

Request For Quotation (RFQ): Design, Supply, Installation, commissioning & Testing of IP based CCTV system at ISRPL, Panipat

General Overview: Bidder shall supply complete package, install, test and commission the Closed-circuit television (CCTV) Surveillance System at the ISRPL site. The purpose of the CCTV System is to monitor the complete facility operations & surveillance from designated location. It is intended to install CCTV system to track the material movement, objects through high quality images. The recording of the scene can be used in investigation, recreating the scene and establishing the truth.

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Vendor Scope of Work:

1.0 General Scope:

1.1 The vendor shall be fully responsible for proper selection of equipment's, design engineering, performance and successful operation of the complete system meeting the functional & technical requirements.

1.2 Technical description of Components indicates the minimum requirements of cameras, video managements system & associated hardware etc. however, this does not absolve the vendor of the responsibility for proper selection with respect to the following.

1.3 Selection of lens, focal length, camera, encoding techniques, selection of hardware and appropriate software for video management, selection of video recorder and its sizing to meet the storage requirements for proper monitoring and control.

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1.4 ISRPL reserve the right to modify, revise, and alter the specifications of equipment, system prior to acceptance of any offer. System requirements may be modified after selection of successful Bidder to meet operational requirements not envisaged at the time of selection of Bidder.

1.5 Mandatory Term: Bidder shall successfully Complete the CCTV project within 4.5 Month after order awarded.

2.0 Code & Standard

The CCTV system shall be designed, manufactured and tested in accordance with one of the latest editions of the following standards or codes:

- a) Electronic Industries Association (EIA)
- b) European Committee for Electrotechnical Standardization (International Electrotechnical Commission (IEC)
- c) International Electrotechnical Commission (IEC)
- d) Institution of Electrical Engineers Regulations for Electrical Installations (IEEE)
- e) International Standards Organization (ISO)
- f) National Television System Committee (NTSC)
- g) UL: Underwriters Laboratories

3.0 Scope of supply

The vendor shall supply, but not limited to following items,

3.1 IP Based Flameproof Camera -14Nos. Quantity & IP Based Weather Proof Camera-25 Nos. complete set with all associated hardware's, software's & accessories.

3.2 Central control unit

3.3 Unit mounting rack cabinet/Panel along with accessories, earthing arrangements, limit switches,

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breaker, fuses, terminal blocks and wiring etc. complete package.

3.4 NVR with redundancy

3.5 Camera mounting hardwares

3.6 Transmission & signal processing control cables

3.7 Video signal transmission unit

3.8 Video signal distribution unit

3.9 22" inch CCTV video surveillance LED monitor-03 Nos. Quantity with complete set

3.10 75" inch CCTV video surveillance Smart LED TV-03 Nos. Quantity with complete set

3.11 Power supply distribution unit

3.12 Power Cables as per requirement

3.13 Client work station 01 nos. Quantity

3.14 Network Storage (NAS) with capacity of 3month video storage

3.15 Camera housing

3.16 Cable Tray with cover & with necessary support as per requirement.

3.17 All hardware's, accessories & components etc. required for fully function of complete system.

3.18 All hardware's, software's, accessories & components required for integration of existing 05Nos. IP based Honeywell make camera with proposed CCTV system. However, these cameras will supply by ISRPL.

3.19 Junction Box as per requirement and as per area classification.

3.20 Spares: Layer 2 Industrial Grade Managed Ethernet Switches-01No. & Layer 3 Industrial Grade Managed Ethernet Switches-01No.

3.21 All hardware's, software's, accessories & components required for display of Plant CCTV system in COO office (Admin building, Panipat) & MD office (Head Office, Noida) in 55" inch TV. However, 55 Inch TV & internal leased line to be provided by ISRPL. Necessary bandwidth requirement to be provided by vendor. Integration & commissioning in all respects is in vendor scope. Vendor shall also suggest necessary scheme.

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Note: All of the proposed components shall be industrial grade & suitable for hazardous/weather proof according to area classification.

4.0 Selection of equipment suitable for the environmental conditions

4.1 All the devices and equipments provided by vendor shall be suitable for 24x7 operations.

4.2 It is presumed that the vendor being the domain expert in the field of CCTV Systems & is capable enough to select the best equipments & can provide best of detailed engineering in all respect in line with the contractual scope & specification. However, all the documents (viz datasheets / detail engg / SW logic / System configuration etc.) in compliance with the work order need to be submitted to ISRPL review.

4.3. The operational requirements as specified in the tender might undergo revisions during detailed design Engineering. The vendor must ensure that the offered system software/hardware has the capability and flexibility to take care of these.

4.4 Structural Steel (Mild Steel) required for mounting of equipments, JB's as per area classification etc. are included in vendor scope.

4.5 All special tools & test equipments, spares, consumables required for installation, testing, calibration and commissioning of the system is to be arranged by the vendor.

4.6 All materials including switchgears, cables, consumables, testing appliances, tools and tackles necessary for completing the work as per site requirements shall be procured/arranged by the vendor. No claim/ delay

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on this account will be entertained.

4.7 All commissioning and start-up spares required up to commissioning, system acceptance and handing over of the system to the owner shall be in the vendor's scope.

4.8 Maintenance of all the CCTV equipments, hardware & software as supplied by the vendor shall be in the scope of the vendor throughout the commissioning including warranty and CAMC period is for 2 Year.

5.0 CCTV SURVEILLANCE SYSTEM

5.1 Design, Supply, installation, testing and commissioning of CCTV System comprising of cameras, redundant servers, client workstations, storage devices (NAS/SAN), networking components, Display monitors, poles if required, analytic software etc. as detailed in tender document and BOQ.

5.2 Integration of CCTV system shall be possible over TCP IP/ MODBUS/open protocol.

5.3 Ladders & Scaffolding if required for installation, maintenance, testing and commissioning of the CCTV to be arranged by vendor.

5.4 Fault Indication to be provided, This includes fault occurring in the cameras, video encoders, FO cable, video recorders. Faults occurring in each of these devices shall generate an alarm in the Client console.

5.5 Fault Event to be logged in client console include device failure, date, time and description. The system shall support logging of events for reviewing and analysis in the future.

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5.7 Supply, installation, laying, glanding, ferruling and termination of power cables is in vendor scope.

5.8 Supply, laying, glanding, ferruling and termination of optical fibre cable and CAT 6 cables, OFC components, media converters, Fiber interconnecting unit, patch cords, pigtails, connectors etc along with accessories like FLP JBs, Explosion proof housing for mounting of field components, glands, plugs, cable trays, HDPE pipes, mounting structure, civil and mechanical work etc. for complete CCTV system.

5.9 The offered Video management software (VMS) software should be able to integrate all standard make and models.

5.10 Plant CCTV system to be display in COO office (Admin building, Panipat) & MD office (Head Office, Noida) in 55” inch TV. TV & internal Leased line to be provided by ISRPL. Integration & commissioning in all respects is in vendor scope. Vendor shall also suggest necessary scheme.

5.11 ISRPL will supply 5 Nos. Qty. IP based Honeywell make cameras. this camera to be integrated with proposed CCTV system in all respects.

Details of IP based Camera:

a. Make: Honeywell,

Model: HEIPTZ-2201W-IR

Type: Explosion Proof, EXD, IIC, T6, IP68

Quantity-04 Nos.

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b. Make: Honeywell,

Model: HZC 363-P-VR

Type: Weather Proof, IP66

Quantity-01 No.

6.0 Main CONTROL ROOM EQUIPMENTS

6.1 Supply, installation, configuration, integration, testing and commissioning of control room equipment's like CCTV Servers, CCTV client workstations, CCTV Display screens mounting panels, consoles, stands, structural supports, associated hardware and software complete as per Design Engineering, BOQ and tender document.

6.2 Supply and installation of System cabinet/Panel along with accessories, earthing arrangements, limit switches, breaker, fuses, terminal blocks and wiring etc. complete package as per as per Design Engineering specification and tender document for mounting of CCTV Servers, Analytics Servers, NAS/SAN along with associated rack mounted monitors, keyboards, mouse, industrial switches, power adapters, layer 3 Ethernet switch etc.

6.3 Supply, installation, integration, testing and commissioning of CCTV client PC's with LED camera display LED TV's along with networking components, networking rack, software, OS, antivirus etc. complete as per specification and tender document at Terminal Manager's Room and security room.

6.4 Supply and installation of Multi Cable Transit (MCT) Blocks at the CCTV cable Entry point to control room, for proper sealing of the cable entry point. All works relating to the sizing, designing and installation of MCT Blocks is within the scope of the vendor.

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6.5 Supply, installation, testing and commissioning of earthing pit required as per details engineering.

7.0 Cabling and Earthing

7.1 Complete CCTV system along with power cabling, JB's, Power Distribution panel, miscellaneous instrumentation comprising of suitable MCCBs, MCB, isolators, indication lamps, control wiring, voltmeters, ammeters, Terminal blocks, structural support etc with 20% spare power points to be made available for future use.

7.2 All the CCTV equipment's, JB's etc supplied by the vendor are to be properly earthed and as per OEM's recommendations.

7.3 All earthing cables shall be of minimum 1C x 6 sqmm FRLS unarmoured copper cable (Green Colour) or as per requirement

7.4 Supply, fabrication & erection of all the structural & other materials for installation of CCTV equipment's.

7.5 Cable tray with cover(Hot Dip Galvanized steel) & with structural support, trenches with structural support for cable tray wherever required, any additional requirement of cables laying as per site requirement.

7.6 Vendor to consider the supply and laying of entire cable trays with cover(Hot Dip Galvanized steel), structural support, trenches, HDPE pipe, required civil & mechanical work etc. in the quoted price. No separate payment for the same shall be made. If required please visit the site for actuals.

7.7 Vendor to propose and submit the complete cable route diagram along with structural support, earthing of cable trays and other details associated to it prior to physical execution of the cabling works at site.

7.8 Supply, installation, testing and commissioning of complete Earthing system for CCTV system is in vendor scope.

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7.9 Minor civil works like chipping / grouting for the instrument panels/supports stand etc. is in vendor scope.

7.10 Civil works associated grouting and fixing of equipment and entry/ exit of cables at the main control room, all masonry work associated with entry and ingress of equipment or cable inside the main control room including making goods, painting and finishing, all masonry work associated with erection of cabinets, junction boxes, within the main control rooms/outside is in vendor scope.

7.11 Anti Corrosive Painting of all structural supports for trays, panels, junction boxes, instruments, ducts, supporting structural etc. is in vendor scope.

8.0 ACCEPTANCE TEST

It shall be Vendor's responsibility to modify and/or replace any hardware and modify the software, if the specified functions are not completely achieved satisfactorily during post commissioning and as per ISRPL requirement.

9.0 Training

Two-day inhouse training to be imparted for maintenance of CCTV system.

10.0 Warranty

The warranty period shall be Five (5) years, with effect from commissioning date. During the warranty period, the Manufacturer shall replace at his own cost (parts and labour) and within the shortest possible delay, any element recognized to be defective or falling to provide the performance levels indicated

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required by this specification. Post-sale support for services & parts of minimum 5 Year, Certificate for the same to be provided by OEM.

11.FUNCTION SPECIFICATION AND SOFTWARE TESTING

11.1 GENERAL

The CCTV system software shall be operating system running in a real time mode and shall be able to meet all functional requirements as specified minimum.

11.2 SYSTEM EXPANDABILITY

The system design shall permit the on-line addition of new devices with no disruption to either the operation of existing devices or system communications for future expansion. The offered software should have in-built capability/provision to take care for future expansion upto 30%.

11.3 UPGRADABILITY

The system architecture shall provide a logical planned implementation of evolving technologies and provision for up-gradation of existing equipment.

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11.4 NETWORK REQUIREMENTS

The system communication shall be on the high-speed modern local area network (LAN) conform in ANSI & ISO standards and the same is also conforming to OSI functional layer and utilize industry standard protocols with 100 MBPS speed or better.

- a. Managed Ethernet Switches 100 MBPS port or better should be used for establishing LAN inter-connectivity in dual redundant configuration. All the cabling within Ethernet network should have 40% redundancy
- b. 40 % spare ports are to be provided on each of the Ethernet Switches.
- c. Type of communication cable to be used for dual LAN system
- d. The communication software should employ a peer-to-peer / Master-Slave communications protocol between all sub-systems wherever applicable.
- e. Loss of a subsystem or module shall not disrupt communications to other subsystems or result in performance de gradation. Loss of a subsystem or module or module channel shall generate a diagnostic message to be displayed at the operator stations and logged; identifying location / type of fault.

11.5 SYSTEM ACCESS SECURITY:

- a. The Operating system of client work station must be password protected. Minimum two different levels of user ids should exist –One of monitoring purpose (User) and other for configuration purpose (Administrator).
- b. Access to all system functions shall be protected by a multi-level password system.

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11.6 NETWORK SECURITY TOWARDS CYBER THREATS:

6.1 Following cyber security measures to be implemented in CCTV network for securing to cyber threat from the external world.

- a) Restriction of access to CCTV network from any network .
- b) Blocking of internet access directly from CCTV network through internet dongles.
- c) Availability of logs to determine the access of the CCTV network from outside network if any.
- d) Only client workstation has USB port access with password protected

- e) The vendor shall be fully responsible for maintaining updated antivirus throughout warranty and CAMC period at no extra cost.

12.0 TECHNICAL SPECIFICATION

12.1 CCTV SURVEILLANCE SYSTEM

Bidder shall supply, install, test and commission the Closed circuit television (CCTV) Surveillance System at the ISRPL site . The purpose of the CCTV System is to monitor the facility operations & security surveillance from main control room room. It is intended to install CCTV system to track the Material movement, objects through high quality images . The recording of the scene can be used in investigation, recreating the scene and establishing the truth.

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12.2 CCTV REQUIREMENT, LOCATION OF CAMERAS & MINIMUM TECHNICAL SPECIFICATION

a) The requirement calls for a complete working system and not components thereof. Bids must be completed with all equipments and required accessories along with necessary power systems including standard Un- interrupted Power Supply units for the entire system & equipments, video connectors, patch connectors, patch leads, mounting and fitting hardware, plugs, sockets, and any hardware/software, supply of cables, network components, etc. as required for complete installation of the System under this contract.

b) The proposed AI IP based CCTV surveillance system must be of open architecture type and should be OPCDA compliant (Object Linking and Embedding for Process Control Data Access) with latest version. The above compliance is under the scope of Design, Supply, Installation, Testing and Commissioning for the same. Bidders may consider and include the cost of the same as all inclusive while bidding the tender.

c) The CCTV system shall consist of indoor and outdoor weatherproof/Flameproof high speed day night cameras as per specification or latest as per application and client workstation with colour LED monitor, control keyboard, Television set (TV's) located in main control The cameras shall have Day/Night operation facility and automatic switching from color to black & white mode during night.

d) All equipment shall have sufficient number of alarms and supervisory indications and shall be provided with self-diagnostic facilities. All alarms and monitoring & diagnostic facilities shall be built-in (e.g. optical link failure) & shall be displayed on the front panel of the equipment for ease of maintenance

e) The CCTV Surveillance System shall include CCTV Cabinet with Network Recording Servers, External array of hard disks, Workstations with Displays Monitors, control keyboard, Power cables & cable tray, Fiber Optic

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cables, OFC components, CAT6 cable, patch cords, Networking components, FLP JB's, weather proof JB's, Software for operation, control, utility software for infrastructure management, like network & security management, Video Analytics Application Software, Remote Monitoring software with necessary accessories and fitting hardware, poles with mounting brackets if required etc. complete package and as per design requirement.

- f) The CCTV System shall be based on a digital network solution that enables video, data streaming over an IP network. The proposed system should capture, store and analyze Video images.
- g) System should facilitate multiple viewing of live and recorded images and controlling of all cameras by the authorized users present in the CCTV LAN.
- h) The selection weather proof or flameproof /Exd cameras shall be as per the hazardous area classification. The cameras shall be designed to withstand all weather conditions, including storm. The IP 67 or better rating and mounting details shall therefore taken into consideration.
- i) Cameras locations shall as per existing location or better. Vendor will visit site during details engineering and provide camera location architecture to ISRPL. However, areas of existing cameras and Minimum specification of Cameras & associated equipments shall be as follows,

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S.No.	Activity Area	Installed for the object	Application	Ex. Class	Item Qty. (Nos.)
1	200	30-V-01A	Focus on flash tank side glass. Monitor of foaming inside flash tank.	Explosion Proof Exd,IIC,T6,IP66	01
2	200	30-V-02A	Focus on flash tank side glass. Monitor of foaming inside flash tank.	Explosion Proof Exd,IIC,T6,IP66	01
3	200	30-V-01B	Focus on flash tank side glass. Monitor of foaming inside flash tank.	Explosion Proof Exd,IIC,T6,IP66	01
4	200	30-V-02B	Focus on flash tank side glass. Monitor of foaming inside flash tank.	Explosion Proof Exd,IIC,T6,IP66	01
5	300	30-C-01S	Focus on column tank side glass. Monitor of foaming inside column tank.	Explosion Proof Exd,IIC,T6,IP66	01

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6	300	30-C-02S	Focus on column tank side glass. Monitor of foaming inside column tank.	Explosion Proof Exd,IIC,T6,IP66	01
7	300	30-V-03A	Focus on flash tank side glass. Monitor of foaming inside flash tank.	Explosion Proof Exd,IIC,T6,IP66	01
8	300	30-V-04A	Focus on flash tank side glass. Monitor of foaming inside flash tank.	Explosion Proof Exd,IIC,T6,IP66	01
9	300	30-V-03B	Focus on flash tank side glass. Monitor of foaming inside flash tank.	Explosion Proof Exd,IIC,T6,IP66	01
10	300	30-V-04B	Focus on flash tank side glass. Monitor of foaming inside flash tank.	Explosion Proof Exd,IIC,T6,IP66	01
11	300	30-C-01A	Focus on column tank side glass. Monitor of foaming inside column tank	Explosion Proof Exd,IIC,T6,IP66	01

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12	300	30-C-02B	Focus on column tank side glass. Monitor of foaming inside column tank.	Explosion Proof Exd,IIC,T6,IP66	01
13	300	30-C-01B	Focus on column tank side glass. Monitor of foaming inside column tank.	Explosion Proof Exd,IIC,T6,IP66	01
14	100	TANKER UN- LOADING AREA	Tank unloading & Movement activities.	Weather Proof,IP66 & Nema 4X	01
15	100	PIGMENT FIRST FLOOR	Monitor of batch preparation.	Weather Proof,IP66 & Nema 4X	01
16	140	FLARE PILOT(RLNG)	Monitor on flare stack.	Weather Proof,IP66 & Nema 4X	01
17	320	REFRIGERATION AREA	Ammonia vessel storage.	Explosion Proof Exd,IIC,T6,IP66	01

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18	400	A-DRYER_INLET	Monitor of rubber crumbs..	Weather Proof,IP66 & Nema 4X	01
19	400	C-DRYER_INLET	Monitor of rubber crumbs.	Weather Proof,IP66 & Nema 4X	01
20	400	B-DRYER_INLET	Monitor of rubber crumbs..	Weather Proof,IP66 & Nema 4X	01
21	400	D-DRYER_INLET	Monitor of rubber crumbs.	Weather Proof,IP66 & Nema 4X	01
22	400	A-SCALE INCLINED CONVEYOR	Monitor of rubber crumbs.	Weather Proof,IP66 & Nema 4X	01
23	400	C-SCALE INCLINED CONVEYOR	Monitor of rubber crumbs.	Weather Proof,IP66 & Nema 4X	01

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24	400	B-SCALE INCLINED CONVEYOR	Monitor of rubber crumbs.	Weather Proof,IP66& Nema 4X	01
25	400	D-SCALE INCLINED CONVEYOR	Monitor of rubber crumbs. Focus only rubber crumbs. Zoom In/Out required.	Weather Proof,IP66& Nema 4X	01
26	400	A-LINE CHECK MAN	Monitor on bale movement on Kenmac conveyor.	Weather Proof,IP66& Nema 4X	01
27	400	A-ROBOT	For robot operation.	Weather Proof,IP66& Nema 4X	01
28	400	B-LINE CHECK MAN	Monitor on bale movement on Kenmac conveyor.	Weather Proof,IP66& Nema 4X	01

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29	400	B-ROBOT	For robot operation.	Weather Proof,IP66& Nema 4X	01
30	400	B-COAGULATION SHAKER SCREEN	Monitor of rubber crumbs on coagulation shaker screen	Weather Proof,IP66& Nema 4X	01
31	400	A-COAGULATION SHAKER SCREEN	Monitor of rubber crumbs on coagulation shaker screen	Weather Proof,IP66& Nema 4X	01
32	Substation	Substation	Monitor of entire HT Board	Weather Proof,IP66& Nema 4X	02
33	400	Checkman Line "A" Cabin	Monitor of bale movement	Weather Proof,IP66& Nema 4X	01

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34	400	Checkman Line "B" Cabin	Monitor of bale movement	Weather Proof,IP66& Nema 4X	01
35	Solar Plant	Solar Plant		Weather Proof,IP66& Nema 4X	04
Total					39

Note:

- a. IP Based Flameproof Camera -14Nos. Quantity & IP Based Weather Proof Camera-25 Nos. complete set with all associated hardware's, software's & accessories.**
- b. ISRPL will supply 5 Nos. Qty. IP based Honeywell make cameras. this cameras to be integrated with proposed CCTV system in all respects.**
- c. Housing & Camera should be same manufacturer and it should be integrated.**
- d. Certificates along with factory test to be submitted**
- e. All cameras shall be of same OEM**

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CAMERA SPECIFICATIONS:

i. PTZ type (Explosion Proof, HD Megapixel, AI, IP based, bullet Cameras)

S. No.	FEATURES	Description
1	Application	Day & Night Operation. Structure mount for monitoring of foaming inside column & flash tank
2	Pixel	HD Megapixel 2MP
3	Optical Zoom	30×
4	Digital Zoom	12×
5	Iris Type	Auto
6	Focus	Auto & Manual; with electronic shutter
7	Lens	Motorized Varifocal
8	Image Sensor	: 1/3" PROGRESSIVE SCAN CMOS or better
9	Pan movement	360° (endless) continuous pan rotation
10	Tilt Range	0° to 85° vertical (Zero Degree is defined as horizontal view on x -axis)
11	Pan Speed	Variable between 0.1°/sec to 80°/sec (Adjustable through software, also possible manually)
12	Tilt Speed	0.1 deg. to 40°/sec (Adjustable through software, also possible manually)

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13	Min. Illumination	Color: 0.002 LUX @(F1.5, AGC On), ,0 LUX with IR
14	Min. Resolution	1920x1080 (Full HD) or better
15	Protocols	TCP,IPV4/IPV6,TCP, HTTP, HTTPS, 802.1X, QOS, FTP, SMTP, DNS, NTP, RTSP, RTCP, RTP, TCP/IP, UDP, UPNP, SNMP, API: OPEN-ENDED, SUPPORT ONVIF, ISAPI, AND CGI, SUPPORT THIRD-PARTY MANAGEMENT PLATFORM. SHALL SUPPORT
16	Video Compression	Main Stream: H.265+/H.265/H.264+/H.264, SUB-Stream: H.265/H.264/MJPEG,Third Stream: H.265/H.264/MJPEG
17	Working Temperature:	-40°C TO 60°C (-40°F TO 140°F)
18	Explosion-Proof Certificate	For Explosive Gas Mixture Atmospheres Zone 1, Certified For EXD II C IP67, T6 ATEX(Atmosphere Explosible) Certified
19	Approved Makes	Bidder to propose CCTV from the following approved vendor list only: Refer vendor recommendation list
20	Mounting	As per site conditions. Adjustable head with 360 deg pan, 180 deg tilt. Make to be same as that of the Camera. Mounting to be done on existing structure. Cost of fabrication of support for the same to be included in the pricing of camera.
21	Accessories	The cost of Camera shall include all the required accessories, connectors etc. to connect Camera with Cat-6 Cable & for mounting on the pole or wall, surge arrestor in-built (or external) for power & Ethernet circuits
22	Power Source	Vendor is required to design the system of 110V AC +/-10%,50 Hz +/- 5%. for providing respective supplies to CCTV cameras. Necessary cabling,

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		industrial grade converters, Jb's, accessories etc. required is in vendor scope.
23	Housing material:	Stainless steel AISI 316L. The Viewing window of camera is made of toughened glass, which stands up to both the impact test and thermal shock test
24	Connectivity	Network interface: IEEE802.3, 10/100BaseT Ethernet networks (RJ45) for LAN/WAN, TCP, UDP, IGMP, SNMP, HTTP, RJ45
25	Operational Temp.	Outdoor with temperature range upto 60 deg C. Outdoor housing and mounts to be provided with IP-67 rated protection.
26	Operating Humidity	20% to 80% RH (non-condensing)
27	Certifications	IEC, UL, CE (UL certificate is mandatory). Certificate along with factory test record to be submitted
28	Application Programming Interface	Camera shall be certified for latest ONVIF version with suitable SDK s & APIs to be supplied with the camera.
29	Alarm triggers	Intelligent video, Camera shall have AI analytics(person and vehicle classification objects in area, line crossing, loitering, objects enter or leave area, directional violation, sabotage, etc. external inputs.
30	Approved Makes	Bidder to propose CCTV from the following approved vendor list only.
31	Make Offered	Bidder to Mention the Make of the product being offered
32	Model Offered	Bidder to Mention the Model of the product being offered
33	Warranty	5 years warranty after successful commissioning

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ii. PTZ type (Weather –Proof, HD Megapixel, IP, based ,bullet Cameras)

S.No.	FEATURES	Description
1	Application	Day & Night Operation (Automatic switchover from color mode to Monochrome Mode when the light falls below a certain threshold level)
2	Pixel	HD Megapixel 2MP
3	Optical Zoom	30×
4	Digital Zoom	12×
5	Iris Type	Auto
6	Focus	Auto & Manual; with electronic shutter
7	Lens	Motorized Varifocal 4.5mm-125mm
8	Laser Illumination Distance	Minimum 150 Meter
9	Sensitivity (Minimum Illumination)	Color: 0.005 Lux @ (F1.6, AGC ON), B/W: 0.01 Lux@(F1.6, AGC ON), 0 Lux with IR IR Range: 150 meter (Sensitivity shall be measured minimum @ IRE-30)

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10	Image Sensor	Minimum 1/3 inch Progressive Scanning or better CCD/CMOS Color Sensor
11	IR Cut Filter	Automatic removable IR Cut filter
12	Electronic Shutter	Automatic Electronic Shutter with Speed of approx. 1/10,000 second to 1/10 second or better to capture clear picture / video as per specifications
13	Iris Type	Auto
14	Presets	Min 200
15	Programmable Patterns	Min 4 (Four) including Pan, Tilt & Zoom tour functions
16	Flip Function	Auto
17	Pan movement	20deg to 90deg
18	Tilt Range	15~85deg Vertical
19	Pan Speed	Variable between 0.1°/sec to 80°/sec (Adjustable through software, also possible manually)
20	Tilt Speed	0.1 deg. to 40°/sec (Adjustable through software, also possible manually)
21	Zoom Speed	Adjustable
22	Wide Dynamic Range	Yes (Min. 120 DB)
23	Television System	PAL
24	Video Streaming/ Video Compression	Triple Streaming (3 x H.265)
25	Auto image stabilizer	Camera should support EIS
26	Uni -casting & Multicasting feature	Required
27	Aspect Ratio	Compatible to HD (16:9)

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28	Minimum Resolution	Resolution: 1080x1920(Full HD) or better
29	Frame Rate	Frame: 50/60 fps or better
30	S/N Ratio	50 dB or More
31	Automatic Gain Control (AGC)	Yes, On / Off (Selectable)
32	White balance	Yes, Automatic with Manual Override (2,000° to 10,000°K)
33	Back Light Compensation (BLC)	Yes, On/Off (Selectable)
34	Image settings	Compression, color, brightness, sharpness, contrast, white balance, exposure control, backlight compensation, exposure zone, automatic back focus, mirroring of images, WDR, dynamic contrast, text & image overlay, privacy mask.
35	Software Interface	Latest prevalent interfaces (Preferably web based)
36	Image Enhancement feature	Yes
37	Tilt & Zoom Display	On Screen
38	Privacy Zone masking	Yes, Min 4 zones with 3D privacy mask
39	Auto focus	Yes
40	Alarm triggers	Intelligent video,Camera shall have AI Analytic,Motion detection & Camera sabotage
41	Audio Compression	AAC LC 8/16 kHz./G.711 PCM8kHz./G.726 ADPCM8kHz.Configurable bit rate
42	Audio Input/output	Built-in microphone or port for connecting External microphone input on camera/ Layer-2 switch. Signal Line in / Line out to support audio

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		Inputs & outputs. (Ports required to pick up sound along with video are optional).
43	Security	Password Protected access, IP address filtering & user access log facility
44	Supported Protocols	TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4, IPv6, SNMP v2c/v3, QoS, HTTP, HTTPS, SSH, SSL, SMTP, FTP and 802.1x (EAP). Camera shall support open IP standards.
45	Service Port	PAL output
46	Power Source	Vendor is required to design the system of 110V AC +/-10%, 50 Hz +/- 5%. for providing respective supplies to CCTV cameras. Necessary cabling, industrial grade converters, Jb's, accessories etc. required is in vendor scope.
47	Dome Housing	IP-66 & NEMA 4X rated (Weather & Dust Resistant) with an aesthetic appeal
48	Dome Housing	Impact Resistant (IK10)
49	Dome Housing	Dome housing make to be same as that of camera make
50	Mounting	Pendant type. As per site conditions. Adjustable head with 360 deg pan, 180 deg tilt. Make to be same as that of the Camera.
51	View Material (Dome Bubble) SD card Support	Upto 2TB slot
52	Connectivity	Network interface: IEEE802.3, 10/100BaseT Ethernet networks (RJ45) for LAN/WAN, TCP, UDP, IGMP, SNMP, HTTP, RJ45
53	Internal Heat Sink	Required
54	Operational Temp.	Outdoor with temperature range upto 60 deg C. Outdoor housing and mounts to be provided with IP-67 rated protection

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55	Operating Humidity	20% to 80% RH (non-condensing)
56	Accessories	The cost of Camera shall include all the required accessories, connectors etc. to connect Camera with Cat-6 Cable & for mounting on the pole, surge arrestor in-built (or external) for power & Ethernet circuits
57	Certifications	UL, CE, FCC, BIS
58	Application Programming Interface	Camera shall be certified for latest ONVIF version with suitable SDK s & APIs to be supplied with the camera.
59	License Fees	Perpetual license to be provided
60	Approved Makes	Bidder to propose CCTV from the following approved vendor list only: Refer vendor recommendation list
61	Make Offered	Bidder to Mention the Make of the product being offered
62	Model Offered	Bidder to Mention the Model of the product being offered
63	Warranty	5 years warranty after successful Commissioning

iii. Network Video Recorder Servers (NVR) IP Based

CCTV NVR solution so proposed shall be a fully IP based system with one Management Server, Video Recorders, Video Management Software, CCTV Client Workstation and IP cameras' management suitable for new cameras as defined above. NVR system shall be able to connect to all network-connected devices. It shall have open architecture. NVR shall have capability of connecting to all the existing cameras in its region as well as further connectivity with NVRs of other regions shall be provided.

When an alarm occurs in the NVR server, the live video output of the camera associated with that alarm should be switched directly to the Viewing monitor.

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NVR/ VMS shall be completely ONVIF compliant. Any new IP Based camera (ONVIF Compliant) shall be able to configure on the NVR/VMS without any additional software, license, expenditure.

View options:

- a. Single camera view
- b. 1 to 8/16 views on a single screen.
- c. Sequence view
- d. Map view
- e. Must be able to view cameras from NVR

NVR system shall have the following as a minimum

Sr. No.	FEATURES	Description
1	General requirement	Should be compatible for loading video analytic Software (supporting ON-VIF protocol) from any third party. Also shall support in-built analytics of any ON-VIF compliant camera issued with this tender or to be installed at later. The NVR server system proposed by bidder should comply following: a) The NVR server system should be capable to process minimum 60 IP based AI cameras at 1080p Full HD resolution at 25 fps for 24/7 recording

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		<p>b) The NVR server system should be capable to store minimum 90 days recording of 60 IP based cameras at 1080p Full HD resolution at 25 fps.</p> <p>c) Redundancy: There should not be any single point of failure and should have following Redundant, Disk Drive, Power Supply & FANS.</p>
2	Processor Type	2 x Intel® Xeon® processor(10 Cores, 2.40 GHz) or better
3	Hyper Threading Technology support	Yes (2 threads / core)
4	Turbo boost Technology support	Yes
5	CPU Cache	LLC cache : up to 25MB per socket
7	NIC	Minimum 2 nos with 1/10Gbps onboard
9	Standard Memory	32 GB (4 x 8GB ECC DDR4 DIMM slots, 2133 MHz) or better
10	DIMM Slots	DDR-4 type
11	Memory Access Speed	Min 1066MHz
13	Storage Technology	Hot-pluggable/ swappable SAS HDD
14	No of HDD Bays (Internal)	8
15	Hard Disk Capacity (Internal)	4 TB-Raw storage capacity minimum. Four Bays shall be available for future expansion.

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16	Hard Disk Capacity (External)	Capacity to store minimum 90 days recording of number of licensed IP cameras at 1080p Full HD resolution at 25 fps in each server Whichever is higher. The solution should be capable for additional modules to store 30 days data apart from 90 days designed without additional processors Bidder to provide Calculation along with technical bid. Proposed storage shall be at least 10% more than the calculated storage.
17	RAID Configuration Internal	RAID 1 configuration
18	RAID Configuration external	RAID 5 configuration having support for RAID-1,5,6
19	No of Video Ports	Dual
20	Video Memory	16MB DDR3 SDRAM or better
21	No of Gigabit Ports	2 No.of 1/10Gb port
22	No of USB Ports	3
23	Integrated systems management controller	Yes (IMM or equivalent)
24	Security	Power-on password / administrator password / unattended boot /selectable boot / unattended start mode.
25	Optional systems management adapter	Virtual Media Key (optional)
26	Predictive Failure Analysis	(PFA) support Memory, HDDs
27	No of Power Supplies	1 +1 (redundant)

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28	No of cooling fans	(As per the server design)
29	Operating System	<p>Microsoft Windows Latest Version / Edition Including Supporting the latest hypervisor including the hypervisor, VMware, Citrix , Standard or Enterprise.</p> <p>Should be compatible with the supplied video management software and analytics (supporting ON-VIF protocol) from any third party. Also shall support in-built analytics of any ONVIF compliant camera issued with this tender or to be installed at later date during warranty and comprehensive AMC period.</p> <p>Vendor should be able to downgrade the OS as per the recommended OS by the chosen video management software vendor till the OS OEM licensing support is available.</p>
30	Form Factor	Rack
31	Anti-Virus	Norton (Latest) or approved equivalent with free upgrades till validity of contract including comprehensive AMC period.
32	Approved makes	Milestone, Genetec or camera OEM Make
33	Make Offered	Bidder to Mention the Make of the product being offered.
34	Model Offered	Bidder to Mention the Model of the product being offered.

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iv. Video Management Software (VMS) shall have following minimum features:

S. No.	FEATURES	Description
1	OEM Requirements	OEM of VMS should have Service Centre Support in India from minimum last 3 years.
2	OEM Requirements	OEM of VMS should be in the manufacturing for minimum 10 years globally. Bidder to submit OEM undertaking with details.
3	OEM Requirements	It should be compatible with other OEM camera with open protocol
4	Software Functional Requirement	The Software should be a highly scalable enterprise level solution. It must offer Video Management solution scalable from 1 camera to 60 cameras.
5	Software Functional Requirement	Shall support IP based AI Cameras Documentary evidence having make detail should be mandatorily submitted.
6	Software Functional Requirement	The VMS shall be based on open architecture which facilitates integration with other systems, Owner supplied free-issue cameras with the help of API (distributed free of charge). Shall be compliant to latest version of ON-VIF (S, G, T, Q & M Profile).
7	Software Functional Requirement	The system shall allow operation with PC Keyboard, Mouse, CCTV Keyboard.
8	Software Functional Requirement	Shall be able to view single and multiple cameras simultaneously.

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9	Software Functional Requirement	The software should support viewing/ recording of minimum 60 cameras per NVR server. The rate quoted by the bidder for NVR (and software) shall include licensing charges for VMS as above. No additional charges will be payable on this account till completion of comprehensive AMC period.
10	Software Functional Requirement	Remote Administration, Monitoring & Management of Video.
11	Software Functional Requirement	Facility for exporting the video
12	Software Functional Requirement	Alarm pop ups for the associated cameras.
13	Software Functional Requirement	VMS shall be open to any standard storage technologies integration.
14	Software Functional Requirement	The management server shall allow access to a system manager from where the administrator can configure and manage all servers, cameras, and users. The system shall allow the management server to be installed on multiple servers within a cluster of servers ensuring that another server in the cluster automatically takes over in case the first server fails.
15	Software Functional Requirement	The Video Management System shall support high availability of recording servers. A failover option shall provide standby support for recording servers with automatic synchronization to ensure maximum uptime and minimum risk of lost data.

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16	Software Functional Requirement	The Video Management System software shall provide fast evidence export by exporting in video to various formats, including video from multiple cameras in encrypted native database format with an included viewer.
17	Software Functional Requirement	Edge storage shall secure that when a lost or broken connection is back up, the data stored on the camera's internal storage shall be retrieved and stored in the media database.
18	Software Functional Requirement	Edge storage shall secure that after recovery from a malfunction it shall be possible to play back and view the video, and audio recorded by the device, while the malfunction persisted
19	Software Functional Requirement	The client viewer shall support the use of 3-axis USB mouse for control of pan, tilt, zoom and auxiliary camera functions.
20	Software Functional Requirement	The operator shall have the ability to use digital zoom where the zooming is performed in the image only on any number of cameras simultaneously. This functionality shall be the default for fixed cameras. The use of digital zoom shall have no effect on recording, or other users.
21	Platform	The software platform should be latest version of Windows server.
22	Compatibility	The VMS should be built on open standard and shall be compatible with products from industry leading manufacturers.
a	Viewing	Drag and Drop Camera Viewing.
b	Viewing	Multi camera sequential tours
c	Viewing	The VMS should have viewing client to enable the feed
d	Viewing	Extended camera viewing on multiple monitors
e	Viewing	Provision for remote viewing of cameras through internet.

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f	Viewing	Digital zooming feature
g	Viewing	User friendly PTZ Control functions of PTZ Camera.
h	Viewing	Support Multiple Video Resolutions (CIF, 2CIF, 4CIF & HD (up to 8MP))
23	Recording & Retrieval	Should have feature of recording and retrieval of Video and Audio.
a	Recording & Retrieval	Continuous recording, by trigger (motion or alarm), by schedule.
b	Recording & Retrieval	Should support the recording of H.264,MPEG-4 & MJPEG compressions
c	Recording & Retrieval	Storage device/HDD technical specification shall be as per OEM recommendation. OEM recommendation shall supersede to the NAS hardware specification.
d	Storage	Multi-level storage: should support multilevel storage (live recording on primary disk, archiving on secondary, and so on) should delete video after configurable duration.
24	Storage	Distributed, fault tolerant database architecture
a	Video Search	Video smart search on the basis of date, time, event, camera, location & alarm
b	Video Search	Should have advanced / smart / quick search function
c	Video Search	Sorting by camera name & IP Address.
d	Video Search	Should be able to export searched video to standard video codec (or with video player in case of proprietary format)
e	Video Search	Quick review of upto 60 minutes of data.

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25	Event Management	Register event, associated video and alert operator on screen with audio. Motion detection, sound detection, camera tampering events should be alerted to the operator.
26	Camera Management	Show connection status of cameras, alert operator on screen with audio Manage firmware upgrades (Optional), and setting IP address. Set camera settings such as brightness, contrast etc.
27	Security	User management, password management, user access level management
28	General Features & Specifications	Provides a multiple perspective geographic display of site locations with site specific surveillance information including sensor locations and alarm conditions.
29	General Features & Specifications	Ability to record and retrieve stored video
30	General Features & Specifications	Integrated-Alarm visualization rule and device control displays in either a single or double monitor format
31	General Features & Specifications	Software should be an open IP surveillance product, enabling simultaneous digital video recording from network, mega pixel and analog device, intelligent video analysis and remote access to live and recorded images from any networked computer.
32	General Features & Specifications	Software should allow to add, edit, delete or disable and enable policies for video management.
33	General Features & Specifications	Software should be able to store video to local hard disk, a RAID configuration or even a storage-area network (SAN
34	General Features & Specifications	Option of On screen digital video tracking & digital Zoom On tracked area.

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35	General Features & Specifications	-Software shall be able to perform the following tasks simultaneously: a. Digitizing and compressing video b. Writing video to files on local hard disk and maintaining an accurate index of the stored video file c. Deleting older video files as needed, to free up space to record newer video files d. Selectively transferring recorded video to long term storage media
36	General Features & Specifications	Updates as & when required during warranty period shall be done without additional cost. Original licensed copy of the software shall be supplied along with the system.
37	Certifications	Software shall be compliant to latest version of ONVIF
38	Remote Client Viewer	The web-based remote client viewer shall offer quick overviews of sequences with detected motion.
39	Remote Client Viewer	The recording server shall utilize high performance ISCSI, SCSI, SAS and SSD disk drives for online recording storage and shall allow the use of lower cost SATA drives for the RAID arrays for online archive storage.
40	Approved Makes	Nice, Mirasys, Milestone, Vicon, Honeywell, Verint, AXIS, Genetic, Mindtree or camera OEM.
41	Make Offered	Bidder to Mention the Make of the product being offered.
42	Model Offered	Bidder to Mention the Model of the product being offered.

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iv. Ethernet Switches:

a. Industrial Grade Managed Ethernet Switches: Layer 2

Bidder to note that all the Ethernet switches supplied shall conform to the following specifications as a minimum. All feature mentioned below shall be part of the offered switches and available for use and implementation out-of-the-box. It shall not be required to procure any additional software / hardware / licenses for the same.

SI. NO.	SPECIFICATION	REQUIRED PARAMETERS
1	General Features	Manageable, equivalent Layer-2, Open Configuration Auto negotiation on all the ports & Switches shall be supplied with the management modules / Management Port, licenses required for the switching solution.
2	High Availability	Switch having redundant power supplies and fans Spanning Tree (IEEE 802.1 d), Multiple Spanning Tree Protocols (IEEE 802.1 w) Link Aggregation across multiple ports of the same switch and across multiple ports of multiple switches
3	Connectivity/Ports Required	As per the approved Layout of CCTV, wire speed Fast Ethernet (10/100 BASE-T) ports for LANs provided per switch or better.

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4	Performance /Features Required	Broadcast suppression functionalities shall be able to perform L2 switching
5	Layer-1 Services / Features	Support for 10/100 Base-T, 100 Base-FX, 10/100/1000 Base-T, 1000 Base- SX, 1000 Base- LX
6	Layer-2 Service	IEEE 802.1d Bridging, Spanning Tree IEEE 802.1p Priority Queuing IEEE 802.1q VLAN Tagging Port- based VLAN MAC- based VLAN IEEE 802.1s Multiple Spanning Tree IEEE 802.1w Rapid Spanning Tree Protocol IEEE 802.1x Port Based Network Access Control IEEE 802.1ab Link Layer Discovery Protocol IEEE 802.3ad Link Aggregation IEEE 802.3x Flow Control IGMP snooping v1, v2, and v3 Link Aggregation and Port Trunking (based on IEEE 802.3ad)
7.	QoS	Layer 2 QoS IEEE 802.1p Priority Queuing Per Port QoS Configuration

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8.	Security Services / Features Required	capabilities to deploy filters / access-lists on all the ports DHCP Snooping capabilities to implement IP and TCP based filters on inter-VLAN routing IEEE 802.1x port based network access control
9.	Management Features Required	SNMP V1, V2 and V3 implementation Command-line interface (CLI)-based management console to provide detailed and complete device management capabilities Capabilities implemented mirroring ports at ingress and egress for detailed traffic and network usage analysis Remote Monitoring (RMON) software agent to support four RMON groups (history, statistics, alarms, and events) for enhanced traffic management, monitoring, and analysis
10.	Software	Version of software for supplied switch should be latest release to support all required features.
11	Fibre Optic Ports	Minimum 4 nos. 1000 Mbps fibre optic ports for distances up to 10km. Single mode links
12	Regulatory Compliances	Safety Certifications : UL 60950/ EN 60950/CSA-C22.2 No.60950/ IEC 60950 Electromagnetic Emission Certificate: FCC Part 15 (CFR 47), Class A/ ICES-003, Class A/ EN 55022, Class A/ CISPR 22, Class A/ VCCI Class A/ EN300 Environmental Safety:RoHS Compliant

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13	Power	Vendor is required to design the system of 110V AC +/-10%,50 Hz +/-5%. for providing respective supplies to CCTV cameras. Necessary cabling, industrial grade converters, Jb's, accessories etc. required is in vendor scope.
14	Application	Outdoor(Field)

b. Industrial Grade Managed Ethernet Switches: Layer 3

SL NO.	Specification	Required Parameter
1	General Features	Manageable, equivalent Layer-3,Fixed configuration Auto negotiation on all the ports & Switches shall be supplied with the management modules /Management Port, licenses required for the switching solution.
2	Port Density	24 x100/1000 BASE-X SFP ports
		Gigabit SFP ports will support any combination of 10/100/1000 BASE-T, 100BASE-X or 1000BASE-X SFPs,
		100BASE-FX, 100BASE-BX, 1000BASE –SX, 1000BASE-LX, 1000BASE-ZX or 1000BASE-ZX CWDM SFPs
3	Performance	Forwarding Rate-35.7 Mbps or as per design engg. Switching Fabric- 48 Gbps or as per design engg.

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		Supports 9 KB Jumbo frame size UP to 4K IPv4 routes, UP to 16K MAC addresses, UP to 2K layer 2 multicast groups, 4K VLAN ID, 256 MB DDR SDRAM, Separate packet buffer memory, 32MB Flash Memory, IPv6 routing option
4	Resiliency	Link Aggregation (802.3ad LACP) Dynamic Link Failover,
		<50 msec ring convergence incase the link failure, optimized for voice & video traffic. Loop Protection- Loop Detection
		Loop Protection-Thrash Limiting STP Root Guard, IEEE 802.1D Spanning Tree, Protocol (STP)-MAC Bridges, IEEE 802.1s Multiple Spanning, Tree Protocol (MSTP), IEEE 802.1t -2001 802.1D maintenance, IEEE 802.1w - 2001
		Rapid, spanning Tree protocol (RSTP), RFC 3768 virtual Router Redundancy Protocol (VRRP)
5	VLAN support	Support 1K VLANs, IEEE 802.1ad VLAN double tagging (Q-in-Q) IEEE 802.1QVirtual LANs IEEE 802.1v VLAN
		classification by protocol & port. IEEE 802.3ac VLAN tagging
6	Security	Private VLANs, providing security and port isolation of multiple customers using the same VLAN. Dynamic VLAN assignment NAC 802.1x support ACLs Access Control Lists BPDU Protection Guest VLAN support (IEEE 802.1x)
		IEEE 802.1x port Based Network Access Control IEEE802..1x Authentication protocols (TLS, TTLS, PEAP &
		MD5) IEEE 802.1x Multi Supplicant authentication MAC- based authentication port Security SSH Remote Login SSLv3 Web-based

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		Authentication RFC 2246 TLS Protocol V1.0 RFC 2865 RADIUS, RFC2866 RADIUS Accounting RFC
		3546 Transport Layer Security (TLS) Extensions RFC 3748 PPP Extensible Authentication Protocol (EAP)
7	Quality of Service	TCP-IP bandwidth limiting performance and bandwidth resolution down to 1Kbps IEEE 802.1p Priority Tagging
8	IPv6 Features	IPv4 and IPv6 Dual Stack IPv6 Management via Ping, Trace Route, Telnet and SSH Static Unicast Routes for IPv6 RFC 1886 DNS Extensions to support IPv6 RFC 1887 An Architecture for IPv6 Unicast Address Allocation RFC 2461 Neighbour Discovery for IPv6 RFC 2463 ICMPv6 RFC 2464 Transmission of IPv6 packets over Ethernet Networks RFC 2711 IPv6 Router Alert Option RFC 3056 Connection of IPv6 Domains via IPv4 Clouds RFC 2513 IPv6 Addressing Architecture RFC 4443 Internet Control Message protocol (ICMPv6)
9	General Routing	Broadcast Forwarding ECMP Equal Cost Multi Path routing RFC 768 User Datagram Protocol (UDP) RFC 791 Internet Protocol (IP) RFC 792 Internet Protocol Message Protocol (ICMP) RFC 793 Transmission control Protocol (TCP) Route Maps Route Redistribution (OSPF, RIP) RFC 1058 Routing Information Protocol (RIP) RFC 2080 RIPng for IPv6 RFC 2081 RIPng Protocol Applicability Statement RFC 2082 RIP-2 MD5 Authentication RFC 2453 RIPv2

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10	Multicast Support	Bootstrap Router for PIM-SM IGMP Proxy IGMP Snooping MLD Snooping (v1 and v2) RFC 1112 Host extensions for IP multicasting RFC 2236 Internet Group management Protocol v2 (IGMPv2) RFC 2362 PIM-SM RFC 2715
		Interoperability Rules for Multicast Routing Protocols RFC 3376 IGMPv3 RFC 3973 PIM-DM RFC 14541 IGMP &
		MLD snooping switches
11	Management	10/100/1000 console management port, port mirroring SSH and SNMPv3 for secure management RADIUS Authentication RMON (4 groups) SNMP Traps RFC 1157
		Simple Network Management Protocol (SNMP) RFC 1212
		Concise MIB definitions RFC 2574 User-based Security ioModel (USM) for SNMPv3 RFC 2575 View-based Access Control Model (VACM) for SNMP RFC 2741 Agent Extensibility (Agent X) Protocol Diagnostic Tools 10.1.1 BIST (Built-in Self Test) 10.1.2 Ping Polling User Interface & administrator Features should support multiple firmware on switch flash & so that backup firmware can be used incase main firmware fails Graphical User Interface (GUI) / Web GUI Industry- standard CLI with built-in Help
12	Electrical Approvals and Compliances	EMC EN55022 class A, FCC class A, VCCI class A Immunity EN55024, EN61000-3-levels 2 (Harmonics), and 3 (Flicker)
13	Safety Standards	UL60950-1 CAN/CSA-C22.2 No. 60950-1-03, EN60950-1, EN60825-1, AS/NZS 60950-1
14	Certification	UL / TUV or Equivalent BIS
15	RoHS compliant	Required

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16	Power	Vendor is required to design the system of 110V AC +/-10%,50 Hz +/- 5%. for providing respective supplies to CCTV cameras. Necessary cabling, industrial grade converters, Jb's, accessories etc. required is in vendor scope.
18	Operating & Design Temperature	Refer Site Data
19	Relative Humidity	Up to 95%
20	Application	Indoor(Control Room)

v. Industrial grade LED TV Specification as a minimum:

S. no.	Min Specifications
1	Make: Bidder to propose LED TV for CCTV from the following approved vendor list only: Refer vendor recommendation list
2	Display: LED Smart TV- 75 "
3	Screen Type: UHD(4K) Smart LED
4	Resolution:3840x2160 Pixel
5	The Display should have minimum (Native) contrast ratio of 5,000:1
6	The Display should have minimum life span of 50,000 Hrs.
7	The display should have brightness of 850cd/m ²

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8	The display should have following input terminals. a) RGB Input –Mini D-Sub 15 PIN x 1 b) DVI-D In – 24+1 PIN c) RS-232C - D-Sub 9 PIN X 1 d) HDMI In – 1 e) Component/ Composite Port -1 f) LAN port - RJ45 g) USB Port- 1
9	The LED should have in-built speakers (minimum 10W rms x 2)
10	The Display should Be supplied with wall Mount Bracket
11	The display should have the following standards certification a.RoHS compliant – For environment b.UL/IEC – For safety c.Energy Star 5.0 Certification – for Power Consumption
12	Accessories: USB cable, video cable with male/female socket (2 core 1 mm ² : Length 3 meters)
13	Warranty: Minimum of 12 Month after successful commissioning

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vi. Industrial grade Client Workstation Specification as a minimum:

S. no.	Min Specifications
1	Make: Bidder to propose Client work station for CCTV from the following approved vendor list only: Refer vendor recommendation list
2	Display: 21 " UHD LED & 32' UHD LED Display
3	Accessories: key board, mouse, hardware & connector
4	Client software & licenses, Antivirus with Complete package.
5	Warranty: Minimum of 24 Month after successful commissioning

CABLING, EARTHING, AND OTHER ACCESSORIES SPECIFICATIONS

i. CAT 6 ETHERNET CABLES (NON-ARMOUR)

S.NO	DESCRIPTION	MINIMUM REQUIREMENT
1	Type of Cable	Shielded twisted pairs
2	Conductor	4 unshielded twisted pair , 23 AWG Annealed bare stranded copper or as per design data

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3	Transmission frequencies	Up to 250 MHz
4	Characteristic Impedence	100(+/-3) Ohms 250 MHz
5	Primary insulation	Polyethylene insulation
6	Inner Sheath	Extruded FRLS PVC Type ST-2 as per IS:5831
8	Outer Sheath	Extruded FRLS PVC Type ST-2 as per IS:5831
9	Application standard	ISO/IEC 11801 2nd Ed., EN 50173-1 May 2007 (DIN EN 50173-1), DIN 44332-5, IEC 61156-5 2nd Ed., EN 50288 x-1, 10GBase T in acc. with IEEE 802.3, tested and certified by independent laboratory. TIA/EIA 568.B
10	Application	Indoor installation (control Room). If above 2meter length only armoured cable to be used.

ii.CAT 6 ETHERNET CABLES (ARMOUR)

S.NO	DESCRIPTION	MINIMUM REQUIREMENT
1	Type of Cable	UTP (unshielded twisted pairs)
2	Conductor	4 unshielded twisted pair , 23 AWG Annealed bare stranded copper or as per design data

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3	Transmission frequencies	Up to 250 MHz
4	Characteristic Impedence	100(+/-3) Ohms 250 MHz
5	Primary insulation	Polyethylene insulation
6	Inner Sheath	HDPE
7	Armour over inner sheath	Required (Galvanized steel wire or Corrugated ECCS Tape)
8	Outer Sheath	HDPE
9	Application standard	ISO/IEC 11801 2nd Ed., EN 50173-1 May 2007 (DIN EN 50173-1), DIN 44332-5, IEC 61156-5 2nd Ed., EN 50288 x-1, 10GBase T in acc. with IEEE 802.3, tested and certified by independent laboratory. TIA/EIA 568.B
10	Application	outdoor installation

iii. EARTH CABLE

S.NO	DESCRIPTION	MINIMUM REQUIREMENT
1	Voltage Grade	1.1 KV
2	Standard Applicable	IS:1554 part-1 with latest Ammendments

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3	Conductor	
A	Material	Annealed bare copper of EC Grade as per Class-2 of IS:8130
B	Effective Cross Section Area	Panel Earthing-10Sqmm, Cable Tray-6 Sqmm, JB's-6 Sqmm & Instruments-6Sqmm
4	Max. DC resistance @ 20 Degree C	As per IS:8130 Table-2
5	Max, Conductor Temperature	
A	Rated	70 Degree C
B	During Short Circuit	160 Degree C
6	Insulation	
A	Material	Extruded PVC Type C as per IS:5831
B	Thickness (Nominal)	As per Table 2 of IS 1554 (Part-1)
C	Rodent and Termite attack protection	Yes
7	Outer Sheath	
A	Material	Extruded FRLS PVC Type ST-2 as per IS:5831
B	Thickness of Outer Sheath	The average thickness of PVC outer sheath shall be not less than the nominal value specified under col 3 of Table 7 and the smallest of the measured values shall not be less than the minimum value

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		specified in co1 4 of Table 7.
C	Outer Sheath Colour	Green
8	FRLS Properties	
A	Oxygen Index	Min 29 at 27 Deg C to ASTM D 2863
B	Temperature Index	Min 250 Deg C to ASTM D 2863
C	HCL Emission	Max 20% by weight to IEC 754-1
D	Smoke Density	Max Smoke Density Rating shall be 60%, tested as per ASTM D 2843.
E	Flamability Test	As per IEC:332-1

Note:

1. Earthing in cable tray to be provided in every 6 meter distance.
- 2.All the instruments, Junction Boxes, cable trays etc are to be earthed using minimum 1C x 6 Sq. mm FRLS Copper un-armoured cable (green colour).

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iv. FIBER OPTIC CABLE(ARMOUR)

SL NO	DESCRIPTION	SPECIFICATION / MINIMUM REQUIREMENT
1	Type of Fiber	Single Mode
2	Specification	IEC 60793-2-50, ITU G.652
3	Construction	Multi-Fiber loose tube jelly filled
4	No. of fibers	12
5	No. of loose tube	1
5	Laying	Direct Burial (Underground)/ Inside HDPE conduit/cable tray (Above Ground)
6	Strength member	2 Nos. of steel wires
7	Armour	G.I./ Electrolytic chrome coated steel
8	Overall sheath	Tough weather resistant made High Density Polyethylene compound (HDPE) with anti-termite and anti-rodent properties.
9	Attenuation at 1310 nm	0.38 dB/Km
10	Attenuation at 1550 nm	0.25 dB/Km
11	Fiber cutoff wavelength	> 1150 < = 1320 nm
12	Polarization Mode Dispersion (PMD)	≤0.5 /√km

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13	Micro bending loss at 1550 nm	≤0.05
14	Proof stress level	≥ 0.7 Gpa

Note:

- a. Optical fibers shall be with buffer loose tube filled with Thixotropic Gel. Cable shall be rodent and termite resistant and designed to protect the fibers from environmental hazards in direct burial use.
- b. Internal test certificate for attenuation and length shall be available

v. FRLS POWER CABLE(Armoured)

SL NO	DESCRIPTION	SPECIFICATION / MINIMUM REQUIREMENT
1	Type of Cable	Copper cable
2	Voltage Class	1100 VAC grade
3	Size of Cable	As per load calculated & voltage drop calculation
4	Applicable standard	IS 1554 Part-1/1988
5	Material	FRLSH XLPE Armoured
6	Type	Extruded
7	Thickness	As per Table 2 of IS 1554 (Part-1)
8	ELECTRICAL PARAMENTERS	
	High voltage test	3 KV rms for 5 min between core to core 3 KV rms for 5 min between core to armour

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vi.HDPE PIPE

S.NO	DESCRIPTION	MINIMUM REQUIREMENT
1	Base Density (at 27°C)	940 to 958 Kg/m ³
2	Tensile strength at yield.Speed of testing 50 mm/ minute	Min. 20 N/mm ²
3	Outside Diameter	As per BOQ
4	Wall thickness	Min. 2.90 to Max. 3.10
5	Lubricated layer thickness	Should be min. 10% of wall thickness
6	Inner Layer	The inner layer of solid permanent lubricant shall be continuous all through and shall not come out during storage, usage and through out the life of duct.
8	Visual Apperance	Smooth inside & out side surface, free of blisters, shrink, hole, flaking, scratches & roughness. Duct shall be smooth, clean and round. The end shall be clearly cut and shall be square with axis of duct.

vii. EXPLOSION PROOF JUNCTION BOX

SRNO	DESCRIPTION	MINIMUM REQUIREMENT
1	Body & Cover	Cast Al. Alloy (LM-6) minimum 5 mm thick.

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2	Terminals	Clip on type, block locked at both ends suitable for up to 2.5 mm 2 conductor.
3	Tag nameplate	to be provided
4	Paint	Anti corrosive epoxy paint, shade light gray
5	Protection class	Suitable for area classified as EXD,IIC, T6 as per IS2148 IP – 67 as per IS – 2147
6	Other	<p>Sizing shall be done with due consideration for accessibility and maintenance in accordance with the following guidelines</p> <p>All junction boxes shall be provided with external earthing lugs</p> <p>All junction boxes shall be provided with 20% spare cable entries and terminals. Each junction boxes shall have a minimum of 10% or 2 Nos. whichever is higher, spare entries. All spare entries shall be with EXD plugs.</p> <p>All cable glands and plugs shall be of nickel-plated brass material. Double compression type cable glands shall be used for armoured cable.</p>

viii. WEATHERPROOF JUNCTION BOX

SRNO	DESCRIPTION	MINIMUM REQUIREMENT
1	Body & Cover	Housing :Carbon steel

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		Door: Carbon steel, all-round foamed-in PU seal
2	Surface finish	Housing and door: Dipcoat primed, powder-coated on the outside, textured paint Mounting plate: Zinc-plated
3	Material thickness	Housing: 1.38 mm (0.05 ") Door: 1.5 mm (0.06 ") Mounting plate: 2.5 mm (0.1 ")
4	Gland Plate	Bottom
5	Terminals	Clip on type; block locked at both ends suitable for up to 2.5/4/6/10 etc. mm 2 conductors as per requirement.
6	Tag name plate	To be provided
7	Color	RAL 7035
8	Protection class	IP 67/Nema 4 or Better
9	IK Code	IK08
10	Other	Terminal shall be spring loaded, vibration proof, clip-on type, mounted on nickel plated steel rails complete with end cover and clamps for each row. Sizing shall be done with due consideration for accessibility and maintenance in accordance with the following guidelines 50 to 60 mm between terminals and sides of box parallel to terminals strip for up to 50 terminals and additional 25 mm for each additional 25 terminals.

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		<p>100 to 120 mm between terminals for up to 50 terminals and additional 25 mm for each additional 25 terminals.</p> <p>All junction boxes shall be provided with one number internal and two number external earthing lugs.</p> <p>All junction boxes shall be provided with 20% spare cable entries and terminals. Each junction boxes shall have a minimum of 10% or 2 Nos. whichever is higher, spare entries. All spare entries shall be plugs.</p> <p>All cable glands and plugs shall be of nickel-plated brass material. All the cable glands shall be preferably NPT with with PVC hoods unless otherwise specified. Double compression type cable glands shall be used.</p>
11	Mounting	Wall/Strcuture

i)The overall Video system shall be connected via a dedicated and secured LAN network and shall be built using fiber optic & CAT6 communication cables utilizing standard TCP/IP protocols.

j) CCTV Server shall be installed at Main Control Room. System shall allow the storage of time-lapse and time stamped digital video images from all connected cameras. Video images shall be stored on a hard-drive array unit.

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k) The system storage should support continuous recording for all cameras at least for a period of 90 days at a resolution of (for 2MP cameras), 2160p @ 15 fps (for 4k cameras) with H.265+/H.265/H.264/MPEG-4 compression format or better with video quality High. The system should automatically overwrite the previously recorded video when it exceeds 90 days without any human intervention. The system shall always have recorded video of last 90 days at any given point of time.

l) The System's server and its operating system shall be from the OEM and shall not be third party.

m) All cameras are to be connected in hybrid of ring. All devices deemed necessary for implementing the Ring topology should be considered. The ring should start from main control room and should return back to control room so that single point cable cut will not affect the system and every camera will available 24X7.

n) The System shall be designed in such that any failure in the system shall not affect the normal operation of the entire integrated system, the remaining system components shall continue to operate with full functionality that is, no single – point of failure (SPOF).

O) The System shall have original License copy of Operating System (OS), VMS and analytic software's and shall have lifetime license in favor of ISRPL

P) All software and firmware upgrades shall be free of charge. Vendor should upgrade the software, free of cost in case new versions are released during the warranty and CAMC period including Antivirus updation

Q) Vendor should ensure backward compatibility with all the hardware and other software at least for one generation, even if new versions of software are released.

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12.3 CCTV System Description

a. CCTV Equipment

a) The CCTV central control equipment and video LAN server shall be installed in a standard cabinet located in the Main Control Room. This cabinet shall also house all the termination equipment required for the CCTV monitor and the interface equipment.

b) At each location, video signals and camera control signals from each camera shall be routed directly onto a local Ethernet to a video unit via OFC/ CAT 6 backbone for video signals & data.

c) All the equipment offered shall be suitable for operation on 110V +/- 10%, 50 Hz +/- 5% power supply. If any equipment operates on any voltage other than the supply voltage and supply frequency, necessary conversion/correction device for supply shall be included in the respective items in vendor scope. The power distribution JB's & cabling, accessories etc. shall be supplied and installed by the Bidder.

e) CCTV cabling/JBs should be laid/fixed, wherever there is a road crossover the cabling to be done either through culvert or above ground crossover structure.

f) All cables entries into the control room and Terminal manager room after laying and testing of all boxes of cables etc. to be sealed by installing Multi Cable Transit (MCT) Blocks. All works relating to the sizing, designing and installation of MCT Blocks is within the scope of the vendor.

g) The scope is deemed to include all components, accessories and equipment required to implement a fully functional CCTV system regardless of whether they are explicitly mentioned or not.

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h) All the equipment of CCTV should be of reputed make & on open platform and the software should conform to ONVIF Profile (Open Network Video Interface Forum) specification guaranteeing interoperability.

i) Bidder shall provide a CCTV cabinet of standard size i.e. rack cabinet shall be 19" (493 mm) wide by maximum 2100 mm high to house the control room equipment, Network Switches, Servers with Monitors, plug points etc. Bidder shall provide all the interfacing hardware and software necessary with this equipment to enable control room operators and maintenance personnel to monitor and control all cameras of the facility.

b. Mounting

a) The civil works shall also be part of the works involved and as per the descriptions under respective items of work. The scope includes supply and installation of required mounting arrangement / brackets/ stands, poles with required foundation & accessories etc. complete in all respective and as per requirement.

c. Documentation

a) Documentation to be submitted shall include but not be limited to schematic drawings of the CCTV system with all the components shown, data sheets and catalogues of equipment offered, and operation and maintenance manuals.

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b) Submission of Drawings, all CD's, software license and Manuals,

i) Detailed literature/ catalogues giving full particulars. Principle of operation, range and setting whether settings adjusting at site, materials of equipment enclosures, degree of protection and mounting details for all types of equipment offered.

ii) Detailed internal schematics and wiring diagram for Control and viewing room setup

- IP camera network
- Cable layouts
- Server set up

c) Functional design specification explaining principle and operations of the complete CCTV surveillance system.

d) Material test and inspection reports and certificates.

e) Approved certificates obtained from competent authorities for use in hazardous atmospheres (wherever applicable).

f) Certificate of weatherproof and explosive license of equipment's wherever applicable.

Note: All above mentioned documents in systematic way(02 Set of hardcopy & 1 set of soft form) to be handover to ISRPL.

D. Testing and commissioning

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- a) The testing and commissioning document has to cover the following minimum points,
- b) Format for Verification of QTY measurement as per BOQ.
- c) Format for checking Installation of Equipment location wise as per approved layout, cabling scheme etc.
- d) Format for Functional checking of System performance & software functional checks as per tender document.
- e) Vendor needs to test the system in totality and satisfy itself of its functionality to meet ISRPL requirement. System will be accepted to have been commissioned by ISRPL on its satisfactory performance as brought out in special terms and conditions of the tender.

Note: Till the system is commissioned & handover to ISRPL, vendor shall be the custodian of all the materials at site, and in case of any theft or damages of any equipment / system before the handing over for any reason whatsoever, vendor shall be solely responsible to replenish/repair/reconfigure the same in good condition to the entire satisfaction of the ISRPL.

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13.0 Vendor Recommendation

Equipment wise vendor recommendation List

S.NO.	EQUIPMENT/INSTRUMENT	RECOMMENDED VENDOR/OEM
1	FLP JUNCTION BOXES, ENCLOSURES, CABLE GLANDS, PLUGS, PUSHBUTTON STATIONS	Baliga, FEPL LTD., FCG FLAMEPROOF CONTROL GEAR, FLEXPRO
2	CONTROL PANELS & CONSOLES	RITTAL, SCHNEIDER ELECTRIC, ABB
3	CABLE- SIGNAL & CONTROL	DELTON, LAPP, BELDEN, CORDS CABLES
4	CABLE- POWER & EARTH	CORDS CABLES,CCI, KEI,Polycab
5	MCB, ELCB & MCCB	SIEMENS, ABB, LARSEN & TOUBRO, SCHNEIDER ELECTRIC
6	CABLE TRAY & TRAY COVERS	INDIANA, PARAMOUNT, GLOBE ELECTRICALS, LARSEN &

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		TOUBRO, ELCON CABLE TRAYS PVT. LTD.
7	FIBRE OPTIC CABLE	FINOLEX, ABB, TYCO, LUCENT – AT & T
		SIEMENS, D-LINK
8	CAT 6/6A CABLE	TYCO, DIGILINK, MOLEX
9	CAMERA SURVEILLANCE SYSTEM:	
A	WEATHER PROOF AND FLAMEPROOF CAMERAS, ENCODER	PELCO, HONEYWELL, BOSCH, INFINOVA, PANASONIC, AXIS
B	VMS, ANALYTICS SOFTWARE	Nice, Mirasys, Milestone, Vicon, Honeywell, Verint, AXIS, Genetic, Mindtree or camera OEM
C	NVR	Milestone, Genetec or camera OEM Make
D	NAS/SAN	HITACHI, HP, DELL, FUJITSU
E	LED TV	SONY, SAMSUNG
F	MONITOR	HP, IBM, DELL

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G	INDUSTRIAL GRADE LAYER 3 GIGABIT ETHERNET SWITCH	CISCO
H	INDUSTRIAL GRADE LAYER 2 ETHERNET SWITCH	ROCKWELL, SIEMENS,CISCO
I	FIBRE OPTIC NETWORK COMPONENTS	LUCENT -AT & T, OPTEL, ABB, SIEMENS, PHOENIX CONTACT
J	VIDEO CABLE	FINOLEX, NICCO HAVEL, UNIVERSAL CABLES
K	DC POWER SUPPLY	LAMBDA, SIEMENS, ABB