the coverages, as specified below:
 - i. at the Purchaser's request, shall provide evidence to the Purchaser showing that such insurance has been taken out and maintained and that the current premiums therefor have been paid.
 - ii. Employer's liability and workers' compensation insurance in respect of the Personnel of the Company, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Personnel, any such life, health, accident, travel or other insurance as may be appropriate
 - iii. Insurance coverage shall also adhere to clause 13 (Delivery of Goods)
 - iv. for liability of both Parties for loss, damage, death and injury to third parties or their property arising out of the IA's performance of the Contract including the IA's liability for damage to the Purchaser's property other than the Works and for liability of both Parties and of any Purchaser's representative for death and injury to the IA's personnel except to the extent that liability arises from the negligence of the Purchaser, any Purchaser's representative or their Employees.
 - v. The Goods supplied under this Contract shall be comprehensively insured by IA at their own cost, against any loss or damage due to factors including but not limited to theft, riots, fire, manmade disaster or natural disaster for the entire period of the contract. IA shall submit to the Purchaser, documentary evidence issued by the insurance company, indicating that such insurance has been taken.

11. Exit Management Plan

An Exit Management plan shall be furnished by IA in writing to the Purchaser within 120 days from the date of signing the Contract, which shall deal with at least the following aspects of exit management in relation to the contract and in relation to the Project Implementation, and Service Level monitoring.

- i. A detailed program of the transfer process that could be used in conjunction with a Replacement IA including details of the means to be used to ensure continuing provision of the services throughout the transfer process or until the cessation of the services and of the management structure to be used during the transfer;
- ii. Plans for provision of contingent support to Project and Replacement IA for a reasonable period after transfer.
- iii. Exit Management plan in case of normal termination of Contract period
- iv. Exit Management plan in case of any eventuality due to which Project is terminated before the contract period.
- v. Exit Management plan in case of termination of the IA

Exit Management plan at the minimum adhere to the following:

- i. 3 (three) months of the support to Replacement IA post termination of the Contract
- ii. Complete handover of the Planning documents, bill of materials, functional requirements specification, technical specifications of all equipment, change requests if any, sources codes, reports, documents and other relevant items to the Replacement IA / Purchaser. Source code for any modifications done for the project shall be property of the Purchaser.
- iii. Certificate of Acceptance from authorized representative of Replacement IA issued to the IA on successful completion of handover and knowledge transfer.

In the event of termination or expiry of the contract, Project Implementation, or Service Level monitoring, both IA and Purchaser shall comply with the Exit Management Plan. During the exit management period, the IA shall use its best efforts to deliver the services.

12. Responsibility Matrix

Sl. No.	Activity / Component	Purchaser	Implementing Agency (IA)
	A. Planning & Design		
1	Integrated project plan & execution methodology		Y
2	Detailed technical architecture (HLD, LLD, integration flows)		Y
3	Preparation of FRS, SRS, design documentation, reporting formats		Y
4	Detailed site surveys (devices, network, power, civil, drone nodes)		Y
5	Design validation workshops with stakeholders		Y
	B. Procurement & Logistics		
6	Warehousing and logistics of equipment		Y
7	Procurement, supply of cameras, drones, body-worn cameras, field infra, network equipment, servers, storage		Y
8	OEM certification, warranties, compliance documents		Y
	C. Installation & Integration		
9	Civil/electrical works (poles, mounts, gantries, trenching, ducting, RI (reinstatement), power cabling, enclosures, cages, stickers)		Y
10	Interior works at ICCC, CDC, TCCC (Civil, electrical, fire & security)		Y
11	Provision of adequate space for CDC, TCCC, ICCC expansion	Y	
12	Procurement, of SIP/ Trunk connectivity for IP-PBX system from DoT licensed Telecom Service Provider, configuration and integration with IP-PBX system. (All necessary documentation, authorization letters, and coordination support required for such procurement shall be provided by the Purchaser).		Y

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Sl. No.	Activity / Component	Purchaser	Implementing Agency (IA)
13	Installation & commissioning of cameras, drones, body-worn cameras		Y
14	Deployment of network infra (access, aggregation, core switches, firewalls, routers)		Y
15	Finalization of ring architecture & coordination with IA-2 (OFC SI)		Y
16	Integration of existing camera feeds (ICCC, EOC)		Y
17	VMS licences for viewing existing cameras in existing system	Y	
18	Integration of VMS, VA, ANPR, FRS with ICCC .		Y
	D. Storage & Data Centres		
19	Setting up data centre at ICCC Panchwati & at TCCC Server Room		Y
20	Storage architecture (hot, primary, secondary, incident retention)		Y
21	Cost of recurring infra items (telephone lines, utilities at ICCC/TCCC). This does NOT include electricity bills.	Y	
22	Payment of electricity bills during Implementation phase (field junctions, CDC, TCC		Y
23	Fuel for generators during implementation phase		Y
	E. Testing & Acceptance		
24	Submission of FAT/SAT test formats		Y
25	Conduct of FAT/SAT, UAT		Y
	F. O&M & Support		
26	Comprehensive O&M (preventive, corrective, upgrades, firmware, patches)		Y
27	24x7 NOC & helpdesk		Y
28	Fuel for generators		Y
29	Payment of security deposits for electric meters and payment of electricity bills (Field junctions, CDC, TCC)		Y

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Sl. No.	Activity / Component	Purchaser	Implementing Agency (IA)
30	Network connectivity & AMC of already existing and installed cameras of the earlier projects	Y	
	G. Documentation & Training		
31	Preparation of policy documents for operations		Y
32	Guideline documents/manuals for file formats, interfaces		Y
33	SOPs, training of stakeholders		Y
34	As-built documentation, asset registers, GIS/KML mapping		Y
35	Submission of test reports, certification records, audit logs		Y
	H. Miscellaneous		
36	Specific RoW/RI charges & fees to Nashik Municipality and other bodies only during this project under IA		Y
37	Minor civil/electrical works at viewing centres		Y
38	Safety signages, awareness boards		Y

13. Unpriced Bill of Material (I)

S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
A.	Field Infra				
A.1	City Surveillance: Field Infrastructure				
1	Fixed/ IP Bullet Camera for Surveillance, FRS and other Analytics with external/ inbuilt IR illuminator and associated accessories & systems including all cables/wires	Nos.	2650	661	3311
2	IP PTZ (4 MP) Camera along with associated accessories & systems including all cables/wires	Nos.	400	100	500
3	Supply, Installation Testing & Commissioning of the Outdoor Utility Cabinet (Pole Mounted Junction Boxes)	Nos.	900	220	1120
4	Pole mounted IP-PAS Units along with cables and accessories in configuration of PA System , with configurable features for increase and decrease sound volume (one PAS unit = 2 speakers)	Nos.	500	500	1000
5	Providing & erecting 6 m high (clear height) galvanised octagonal pole with lightning arrester with Stickers and signages on poles.	Nos.	900	220	1120
6	Supply, installation, testing & commissioning of vertical GI cantilever arm of length 1.5 Meter	Nos.	1400	300	1700
7	Patch Panel along with cables and accessories.	Nos.	900	220	1120
8	Supplying, erecting, testing and commissioning of single phase input & 1 phase output 1KVA capacity online pure sine wave UPS along with battery (Minimum 1 hr back up time)	Nos.	900	220	1120

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
9	Edge level /Access Switch (8 POE Ports) for field locations along with cables and accessories including SFP module.	Nos.	900	220	1120
10	Networking Cost (Passive Components)s like , Cat6 Cable, Patch Cords, GI, HDPE Pipes, Installation & Labour Charges, etc	Nos.	900	220	1120
11	Last mile Complete cabling and civil works as required including but not limited to: HDPE Pipe at road crossing, island, median etc.; DWC pipe, Armoured cables; Power cable Core, jointing, terminating, glanding, trenching, excavation, ducting, compacting, backfilling with RI	Locations	900	220	1120
12	Providing earthing as per specifications	Nos.	900	220	1120
A2.	Automatic Number Plate Recognition Field Infrastructure				
1	IP Fixed Box ANPR (4MP) Camera along with associated accessories & systems including all cables/wires	Nos.	190	10	200
2	Supply, Installation, testing and commissioning of lens of lower limit 5 mm or better & upper limit of 50mm or better	Nos.	190	10	200
3	Supply, installation, testing & commissioning of 7 m high (clear height) galvanised octagonal pole along with Cantilever, circular type 7m length with Stickers and signages on poles	Nos.	100	5	105
4	Local Processing Units with ANPR at edge, including all passive components & accessories.	Nos.	50	5	55
5	Supply, Installation Testing & Commissioning of the Floor mount Outdoor Utility Cabinet / Junction Box (80:20 pole mounted: ground mounted)	Nos.	50	5	55
6	Supplying, erecting, testing and commissioning of single phase input & single phase output 2KVA capacity online pure	Nos.	50	5	55

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
	sine wave UPS along with battery (Minimum 1hr back up time)				
7	Supplying, Installation and erecting of ISI mark Gantry. with pole cap ., Gantry Height-6 meter above road surface, Gantry Length – Covering 3 lanes , Gantry Thickness- 4mm or better with Stickers and signages on poles.	Nos.	2	1	3
8	Networking Cost (Passive Components)s like , Cat6 Cable, Patch Cords, GI, HDPE Pipes, Installation & Labour Charges, etc	Nos.	100	5	105
9	Last mile Complete cabling and civil works as required including but not limited to: HDPE Pipe at road crossing, island, median etc.; DWC pipe, Armoured cables; Power cable Core, jointing, terminating, glanding, trenching, excavation, ducting, compacting, backfilling with RI	Locations	50	5	55
B.	Mobile Surveillance and Other Security Equipment				
1	Mobile Surveillance System (Vehicle Mounted) along with all components, associated accessories & systems	Nos.	10	8	18
2	Drones with Ground Control Station, five batteries and battery charger.	Nos.	5	5	10
3	Tethered Drones with Ground Control Station, Generator and tethering cable	Nos.	5	3	8
4	Body worn camera	Nos.	100	80	180
5	8 channel Charging and Video docking station	Nos.	14	10	24
6	Megaphone	Nos.	300	200	500
C.	Core Ring Infra				

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
1	Core Distribution Switch along with cables and accessories including SFP module	Nos.	8	2	10
2	Distribution Aggregation Switch along with cables and accessories including SFP module	Nos.	18	4	22
3	Light Interface Unit (LIU)	Nos.	963	228	1191
4	Patch Panel along with cables and accessories	Lot.	18	4	22
5	19 U Network rack along with cables and accessories	Nos.	18	4	22
6	3 KVA UPS with requisite capacity along with batteries and accessories (Minimum 2 hr back up time)	Nos.	18	4	22
7	Air Conditioning 2 Ton along with cables and accessories	Nos.	18	4	22
D.	ICCC Panchwati Expansion				
1	LCD video walls, 55-inch direct-lit LCD panels, (2×2) + (2×2) matrices, 24×7 rated, narrow-bezel, with mounting structures, wall controller/processor, signal transport, all cabling/terminations, calibration, integration, testing & commissioning	Set.	1	0	1
2	Work station with two monitors 24 inch along with cables and accessories.	No.	10	0	10
3	Joystick (PTZ Camera), Keyboard & Job dial along with associated accessories & systems including all cables/wires required for end to end installation.	No.	2	2	4
4	PAS in house mic along with associated accessories & systems including all cables/wires required for end to end installation.	No.	8	0	8
E.	Data Centre - City Data Centre (CDC) & TCCC Server Room				
E1.	Hardware and active components				

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
1	TOR Switch	Nos	8	6	14
2	Core Switches along with cables and accessories including SFP module.	Nos.	2	2	4
3	Aggregation Switches along with cables and accessories including SFP module.	Nos.	2	2	4
4	NGFW Firewall in (Perpetual Licenses) with 5 years of support (including patch upgrade, update, bug fixing etc.)	Nos.	2	1	3
5	42U Rack along with associated accessories & systems including all cables/wires required for end-to-end installation	Nos.	6	4	10
6	SIEM with Server along with associated accessories & systems including all cables/wires required for end to end installation.	Nos.	1	1	2
7	Rack Server along with associated accessories & systems including all cables/wires required for end to end installation.	Lot.	1	1	2
8	GPU based Server for AI-based Video Analytics along with associated accessories & systems including all cables/wires required for end to end installation. 1. 1000 Numbers of analytics to be run at CDC. 2. 300 number of analytics to be run at TCCC Server room. 3. 150 Number of FRS to be run at CDC. 4. 100 number of FRS to be run at TCCC Server room. 5. 190 numbers of ANPR to be run at CDC. 6. 10 numbers of ANPR to be run at TCCC Server room.	Lot	1	1	2
9	Primary Storage along with associated accessories & systems including all cables/wires required for end to end installation.	Lot	1	1	2

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
10	Secondary Storage along with associated accessories & systems including all cables/wires required for end to end installation.	Lot	1	1	2
E2.	Civil electrical and allied components				
1	Air Conditioning System. Designing and SITC of AC unit for Data Centre and Split AC for TCCC less Data Centre and VRV units for surveillance room and conference room. Nashik & Trimbakeshwar	Lumpsum	1	1	2
2	ELV. Designing and SITC for ELV system including but not limited to Fire Alarm system, Rodent Repellent System, Access Control System, CCTV (6 dome cameras) for TCCC, and Gas Suppression system, Water leakage detection system, Fire Alarm system, limited for Electrical Room, and Data Centre Room Nashik & Trimbakeshwar	Lot	1	1	2
3	Data Centre. Designing and Site Preparation Work for Data Centre (including interior civil work, Raised Floor, False Ceiling, Ducting, Access Doors, Painting, Partitioning, network cabling, electrical work, wall partitioning, dismantling existing infrastructure etc.) Nashik	Sq. feet	300	0	300
4	Server Room. Designing and Site Preparation Work for Server room (including interior civil work, Raised Floor, False Ceiling, Ducting, Access Doors, Painting, Partitioning, network cabling, electrical work, wall partitioning, etc.) Trimbakeshwar	Sq. feet	0	270	270

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
5	Electrical and UPS Room. Designing and Site Preparation Work for Electrical Room and Modular UPS (60 kVA(N+1))\ Room (including interior civil work, Raised Floor, False Ceiling, Ducting, Access Doors, Painting, Partitioning, network cabling, electrical work (all electrical DBs, LT panel, Switch gears components, Changeover switches, HV & LV Cabling, Copper Earthing, Trays, Lighting and other related equipment), wall partitioning etc.) Nashik & Trimbakeshwar	Sq. feet	150	300	450
6	Diesel Generator (100 KVA) along with all associated accessories, incl civil working (constituting foundation, shed and fencing around DG) electrical work, fabrication work and earthing (Including AMF (Automatic mains failout) control panel, equipment and Installation Cost and running cost for 60 months @ 50 liters per day (@INR 5000 per day) Nashik & Trimbakeshwar	Lot	1	1	2
E3.	Application Software				
1	Video Management System including dual recording and viewing in TCCC and CDC(Perpetual Licenses) [all cameras to be viewed at form either location] with 5 years of support (patch upgrade, update, bug fixing etc.) to be viewed as locations as defined in scope of work. VMS to also extend viewing to mobile devices.	Nos.	3050	761	3811

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
2	Facial Recognition System software (Perpetual Licenses) with 5 years of support (including, patch upgrade, update, bug fixing etc.) 1. Facial recognition (where legal)	Nos	80	20	100
3	Video Viewing center software	Nos	40	30	70

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
4	AI based Video Analytics System (Perpetual Licenses) with 5 years of support (including, patch upgrade, update, bug fixing etc.) Crowd Safety & Movement (1000) 1. Crowd estimation 2. Crowd count and statistics with Direction 3. Heat map 4. People Entry Exit Count Investigation & Search (250) 5. Person attribute analysis and search (clothes/bag/color, etc.) 6. Abandoned bag or object / unattended object Public Order & Perimeter monitoring (150) 7. Intruder alert (line/zone) 8. Violence detection 9. Gesture 10. Fire & smoke detection Traffic & Road Safety and others (200) 11. Helmet violation 12. Triple riding 13. Seat-belt detection 14. Wrong way 15. No-parking and parking violation / illegal stop (dwell) 16. Animal on route (stray cattle/dogs) 17. Debris on road 18. Queue management 19. Stolen Vehicle	Nos.	1200	400	1600
5	ANPR Software License (Perpetual Licenses) with 5 years of support (including patch upgrade, update, bug fixing etc.) 1. Licence plate recognition (ANPR)	Lot	1	1	2

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
6	AAA Software License (Perpetual Licenses) with 5 years of support (including patch upgrade, update, bug fixing etc.)	Lot	1	1	2
7	Public Address/Announcement Software License (Perpetual Licenses) with 5 years of support (including patch upgrade, update, bug fixing etc.) 1. Public announcement alert and massaging using PA system	Lot	1	1	2
8	EMS (Enterprise Management System)	Lot	1	1	2
9	Antivirus for Endpoint security	Lot	1	1	2
10	IP BAX Software License (Perpetual Licenses) with 5 years of support (including patch upgrade, update, bug fixing etc.) with Computer Telephony Interface (CTI) and Soft Phone.	Nos	10	12	22
11	Virtualization Software (Perpetual Licenses) required all Server including but not limited to Hypervisor licenses, Management software, Guest OS licenses, Backup software, HA, Live Migration, Cluster Management, Backup integration	Lot	1	1	2
12	ICCC Platform	Nos.	1	0	1
13	Integration with existing VMS	Nos.	1337	0	1337
14	Integration of Cameras, PAS, Drone with ICC Platform	Lot	1	0	1
F.	Trimbakeshwar Command Control Centre (TCCC) and Conference Room				
1	LCD video wall, 55-inch direct-lit LCD panels, 4x2 matrix, 24x7 rated, narrow-bezel, with mounting structures, wall controller/processor, signal transport, all cabling/terminations, calibration, integration, testing & commissioning	Set.	0	1	1

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
2	Videowall Controller and Management Software (Perpetual Licenses) with 5 years of support (including patch upgrade, update, bug fixing etc.)	Set.	0	1	1
3	Joystick (PTZ Camera), Keyboard & Job dial along with associated accessories & systems including all cables/wires required for end to end installation	Nos	0	4	4
4	Surveillance Room. Site Preparation Work for Surveillance Room (including interior civil work, False Ceiling, Wall Paneling, Ducting, Access Doors, Painting, network cabling, electrical work, wall partitioning, CCTV (2 dome cameras) for TCCC etc.)	Sq. feet	0	990	990
5	Meeting cum Conference Room. Site Preparation Work for 9 seater Meeting Cum Conference Room with 65 inch Smart Touch screen LED TV (including but not limited to interior civil work, Conference Table and ergonomic chairs, False Ceiling, Wall Paneling, Ducting, Access Doors, Painting, network cabling, electrical work, wall partitioning etc.)	Sq. feet	0	390	390
6	Passage Area. Site Preparation Work for Passage Area (including interior civil work, False Ceiling, Wall Panelling, Ducting, Access Doors, Painting, network cabling, electrical work, wall partitioning, etc.)	Sq. feet	0	1000	1000
7	Work station with two monitors 24 inch, including ergonomic chairs and furniture.	Nos	0	12	12
8	PAS inhouse speaker	No.	0	4	4
G.	Ramkund & Sadugram Mini Viewing Hub				

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
1	One 65 inch Smart Touch screen LED TV along with cables and accessories.	Nos	2	0	2
2	Work station with two monitors (24 inch) along with cables and accessories.	Nos	2	0	2
3	Edge level /Access Switch (8 POE Ports) for Police stations along with cables and accessories including SFP module.	Nos	2	0	2
H.	Electric Meters				
1	Supplying and erecting three phase static energy meter with cabling with Security deposit for electric meter for CDC and TCCC	Nos	1	1	2
2	Supplying and erecting Single phase static energy meter with cabling with Security deposit for electric meter for field Junctions (one per pole)	Nos	950	225	1175
I.	Shifting of Surveillance Infra post Kumbh				
1	Shifting from old junction to new junction, including installation, testing, and commissioning of the complete Junction Setup, comprising but not limited to Camera, PAS, Pole, JB, Switch, Cabling, and allied components at the new location	Nos.	120		120
J.	Key Resources / Manpower				
1	Manpower	Lot	1		
K.	Miscellaneous				

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S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
1	Project Implementation, Training & Handholding Cost	Lumpsum	1	1	2
2	Third Party Audit for all the systems	Lumpsum	1	1	2
	Project Operations & Management Cost.				
3	AMC for Year 1	Lumpsum	1	1	2
4	AMC for Year 2	Lumpsum	1	1	2
5	AMC for Year 3	Lumpsum	1	1	2
6	AMC for Year 4	Lumpsum	1	1	2
7	AMC for Year 5	Lumpsum	1	1	2

14. Priced Bill of Material (II)

S. No.	Item Name		Nashik	Trimbakeshwar	Total
		Unit	Quantity	Quantity	Quantity
A.	Consumables				
1	Electricity bill charges, including security deposit, meter procurement charges, and liaising during implementation and O&M period of 60 months, for Nashik (Junction Electrical Meter and City Data Centre) and Trimbakeshwar (Junction Meter and TCCC Data Centre Meter)	Lumpsum.	-	-	6,00,00,000
			Total		6,00,00,000

Note: Financial cost of Bidder for consideration in QCBS will be the sum of Unpriced Bill of Material (I) and Priced Bill of Material (II).

15. Requirement Specifications (Functional Requirements & Technical Requirements)

Note: To be provided on the Letter head of the respective OEM signed by Authorized Signatory along with counter sign of bidder's authorized signatory.

Adequate supporting documents pertaining to the above points, along with a summary compliance table, should be submitted in the technical proposal by the Bidder.

15.1. Fixed/ IP Bullet Camera for Surveillance, FRS and other Analytics

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Image Sensor	1/3" Progressive CMOS or better		
2	Maximum Resolution	4 Megapixel (2560 × 1440) or better		
3	Lens Type	For Surveillance Camera 2.8 mm or Better . For FRS Camera 5-50 mm lens or better		
4	Iris	Auto-iris / DC		
5	Minimum Illumination	0 Lux with IR illuminators ON		
6	IR Illuminators	Built-in IR illuminator, range 30 meters or better		
7	On-board SD Card Storage	Minimum 128 Gb or Better		
8	Video Codec	H.265 or better		
9	Maximum Frame Rate	25 fps		
10	Video Streaming	Adjustable resolution, quality and bitrate		
11	Interface	10 Base-T/100 BaseT		
12	ONVIF	Profile G, S, T		
13	Power Input	DC12V/AC 24V/PoE power input		
14	Casing	Weather-proof IP66 or better, Vandal-proof IK10		
15	Safety Certifications	FCC/CE/UL/BIS		
16	Cyber Security	Cyber Security Certified by STQC as per IoTSCS and meet the essential requirement issued by MeitY		

15.2. PTZ Camera

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Image Sensor	1/3" Progressive CMOS or better		
2	Maximum Resolution	4 Megapixel (2560 × 1440 or better)		
3	Lens Type	30x Optical Zoom or better		
4	Pan/Tilt/Zoom Functionalities	Auto pan mode, Auto patrol mode		
5	IR Illuminator	Built-in IR Illuminators 150 meters or better		
6	On-board SD Card Storage	Minimum 128Gb or better		
7	Video codec	H265 or better		
8	Maximum Frame Rate	25 fps		
9	Video Streaming	Adjustable resolution, quality and bitrate		
10	Interface	10 Base-T/100 Base-T		
11	ONVIF	Profile G, S, T		
12	I/O	Digital input*1, Digital output*1		
13	LED Indicator	System power and status indicator		
14	Power Input	DC12V/AC 24V/PoE ++		
15	Casing	Weather-proof IP66 or better, Vandal-proof IK10		
15	Safety Certifications	CE/FCC/UL/ BIS		
16	Cyber Security	Cyber Security Certified by STQC as per IoTSCS and meet the essential requirement issued by MeitY		

15.3. ANPR Camera

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Image Sensor	1/3" Progressive CMOS or better		
2	Maximum Resolution	4 Megapixel (2560 × 1440 or better)		
3	Lens Type	Vari-focal, 5-50mm		
4	Iris	Auto-iris / DC		
5	Maximum Frame Rate	25 fps or better		
6	Video Codec	H.265 or better		
7	Interface	10 Base-T/100 Base-T		
8	ONVIF	Profile G, S, T		
9	Power Input	DC12V/AC 24V/PoE power input		
10	Power Input	AC/DC --12/24V		
11	Housing	Weather-proof IP66 or better / Vandal-proof IK10		
12	IR Range	50 Mtrs or better (Internal / External)		
13	Safety Certifications	CE/FCC/UL/BIS		
14	Cyber Security	Cyber Security Certified by STQC as per IoTSCS and meet the essential requirement issued by MeitY		

15.4. Poles, Cantilever and Gantry

Poles

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Pole type	Galvanized octagonal pole with foundation bolts after fabrication, hot-dip galvanized		
		Silver painted/epoxy finish		
2	Height	For Surveillance: 6 meters (clear height) For ANPR: 7 meters (clear height)		
3	Pole Diameter	Designed as per wind speed of 110 km/h		
5	Design	Pole and its accessories shall be designed in such a way that it should withstand a windspeed of 110/kmph. Structural stability certification to be provided by recognized third party consultant (to be approved by Purchaser)		
6	Base Plate & Foundation	Base plate minimum size 300 mm × 300 mm × 15		
7	Mounting facilities	Integrated mounting provision for CCTV cameras, junction box for IT components, and meter box. Camera bracket to be adjustable for angle/focus.		
8	Pipes, Tubes	All wiring must be Concealed/hidden, through HDPE/DWC/tubes/pipes. No wires shall be visible from outside.		
9	Foundation	Casting of Civil Foundation with foundation bolts, to ensure vibration free erection. Expected foundation depth as per site conditions.		
10	Protection	Lightning arrester shall be provided, to protect all field equipment mounted on pole.		
11	Testing and	All poles shall be factory load tested and supplied with compliance certificates		

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	certificati on			
12	Sign Board & Number plates	A sign board describing words such as “This area under surveillance” and with serial number of the pole.		

15.5. Utility Cabinet

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Size	Suitable size as per site requirements to house the field equipment		
2	Cabinet Material	Powder coated CRCA sheet/ Stainless steel		
3	Material Thickness	Min 1.2mm		
5	Number of Locks	Minimum one		
	Mechanism	3 Point Locking		
6	Protection	Min. IP55 or better suitable for operations of field equipment's		
7	Mounting	On Camera Pole / Ground mounted on concrete base		
8	Form Factor	Rack Mount/DIN Rail		
9	Other Features	Rain Canopy, Cable entry with glands and Fans/any other accessories as required for operation of equipment's within junction box.		

15.6. LPU

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Processor	Intel® Core™ i7 or better		
2	Memory -RAM	16GB DDR4		
3	Ethernet Port	Minimum 4 × RJ-45 auto-negotiating LAN ports (10/100/1000 Mbps or better)		
4	USB Ports	USB ports ; USB 2.0 or better		
5	Monitor Output	At least one video output (VGA / HDMI / DisplayPort) for setup and diagnostics.		
6	Serial Port	1 × COM (configurable RS-232/422/485)		
7	Storage	Minimum SSD:256GB; optional- SSD/ HDD 1TB		
8	Temperature:	-10°C ~ 55°C (14°F ~ 131°F) or better		
9	Certification	CE/FCC/ BIS or Equivalent		
10	Format	Aluminium housing, Fanless		

15.7. UPS 1/2/3 kVA

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Capacity	1 KVA/2 KVA/3KVA UPS with 60 Min backup as per equipment power load; vendor must size batteries accordingly		
2	Input Voltage	160-280 VAC 50Hz $\pm 3\%$		
3	Output Wave Form	UPS Output Voltage in Battery mode- 230V AC $\pm 1\%$ 50Hz $\pm 3\%$		
		Pure Sine wave		
4	Battery Backup	60 Mins Backup		
5	Battery	Lithium ION		
6	Indicators & Metering	Indicators for AC Mains, Load on Battery, Fault, Load Level, Battery Low Warning, Inverter On, UPS on Bypass, Overload, etc. Metering / Graph for Input Voltage, Output Voltage and frequency, battery voltage etc.		
7	Audio Alarm	Battery low, Mains Failure, Over temperature, Inverter overload, Fault etc.		
8	Management Protocol / UPS Health Monitoring	Required SNMP Support through TCP/IP		
	Certifications	CE/FCC/ UL/ BIS		

15.8. Modular UPS 60 kVA

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Capacity & Technology	(As per bidder solution) KVA (N+1 config 3-Phase Input / 3-Phase Output. With 60 Min battery backup		
		a) True Online configuration with double conversion UPS		
		b) DSP based technology with reduction in electronic components.		
		c) Fully rated power (kVA=kW) for maximum power availability.		
		f) UPS should be designed at Rated PF of 1 UPS rating.		
		g) Dual Input design.		
		h) UPS should have IGBT topology for both PFC (power factor correction) and inverter.		
		i) Capability of independent battery bank operation of the UPS system when operated in parallel system		
		j) Online Hot-Swappable		
		k) Independent LCD display on each power module		
	Input			
2	Input facility - Phases / Wires	3-Phase / 4-Wire & Gnd (3Phase & Neutral + Ground)		
3	Input Voltage Range	380V, 400, 415V Range (Full Load) 320~475VAC		
4	Nominal Input Frequency	50/60Hz (Auto Selectable)		
5	Input Frequency Range	45-65Hz or better		
6	Input Power Factor	> 0.90		
7	Current Harmonic	<3%		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
	Distortion (ITHD)			
8	Input Protection	Fast Acting Semiconductor Fuse		
	Output			
9	Nominal Output voltage for 3 ϕ	380, 400, 415 Vac		
10	Output Voltage Regulation	$\pm 1 \%$		
11	Nominal Output Frequency	50/60 Hz		
12	Output Frequency Regulation	$\pm 0.05\text{Hz}$		
13	Output Wave Form	Pure sine wave		
14	Output Voltage Distortion (THDu)	<1.5% from 0% to 100% linear load		
		<6% full non-linear load according to IEC/EN62040-3		
15	Inverter Bridge	Space Vector Modulation & IGBT Technology		
16	Crest Factor	3:01		
17	Output Short circuit Protection	Electronic Protection		
18	Controller	32bit DSP based		
19	Frequency Converter Mode	Available		
	Efficiency			
20	Overall Efficiency (AC to AC) - Online (Double Conversion)	Upto 95%		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
21	Indications (LED)	For fault indications		
	SYSTEM			
22	Display	LED + LCD + touch screen		
23	Interface	RS232, RS485, USB,SNMP		
24	LCD display	User friendly interface LCD touch screen display provides graphical and text based information of alarms, status data, instructions for more friendly and safer operation.		
		Output V/C waveforms on display		
	Battery Backup / Battery Bank & Charger			
25	Battery Bank Voltage	480-528Vdc		
26	Battery Bank	Lithium ION / SMF		
27	Backup Required	Min 60 minutes as per the load		
28	Mandatory Safety Certifications/ compliances	UL 1973 / UL 1642 certified/ BIS /IEC 62619/CE certified		
	Bypass Parameters			
29	Input Connection	Common with mains input		
30	Bypass Voltage & Variation	380/400/415V AC (3 Ph + N), -20%, + 15%		
31	Frequency Sync range	50 Hz +/-2.5 Hz		
32	Transfer Time	Sync Mode: No Break, Async Mode: Inhibited		
33	Retransfer Time	Sync mode: No Break, Async Mode: Inhibited		
34	Manual Bypass	Should be available		
	Restart / Testing Capability			
35	Automatic Restart	UPS should start up automatically on mains resumption after battery low shutdown		
36	Battery Self-Test	Manual / Scheduled battery test to ensure healthiness of batteries.		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
37	Operating Temperature	0 to 30 deg C		
38	Operating Humidity	0 to 95% RH (Non-condensing)		
39	Protection Class	IP – 20		
40	Form Factor	Free Standing Floor Mounted UPS- Tower type		
41	Connections - Rectifier Input / Output / Bypass Input / Battery	Breakers for input, output, bypass & Maintenance bypass		
42	Interfaces	Monitors and controls the status of the UPS via a network system		
	Restart / Testing Capability			
43	Automatic Restart	UPS should start up automatically on mains resumption after battery low shutdown		
44	Self-Diagnosis	UPS should be capable to carry out self-test of Rectifier / Charger / Battery & Inverter module during start-up		
45	STANDARDS COMPLIED			
	Quality	ISO 9001/ ISO 14001/ ISO 27001/ ISO 45001, CE/ FCC/ RoHS/BIS		

15.9. Earthing

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Type of electrode	Copper-bonded steel rod, Dia ≥ 17.2 mm, length ≥ 3.0 m (couplable sections allowed), conforming to IEC 62561-2		
2	Backfill compound	Maintenance-free conductive compound, test report from NABL-accredited lab		
3	Conductor	Cu cable ≥ 25 mm ² from rod to test link; joints by exothermic weld.		
4	Protection	GI medium pipe ≥ 25 mm up to 1.0 m above GL		
5	Performance	Earth resistance $\leq 2 \Omega$. Vendor to add electrodes/compound at no extra cost until values achieved.		
6	Testing and acceptance	Pre-work Wenner test; per-pit Fall-of-Potential with test link open; sector combined resistance at earth bar with links closed; continuity checks. Random sampling $\geq 10\%$ pits/batch; if failures $> 5\%$ $\rightarrow$ batch rework. Geo-tagged photos (pre-backfill, connection, final JB) for every pit.		

15.10. IR Illuminator (Internal /External)

S.No	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Wavelength	850 nm		
2	Range	80-150 m or better		
3	Beam Control	10 degree to 60 degree (interchangeable or selectable)		
4	Power	12-24 Volts DC		
5	Controls	Built-in photocell (day/night auto), telemetry/dry contact input for sync with ANPR camera shutter		
6	Housing	Aluminium		
7	IP protection	IP 66 or better		
8	Vandal Proof	IK 10		
9	Temperature	minus 15 degree to plus 50 degree or better; Humidity 95%RH or less (non-condensing)		
10	Mounting	Adjustable bracket suitable for pole/gantry/camera housing		
11	Quality	CE/ FCC/ RoHS/BIS		

15.11. Mobile Surveillance

#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Mobile Van		
1.1	Van to be provided by department		
1.2	Cushioned seats for 5 personnel		
1.3	Customized Platform to be provided on the roof of the vehicle to accommodate cameras and PA System, with telescopic mast		
1.4	Certifications: All electrical/structural fittings BIS compliant		
2	Cameras		
2.1	Vehicle mounted PTZ Camera (01 No.)		
2.1.1	Maximum Resolution: 4 Megapixel (2560 × 1440) or better		
2.1.2	30x Optical Zoom or better		
2.1.3	Video Compression: H.265		
2.1.4	Control: Full PTZ (pan/tilt/zoom) operation via NVR interface		
2.1.5	Certifications : BIS, CE/ FCC/UL		
2.1.6	Cyber Security Certified by STQC as per IoTSCS and meet the essential requirement issued by MeitY		
2.2	Vehicle Mounted Fixed Bullet Cameras (4 nos.)		
2.2.1	Maximum Resolution: 4 Megapixel (2560 × 1440) or better		
2.2.2	Power: PoE+ (preferred)/DC/ AC		
2.2.3	Control: Remote zoom/focus adjustment from NVR/VMS interface		
2.2.4	Certifications : BIS, CE/ FCC/UL		
2.2.5	Cyber Security Certified by STQC as per IoTSCS and meet the essential requirement issued by MeitY		
3	PA System		
3.1	Mic with 2 speakers along with required accessories		
3.2	Certifications: BIS, CE/ FCC/UL		
4	Local Storage (Mobile NVR)		
4.1	8 channel ruggedized mobile NVR		
4.2	Recording Resolution: Minimum support up to 4 MP (2560 × 1440 / 2688 × 1520), 25/30 fps per channel		
4.3	Storage: Hot-swappable HDDs, ≥ 2 × 2 TB (RAID 1 preferred), minimum 7 days retention at 4 MP recording		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
4.4	Vibration resistance: Compliant with MIL-STD or EN50155 (vehicle use)		
4.5	Network: Dual Gigabit LAN, built-in Wi-Fi/4G optional		
4.6	Video Compression: H.265/H.264 support		
4.7	Display: Integrated rugged monitor $\geq 19''$, Full HD or higher		
4.8	Power: Wide DC input range compatible with vehicle inverter		
4.9	Certifications: CE/ FCC/ UL, BIS		
5	Network		
5.1	Switch / GSM Router (as per bidder's solution)		
6	Vehicle Fire Extinguisher		
6.1	2 Nos (as per BIS standards)		

15.12. Drones

#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Micro UAV system should consist of the following sub- systems:- a) UAV Bird with battery pack b) Ground Control station with data link equipment c) Daylight Camera Payload d) Night Camera Payload e) Universal Battery Charger with Power Supply System		
2	UAV Characteristics		
2.1	Role: Surveillance, reconnaissance, and detection during day and night.		
2.2	Launch and Recovery mode: i) Vertical Take Off and Landing (VTOL) from within an area of 25m X 25m clearing or less. ii)Payload should not damage during recovery of UAV		
2.3	Aural Signature: <40db at 300 meters. Above ground Level		
2.4	Payloads carrying capability: Should be capable of carrying Hybrid electro optical (EO) camera for day and Thermal Imager (TI) camera for night vision.		
2.5	Flight Modes: a) Fully Autonomous Vertical Take Off b) Fully autonomous Vertical Landing c) Hover at defined waypoint (position hold better than 25m) d) Autonomous waypoint navigation (pre-defined as well as dynamically adjustable waypoints during flight) e) Remote Piloted mode for video based user navigation. g) Should be controllable in real time from the GCS up to recovery h) Fully autonomous and stabilized.		
2.6	Endurance: 35 minutes or more with all payloads at Mean Sea Level.		
2.7	Operating Altitude: 500m AGL (Above Ground Level) or more.		
2.8	Launch Altitude: 4500m AMSL (Above Mean Sea level) or more.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
2.9	Range of Operation: Minimum 3 km line of sight		
2.10	Cruise Speed: 25 km/h or more		
2.11	Operating Wind Conditions: a) Take off: 30 km/h or more. b) Landing: 30 km/h or more c) Operate : 30 km/h or more.		
2.12	Failsafe Features: a) Automatic Return to Home on communication failure. b) Automatic Return to Home/Land on low battery c) Multiple (IFS on board for GPS failure redundancy		
2.13	Propulsion System: Electrical with rechargeable batteries		
3	Payload characteristics		
3.1	Payload Required: a) Electro Optic (EC)) for day (colour) b) Thermal Imager (TI) for night		
3.2	Payloads and Video Stabilization: a) All payloads should be Gimbal stabilized on-board b) Video output should be digitally stabilized at all zoom levels. c) Quality of video should not be affected by UAV vibrations.		
3.3	Electro optic (E0) Daylight Payload: a) Colour Camera with 360° pan and 90° tilt control. b) Resolution: 1280 X 720 pixels or better c) Optical Zoom : 10x zoom with minimum FOV $\leq 5^\circ$ or less. Additionally, 4x digital zoom. Max. FOV $\geq 45^\circ$ (wide field). Digital Zoom: 4X		
3.4	Thermal Imager (TI) Night Payload: a) Thermal Camera with 360° pan and 90° tilt control. b) Resolution: 640 x 480 pixels or better. c) White/Black Hot modes d) Digital Zoom: 4X or more		
3.5	Night Recovery Beacon: Switchable (from GCS) LED light when operating with Night Payload.		
4	Ground Control Station Characteristics		
4.1	Communication: Communication System (CS) should have water and dust resistant design flexibility to work freely in any environment		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
4.2	CPU: Intel Core i3 v Pro Processor or higher semi rugged		
	Storage: At least 256 GB		
	Display: 10 inch n		
	Audio : Integrated Speaker		
4.3	Battery Operation: Minimum two hours at peak utilization		
4.4	Battery Charging time: Should be less than 3.5 hours		
4.5	Data portability: Ports for data transfer to external secondary storage devices		
4.6	Interface: HDMI, USB, Ethernet.		
4.7	Capability: a) Transmit control commands to UAV. b) Receive UAV flight and propulsion parameters. c) Receive, display and record real lime day and night video from UAV. d) Capability to control UAV while on the move		
4.8	GCS Application Software: a) Geographic Map along with UAV location, UAV trajectory,, camera view polygon, waypoints and flight plan b) Real-time video from the UAV withon-screen display of important parameters like i) Coordinates of Target ii) Ground altitude of Target iii) UAV position iv) Height of UAV above ground level. v) Distance of UAV from GCS vi) Bearing (Azimuth) of UAV from GCS. vii) Ground speed of UAV viii) UAV Heading/True North Indication ix) Mission Time. c) Geographic map and real-time video should be displayed at all times during the flight. d) Geographic map and real-time video views should be resizable and /or switchable to allow user to switch between big map/small video and small map/big video views through a single click/button input. e) Artificial Horizon indicating UAV attitude.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
4.9	Map Formats: a) Should have the capability to integrate georeferenced raster maps provided in at least one of the commonly used digital map formats (gif, tiff, DTED and SRTM etc.) b) Should be able to work with Google Maps, application should have the capability to download maps automatically after specifying location GPS coordinates.		
4.10	Payload Controls: a) Selection and switch on/off of payload b) Pan/Tilt/Zoom Controls c) Points payload to ground co-ordinate Function d) Recording on/off e) Switch on/off Night Recovery Beacon		
4.11	Video: a) Video should be recorded in any commonly portable video formats (AVI, MPEG, MP4 etc.) b) Video of the full flight should be recorded c) Should have capability to take image snapshots at any time during flight d) Software should be provided that will facilitate extraction of imagery from the recorded video post flight		
4.12	Pre-flight checks: Self-test of UAV system, Output : go / no go		
4.13	Joystick		
5	Communication Link		
5.1	Communication link equipment capability: i) Transmit control commands from GCS to UAV ii) Transmit parameter of UAV and payload to GCS iii) Transmit day and night video from UAV to GCS		
5.2	Type of link: Secured digital uplink 86 downlink with AES encryption.		
5.3	Frequency Band: System should operate on UHF frequency Band uplink and down link, preferably on license free band i.e 2.4Ghz		
5.4	Remote video / image streaming: Ability to transmit videos and images at remote location in real time.		
6	General System requirement		
6.1	Weight: The weight of complete UAV bird including battery pack & One payload should $\leq 4\text{kg}$		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
6.2	Assembly/ Disassembly time: Less than 10 minutes each.		
6.3	Life of Micro UAV: The total Technical life of micro UAV should not be less than 1000 landings.		
6.4	Environmental Conditions for Operation and Storage: The UAV and associated systems should be certified for operation and storage for following environment conditions. i) Damp Heat: 40°C at RH not less than 95%. ii) Operating temperature & Storage temp:- -10° C to +55° C iii) Ability to withstand dust, drizzle and humid conditions		
6.5	Portability and Operation: The Micro UAV should be battery operated portable, light in weight, compact, for day and night surveillance, capable of being carried and operated by two men.		
6.6	Battery of AV: The intelligent standard lithium based battery pack should have the back up of minimum 35 minutes.		
6.7	Battery Charger of AV battery: Suitable universal battery charger to charge the batteries within two to three hours		
6.8	Accessories: a) Water-proof Back Packs: 1 set b) Field Repair Kit: 1 No's c) Lithium based Battery packs : 2 No's d) Spare propeller Sets : 2 No's Spare e) Landing Gear sets: 4 No's f) Associated Cables Mountings: 1 set g) Hard transportation boxes: 1 set h) User, Technical, Maintenance Manual: 1 set i) Log book: 1 set		

15.13. Tethered Drone

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Performance Characteristics	Endurance of up to 4 hours in tethered mode & 5 minutes emergency with battery backup: 20 minutes endurance with battery (untethered)		
2		The system shall function in a range of minimum 300 m LOS (Line-of-sight)		
3		The system shall have operating altitude of 100m AGL (Above Ground Level) or more		
5	Operational Characteristics	The system shall have space recovery of 25m x 25m or better		
6	System Configuration	The system shall have following configurations:		
7		a) RGB 1080p three axis gymbal camera		
8		b) One GCS with Communication System		
9		c) All the required Accessories		
		d) spare propeller		
		e) Tethered wire upto 50 meters		
10		f) Waterproof Backpack		
11	Video	Video shall be recorded in commonly portable video format (AVI/MP4 etc.) on the GCS.		
12		Video of the full flight should be recorded by default with option to turn recording off		
13		System should have the capability to take image snapshots with on-screen display parameters.		
14	User Controls	System shall have the following features:		
15		a) One-click Take-off/Land/Hover		
16		b) Set altitude of the UAV		
17		c) Waypoint navigation		
18		d) Dynamic flight plan adjustment		
19		e) Point payload to ground co-ordinate function		
20	Joystick Controls	System shall have full camera controls including:		
21		a) Pan/Tilt		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
22		b) Zoom In/Out		
23		c) Black/White Hot		
24		d) RPV mode		
25		e) Altitude control		
26		Real-time video from the system with on-screen display of important parameters like its co-ordinates, target (payload) co-ordinates and range from the system, true North indication, Distance from HOME etc.		
27	Failsafe features	The system shall have following failsafe features built in:		
28		Return to home on communication failure		
29		Return to home on low battery		
30		Return to home on High Winds		
31	Camera Specifications	Daylight: Resolution: Minimum 1920 x 1080; 10x Optical Zoom		
32		Night: Resolution: Minimum 320 x 240; 4x Digital Zoom;		
33	Batteries	Two batteries to be provided		
34	Battery Charger	Battery charger to be compatible with batteries provided		

15.14. Body worn cameras and docking station

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Device type	Body Camera		
2	Display	Shall have i LCD touchscreen		
3	Image Sensor	CMOS , with horizontal field of view more than 130 degree		
4	Frame Rate	25 FPS or better		
5	Focal length	2.4 mm fixed lens or better		
6	Transmission	Wi-fi 802.11b/g/n OR 4G		
7	Storage	Inbuilt Min. 32GB		
8	Speaker	1 built-in speaker		
9	Charging Interface	Type-C, Pin connection		
10	Protection	IP66 orbetter		
11	SIM Card	SIM card to be supported		
12	Communication Network	GSM: 850/900/1800/1900 or WCDMA: B1/B8 or FDD-LTE: B1/B3/B4/B7/B20/B28 or TDD-LTE: B34/B38/B39/B40/B41		
13	Accessory Included	Body Camera Clip		
14	Certification	CE/BIS/ FCC/ RoHS		

Docking Station				
#	Parameters	Minimum Specifications or better	Compliance (Yes / No)	Remarks (If compliance is No)
1	Device type	Dock Station		
2	Body Camera	Support 8 body cameras or better		
3	Memory	1GB or Better		
4	Feature	Simultaneously charge and collect data from body worn cameras.		
5	Storage	Minimum 2 TB or better		
6	External Interface	RJ-45 10M/100M/1000M self-adaptive Ethernet port/equivalent		
7	Mount	Should Supports wall mount/mobile mount/ desktop mount.		

15.15. Megaphone

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Power Output	20 watts or Higher		
2	Power Source:	10 x AA Pencil Cells		
3	Microphone:	Unidirectional		
4	Inputs:	Dedicated microphone		
5	Voice Range:	400m (Siren 500m)		
6	Features:	Built-in Siren, Hand Grip, Shoulder Sling		
7	Other:	Microphone with Volume Control and Press-to-Talk Switch, Additional microphone switch on the hand grip, Shoulder Sling & Hand Grip Type		

15.16. 19U Rack

S.No	Parameters	Minimum Specification	Compliance (Yes / No)	Remarks
1	Type	19U Floor Standing		
2	Rack Size	19-inch wide, 19U height		
3	Material	High-quality CRCA steel frame and panels		
4	Finish	Powder-coated (scratch-resistant, anti-rust coating)		
5	Mounting Depth	Minimum 600 mm to 800 mm (adjustable mounting rails)		
6	Front Door	Toughened glass door with lock and key		
7	Rear Door	Perforated or solid metal door with lock		
8	Side Panels	Removable side panels with lock		
9	Top & Bottom Entry	Cable entry provision at top and bottom		
10	Cooling Provision	At least 2 x fans mounted on top r for airflow		
11	Load Capacity	Minimum 60 kg static load bearing capacity		
12	Ventilation	Perforation for passive airflow on top and rear		

15.17. Workstation

Sl. No.	Parameters	Minimum Technical Requirements	Compliance (Yes/No)	Remarks
1	Processor	i7 processor		
2	Motherboard	OEM Motherboard		
3	RAM	Minimum 32GB DDR4 RAM		
4	Graphics card	Minimum Graphics card with 4 GB video memory (non-shared)		
		HDMI/mini display ports for connecting three different monitors simultaneously.		
5	Monitor	2 x 24" LED monitor		
6	HDD	Min. 1 TB SSD		
7	Other Accessories	Line/Mic IN, Line- out/Speaker Out (3.5 mm), Minimum 2 USB ports in front, 104 keys minimum OEM keyboard, USB Optical OEM mouse,		
9	Operating System	Pre-loaded Windows 10 (or latest) Professional 64 bit		
10	End Point Protection	End point Protection to be considered		
11	Network Interface Port	4 x 1G Port		

15.18. Field Switch 8

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Switch Type	L2 Managed Outdoor Din-Rail Industrial grade switch		
2	Total Ports	8 x 10/100/1000 TX PoE+ downlink Ports and 4 x 100/1000 SFP uplink Ports		
		1 RJ45 Console Port		
3	PoE Standards	IEEE 802.3af and 3at or better. 30W per port and total PoE Power budget 240W		
4	Protocols	4K VLAN Entries, Port based VLAN, 802.1Q VLAN, Private VLAN, Protocol VLAN		
		Generic Vlan Registration Protocol (GVRP)		
		802.1ad VLAN Stacking (QinQ), Selective QinQ		
		802.1D (STP), 802.1W (RSTP), 802.1S (MSTP)		
		Ethernet Ring Protection Switching (ERPS)		
		Ethernet Automatic Protection Switching (EAPS)		
		IGMP Snooping v1/v2, IGMP Fast Leave, IGMP Query		
		Vlan Registration (VR)		
		MLD v1/v2 Snooping		
		DHCP Relay, DHCP Client		
		Link Layer Discovery Protocol, Virtual Cable test , Digital Diagnostic Monitoring		
		Traffic Supervision and traffic Shaping		
		Ethernet OAM EFM/CFM		
5	Security	Port Security, Port Isolation		
		IEEE 802.1x authentication, RADIUS and TACACS authentication		
		SSH v1/v2, IP Source Guard		
		DHCP Snooping, DHCP option82		
		MAC Filtering		
		IP+MAC+Port Binding		
6	Management	Console, Telnet, SNMP v1/v2/v3, Zero Touch Provisioning		
		Port Mirroring, NTP, SNTP		
7	IP Rating	IP 40 Protection		
8	Lightning Protection Level	6KV		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
9	Power Inputs	Dual DC 48-55V Inputs. should supply 240W industrial grade DIN Rail power supply		
10	Operating Temperature	-40° C to 75° C or better		
11	Certification	The Offered switch should have TEC/ BIS certificate		
12	OEM Criteria	Industrial grade switch and SFP transceivers should be from same OEM for better compatibility and ease of integration		

15.19. Core Aggregation Switch / Aggregation Switch

#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	General Features		
1.1	The switch shall d rack-mountable in a standard 19" equipment rack.		
1.2	The switch shall support Stacking.		
2	Performance		
2.1	The switching fabric capacity shall be at least 128 Gbps with a minimum forwarding rate of 95 Mpps.		
2.2	The switch shall support at least 10,000 MAC addresses and 100 active VLANs.		
2.3	The switch shall support a minimum of 10,000 IPv4 routes or higher.		
2.4	The switch shall support 1,000 or more multicast routes.		
2.5	The switch shall support Spanning Tree Protocol (STP).		
2.6	The switch shall be equipped with a minimum of 4 MB packet buffer memory.		
3	Functionality		
3.1	The switch shall support the following IEEE Ethernet standards		
3.2	The switch shall support Layer 3 features such as static routing, RIP, PIM, OSPF, , policy-based routing (PBR), and QoS functionalities.		
3.3	The switch shall support traffic classification, marking, policing, shaping, and egress queues.		
3.4	The switch shall support management protocols including SSHv2, SNMPv2/ SNMPv3, NTP, RADIUS/TACACS+.		
3.5	The switch shall include IPv6 security features.		
3.6	The switch shall support 802.1x authentication.		
4	Interfaces		
4.1	Switch should have 24 /48 port 1/10/25G with 4 ports x 10/ 25/40/100G uplink or as per bidder specifications		
5	Certifications		
5.1	Certification: Switch shall conform to UL/FCC/CE or equivalent		

15.20. Core Distribution Switch / Core Switch

#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	General Features :		
1.1	Switch shall be rack mountable in standard 19" rack.		
1.2	Switch shall have power supply and fan.		
2	Performance :		
2.1	Switching system shall have minimum 1.5 Tbps of switching fabric.		
2.2	Switching system shall have minimum 50K MAC Addresses and 1K VLANs.		
2.3	Switch should support minimum 18K ACLs, 16K Multicast and 32K IPv4, 16K IPv6 Routes..		
2.4	Switch shall support application visibility and traffic monitoring		
2.5	Packet buffer : minimum 20 MB		
3	Functionality :		
3.1	Should support IEEE Standards of Ethernet		
3.2	Must support BGP /MPLS/IS-IS/ VRF/VXLAN/NAT/OSPF /Routed Access/ Policy-Based Routing (PBR)/ PIM SM/ Virtual Router Redundancy Protocol (VRRP)		
3.3	Shall have 802.1p class of service, marking, classification, policing and shaping. Should support strict priority queuing.		
3.4	Switch should support management features like SSHv2, SNMPv2c, SNMPv3, IGMP, Netconf/YANG.		
3.5	Switch should support port security, DHCP snooping, Spanning tree root guard, First Hop Security.		
3.6	Should support 802.1x authentication and accounting, IPv4 and IPv6 ACLs and Dynamic VLAN assignment.		
4	Interface		
4.1	Switch should have 24 /48 port 1/10/25G with 4 ports x 10/ 25/40/100G uplink or as per bidder specifications & required modules to be provided .		
5	Certification: Switch shall conform to UL/FCC/CE or equivalent		

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15.21. NGFW Firewall

#	Minimum Specifications	Compliance (Yes / No)	Remarks
	Hardware		
1	Should have 8 or more 1G Rj45 interfaces and 4 or more 1G SFP slots		
2	Should have 4 no of 10G SFP+ slots populated with 2 nos of 10G transceivers		
3	Should have 1 console port (RJ45) and 1 or more Number of USB ports		
4	Should have internal redundant power supplies		
	Firewall Performance		
5	The Firewall must be hardware appliance based on ASIC based processors		
6	IPSec VPN throughput should be 10 Gbps or more		
7	NGFW throughput should be 3 Gbps with enterprise mix traffic \ real world traffic		
8	Threat protection throughput should be 3 Gbps with enterprise mix traffic \ real world traffic		
9	Must support at least 25,00,000 or more concurrent connections		
10	Must support at least 150,000 or more new sessions per second processing.		
11	Should support minimum 500 simultaneous VPN sessions		
12	Should Support Virtualization (ie Virtual Systems / Virtual Domains). Should be having 10 or more virtual system license from day one.		
	Firewall Features		
13	Should support both "bridge mode" or "transparent mode" apart from the standard NAT mode		
14	Should provide NAT functionality, including PAT. Should support NAT 66, NAT 64, Static NAT IPv4 to IPv6 and vice versa and IPv6-IPv4 tunnelling or dual stack.		
15	Should support IPv4 & IPv6 policies		
16	Provision to create secure zones / DMZ (ie Multi- Zone support)		
17	Should support the standard based Multi-Link aggregation technology (IEEE 802.3ad) to achieve higher bandwidth.		
18	Should support VLAN tagging (IEEE 802.1q) in NAT/Route mode		
19	Should support Static routing and Dynamic Routing (RIP, OSPF & BGP)		
20	Should support Active-Active/ Clustering as well as Active-Passive redundancy.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
21	Should support ISP Load balancing/ Link Sharing and Failover		
22	Should support multi-path intelligence based on link quality criteria		
23	Should support link performance check based on packet loss, latency & jitter		
24	Should support application specific rules based on SLA strategy		
25	Should support high performance deep packet inspection for application identification and control		
26	Should support User-Group based Authentication (Identity based Firewalling) & Scheduling		
27	Should support authentication servers – RADIUS, LDAP & Active Directory		
28	Support for RSA Secure ID or other Token based Products		
29	Should support protocols such as DES & 3DES, MD5, SHA-1, SHA-256 authentication, Diffie- Hellman Group 1, Group 2, Group 5, Group 14, Internet Key Exchange (IKE) v1 as well as IKE v2 algorithm, The new encryption standard AES 128, 192 & 256		
30	Should support NAT within IPSec/SSL VPN tunnels		
31	Should support Stateful failover for both Firewall and VPN sessions.		
32	Should support host check feature like mac address check for vpn users before connecting the VPN		
	Security Features		
33	Should have a built-in Signature and Anomaly based IPS engine on the same unit		
34	Should provide Real time protection for Web protection, Mail server protection, against cross site scripting, Vulnerabilities, Brute Force attacks, SQL injection, DoS attacks.		
35	should also include Botnet filtering and detecting and preventing Botnet command and control traffic		
36	Should have provision for Real Time Updates of signatures, IPS Should support Automatic signature synchronization from database server and should have capability to define User Defined Signatures		
37	Should have integrated DOS protection against abnormal traffic behaviour		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
38	Should have rate-based DOS protection with threshold settings against TCP Syn flood, TCP/UDP/SCTP port scan, ICMP sweep, TCP/UDP/SCTP/ ICMP session flooding		
39	Should support configuring DOS policies based on Source and Destination		
40	Should have Application control feature with 3000 or more application signatures		
41	Should perform Traffic Shaping based on applications		
42	Should control popular IM/P2P, proxy applications regardless of port/protocol		
43	The appliance should facilitate embedded anti-virus/ anti-malware support		
44	Gateway AV/ Anti-malware should be supported for real-time detection of viruses and malicious code for HTTP, HTTPS, FTP, SMTP, SMTPS, POP3 and IMAP protocols		
45	Should have configurable policy options. Possible to select traffic to scan for viruses		
46	The appliance should facilitate embedded Web Content and URL Filtering feature		
47	Should support category based web filtering with option for black/safe listing urls		
48	URL database should have 200 million or more URLs under more than 70 categories		
49	Should be able to block different categories/sites based on User Authentication.		

15.22. TOR Switch

#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	General Features :		
1.1	Switch should be 1U and rack mountable in standard 19" rack.		
1.2	Switch should support internal field replaceable unit redundant power supply and can be added in the future without changing the hardware.		
1.3	Switch should have modular stacking.		
2	Performance :		
2.1	Switch shall have minimum 96 Gbps of switching fabric and 80 Mpps of forwarding rate.		
2.2	Switch shall have minimum 16K MAC Addresses and 200 active VLAN.		
2.3	Should support minimum 10K IPv4 routes or more		
2.4	Switch shall have 1K or more multicast routes.		
2.5	Switch should support atleast 12K flow entries		
2.6	Switch should support 128 or more STP Instances.		
2.7	Switch should have 4MB or more packet buffer.		
3	Functionality :		
3.1	Switch should support IEEE Standards of Ethernet		
3.2	Switch must have functionality like static routing, RIP/ PIM/ OSPF/ VRRP/ PBR / QoS features		
3.3	Switch should support network segmentation that overcomes the limitation of VLANs using VXLAN / VRFs.		
3.4	Switch shall have 802.1p class of service, marking, classification, policing and shaping and egress queues.		
3.5	Switch should support management features like SSHv2/ SNMPv2c/ SNMPv3, NTP/ RADIUS / TACACS+ .		
3.6	Switch should support IPv6 Binding Integrity Guard/IPv6 Snooping/ IPv6 RA Guard/ IPv6 DHCP Guard/ IPv6 Neighbor Discovery Inspection /IPv6 Source Guard.		
3.7	Switch should support authentication and accounting, IPv4 and IPv6 ACLs and Dynamic VLAN assignment		
3.8	Switch must have the capabilities to enable automatic configuration of switch ports as devices connect to the switch for the device type.		
4	Interfaces		
4.1	Switch shall have 24/48 x 1/10G SFP and Additional 4 nos. 10G/25G SFP+ for uplinks ports or as Per bidder solution		
5	Certification: Switch shall conform to UL/FCC/CE or equivalent		

15.23. Videowall

#	Parameters	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Overview Display	The displays shall utilize direct LED lit LCD panel technology with 100,000 Hours Life time of LED, with a matrix of 3(C) and 2(R)		
2		All panels shall of 55" diagonal size with Screen gap <0.88mm		
3	Native Resolution per Panel	In order to achieve acceptable image quality for both video and graphics, and to avoid pixel loss, the LCD panel must be of native resolution of 1920 x 1080.		
4	Aspect Ratio	16:9,		
5	Backlight	Direct LED with 500 Nits of brightness and 100,000 Hours lifetime of LED minimum		
6	Brightness	The "Typical" Luminance specification must be 500 Cd/m2 (nits) or higher with a "Typical" Static Contrast Ratio of 1500:1 or greater in normal operation.		
7	Viewing angle	Each display shall utilize a high contrast screen (anti-glare) with sizes of 55" diagonal. The screen shall have a H 178°/V 178° viewing angle or greater with a screen "haze" value of 28% or greater for wide viewing angles for operators.		
	Connectivity	2 DP , 2 HDMI , 2 USB , 2 LAN		
8	HDCP	Yes		
9	Ethernet ports	2		
10	Redundant Power supply	Inbuilt Dual Redundant Power supply for Fail safe Operations.		
11	Service	Front Access only		
12	Redundant wall	Complete wall should be redundant and no downtime to be there in case of power supply failure		
13	Remote Redundancy	Option should also be available to give Remote Rack based Redundancy to ensure 24x7 Failsafe operations		
14	Power consumption (Max)	Less than 190 watt in Full Brightness Mode		
15	Operating Temperature	system shall be operate properly under 0°C to 40°C Temperature		
16	Storage Temperature	-20°C to +60°C		
17	Heat Dissipation (Max)	Less than 650 BTU/Hr in Full Brightness Mode		

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#	Parameters	Minimum Specifications	Compliance (Yes / No)	Remarks
19	Humidity	upto 80% (non-condensing)		
20	Size (L x H x D)	Minimum 1211 x 682 x 91.1 mm		
21	Automatic calibration	Each LCD panel shall be equipped with two (2) built-in sensors, permitting the brightness level of each LED Backlight to be controlled and adjusted automatically.		
22	Certifications	BIS , CE,CB, UL , FCC , ISO 9000 , ISO 14000 & ISO 27000 to be submitted along with bid		
23	Class 1/ Class 2 Suppliers	OEM should be Class 1/ Class 2 are allowed to participate who have Local content & value addition is being done at there respective factory to be checked if required		
24	Modules	The Display Modules, Display Mount, Display Controller & Software should be from a single OEM		
25	Brightness Uniformity	98% .Proof of same to be submitted		
26	Bit depth	3 x 10 Bits		
27	Inputs	2 DP , 2 HDMI , 1 DP Out & HDCP		
28	Cooling	Fanless		
29	Calibration	Automatic color calibration in real time		
30	Input Ports	2 x DP1.2 (4K@60Hz), 2 x HDMI 2.0 (4K @60 Hz.)		
31	Output ports	1 x DP1.2 (support UHD @ 60 Hz)		
32	Communication Ports	2 x RJ-45 (Ethernet Ports) with Loop-in feature		
33	Panel Design	Fanless & Modular (External Power & I/O Board) for faster replacement of faulty part		
34	Mounting system	Complete front accessible mounting system must have feature of Auto alignment in X-Y-Z direction using gravity/hydraulics to ensure minimum efforts & fast replacement of display or faulty components.		
35	Display Control	Display panels must have Integrated Webserver to manage the display from remote using any web browser of any system in network or via dedicated controller.		
36	Videowall Management	Dedicated Controller for managing Videowall Display over IP network using any web-browser of any system in the network. (without Installing any application on system)		
37	Key Feature required	Temp. sensors, Brightness and color sensors, Wake on LAN, ON/Off time scheduling, Source sensing & auto switch feature (Failover) in case of primary signal failure, IP Controlled with dedicated Controller for remote monitoring and		

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#	Parameters	Minimum Specifications	Compliance (Yes / No)	Remarks
		management, Auto colour and brightness adjustment		
	Controller specifications			
38	Features			
		Any operator can access any PC or multiple from their desk simultaneously and can work on any or multiple PC using single Keyboard and Mouse		
		Supports output up to 3840 x 2160 resolution with 60fps per port		
		Supports H.265, H.264, MPEG2/ 4, MxPEG, MJPEG, V2D, H.263, RDP,6 Inputs		
		Supports Multicasting Protocol IGMP V1, V2, V3		
39	Output	Need to Connect minimum 6 Displays & same should be driven through control ware		
40	MTBF	More than 350000 Hours		
41	Image processing	Network-based content synchronization between multiple display nodes driving a single wall, Frame lock between multiple display nodes		
		6 workstation to be connected to encoders		
		Output nodes can display high density content		
42	Network	1000 MB network with active failover		
		Supports protocol - DHCP, TCP/IP, Supports only Dynamic IP scheme		
43	Security	Product should be full secure with end-to-end encryption from Source to Video wall		
		Product should be based on RTSPS only to secure streaming over the network		
		All communication between devices should be encrypted with TLS to protect from cyber attack		
		Auto-discovery allows modules to announce themselves to the central management service across network segments (VLANs) at a site and across different sites. Industry standard protocols like DHCP, DNS and NTP are deployed to achieve minimal maintenance of the components. All sources for operator desk and wall are only configured once and managed by the central service.		
		Video wall GUI should be accessible using only FQDN directly		

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#	Parameters	Minimum Specifications	Compliance (Yes / No)	Remarks
		All connected devices must be signed with certificates to avoid any tampering or security threat		
		All system settings and configured parameters can be securely backed up and restored with password encrypted backups. The configuration of the system is done via a web-based administration tool, which is operated by means of secure https-based communication		
44	Operator Collaboration Solution	Proposed solution enables the operator to be more efficient by offering an integrated view, control and interaction		
		All video wall operations and configuration shall be operable from web-browser only no native application is required		
		No more switching between screens and computers to consult specific information: everything is available within the same pixel space. The operator can simply call the needed information to the screen in front of him/her, enabling swift decision-making		
45	AD Integration	Proposed solution should support LDAPS integration to fetch customer's Active Directory so that any operator can login the application using their own credentials "Follow me" function provides operator's personalized workspace upon login		
46	HDD	Complete solution should be equipped with SSD Hard disk (SATA Hard Disk is not acceptable)		
47	Operating Range	Temperature: 0-40 degree Centigrade Humidity - upto 80% non-condensing		
48	LED indicator	LED indicators for Power, HDD, Network, Identification		
49	Specify the proposed Make and Model	Complete end-to-end video wall and operator collaboration solution is from single OEM only to avoid any compatibility issue		
50	Certifications	CE, CB, UL, FCC Class B BIS, KC, CU-EAC, DoC, RCM, TAA		
	Software Specification			
51	Software	The software should be able to preconfigure various display layouts and access them at any time with a simple drag and drop operation		
52	Sharing and Collaboration	Any content of main console NOC room can be shared in WAR/ Meeting/ Conference Room or vice-versa over the IP only		

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#	Parameters	Minimum Specifications	Compliance (Yes / No)	Remarks
53	Software	Any workstation in the NOC Room can be displayed in any size and anywhere on video wall over the IP only		
54	Screen Scrapping	Live view (minimum atleast 1FPS) of video wall can be seen anywhere over the network without the need of any application over the web-browser		
55	Software	Capability to show one or more input sources (workstation or direct) on the entire or part of the video wall or on single cube.		
56	Sharing between Operators	Any operator can share there screen with other operator in the same room in real-time for fast decision making		
57	Software	The software should be able to create layouts and launch them as and when desired		
58	Software	It should be possible to create layouts comprising of screen scrapped content of Workstations, DVI inputs, Web sources, URLs configured as sources. Layouts can be pre-configured or changed in real time Can be pre-configured or changed in real time		
59	Software	The control of the wall shall be possible via a network. All cubes shall have their own IP address, and the control software can access all of them at the same time. The available features shall be: On/Off, Brightness and Colour, Input control Separate hardware server for monitoring features Wall or Panel On/Off, Brightness and Colour, Input control, health monitoring		
60	Modules	Complete end-to-end video wall and operator collaboration solution is from single OEM only to avoid any compatibility issue		

15.24. Display

S.No	Specification			Compliance (Yes/No)	Remarks
1	Display	Inch	65"		
2		Type	Interactive (Touch Screen)		
3		Resolution	3,840 x 2,160		
4		Backlight Unit Type	Direct		
5		Brightness (nit)	Minimum 300		
6	Audio	Audio Output	Minimum 20W		
7		Speaker System	Ch		
8	Power	Voltage, Hz	AC 100~240V, 50-60Hz		
9		Power Consumption (Max.)	500 W		
10	Interface	Side /Rear	HDMI 2.0 ,Headphone Out, USB 2.0, RF In, Digital Audio Out (Optical), External Speaker		
11	Certification	Safety	CB/CU /TR/ equivalent		
12		EMC	CE or equivalent		

15.25. 42U Rack

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Type	19" 42U racks mounted on the floor Floor Standing Server Rack - 42U with Heavy Duty Extruded Aluminium Frame for rigidity. Top cover with FHU provision. Top & Bottom cover with cable entry gland plates. Heavy Duty Top and Bottom frame of MS. Two pairs of 19" mounting angles with 'U' marking. Depth support channels - 3 pairs . All racks should have mounting hardware 2 Packs, Blanking Panel. Stationery Shelf (2 sets per Rack) All racks must be lockable on all sides with unique key for each rack		
2	Wire managers	Two vertical and four horizontal		
3	Power Distribution Units	2 per rack Intelligent Power Distribution Unit - Vertically Mounted, 32AMPs with 25 Power Outputs. (20 Power outs of IEC 320 C13 Sockets & 5 Power outs of 5/15Amp Sockets), Electronically controlled circuits for Surge & Spike protection, LED readout for the total current being drawn from the channel, 32AMPS MCB.		
4	Doors	The racks must have steel (solid / grill / mesh) front rear doors and side panels. Racks should NOT have glass doors / panels. Front and Back doors should be perforated .Both the front and rear doors should be designed with quick release hinges allowing for quick and easy detachment without the use of tools.		
5	Fans and Fan Tray	Fan (4 Nos. per Rack). Fan Housing Unit 4 Fan Position (Top Mounted)		
6	Metal	Aluminium extruded profile		
7	Side Panel	Detachable side panels (set of 2 per Rack)		

15.26. SIEM

#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	The solution should be able to collect logs from different infrastructure components such as Servers, Firewalls, Databases, Applications.		
2	The solution should normalise the logs to collect insights from the logs		
3	The proposed solution should have connectors to support the listed devices/ applications, wherever required the vendor should develop customized connectors at no extra cost		
4	The Solution should support collectors at separate locations.		
5	The user interface to monitor and investigate events from the SIEM tool should be interactive and should provide capabilities necessary for further analysis		
6	The proposed solution should be configurable, manageable, and should have ability to be monitored through a centralized console		
7	The solution should have ability to perform trend analysis basis the historical data collected.		
8	The solution should have ability to do full-text search on any field in the indexed data		
9	Solution should enable the easy customizable dashboards and customizable dashboards based on various visualizations		
10	Solution should anticipate likely threats to the customer both from outside as well as arising from customer's internal infrastructure.		
11	The solution should provide an inventory solution through collected information		
12	Vendor should have capabilities to detect anomalies such as brute force, command injections, indicators		
13	Solution should collect existing logs from security controls such as firewalls , IPS devices , to detect targeted attacks.		
14	The solution should have capabilities to detect any compromises by linking related alerts collected together over a period of time.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
15	Solution should have capabilities to correlate alerts between sources & destination Ips to find similar or colluding threat signals.		
16	Solution should have detection models to find out threats sources are linked to the same attacker by grouping alerts with common characteristics like time, day location, target asset profiles etc.		
17	In addition to the advanced analytics capabilities solution should have capabilities to define rules on event logs captured from various sources to detect suspicious activities Examples		
	• Failed login attempts		
	• Vendor logins from unauthorized subnets		
	• Vertical & Horizontal port scans		
	• from blacklisted Ips		
18	Solution should support criticality levels of alerts from a number of security products including Firewalls, Routers ,AV etc.		
19	The proposed solution should support collection of events through customization of connectors or similar integration for the assets that are not natively supported		
20	The proposed solution should be able to collect data from new devices added into the environment, without any disruption to the ongoing data collection.		
21	The proposed solution should have connectors to support listed devices/ applications, wherever required the vendor should develop customized connectors.		
22	The proposed solution should support log collection from all major operating systems and their versions but not limited to Windows, Linux, AIX, Solaris etc.		
23	The collectors should be able to store/retain both normalized & raw data for forensic purposes		
24	The proposed solution should have capabilities to store the event data in its original format in the central log storage		
25	The proposed system shall be able to capture all details in raw log, events and alerts and normalize them into a standard format for easy comprehension.		
26	The proposed solution should support multiple log collection protocols.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
27	The proposed solution (SIEM) should be able to perform the correlations between different logs.		
28	Events should be presented in a manner that is independent of device specific syntax and easy to understand for all users		
29	Log Retention should be customizable as per the customer requirement		
30	The solution should be able to parse logs generated by custom developed applications.		
31	The solution should be able to send notification over multiple channels		
32	The solution should be able to integrate with third party threat intelligence sources over APIs to enrich events and cases		
33	The solution should allow to create custom visualizations and graphs as per customer requirement		
34	The solution should allow access to the raw logs for investigation and RCA activities		
35	The solution should be able to export dashboards/reports.		
36	The solution should have User management module for authentication and authorization		
37	The proposed solution should support log collection, correlation, and alerts for the number of devices /applications		
38	The proposed solution must ensure all the system components continue to operate when any other part of the system fails or loses connectivity.		
39	The proposed solution must automate internal health checks and notify the user in case of problems.		
40	The proposed solutions should be able to collect data from new devices added into the environment, without any disruption to the ongoing data collection.		
41	The proposed solution should have connectors or should have option to create custom parser to support all the devices/applications of all project landscape described in this RFP.		
42	The proposed solution should be able to continue to collect log data during database backup, de-fragmentation, and other management scenarios, without any disruption to service		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
43	The proposed solution should provide options to load balance incoming logs to multiple collector instances.		
44	The proposed solution should support log collection from all operating systems and their versions including but not limited to Windows, Unix, Linux, etc.		
45	The proposed solution should be able to store/retain both the log meta data and the original raw message of the event log for forensic purposes.		
46	The proposed solution should allow the creation of Custom correlation rules		
47	The proposed solution should be able to parse and correlate multi line logs		
48	Events should be presented in a manner that is independent of device specific syntax and easy to understand for all users		
49	The dashboard should show the status of all the tools deployed as part of the SIEM		
50	It should be possible to categorize events while archiving / real time for example, events for network devices, antivirus, servers etc.		
51	The Dashboard design for the proposed solution should be editable on an ad hoc basis as per the individual user need		
52	The proposed solution should allow applying filters and sorting to query results.		
53	The proposed solution should generate alerts on e-mail notifications for all critical/high risk alerts triggered from SIEM		
54	The proposed solution should have the ability to perform free text searches for events, incidents, rules, and other parameters.		
55	The proposed system should identify the originating system details while capturing event data.		
56	The proposed solution should be able to store both normalized and RAW logs		
57	The Solution should support case management to analyse the alerts.		
58	The solution should be able to send notification over multiple channels by integrating with email server , SMS gateway.		
59	Solution should enable easy customizable dashboards visualizations:		

15.27. Rack Server (All Applications/ Recording/Database/others)

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Chassis	1U/2U Rack Mountable		
2	CPU	2x 24 core processor with 2.4Ghz or Higher		
3	Memory	256 GB Dual rank RDIMMs		
4	Hard disk drive	2 x 480GB SSD (OS), 2 x 1.92TB SSD		
Other General Specifications				
1	Memory Protection	ECC with multi-bit error protection, Online spare or mirrored memory		
2	HDD Bays	Up to 8 SFF HDD/SSD		
3	Controller	System should support Raid Controller with RAID 0, 1, 5, 6, 10, 50, 60		
4	Networking features	1Gb 4-port network adaptors		
		2 x10Gb port - 10GBASE-T Copper / SFP or as per bidder solution		
5	Interfaces	Serial — 1		
		minimum 2 USB port, USB 2.0 or higher		
6	Bus Slots	Server should support two PCI-Express 3.0 slots, at least one x16 PCIe slots		
7	Power Supply	Should support hot plug redundant power supplies		
8	Fans	Redundant hot-plug system fans		
9	Operating Systems	As per Solution		
10	Server Management	System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive.		
11	End Point Protection	End point Protection to be considered		

15.28. GPU Server

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Chassis	2U Rack Mountable		
2	CPU	2x 24 core processor with 2.4Ghz or Higher		
3	Memory	256 GB Dual rank		
4	Hard disk drive	2 x 480GB(OS), 2 x 1.92TB SSD or higher		
Other General Specifications				
1	Memory Protection	ECC with multi-bit error protection, Online spare or mirrored memory		
2	HDD Bays	Up to 8 SFF HDD/SSD		
3	Controller	System should support Raid Controller with RAID 0, 1, 5, 6, 10, 50, 60		
4	GPU	GPU Cards to be provided as per the bidder Solution requirement .		
5	Networking features	1Gb 4-port network adaptors		
		2 x10Gb port - 10GBASE-T Copper / SFP or as per bidder solution		
6	Interfaces	Serial — 1		
		minimum 2 USB port, USB 2.0 or higher		
7	Bus Slots	Server should support two PCI-Express 3.0 slots, at least one x16 PCIe slots		
8	Power Supply	Should support hot plug redundant power supplies		
9	Fans	Redundant hot-plug system fans		
10	Operating Systems	As per Solution.		
11	Server Management	System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive.		
11	End Point Protection	End point Protection to be considered		

15.29. Primary SAN Storage

#	Minimum Specifications		Compliance (Yes / No)	Remarks
1	Solution/Type	Bidder is expected to provide storage solution (of NAS/Scale-out NAS/SAN) supporting required protocols (IP Based/iSCSI/FC/NFS/CIFS etc.) for the offered storage solution, meeting benchmark performance parameters specified in SLA		
		Solution proposed should yield low cost per TB, while meeting the performance parameters		
		Data of the departments shall be stored with the respective department to an extent possible		
2	Storage	Disks should be preferably minimum of 8 TB capacity or better Nashik Data center & DR for Trimbakeshwar: Surveillance Cameras : 30 Days of Storage of Nashik Cameras & 7 Days storage of Trimbakeshwar Cameras. Flagged Data : 90 Days of Nashik Cameras ANPR Data : 30 Days of Nashik Cameras Trimbakeshwar Data Center & DR for Nashik : Surveillance Cameras : 30 Days of Storage of Trimbakeshwar Cameras & 7 Days of Nashik Cameras Flagged Data : 90 Days of Trimbakeshwar Cameras ANPR Data : 30 Days of Trimbakeshwar Cameras		
		To store video stream and other data as required, to meet the archival requirement for different type of video feeds		

Volume 2 - Scope of Work and Requirement Specifications

#	Minimum Specifications		Compliance (Yes / No)	Remarks
		· The storage design must be based on the expected data volume from the project.		
		· Storage solution should be capable of scaling vertically or horizontally		
		· Data of the departments shall be stored with the respective department to an extent possible		
3	Hardware Platform	· Rack mounted form-factor		
		· Modular design to support controllers and disk drives expansion		
4	Connectivity	· The storage system shall be capable of providing host connectivity as per solution offered (SAN/NAS/Scale out NAS) as to meet operational SLA requirements.		
5	Controllers	· At least 2 Controllers in active/active mode · The controllers / Storage nodes should be upgradable seamlessly, without any disruptions / downtime to production workflow for performance, capacity enhancement and software / firmware upgrades.		
6	RAID support	· Should support various RAID levels (RAID5 or equivalent or disk failure protection)		
7	Cache	· Minimum 64 GB of useable cache		
8	Redundancy and High Availability	· The Storage System should be able to protect the data against single point of failure with respect to hard disks, connectivity interfaces, fans and power supplies		
9	Storage Management software	· All the necessary software (GUI Based) to configure and manage the storage space, RAID configuration, logical drives allocation, snapshots etc. are to be provided for the entire system proposed.		
		· Licenses for the storage management software should include disk capacity/count of the complete solution and any additional disks to be plugged-in in		

Volume 2 - Scope of Work and Requirement Specifications

#	Minimum Specifications		Compliance (Yes / No)	Remarks
		the future, up to the max disk capacity of the existing controllers/units.		
		· A single command console for entire storage solution.		
		· Should also include storage performance monitoring and management software		
10	Data Protection	· The storage array must have cache protection mechanism or alternate protection mechanism		

15.30. Secondary SAN Storage

#	Minimum Specifications		Compliance (Yes / No)	Remarks
1	Solution/Type	Bidder is expected to provide storage solution (of NAS/Scale-out NAS/SAN) supporting required protocols (IP Based/iSCSI/FC/NFS/CIFS etc.) for the offered storage solution, meeting benchmark performance parameters specified in SLA		
		Solution proposed should yield low cost per TB, while meeting the performance parameters		
		Data of the departments shall be stored with the respective department to an extent possible		
2	Storage	Disks should be preferably minimum of 10 TB capacity or better Nashik Data center & DR for Trimbakeshwar: Surveillance Cameras : 60 Days of Storage of Nashik Cameras & 7 Days storage of Trimbakeshwar Cameras. Flagged Data : 120 Days of Nashik Cameras ANPR Data : 60 Days of Nashik Cameras Trimbakeshwar Data Center & DR for Nashik : Surveillance Cameras : 60 Days of Storage of Trimbakeshwar Cameras & 7 Days of Nashik Cameras Flagged Data : 120 Days of Trimbakeshwar Cameras ANPR Data : 60 Days of Trimbakeshwar Cameras		
		To store video stream and other data as required, to meet the archival requirement for different type of video feeds		
		The storage design must be based on the expected data volume from the project.		

Volume 2 - Scope of Work and Requirement Specifications

#	Minimum Specifications		Compliance (Yes / No)	Remarks
		Storage solution should be capable of scaling vertically or horizontally		
		Data of the departments shall be stored with the respective department to an extent possible		
3	Hardware Platform	- Rack mounted form-factor - Modular design to support controllers and disk drives expansion		
4	Connectivity	The storage system shall be capable of providing host connectivity as per solution offered (SAN/NAS/Scale out NAS) as to meet operational SLA requirements.		
5	Controllers	- At least 2 Controllers in active/active mode - The controllers / Storage nodes should be upgradable seamlessly, without any disruptions / downtime to production workflow for performance, capacity enhancement and software / firmware upgrades.		
6	RAID support	Should support various RAID levels (RAID5 or equivalent or disk failure protection)		
7	Cache	Minimum 64 GB of useable cache		
8	Redundancy and High Availability	The Storage System should be able to protect the data against single point of failure with respect to hard disks, connectivity interfaces, fans and power supplies		
9	Storage Management software	All the necessary software (GUI Based) to configure and manage the storage space, RAID configuration, logical drives allocation, snapshots etc. are to be provided for the entire system proposed.		
		Licenses for the storage management software should include disk capacity/count of the complete solution and any additional disks to be plugged-in in the future, up to the max disk capacity of the existing controllers/units.		
		A single command console for entire storage solution.		

Volume 2 - Scope of Work and Requirement Specifications

#	Minimum Specifications		Compliance (Yes / No)	Remarks
		Should also include storage performance monitoring and management software		
10	Data Protection	The storage array must have cache protection mechanism or alternate protection mechanism		

15.31. Rodent Repellent

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Type	Ultra-sonic		
2	Configuration	Master console with necessary transducer		
3	Operating Frequency	Above 20 KHz (Variable)		
4	Sound Output	50 dB to 110 dB (at 1 meter)		
5	Power Output	800 mW per transducer		
6	Power Consumption	15 W approximately per controller		
7	Power Supply	230 V AC 50 Hz		
8	Mounting	Wall		
9	Transducer Support	Minimum 10 per controller		

15.32. Access Control System

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Type Of System	Facial Recognition Multimodal: Face plus RF ID Card plus keypad (PIN based) recommended		
2	Display Type	LCD		
3	Screen Size	Minimum 7 Inch / Minimum 5 inch recommended		
4	Operating System	Linux/windows		
5	Certification	IP65 or better		
6	Type	Touch Screen/normal screen		
7	Video Pixel	2 MP or higher		
8	Lens	Dual Lens		
9	Card Capacity	minimum 20000		
10	Face Capacity	minimum 10000		

15.33. Dome Camera

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Video Compression	H.264 or better		
2	Video Resolution	1920x1080		
3	Frame rate	25 fps in all resolutions		
4	Lens Type	Varifocal		
5	Lens	Fixed IRIS		
6	Minimum Illumination	0.9 lux		
7	Image settings	Compression, colour, brightness, sharpness, contrast, white balance, exposure control, backlight compensation, rotation		
8	Protocol	HTTP, HTTPS, FTP, SMTP, RTSP, RTP, TCP, UDP, RTCP, DHCP, UPnP, QoS, IPV4, IPV6		
11	Cyber Security	Cyber Security Certified by STQC as per IoTSCS and meet the essential requirement issued by MeitY		

15.34. Water Leakage Panel

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Type	2 Zone - Water Leakage Panel		
2	Configuration	Water Leak panel		
3	Mounting	Fixing Clips		
4	Sound Output	Hooters		
5	Others	Accessories		

15.35. Fire Detection System

#	Parameters	Compliance (Yes / No)	Remarks
1	The system shall provide an early warning of fire in its incipient stage, analyse the risk and provide alarm and actions appropriate to the risk. The system shall include, but not be limited to, a Display Control Panel, Detector Assembly and the properly designed sampling pipe network.		

15.36. LT Panel

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Voltage Rating	≤ 1000 V; typically, 400/415 V, 3-phase 4-wire		
2	Current Rating	Main incomer ≥ required load; outgoing feeders 100 A to several kA; design with 80% headroom DJ Electro Controlsvolt-on.in		
3	Construction	Modular or compartmentalized; CRCA steel or SS; indoor/outdoor variants; IP44 to IP65 rating Nextgen Power Control Trade India		
4	Busbar & Wiring	Aluminium or copper busbars sized per continuous current & fault rating; SMC/DMC supports; PVC-insulated Cu wiring up to 1100 V grade Nextgen Power Controlswitchgearpanels.com		
5	Finish & Protection	-		
6	Protection & Control	MCCB/MCB, bus coupler, protective relays, indication lamps, meters, interlocking, AMF/APFC options Nextgen Power Controlswitchgearpanels.com		
7	Standards Compliance	IS 8623, IS 4237, GB7251.12, IEC439; CPRI / ISO certification if applicable switchgearpanels.comvolt-on.in		
8	Testing & Documentation	Factory tests (routine/type), GA drawings, BOM, test certificate, O&M manual, fabrication & painting records Scribd		
9	Environmental Ratings	Operating ambient: 0–40 °C; adequate ventilation; optional exhaust fans or louvre louvers Nextgen Power Control		
10	Warranty & Support	Minimum 1-year manufacturer's warranty; spares availability for 3 years. Optional maintenance service or SLA.		

15.37. DG Set

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	General	· Auto Starting DG Set mounted on a common base frame with AVM (Anti-Vibration) pads, residential silencer with exhaust piping.		
		· KVA rating as per the requirement		
2	Engine	· Radiator cooled, multi cylinder, 1500 RPM diesel engine, with electronic/manual governor and electric al starting arrangement complete with battery		
3	Fuel	· High Speed Diesel (HSD)		
4	Alternator	· Self-exciting, self-regulating type alternator rated at 0.8 PF or better, 415 Volts, 3 Phase, 4 wires, 50 cycles/sec, 1500 RPM, conforming to IS 4722/ BS 5000, Windings of 100% Copper, c lass H insulation.		
5	AMF (Auto Main· Failure) Panel	· AMF Panel fitted inside the enclosure, with the following:		
		· It should have the following meters/indicators		
		· Incoming and outgoing voltage		
		· Current in all phases		
		· Frequency		
		· KVA and power factor		
		· Time indication for hours/minutes of operation		
		· Fuel Level in fuel tank, low fuel indication		
		· Emergency Stop button		
		· Auto/Manual/Test selector switch		
		· MCCB/Circuit breaker for short-circuit and overload protection		
		· Control Fuses		
		· Earth Terminal		
		· Any other switch, instrument, relay etc. essential for Automatic functioning of DG set with AMF panel		
6	Acoustic Enclosure	· The DG set shall be provided with acoustic enclosure / canopy to reduce the sound level and to house the entire DG set (Engine & Alternator set) assembly outside		
		· (Open- air).		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		· The enclosure must be weather resistant powder coated, with insulation designed to meet latest MOEF/CPCB norms for DG sets, capable to withstand City climate. The enclosure must have ventilation system, doors for easy access for maintenance, secure locking arrangement, complete		
7	Fuel Tank Capacity	· It should be sufficient and suitable for containing fuel for 12 hours continuous operation, Complete with level indicator, fuel inlet and outlet, air vent, drain plug, inlet arrangement for direct filling and set of fuel hoses for inlet and return.		
8	Fuel Tank Addition	Additional Fuel Tank to be provided if Required		

15.38. Video Management Software (VMS)

Video Management Software (VMS) is a software application that shall be installed in commercial off-the-shelf hardware platforms on Windows and Linux. It shall support both, open-source and proprietary database management systems compatible with standard storage technologies like NAS, SAN, and DAS.
VMS shall enable users to get situational awareness of the scene using live monitoring, recording, and replay and have an inbuilt framework to run AI-enabled Video analytics applications for proactive notifications on the detecting anomalies as defined by Video analytics application rules. It shall also provide innovative dashboards to visualize system-generated data, including the health of servers, storage, cameras, and other assets connected to the system. It shall serve as a decision support system and provide actionable intelligence for situational awareness, security, and safety requirements.
VMS Overview
The VMS shall have various components such as a Management Server, Relational Database, Media Server, and Analytics Server. It shall be based on a client-server architecture that supports unlimited cameras by augmenting Media, Management, and Database Servers. The single Management Server shall handle unlimited cameras, Media Servers, and users.
The VMS shall be operating system-agnostic and compatible with Microsoft Windows, Unix, and Linux Operating Systems. It shall also support virtualization on all the leading virtualization platforms. Furthermore, the VMS shall be able to work with multiple Database Servers, including Microsoft SQL, MySQL, PostgreSQL, and Oracle.
The VMS shall comply with ONVIF Profiles S, G, T, and M, and the VMS OEM shall be an ONVIF member at the "Full" membership level. The ONVIF website shall have a certificate to this effect.
The VMS shall work with Commercially off-the-shelf hardware and storage systems. It shall allow for a separate media streaming service on a separate server to support independent scaling up of streaming services. Additionally, the VMS shall support unicast and multicast streaming for live viewing.
The VMS shall be cloud deployment-ready and agnostic to the cloud environment. It shall work on the cloud servers with in-built intelligent video streaming and resource orchestration services.
The VMS shall allow the addition of multiple storage paths for each Media Server and shall allow the writing of video files on each storage path in a round-robin fashion.
The VMS shall support multi-tier object storage with data retention policies.
The VMS should be STQC Certified. The VMS should be STQC Certified for thick client, mobile client(both android and IOS) & web client . Required certification has to be shared
VMS & VA SOFTWARE should be available from the single OEM. This is to ensures seamless integration and compatibility across the solution and single source liability
The VMS shall be operating system-agnostic and compatible with Microsoft Windows, Unix, and Linux Operating Systems. It shall also support virtualization on all the leading virtualization platforms. Furthermore, the VMS shall be able to work with multiple Database Servers, including Microsoft SQL, MySQL, PostgreSQL, and Oracle.
The proposed security software OEM (providing VMS solutions) should have OS and Graphics Acceleration platform partnership to ensure seamless operation of the solution.
The VMS OEM should be in existence in India since last 15 years. The OEM should have at least the following certificates: ISO 9001, 27001, ISO 27017, 14001 and CMM I Level 3.
VMS OEM must have partner level accreditation and ISV certification from Microsoft and Linux (Red Hat). The necessary supporting documentation must be included with the bid.

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All the communication among the servers and clients should be secured and the VMS should support the SSL and TLS communication. It should have option of encryption with AES 128, 256 and RSA 1024 and 2048 encryption standards. The VMS should also support secure communication between the camera and the server using SRTP and RTSPS protocols. The VMS software should have been tested for vulnerabilities and should have been penetration tested as per the OWASP guidelines. Certificates from the CERT empanelled auditor from the respective country of origin clearly indicating the encryption and VAPT test should be available..
System configuration data should be stored in encrypted files with checksum and there should be user selectable encryption algorithms such as MD5, RSA and SHA.
The proposed VMS should offer 1 full resolution and 1 lower resolution stream for live viewing and 1 Video Analytics Stream. All the video streams (including live or recorded video viewing from multiple operators) should be taken from the VMS and not from the camera at any given point. The VMS should provide the multicasting functionality. The VMS should provide the integrated management functionality for camera, recording, VA use cases management and user management for ease of operation. The Bidders may propose single or different OEMs provided the functional requirement is fulfilled.
Architecture
VMS shall have a Deep Learning Framework - Deeper Look embedded in the Architecture, giving Full Control to build new AI Applications as per market demand quickly compared to others who rely on third parties.
The VMS shall be integrated with the AI Analytics Application Suite in a Single Pane of the window. The analytics events can be monitored in Live View of channels.
Homegrown models shall be adapted to the surveillance domain & High Performance and accuracy compared to open-source models or pure CV-based Algorithms. Each AI Application acts like a device to detect anomalies.
- The microservices-based architecture supports scalability, easy fault isolation, data integrity, and flexible deployment across the edge, near edge, hybrid, or cloud environments. Within the architecture of the VMS, following shall be the important application building blocks: 1 Management Server 2 Database Server 3 Media Server 4 Video Analytics Server 5 API Server (Integration Server) 6 Storage Devices 7 Client Application
Within the architecture of the VMS, following shall be the important application building blocks:
Each building block is explained in detail below.
Management Server
The Management Server shall monitor and manage the operations of the rest of the components. The following shall be common tasks performed by the Management Server:
a) User Authentication
b) Event and Alarm handling
c) Distribution of camera load across Media servers
d) Device health monitoring
An Auxiliary Management Server can also be installed to provide fail-over support for the Master server.
Database Server

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Database Management System (DBMS) shall be a third-party software, and the VMS shall use the database to keep all the configuration information, user credentials, indexes of recorded video, Events, Alarms, etc.
Media Server
Media servers shall receive video streams from IP cameras or encoders, store the video in storage devices with indexing in the Database, and stream the video to the rest of the system on demand. A Media server should also be responsible for fetching the archived video from the storage system and streaming it to client software for viewing.
Media Servers shall form clusters amongst themselves and provide multiple options for failover recording and video streaming services, as follows:
API Server (Integration Server)
VMS shall provide a REST API-based integration server to exchange information with third-party applications such as Integrated Command and Control Center, C4i, etc.
VMS shall stream live and archived video to third-party applications. It can also send Alerts and Alarms to external systems. The API Server shall also host the Video Streaming Engine.
Storage Devices
VMS shall support multiple storage technologies such as Direct Attached Storage (DAS), Network Attached Storage (NAS), Storage Area Network (SAN), and Object Storage.
VMS shall offer a unique recording option when it comes to storage. In case Media Servers are connected to more than one storage device, the Media Servers shall write to the available storage devices in a round-robin fashion. So, the video files shall be distributed on the available storage devices. If one of the storage devices is unserviceable, some parts of video recordings for any camera may become unavailable, but the rest of the recorded video shall be retrieved easily.
VMS shall also support redundancy and failsafe operations for storing the video files.
Client Application
VMS client application is a unified, highly intuitive, and user-friendly application that shall provide an interface to operate the system. The client application shall provide Configuration, Management, and Operation of user functions based on the login credentials.
Web and Mobile clients shall be available. The web client shall work on all the leading web browsers, while the Mobile Client shall be available for Android and IOS platforms.

Product features and functionality

#	Minimum Specifications	Compliance (Yes / No)	Remarks
A	VMS Client and Operator Functions		
1	The VMS shall offer a feature-rich desktop client for Microsoft Windows and MAC OS, a browser-agnostic web client, and a mobile client for Android and IOS platforms.		
2	The VMS desktop client shall provide all the configuration, administration, and operator functions for the Video Management Server, Media Servers, Storage, and Video Analytics to create rules. The client shall support the following minimum functions:		
3	Provide a site-wide, hierarchical tree of cameras visible to all the operators with appropriate rights.		
4	Operator-specific unlimited hierarchy of cameras.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
5	▪ Quick selection of cameras by IP address, Camera numbers, etc		
6	▪ Quick import of camera live view on any video tile by entering the camera number only.		
7	▪ Multi-monitor support for the client workstation		
8	▪ Allow setting up a camera matrix, a map view, and VA alerts view on different monitors.		
9	▪ Set up a personalized screen layout available to the operator from any workstation.		
10	▪ Allow synchronized and simultaneous archive viewing.		
11	▪ Adjust buffer control parameters for fine-tuning the encoded and decoded video buffer time for the smooth playback of the video.		
12	▪ Automatic, or manual selection of hardware/software accelerator decoder.		
13	▪ Retain the VMS client screen state (including Video Analytics alert window, message window, Video Matrix, etc.) in case of an accidental shutdown or log-off from the workstation.		
14	▪ Provide selectable aspect ratios such as 4:3, 16:9, and fill-view for all cameras with override for selected cameras in the matrix view.		
15	▪ View the live videos straight from cameras without passing through any server.		
16	▪ Quick archive video jumping from the live view window by selecting shortcuts for 5, 10, 20, 30 seconds, 1, 5 minutes, 1, 5 hours, and the exact date and time through the calendar widget.		
17	▪ Tabbed view to show camera dashboard, events, archived videos, system configuration, and client setting tabs for various system functions.		
18	▪ Functional system dashboard to view and manage the cameras, operator-specific camera matrix views, map views, VA alerts, and alerts from the integrated devices.		
19	▪ Monitoring of cameras and the external integrated systems.		
20	▪ Create a PTZ tour based on the presets available from the PTZ cameras.		
21	▪ Attach PTZ preset to any video analytics use case.		
22	▪ Provide video playback frame by frame.		
23	▪ Tag a video segment as an event with a description that shall be searchable by the camera, time, and event type.		
24	▪ Provide digital zoom for live and archived video. It shall be possible to monitor the same camera on multiple display tiles; digitally zoomed or on a high-resolution stream.		

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#	Minimum Specifications	Compliance (Yes / No)	Remaks
25	Filter events by camera, VA use case, camera group, and duration. Show a graphical representation of the reports in terms of bar charts and pie charts.		
26	Export reports in Excel and CSV.		
27	Support switchover of unicast and multicast streams based on the network reliability.		
28	Record and playback video + audio from the camera.		
29	Export of single frame of video in JPG and PNG formats.		
30	Add multiple video segments for export in a video cart and tag each segment with a text message. Export all the video segments from the cart at one go to a single folder along with a report where details of each video segment are listed as hyperlinks to the exported video.		
31	Export audio and video together in the AVI format.		
32	Allow raising support tickets from the Help menu by attaching a screenshot of the error.		
33	Record a video clip of the desktop activity for problem reporting.		
34	Allow the administrator to record a movie clip of the screen activity for creating video tutorials for training purposes.		
B	Camera Management and Viewing Functions		
1	VMS shall offer various camera management and monitoring functionalities such as:		
2	Allow configuring the cameras in multiple groups independently.		
3	Assign camera/s to single or multiple groups simultaneously.		
4	Create operator-specific camera matrix of live and recorded videos.		
5	Users can share the camera matrix with other users.		
6	Option for Multiple Grid layout (1x1, 2x2, 3x3, 4x4, 5x5, 6x6, 8x8, 2x1, 5+1, 7+1, 9+1, 12+1, 16+1).		
7	Single-click operation to view a camera in full resolution and full screen from the camera matrix.		
8	Cyclic monitoring of the camera matrix.		
9	Offer drag and drop of the cameras from the camera directory to the video matrix.		
10	Offer an automatic selection of lower-resolution streams for matrix monitoring and higher-resolution streams for full-screen monitoring.		
11	Show color-coded camera icons in the camera tree to indicate camera status such as live, recording, stopped, and VA alerts.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
12	Camera Import through IP address, camera number, name & drag to view in any video tile. A single camera can be played in full screen.		
13	Users can create a custom grid view (M * N) matrix for live view and recorded video replay.		
14	Smaller screens adapt to lower resolutions, and bigger screens adapt to the higher resolution.		
15	Buffers can be adjusted for a smoother live view in case of network fluctuations.		
16	While the operator is watching live, he or she can go 5/10/.. seconds back for any particular camera or all.		
17	Easy download of recorded video of the same period from multiple cameras from the Live view panel (Dashboard panel) in the Video cart.		
18	Recorded video view control (fast forward, pause, Rewind) in a time-synced manner for multiple cameras.		
19	In the same matrix view, have a combination of live view, and replay for some cameras, at the same time in one or more tiles. Additionally, we can see external device alerts like Access Control swipe in swipe out and other alerts from other devices(e.g., PIDS) connected to the system.		
20	The operator can make any matrix tile as a hotspot, and video will start playing in this tile if any event /alert happens.		
21	Define operator-specific bookmarks (i.e., camera placement at different tiles) by dragging and dropping cameras from various sites.		
22	All the PTZ functionalities like pan/tilt/zoom, manage presets, and tour are available for the operator.		
23	The matrix view of the client can be mapped to multiple monitors with assigned layouts and cameras.		
24	Users can place camera views (live or recorded video) in matrix tiles and save them as a bookmark. A single click on the saved Bookmark will show the camera views on that saved matrix layout.		
25	The operator can select multiple bookmarks and switch them automatically in the matrix view with specified switching intervals.		
26	The operator can select multiple bookmarks and switching intervals. Matrix view can be exported to other monitors with Bookmark switching enabled.		
27	Streams from the camera can be directly displayed in the operator client bypassing the VMS server. Useful when the camera streams in multicast and the network is Multicast aware.		

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#	Minimum Specifications	Compliance (Yes / No)	Remaks
28	PTZ Camera displays all preset views with a configured time limit at each preset. The setting is embedded in the camera.		
29	The operator can create a tour using the PTZ preset and define the time interval for each preset, the tour settings in embedded in the VMS application, without disturbing the camera's internal settings.		
30	Digital zoom with a picture-in-picture functionality shall allow users to zoom in on a specific area of interest within an image or video while maintaining an overall view of the entire image or video.		
31	Cameras to the VMS server shall support both unicast and multicast streams. The system also provides configuration to switchover between unicast and multicast streams.		
32	On noticing some suspicious activity in the scene, the operator can click the snap capture button to save the image being displayed.		
33	Using a client application, the operator can broadcast any preserved audio message through the speaker attached to the cameras. Similarly, the operator can hear the audio received from the camera's microphone. The operator can also talk to the microphone attached to the workstation and play it through camera camera-attached speaker. Setup personalized screen layout which is available to the operator from any workstation.		
34	On the video tile itself camera name, and stream info like fps, bitrate, frame time, and stream type are visible.		
35	The operator can copy the snapshot of the video matrix view from the live view panel to the system clipboard and can further send it via email to supervisors or administrators for investigation.		
36	Cameras can be grouped based on Location.		
37	Cameras can be grouped based on camera type or business-specific use case type. For example, all PTZ cameras can be put in the PTZ Collection so that a single click on the label name can start a live feed for all the PTZ cameras.		
38	Hotkeys for faster controls, for example: left arrow for PTZ continuous left move, +/- for zoom in zoom out, space bar for play pause.		
39	The viewing experience can be enhanced by controlling brightness and sharpness using the client application.		
40	Provide selectable aspect ratios such as 4:3, 16:9, and fill-view for each tile.		
41	Shortcut for 5/10/20/30 seconds, 1/5 minutes, 1/5 hours past archive view from live.		

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#	Minimum Specifications	Compliance (Yes / No)	Remaks
42	Display of camera recording stopped status on video tiles with date and time since it was stopped.		
43	Multiple cameras can be grouped with a name and the same can be displayed in a single video tile in round-robin fashion and forward / backward mode. Using this you can see even 1000 cameras in 2x2 view having 25 cameras assigned to each tile.		
44	The Application shall have the capacity to configure key frame intervals (i-frame) in seconds or number of frames.		
C	Recording Functions		
1	The VMS shall allow the creation of customized recording profiles with day and hour granularity with the addition of recording profiles for special days. It shall have unlimited recording schedules with multiple streams. The recording configuration shall have the following options:		
2	Redundant recording		
3	Edge recording		
4	Selection of SRTP or RTSPS protocols		
5	Motion-only recording, FIFO, and retention period based.		
6	The VMS shall offer hue, saturation, contrast, brightness, sharpness, IRIS, and automatic or manual focus adjustment parameters.		
7	The VMS shall provide replenishment of recording from camera edge storage in case it is not available in the VMS due to network disconnection. Such video segments shall be identifiable with different colors in the timeline bar in the video replay panel.		
8	The VMS shall have a non-delete flag for important events, such a flag shall have a perennial or configurable retention period.		
9	The VMS shall facilitate to record videos at a lower frame than is received from the camera with frame rate reduction mode.		
10	The VMS shall offer three options for operator-specific recordings:		
11	a) Record Matrix Videos: Record a matrix of the videos being displayed on the screen.		
12	b) Record Stitched Videos: Stitch and record the video matrix in the horizontal or vertical direction.		
13	c) Record Screen: Record the entire screen of the operator including a matrix of cameras visible and other desktop activity being performed by the user outside of the VMS client.		
14	The VMS, once configured, shall work seamlessly, without any configuration, after the server/s passes through the power on-off cycle.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
15	Other recording and archive view features shall include:		
16	▪ Operator can configure Type of Stream, buffer size, quality of video & decoder type.		
17	▪ Time synchronized and simultaneous archive viewing from multiple cameras		
18	▪ Ability to configure multiple recording schedules with a combination of multiple streams at various time intervals.		
19	▪ System can identify the presence of a person/vehicle in recorded video. No server computation is required. A workstation is used to analyze the video as it is being streamed to the workstation.		
20	▪ Parallel recording in a separate storage, system can get different streams from the camera and be used for simultaneous recording in two different storage devices.		
21	▪ System shall have a non-delete flag for important events to ensure it is kept safe, event can be kept for a defined retention period or permanently		
22	▪ Export archive display panel in another monitor		
23	▪ Users can traverse the archive and view recordings according to the desired timeline		
24	▪ The speed of the archive view can be configured		
25	▪ Multiple camera recordings, time synced or otherwise, can be stitched together horizontally or vertically		
26	▪ Record the entire screen of the operator including the matrix of cameras visible and other desktop activity being performed by the user and visible onscreen. The recording can be exported and shared with others		
27	▪ On demand, the recording can be stored in a local workstation.		
28	▪ Motion-only recording feature shall record camera streams only when motion is detected. This helps optimize storage space.		
29	▪ System shall provide the facility to fetch SD card recorded video from the camera and seamlessly backfill the same if there are gaps in recording due to network disconnection or otherwise.		
30	▪ Rewind by time and replay in archive panel		
31	▪ Fast Forward, Backward by time & play in the archive panel		
32	▪ With one One-Click of a button user can navigate frame by frame in recorded video		
D	Storage Management Functions		
1	The VMS shall include the following Storage Management related functions:		
2	▪ Export audio and video together in the AVI / MP4		

Volume 2 - Scope of Work and Requirement Specifications

#	Minimum Specifications	Compliance (Yes / No)	Remarks
3	▪ Support Local HDD, DAS, and Hybrid Storage for video data archiving.		
4	▪ Provide store and forward recording between local storage and network storage with a configurable video retention duration.		
5	▪ When the camera disconnects from the system, VMS will lose the recording. Using this feature missing data can be recovered from the edge when the camera is online.		
6	▪ First-In-First-Out Data Cleaning Policy		
7	▪ Users can define the retention period.		
E	Information Security & User Management		
1	The system shall have multiple levels of authentication and access control mechanisms:		
2	▪ Role-based Authentication - Addition of new users based on five different profiles with Role-based Access Control. Administrator, Supervisor, and 3 Levels of Operator are the different profiles available.		
3	▪ User stickiness to a particular workstation or mobile phone.		
4	▪ Users of the Operator category can be restricted to viewing sections of camera FOV, both in live and recorded video.		
5	Following shall be the main features to ensure the information security:		
6	▪ Provide encryption with symmetric or asymmetric cryptography options using AES 128 and 256 and RSA 1024 and 2048 encryption standards.		
7	▪ Provide SRTP and RTSPS protocols between the camera and the server.		
8	▪ Store configuration data in encrypted files with checksum and provide user-selectable encryption algorithms such as MD5, RSA, and SHA.		
9	▪ Proprietary and encrypted format for the data at rest.		
10	▪ Watermark the videos downloaded from the system.		
11	▪ Export videos without tampering and support converting one file format to another.		
12	▪ Maintain audit trails of all activities in the system.		
13	▪ Provide in-built audit reports for network connectivity and the throughput of storage devices against each server.		
14	▪ Restrict users from viewing some cameras marked by the admin.		
15	▪ Allow the Administrator to audit the operator screen by importing any active user screen on the camera matrix tile to watch and record the operator's screen activity.		
16	▪ OAuth 2.0 Protocol support for authorization of user login		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
17	For additional security and accountability, it shall be possible to:		
18	▪ Restrict the operator to a hardware workstation.		
19	▪ Allow verification of the user through seeking answers to the security questions during password reset.		
20	▪ Select a different password than the last three passwords.		
21	▪ The system generates an Alert on user-login.		
22	▪ Admin can force any operator to logout from the system		
23	The VMS shall provide a surveillance chat room for collaborative vigilance. It shall offer:		
24	▪ Exchange text messages, user-selectable files, archived video links, camera layout details, incident snaps, Video clips, and VA alerts. The exchange of information shall be possible amongst users of the systems.		
25	▪ Show color-coded status for messages sent, delivered, and read.		
26	▪ Administrator access to all the messages exchanged in the chat room.		
27	▪ Share the camera matrix of live and playback videos.		
28	The VMS shall have event escalation for unattended events from the operator to the supervisor.		
29	The VMS shall allow camera permissions to the users based on individual cameras, groups of cameras, and all cameras.		
F	Standards and Protocols		
1	The VMS shall include the following Standards and Protocols related features:		
2	▪ Support ONVIF Profile S, T for Streaming Video and Audio.		
3	▪ Support of standard real-time streaming protocol to receive video feed from cameras. Provide Secure-RTP and RTSP-Secure protocols between the camera and the server.		
4	▪ Support matrix view at full frame rate with support for H.265, H.264, MPEG4, and MJPEG video compression.		
G	Multi-site Deployments and Centralized Management		
1	The VMS shall support multi-site deployments with centralized monitoring of cameras and management of respective VMS sites. The centralized monitoring platform shall have the following features:		
2	▪ Support matrix view at full frame rate with support for H.265, H.264, MPEG4, and MJPEG video compression for the remote cameras.		
3	▪ Define operator-specific bookmarks by drag and drop of cameras from various sites and various combinations.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
4	▪ Control PTZ cameras of any site from the central monitoring client application.		
5	▪ Ability to pick and choose the selected cameras from multiple remote sites in a single pane of window.		
6	▪ Ability to search and retrieve the archived video from the remote site with intelligent motion-based search.		
7	▪ Download multiple video segments from multiple sites easily using the Video Cart export functionality.		
8	▪ Support secure and encrypted transmission of video files and other data. All communication channels should be conformant with TLS 1.3.		
9	▪ Receive alerts from the remote site with event metadata received first and then the users can request image and video clips to ensure effective bandwidth management.		
10	▪ Dashboard of all connected devices and the health status of the devices.		
11	▪ Resource utilization of the system and statistical reports for the remote sites.		
12	▪ Camera SLA report with camera connection and uptime information.		
13	▪ Video and Event Backup at a central location from multiple sites at central storage and database.		
14	▪ Streaming from multiple sites at multiple workstations/web clients without loading On-Prem VMS.		
15	The VMS shall include the following Deployment Environment:		
16	a) Client and Server supported in Windows mode.		
17	b) VMS Server components available in Linux.		
18	c) VMS can be deployed in a Container setup		
19	d) VMS can be deployed in a Virtualization Environment. VMWare, HyperV, and QEMU (open source).		
20	e) Ability to work with multiple DBMS including Microsoft SQL, MySQL, PostgreSQL		
H	Failover Functionalities		
1	The VMS shall provide multiple redundancy options in the platform for the following components:		
2	▪ Native failover functionality for the Management server without any dependency on the external tools. The VMS shall provide a failsafe mechanism so that camera recording services are not disturbed if the Management server or Auxiliary Management server is temporarily unreachable over the network.		
3	▪ The VMS shall provide failover redundancy for the Media Server with a Fixed allocation of cameras to the servers and also automatic load balancing across all the active Media servers.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
4	In Automatic Mode, the VMS shall assign the cameras for recording to each Media Server based on the computing capability of the respective Media Server. VMS shall utilize all the Media Servers including the redundant one for recording in a clustered configuration.		
5	In Fixed Mode, the VMS shall allow the administrator to assign the cameras to a Media Server and assign a Failover Media Server to a single or a group of Media Servers.		
6	Each Media Server shall have an independent configuration of local and network storage.		
7	VMS shall provide a failsafe mechanism so that camera recording services are not disturbed even if the Management server or Auxiliary Management server is temporarily unreachable over the network.		
8	VMS shall provide failover redundancy for the Master Server with an Auxiliary server.		
9	Each Media Server shall have an independent storage configuration for local and network storage. Storage can be allocated media server-wise		
10	The VMS shall provide store and forward recording between the local and network storage with a configurable video retention duration.		
I	Investigation and Tracking Functions		
1	The VMS shall offer the following investigation and tracking functionalities:		
2	Recreate a scene by arranging the cameras and their respective time-stamped archived video and record the matrix as evidence video.		
3	Associate up to 4 neighbourhood-view cameras to a base camera for tracking activity for investigation. The screen widget shall show live and playback video of the base camera and live view of the associated cameras along with the map view.		
4	Allow tagging of exceptions/audit/investigation findings and create an institutional library for reference.		
5	Search motion by marking an area of interest of any shape for the selected duration in playback video.		
6	Provide an audit tool that only shows the pre and post-video of the events recursively for the selected camera.		
7	Snap search feature to allow an operator to view the system-generated image snap matrix for the selected duration with dynamic and high-level time intervals between the snaps. The VMS shall show a recursive set of snaps with lower time intervals automatically upon clicking any snap to quickly locate the area, incident, or object of interest in the scene.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
8	The VMS shall have an attribute search analytics feature to select any person in the camera field of view and search for a similar-looking person based on the attributes in other cameras. The search shall yield a grid showing matching persons. The video shall playback upon clicking any person instantly.		
J	Events		
1	The VMS shall include the following Events-related functionalities:		
2	Event display in real-time as and when received from VA/AI subsystem.		
3	Popup notifications for a category of events, as categorized by users		
4	Search events for a selected camera.		
5	Search events for a selected Analytic Use case.		
6	Search all events for a selected camera group.		
7	Operator can select a duration and see all the events that occurred during the given period.		
8	Filter events based on date, time, severity (Critical, High, Medium, Low), Location, Camera, and acknowledgment status.		
9	Show a graphical representation of all events using bar and pie charts.		
10	Retain only the part of the recorded video when the event has occurred to optimize the storage space. Users may configure to keep continuous recording of one day and then retain only those parts where the event has occurred.		
11	Operators can acknowledge the event and take necessary action per the standard operation procedure. Here acknowledgment can be Valid, or spurious- if it is a false event or ambiguous in case of no clarity even during a manual audit.		
12	Separate audio files for supported event types such as Intrusion detection, crowd detection, people, vehicle, animal & others. If an event happens then the client application will play the pre-recorded audio file, possibly different for different event types, through the speaker attached to the machine.		
13	Export filtered events to EXCEL/CSV/PDF, containing event details and images.		
14	Critical videos saved for future reference can be viewed and downloaded.		
K	Web and Mobile Clients		
1	The VMS shall have a browser-agnostic web client and mobile client for Android and IOS platforms available from the respective Play Store and App Store.		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
2	The web application shall support HLS and Web RTC streaming. It shall support link sharing within authenticated users from the web application. The VMS web interface user can forward video link URLs by email to another user.		
3	The web client functionalities shall also include:		
4	Live view and archive data view of the camera for connectivity		
5	Operators can download the archive video clip for a given timeline		
6	Event search based on Analytic type, Camera name, date, and time		
7	Live Notification of VA event on web client application		
8	VMS supports link sharing within authenticated users from the web application. The VMS web interface user can forward video link URLs by email to another user.		
L	Health Monitoring, Audit Trail, and Reporting Functions		
1	The VMS shall have following functionalities:		
2	A dashboard indicating the health of the overall system, status of the master server, media server, network storage, cameras, users, database, and auxiliary server, connectivity & count of cameras online/offline, the total number of users, and the number of users connected, connectivity and count status of the master server, media server, network storage, and database.		
3	Server report containing media server name, IP address, and streaming status of cameras connected to the server. Indicates warning if any camera is disconnected or not streaming. It also indicates the connectivity status of the server to the database, local storage, and network storage.		
4	Show health dashboard with vital system parameters such as RAM and CPU utilization for Media Server and Local Workstation along with the status of Management, Database Server, and Storage.		
5	Camera SLA report showing uptime, recording percentage, recording status, critical events, incident video, etc.		
6	Storage utilization for all connected servers is displayed in the dashboard.		
7	Camera Status report containing Total Number of Cameras, Number of cameras recording, Not Recording, Camera Name, IP, Camera-wise recording status, Recording status streamwise (Major/Minor), bit rate, frame rate, timestamp of oldest recording, timestamp of newest recording, Video retrieval time, latency and Video viewing frame rate.		

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#	Minimum Specifications	Compliance (Yes / No)	Remaks
8	List all active or incoming alarms by duration, source, operator, and alarm state.		
9	Provide Alert, Events, and Rule Logs searchable by various parameters.		
10	System logs report containing user login, logout information with date, time, camera connection, disconnection, media server up/down, storage connection, disconnection with date and time, the status of stitched recording, bookmarks created, map views done, the status of analytics server up/down & new locations created. Filter the logs for a given date & time based on component status as applicable to the components (Low Storage, Storage full, start, stop, add, delete, update, login, logout, alarm on, off, alarm silent, alarm reset, registration, update, download clicks) and level (Error/Debug/Trace/Warning), and export the data in Excel.		
11	Operators can ping the camera from a client of VMS.		
12	Automatically generate periodic reports for camera connection status, storage, database, and camera-wise recording status. The report gets created in a .csv format.		
13	Camera-wise recording percentage display of the current day. The report can be exported in the form of EXCEL.		
14	Recording percentage camera-wise for all the days of the month camera wise. The report can be exported in the form of EXCEL.		
15	The system generates an alert on server connection and disconnection, Video loss from any connected camera, recording stops, storage disconnection, and camera disconnection. The report can be exported in Excel.		
16	The server health report and Camera health report can be downloaded in EXCEL format.		
17	The VMS shall also include an Audit Trail report on the:		
18	Operator-wise Live-view and Archive view requests made with date and time.		
19	Events exported by operators with date and time.		
20	All PTZ requests made by operators with date and time.		
21	Events acknowledged by operators with date and time		
22	The unified dashboard shall include the following functionalities:		
23	Display of events specific to the Location		
24	Export event reports Excel/PDF.		
M	API and Integration Functions		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	The VMS shall provide an Open API-based integration gateway without additional cost or licensing. The API shall be able to send information about various aspects of the VMS system to the external application requesting the information. The API shall provide functions such as:		
2	Find servers, registered users, alert types and alerts, available channels, channel ID, count, status, type, PTZ cameras, and PTZ controls, get event count, event search, event snap ID, event video clip, camera live video play, playback video play, trigger an event, activate, or suspend a device, etc.		
3	Provide HTTPS-based REST API with cryptographic controls for secure connection between web and mobile users.		
4	Provide a web interface with login credentials to request the information from the system.		
5	Offer web user management for API services.		
6	Register the servers to set up the integration.		
7	Provide a single API gateway for Video Management and Video Analytics functions.		
8	Provide a dynamic and interactive playground for testing all the API calls.		
9	Display the list of API calls available, show the URL, the method for requesting the information, and the required headers.		
10	Present the real-time response from the VMS in the web interface to test the API calls.		
11	Subscribe or unsubscribe from the alerts.		
12	Find alert types and alerts		
13	Provide descriptive documentation on using the API services and the features available.		
14	Integration with ICCV applications, providing operators with advanced capabilities for efficient management and response to security incidents		
15	Integration with Camera-specific SDK/API to realise and get the benefits of features that are not available over ONVIF Profiles.		
16	Joystick controller integrations to facilitate intuitive and precise control of PTZs, and video tile operation.		
17	VMS shall deliver optimal performance & reliability with a wide range of CPU, GPU, and storage devices		
18	Integration with video decoder devices for enhanced situational awareness and effective monitoring of a wide array of camera feeds in real time.		
19	Integrate NVRs/DVRs to retrieve video streams.		
N	1.1 Special Features		
1	The VMS shall also include the following special features:		

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#	Minimum Specifications	Compliance (Yes / No)	Remarks
2	During emergency investigations, a group of operators can quickly chat and exchange critical evidence information and video clips via chat.		
3	Exchange text messages, user-selectable files, archived video links, camera layout details, incident snaps, Video clips, and VA alerts. The exchange of information shall be possible among users of the systems.		
4	Media servers do not need fixed IP addresses. Hence, the system can be deployed when static IP addresses are unavailable (e.g. over broadband communication).		
5	If events occur in close succession, the pre-event and post-event clips generated are reused.		
6	Fully Compliant with ONVIF T, M specification for retrieving edge alerts.		
7	Retain the VMS client screen state (including Video Analytics alert window, message window, Video Matrix, etc.) in case of an accidental shutdown or log-off from the workstation.		
8	Monitoring of the cameras and the external integrated systems in the same matrix view		
9	Choose from auto/manual selection of hardware/software accelerator decoders. Based on the number of channels, operators can choose the optimal decoder.		
10	Allow quick investigation by watching snaps of a particular camera over a timeline at periodic intervals.		
11	Add multiple video segments before exporting to a video cart, and tag each segment with a text message. Export all the video segments from the cart at one go to a single folder along with a report with details of each video segment as hyperlinks to the exported video.		
12	Raise support tickets from the Help menu by attaching a screenshot of the error.		
13	Export of single frame of video in JPG, PNG, or GIF formats		
14	The client application state can be saved so that operators can resume later from where they left off.		
15	The VMS should be STQC Certified. The VMS should be STQC Certified for thick client, mobile client(both android and IOS) & web client . Required certification has to be shared		

15.39. Virtualization Software

#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	General Requirements		
1.1	The solution shall be an hypervisor, or equivalent, capable of creating, running, and managing multiple VMs on shared physical infrastructure.		
1.2	Shall support deployment with centralized management, policy-based and stability, or equivalent.		
2	Compatibility & Interoperability		
2.1	Shall support industry-standard x86-64 multiprocessor rack servers (Intel/AMD)		
2.2	Shall support Microsoft Windows Server (latest), Linux distributions (RHEL, Ubuntu, CentOS, SUSE), and Unix variants as guest operating systems.		
2.3	Integration with SAN/NAS/DAS or equivalent storage.		

15.40. ICCC Platform

#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Standardized Data Aggregation and normalization capabilities	It is envisaged that the Unified Operation Centre of NASIK KUMBH will follow system-of-systems approach and implement multiple Smart System use cases over a period. The potential System to integrate as per current and future scope are:		
		o Public Address System		
		o CCTV Surveillance - Video Management System		
		o GIS Application		
		o Traffic Enforcement System		
		o VMD		
		o Emergency Call Box		
		ICCC Platform should follow System of Systems approach and integrate with existing sub-systems as well as future sub-systems.		
		Should have ability to integrate with subsystems natively driving unified user interface providing ease of operations and facilitating central control across multiple operations.		
		The ICCC Platform should be able to integrate with required sensor platform – Standalone Sensor System, IoT Gateway connected Sensors, Network components etc. which is being used for NASIK KUMBH applications irrespective of the technology used.		
		The data store function shall acquire data both automatically and manually. Automatic data acquisition shall be met through industry-standard data transports. Data Acquisition via Dynamic Data Exchange and for Process Control along with other proprietary transports shall also be supported.		
		ICCC Platform should be able to connect to operational technologies with bi-directional control via native protocols for scalability.		
		ICCC platform should connect to IT Application and network components via point-to-point integration with IT protocols via Web-		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		services/APIs/ REST/SOAP and Network protocols via SNMP.		
		The device integration components must include powerful diagnostics, redundant communications, data level security, native open protocol communication connectivity and improved deployment capabilities.		
		The platform should be able to aggregate and normalize the data coming from different devices of same and provide secure access to that data using data API(s) to application developers. The message exchange between various applications via ICCC platform should be fully encrypted and authenticated.		
		ICCC platform is required to provide a single common layer for all connectivity to simplify configuration, establish standards, accelerate implementation, minimize maintenance, and expand capabilities. It must fully embrace the openness of open protocol communication technology, exposing data from products as an open protocol communication Client and providing the means to connect to any third-party open protocol communication Server.		
		The platform should support distributed deployment of functions (workflows & policies) across System's network and compute infrastructure with centralized management and control.		
		The platform for ease of management with adequate authentication and Role based access control mechanism.		
		The platform should support on-premises Active Directory or cloud-based Azure Active Directory for user authentication.		
		The platform should have provisions for flow of normalized data in a predefined manner with adequate authentication.		
2	Developer Program Tools	ICCC platform should provide a comprehensive API or SDK (Software development kit) to allow interfacing and integration of 3rd party systems.		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		SDK tools should help System to produce new applications, and/or use solution APIs to enhance or manage existing solution.		
3	Platform Upgrade and Maintenance	Platform should be able to make incremental changes in response to the staged object deployment within same scan cycle and make continuous updates on the fly.		
		Platform should be able to be deployed as an on-premises Model as a primary service or on Virtual environment to support for implementing Disaster Recovery.		
		And Platform should support IaaS environment on public cloud		
		*(Disaster recovery is not part of Current scope)		
4	Platform Functionality (ICCC)	System should enable users to define the business rules around incidents handling and Emergency response as per agreed SOPs		
		System should provide a common data integration layer for Transactional data (DB) and common data integration layer for time-series data (Process Historian) which can collect and contextualize information from disparate data sources regardless of protocol. Platform should have supervisory capabilities and should be able to bi-directionally monitor, command & control all types of operational technology.		
		System should manage the life cycle of incidents and related entities via predefined workflows. Workflow should be able to write interactive SOPs. The workflow could cut across multiple systems via the interfacing modules. Workflow for operational alerts and escalations should be triggered automatically without human intervention.		
		System should manage the planning preparations of an incident including resource allocation, tasks management etc.		
		System should provide users with business analytics reporting and tools to organize, evaluate and efficiently perform day to day operations		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		System should provide filterable reports and dashboards about critical information pertaining to incidents and KPIs collated in a single view which can be drilled down further for more detailed information		
		System should manage roles definition for internal as well as external access		
		System should provide facility for centralized storage of operational data (time-series) with high granularity and data compression capability		
		System should enable operators and the crew members to access the workflow task assigned to them and act using the native mobile application. They should be able to close loop of workflow by acknowledging the real-time status of Action assigned to them.		
		Application management: Provides role-based access view to applications		
		Enabling analytics: real-time analytics through Stream Analytics and time-shifted analytics.		
		Application GUI should support multi-monitor application.		
		Application client access should support:		
		a) Web based terminal application which includes technologies like RDP over HTML (No software installations are required, and application should be accessible from web browser)		
		b) Operating system based application interface. (Dedicate application clients which require software installation on Workstation for secure node data communication)		
		c) The supported browsers shall include but not limited to IE, Chrome, Firefox and Safari. In addition, the platform shall also be able to present information on mobile devices such as tablets and smartphones while maintaining the basic UI features.		
		d) Application should support Read only OR Read/Write communication configuration for monitoring and control operations.		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
5	Authentication, Authorization	System should support standard Authentication, Authorization Performa.		
6	Operation Management Interface	a) ICCC platform should have a user interface or dashboard and schematics that connects a person to a machine system or a device to achieve human machine interface. The interface should provide displays with modern UI/UX design. System should provide multi-touch and gesture controls such as panning & zooming, swipe, clutter & declutter of graphical layers and a larger view of the process. Extensible library of pre-designed 'intelligent' and customizable visualization objects & templates		
		b) ICCC platform should have a client/server architecture to allow multiple client access to an Ethernet connected server. The workstation shall operate also as a stand-alone workstation/server. Should have built-in, real-time, and historical trending. Stunning graphic visual representation and interaction with operation bringing the right information to the right people at the right time		
		c) UI/UX for ICCC platform should supports multi-monitor. And shall works on both OS based native application as well as web-browser (RDP over HTML).		
		d) ICCC platform shall enable an operator to interact with various devices including network nodes, recorders, input/output (I/O) systems, intelligent transmitters, and other field devices.		
7	Data and Analytics Engine	Data archive and logging: stores data feeds from the device engine and external data sources		
		ICCC platform should be able to perform multi-dimensional analysis on incidents data. This should provide capability to do Trends Analysis and provide near real time Stream Analytics, time-shifted or offline analytics on the archived data		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		Reporting: delivers reports based on events triggered by device engine data and external notifications.		
		ICCC platform should have inbuilt Time-series historian (OT Data) with advance data retrieval. Platform should have following advance data retrieval modes like:		
		• Time-in-state		
		• Best fit		
		• Counter		
		• Minimum, maximum, average		
		• Slope		
		• Time weighted average		
		• Cycle and delta		
		• Value state		
		• Interpolated		
		• Integral		
		• Full		
		• Round trip		
		System should be able to handle data coming in from system with mismatched system clocks, preserving the correct data sequence automatically		
		ICCC platform should have inbuilt Historian to capture and store high-fidelity industrial and enterprise data. Historian should high-performance process database capable of storing the huge volumes of data generated.		
		Historian should be capable of unite high-speed data acquisition and storage with traditional relational database management.		
		Historian shall have capability to support up to 2 million I/Os		
8	Trending & Reporting Service	It should provide data-trend analysis, sophisticated numerical-data analysis using Microsoft Excel spreadsheet software, comprehensive data reporting using Microsoft Word and the capability to publish real-time and historical information to the Web or intranet site;		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		• Must produce on demand and scheduled reports for regulatory compliance and management;		
		• It should publish reports easily to intranet or Internet servers;		
		• It must be possible to customize data queries as per users' inputs;		
		• Integration with and support for Microsoft Office® via Excel® and Word® add-ins.		
		• Possibility to connect to local or remote Relational Database (RDB) sources through either Open Database Connectivity (ODBC) or OLE-DB;		
		• Report template version management;		
9	Events & Incident Management	• System should allow policy creation to set of rules using Rule Engine that control the behaviour of infrastructure items. Each policy should a set of conditions that activate the behaviour it provides. System should allow Default, Time-based, Event-based, and Manual override policy creation.		
		• System should support for sudden critical events and linkages to standard operating procedures automatically without human intervention.		
		• Should support for multiple incidents with both segregated and / or overlapping management and response teams		
		• Should provide facility to capture critical of the incident and be modifiable in real time by multiple authors with role associated permissions (read, write). Incidents should be captures in standard formats to facilitate incident correlation and reporting.		
		• System should provision to defines a set of conditions that can be used to trigger an event-based policy		
		• The system must identify and track status of critical infrastructure/ resources and provide a status overview of facilities and systems		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
10	Notifications, Alerts and Alarms	System should generate Notification, Alert and Alarm messages that should be visible within the Dashboard and the Enforcement Officer Mobile App if required. System should have advance alarm management capabilities like state-based alarming, alarm suppression, alarm shelving, alarm grouping and aggregation (active & historical) alarms		
		All system messages (notifications, alerts, and alarms) should always be visible from the Notifications view, which provides controls that operator can use to sort and filter the messages that it displays.		
		Systems should deliver message to a set of subscribers. The Notification service should support minimum three types of notification methods – Email notification and Short Messaging Service (SMS) notification and Mobile App based Notifications		
11	Users and Roles	Users access and perform various tasks, such as adding new locations, configuring new devices, managing adapters, and so on. However, not all users can perform all tasks. Each user should be associated with one or more roles and each role is assigned a certain set of permissions.		
		These roles and permissions define the tasks that a user can perform. Additionally, system should assign one or more locations to each role so that the user can perform tasks at the assigned locations only.		
		Roles and permissions define the tasks that a user can perform, such as adding users, viewing location details, exporting devices, generating reports, and so on. Each user should be associated with one or more roles and each role has an assigned set of permissions.		
		The platform should allow different roles to be created and assign those roles to different access control policies.		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		Since this platform is being used for complete <u>NASIK KUMBH</u> , the platform should also allow association of users and areas. For example, the platform should allow creation of areas/locations in the system which correspond to various physical areas in the System and allow the admin to associate different users to different areas with the intent that each user can control only services for a respective area/location for which has been given access.		
		System should support LDAP to be used as an additional data store for user management and authentication.		
1	Dashboard and Analytics	The ICCC platform should allow users to define benchmarks against performance parameters. Performance reports shall have the option to generate reports with or without benchmark comparison. The platform should have capability to provide access to near real-time, real-time data and historical data from various connected devices for reporting and analytics.		
2		• ICCC platform should provide filterable reports and dashboards about critical information pertaining to incidents and KPIs collated in a single view which can be drilled down further for more detailed information.		
		• ICCC platform should provide integrated dashboard and KPI tracking capabilities for various System functions. Dashboards should be designed in such a way that user should be easily navigate user interfaces for managing profiles, groups, messages templates, communications, tracking receipts and compliance. Likewise, ICCC should have capabilities to configure and monitor key performance indicators on real time basis.		
		ICCC platform should provide historical reports, events data, and activity logs. The reports can be exported to PDF or other formats. Offered platform for Reporting and dashboard solution should have consolidated Single window		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		reporting, correlation, and Analytics solution for all non-video applications.		
1 3	Data Security	The access to data should be highly secure and efficient.		
		Access to the platform API(s) should be secured using API keys.		
		Software should support security standards: SSO, HTTPS over SSL, and key management help protect the data across all domains.		
1 4	CCC Operations	The ICCC platform shall be fully integrated commercial off the self (COTS) software platform that provides seamless integration and control mechanism with various Information Technology, Operational Technologies and IOT sensors/ applications/ platforms.		
		The solution shall integrate with GIS and map information and be able to dynamically update information on the GIS maps to show status of resources.		
		The solution shall also provide an integrated user interface for all the smart elements implemented.		
		The solution should provide operators and managers with a management dashboard that provides a real time status and is automatically updated when certain actions, incidents and resources have been assigned, pending, acknowledged, dispatched, implemented, and completed. The above attributes shall be color coded.		
		The solution shall provide the “day to day operation”, “Common Operating Picture” and situational awareness to the center and participating agencies during these modes of operation.		
		It shall improve scalability for large and geographically distributed environments.		
		It shall provide complete view of sensors, facilities, ERP, video streams and alarms in an easy-to-use and intuitive GIS-enabled graphical interface with a powerful workflow and business logic engine.		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		• It shall provide a uniform, coherent, user-friendly, and standardized interface.		
		• The dashboard content and layout shall be configurable, and information displayed on these dashboards shall be filtered by the role of the person viewing dashboard.		
		• The solution shall allow creation of hierarchy of incidents and be able to present the same in the form of a tree structure for analysis purposes.		
		• The solution shall be available via a VPN as a web-based interface or a thin-client interface.		
		• It shall be possible to combine the different views onto a single screen or a multi-monitor workstation.		
		• The solution shall maintain a comprehensive and easy to understand audit trail of read and write actions performed on the system.		
		• The solution shall provide ability to attach documents and other artefacts to incidents and other entities.		
		• The solution shall provide real time schematics to control the assets/operations. The platform shall have capability to authorize and authenticate operator upon every write issued from the ICCC platform		
15	System Development	• ICCC platform development Environment shall provide a mechanism to develop Application Object Templates.		
		• ICCC platform system software shall include an object-oriented color graphics display generator with full animation capabilities to provide users with a realistic and efficient visualization of the system process. It shall provide graphical capabilities to allow design of highly efficient user interface aimed at helping operators to easily achieve a state of situational awareness in relation to the process.		
16	Common Operational Picture	Common Operational Picture should comprise of a comprehensive view of the incident or a group of related incidents as on a specific date		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		and time which should include but not be limited to the following:		
		a. Tasks assignment and their status		
		b. Department involved		
		c. Resources deployed		
		d. Incident status across relevant parameters of the incident		
		e. Timeline view of the situation		
		f. Suggested actions from the system with their status		
1 7	Business Rule Engine	Platform should automatically update the information based on alarms and incidents that are presented to it via the business rules engine. The polling and platform database refresh cycle shall be configurable to match the status of the situation (whether there is an emergency or crisis or just monitoring only).		
		Platform should have the Incident workflow management. The ICCC platform should have a built-in alarm handling facility based on configurable cause and effect rules.		
		The business rules engine shall be able to distinguish between “early warning or anticipation” type mode of operation and an “emergency or crisis” mode of operation.		
		The ICCC shall provide capability to do a simulation run of a newly created/added business rule before it is activated.		
1 8	Workflow	The platform should have process designer - Intuitive visual tool that offers an integrated workflow process design and deployment tool for use by departments, developers’ community, technical architects, and ISVs without any restriction for X or Y axis for design interface. Graphical process designer must be 100% web-based tool that enables BPM practitioners to define processes to achieve smart System objectives.		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		The platform shall have cross functional workflows with the ability to communicate between People, devices and systems.		
		Workflow function should provide facility to trigger a corrective action workflow and define the stakeholders for the same.		
		Workflow system should be able to create, assign, track, and report on the lifecycle of tasks during an incident.		
		The workflow system should allow a specific task to be decomposed into sub-tasks.		
		The workflow engine should be able to dynamic assignment of tasks based on roles, name, designation, or any other attribute present in the resource database		
		The criticality of task within workflow should be dynamically changed depending on the response SLA, for example, in case of delays in response to the task should change the task to high priority task.		
		The workflow should be able to do queue management for management of resources performing similar functions. Queue Management allows automatic, semi-automatic and manual modes of task dispatch. FIFO, LIFO, and Round-robin are some of the algorithms supported.		
19	Standard Operating Procedure	ICCC platform should provide for authoring and invoking un-limited number of configurable and customizable standard operating procedures through graphical drag and drop design tool preferably using workflow engine.		
		Standard Operating Procedures should be established, approved sets of actions considered to be the best practices for responding to a situation or carrying out an operation.		
		The users should be able to also add comments to or stop the SOP (prior to completion).		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		There should be provision for automatically logging the actions, changes, and commentary for the SOP and its activities, so that an electronic record is available for after-action review.		
		If-Then-Else Activity - A conditional activity that allows branching based on specific criteria. Either enter or select values for Then and Else.		
		Notification Activity - An activity that displays a notification window that contains an email template for the activity owner to complete, and then sends an email notification.		
		SOP Activity - An activity that launches another standard operating procedure.		
		System should be able to read data from flat CSV files.		
		The SOPs defined in the system should be easily editable by an administrator with drag and drop capabilities.		
		ICCC platform shall present the workflow and task information in a clear and logical manner on the incidents screen.		
		ICCC platform system shall include a section that will contain the policy and standard operating procedures with easy to search functions to support the Operators during a crisis		
		ICCC platform should be able to pass the SOP step on to operator workstation for the user to respond based on his role and responsibility in the SOP to achieve faster response to the incidences or events		
20	Export Formats	System should allow export the analysis into min following formats:		
		XML/JSON/Image, Excel, PDF, CSV		
21	Field Responder Mobile Apps	ICCC platform should enable operators and the crew members to access the workflow task assigned to them and act using the native mobile application (Android & IOS). They should be able to close loop of workflow by acknowledging the real-time status of Action assigned to them		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
		• ICCC platform should be able to pass the SOP step on to mobile application for the user to respond based on his role and responsibility in the SOP to achieve faster response to the incidences or events.		
222	Security Development Lifecycle (SDL) Standard	ICCC platform should be in compliant with ANSI/ISA/IES-62443-4-1 for Secure product development lifecycle. ICCC OEM should also have ISO 9001:2015 certification for Quality Management Systems ICCC platform SDL should follow Security Best Practices aligned with IEC 62443, OWASP, SANS, and utilizes Microsoft and other security tools.		
233	GIS Map Support	The platform should have GIS UI/UX which can integrate with any GIS solution via standard integration protocol like WMS/WFS. The platform should be interactive with all sub/systems as and when required. It should not be just an embedded browser or i-frame in application interface. It should be possible to visualize all the Assets (Sensor, Devices, Vehicles, Cameras, other System resources) on map. Also, these Assets must be provided as layers with ability to switch these layers and visualize the assets of only selected layers. GIS solution's Advance analytics or network querying capability to be integrated via API or SDK integration. Pushing output on GIS map will be pushed by GIS solution provider. ICCC platform's GIS UI to only interface same via defined WMS/WFS/WMTS server configurations/service. As an alternate, GIS solution provider will provide Dynamic URL to ICCC application to be interfaced for contextualize navigation.		
244	Video Display (Integration with VMS vis	Shall have the ability to view live or recorded video from resizable and movable windows through integration with video management system		

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#	Parameter	Minimum Specifications	Compliance (Yes / No)	Remarks
	SDKs/APIs or Dynamic web UI for tight contextualization)	Shall have an ability to perform video controls for video management systems from workstation		
		Shall play, fast-forward, rewind, pause, and specify time to play recorded video through integration with video management system		
		Shall take a video still image (snapshot) from live or recorded video through integration with video management system		
		Shall export video for user specified time and duration through integration with video management system		
		Shall perform video controls for video system and move PTZ cameras by taking controls from video management system		
		Shall enable user to only view and control video for which they have been assigned permissions by the administrator.		
25		OEM of ICCV should have experience with at least 1 City Surveillance project in India with a minimum of 1000 cameras deployed in the last 5 years		
26	License Model	Perpetual		

15.41. Face Recognition Software

#	Minimum Specifications	Compliance (Yes/No)	Remarks
1	Face Recognition System (FRS) shall be a face recognition system utilizing a rich set of Artificial Intelligence (AI) based algorithms and computationally efficient modular architecture, enabling deployment on both on-premises and on-cloud infrastructure. FRS shall adhere to industry guidelines and maintain a leading position in the industry, making it one of the top Face recognition companies and the preferred choice among customers. It shall train on more than 1 billion faces. FRS software shall be unbiased to geography or facial attributes, making it the best face recognition software applicable across diverse world populations.		
	AI & DEEP LEARNING POWERED FACE RECOGNITION SYSTEM		
2	FRS shall be a versatile, intelligent and adopt rich set of Artificial Intelligence (AI) based algorithms and a computationally efficient modular architecture. The software's flexibility and modularity should make it suitable for deployment on-premise and on-cloud infrastructure with unlimited scalability.		
3	The architecture shall be modular, the underlying modules should be distributed across multiple edge or computing devices for flexible deployment and operational excellence. It should have a simple web-based user interface which is highly responsive to user actions.		
3.1	Features & Functionalities		
i	Should support multiple resolutions such as 720p, 1080p, 4K, and should be flexible to accommodate higher resolutions.		
ii	Should support a variety of image formats and compression standards – MJPEG, MPEG2/ MPEG4, H.264, H.265, H.265+.		
iii	Should support automatic face correction - Yaw, pitch and roll correction to recognise faces from different angles.		
iv	Should support faces of size as low as 50*50 which can be recognized with high accuracy.		
v	Should support a large database of multi-million unique faces and should be able to tag a group of images of a single person.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
vi	Should support innovative multi-layer face database architecture and hierarchical facial matching technique for quick face search.		
vii	The face recognition response time should be less than 5 seconds to search a face database of 1 million persons (with multiple faces per person).		
viii	The face recognition response time should be less than 10 seconds to search a face database of 100 million persons (with multiple faces per person) distributed in multiple parallel database machines.		
ix	Should support clustering and indexing of multiple occurrences of unknown/ unregistered persons, to find navigation history.		
x	Should support anti-spoofing.		
xi	Should support notifications and alerts to field operatives over cell phones.		
xii	The Face recognition software module should be capable of running in other devices like Access Control Unit, Turnstile, POS terminals etc.		
4	Architecture		
4.1	The FRS should have a built in Deep Learning Framework and ability to build new AI Application as per market demand quickly compared to others who rely on third parties.		
4.2	The FRS shall be integrated with VMS AI Analytics Application Suite in a Single Pane of window and analytic events should appear in live view.		
4.3	Micro services-based architecture should be supported for scalability, easy fault isolation, data integrity, flexible deployment across edge, near edge, hybrid or cloud environments		
	Within the architecture of the FRS, following shall be the important application building blocks:		
i	Master Server The master server shall serve as the primary API server, responsible for handling and facilitating all API requests required by the application. It should function as the central hub for API interactions, ensuring seamless communication and data exchange between application components. The master server shall efficiently manage and process API calls, providing essential services such as authentication, data retrieval, and integration with other systems.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
ii	Database Server Database server shall be a third-party software and FRS shall use the database to keep all the configuration information, user credentials, Events, and Alarms, etc.		
iii	Analytics Engine The Analytics Engine is an integral part of the FRS System. Analytics Engines shall take the video feeds from the cameras and process the same in real time. The alerts shall be generated when a condition matches the configured use case rule. The alerts related meta-data shall be stored in the database and the event images, videos in file system.		
iv	Client Application FRS client application should be a unified, highly intuitive, and user-friendly application which shall provide interface to operate the system. The client application shall provide configuration, management and operation user functions based on the login credentials. Web and Mobile clients shall be available. Web client shall work on all the leading web browsers and the Mobile Client shall be available for Android and IOS platforms.		
5	FRS Features FRS home page shall list face events, face gallery and audit logs enabling users with tools for real-time monitoring, face identification and system activity tracking.		
i	Shall support live streaming from connected cameras. This real-time video feed allows users to monitor different areas, perform security checks, and observe events as they happen. It serves as an essential tool for surveillance and situational awareness.		
ii	Shall support listing of face events. These events could involve recognized or unrecognized faces, along with the associated confidence level of matching against registered faces.		
iii	Shall support listing of face gallery. This gallery includes information about each registered face, such as images, personal details, categories, and other relevant attributes. It allows users to manage and review the database of registered individuals.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
iv	Shall support audit logs displaying a chronological record of system activities and events. It provides a quick lookup of the latest events that have occurred within the FRS application. These logs include user actions, system changes, and other relevant events. This section serves as a valuable tool for monitoring system activities, tracking user interactions, and ensuring compliance.		
6	Face Gallery FRS should support Face Gallery, which offers a comprehensive display of all the faces that have been successfully registered in the system's face database. This section should be equipped with various functionalities that empower users to effectively manage and analyse the registered face data.		
6.1	Face Gallery Functionalities		
i	FRS should support face gallery, serving as a central hub for managing and exploring the registered face database.		
ii	Face Gallery should provide users with the ability to filter registered faces based on specific filter categories. These categories could encompass various attributes associated with registered faces, such as age, gender, ethnicity, or any other relevant characteristic. Users can select one or more filter criteria to refine their search and narrow down the displayed results, making it easier to retrieve specific subsets of registered faces.		
iii	FRS should support a recent filter option, allowing users to quickly access the faces that have been registered most recently.		
iv	FRS should support exporting reports, enabling users to generate and export comprehensive reports containing information about the registered faces. These reports should include details such as face images, associated metadata (such as timestamps, registration sources, etc.), and any other pertinent data. Exported reports shall be utilized for various purposes, such as archiving, analysis, and sharing with relevant stakeholders.		
7	Face Filtering		
i	FRS shall support managing and analysing registered faces for security, identification, or organizational purposes. It shall provide filters to narrow down faces based on various parameters, aiding in specific subset selection.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
ii	FRS shall support categorizing faces and using a category-based filtering system, enhancing user search efficiency. This support involves assigning labels to faces based on characteristics, organizing them into meaningful subsets.		
iii	Shall support searching of faces by registered names. Search results should include associated attributes and images.		
iv	Shall support search function for both partial and exact matches, facilitating user flexibility in name search queries.		
8	Face Registration		
i	Shall support IP Cameras, images, and video files as inputs, crucial for building a comprehensive face recognition system.		
ii	Shall support face recognition nodes specialized in detecting and recognizing faces with the given input. These nodes employ advanced algorithms for face detection, feature extraction, and face matching		
8.1	Managing Registered Faces. FRS shall offer various options for managing and interacting with registered data such as:		
i	Edit Registered Face: Users can update details of registered face.		
ii	Delete Registered Face: Removal of registered faces when necessary.		
iii	Export Registered Face: Ability to export face data in a structured format.		
iv	Generate Face Reports: Users can generate comprehensive reports on registered individuals and their attributes		
9	Bulk Face Registration		
	Shall support bulk face registration, streamlining the process of adding multiple faces to FRS simultaneously. System shall facilitate uploading folders containing face images and an excel file with associated details, which increases the overall efficiency of registration.		
10	Face Events		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
	The Face Recognition Node shall be a core component within the FRS system responsible for analysing images and videos from diverse sources, such as IP cameras and media files. Its primary function should be detecting and recognizing faces, as well as performing real-time matching against both registered and unregistered faces in the system's database.		
10.1	Categorizing Recognized and Unrecognized Faces: FRS shall support a confidence threshold to determine whether a detected face is recognized or unrecognized. This threshold is a numerical value reflecting the system's certainty in its recognition decision. Faces are categorized based on this threshold.		
10.2	Filter Options for Face Events: FRS Shall Support a comprehensive set of filter options for narrowing down and refining the search for specific face events. These filters enhance the ability to analyse and retrieve relevant face-related information based on various criteria. List of filters include category, age, attributes and date range.		
10.3	Exporting Face Events in PDF and Excel Formats: FRS shall support exporting of face events in both PDF and Excel formats. This feature enables users to create reports or summaries of face-related events and their associated information.		
10.4	Face Occurrences		
i	FRS shall support users the ability to examine and analyse face occurrences within a specified time frame. This feature allows users to review face events that occurred during a specific period and gain insights into the frequency and nature of those occurrences. The key value of the feature shall be		
ii	The ability to reset and upload face images which enables users to maintain accurate and up-to-date image data. Face occurrences can serve as evidence or documentation for incidents, events, or activities.		
iii	Provide insights into patterns, trends, and frequencies of face events during a specific period.		
iv	Users can use this feature to investigate and analyse specific events or anomalies that occurred within the chosen time frame.		
10.5	Face Alerts		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
i	System shall support face alerts and empower users to search, and review captured faces and associated alerts across various cameras. Filtering criteria such as date range, attributes, and name allow users to retrieve specific face-related alerts, supporting investigations, documentation, and pattern identification.		
ii	System shall differentiate between recognized and unrecognized faces, as well as authorized and unauthorized faces, enhancing security, access control, and monitoring capabilities.		
10.6	Recognized Faces:		
	Recognized faces refer to individuals whose identities have been registered in the FRS system's face database. These individuals have undergone the enrolment process, where their reference images and associated details have been added to the database. When the system detects a face that matches one of the registered identities with a confidence level above a predefined threshold, it categorizes the face as recognized. Recognized faces may be associated with specific privileges, access levels, and customized alerts within the system.		
10.7	Unrecognized Faces:		
i	Unrecognized faces are those that do not match any face registered in the database, these faces could belong to individuals who have not been enrolled or registered in the system, or they could be faces with insufficient similarity to registered faces.		
ii	System should record and store information about unrecognized faces, which shall help in monitoring and registration at a later stage.		
10.8	Authorized Faces:		
i	Authorized faces refer to individuals whose presence and access have been approved within specific areas or scenarios. Authorization could be granted based on roles, credentials, or access permissions assigned to their registered identities.		
ii	System shall use access control feature to grant access privileges to authorized faces, allowing them to enter restricted areas or triggering specific actions.		
10.9	Unauthorized Faces:		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
	Unauthorized faces are those that do not have approval or permission to access certain areas or perform specific actions. These individuals could include intruders, unauthorized personnel, or individuals whose presence triggers security alerts. System should identify unauthorized faces and trigger alarms.		
11	Exporting Alerts in PDF and Excel Formats		
	System shall support users to export alerts in both PDF and Excel formats. This feature allows users to create reports or summary of alert events and associated information, aiding in analysis, documentation, and sharing of information.		
12	Face Search and Investigation System shall support facial search and investigation feature, empowering users to conduct search with images or video frames as input. The feature should have following capabilities		
i	Aid in identifying individuals from still images or video frames, helping locate suspects, missing persons, or persons of interest.		
ii	Investigators can use facial search to gather evidence from video footage and images related to criminal activities or security incidents.		
iii	Automated search and ranking reduce the manual effort required to browse through large amounts of data.		
iv	User-defined matching thresholds ensure that only relevant and high-confidence matches are presented.		
13	Compare Feature: Using Probe Images or Videos		
	System shall support Search In Video feature which allows users to search within a video for potential matches by using a probe image as a reference. This functionality is particularly valuable for identifying specific individuals within video footage.		
14	Statistics and Logs Visual Analytics: System shall support a visual analytics section that offers insights into various distributions related to the registered faces and recognized events within the system. The charts should contain distribution based on Gender, Age		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
15	Audit Logs in FRS System shall support audit logs, a crucial component of any system involving security, access control, and sensitive data. In FRS, the audit logs feature provides a comprehensive record of activities and events within the system. It offers insights into user actions, system events, and security-related activities. Key capabilities of audit logs shall be as follows:		
i	Activity Tracking: Audit logs capture a wide range of activities and events that occur within the FRS system, including user interactions, system changes, access attempts, and more.		
ii	User Actions: The audit logs provide actions performed by users within the system, such as registering new faces, modifying user permissions, exporting reports, and more.		
iii	System Events: The logs also track system-level events, including updates, configuration changes and alerts triggered.		
iv	Access Attempts: Audit logs provide information about access attempts, including login attempts, access requests, and actions that require authorization.		
v	User Identification: Audit logs attribute each event to the user responsible for the action, providing accountability and transparency.		
vi	Event Details: Audit logs include specific details about each event, describing the nature of the action, the entities involved, and any outcomes.		
vii	Security Compliance: Audit logs contribute to security compliance by offering a record of activities for auditing purposes, which can be helpful in demonstrating adherence to regulations and protocols.		
16	Profile and User Configurator		
i	System shall support user and role Management, a critical feature in FRS that allows administrators to manage user accounts and their access privileges within the system. This feature ensures that users have appropriate levels of access to different functionalities based on their roles and responsibilities.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
ii	Shall support user profile and password management, which provides users with control over their account settings and offers security measures to protect their credentials. This includes the ability to recover forgotten passwords, change passwords, and maintain account security.		
17	License Management System shall support License Feature, which provides a platform for managing licenses, downloading applied licenses, applying new licenses, and displaying license validity and types for different engines. This feature ensures compliance, efficient resource allocation, and uninterrupted system functionality based on the acquired licenses.		
17.1	Engine Configuration		
	System shall allow administrators to manage the configuration settings of different engines used. This encompasses the ability to view, modify, and even remove engines as needed.		
17.2	User Management		
i	System shall support user management function, which involves handling user accounts, permissions, and security settings within the FRS system.		
ii	User management section should provide administrators with a list of all the users who have been configured and granted access to the FRS system. Each user should typically have a profile that includes their username, role, and other relevant details.		
iii	Administrators should have the ability to delete user accounts from the system. Deleting a user account removes their access and privileges from the system. This action should be typically irreversible.		
iv	Shall Support Two-Factor Authentication (2FA), an additional layer of security that requires users to provide a second form of verification beyond their password. Administrators can enable 2FA for users, and users will need to provide a second factor (such as a code sent to their phone) to log in.		
17.3	User Session Management		
i	System shall support user session management, which involves monitoring and controlling user sessions, which are active connections between users and the FRS system.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
ii	User session management section should provide administrators with a list of all currently active user sessions within the FRS system. Each active session typically includes details such as the user's name, IP address, device information, and session duration.		
17.4	User Registration		
i	System shall support User registration, which is the process of creating new user accounts within the FRS system, allowing individuals to access and use the system's functionalities. User registration in FRS involves collecting essential user details and assigning appropriate permissions based on roles. This process is crucial for secure access, proper system utilization, and maintaining accountability within the system.		
17.5	Alert Settings		
i	System shall enable administrators to configure how alerts are generated, who receives them, and the methods through which alerts are delivered.		

15.42. AI Based VA

#	Minimum Specifications	Compliance (Yes/No)	Remarks
1	People Counting		
	People counting video analytics is used to automatically detect and count individuals entering, exiting, or moving within a monitored area in real time.		
2	Crowd Detection		
	The system shall generate an alert if it detects more than a user-specified number of humans within a specified zone in a FoV for a user-specified time threshold. The system will work more efficiently in case of sparse crowds where the maximum number of humans in the crowd is approximately 15 or fewer, providing insights into crowd dynamics and behavior in various environments.		
3	Crowd Statistics & Heatmap		
	Crowd Statistics & Heatmap analytics provide real-time insights into crowd density within a monitored area. The system uses analytics to generate heatmaps indicating high crowd distribution, enabling better crowd management, safety monitoring, and space utilization.		
4	Parking Violation & Detection		
	The system shall trigger an alert if it detects the presence of a vehicle within a specified zone in the FoV, enabling enforcement actions and improving traffic flow. Typically, FOV will be marked where the vehicle is not meant to be parked		
5	Attribute Analysis & Search		
	Main purpose of the proposed OIS is to reduce the search/viewing time otherwise required for finding an object of interest (e.g., human, vehicle and animal with certain attributes/appearance etc.) in single/multiple videos (live or archived) coming from centralized and/or distributed video surveillance setup.		
	The GUI for object attribute must have a checkbox input which will indicate whether the application requires the unique attire types for the Indian subcontinent. If checked, the engine will determine international attire along with the Indian attires also like "top_type", "bottom_type", "kameez", "saree" etc.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
	During the object attribute search operation, the user does not need to mention or indicate whether they are searching for a vehicle or a human. The engine is capable of determining the object the user is referring to using the bounding box drawn by the user during the search operation. If the engine finds an object of interest (human or vehicle) within the drawn bounding box, it will determine the attribute of the object according to the type of the object the user is referring to, and return attributes accordingly.		
	Features:		
5.1	1. There is no limit on how many channels can be supported by a single OIS engine. Number of simultaneously running OIS engines reduces the search time. Users can select any channel and configure it for OIS temporarily and or permanently.		
5.2	2. A single OIS engine can work on a single channel or multiple channels in two input modes -		
	•Live Video Search (Future Search).		
	• Archived Video Search (Past Search).		
5.3	3. OIS engine can run on two operating modes -		
	•Pre-configured - One or more OIS engines are running on one or more live/archived channels. In this mode, each frame of the incoming video will be analyzed - OOs will be detected, tracked and their attributes will be estimated. These results will be indexed into a database for later searching purpose.		
	•Unconfigured - One or more channels can be selected from the available list of channels and one or more OIS engines can be configured with simple mouse click to start the analysis procedure.		
5.4	4. OIS engine can run on two time modes -		
	•Continuous - OIS engine(s) are running on live/archived videos with a maximum default time-interval (say 24 hours).		
	•Time-interval - OIS engine(s) are running on live/archived videos with specific time-interval(s).		
5.5	5. OIS engine has following two search/query modes -		
	•Textual search		
	•Image search		
5.6	6. Users should be able to stop any video. Mark one or more OOs in the video. Preferably, apply some sort of enhancement on these marked regions - and start the search procedure (image search) on one or more selected channels (from the list of available channels).		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
5.7	7. If any channel is analysed for OIS then that channel should not be again analysed for a later search. Results from the first analysis should be recorded in the database - in such a way that later also it can be used for speeding up the search process.		
5.8	8. If any channel is selected for OIS - then depending upon the time-interval specified based on the available channel proximity map information - locally close channels will be searched first for speeding up the search process.		
5.9	5. The output of the search procedure can generate a location map where the OOI has moved in the proximity.		
5.10	5. The output of the initial search can be improved based on the user feedback by marking the irrelevant outputs in the output window. This also internally modifies the identifying descriptions/attributes of the OOI using relevance feedback mechanism - so that all the later search results get improved.		
5.11	11. An advanced feature of OIS is to search for object's attributes on events generated by other analytics on demand. This will reduce the computational requirements many-folds.		
6	Vehicle Classification & Count		
	Vehicle classification and count video analytics automatically detect and categorize vehicles (such as cars, trucks, buses, and two-wheelers) passing through a monitored area in real time.		

15.43. ANPR Software

#	Minimum Specifications	Compliance (Yes/No)	Remarks
Traffic Management Software (TMS)			
1	Architecture Key Capability		
	The Traffic Management System (TMS) Architecture shall have the following functionalities and features:		
1.1	TMS Integrated with AI Analytics Application Suite: TMS shall be integrated with AI Analytics Application Suite in a Single Pane of window. The analytic events can be monitored in Live View of channels.		
1.2	Own Deep Learning framework: shall have a Deep Learning Framework - Deeper Look embedded in the Architecture, this gives Full Control to build new AI Application as per market demand quickly compared to others who rely on third party.		
1.3	Home Grown Models: Home grown models adapted to surveillance domain & High Performance, Accuracy compared to open-source models or pure CV based Algorithms. Each AI Application shall act like a device to detect anomalies.		
1.4	Micro service based Architecture: Micro services based architecture supported for scalability, easy fault isolation, data integrity, flexible deployment across edge, near edge, hybrid or cloud environments.		
2	Architecture & Components		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
2.1	The TMS shall have the components such as Junction Servers (LPUs, which can be deployed at a traffic junction in a suitable COTS hardware or can be deployed centrally in the data center), Event Aggregation Servers, Master Server and Database Server (Relational Database). Each component shall provide failover redundancy. The TMS platform architecture shall allow flexible and modular deployment of software components in a distributed computing architecture. At the same time, it shall allow fully centralized deployment of the software application. The TMS distributed architecture shall allow for the installation of a Junction Server on any commercial off-the-shelf (COTS) hardware server that can operate within the temperature and environmental conditions at the traffic junction. These servers shall process the video surveillance camera feeds locally and send traffic events and metadata to the Events Aggregation servers. The TMS shall support modularity in data processing. Under the centralized deployment, video feeds shall be processed on Junction Servers located at the data center without requiring any on-field infrastructure. The system does not limit the number of junctions configured on a central junction server; instead, it depends on the server's available compute power.		
2.2	To enable wireless connectivity on traffic junctions, the Junction Servers shall connect through 3G, 4G, or 5G without relying on static public IP addresses. The servers shall store violation records and junction camera video streams for a configurable duration. The Events Aggregation Server shall manage and aggregate the alerts generated from the Junction Servers spread across various locations. The Master Server shall manage the TMS resources, failover functionalities, user authentication and other management functionalities. The Relational Database shall keep various configurations, user details, events, and alerts metadata.		
2.3	The TMS shall be ONVIF compliant with support for profiles S, G, T and M. The information is available on the ONVIF website for verification. It shall have multiple levels of authentication and access control mechanisms such as: 1. Role based Authentication. 2. Session control using encrypted tokens. 3. User restriction to use a particular hardware workstation. 4. It shall allow restricting an operator to a single or multiple traffic junction/s and associated cameras.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
2.4	All the communication among the servers and clients shall be secured and the TMS shall support the SSL and TLS communication. It shall have options of encryption with AES 128, 256 and RSA 1024 and 2048 encryption standards. It shall support secure communication between the camera and the server using SRTP and RTSPS protocols. TMS shall be compliant to OWASP guidelines & have secured Vulnerability Assessment and Penetration Testing (VAPT) Certificate. To facilitate communication and information collaboration among the operators from various traffic zones, the TMS shall provide a built-in chat function to exchange the text, image, video clips or any other file from the workstation to other fellow operators or supervisors, thus creating an ad-hoc collaborative environment for incident investigation. The TMS shall provide all the use cases and functionalities mentioned in the specifications in a single unified platform. Operators can monitor live and archived videos from the unified client. It shall provide an integrated management functionality for live view, recording, traffic violation, incident use cases management and user management for ease of operation.		
2.5	System Management Functions The TMS shall provide centralized management of the Junction Servers, aggregation, and processing servers from the unified client. The TMS shall be based on the latest AI-DL technologies for continuous improvement of accuracy in event / violation identification. The TMS unified client shall show system health alerts for camera, junction server, database server and storage. The drill-down system health shall cover area, junction, to further details of system utilization, major and minor stream, real time bitrate and frames configured for analytics, camera details such as camera name, IP address, Media Server status showing status of the live recording of the cameras in the system, list of junctions which are sending live feed etc. The storage status shall show central storage and all the network drives and utilisation of the storage and alert when the total available TMS storage drops below the configured threshold limit. The TMS shall maintain a full audit trail and log of various system generated alerts.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
2.6	Video Handling and General Functions The Junction Servers shall locally record camera streams in accordance with the specified duration, using continuous, event-based, schedule-based, or trigger-based recording methods. The TMS shall then synchronize these recorded video streams from the Junction Servers to the Control Room storage devices. The system shall perform this synchronization in the background and prioritize it based on event transfer priority. For instance, during periods of low event generation, the Junction Server shall transfer recorded videos to the Control Room TMS servers. Operators shall be able to replay recorded videos stored in the Junction Servers on-demand. The TMS shall allow operators to record a matrix of cameras from their workstation as a single video file, which can be used to create an investigative report in the event of an accident or incident. The system shall enable users to search the archive video by date, time, or event type.		
2.7	Users shall be able to view live and archive videos in real-time using multiple matrix layouts, such as 1x1, 2x2, 3x3, 1+5, and 1+7. The system shall support cycling through multiple layouts with configurable time. Additionally, a drag-and-drop functionality shall be supported for viewing cameras on the screen. The TMS shall enable users to download multiple segments of encrypted video from one or more cameras in the archive. Users shall be able to tag each downloaded segment with text messages. The downloaded video segments shall be saved in a single folder, along with an Excel spreadsheet containing details of each segment listed as hyperlinks to the exported video files. The TMS shall allow users to search for violations that occurred during a specific time frame and provide statistical analysis of the number of incidences that occurred during different days and months of the year in graphical format. The system shall automatically generate a report of all such incidences in an Excel spreadsheet format.		
3	Smart Traffic Dashboard (Web)		
	The Smart Traffic Dashboard through web-based interface shall have the following features:		
3.1	Total Vehicle Flow: System displays the total vehicle flow in the city for day, week and month. It also gives a comparison of flow with respect to the previous day, week and month. The data can also be seen for a specific date range and filtered area wise, junction wise		
3.2	Area wise Traffic Distribution: System provides a Interactive donut chart of traffic distribution (Count of Vehicles) area wise. Operators can intuitively remove, add areas using the donut. The distribution can be seen for the day, week, month, specific date range and can also be filtered area wise, junction wise		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
3.3	Distribution by vehicle class / type: System provides a Interactive donut chart of vehicle count by vehicle type such as Car, Bus, Motorbike etc. Operators can intuitively remove, add vehicle type using the donut. The distribution can be seen for the day, week, month, specific date range and can also be filtered area wise, junction wise		
Automatic Number Plate Recognition Software			
1	The system shall capture the license plates of vehicles and the vehicle categories (such as cars, Heavy Commercial Vehicles, Three Wheelers, Two Wheelers, and Buses) for each transaction. The system shall store the license plate and vehicle category information for each transaction in the system database.		
2	The TMS shall categorize license plates into Good (readable), Bad/dilapidated (partial or fully non-readable), Broken, License Plates without numbers.		
3	The system shall use image processing algorithms to identify license plates and convert them into a text string for Four-wheelers and above vehicles with a minimum detection accuracy of 95% and a minimum conversion accuracy of 90%. The TMS shall also provide the license plate conversion confidence percentage for each license plate detected.		
4	The TMS shall provide a dashboard that allows users to view captured vehicles categorized as private, commercial, electric, and other special vehicles such as military without connecting to other systems such as the vehicle registry database.		
5	The dashboard shall have various filters that allow users to search for vehicles by date, time, location, vehicle category, and license plate category.		
6	The system shall capture license plates and vehicle categories such as cars, Heavy Commercial Vehicles, Three Wheelers, Two Wheelers, and Buses, and store this information along with the license plate information for each transaction in the database.		
7	The TMS shall be designed to provide reliable license plate categorization in daylight conditions. TMS shall provide the ability to capture vehicles with no number plate, hand-written / fancy number plates and number plates with regional languages.		
8	The license plate recognition engine shall be language agnostic and shall support vernacular languages with minimal training required to train the AI-ML datasets.		
9	The system shall have Vehicle Counting and Classification functions using the ANPR and overview cameras. The system shall detect the colour of all the vehicles on a best effort basis during daytime in the camera view and categorize them based on the predefined list of system colours.		

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#	Minimum Specifications	Compliance (Yes/No)	Remarks
10	The system shall store the colour information of each vehicle along with the license plate information in the database for each transaction. The system shall have the capability to store a list of license plates of stolen or suspicious vehicles, and allow for editing and bulk importing of the list.		
11	The system shall generate an automatic alert in the control room when a license plate from the hot list is detected through the ANPR camera.		
12	The TMS shall allow the operator to edit the license plate number of a vehicle in case it is wrongly captured. The system shall display the captured vehicles with selectable ANPR conversion confidence menu. Additionally, the system shall maintain a full audit trail of all user actions for accountability and traceability purposes.		
13	The system shall provide a quick search functionality that allows users to search for license plates based on criteria such as full or partial number of the license plate, color of the vehicle, speed of the vehicle, classification of the vehicle, junction name, and other relevant criteria. The search results shall be displayed in a user-friendly format, with options to filter, sort, and export the results.		
14	The system shall have an automated violation detection and ticket generation process based on the ANPR conversion and violation detection confidence level. The confidence level threshold for pushing violations to ticket generation shall be configurable by the user.		
15	The system shall be flexible to capture the license plates from front-side and back-side of the vehicle, subject to the required field of view,		
16	The system shall allow the operator to create a weekly schedule to enable the video analytics.		

15.44. IP Public Address System

#	Minimum Specifications		Compliance (Yes/No)	Remarks
1	PAS system	Should have the capability to control individual PAS i.e. to make an announcement at select location (1:1) and all locations (1: many) simultaneously. The PAS should also support both, Live and Recorded inputs		
2	Speaker	Minimum 20Watts speaker		
3	Connectivity	IP Based		
4	Access Control	Access control mechanism would be also required to establish so that the usage is regulated.		
5	Integration	With VMS and Command and Control Center		
6	Construction	Sturdy Body for equipment		
7	Power	Automatic on/off operation		
8	Casing	IP-55 rated or better		
9	Operating conditions	As per the conditions prevailing in the City		

15.45. EMS

#	Minimum Specification	Compliance (Yes/No)	Remarks
	General Functions		
1.	For effective operations and management of IT Operations , there is a need for an industry-standard Enterprise Management System (EMS). Given the expanse and scope of the project, EMS has become very critical for IT Operations, IT Service Management and SLA Measurement. Some of the critical aspects that need to be considered for operations of IT setup of are: Network Fault Management, Network Performance Management, Centralized and unified Dashboard, Centralized and customizable service level reporting, IT Service Management Ticketing tool, Asset Management.		
2.	The Monitoring solution should provide Unified Architectural design offering seamless common functions including but not limited to: Event and Alarm management, Auto-discovery of the Network environment, Correlation and root cause analysis, Reporting and analytics		
3.	The OEM of the proposed monitoring solution shall be present in latest Gartner's Market Guide Report of year 2025. The documentary proof must be enclosed with the bid.		
4.	There should be a tight integration between infrastructure metrics and logs to have the single consolidated console of Infrastructure & security events.		
5.	Consolidate IT event management activities into a single manager of manager that allows operator quickly identify the cause of the IT incident, reduces duplication of effort and decreases the time it takes to rectify IT issues.		
6.	The Operator should be able to pull up security events related to a given Configuration Item, from a single console which also has NOC events, and use the security events to triage the problem. This way the Operator gets consolidated system/network event details and security events (current and historical) from the same console and save time in troubleshooting / isolating the issue.		
7.	The solution should have capability to perform cross domain correlation with alarm correlation built-in algorithms from Network , Systems and other domain events as well as KPI patterns, also correlation should not be limited to only parent-child or service mapping relationships		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
8.	The operator should be able to build correlation rules in a simple GUI based environment where the Operator should be able to correlate cross domain events		
9.	Scalability – The system should be capable of supporting at least 15 thousand network flow per second on single server with capability to capture each unique traffic conversations		
10.	The solution shall provide future scalability of the whole system without major architectural changes.		
11.	The solution shall be distributed, scalable, and multi-platform and open to third party integration such as Cloud, Virtualization, Database, Web Server, Application Server platforms etc.		
12.	The system must not use any open-source third-party relational or time-series databases. It should use a native, proprietary-built reporting database for high-speed, high-volume observability workloads and security constarins.		
13.	The proposed solution allows Correlated events to be generated by multi-KPI alerts, correlation searches, and anomaly detection algorithms.		
14.	The Correlated events view provides filters and tools to help you organize notable events, examine the details of event, investigate the cause of the event, and then resolve and close the notable event.		
15.	The Anomaly event configuration engine can be configured to perform actions on anomaly events, including running a script, sending an email, creating a ticket in 3rd party ticketing tools, adding a link to a ticket in an external system, and any other custom actions that are configured.		
16.	The proposed solution must support anomaly and correlated event aggregation automatically or through a user defined aggregation policy that helps to group notable events to organize them in the Notable Events Review.		
17.	The proposed solution must provide an aggregation policy to employ machine learning algorithms to group of polled data or KPIs		
18.	The proposed solution must provide a customizable anomaly, baseline and static event aggregation policies that group notable events based on the following criteria:		
19.	A field matches a string does not matches sum of occurrences,		
20.	A Sum of occurrences of the field and value		
21.	A field value sum grater than a size or less than a size		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
22.	A field matches a string before filter and after filter		
23.	Log management		
24.	The proposed solution must provide a customizable control of grouping of log events in the following ways:		
25.	Split events and log into multiple groups by one or more fields, such as source or host. Show nearby and surrounding events based on time		
26.	Extract all the fields and list them to filter data based on data indexed in each fields such as top 5 values of data indexed in columns		
27.	The proposed solution must allow customization of visualizations of IT data and key business metrics, and map KPIs to these visualizations to easily view the health and performance of what matters most.		
28.	Show unique log event patterns from collected data and allow drill down on these events for faster troubleshooting and investigation		
29.	Configure a shape or icon in the dynamic dashboard to act like a KPI or ad hoc search widget		
30.	Configure threshold to determine the color of the widget which indicates the current status of the metric		
31.	Configure cross domain data search widgets in dynamic dashboards		
32.	Configure drill-downs to other dynamic dashboards or a custom URL		
33.	The proposed log management solution should include out-of-the-box parsers for various operating systems, databases, applications, network devices, and system logs. Additionally, if any collected logs cannot be parsed then the console must provide seamless automation to extract fields from collected logs via drag and drop functionality to avoid log parsing complexity of collected logs from various syslog/ windows/ application sources.		
34.	Proposed solution must provision options to download the raw logs on a csv format. (For a given IP or a complete application group or an application instance type).		
35.	Proposed solution should have features for logical grouping of server instances based on applications onboarded/ type of OS/ type of Databases/ type of devices in the log management solution		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
36.	Proposed solution include powerful search engine to find the pattern or key word from the logs stored for a specific IP/server or an application group or a similar application instances deployed for multiple eco systems. E.g., If user wants to search the logs for a specific IP Range in the web server logs. Search should support with required filters to search from specific server, multiple webserver belongs to the same application and webserver deployed for multiple applications		
37.	The proposed solution must have the capability to provide live log tail to access all log events in real-time from any source in the infrastructure, support keyword- based search capability from the live log tail, and highlight the log tail based on keywords for quick live log troubleshooting.		
38.	Proposed solution should have custom logging feature to ensure that only if certain logs to be logged as required. For example, for application logging bank may want to capture only errors or warnings using certain keywords excluding information events		
39.	The system should have out of the box dashboards, alerts and reports for the errors, in log collection, storing and system should be able to alert through different channels such as SMS, Email and chat whenever the threshold is breached. The ticket should be created in ITSM portal for breached event.		
40.	The proposed solution must provide anomaly overlays to view these baseline and track anomalous trends in the KPI data by enabling anomaly detection and forecast algorithms that detect statistical outliers in KPI search results.		
41.	The proposed product must provide user-friendly dashboards and reports featuring intuitive chart types such as gauge, grid, heat map, donut chart, and others for effective monitoring of operations. It should include out-of-the-box dashboards and reports, along with support for easily creating and maintaining custom dashboards. The dashboard and report builder must be simple and intuitive to use, offering real-time visualization during the creation process to ensure quick, accurate, and efficient design.		
42.	The system shall be capable of operating at a sustained 5000 EPS per collection instance from day one. The system shall provide the ability to scale to higher event rates by adding multiple collection instance		
43.	Application Performance Monitoring		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
44.	Platform shall support both Linux or Windows flavors for the deployment of its core components (such as management server) and should not require any kind of "root access" or "root privilege" to deploy agents in the monitored applications.		
45.	Should have out of the box support for automatic baselining wherein the solution can automatically learn the behavior of monitored applications and set baseline thresholds automatically for all the monitored metrics, including: 1. Server metrics 2. End User metrics 3. Custom metrics 4. Business metrics 5. Database metrics 6. VM Metrics (CPU, Memory, disk I/O latencies, etc.) The solution must also provide an option of fixed as well as rolling time periods to calculate these thresholds. There should not be any limit to number of metrics being auto baselined.		
46.	Shall provide an auto-discovered dynamic visual representation of the application topology comprising of components and activities in the monitored application environment. The discovered topology visualization (map) must clearly depict the following information: i) Round trip time of the request between components (including network and backend time) ii) Baseline indicators for requests between components The solution should also provide options to manage/configure/customize the visualization (map) to suit the monitoring needs.		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
47.	Should be automatically discover end-to-end, cross component processing paths used to fulfil a request for all services provided by the monitored application, without requiring any changes to the existing application code. After discovering the transactions, the solution should be able to further categorize the transactions into below buckets automatically, based on their behavior: i) Normal ii) Slow iii) Very Slow iv) Stalled v) Errors vi) VM details (Over provisioned, under provisioned) The solution must be able to automatically segregate and sort these transactions based on load, errors, response times, health violations as well as percentage contribution to overall application average response time.		
48.	Should also have an option to identify network performance bottlenecks and app/network-interaction bottlenecks using an agent that resides on the application instance without needing any kind of network tapping or data capture appliances. The solution should be able to detect load balancers, TCP endpoints etc. and depict it on a dynamic network map. The solution should also be able to capture network KPIs such as throughput, latency, TCP Loss, SYN/FIN errors, client limited, client zero, TCP retransmission timeouts, server limited, server zero etc. in-context to the problematic application transaction with a provision to drill down from the application transaction to any correlated or contextual network metric.		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
49.	Should be able to provide database monitoring in context, supporting wide array like RDBMS, MySQL, NoSQL etc. The solution should be able to report a) top database activities (e.g. Top SQL, Top Users, Top Programs); b) database activity profile over-time (identify patterns); c) Collect and store all database wait events and correlate with SQL/Stored Procedures; d) Collect and store SQL/Stored Procedure Key Performance Indicators (CPU, Count, Reads/Writes) e) Collect and store database instance level statistics (table size, row count, indexes) f) Collect and store database server/host Key Performance Indicators (CPU, Memory, ...) g) breakdown of latency of stored procedure components h) Collect SQL Explain & Execution plans i) Collect and store performance data on database Objects (Schemas, tables, indexes)		
50.	Shall provide comprehensive coverage for container based microservices monitoring along with container orchestration layer monitoring support. The solution should be able to monitor the container images and the services running on those images. The solution should also be capable of pulling information from the orchestration layers like kubernetes/open shift and presenting relevant metrics like pod metrics, node metrics, deployment metrics, endpoint metrics etc.		
51.	Should be ITIL v4 certified with 12 practices and with the all modules from the same OEM to avoid any integration conflicts / challenges.		
52.	Should have a unified agent to collect the metric, telemetry and traces data from the target server. The agents should be to set polling interval as low as 1 second with low overhead on target server infrastructure		
53.	Platform shall support both Linux or Windows flavors for the deployment of its core components (such as management server) and should not require any kind of "root access" or "root privilege" to deploy agents in the monitored applications.		
54.	Network Performance Management		
55.	The solution must provide discovery & inventory of heterogeneous physical network devices like Layer-2 & Layer-3 switches, Routers and other IP devices and do mapping of LAN & WAN connectivity with granular visibility up to individual ports level.		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
56.	The solution must support custom device template to support Generic SNMP devices as well as expensive support on traffic encryption including SNMP v3 with AES-256 encryption		
57.	The solution must automatically discover, map, and visualize the full network path between source and destination nodes, including all intermediary hops, while providing granular hop-by-hop performance metrics (latency, packet loss, availability) with threshold-based alerting, as well as end-to-end aggregate metrics (with historical retention for trend analysis) to comprehensively assess path health and performance.		
58.	The system must correlate hop-level degradations with service-impacting incidents, enrich paths with node metadata (hostname, IP, geo-location, ISP/ASN details, and contact information), enforce customizable performance policies for proactive violation alerts, and deliver an interactive visualization interface—enabling drill-down into per-hop metrics, logs, and business-context tags for detailed analysis and operational troubleshooting.		
59.	The EMS should provide very powerful event correlation platform/engine and thus must filter, correlate & process, the events that are created daily from network devices. It should assist in root cause determination and help prevent flooding of non-relevant console messages.		
60.	It shall provide Real time network monitoring and Measurement off-end-to-end Network performance & availability to define service levels and further improve upon them.		
61.	The Network performance operator console should provide operators with seamless transitions from fault data to performance data. For example - select a EMS fault event and fault drill down must also provide historical, near real time and correlated data without switching the page		
62.	The solution should have the ability to do "baseline" performance metrics and determine normal operating values and patterns by self-learning algorithms on a day, week, month, etc. and ability to configure threshold on these values. The solution should also have built in algorithms to start the monitoring with zero threshold configurations		
63.	The proposed system should be able to auto-calculate resource utilization baselines for the entire managed systems and networks and allow user choose algorithms that is more relevant to specific KPI in case of false positive		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
64.	The agents should be extensible and customizable allowing incorporation of any required monitoring source not included in the out-of-the-box monitoring policies. With capabilities to collect and analyze performance data from the operating system and installed applications and use historical patterns to establish performance baselines.		
65.	All baseline thresholds should have lower bound, higher bound, polarity, deviation set point and reset point for ease of use.		
66.	System should have anomalies detection, outlier detection and stop alarm flooding with these dynamic thresholds.		
67.	The solution should be capable of performing prediction- based anomaly detection to identify unusual or unexpected events and measurements within the monitored environment.		
68.	The solution should provide AI and ML capabilities to help in preventing of Network problems before they occur the solution should include unsupervised learning module to gather real-time network data and which learns the behavior of devices, applications, and users on the network It should be capable to bring together and correlate network and application data to predict anomaly and performance issues		
69.	The solution must provide agentless and agent based method for managing the nodes and have the capability of storing events / data locally if communication to the management server is not possible due to some problem. This capability will help to avoid losing critical events.		
70.	The EMS admin console must provide the ability to start, stop and restart the agent on target server infrastructure and the agent should provide collection capabilities not limited to just KPIs but also support collecting raw logs as well as packets.		
71.	The proposed solution must provide agentless as well as agent based monitoring for server infrastructure. The agents should be to set polling interval as low as 1 second with low overhead on target server infrastructure		
72.	The proposed solution should include a distributed search engine data-store to ingest various types of textual, numerical, geospatial, structured and unstructured data.		
73.	The EMS admin console must provide operators with seamless automation to extract fields from collected logs via drag and drop functionality to avoid log parsing complexity of collected logs from various syslog/ windows/ application sources.		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
74.	It shall provide Real time network monitoring and Measurement offend-to-end Network performance & availability to define service levels and further improve upon them.		
75.	The EMS solution shall keep historical rate and protocol data for a minimum of 30 days (most recent) in its long-		
76.	term operating database. All data in that database shall have a minimum 5 minutes window granularity		
77.	The proposed system should be able to administer configuration changes to network elements by providing toolkits to automate the following administrative tasks of effecting configuration changes to network elements: Capture running configuration. Capture startup configuration Upload configuration; Write start-up configuration; Upload firmware		
78.	The platform should be able to detect vulnerabilities for Linux and Windows server The Monitoring platform must integrate seamlessly with the NVD to automatically import and update vulnerability information. The platform should contextualize NVD data with additional information such as asset criticality, network exposure, and exploitability and help create custom prioritization.		
79.	The platform should have unified agent to collect telemetry data like Metric, log and vulnerability details.		
80.	The platform should provide comprehensive OOTB organization wide vulnerability dashboard which should help identify actionable vulnerabilities to remediate.		
81.	Fault Management		
82.	The proposed solution must should provide out of the box root cause analysis with multiple root cause algorithms inbuilt for root cause analysis. It should also have a strong event correlation engine which can correlate the events on the basis of event pairing, event sequencing etc.		
83.	The Platform must include an event correlation automatically fed with events originating from managed elements, monitoring tools or data sources external to the platform. This correlation must perform event		
84.	filtering, event suppression, event aggregation and event annotation		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
85.	The proposed solution should provide alert console with alert summary such as no. of correlated alert, network alert, server alert, virtualization alert, cloud alert, application alert etc.		
86.	The system must have provision to overlay alert on reported metric to understand alert triggering behaviors across multiple drill down pages		
87.	The proposed solution should have drill-down and correlation page to correlate cross domain historical data points and result should be exported as image and tabular format.		
88.	The proposed solution should provide out of the box root cause analysis with multiple root cause algorithms inbuilt for root cause analysis. It should also have a strong event correlation engine which can correlate the events on the basis of event pairing, event sequencing etc.		
89.	Powerful correlation capabilities to reduce number of actionable events. Topology based and event stream based correlation should be made available.		
90.	The solution must offer relevant remedy tools, graphs in context of a selected fault alarm/event		
91.	The proposed monitoring solution should have capability to configure actions based rules for set of pre-defined alarms/alerts enabling automation of set tasks.		
92.	The Platform must support Event or Alarm Correlation integrations with the service desk to trigger automated creation of incidents.		
93.	The solution should classify events based on business impact and also allow defining custom severity levels and priority metrics such as Ok, Critical, Major, Down, Info etc. with color codes		
94.	The solution should allow creation of correlation or analytics rules for administrators		
95.	The proposed solution must provide default event dashboard to identify, accept and assign generated alarms		
96.	The proposed solution must provide out of the box root cause analysis with multiple root cause algorithms inbuilt for root cause analysis. It should also have a strong event correlation engine which can correlate the events on the basis of event pairing, event sequencing etc.		
97.	Network Flow-based Traffic Analysis		
98.	The proposed traffic monitoring system must be able to track all network flow (including NetFlow v1-v9, Jflow, Sflow and IPFix) of traffic on the network and identify malicious behavior with all IP conversations.		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
99.	The NetFlow analyzer must be capable of automatically identifying and classifying globally recognized applications (like YouTube, Skype, WhatsApp, Dropbox) and cloud services (such as AWS, Azure, Google Cloud, Microsoft 365, Salesforce, etc.) based on flow data. In case of unknown application the solution should provide CSV import support to resolve the DNS.		
100.	The proposed system must provide details of applications, hosts, and conversations consuming WAN bandwidth to isolate and resolve problems.		
101.	The proposed system must provide baseline network flow policy to detect anomaly in traffic usage behaviors		
102.	The solution must provide flow data explorer with capability to analyze extracted data using multiple columns , chart type, group by operators and filters. System must also provide dashboard to flow data explorer drill down capability.		
103.	The proposed solution must be able to monitor and report on a variety of unique protocols (used in the overall deployed solutions) per day and display utilization data for each protocol individually. This capability must be available for each monitored interface uniquely.		
104.	The proposed solution must keep historical rate and Ip to Ip, Ip to protocol, protocol to protocol conversation		
105.	data for a minimum of 3 months (most recent) in its current long term operating database. All data in that database must have a maximum 15 minute window granularity.		
106.	The proposed solution should include a distributed search engine data-store to ingest various types of textual, numerical, geospatial, structured and unstructured data.		
107.	Should support use of policies that can detect violations based on blacklist/whitelist matches.		
108.	The proposed solution must keep historical rate and protocol data for a minimum of 60 days (most recent) in its short-term operating database. All data in that database must have a minimum 5 minutes window granularity with option change retention period"		
109.	"The system must support the ability to create reports that allow the user to search all IP traffic over a specified historical period, for a variety of conditions.		
110.	o Search for any traffic using a specific configurable destination port, or port range.		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
111.	o Search for any protocol in use by a specific host, interface or list of hosts or interfaces. "		
112.	The proposed solution should have at least 3 deployments (in state/central Government/ PSU) in India with 10,000 devices or more being monitored in each of these deployments in last 5 years. Reference PO copy and completion/ sign-off document need to be submitted at the time of bid submission.		
113.	The OEM of the proposed Network Monitoring solution should have presence of min. 10+ years in market in India. The documentary proof should be submitted at time of the bid submission.		
114.	The proposed EMS solution must comply with the following standards: CIS certification, ISO 27034-1 for application security or equivalent, ISO 27001:2022 for information security management or equivalent, GDPR for data privacy, SOC 1, SOC 2 Type I & II and SOC 3 for service organization controls. This ensures robust security, regulatory compliance, and comprehensive data protection across all managed network operations. Valid supporting documents must be submitted with the bid.		
115.	ITSM - Help Desk Tool		
116.	The proposed helpdesk system shall provide flexibility of logging, viewing, updating and closing incident manually via web interface		
117.	The proposed solution should be aligned with ITIL framework principles and certified with ITIL4 with minimum 12 practices. Documentary proof must be submitted during the bid submission time.		
118.	Each incident shall be able to associate multiple activity logs entries via manual update or automatic update from other enterprise management tools.		
119.	The proposed helpdesk system shall be able to provide flexibility of incident assignment based on the workload, category, location etc.		
120.	The proposed solution should automatically provide suggested knowledge base articles based on Incident properties with no programming		
121.	The proposed solution should automatically suggest available technicians based on workload, average ticket closure time assigning tickets with no programming		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
122.	The proposed solution should tightly integrate with monitoring system to provide two way integration - E.g. when system down alarm created, it should automatically create ticket and assign it to technician, in case system comes up before ticket is resolved by technician, it should automatically close the ticket to minimize human efforts		
123.	The proposed system must not create more than one ticket for same recurring alarm to avoid ticket flooding from Monitoring system		
124.	The proposed solution should allow administrator to define ticket dispatcher workflow which automatically assign incoming tickets based on rules defined in workflow. E.g. Network fault keyword tickets gets assigned to network technician automatically within NOC team		
125.	The proposed helpdesk system shall provide grouping access on different security knowledge articles for different group of users.		
126.	The proposed helpdesk system shall have an updateable knowledge base for technical analysis and further help end-users to search solutions for previously solved issues		
127.	The proposed solution should allow Technician to relate Incidents to Problem, Change and vice versa to have better context while working on any of ticket type		
128.	The proposed helpdesk system shall support tracking of SLA (service level agreements) for call requests within the help desk through service types.		
129.	The proposed helpdesk system shall integrate tightly with the Knowledge tools and CMDB and shall be accessible from the same login window		
130.	The proposed helpdesk solution should be equipped with chatbot functionality for identifying the intent of the query and provide an accurate answer and suggest options to confirm or resolve the issue.		
131.	The chatbot should have NLP functions (Natural Language Processing) to analyze the context of the query.		
132.	Proposed solution should not be dependent on any third party NLP algorithm. It should be inbuilt in the product.		
133.	Proposed helpdesk should have support of inbuilt conversational AI.		
134.	Asset Management		
135.	A configuration management database shall be established which stores unique information about each type Configuration Item CI or group of CI.		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
136.	The proposed solution allow scheduling periodic report to check current software and hardware inventory		
137.	The proposed solution must allow attaching CI record to generated service tickets		
138.	The Proposed solution should provide end to end Asset Life Cycle Management: Makes it easier to handle the complete life cycle of an asset, that is, all stages/modules from procurement to disposal		
139.	The Proposed solution should support maintaining AMC/Warranty Information with Alerting when about to expire also provide Asset Deletion capabilities enabled with workflow engine		
140.	The Proposed solution should support Software License Metering: Helps to understand the software license compliance and the use of unauthorized software in the organization and helps to act proactively to curb illegal usage and problems associated with it.		
141.	The proposed solution should provide Asset Dashboards/Reporting: Graphical representation all the assets based on Category, location, aging of the asset, customer, which can be further level down to the incident record ID		
142.	The proposed solution should provide out of the box purchase and contract management modules to support end to end asset life cycle.		
143.	The proposed solution should be able to take remote of the Desktops and laptops. Ability to remotely do chat, voice call, video call, transfer files across machines.		
144.	The proposed solution must provide asset baselining to manage and track asset effectively.		
145.	For the purpose of ensuring seamless integration, the proposed asset management solution should be provided by the same OEM as the service desk.		

15.46. Anti-Virus End Point Protection

#	Minimum Specifications	Compliance (Yes / No)	Remarks
1	Shall be able to scan through several types of compression formats.		
2	Must update itself over internet for virus definitions, program updates etc. (periodically as well as in push-updates in case of outbreaks)		
3	Able to perform different scan Actions based on the virus type (Trojan/ Worm, Joke, Hoax, Virus, other)		
4	Shall be able to scan only those file types which h are potential virus carriers (based on true file type)		
5	Shall be able to scan for HTML / VBScript Viruses / malicious applets / ActiveX controls		
6	Shall provide Real-time product Performance Monitor and Built -in Debug and Diagnostic tools, and context-sensitive help.		
7	The solution must support multiple remote installations		
8	Shall provide for virus notification options for Virus Outbreak Alert and other configurable Conditional Notification.		
9	Should be capable of providing multiple layers of defense		
10	Shall have facility to clean, delete and quarantine the virus affected files.		

15.47. Passive Components

Specification and Compliance for Passive Components
(CAT 6 U/UTP Outdoor Cable, Patch Panel Side, Cat (0.5, 1, 1.5, 2, 3 and 5 meters), Field Termination Connector IP20 For field equipment, UTP Patch Cord Lock, HDPE Pipe

15.48. IP-PBX with CTI, Softphones and Headsets

#	Minimum Specification	Compliance (Yes/No)	Remarks
1	General		
1.1	software licenses. Includes 5 years OEM + SI support (patches, upgrades, bug fixes).		
1.2	System shall support multi-site deployment (Nashik, Trimbakeshwar) with centralized management. Minimum 22 concurrent operator seats, expandable in future.		
1.3	System shall support for voice traffic to ensure call quality.		
1.4	System shall retain call, access, and configuration logs for at least 90 days. Logs shall be exportable/archivable for longer retention if required		
2	Interfaces		
2.1	System shall accept SIP trunk handoff (preferred) or PRI interface (fallback) procured by the Implementation Agency (IA) from a DoT-licensed TSP, with necessary documentation and authorization support provided by the Purchaser.		
2.2	Optional support for analog trunks / GSM gateway / radio devices if required.		
3	IP-PBX Features		
3.1	Ability to route inbound calls from SIP/PRI to operator softphones using hunt groups/queues with basic wait-time announcements.		
3.2	Operators shall be able to make outbound calls via softphones through SIP/PRI trunks.		
3.3	Core telephony features: call forward, transfer, hold/retrieve, three-party call join/conference, call waiting, missed call info, directory dial, speed dial, last number redial, malicious call trace.		
3.4	Inbuilt web GUI for configuration, monitoring, and management with real-time health and performance alerts.		
4	Softphone & Headset		
4.1	SIP-based softphone for Windows / Android.		
4.2	Each operator to receive unique login credentials.		

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#	Minimum Specification	Compliance (Yes/No)	Remarks
4.3	Functions: dial, answer, hold, transfer, call back, mute/unmute, volume control. Missed call alerts, call status.		
4.4	LDAP directory lookup and CTI integration for caller info and CRM access.		
4.5	Support for LAN, Wi-Fi, MPLS, VPN-less mobility.		
4.6	Each operator softphone shall be provisioned with a professional wired USB headset .		

16. Indicative List of Landmarks

The following list of landmark locations (with latitude and longitude coordinates) has been identified through the initial survey as sites where fibre is to be laid under Tender Ref. No. NMSCDCL/51/2025-26 dated 30th July 2025.

During the detailed site survey, the Implementation Agency (IA), in coordination with the Purchaser and designated staff/Police officials, shall determine the number of poles required to ensure adequate surveillance coverage.

Each pole shall be treated as a Unique Location for the purposes of the Project. A single landmark may require the installation of multiple poles. Each pole shall be equipped with cameras, a dedicated field access switch, and a junction box.

Locations shall be defined using a standardized naming convention, as illustrated in the following example:

- ▶ Landmark: Odha Railway Station
- ▶ Latitude: 20.01777
- ▶ Longitude: 73.91287

Assuming there will be two poles to be installed at Odha Railway Station

Then, naming convention in site survey:

Landmark	Lat	Long	Location	Lat	Long
Odha Railway Station	20.01777	73.91287	Odha_1	AAA1	BBB1
			Odha_2	AAA2	BBB2

16.1. Locations of Nashik

Indicative List

S. No.	Name of Location	Latitude	Longitude
1.	Near Odha Railway Station	20.01789	73.91350
2.	Adgaon Track Terminal	20.04731	73.87721
3.	Nandur Naka Signal	19.99676	73.84379
4.	Jatra Hotel Chowk	20.02528	73.84189
5.	Mirchi Chowk	20.00503	73.82611
6.	Swami Narayan Choufuli	20.00201	73.81197
7.	Tapovan T Point Near Janardan Math Kaman	20.00834	73.81528
8.	Kapila Sangam tapovan	20.00062	73.81444
9.	Laxmi Narayan Lawns T Point Road going Towards Kevadiban	20.00225	73.81078
10.	Aathvan Lawns T Point	20.00483	73.80765
11.	Tapovan Corner Joshi Gas Gowdown	20.00671	73.80424
12.	Swami Narayan Mandir (BAPS) Below the Bridge of Nearest Highways	20.00970	73.80763
13.	Near By Nandurgaon MNC School	19.99239	73.84411
14.	Nilgiri Baag	20.00726	73.83150
15.	Bidi Kamgar Chowk	20.01127	73.8259
16.	Below the Bridge at Medical Choufuli	20.03086	73.85678
17.	Amrutdham Chowk	20.01605	73.82529
18.	Health Science University, Dindori Road, Mhasrul, Nashik (Ground In front)	20.078733	73.80267
19.	RTO Corner Signal/ Chhatrapati Shivaji Maharaj Chowk, Dindori Road, Mhasrul, Nashik	20.034101	73.80319

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S. No.	Name of Location	Latitude	Longitude
20.	Jio Petrol pump Signal / Jijau Chowk, Mhasrul, Nashik	20.03587	73.80380
21.	Mhasrul Gaon Chowk, Dindori Road, Mhasrul, Nashik	20.047725	73.80618
22.	Vadnagar T Point ,Dindori Road, Mhasrul, Nashik	20.05052	73.80582
23.	Vadhane Colony/ Prabhat Nagar T Point,Dindori Road, Mhasrul, Nashik	20.04781	73.806055
24.	Kansara Mata Chowk, Mhasrul- Makhamalabad Link Road, Nashik	20.0487	73.7991
25.	Rao Hotel Signal Chowk, Peth Road, Mhasrul, Nashik	20.0464	73.7918
26.	Onkar Nagar T Point,Kishor Suryavanshi Marg, Mhasrul, Nashik	20.0377	73.7988
27.	Namko Hospital + R.T.O. Office Chowk, Peth Road, Mhasrul, Nashik	20.0342	73.7951
28.	Gamne Mala T Point, Shantinagar to Makhamalabad Road	20.0464	73.7774
29.	Shantinagar Bus Stop, Makhamalabad Road, Sai Siddhi All in One T Point	20.0416	73.7803
30.	Makhamalabad Gaon Bus Stand,Makhamalabad, nashik	20.048	73.7737
31.	Makhamalabad - Gangapur Katariya Bridge T Point Suyojit Garden Makhamalabad Road	20.0233	73.7569
32.	Health Science University, Dindori Road, Mhasrul , Nashik	20.0786	73.80510
33.	Hanuman Temple , Dindori Road , Commissioner Office Boundry	20.0817	73.8039
34.	Balaji Chowk , Kalanagar	20.035332	73.806701
35.	Sai Temple,Dindori Road, Mhasrul, Nashik	20.042515	73.805087

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S. No.	Name of Location	Latitude	Longitude
36.	Vadhane Colony/ Prabhat Nagar , Dindori Road,Mhasrul, Nashik	20.052778	73.804701
37.	Sati Asara Temple , Ekta Nagar, Borgad, Nashik	20.0553	73.7952
38.	Chanakyapuri Society, Mhasrul-Makhamalabad Link Road, Nashik	20.0477	73.7959
39.	Mehardham, Peth Road, Nashik	20.0406	73.7941
40.	Shantinagar, Makhamalabad Road, Nashik	20.029300	73.783561
41.	Koliwada, Makhamalabad, Nashik	20.0453	73.7724
42.	Vaiduwadi, Mhasrul, Dindori Road	20.0460	73.8061
43.	Makhamalabad Gaon	20.0464	73.7736
44.	R.T.O. Corner	20.0331	73.8031
45.	Rajsweet Corner	20.03275	73.80285
46.	New Sambhajinagar Naka	20.01093	73.80981
47.	Amardham	20.00268	73.79885
48.	Sharadchandra Pawar Market Signal	20.03010	73.79543
49.	Nashik Krushi Utpanna Bajar Samiti	20.01461	73.79626
50.	Minatai Thakre Stadium	20.01252	73.81392
51.	Baijabai Chhavani Corner	20.01111	73.78706
52.	Makhamalabad Naka	20.01220	73.79022
53.	Peth Naka	20.01256	73.79280
54.	Dindori Naka	20.01165	73.79565
55.	Tin Putle Phulenagar	20.02076	73.79423
56.	Panchavati Karanja	20.00988	73.79494
57.	Kamalnagar	20.01917	73.81492
58.	Indrakund	20.01007	73.79333

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S. No.	Name of Location	Latitude	Longitude
59.	Shanichowk	20.00784	73.79409
60.	Kalaram Mandir	20.00694	73.79596
61.	Sitagufa	20.00788	73.79630
62.	Nimani Bus Stand	20.01135	73.79637
63.	S.T.Dpot no. 02	20.00929	73.80341
64.	J.K. Tyre	20.00699	73.80393
65.	Shrikrushna Ice Factory	20.00819	73.80344
66.	Shrikrushna Tirth Ashram Corner	20.00885	73.80276
67.	Katya Maruti Chowk	20.00880	73.80219
68.	Takle Nagar Board	20.00825	73.80125
69.	Pashan Maruti Temple Amardham Road, Infront of Library	20.00747	73.80036
70.	Devi Chowk , Amardham Road	20.00641	73.79963
71.	Dhandai Optician Ganeshwadi	20.00622	73.78862
72.	Munjoba Chowk	20.00572	73.79693
73.	Ayurvedic College, Phule Bajar	20.00538	73.79596
74.	Gadge Maharaj Bridge Corner	20.00497	73.79524
75.	Gauri Patangan Devi Mandir	20.00425	73.79448
76.	Gauri Patangan Near Haymas	20.00310	73.79414
77.	Talkuteshwar Mandir	20.00192	73.79827
78.	Rokdoba Chowk	20.00383	73.79322
79.	Gadge Maharaj Below Bridge	20.00447	73.79383
80.	Gadge Maharaj Above Bridge	20.00447	73.79383
81.	Dilli Darwaja	20.00408	73.79317
82.	Kapurtala Maidan Chimani Javal	20.00505	73.79274

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S. No.	Name of Location	Latitude	Longitude
83.	Sanjivani Samadhi Mandir Near Haymas Mhasoba Patangan	20.00507	73.79350
84.	Ramsetu Bridge	20.00563	73.79231
85.	Sardar Chowk	20.00597	73.79349
86.	Nilkantheshwar Mandir	20.00648	73.79214
87.	Old Bhaji Patangan Near Haymas	20.00672	73.79265
88.	Sai Baba Mandir	20.00686	73.79320
89.	Ekmukhi Datta Mandir Near Haymas	20.00729	73.79147
90.	Devnamledar Samadhi Mandir	20.00717	73.79194
91.	Gandhi Talav Jyot	20.00826	73.79147
92.	Janardan Swami Stambhajaval	20.00843	73.79128
93.	Sulabh Showchalay Near Victoria Bridge	20.00862	73.79128
94.	Dinbandhu Office	20.00856	73.79186
95.	Ahilyabai Gym School Near Temple	20.00777	73.79257
96.	Ganesh Mandir Goreram Lane	20.00798	73.79284
97.	Kapaleshwar Mandir Samor	20.00824	73.79259
98.	Shi Chatru Sampraday Aakhada Mandir	20.00583	73.79240
99.	Vastrantar Gruh Ramkund	20.00797	73.79252
100.	Khandave Sabhagruh	20.00865	73.79393
101.	Malviy Chowk	20.00873	73.79409
102.	Janki Silk Saree	20.00898	73.79436
103.	Sukenkar Lane Corner	20.00903	73.79509
104.	Sivaji Chowk	20.00894	73.79634
105.	Patharvat Lane Hanuman Mandir	20.00895	73.79718

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S. No.	Name of Location	Latitude	Longitude
106.	Gajanan Chowk	20.00888	73.79832
107.	Gurudwara Road Near Gurudwara	20.00901	73.79892
108.	Laxman Zula Bridge (Hatti Pul)	20.00883	73.80027
109.	S.T.Depot no. 02	20.00929	73.80341
110.	Santosh T Point	20.00977	73.80547
111.	Modakeshwar Vasahat, Rokdoba Pataangan	20.00287	73.79334
112.	Nehru Chowk	20.00404	73.79156
113.	Taalkuteshwar Mandir, Amardham Road	20.00102	73.79829
114.	LaxmiNarayan Ghat	20.00248	73.80554
115.	Kannamvaar Bridge	20.00044	73.80284
116.	Maruti Wafers, Tapovan Road	19.997734	73.809731
117.	Shivaji Chowk	19.99784	73.79655
118.	Azaad Chowk	19.99671	73.79427
119.	Gumshaha Baba Darga	19.99864	73.79703
120.	Kathada Savarkar Chowk	19.99683	73.79642
121.	Hotel Shirsaath	19.99599	73.79435
122.	Chowk Mandai	19.99577	73.79217
123.	Helbawdi Mashid Dudh Bazaar	19.99883	73.78988
124.	Dudh Bazaar	19.99934	73.78986
125.	Mhasrul Tek Shivaji Chowk	20.00020	73.79185
126.	Battaase Corner Budhwaar Peth	19.99935	73.79330
127.	Chhaprichi Taalim	19.99926	73.79418
128.	Jumma Masjid, Shirishkumar Chowk	20.00045	73.79454
129.	Chavhaata Devi Mandir	19.99837	73.79418

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S. No.	Name of Location	Latitude	Longitude
130.	Dande Hanuman Chowk	19.99682	73.79258
131.	Gaadge Maharaj Statue Main Road	20.00195	73.78880
132.	Baadshahi Corner	20.00193	73.78972
133.	Dudh Bazaar	19.99934	73.78986
134.	Nehru Chowk	20.00404	73.79156
135.	Shaalimaar	20.00061	73.78670
136.	Nepaali Corner	20.00186	73.78730
137.	Azaad Chowk	19.99671	73.79427
138.	Shivaji Chowk	19.99784	73.79655
139.	Badi Dargaah	19.99951	73.79188
140.	Rokdoba Pataangan, Modkeshwar Vasahat	20.00287	73.79334
141.	Taalkuteshwar Mandir, Amardham Road	20.00102	73.79829
142.	Nehru Chowk	20.00404	73.79156
143.	Dudh Bazaar	19.99934	73.78986
144.	Shivaji Chowk	19.99784	73.79655
145.	Dwarka	19.99382	73.79644
146.	Dongre Vastigruh Maidaan	20.00662	73.77294
147.	Ravivar Kaaranja	20.00686	73.78965
148.	Ashok Stambh	20.00698	73.78464
149.	Dhumaal Point	20.00421	73.78900
150.	Nehru Chowk	20.00404	73.79156
151.	Gharpureghat T Point, Goda Riverside	20.00892	73.78310
152.	Meher Signal	20.00467	73.78397
153.	CBS Signal	20.00050	73.78243

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S. No.	Name of Location	Latitude	Longitude
154.	Thakkar Bazar Bus Stand	19.99878	73.78081
155.	Thakkar Bazaar Manse Karyalaya Chowk	19.99878	73.78081
156.	Mela Bus stand	19.99877	73.78080
157.	Jaltaran Signal	19.995860	73.776326
158.	Magesh Mithai	20.00601	73.78948
159.	Saangli Bank Signal	20.00419	73.78679
160.	Redcross	20.00519	73.78727
161.	Ahilyabai Holkar Bridge	20.00788	73.78992
162.	Marathon Chowk	20.00614	73.77627
163.	Mico Circle	19.99446	73.77139
164.	Chopda Lawns	20.00992	73.77345
165.	Vidya Vikas Circle	20.00944	73.76667
166.	June Gangapur Naka	20.0074	73.77168
167.	Guracha Dawakhana	20.00692	73.78387
168.	Across Police Aayukt Office	20.00612	73.78102
169.	Gharpure Ghat, Siddheshwar Mandir	20.00921	73.78543
170.	Fani Baba Dargaah	20.00932	73.78715
171.	Gangawadi Chowk	20.00886	73.78959
172.	Ekmukhi Datta Mandir	20.00763	73.79073
173.	V. V Shirodkar Jogging Track PNT Colony	19.99829	73.76397
174.	Pramod Mahajan Garden	20.00763	73.77294
175.	Big Bazaar Chowk College Road	20.00562	73.76546
176.	Ahirrao Photo Studio	20.00395	73.77054
177.	Canada Corner	20.00306	73.77037

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S. No.	Name of Location	Latitude	Longitude
178.	Holaram Colony Chowk	19.99808	73.77184
179.	Kulkarni Garden	20.00233	73.77294
180.	Rane Dairy	20.00188	73.77496
181.	Tilakwadi Signal	20.00089	73.77701
182.	K.T.H.M. College Samor	20.00611	73.77853
183.	V.N.Naik College Samor	20.00518	73.77360
184.	Gangapur Gaav Jakaat Naka	20.03007	73.71465
185.	Balaji Mandir Samoril Moklya	20.02604	73.71949
186.	Someshwar Dhabdhaba	20.02972	73.72268
187.	Jehaan Circle	20.01202	73.75602
188.	Pipeline Road Signal	20.01231	73.74548
189.	A.B.B Circle	19.99370	73.75425
190.	Shahid Circle	20.01190	73.75841
191.	Prasad Circle	20.01122	73.76067
192.	KBT Circle	20.01049	73.76412
193.	Vidyavikas Circle	20.00944	73.76667
194.	Bhosla Circle	20.00871	73.75554
195.	Modern Chowk	20.01707	73.75897
196.	Manywar Chowk	20.00708	73.75962
197.	Hallmark Chowk College Road	20.00575	73.76333
198.	Hotel Panchavati Elite Signal	19.99499	73.76345
199.	Akashwani Bhaji Market	20.01388	73.76095
200.	Asaaram Bapu Bridge	20.02152	73.75514
201.	Baardaan Phata	20.02441	73.72186

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S. No.	Name of Location	Latitude	Longitude
202.	Kataariya Bridge	20.02129	73.76729
203.	Satpur Club House Maidaan	19.99360	73.73339
204.	Satpur Ambad Link Road	19.97874	73.72603
205.	ITI Signal Satpur Trimbakeshwar Road	19.99339	73.74990
206.	Sakaal Circle Trimbakeshwar Road	19.99161	73.74171
207.	Satpur Gaav Rajwada Trimbakeshwar Road	19.99109	73.73594
208.	Mahindra Circle Trimbakeshwar Road	19.99026	73.73101
209.	Shreeram Chowk Trimbakeshwar Road	19.98943	73.72908
210.	Papaya Nursery Signal Trimbakeshwar Road	19.98577	73.72372
211.	Bajrang Nagar T Point Satpur Ambad Link Road	19.97656	73.72689
212.	Samruddhi T Point/ Amrut Garden Signal Trimbakeshwar Road	19.98327	73.71847
213.	Pimpalgaon Bahula Trimbakeshwar Road	19.98055	73.71106
214.	Hotel Sanskruti Trimbakeshwar Road	19.97171	73.67922
215.	Satpurgaon Kamaan Trimbakeshwar Road	19.99082	73.73355
216.	Dr. Babasaheb Ambedkar Bhaaji Market Satpur Colony	19.98947	73.72404
217.	Anand Chhaya Circle Bus Stop Satpur Colony	19.98930	73.72125
218.	Near Baagul Driving School Savarkar Nagar	19.98859	73.71713
219.	Near Ashok Nagar Police Chowki	19.98891	73.71367
220.	Shri Chhatrapati Shivaji Maharaj Bhaaji Market Naagre Chowk	19.99089	73.71116
221.	Carbon Naka Satpur	20.00247	73.71137
222.	Near Reliance Petrol Pump Ganesh Nagar Pipeline Road	20.00379	73.74209

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S. No.	Name of Location	Latitude	Longitude
223.	Across Matoshri Sweets Kaamgaar Nagar Road	20.00246	73.74976
224.	Satpur Bus Stop	19.99026	73.73101
225.	Croma Showroom Signal, Poonaroad	19.97943	73.80754
226.	Kathe Galli Signal	19.990711	73.799296
227.	Dwarka Circle	19.99382	73.79644
228.	Sarda Circle	19.99403	73.79036
229.	Gadkari Chowk	19.99341	73.78271
230.	Triambak Naka Signal	19.99712	73.78100
231.	Jaltaran Talaw Signal, Triambak Rd	19.995860	73.776326
232.	Mico Circle, Triambak Rd	19.99446	73.77139
233.	C.C.M Signal, Untawadi Rd	19.99088	73.76378
234.	Indra Nagar Bogda, Govind Nagar Side, Rd from Mumbai Naka to Service Rd to CBS	19.97962	73.78048
235.	Mumbai Naka Circle	19.98729	73.78436
236.	Sainath Chowfuli Signal, Rd to Indra Nagar	19.97962	73.78048
237.	Vadalanaka	19.99194	73.79366
238.	Usmaniya Chowk , Pakhaal Rd	19.98988	73.79509
239.	BharatNagar Chowfuli, Wadala Rd	19.99712	73.78100
240.	R.D.Circle, Indranagar Bogadyakadun C.C.M kade janara Rd	19.97962	73.78048
241.	AshokaMarg Signal, AshokaMarg	19.98694	73.77058
242.	Seble Furniture Chowk, Milind Nagar	19.99264	73.7724
243.	Nagsen Nagar	19.98857	73.79295
244.	RaviShankar Marg	19.97856	73.80685

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S. No.	Name of Location	Latitude	Longitude
245.	AshokaMarg	19.98093	73.79658
246.	Indra Nagar Jogging Track	19.97962	73.78048
247.	Bharat Nagar , Shivajiwadi Slum Area	19.98410	73.79219
248.	Bajarangwadi	19.98517	73.80153
249.	Nagsen Nagar	19.99388	73.79395
250.	Milind Nagar	19.99184	73.77315
251.	Kranti Nagar, Untawadi Rd	19.99163	73.76559
252.	Pathardi Phata	19.95692	73.75805
253.	Rane Nagar Bogda	19.96622	73.76738
254.	Indra Nagar Jogging Track	19.97969	73.77943
255.	ITI Bridge	19.98846	73.74998
256.	Datta Mandir Stop Kewal Park	19.97626	73.72709
257.	State Bank Chowfuli	19.96881	73.76898
258.	Lekha Nagar	19.97306	73.77339
259.	Shivaji Chowk	19.97528	73.77115
260.	Maharana Pratap Chowk	19.97365	73.76596
261.	Vijaynagar Bus Stop	19.96793	73.76018
262.	Uttam Nagar Bus Stop	19.96939	73.75486
263.	Pavan Nagar Bhaji Market	19.97473	73.75574
264.	Divya Adlab	19.98181	73.75578
265.	Trimurti Chowk	19.98427	73.75653
266.	Patil Nagar	19.98395	73.76030
267.	Mauli Lawns	19.97272	73.74741
268.	Vavre Nagar Jogging Track Kuthwad Nagar	19.97966	73.74731

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S. No.	Name of Location	Latitude	Longitude
269.	Bhole Mangal Karaylay Shubham Park	19.97072	73.75155
270.	Cidco Hospital	19.95937	73.75467
271.	Mahakali Chowk	19.97174	73.75841
272.	Ashwin Nagar	19.96140	73.76212
273.	Indra Gandhi Vasahat Kramank .2 Lekha Nagar Zhopadpatti Cidco Nashik	19.97500	73.77415
274.	Audumbar Bus Stop Cidco Nashik	19.97209	73.76769
275.	Badade Nagar Rd Khande Mala Area	19.98008	73.76787
276.	Kamatwade Gaon Matale Chowk	19.9773	73.75042
277.	Azaad Nagar Khaadi Area	19.97121	73.73195
278.	Fadol Mala	19.96919	73.74706
279.	Ambad Gaon Chowfuli	19.96174	73.74432
280.	Garware T-Point	19.94392	73.7441
281.	Glasko T-Point	19.94939	73.73867
282.	RP Sweets, T-POINT	19.95579	73.73501
283.	Exelo Point	19.96309	73.73535
284.	Sanjiv Nagar Kamaan(Indian Hotel)	19.97025	73.73025
285.	Indian PetrolPump	19.97312	73.72841
286.	Datta Mandir Stop	19.97626	73.72709
287.	Chhatrapati Shivaji Maharaj, Statue Pathardi Phata	19.95675	73.75771
288.	Ambad Gaon	19.96174	73.74432
289.	Lokmat Ramp Jawal	19.95143	73.75221
290.	Villholi Check Post	19.93674	73.73611

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S. No.	Name of Location	Latitude	Longitude
291.	Sanjiv Nagar Parisar	19.96917	73.72898
292.	Kargil Chowk, Datta Nagar Parisar	19.95904	73.72675
293.	Mhada Colony, Jadhav Sankul Parisar	19.97163	73.72184
294.	Gharkul Chunchale Parisar	19.94670	73.71778
295.	Pushpanjali Beer Bar Corner Pethe Nagar Police Station kade janara rasta	19.97408	73.77544
296.	Rajiv Nagar Valucha Thiyya Corner	19.97259	73.77406
297.	Dr. Babasaheb Ambedkar Statue, Bhagatsingh Nagar, Zhopadpatti, Rajiv nagar	19.96925	73.77052
298.	Rane Nagar Bogda Samor	19.96617	73.76806
299.	Pathardi Phata	19.95651	73.75862
300.	Bauddha Smarak Entry Gate, Pandavleni	19.94601	73.74674
301.	Garware Service Rd	19.9528	73.75473
302.	D-Mart Mumbai Agra Rd Chowfuli	19.93658	73.73599
303.	Kachra Depo , Gaulane Rd	19.917075	73.739424
304.	Signas Hospital, Pathardi Deolali Rd	19.95197	73.76887
305.	Shell Petrol pump Samor, Damodar Nagar kade , Pathardi Phata-Deolali Rd	19.94925	73.77082
306.	Pathardi Gaon Circle, Pathardi Phata-Deolali Rd	19.944148	73.77409
307.	Maruti Mandir, Pathardi Gaon	19.94238	73.77384
308.	Mango farm, Pathardi-Phata-Deolali Rd	19.941601	73.784912
309.	Jagganath Chowk, Wada-Pathardi Rd, Indra Nagar Nashik	19.95439	73.77597

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S. No.	Name of Location	Latitude	Longitude
310.	Samrat Sweet, Pandav Nagari, Chowfulli, Indra Nagar, Nashik	19.96027	73.7776
311.	Kalanagar Signal, Indra Nagar Nashik	19.9692	73.78237
312.	Kalanagar Chowk, Indra Nagar Nashik	19.96971	73.78242
313.	RathChakra Chowk, Chowfulli Indra Nagar Nashik	19.97217	73.78472
314.	Bappa Chowk, Indiranagar, Nashik	19.97151	73.78631
315.	Sainath Nagar, Chowfulli	19.97651	73.78900
316.	Indra Nagar Jogging Track City Garden	19.97794	73.78497
317.	Indra Nagar Jogging Track Entry Gate	19.97898	73.78183
318.	Indra Nagar Bogda, Chowfulli	19.97952	73.78012
319.	Wadala gaon Corner, Ashoka Hospital	19.97244	73.79400
320.	Madina Nagar Chowfulli, Wadala Gaon Nashik	19.96836	73.79835
321.	MaNaPa Hospital, Wadalagaon, Mhada Vasahat Jawal	19.96816	73.78909
322.	Gaussiya Majid, Wadala Gaon Nashik	19.97092	73.79428
323.	Raza Chowk, Wadalagaon, Nashik	19.97001	73.79504
324.	Mali Galli, Hanuman Mandir, Wadalagaon, Nashik	19.96988	73.79296
325.	MaangirBaba Chowk, Wadalagaon, Nashik	19.96799	73.79221
326.	Mehaboob Nagar Galli no. 01 Medical Jawal Wadalagaon Nashik	19.96639	73.79050
327.	Madaar Majid, Sathenagar	19.96301	73.78929
328.	Madina Lawns pudhe, Wadalagaon Nashik	19.96305	73.78933
329.	Mumtaz Nagar, Wadalagaon Nashik	19.96758	73.79732

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S. No.	Name of Location	Latitude	Longitude
330.	Charwak Chowk, Indra Nagar Nashik	19.97237	73.78161
331.	Pimpal Chowk, Old Indra Nagar near Police Station, Indranagar Nashik	19.97020	73.77948
332.	Gamne Maidaan, WasanNagar Pathardiphata	19.95475	73.76926
333.	MarkMall, Krushnai Nagar, IndraNagar Nashik	19.96023	73.76867
334.	Samrat Sweet, Sadaiccha Nagar kade Janara Road, Indiranagar , Nashik	19.96034	73.77778
335.	Rajivnagar Slum, Rajivnagar, Indiranagar, Nashik	19.97112	73.77718
336.	Damodar Chowk, Pathardiphata, Nashik	19.94967	73.76192
337.	New Petrolpump, Damodar Chowk kade janara Road,Behind Hotel Express INN	19.95002	73.75588
338.	Gajanan Maharaj Mandir, Kamodnagar, Nashik	19.97543	73.78186
339.	Ramdas Swami Takli Ghat Godavari River	19.98825	73.82235
340.	Hanuman Takli Ghat Godavari River	19.98854	73.82537
341.	Muktidham Ram Mandir Nashik Rd	19.95140	73.83743
342.	Mohammadiyaan Chowk Deolali Gaon Mistrivasti	19.94476	73.83452
343.	Datta Mandir Signal Nashik Poona Rd	19.95651	73.83408
344.	Chincholi Naka, Shinde Nagar	19.90479	73.91283
345.	Chehadi Jakat Naka, Truck Terminal Point, Nashik Rd	19.93637	73.85904
346.	Krushni Utapanna Bazaar Samiti-Ekhlare Rd	19.95163	73.84808
347.	Chhatrapati Shivaji Maharaj Statue Nashik Rd	19.95205	73.84043

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S. No.	Name of Location	Latitude	Longitude
348.	BharatRatna Dr. Babasaheb Ambedkar Statue Nashik Rd	19.94853	73.84088
349.	Bitco Chowk, Nashik Rd	19.95389	73.83769
350.	Godavari Nadi Dasak Ghat Jail Rd Nashik Rd	19.98827	73.84534
351.	Nashik Road Railway Station Baheril Parisar	19.94807	73.84116
352.	Nashik Road Railway Station Platform No. 4 and Baheril Parisar	19.94947	73.84361
353.	Nashik Road Bus Stand	19.94832	73.84121
354.	Chhatrapati Shivaji Maharaj Statue Nashik Rd	19.97907	73.84245
355.	Bagul Nagar, Vihitgaon, T Point	19.94708	73.84670
356.	Sinnar Phata, Chowki Samor, Nashik Rd	19.93748	73.83465
357.	Jail Rd Panyachi Taaki, Nashik Rd	19.97030	73.83994
358.	Shinde gaon, Naygaon Rd T point	19.92256	73.91290
359.	Ashwini Colony-Shasikiya Tantraniketan Mahavidyalay Corner, Samaan Gaon Rd, Nashik Rd	19.95156	73.86066
360.	Bhagwati Lawns Jawal, Chowk, Jail Rd, Nashik Rd	19.97822	73.85325
361.	Jama Majid, Nashik Rd	19.95219	73.83753
362.	Maal Dhakka Gate Samor, Nashik Rd	19.95104	73.83998
363.	Vasco Chowk, Nashik Rd	19.94076	73.83962
364.	Chehdi Hanuman Mandir, Nashik Rd	19.93600	73.85454
365.	Siddharth Nagar Ekhlahare Gate	19.97654	73.87766
366.	6 Number Naka Lame Rd	19.9268	73.8338
367.	Bhairav Nath Mandir Rd D. Camp	19.9207	73.8334

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S. No.	Name of Location	Latitude	Longitude
368.	Sansari Naka	19.9068	73.8329
369.	Selection Corner	19.9045	73.8329
370.	Chandramani Bustop	19.1994	73.8326
371.	Trimurti Bus Stop D. Camp	19.9060	73.8261
372.	Devi Mandir Renuka Mata Mandir	19.8884	73.8327
373.	Old Bus Stand D. Camp	19.9021	73.8297
374.	Jama Majid Sunni	19.9028	73.8292
375.	Balwant Plaza D. Camp	19.9070	73.8295
376.	Kale Chowk Hadola	19.9035	73.8300
377.	Rehman Nagar D. Camp	19.9040	73.8307
378.	Sunday Market D. Camp	19.9021	73.8308
379.	Sansari Gaon Chowk	19.9064	73.8399
380.	Levit Market	19.9018	73.8279
381.	Zenda Chowk	19.9011	73.8286
382.	Khanderao Takedi	19.8976	73.8224
383.	Kendriya Vidyalaya	19.8869	73.8330
384.	Mahalaxmi Mandir	19.9245	73.8267
385.	Karla Poornam Mandir	19.9211	73.8269
386.	Dastagir Baba Chowfuli	19.9186	73.8334
387.	Bhagur Naka No.2	19.8818	73.8331
388.	Shivaji Chowk Bhagur	19.8771	73.8343
389.	Donbhi Naka	19.8766	73.8318
390.	Ram Mandir/ Shahi Majid Bhagur	19.8743	73.8323
391.	Samaatwadi Bhagur	19.8780	73.8357

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S. No.	Name of Location	Latitude	Longitude
392.	Minara Majid/Gaikwad Galli	19.8784	73.8335
393.	Sawarkarwada Bhagur	19.8755	73.8334
394.	Tahuja Complex Vijay Nagar Bhagur	19.8780	73.8381
395.	Saibaba Mandir Bhagur Rahuri	19.8740	73.8382
396.	Sawanlila Lahavit Rd	19.8742	73.8265
397.	Sonawane Mill Bhagur	19.8749	73.8347
398.	Bhagur Bus Stand	19.8799	73.8332
399.	Barnes School Chowk	19.8769	73.8146
400.	9 Mile Commissioner Area Parking	20.06137	73.88972
401.	Truck Terminal Parking	20.04731	73.87721
402.	MadSangvi Parking	20.00662	73.86739
403.	Nilgiri Bag Parking	20.00225	73.83117
404.	Peth Road Navin Stadium Parking	20.01256	73.79280
405.	Thakker Maidan	20.00632	73.77420
406.	Sharadchandra Pawar Market Parking	20.03010	73.79543
407.	Arogya Vigyan Vidyapeeth Dindori Rd, Mashrul, Nashik Border Open Parking	20.0786	73.8051
408.	9th Mile Commissioner Compound	20.06137	73.88972
409.	Truck Terminal Parking	20.04731	73.87721
410.	Adgoan T Point	20.03883	73.86811
411.	Medical Choufuli	20.03086	73.85678
412.	DMART	20.02923	73.83305
413.	Laxminarayan Festival Lawns	20.02739	73.84742
414.	Jatra Chowk	20.02528	73.84189

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S. No.	Name of Location	Latitude	Longitude
415.	Rasbihari Chowk	20.01942	73.83142
416.	Amrutdham Chowk	20.01605	73.82529
417.	K.K. Wagh Chowk	20.01501	73.82149
418.	Swami Narayan Chowk	20.01059	73.81008
419.	Santosh T Point	20.00922	73.80583
420.	Tapovan Crossing	20.00672	73.80428
421.	Kannamvar Bridge	20.00374	73.80323
422.	Lakhalgaon Hadd	20.00059	73.93385
423.	Odha	19.99724	73.90784
424.	Shilapur	19.99645	73.89945
425.	Madsanghvi	20.00073	73.86998
426.	Manur Fata	19.99790	73.84962
427.	Nandur Naka	19.99676	73.84379
428.	Siddivinayak Chowk[PARKING]	20.00225	73.83117
429.	Mirchi Chowk	20.00503	73.82611
430.	Janardhan Swami Ashram	20.00201	73.81197
431.	Janardhan Swami T-Point	20.00834	73.81528
432.	Peth Road Commissioner Area	20.07942	73.77989
433.	Tavli Phata	20.06140	73.78314
434.	Raau Hotel Choufuli	20.04640	73.7918
435.	S T Workshop	20.04372	73.79322
436.	RTO	20.03310	73.80310
437.	Peth Choufuli	20.02261	73.79443
438.	Phule Nagar	20.02076	73.79418

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S. No.	Name of Location	Latitude	Longitude
439.	Phule Nagar Petrol Pump	20.02674	73.80056
440.	Bhakti Dham	19.99933	73.81013
441.	Peth Naka	20.01256	73.79280
442.	Arogya Vigyan Vidyapeeth	20.0786	73.80510
443.	Jakat Naka	20.06702	73.80561
444.	Dr.Babasaheb Ambedkar Chowk Mashrul	20.052699	73.804843
445.	Sarvajanik Shouchalay Mashrul	20.05052	73.80582
446.	Mahshrul Gaon	20.04781	73.806055
447.	Jijau Signal	20.035809	73.803691
448.	Raj Sweet Signal	20.03310	73.80310
449.	Tarwala Signal	20.02665	73.80080
450.	Path Choufuli	20.01256	73.79280
451.	Market Gate Parisar	20.01461	73.79626
452.	Dindori Naka	20.01165	73.79565
453.	Tapovan Road Gangavaril Bridge Shankar Nagar Takli Road Pulachi Baju	20.00825	73.80125
454.	Sadhugram Entry Front Gate	20.00234	73.81082
455.	Laxminarayan Lawns Corner	20.00180	73.80784
456.	Panchmukhi Hanuman Mandir	20.00891	73.80270
457.	Juna Adgaon Nakya Kadun Nimani Kadhe yenarya Rastyavar	20.00888	73.80269
458.	Panchmukhi Hanuman Mandir samarun Dubhakavar Katya Maruti police chowki parent	20.00870	73.80288
459.	Hirawadi Road Backside	20.00893	73.80228

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S. No.	Name of Location	Latitude	Longitude
460.	Near Katya Maruti Mandir	20.00854	73.80103
461.	Manoday Society	20.00862	73.80165
462.	Pashaneshwar Hanuman Mandir Takle Nagar	20.00747	73.80036
463.	Navdurga Shejari Amardham Kadhe Janara Rasta	20.00792	73.79841
464.	Nagchowkakade Janara Rasta New Bridge	20.00648	73.79214
465.	Kalaram Mandir Kadhe Janara Rasta	20.00505	73.79274
466.	Gadge Maharaj Bridge	20.00447	73.79383
467.	Mari Mata Mandir	20.00548	73.79336
468.	Gouri Pathangan	20.00310	73.79414
469.	SARDAR CHOWK PANCHER	20.00597	73.79349
470.	Indiranagar Jogging Track	19.978923	73.78166
471.	Mumbai Naka Circle	19.986813	73.78416
472.	Nagaji Signal	19.98850	73.79276
473.	Kathe Galli Signal	19.99091	73.79921
474.	Dwarka Circle	19.99422	73.79701
475.	Tractor House	19.997839	73.80212
476.	Samarth T Point	19.98897	73.80909
477.	Maruti Wafers	19.99816	73.80963
478.	Jaishankar Chowk	19.99407	73.80931
479.	ABB Circle	19.993820	73.75405
480.	Bhavani Circle	19.99446	73.77139
481.	In Front of Civil Hospital	19.99648	73.77842
482.	Rajdutt Hotel	19.99674	73.77960

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S. No.	Name of Location	Latitude	Longitude
483.	In Front of Thakkar Bajar Road	19.99680	73.77976
484.	In Front of Taluka Police Station	20.00090	73.78062
485.	Modak signal 4	19.99712	73.78100
486.	Cbs Signal	20.00050	73.78243
487.	Shalimar Chowk	20.00061	73.78670
488.	Gadge Maharaj Statue	20.00195	73.78880
489.	Bhardan Phat	20.02441	73.72186
490.	Someshwar Temple Gate Memorial	20.02181	73.72650
491.	Jehan Circle	20.01216	73.75603
492.	Old Gangapur Naka	20.00743	73.77168
493.	Marathon Chowk	20.00614	73.77627
494.	Ashoka Pillar	20.00698	73.78464
495.	Sunday Fountain	20.00686	73.78965
496.	Meher Signal	20.00467	73.78397
497.	Sangli Bank Signal	20.00419	73.78679
498.	Saraf Bazar Old	20.00576	73.79033
499.	New Sunday Narayan Temple	20.00788	73.78992
500.	Mahamarg Bus Stand	19.98729	73.78295
501.	Thakkar Bazaar Bus Stand	19.99878	73.78081
502.	Meda bus stand	19.99877	73.78080
503.	Old CBS bus stand	20.00073	73.78157
504.	Anant Kanhere Maidan	19.99611	73.77960
505.	Dogre Hostel Ground	20.00662	73.77294
506.	Thakkar Dome Ground	19.99168	73.75519

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S. No.	Name of Location	Latitude	Longitude
507.	8th Mile / Ambegaon Bahula Mumbai Agra Highway Rural Border Parking		
508.	Khambale Phata, Trimbale Road Parking	19.95164	73.63594
509.	Sambhaji Stadium Parking	19.96082	73.75767
510.	Satpur Bus Stand, Trimbakeshwar Road	19.99026	73.73101
511.	Goulane Phata Mumbai Agra Rd	19.93675	73.73617
512.	Garware T Point Service Rd	19.94404	73.74410
513.	Road beside Volkswagen Road	19.94898	73.74934
514.	Road beside Hotel Welcome	19.95255	73.75374
515.	Road Besides Express Inn	19.95277	73.75473
516.	Pandavleni Bogda Both Ways	19.94607	73.74672
517.	Hotel Taj Gateway Tunnel	19.95569	73.75680
518.	Pathardi Phata Choufuli	19.95692	73.75805
519.	Satyam Mangal Karayalay. Ambad Baju	19.96446	73.76533
520.	Rane Nagar Both Sides	19.96622	73.76738
521.	State Bank Corner to Lekha Nagar Road	19.96881	73.76898
522.	Both Sides of Lekha Nagar Circle	19.97306	73.77339
523.	Bhujbal T Point	19.97615	73.77644
524.	Sanskriti Hotel Trimbakeshwar Rd	19.97171	73.67922
525.	Belgaum Dhaga T Point	19.977464	73.694016
526.	Vasali T Point	19.975020	73.689545
527.	Pimpalgaon T Point	19.98055	73.71106
528.	Samruddhi Circle	19.98327	73.71847
529.	Papaya Nursery Chowk	19.98577	73.72372

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S. No.	Name of Location	Latitude	Longitude
530.	Sriram Chowk	19.98943	73.72908
531.	Mahindra Signal Chowk	19.99026	73.73101
532.	Satpur T Point	19.99109	73.73594
533.	Victor Point	19.99109	73.73594
534.	Sakal Circle	19.99161	73.74171
535.	ITI Signal	19.99339	73.74990
536.	Carbon Naka T Point	20.00247	73.71137
537.	Ashok Nagar Choufuli	19.98891	73.71367
538.	Narhari Chowk	19.94967	73.76192
539.	Gurugobind College	19.95906	73.77727
540.	Kalanagar Signal	19.96928	73.78244
541.	Bapu Bangla	19.97355	73.78609
542.	Sainath Signal	19.97655	73.78908
543.	Cidco Hospital	19.95937	73.75467
544.	Shubham Park T Point	19.97072	73.75155
545.	Divya Adlab Choufuli	19.98181	73.75578
546.	Trimurti Chowk	19.98427	73.75653
547.	Chincholi Naka, Nashik	19.90479	73.91283
548.	Krushni Utapanna Bazaar Samiti-Ekhlare Rd	19.95163	73.84808
549.	Chhatrapati Shivaji Maharaj Statue Nashik Rd	19.95205	73.84043
550.	BharatRatna Dr. Babasaheb Ambedkar Statue Nashik Rd	19.94853	73.84088
551.	Bitco Chowk, Nashik Rd	19.95389	73.83769
552.	Godavari Nadi Dasak Ghat Jail Rd Nashik Rd	19.98827	73.84534

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S. No.	Name of Location	Latitude	Longitude
553.	Ramdas Swami Takli Ghat Godavari River	19.98825	73.82235
554.	Hanuman Takli Ghat Godavari River	19.98854	73.82537
555.	Muktidham , Nashik Rd	19.95140	73.83743
556.	Sansari Naka D. camp	19.94621	73.83647
557.	Chandramani Stop Railway	19.94832	73.84121
558.	Bhagur Naka No.2	19.8818	73.8331
559.	Nashik Road Railway Station Main Building	19.94807	73.84116
560.	Nashik Road Railway Station Platform No. 4 and Baheeril Parisar	19.94947	73.84361
561.	Nashik Road Bus Stand	19.94832	73.84121
562.	Railway Station Deolali Camp	19.89760	73.83619
563.	Sailani Baba Chowk	19.97907	73.84245
564.	Jama Mashid	19.95219	73.83753
565.	Satkar Point	19.95163	73.84808
566.	Deolaligaon Rajwada Corner	19.94231	73.83590
567.	Vihitgaon Signal	19.93761	73.83466
568.	Dasak Ghat	19.98827	73.84534
569.	Sinnar Phata Signal	19.95163	73.84808
570.	Datta Mandir Signal	19.95651	73.83408
571.	Upanagar Signal	19.96910	73.81811
572.	Samrat signal	19.97592	73.81045
573.	Fame Signal	19.97943	73.80754

16.2. Location of Trimbakeshwar

Indicative List

S. No.	Name of Location	Latitude	Longitude
1	Talegaon Phata Highway	19.96191	73.64412
2	Talegaon parking 1	19.95443 6	73.63820 1
3	Talegaon parking 2	19.95328 2	73.63758 4
4	Talegaon parking 3	19.95926 7	73.64048 3
5	Talegaon parking exit	19.96022	73.64142
6	Talegaon parking 4	19.96167	73.64167
7	Khambale Phata Highway	19.95969	73.63016
8	Beje Phata Highway	19.95550	73.60125
9	Anjaneri Kila	19.95457	73.59187
10	Anjaneri Tirth	19.95319	73.58512
11	Brahma Valley College Inner parking	19.95065	73.57622
12	Towards Talwade outer parking Highway	19.95076	73.56398
13	Talwade village outer parking	19.97353	73.55402
14	Pahine T point towards Bhilmal outer parking	19.89923	73.54833
15	Bhilmal outer parking	19.90022	73.54679
16	Pahine outer parking	19.89739	73.54776 5
17	Pahine Inner parking	19.94221	73.55186
18	Prayag Tirth	19.94533	73.55085 73
19	Shri Panchayati Maha Nirvani Akhada	19.94470	73.55037
20	Shree Swami Samartha Gurupeeth Entrance	19.94402	73.54791
21	Shree Chandra Ghat	19.93881	73.53757
22	Kumbhmela Bus Station	19.93815	73.53594
23	Ambedkar square	19.93417 6	73.53250 2
24	Trimbakeshwar Municipal Council Office Corner	19.93484	73.53235
25	Gagangiri Maharaj Tea Point (New Pole-1)	19.93486	73.5307
26	Gagangiri Maharaj Tea Point (New Pole-2)	19.93490 0	73.53138 7
27	Gagangiri Maharaj Tea Point (New Pole-3)	19.93500 5	73.53020 4
28	Khanderao Maharaj Mandir Chowk	19.93533	73.52941
29	Sundarabai math (Teli Galli) (New Pole-1)	19.93488 0	73.52826 5
30	Sundarabai math (Teli Galli) (New Pole-2)	19.93480 0	73.52825 0
31	Sundarabai math (Teli Galli) (New Pole-3)	19.93494 1	73.52857 7
32	Sundarabai math (Teli Galli) (New Pole-4)	19.93509 5	73.52864 6

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S. No.	Name of Location	Latitude	Longitude
33	Patil Galli (Teli Galli) (New Pole-1)	19.93407	73.52826
34	Patil Galli (Teli Galli) (New Pole-2)	19.93381 9	73.52819 0
35	Bhagwati Mandir (Teli Galli)	19.93350 3	73.52814 5
36	Kushavart Tirth	19.93287	73.52780
37	Kushavart Tirth near Darshan Pass Booking Counter	19.93250 0	73.52792 1
38	Indra Kund	19.93244 4	73.52860 3
39	New Gangaputra hotel (Kushavart to Trimbak Temple Street)	19.93183 5	73.52840 3
40	Tulsi inn (Kushavart to Trimbak Temple Street)	19.93177 5	73.52923 6
41	Kalp Niwas Lodge near (Laxmi Narayan Mandir)	19.93206 5	73.52972 0
42	Laxmi Narayan Mandir Chowk	19.93258	73.52979
43	Trimbakeshwar Temple North Gate Entrance Rd	19.93271	73.53062
44	Trimbakeshwar Temple North Gate Entrance	19.93256 0	73.53077 2
45	Chhatrapati Shivaji Maharaj Chowk Near Trimbakeshwar Temple North Gate	19.93288 7	73.53115 9
46	Patil Galli Chowk	19.93390 6	73.53070 2
47	Patil Galli Chowk Near Ajay Jewellers	19.93339 8	73.53070 4
48	Trimbakeshwar Taxi Stand near Patil Chowk	19.93391 2	73.53111 9
49	Trimbakeshwar Bus Stand	19.93438 1	73.53177 7
50	Grampanchayat Office	19.93342 2	73.53177 9
51	Hotel Swami palace near Tahsil Karyalay	19.93466 2	73.53334 4
52	Maheshwari Bhakt Nivas	19.93532 7	73.53415 1
53	Bank of Maharashtra - Trimbakeshwar Branch	19.93621 6	73.53504 3
Around Trimbakeshwar Temple			
54	Around Trimbakeshwar Temple (North Gate Eixsting pole-1)	19.93250 7	73.53065 8
55	Around Trimbakeshwar Temple (North Gate Eixsting pole-2)	19.93253 8	73.53094 0
56	Around Trimbakeshwar Temple (North Gate Eixsting pole-3)	19.93252 5	73.53112 5
57	Around Trimbakeshwar Temple (East Gate Eixsting pole-4)	19.93229 5	73.53116 3
58	Around Trimbakeshwar Temple (East Gate Eixsting pole-5)	19.93194 4	73.53115 3
59	Around Trimbakeshwar Temple (South Gate Eixsting pole-6)	19.93188 5	73.53110 2
60	Around Trimbakeshwar Temple (South Gate Eixsting pole-7)	19.93189 6	73.53086 4

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S. No.	Name of Location	Latitude	Longitude
61	Around Trimbakeshwar Temple (South Gate Eixsting pole-8)	19.93189 6	73.53066 8
62	Around Trimbakeshwar Temple (West Gate Eixsting pole-9)	19.93191 0	73.53033 1
63	Around Trimbakeshwar Temple (West Gate Eixsting pole-10)	19.93196 1	73.53033 3
64	Around Trimbakeshwar Temple (West Gate Eixsting pole-11)	19.93211 2	73.53033 1
65	Around Trimbakeshwar Temple (West Gate Eixsting pole-12)	19.93224 4	73.53032 9
55	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli)		
64	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (New pole-1)	19.93313 9	73.52805 7
65	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (Eixsting pole-2)	19.93325 1	73.52832 3
66	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (Eixsting pole-3)	19.93337 7	73.52858 2
67	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (Eixsting pole-4)	19.93333 0	73.52885 9
68	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (Eixsting pole-5)	19.93316 8	73.52918 8
69	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (Eixsting pole-6)	19.93305 5	73.52942 6
70	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (Eixsting pole-7)	19.93291 2	73.52995 8
71	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (Eixsting pole-8)	19.93282 6	73.52946 0
72	Kushavart Tirth to Laxmi Narayan mandir Street (Bhour Galli) (Eixsting pole-9)	19.93314 5	73.52893 8
	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor		
73	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-3)	19.94044 5	73.53369 4
74	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-7)	19.94515 5	73.52978 0
75	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-9)	19.99788 9	73.59384 5
76	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-11)	19.94976 5	73.52605 9
77	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-13)	19.99731 2	73.59251 5
78	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-15)	19.95451 2	73.52247 7
79	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-17)	19.98603 7	73.58104 5
80	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-18)	19.98116 4	73.58115 1
81	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor (New Pole-22)	19.95982 2	73.51169 2
	Bilva Tirtha Road		
82	Bilva Tirtha Road (New Pole-1)	19.94438 4	73.52811 6
83	Bilva Tirtha Road (New Pole-2)	19.94438 4	73.52657 5

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S. No.	Name of Location	Latitude	Longitude
84	Bilva Tirtha Road (New Pole-3)	19.943138	73.525867
85	Bilva Tirtha Road (New Pole-4)	19.942206	73.525631
86	Bilva Tirtha Road (New Pole-5)	19.942034	73.526691
87	Bilva Tirtha Road (New Pole-6)	19.941479	73.526500
88	Bilva Tirtha Road (New Pole-7)	19.941505	73.525535
89	Bilva Tirtha Road (New Pole-8)	19.940324	73.526386
90	Bilva Tirtha Road (New Pole-9)	19.938872	73.525592
91	Bilva Tirtha Road (New Pole-10)	19.936110	73.526477
92	Chowkimata Mandir	19.934421	73.526495
	Old Jawar Phata Chowk - TMC Office Road		
93	Old Jawar Phata Chowk - TMC Office Rd (New Pole-1)	19.939309	73.532928
94	Old Jawar Phata Chowk - TMC Office Rd (New Pole-2)	19.937936	73.532693
95	Old Jawar Phata Chowk - TMC Office Rd (New Pole-3)	19.936744	73.532445
96	Old Jawar Phata Chowk - TMC Office Rd (New Pole-4)	19.935477	73.532379
97	New Jawar Phata Chowk	19.937429	73.536205
98	Old Jawar Phata Chowk	19.940973	73.53326
99	Sapgon Phata	19.958388	73.514085
100	Sapgon Inner Parking	19.95811	73.51070
101	Trimbak - Jawar Rd Amboli Parking-1	19.97121	73.49627
102	Trimbak - Jawar Rd Amboli Parking-2	19.972907	73.492592
103	Kumbhar Talav Govt Parking Building Trimbak	19.936072	73.531478
104	Kumbhar Talav Open Parking Lot	19.935558	73.530444
	Sundarabai math - Nivruttinath Maharaj Samadhi Mandir corridor		
105	Sundarabai math - Nivruttinath Maharaj Samadhi Mandir corridor (New Pole-1)	19.934416	73.526551
106	Sundarabai math - Nivruttinath Maharaj Samadhi Mandir corridor (New Pole-2)	19.934442	73.525889
107	Sundarabai math - Nivruttinath Maharaj Samadhi Mandir corridor (New Pole-3)	19.9338127	73.5241871
108	Nivruttinath Maharaj Samadhi Mandir chowk (New Pole-4)	19.933219	73.5238448
109	Nivruttinath Maharaj Samadhi Mandir	19.9331284	73.5232333

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S. No.	Name of Location	Latitude	Longitude
	Nivruttinath Maharaj Samadhi Mandir - Shree Swami Samartha Gurupeeth Entrance (Ring Road) Corridor		
110	Panch Agni Akhada	19.932439	73.523654
111	Atal Akhada	19.931796	73.523740
112	Gangasagar Lake Pole-1	19.931815	73.524650
113	Gangasagar Lake Pole-2	19.932407	73.525430
114	Brahmagiri Trek Entrance Point	19.930089	73.523097
115	Gatai	19.930424	73.525009
116	Aahilya Dam entrance on Ring Road	19.929137	73.526039
117	Aahilya Dam Pole-1	19.928340	73.526455
118	Aahilya Dam Pole-2	19.927084	73.527227
119	Aahilya Dam Ghat Pole-1	19.927225	73.527669
120	Aahilya Dam Ghat Pole-2	19.927598	73.527743
121	Aahilya Dam Ghat Pole-3	19.926755	73.527724
122	Aahilya Dam Ghat Pole-4	19.927230	73.528150
123	Shree Panchayti Akhada Naya Udasin Nirvan	19.926745	73.528522
124	Patankar Chowk Ring Road	19.928691	73.527899
125	Bada Udasin Akhara Parking	19.928299	73.530966
126	Bada Udasin Akhara	19.929190	73.532071
127	(Ring Road) Corridor Pole-1	19.929963	73.531725
128	Guru Gaurakshnath Math	19.931752	73.532210
129	Near Shamshanbumi Ring Road	19.933470	73.533607
130	Niranjani Akhada	19.934845	73.538032
131	(Ring Road) Corridor Pole-2	19.935798	73.539471
132	Sadguru dham Ashram	19.937051	73.541168
133	(Ring Road) Corridor Pole-3	19.938618	73.542648
134	(Ring Road) Corridor Pole-4	19.939879	73.544123
135	(Ring Road) Corridor Pole-5	19.942194	73.546500

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S. No.	Name of Location	Latitude	Longitude
	Nivruttinath Maharaj Samadhi Mandir- Kushavart Ghat Corridor		
136	Nivruttinath Maharaj Samadhi Mandir- Kushavart Ghat (Pole-1)	19.93324 9	73.52422 2
137	Nivruttinath Maharaj Samadhi Mandir- Kushavart Ghat (Pole-2)	19.93298 9	73.52575 8
138	Nivruttinath Maharaj Samadhi Mandir- Kushavart Ghat (Pole-3)	19.93285 1	73.52678 5
139	Nivruttinath Maharaj Samadhi Mandir- Kushavart Ghat (Pole-4)	19.93242 0	73.52745 9
140	Nivruttinath Maharaj Samadhi Mandir- Kushavart Ghat (Pole-5)	19.93306 5	73.52744 0
141	Dhobighat Galli - Chowkimata Mandir (Pole-6)	19.93363 0	73.52572 2
	Panchali Galli (Parashuram Mandir - Patankar Chowk)		
142	Panchali Galli (Pole-1)	19.93136 7	73.52912 3
143	Panchali Galli (Pole-2)	19.93122 4	73.52892 0
144	Parashuram Mandir Chowk (Pole-3)	19.93038 9	73.52881 1
145	Panchali Galli (Pole-4)	19.92970 9	73.52851 2
146	Panchali Galli (Pole-5)	19.92920 3	73.52832 8
	Goutam Talav		
147	Goutam Talav (Pole-1)	19.93046 0	73.52963 1
148	Goutam Talav (Pole-2)	19.93049 3	73.53104 8
149	Goutam Talav (Pole-3)	19.93151 8	73.52944 1
150	Goutam Talav (Pole-4)	19.93156 4	73.53020 0
151	Goutam Talav (Pole-5)	19.93113 9	73.53097 1
	Chakra Tirtha Village (Beza)		
152	Chakra Tirtha Village Beza (Pole-1)	19.99635 4	73.59350 4
153	Chakra Tirtha Village Beza (Pole-2)	19.99602 6	73.59357 7
154	Chakra Tirtha Village Beza (Pole-3)	19.99628 7	73.59402 8
155	Chakra Tirtha Village Beza (Pole-4)	19.99663 1	73.59408 8
156	Chakra Tirtha Village Beza (Pole-5)	19.99661 3	73.59330 7
157	Chakra Tirtha Village Beza (Pole-6)	19.99648 1	73.59216 1
158	Chakra Tirtha Village Beza (Pole-7)	19.99697 7	73.59391 6
159	Chakra Tirtha Village Beza (Pole-8)	19.99733 9	73.59371 0

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S. No.	Name of Location	Latitude	Longitude
160	Chakra Tirtha Village Beza (Pole-9)	19.99788 9	73.59384 5
161	Chakra Tirtha Village Beza (Pole-10)	19.99733 9	73.59443 8
162	Chakra Tirtha Village Beza (Pole-11)	19.99688 4	73.59496 6
163	Chakra Tirtha Village Beza (Pole-12)	19.99860 8	73.59270 8
164	Chakra Tirtha Village Beza (Pole-13)	19.99731 2	73.59251 5
165	Chakra Tirtha Village Beza (Pole-14)	19.99567 9	73.58749 9
166	Chakra Tirtha Village Beza (Pole-15)	19.99331 0	73.58260 7
167	Chakra Tirtha Village Beza (Pole-16)	19.99010 3	73.57793 9
168	Chakra Tirtha Village Beza (Pole-17)	19.98603 7	73.58104 5
169	Chakra Tirtha Village Beza (Pole-18)	19.98116 4	73.58115 1
170	Chakra Tirtha Village Beza (Pole-19)	19.97613 6	73.58401 4
171	Chakra Tirtha Village Beza (Pole-20)	19.97398 2	73.58724 5
172	Gajarwadi Inner Parking (Beza)	19.97227 1	73.58833 3
173	Shriram Shaktipith Mandir	19.97704 3	73.58897 1
174	Chakra Tirtha Village Beza (Pole-21)	19.97640 0	73.58553 2
175	Chakra Tirtha Village Beza (Pole-22)	19.96749 2	73.59123 6
176	Chakra Tirtha Village Beza (Pole-23)	19.96247 7	73.59452 4
177	Chakra Tirtha Village Beza (Pole-24)	19.95891 0	73.59802 7
178	Beza Phata Outer Parking	19.95685 3	73.60110 7
	Pahine Road		
179	Pahine Road (pole 1)	19.93886 9	73.55312 2
180	Pahine Road (pole 2)	19.93384 7	73.55384 7
181	Pahine Road (pole 3)	19.92774 7	73.55435 3
182	Pahine Road (pole 4)	19.92193 6	73.55522 2
183	Pahine Road (pole 5)	19.91463 1	73.5546
184	Pahine Road (pole 6)	19.90783 9	73.55208 3
185	Pahine Road (pole 7)	19.90236 9	73.55015 3

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S. No.	Name of Location	Latitude	Longitude
186	Pahine Road (pole 8)	19.899231	73.548331
	Nashik Trimbakeshwar road		
187	Nashik_TrimbakeshwarRoad (pole 1)	19.940211	73.540278
188	Nashik_TrimbakeshwarRoad (pole 2)	19.941628	73.542917
189	Nashik_TrimbakeshwarRoad (pole 3)	19.942914	73.545756
190	Nashik_TrimbakeshwarRoad (pole 4)	19.945431	73.553833
191	Nashik_TrimbakeshwarRoad (pole 5)	19.947881	73.558372
192	Nashik_TrimbakeshwarRoad (pole 6)	19.951914	73.568383
193	Nashik_TrimbakeshwarRoad (pole 7)	19.952169	73.576822
194	Nashik_TrimbakeshwarRoad (pole 8)	19.954981	73.596983
195	Nashik_TrimbakeshwarRoad (pole 9)	19.957867	73.609542
196	Nashik_TrimbakeshwarRoad (pole 10)	19.958417	73.620783
197	Kavnai	19.772989	73.613647
198	Sarvatirth Jatayu Mandir (Taked)	19.700214	73.776364
199	Vani	20.389425	73.909606
200	Shreenath ghat	19.933789	73.5344
201	Trimbak - Jawar Rd Amboli Parking-	19.972494,	73.490778
202	New Jawar Phata - Old Jawar Phata - Sapgon Road corridor	19.957747	73.517125
203	Sadhugram	19.946608	73.552711