Corrigendum 01

Tender No: NKR0000305 dt. 13.05.2019

This corrigendum is being issued for below changes in tender –

1. Tender specification CE/416/CCTV/YTPS Rev 00 is revised to CE/416/CCTV/YTPS Rev 01. Revised technical specification CE/416/CCTV/YTPS Rev 01 is applicable for tender. Revised specification is attached

2. Due date of bid submission is extended upto 13.00Hrs on 03.06.2019

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PROJECT : YADADRI 5 x 800 MW

CUSTOMER : TELANGANA STATE POWER GENERATION CO.

CONSULTANT : TCE

EQUIPMENT : Plant Security System consisting of Perimeter Intrusion Detection System, CCTV system and Patrol guard system

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REVISION HISTORY SHEET

REV No.	DATE	NATURE OF CHANGE	REASON	PREPARED BY	REVIEWED BY	APPROVED BY
00	25.01.2019	FIRST ISSUE	---	AKS	KRS	KCR
01	23.05.2019	SECOND ISSUE	General changes	AKS	KRS	KCR

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SECTION-A : GENERAL INSTRUCTIONS TO BIDDERS:

Bidders are required to submit techno-commercial offer for supply, installation and commissioning of Plant Security System (PSS) consisting of Perimeter Intruder detection system, CCTV system and Patrol Guard system, for TSGENCO's Yadadri 5x800MW project (referred as customer/owner in later sections of the document).

1. The system integrator and make of camera offered requires approval by customer. Therefore, bidder must furnish following document for taking up with customer for their approval as system integrator and also for approval of their offered camera make (in case offered camera is not amount approved camera makes mentioned later in the specification) :

i. Company Profile of the bidder
ii. Tabular List of CCTV system already executed / orders in hand of bidder (especially in power plants, cement plants, petroleum refinery, steel plant, coal mines) clearly mentioning name of project, year of supply / commissioning / handing over, make of camera and contact details of user/owner etc.
iii. Unpriced Copy of Purchase order, Performance certificates, handing over protocols of CCTV system commissioned by bidder.

The credential documents submitted by bidder (as per above list) shall be submitted to customer for approval of bidder as system integrator and their offered camera make. Technical offer of only such bidders who are approved by customer as system integrator will be evaluated for further consideration in the tender. Hence bidders are advised to submit their complete and comprehensive credentials. Further, in case bidders' offered camera make is not approved by customer, bidder will be given opportunity to change camera make along with other associated hardware configuration and software make to approved makes without any price impact.

2. If required during evaluation of Technical offers/bids, bidder should visit BHEL Electronic Division, Bangalore, for discussions, on 3 day notice. Further in the event of ordering, Bidder shall accompany BHEL representative (if required) for discussions with customer / consultant at their works for approval of the system documents.

3. This specification does not prohibit any bidder to submit their offer along with clause wise deviation from the specification. Changes in technical specification / Scope of supply/service, BOM, approved makes of components etc shall be informed to Participating bidders only.

4. Bidders can submit only one bid. If multiple bids / optional bids are submitted by a bidder, then both offers of such bidder will be summarily rejected.

5. All bidders, irrespective of their existing approval with BHEL / other units of BHEL / customer, should submit all documents as called for submission in various sections of this specification.

6. All documents against this Tender/Specification shall be submitted in English only.

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SECTION-B: Pre-Qualification Requirements (PQR)

a) Bidder must have an experience of supplying and completely commissioning at least one "IP-CCTV system", consisting of minimum 150nos of cameras, in a power plant or an Oil industry or a gas industry and the complete system shall be in operation for at least one year as on techno-commercial bid submission due date of this tender. Following supporting documents may be submitted for meeting this criteria:

   i. *Unpriced Purchase Order (PO) Copies, for supply & services, issued in name of bidder*
   ii. *Complete Bill of material (either part of PO or owner approved document)*
   iii. *Commissioning/handing-over protocols of complete system signed by owner of project*
   iv. *Performance certificate issued by owner of project, stating the complete system is working satisfactory for minimum one year.*

b) Bidder should be presently an active system integrator of IP CCTV system, having at least two order of IP CCTV system in hand or have executed for supply and commissioning an IP CCTV system for industrial installations within last three years as on techno-commercial bid submission due date of this tender. One of the following supporting documents may be submitted for meeting this criteria:

   i. *Unpriced Purchase Order (PO) Copies, for supply & services, issued in name of bidder and complete Bill of material (either part of PO or owner approved document)*
   ii. *Commissioning/handing-over protocols of complete system signed between bidder & owner of project and indicating quantity of cameras.*

c) Bidders who are based outside India and are participating in this tender, shall have authorized representatives in India for support related to documentation, technical support, troubleshooting, Erection, Commissioning and other co-ordination work.

   Letter from bidder detailing Indian representative details should be provided. Bidder shall also furnish an undertaking letter that in case of change in their Indian representative / agent, bidder shall continue to support for supply, commissioning and troubleshooting of the complete system procured through this tender.

All PQR criteria mentioned above are to be met by bidder in order to qualify for further consideration in this tender. Hence bidder must submit all documents as mentioned above failing which bidder's offer is liable for rejection.

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SECTION-C TECHNICAL SPECIFICATION

1.00.00 INTENT OF SPECIFICATION

1.00.01 This specification is intended to cover the design, documentation, manufacture/assembly, Inspection and testing at Bidder's works, delivery including packaging, crating in road / sea worthy (imported item) packing, erection, installation and commissioning of the complete Plant Security System (called as PSS in later section of the specification), as required, for safe and trouble free operation.

1.00.02 It is not the intent to completely specify all details of design and construction details herein. Nevertheless, the system shall conform to high standard of engineering, design and workmanship in all respects and shall be capable of performing satisfactorily in continuous commercial operation under the environmental condition of the project.

2.00.00 ABBREVIATIONS

BOQ	- Bill of Quantities
CCB	- Central Control Building
CCTV	- Close Circuit Tele Vision
CCR	- Central Control Room
DCS	- Distributed Control System
DVSP	- Digital Voice Storage Playback
GCC	- General Conditions of Contract
LED	- Light Emitting Diode
LOI	- Letter Of Intent
MDF	- Main Distribution Frame
MTTR	- Mean Time To Repair
PC	- Personal Computer QAP - Quality Assurance Plan
RH	- Relative Humidity RMS - Root Mean Square
SPL	- Sound Pressure Level
UCR	- Utilities Control Room
UHF	- Ultra High Frequency
UPS	- Uninterruptible Power Supplies

3.00.00 SCOPE OF WORK AND EXCLUSIONS

3.01.00 **GENERAL**

3.01.01 The scope of work in this document specifies the technical & contractual requirements for the design, supply, erection, testing and commissioning of PSS and all accessories for Yadadri 5x800MW project.

3.01.02 Bidder shall be fully responsible for compliance of the system to be supplied in line with the requirements of this specification.

3.01.03 Provisions included in the specification will not be limitative to the scope of work and bidder shall be responsible for supply, installation, erection and commissioning of complete system.

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3.02.00 INCLUSION IN SUPPLY

This system is for the entire power plant covering BTG area, Balance of Plants (BOP) areas like Coal Handling Plant, Ash Handling Plant, Plant Water System, CW, ACW System etc and along the plant boundary. The scope of supply of this specification includes Design, fabrication, manufacture and assembly, inspection, shop testing at manufactures works, supply, transportation to site, site testing, erection and commissioning and performance testing of the entire plant Security System as specified in this tender documents. The equipment and materials included for plant security system are as follows:

3.02.01 **SCOPE OF SUPPLY**

a) One set of redundant Camera cum database Server at each of the followings zones:
   i. Common for all camera of all five units (total 270cameras)
   ii. Camera of Common plant areas (total 148nos)
   iii. Camera of CHP area (total 120nos)
   iv. Perimeter cameras (90nos)

   The server shall be supplied with mouse, keyboard and other accessories as required. 22nos of fixed thermal camera shall have a separate network and the same will be controlled using suitable configuration of an OWS.

b) IP PTZ camera with housing, pan / tilt head, power supply, mounts and other accessories complete as per detailed technical specification specified later in this document.

c) Integrated IP ready outdoor fixed varifocal type camera with housing, power supply, mount and other accessories complete as per detailed technical specification specified later in this document.

d) **LVS,** 24'' TFT Monitor, PC, mouse, keyboard with joysticks and accessories for Security Office, CHP etc

e) 32'' TFT Monitor with PC, mouse, keyboard with joysticks, and accessories.

l) Video Motion Detection (VMD) system for the motion detection from each video camera and video surveillance software.

m) Network Access Storage with RAID-5 capacity having capacity to record up to 60 seconds of pre-alarm and 60 seconds of post-alarm video from camera for a duration of 10 days.

n) L3 Core industrial grade switch with optical port and Ethernet electrical port with all accessories for each Camera cum database server set and for fixed and PTZ cameras in that zone.

o) L2 Industrial grade managed Ethernet Distribution switch with optical interface and Ethernet electrical ports and other accessories, enclosed in a **weather-proof junction box** at the base of the camera pole / mounting place of camera.

p) 4 Core Single mode OFC armoured cable

q) Patch panel, pigtails, Cat6 patch cord, SC ST type connectors etc.

r) All types of Interconnection cable between PSS & Other systems, device etc.

s) Twisted, 4 Pair UTP CAT6,1000 MBPS, Base-T cable between CCTV camera & Interface Box at the base of camera.

t) All types of Cable connectors for the above Cables.

u) Power Distribution Assembly and other accessories complete on as required basis as per site requirement.

v) Mounting & Installation Accessories.

w) Patrol Guard System comprising of Patrol Guard Card Reader and collection points

x) Consumables for erection and commissioning of PSS

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3.03.00 **SCOPE OF SERVICE**

Following service shall be provided by Bidder for all equipment & systems supplied under this specification:-

a) Carrying out detail engineering, preparation and submission of all drawings as specified elsewhere in this specification including preparation and submission of detailed bill of materials, configuration drawing showing location of all system equipment and components, cable schedule, cable tray/rack and conduit routing.

b) Inspection and testing at Bidder's works as per the Quality Assurance Plan.

c) Packing and forwarding of all equipment (except cable drums) included under this specification in a container with lock and key. The bidder shall be responsible for safe storage of the items inside the container against weather. It shall be bidder's responsibility to take materials out of container for erection and commissioning of the systems.

d) Installation and Commissioning of the PSS which shall involve deploying labour (skilled and unskilled), supervisory personnel, engineer and also erection tools and tackles, testing equipment, consumables & hardware, transport and storage of electronic items in a weather proof container for timely and efficient execution of the contract work.

e) The installation and commissioning of complete PSS will be in bidder scope of services, except specific exclusion mentioned in the specification section 3.05.00. This will include installation and commissioning of all cameras, servers, switches, software and all other activities related to PSS on as required. Termination of all cables shall be in bidder's scope of supply and services.

f) Bidder will, during the time of detail engineering and installation of the quoted system, interact and coordinate with any other agency regarding collection/retrieval of inputs/information/data and all such works shall be under the scope of this Bidder. If necessary, the Bidder shall contact the purchaser (BHEL) for clarifications before submission of their Bid.

g) Training to be provided to Owner's (TSGENCO) personnel for operation and maintenance of the complete system.

h) Site modification and preparation of "as-built" documentation".

i) Project management and scheduling including micro-planning in specific work area and reporting weekly progress.

j) Bidder has to provide the services required for completeness and correctness of the system irrespective of whether it is mentioned in the specification or not.

k) The complete installation and commissioning of PSS shall be done as per availability of fronts in the project and would have to be done spreading over a period up to 5 years from delivery of the materials at site. The installation and commissioning activity would therefore require multiple visit to site for survey, planning, cable schedule preparation, supervision of camera mounting, server installation and commissioning and camera commissioning etc.

3.04.00 SCOPE OF DOCUMENTATION

01. Prepare work definition and interfacing requirements of all system components.
02. Provide system design documentation.
03. Provide all commissioning and test procedures.
04. Provide inspection, commissioning and test procedures for Owner's approval.
05. Operating & service manuals and handbooks.
06. Tag all equipment as per Project Specification Procedure.

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3.05.00 EXCLUSIONS IN SCOPE OF SERVICES BY BIDDER:

a) Supply of power cable (being supplied separately by BHEL)

b) Laying of power cable, CAT-6 cable and FO cable

c) Splicing/termination of FO cables in LIU

d) Lifting of 42U panel from stores to control room

e) Fixing of camera using suitable camera mount and junction boxes

f) Erection / laying of poles/conduits/cable tray required for PSS

(The above services mentioned in exclusion shall be done by BHEL site)

4.00.00 PERFORMANCE GUARANTEE

4.00.01 The Systems / Equipment to be supplied under this specification shall meet the guaranteed performance specified in the enclosed data sheet, specification sheet and technical attachment sheet when operating at the rated / specified conditions. The acceptance of the System / Equipment shall be subject to satisfying these parameters during FAT at Bidder's works and at site installation in complete installed/commissioned condition.

4.00.02 Performance figures quoted by Bidder shall be guaranteed within the tolerance permitted by relevant standards. In case of failure of the equipment to meet the guarantee, the equipment may be liable for rejection or the decline in performance from the guaranteed performance figures will be rectified by the Bidder without any extra cost.

5.00.00 WORK SCHEDULE

5.00.01 Bidder shall ensure that the delivery of Equipment and accessories shall meet the project schedule.

5.00.02 On finalization of the Contract, a detail supply program for manufacture shall be furnished by Bidder for approval.

5.00.03 Technical documentation such as Data Sheets, Quality Plan & Drawings are required to be submitted after issuance of Purchase order to successful Bidder. The delivery of the cleared quantities shall be completed progressively from the date of Owner's approval of technical documentation

6.00.00 REFERENCE DOCUMENTS' CODES AND STANDARDS

6.00.01 The entire system and accessories materials shall conform to the requirements of the latest issues and most recent revisions and amendments of the standards listed below and to the local laws and regulations applicable to the Project.

6.00.02 This Specification shall be read in conjunction with material Standards, codes, practices and regulations.

6.00.03 Following non-exhaustive list of specific codes and standards shall apply to the all cables and accessories provided in response to this Specification. Mandatory regulations shall supersede this specification.

6.01.00**GENERAL CODES AND STANDARDS**

6.01.01 Materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS), IEC and other internationally recognized standard except where modified and/or supplemented by this specification. Performance figures quoted shall be guaranteed

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within the tolerance permitted by relevant standards. In case of failure of the equipment to meet the guarantee, the equipment may be liable for rejection.

6.01.02 It shall be Bidder's responsibility to comply with the requirements of all Codes and Standards which are applicable to meet the Specification.

6.01.03 The following Codes and Standards form a part of the Specification:

ANSI : American National Standards Institute
BS : British Standards
CCITT : Consutative Committee on Telephone and Telegraph
EIA : Electronics Industry Association
FM : Factory Mutual
IEC : International Electrotechnical Commission
IEEE : Institute of Electrical and Electronic Engineering
IS : Indian Standard
ISA : Instrument Society of America
NEC : National Electrical code
NEMA : National Electrical Manufacturers Association

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI S3.5 Methods for the Calculation of the Speech Intelligibility Index

INDIAN STANDARD (IS)

IS-5	Colour for ready mixed paints and enamels.
IS-694	PVC insulated cables for working voltages upto and including 1100 V.
IS-1554	PVC insulated electric cables.
IS-3961	Recommended current ratings for cables.
IS-3975	Mild steel wires, formed wires and tapes for armoring of cables.
IS-5831	PVC insulation and sheath of electric cables.
IS-8130	Conductors for insulated electric cables and flexible cords.
IS-9302	Characteristics and methods of measurements for sound system equipment.
IS-9537	Conduits for electrical installations.

The edition or revision of the Codes and Standards shall be the edition current at the date of the Contract.

7.00.00 PROJECT INFORMATION

7.01.01 Wherever environment condition is specified as 'Indoor', it shall be considered as air-conditioned having temperature between 20-25 degrees C and RH of about 40%. For outdoor components, ambient operating temperature shall be 55 Deg C.

7.01.02 All outdoor equipment shall be exposed to high humidity & oil/water vapour, coal dust and fly ash laden environment, vibration and electromagnetic interference are also generally encountered in the project's environment.

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8.00.00 TECHNICAL DESCRIPTION

8.01.00 DESIGN BASIS OF PLANT SECURITY SYSTEM

8.01.01 The PSS architecture shall be distributed IP based. The Camera cum Database Servers shall be in Hot Stand By mode and will be installed at CCR-1, CHP CR, common plant Area CR and Main security Gate. Access of all camera video shall be provided through using router switch to authorised users to view the camera video remotely. Besides these nodes, other nodes over the plant area shall also exist. Such nodes shall be connected over 1GBPS Fiber Optic based ring network to Camera cum database server. The fixed cameras installed along perimeter of the plant along with their server, software, switches and accessories shall form Perimeter Intruder Detection System. The remaining PTZ cameras as well as thermal Cameras which shall be installed in plant areas will form CCTV system. The cameras type shall be indoor / outdoor PTZ IP type and outdoor fixed varifocal type IP cameras and shall be distributed as below:

Unit-1	: 54nos PTZ cameras
Unit-2	: 54nos PTZ cameras
Unit-3	: 54nos PTZ cameras
Unit-4	: 54nos PTZ cameras
Unit-5	: 54nos PTZ cameras
CHP Area	: 120nos PTZ cameras
Perimeter cameras	: 90nos Fixed varifocal cameras along perimeter
Common Plant Area	: 148nos PTZ cameras
	: 22nos Fixed thermal camera for transformer/ switchyard in a separate network
Total	**: 650 cameras**

8.01.02 The main node at CCR shall consist of Camera cum Database Server, Core Switch, and Distribution switch along with other similar nodes for CPA and CHP cameras. Remaining other nodes shall comprise L2 field Ethernet switch, media converter and power supply converter to provide the operating voltage of the camera. Nearby cameras shall be connected to the field ethernet switch directly over Cat-6 cable if the distance of the camera from ethernet switch is less than 90 meters (or as per limitation of bidder's offered system). Cameras beyond 90mtrs shall be connected using media converters.

8.01.03 The following types of IP cameras shall be used in plants.

a) Inside plant outdoor area : Outdoor PTZ dome cameras
b) Inside Control Room and protected area: Indoor PTZ dome cameras
c) Perimeter camera : Outdoor fixed Bullet camera
d) Transformer & Switchyard camera : Outdoor fixed thermal cameras

8.01.04 The perimeter of the power plant shall be covered with outdoor IP Fixed Varifiocal cameras, placed at regular intervals to ensure that any intruder along perimeter wall is identified. Field ethernet switch of shall be installed at intermediate locations to connect nearby perimeter cameras to its ethernet ports. The incoming and outgoing OFC link will be connected to SFP fiber ports and such ethernet switches will form an OFC backbone in ring topology for PERIMETER INTRUDER DETECTION SYSTEM system. Four monitors with mouse and keyboards will be installed at Gate Security office for remote monitoring.

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8.01.05 Thermal cameras shall be installed to monitor switchyard and all transformers at TG building. They shall have a separate network, which shall be extended to DE-Electrical office, Switchyard control room, main CCR, SE office and CE office. OWs with monitors, mouse, keyboard and joystick shall be installed in all these rooms.

8.01.06 230V AC UPS power supply shall be provided to 10" panel in all unit control room and other offsite control room like CHP / AHP / Water system etc. It shall be bidder's responsibility for distribution of this power for powering PSS components mounted in PSS panel as well as all cameras and switches installed in field. Necessary converter for powering the PTZ and fixed cameras shall have to be arranged by the bidder. In case there are some camera / switch which are very far from any main plant/ offsite UPS, power supply to all such camera and switch shall be provided using mini UPS of suitable rating with 1hr back up. Power distribution system of such camera shall also be in bidder's scope.

8.01.07 Cameras at certain strategic location and all perimeter camera shall have motion detection feature. Any motion in view of these camera shall generate alarm to operator and also such motion should be tracked by nearest PTZ Cameras.

8.01.08 The PSS network will be a distributed ring network consisting of various micro rings. The micro ring will be formed to connect all geographically nearby cameras. These rings will be connected to each other and overall, they will make a circular ring providing single level of redundancy in the event of a single cut in OFC backbone. Ethernet switch will be used at the common node points to interconnect the micro rings to each other. An illustrative micro ring are defined below, however, the actual micro ring shall be as per geographical grouping of cameras in a zone:

RING-1 (unit cameras)
CCR-Boiler and Turbine Area-> CPU Generation Plant -> DG & Compressor House -> 400KV Switchyard 400KV Switchyard Control Room Service Build HFO, LDO Pump House Ash Water Pump House->CCR

RING-2
CCR-> Ash Slurry Pump House AHP Control Room AHP Compressor House ->ESP Control Room ->FGD Plant->Vacuum Pump House->Silo Utility HCSD Pump House CCR

RING-3
CCR->Switch Yard Control Room->DM Plant Building->Colling Water Pump House->CW Plant->Chemical House->Clarified Water Pump House-> Centrifuge Building->CCR

RING-4
CCR-> CHP Area CCR

8.02.00 **RECORDING EQUIPMENT**

8.02.01 Each Video Recording Device shall have a hard disk capacity capable of continually storing images produced for up to 10 days before overwriting commences. Facilities shall be provided to allow continuous recording of images when in playback mode. Control and set-up of the Video Recording Device shall be possible from the operator keyboards via serial data link.

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8.02.02 Facilities shall be provided for archiving stored images to Server & NAS Storage Device.

8.02.03 The Camera cum database server shall be located in CCR in the same equipment racks as the NVR's. The Camera cum database server shall be 19" rack mount. 24" TFT monitor and control keyboard shall also be used for operation of the cameras and monitoring the views.

8.03.00 **VIDEO MOTION DETECTION OPERATION REQUIREMENTS**

8.03.01 A camera based Video Motion Detection (VMD) shall be used to process the motion detection from each video camera.

8.03.02 In the event of an alarm, PSS controller shall display live video (on a single monitor in quad view) from the two cameras in the corresponding zone in alarm and two cameras from adjacent zones (one camera from each side of the zone in alarm). At the same time, the Network Video Recorder (NVR) shall record up to 60 seconds of pre-alarm and 60 seconds of post-alarm video from these cameras. This operation shall be available at the server.

8.04.00 CCTV CAMERA CUM DATABASE SERVER FEATURES

- The camera cum database server shall be of scalable server (with 20% spare hardware and license capacity in each zone) and client based architecture that allows full virtual matrix switching and control systems.
- The camera cum database server shall be installed on standard servers and storage technologies built on windows operating systems.
- The camera cum database server shall be able to intelligently scan an IP network for new devices (cameras or servers) along with automatic motion detection.
- It shall support a versatile rule based engine that makes it easy to automate different aspects of the system, including the control of cameras, system behaviour and external devices, such as lights and doors, based on events or time schedules, eliminating the need for manual control with numerous options including support to time profiles.
- The video analytics feature can be an integral part of camera or a part of camera cum database server. In case, separate server are required for running analytics, the same shall be offered by bidder within their quoted lumpsum price. The configuration of analytic server shall be same as server. The features shall be user configurable for each camera. It shall be possible to activate recordings automatically based on events generated by video analytics. These events shall also be logged and suitably alarmed on the monitors.
- The system administrator shall have rights to add/delete/configure users with rights. It shall be possible to view the rights of each user or the cameras which can be viewed / controlled by each user. It shall also be possible to add/delete cameras, configure cameras, assign priorities to users, configure alarm monitors etc. It shall also be possible to configure user groups with different rights and assign users to user groups. The system shall support unified log-in throughout the system and it shall be possible for any user to log-in from any location/client and access cameras/recordings and other features as permissible depending on his rights assigned to his log-in.
- Server software shall allow the clients seamless operation of all cameras regardless of the actual connection to different recording servers. Software shall allow the client applications to interact with all the camera cum database servers simultaneously and allow simultaneous display of live video/recorded video regardless of the zone in which the client is connected.
- It shall be possible to define priority based camera control rights for each camera or a group of cameras. The users shall be defined on a hierarchical basis with a minimum of three levels. A higher priority user can take control of camera being controlled by a lower priority' user. In addition the user

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shall have facility to request access of any camera and the existing situation permits the user shall be able to control the camera.

- On screen controls shall be provided to achieve remote operation i.e. PTZ operation of cameras.
- It shall be possible to view live video from cameras on the surveillance system from 1 to 32 per view.
- To access views of cameras on any PC with a client viewer application installed.
- Use multiple screens as well as floating windows for displaying different views simultaneously.
- View images from several cameras in sequence in a single camera position in a view – a so called carousel.
- View video from selected cameras in greater magnification and/or higher quality in a designated hotspot.
- Receive and send video through the matrix functionality, control PTZ cameras.
- Use digital zoom on live as well as recorded video.
- To activate manually triggered events.
- Get quick overview of sequences with detected motion.
- Get quick overviews of alerts.
- It is a requirement that all user actions on the system CVWS be recorded in a log file along with the security system or control system's actions. User actions include:
- Interventions such as manual recording and configuration setting changes.
- Cameras viewed, Video replayed, Video exported, Cameras pan/tilt/zoomed and preset switching.
- This log must also contain a history of the status of the system components. It shall list the status of all cameras, servers and other system components including when they were disabled or foiled. This log shall be maintained for a minimum period of ten (10) days.

PLAYBACK & EXPORT

- It shall be possible to playback simultaneously 32 cameras on the surveillance system, with a selection of advanced navigation tools, including an intuitive timeline browser.
- The Client shall support search of recorded video for motion event in user-specified areas of a camera image
- The VMS shall allow the operator to capture / Export video from the workstation. The recording shall be captured in a standard format, such as AVI, so as to allow playback using Windows Media Player. The recording shall include audio for video sources if audio recording is required.
- 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.

Video Content Analytics (VCA) Software: Third party license to handle a system of cameras (as per BOM) + 20 % spare capacity.

The Video Analytics (VA) shall be designed to provide Intelligent Video Analysis for 24/7 surveillance with support for devices from different bidders and support open platform Video Management System (VMS). The VA shall store alarm video and image files for export, and support Video from at least 10 cameras. The VA shall send alert Meta data with the following information so that alerts can be searched and categorized based on this information in the viewer.

- Timestamp (date & time), Alert Name, Alert Type, Alert location, Text Description, Region associated
- Face detection and Tripwire/Line crossing - Detect people or vehicle crossing virtual line in either direction (applicable for fixed cameras to be installed along perimeter)

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- Object Missing & object left / abandoned
- Smart auto PTZ control –Able to detect analytic rules like Tripwire on PTZ camera and then immediately do Pan, Tilt and Zoom to violator on violation of rules. After the PTZ operation, the software should enable it to come back home position and start monitoring for violation.
- Continuous auto PTZ control - able to continuously track the moving object using PTZ control on PTZ camera. The VA shall be able to track single object and multiple objects through Auto PTZ control.

8.05.00 **PATROL GUARD SYSTEM**

8.05.01 Purpose of the Patrol Guard system is to ensure that security guards on patrol duty are carrying out their duties diligently by recording the visiting time data for different locations.

8.05.02 The system shall comprise of a selected number of location tags mounted in various strategic locations of the Power Plant including the perimeter. The patrol guard recorder will record the date and time when the recorder is swiped on the magnetic strips.

8.05.03 The recorder shall be suitable for downloading the data into a PC.

8.05.04 The system shall be flexible to allow for addition / deletion or movement of monitoring locations.

8.05.05 The patrol readers shall be suitable for operating with standard batteries.

8.05.06 Five nos. of card readers shall be provided. Guard locations to be considered is 50.

8.06.00 SPECIFIC TECHNICAL REQUIREMENTS – SUPPLY

8.06.01 **Technical Requirement of PSS Systems**

This section comprises of the detail specification of the equipment like Camera, PC based operating station, NAS server, network switch, UPS, media converter, fiber termination box (LIU), optical fiber cable, Cat-6 cable, network rack and other accessories.

8.06.02 **IP Dome and Pendent and Box type Camera**

(Make – Honeywell/Bosch/Pelco/Axis/Other make subject to approval of Owner)

a) The colour low light sensitive cameras shall be designed for industrial application. The camera shall have high resolution with CCD/CMOS sensors including lens, shutter, IR cut filter.

b) The camera unit shall have latest compression standard (i.e. H.264 or better), 60/50 FPS transmission speed, provision of flash/SDRAM memory, LAN port and shall be capable of working on open architecture of Internet Protocol (IP). The cameras shall have features like automatic gain control, automatic iris control, white balance, auto backlight compensation, gamma correction etc. The cameras and VMS should be ONVIF compliant.

c) Two types of IP camera shall be used, one with motorized PTZ with remote control arrangement and the other fixed camera (box/barrel). The unit must have IP65 or better protection class and suitable for operating temperature of around 55deg C. Both dome enclosure and camera shall be supplied from same Make to ensure compatibility.

d) Outdoor cameras shall be provided with weather proof enclosure suitable for operation in dusty environment. The dome of the cameras shall have anti-dust coating to prevent accumulation of metal laden dust onto the dome. All cameras shall be provided with mounting frames suitable for

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mounting the same on wall/column/pedestal as required. Accessories such as blower and sun shroud for fixed cameras shall be provided.

e) Facility of camera recording in real time mode (25/15/10/5 FPS) as well as in any desired combination must be available in the system. Facility of camera recording shall be possible in CIF, 2CIF, 4CIF, Q-CIF as well as in any combination. The video shall be compressed using H.264 standard or better.

f) The cameras shall have following minimum technical requirement :

i) High Resolution **Fixed** True Day/Night DNR Colour Camera Indoor / Outdoor Barrel type

01. Video Standard	: PAL
02) Image Sensor	: 1/3” progressive scanning
03. Effective Pixels	: 1920 (H) x 1080 (V)
04. Horizontal Resolution	: 540 TV lines
05. Minimum illumination	: 0.001 lx for colour image 0 lx with inbuilt IR ON
06. Synchronization	: AC line lock/internal
07. S/N Ratio (dB)	: >50 dB
08. Lens Control	: DC / VSD
09. White Balance	: AWC/ATW/MANUAL/IN/OUT
10. Power Source	: 240 Volt, 50Hz AC
11. Power Consumption	: As per Manufacturer standard
13. Lens Mount	: CS mount
14. Certification	: CE/FCC/UL
15. IR range	: 60mtrs

Day/Night Lenses for Fixed Camera

OPERATIONAL

01. Image Format	: 1/3”
02. Lens Mount	: CS (Metal mount)
03. Focal Length	: 5.0 – 50.0 mm (10 X)
04. Focus Range (MOD)	: 1.0’ (0.3 m)
05. Angle of View	: Wide : 50° x 37° :Tele : 5° x 4°
06. Iris Range	: F1.6 ~ T360

Mechanical

01. Construction Housing	: ABS plastic

Environmental

01 Temperature Operating	: 10°C to 55°C
Storage	: 10°C to 60°C
02. Relative Humidity	: Up to 90%

Regulatory

01. Emissions	: EN61000-6-3:2001

Enclosure Housing

01. Camera Mounting	: Reversible slotted camera

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02. Viewing Window : Nominal Clear 1/8" double density glass
03. Cable Entry : 3 glands
04. Construction : Extruded and die-cast aluminum
05. Finish : epoxy powder coating
06. Environmental Rating : IP65
07. Operating Temp : 10°C to 55°C

ii) HD PTZ camera

01. Video Standard : PAL
02. Image Sensor : 1/4" Ex-view HAD CCD / CMOS
03. Effective Pixels HD : 1920 (H) x 1080 (V)
04. Minimum illumination : 0.005 lux for colour, 0.001 lux with IR filter removed
05. Lens : f/1.4 (focal length, 3.4~119 mm;
06. Synchronization : Internal
07. S/N Ratio (dB) : >50 dB
08. Angle of view : 48° (wide end) to 2.8° (tele end)
09. Angular Travel : Horizontal: 360° continuous Tilt: 5°- 90°
10. Speed (Manual Mode) : Pan : Variable from 0.10° to 300°/sec.
    Tilt : variable from 0.10° to 120°/sec.
11. Alarm Input, Output : 4 Input and 1 Output
12. AES (sec) : 1/50 - 1/10,000 sec
13. Zoom : 30× Optical Zoom, 12× Digital Zoom
14. White Balance : AWC/ATW/MANUAL/IN/OUT
15. Image Enhancement : Integrated/Selectable
16. Video Motion Detection: Integrated
17. Power Source : 240Volt,50Hz AC
18. Power Consumption : As per Manufacturer standard
20. Operation Temperature: 10°C to 55°C
21. Protection class : IP65
22. Lens Mount : Motorised zoom lens / CS mount
23. Certification : CE/ FCC/UL

iii) Fixed Thermal cameras

01. Viewing distance- upto 250mtrs
02. Features like line crossing, intrusion
03. NETD: <50mk
04. Effective Pixels: 384 (H) x 288 (V)
05. Adaptive Automatic gain control
06.3D DNR
07. Advanced fire detection
08. Temperature exception display on screen
09. Response Waveband: 8-14Um
10. Temp range: 0 to 350Deg C
11. Temp accuracy: upto +/- 5Deg C
12. Video Compression: H.264 or equivalent
13. Alarm input / output: 1no min
14. Working temperature: 0-55Deg C
15. Protection Level: IP65 or above

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8.06.03 Mounting of PTZ Dome and Pendent Camera

a) The wall mount shall be constructed of high tensile cast aluminum which can be mounted directly to a vertical load-bearing surface and supports up to 15kg. The mount shall have a covered weatherproof cable access hole for ease of installation.

b) The parapet and flat-roof mount shall be designed for use with any PTZ dome. It shall have facility that allows for easy installation of the dome without having to twist the dome and wiring. The mount shall be designed to swivel within small clearance limits. The mount shall be constructed of heavy-duty steel.

c) The mounting shall support up to 10kg and shall withstand winds up to 75 mph when properly fastened to a support structure.

d) The ceiling pendant mount shall be designed for use with any PTZ dome. It shall be constructed of heavy-duty steel. The mounts directly to a horizontal load-bearing surface and supports up to the maximum load of the camera and enclosure.

8.06.04 **PC based Video Monitoring and Control Stations (Make- Dell / HP / IBM-Lenovo)**

Each PC based control and monitoring station shall be provided with the PC, 24" TFT colour LCD monitor, keyboard and mouse. The PC shall be suitable for usage on 24X7 basis. The PC shall be provided with latest configuration and technology available in the market at the time of supply with following minimum configuration.

Control and monitoring station:

1. Processor : Latest, minimum Intel Core i5
2. Configuration : Tower
3. Internal clock : 3.2 GHz (minm.)
4. Architecture : 32 bit
5. Video Card : PCI
6. RAM : 4 GB (Minimum) DDR
7. Hard drive : 500 GB SATA
8. Cache : 512 KB Level 2
9. CD/DVD Drive : CD - Both Read & Write for OWS. Both CD & DVD Read & Write for ES
10. Audio controller : 16-bit
11. Operating system : Latest Windows
12. Graphic accelerator : 8MB (min)
13. Communication ports : 1nos. (min.) Ethernet ports(1000 MB) ,
    4 nos. USB ports (min)

Monitor: (Make – HP / DELL / IBM-LENOVO / SAMSUNG /)

1. Type : TFT monitor
2 Screen diagonal : 24 inch flat
3 Display : XGA or better
4 Resolution : 1024 X 768 or better
5 Degree of protection : IP-30
6 External Controls : Brightness, contrast, Horizontal / Vertical amplification & shift
7 Power supply : 240 V, 50 Hz, 1 phase
8 Ambient temperature : 0-50 Deg C
9 Humidity : 95% non-condensing

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Camera cum Database Server:
Makes- **Dell / HP / IBM -Lenovo**.

1.1.1	Form factor	Rack mountable
1.1.2	Processor	Quad Core Intel® Xeon® E5-2609 V2 2.5GHz with 10MB L3 Cache.
1.1.3	No. of Processors	Support for 2 nos
1.1.4	Motherboard	Intel® C600 Series Chipset
1.1.5	Memory	16GB (2 * 8GB) or higher, populated with registered DDR3 memory. The Server should support upto 24 memory slots or higher.
1.1.6	Memory protection	Server should support memory protection technologies such as: Advanced ECC, Lock-step mode and online spare memory.
1.1.7	Disk bays	Server should support minimum two 2.5" HDD bays as Standard, expandable to four HDD bays. The chassis should be capable of supporting SAS/SATA/SSD drives.
1.1.8	Internal storage	1T GB 15K RPM SFF HDD SAS.
1.1.9	RAID support	6 Gbps SAS Raid Controller with support for RAID 0/1/1+0/5/5+0 with 512MB Flash Backed Write Cache without the need for battery.
1.1.10	Networking features	Total 2 Ports: One 1Gbps Gigabit Server Adapters with TCP/IP Offload Engine One Dedicated remote management port for Remote Management.
1.1.11	Ports	USB 2.0 support with minimum 4 ports
1.1.12	PCI slots	Min 4 PCI-Express slots using single processor
1.1.13	Media bays	DVD Optical Drive within the Server.
1.1.14	Redundancy	Redundant Power Supply & Fans to be loaded from day one.
1.1.15	Hot-swap components	Power supplies, Fan and hard disk drives.
1.1.16	OS Support	Microsoft Windows Server 2008 R2, Microsoft Windows Server 2012, Red Hat Enterprise Linux 6 or Above, SUSE Enterprise Linux Server, VMware vSphere 5.x or above.
1.1.17	Operating System	Microsoft Windows Server 2008 or later.
1.1.18	Keyboard& Mouse	USB Keyboard / USB Optical Mouse.

Large Video Screen (LVS) -
Make: PLANNER(USA)/BARCO(NOIDA)/DELTA(INDIA)/CHRISTIE(USA)

Bidder shall supply Sixty seven (67) inch or similar Large Video Screen (LVS) display unit in 1 (one) row upright in front of the operator in CCR/other control room/security gate complex with seamless integration with PSS system control and monitoring of the camera video. The System shall be configurable in such a way that output from server or CCTV monitoring PC can be directed to LVS.

a) Large Video Screen system shall be based on Digital Light Processing Technology. The software shall have capability to display multiple windows on the screen. The system shall have facility to zoom on any part of the display. Lamp shall be LED type with lamp life more than 60,000 hours.

b) The LVS shall have the following minimum features.

1. Cube & Controller: Cube & Controller should be from the same manufacturer.

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2. Manufacturing: OEM should have a manufacturing setup in India for Video Walls running successfully for the last 3 years or more.
3. Reputed company: The OEM should be an established multinational in the field of video walls and should have installations around the world.
4. Chip Type : Chip 0.95" Digital Micro Mirror Device
5. Resolution : 1400 x 1050 native DMD chip resolution
6. Light Source Type : LED light source with separate LED array for each colour (RGB)
7. Brightness ANSI : Minimum 700 Lumens
8. Brightness Uniformity : ≥ 90 %
9. Dynamic Contrast : 1400000:1 or more
10. Redundant Dual Supply : Cube should be equipped with built in a Dual Redundant Power Supply
11. Hot Swappable Power Supply : Cube should have a Hot swappable Power Supply In built
12. Control : IP based control to be provided
13. Remote : IR remote control should also be provided for quick access
14. Screen to Screen Gap : ≤ 0.2mm
15. Screen Support : Screen should have a Anti Reflective Glass Backing to prevent bulging
16. Control BD Input Terminal : Input: 2 x Digital DVI
    Input: 1 x HDMI
    Input: 1 x 3G-SDI
    Input : 1 x Display Port
    Output: 1 x Digital DVI , 1 x 3G-SDI
17. Cooling Inside Cube : By Means of a heat pipe
18. Maintenance Access : Rear
19. CONTROLLER : Display controller : Controller to control Video Walls in a matrix of 5(C) x 1(R) with outputs , video inputs and Universal inputs along with necessary software's

Processor : Single Quad Core Intel® Xeon/i7 64-bit 2.0 GHz CPU or better Min 4GB
Networking: Dual-port Gigabit Ethernet Controller inbuilt Support for Add on Network adapters Support for Optical Fiber interface Adapters
Accessories : DVD-R,DVD+RW,, Keyboard, mouse
OS : Supports 64-bit Operating Systems Windows 7
Power Supply : (1 + 1) Redundant AC-DC high-efficiency

c) All connecting cable and accessories shall be supplied.
d) The display program shall be such that the entire viewing areas of the screens are utilized and sides are not left blank.

8.06.05 **Network Attached Storage (NAS) Server**

Makes- Dell / HP / IBM – Lenovo / camera OEM make.

a) The network attached storage server shall be integrated with the storage hard disks and server built into the same tower/ rack enclosure. It shall run independently and store video data from all the cameras over CCTV network. The NAS server shall have required capacity for storing video data of cameras required for at least ten (10) days. The NAS server shall be configured for organized data storage on 24X7 bases, keeping on line auto back-up of data and auto purging of data for a prescheduled period at regular intervals.

b) The equipment shall also include back-up management with DVD storage and write options. Any back-up server with required software to work as interface controller shall be included as part of back-up management.

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c) The storage solution shall offer functionality for 100% tamperproof and legally presentable data. Any additional hardware or software that is required for the same shall be included in the scope. Licensing for this solution shall have to be provided for the complete supported capacity of the system.

d) The management shall be through user friendly GUI based and web enabled administration interface for configuration and storage management.

e) The system shall have hot spare disc facility, redundant hot swappable components like controllers, disks, power supplies, fans etc. and disaster recovery support.

f) The minimum technical requirement of NAS is given below :

1.	Net Usable Capacity	6 TB minimum, to be offered as required for recording the vide of all cameras in each zone
2.	Storage controller	Hot redundant with support for logical partitioning
3.	Hard Disc drive	Hot swappable SATA II HDD
4.	RAID support	Required RAID support shall be provided
5.	Client Operating system supported	NAS shall be compatible with client OS of latest and proven version of Windows
6.	Software	All required software (application, backup, Server OS etc.) with licenses
7.	Ethernet Interface	Min. 2 X 1GB RJ 45 connector for load sharing and fail over
8.	Ports	Min. 4 USB
9.	Protocol supported	TCP/IP, CIFS, NFS, HTTP, FTP, NTP, SNMP etc.
10.	Folder Management	Share Folder Level Permission, File Level Permission, Public Folder
11.	Quota Management	Share Folder Quota Control
12.	Event Notification	To be provided
13.	Back up Management	DVD
15.	Mounting	19” rack mountable
16.	Upgradability	Upgradable to higher version of software & higher storage capacity
17.	Security	Standard NAS security features shall be supported
18.	Safety standard	UL/EN

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8.06.06 **Network switch: L3 Core Switch and distribution switch (in Indoor locations)**

Makes: Hirshmann / Other makes subject to approval of owner

a) The bidder shall select the port architecture of switches considering no of fiber optic and CAT-6 terminations from camera ends as well as from PCs, servers and other equipment in line with the system configuration diagram to be submitted along with the offer.
b) The Central control switch shall be manageable type with minimum Layer-3 functionality. The switch shall have required nos. of fiber optic (FO)/SFP and RJ-45 port including 20% Spare ports for each type. No media converter shall be used for connecting OFC cable to switches. All the switches shall be fed from UPS supply.
c) All the switches shall operate with wire speed switching on the same Network Management Software and shall have required intelligence and synchronization to control, monitor and maintain the IP network of the PSS system. It shall be possible to administer all the switches from a pre define PC in the network.
d) The switches should be industrial grade with 10-45 Deg operating temperature range

8.06.07 **Network switch: L2 Distribution / Field Switch**

Makes: Hirshmann / Other makes subject to approval of owner

a) All switches shall be provided with power supply which shall have surge protection withstand capability of minimum of 10 KA surge.
b) All the switches shall be loaded with the same network management software which shall be administered from a pre-defined PC in the network.
c) The switch shall have required nos. of fiber optic (FO)/SFP and RJ-45 port including 20% Spare ports for each type. No media converter shall be used for connecting OFC cable to switches. All the switches shall be fed from UPS supply.
d) L2 distribution switch shall be 10/100/1000Mbps for forming multiple distributed ring network
e) The switch shall be of operating temperature of 10-55 Deg C

8.06.09 **Network Management Software (NMS)**

a) The minimum technical requirement of NMS is given below:

01. Automatic topology discovery and creation of network maps for Layer 3 and Layer 2 network
02. Should have high level Network Inventory polling capability for IP Network nodes, All available L2 Switch , Camera, Modules , ports , Physical links , VLAN interfaces and all the other SNMP capable devices in the network
03. Should have powerful administration control
04. Detailed performance monitoring and management
05. Should have extensive fault management capabilities with Real time Event and Alarm notifications , System Logs and Audit trials
06. Scheduled Device configuration back-up and restore functionality

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07. Automatic Detection of configuration changes for easy trouble shooting and Isolation
08. Should support 3rd party devices and end points
09. Should have the fucntionality of Group provisioning / Scheudled configuration roll out management
10. Should have the ability to perform scheduled or Unscheduled network wide software or Firmware upgrades
11. Should have the ability to customise the NMS dassh boards as per the requirements
12. Should have the ability to perform / create group of devices for applying same task
13. Should have extensive centralised trouble shooting tools in built
14. Should provide the flexibility to the network administartor to assign task to an Indvidual network engineer and assign ownership / track the status of the issue resolution
15. The NMS solution should be preferably from the same Active switching bidder , in case bidders proposing for 3rd party NMS solution should provide all the interop reports certified by both the NMS bidder and Active switching bidder on seamless interoperability
16. All the required Hardware / Software for the NMS solution should be proposed by the bidder

8.06.10 **Not Applicable**

8.06.11 **Patrol Guard Hand Held Guard Tour unit**

SL. NO.	PARAMETERS	VALUE
1.	Smart Card Reader	Supported
2.	Real-time clock (RTC) with independent backup battery	Yes
3.	Cover case	Rugged ABS casing
4.	Checkpoints, events, route and patrolling plan	Programmable
5.	Generation of multiple patrolling reports	Yes
6.	Graphical layout of respectable area	Manageable through software
7.	Event Buffers:	1000
8.	Communication Port	USB
9.	Baud Rate	9600
10.	Read Range	6cm
11.	No. Of Guards	50
12.	Check Points (Stations):	500
13.	No. of Routes	255
14.	Rechargeable Battery	Lithium Ion / equivalent as per

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		manufacturer standard
15.	Software features	• Patrolling of Guards • Assigning Routes to Guards • Monitoring the guard routes. Missing Area Report • Generate multiple patrolling reports • Graphical layout of respectable area

8.06.15 **Cable Specification**

8.06.15.1 **Optical Fiber Cable**

Makes- Birla Ericsson / Aksh Fibre / HFCL / Finolex / D-Link / Terracom / Sterlite – Digilink / Other make subject to approval of owner

The bidder shall supply and install Optical Fiber Cable along with all cable accessories and fittings like Light Interface Unit, Surge suppressors, Opto isolators, Interface converters, Fiber Optic Card Cage, Fiber Optic Line Driver, Repeater/ Modem, cable glands, grommets, lugs, termination kits etc on as required basis. Optical Fiber Cable shall be 4 core. Each core shall be of ultra pure fused silica glass with UV cure acrylate suitable to withstand temperature between 20 and 80ºC. The cable shall have multiple mono mode fiber to avoid usage of any repeaters. . Fiber optic cable shall be of loose buffer tube design with 6 fibers per buffer tube (minimum). Interstices and buffer tubes shall be filled with water blocking compound such be made of materials like Poly-Butelene Terathylate (PBT). They shall be colored for easy identification.. Buffer tubes shall be stranded around Central Strength Member utilizing Reverse Oscillating Lay (ROL). Blank fillers shall be used as necessary to maintain circular cable structure. The central strength member shall be Fiber Reinforced Plastic (FRP) or other material with equivalent mechanical strength to provide both tensile and anti-buckling strength to cable. The interstices between buffer tube and jacket layers shall be protected from water intrusion by a combination of dry water blocking yarns and tapes. These dry materials shall be easily removable from core during cable preparation without use of cleaning solvent. In addition to central strength member, additional strengthening substance like aramid yarns shall be applied helically over the cable core to provide additional tensile strength to cable.

The cable shall be of dual jacket and armoured. Inner sheath consists of medium density poly ethelyne extruded over cable core. Two highly visible ripcords are placed under the jacket to aid in sheath removal. Electrolytically chrome plated corrugated steel taped (ECCST) armouring is provided around inner jacket to provide additional cable compression strength and rodent protection. The armour is covered with outer black MDPE sheath with FRLS and UV resistance properties. A ripcord is also placed underneath the armour for easy outer sheathing removal. The cable shall be suitable for a maximum tensile force of 2000N during installation and once installed, a tensile force of 1000N minimum. The compressive strength of cable shall be 3000N minimum and crush resistance 4000N minimum. Minimum bending radius shall be equal to or more than 15D.

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Specification for G.652 Monomode Fiber:

Sl. No.	Attribute	Value
1	Core Diameter	9±1 micrometer
2	Cladding Diameter	125±1 micrometer
3	Cladding non circularity	≤1.0%
4	Attenuation coefficient at (i) 1290 nm to 1340 nm (ii) 1525 nm to 1575 nm	<0.36 Db/km <0.25 Db/km
5	Chromatic dispersion coefficient at (i) 1310 nm (ii) 1550 nm	<3.5 ps/ nm.km <18 ps/ nm.km
6	Polarization Mode Dispersion (PMD) coefficient	≤0.5 ps/√km
7	Mode field diameter at (i) 1310 nm (ii) 1550 nm	9.2 ± 0.4 micrometer 10.50 ± 1.0 micrometer
8	Mode field concentrality error	≤0.5 micrometer
9	Proof test	≥1%
10	Fiber Curl	≥ 4.0 m
11	Macro bend test on fiber at 1550 nm	≤0.1 dB

The entire length of the cable shall be marked with the manufacturer name, month and year of manufacture, coded description of the cable based on Telcordia's (Bellcore) SR-2014 Suggested Optical Cable Code (SOCC), progressive sequential length marking at every meter interval on outer sheath.

8.06.15.2 **Specification of CAT 6 Cable**

SL. NO.	PARAMETER	SPECIFICATION
1.	No. of pairs	4 pair
2.	Conductor	Solid tinned copper
3.	Construction Parameters	Values
4.	Nominal DC Resistance	67 Ohms /1Km
5.	Nominal Impedance	100 Ohms+/- 15 Ohms
6.	Nominal Capacitance	46pf/ m
7.	Nominal Velocity of propagation	68%

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8.	Nominal Attenuation	100 MHz:-19.9 dB/100m 155 Mhz: -25.3 dB/100m 200 Mhz: -29.2 dB/100m
9.	Insulation Materials	Poly Vinyl Chloride
10.	Cable Outer Diameter	0.38 mm+/- 0.15 mm
11.	Nominal Outer Diameter	6.35 mm
12.	Bend Radius	0.90” for 6.35mm

8.06.15.3 Not used

8.06.16 **Video Management Software (excluding thermal camera)**

Make: The offered camera make & VMS make combination should have a one year satisfactorily working track record as on bid submission date of this tender, in a CCTV system having minimum 150nos of cameras installed in a power plant or Oil/Gas industry

a) The software shall be modular and structured with high security measures and shall work on open platform for interfacing with any third party equipment. It shall include different checks to ensure correct functioning of the system such as prevention of corruption of software, prevention of loss/alteration of memory contents due to power failure or improper operational procedure.

b) The operation of the PSS system shall be software based. Selection, control, monitoring and recording shall be done through menu based operation by PC-keyboard and mouse. Any PC shall be able to access selection/control of any camera in the network. Each PC shall be loaded with required application software for viewing / controlling. The NAS server shall be loaded with required recording software.

c) The software used for viewing and recording purpose shall have required license to accommodate minimum 30% spare cameras. The software shall also be provided with required nos. of licenses for monitoring stations including 30% spares.

d) Required System and Application software shall be provided for following minimum features:

i) **Selection, Control and View**

Single Camera view
Multiple camera views upto the total licensed capacity
Full screen view
Sequence view of camera pre set positions
Minimum 10 nos of simultaneous users of a camera
Drag and drop connection control
Built-in electronic zoom function
On-screen or in picture PTZ camera control
Menu based camera controls like

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Focus/iris/zoom/pan/tilt/enable/disable
Mouse/PC-keyboard controlled PTZ

ii) **Administration**

Assigning IP address for all network components
Creating/modifying topology for the complete network
Adding & deleting of Cameras
Configuring groups
Preset camera sequences
Modifying settings for a camera
Modifying recording settings for a camera
Configuring which user shall view which cameras
Different security levels for allowing users to access view or control cameras

iii) **Recording Administration**

User activated recording
Event activated recording
Pre-scheduled recording
Continuous background recording
Playing back recorded video with date and time stamp
Alarms generation in case of irregularities like video loss, camera tampering, picture blurred, motion detection etc. with audio-visual alert on PCs
Automatic archiving of recording
Search for recording replay with respect to camera, date, time etc.
Replay controls like play, stop, pause, fast/step forward, fast / step rewind etc.

8.06.17 **Accessories**

a) **CAT6 UTP Cable**

Cat6 cable shall be Unshielded Twisted Pair (UTP- CAT6 Cable) category 6 LAN (local area network) four pair cable per box 305 mtr Blue Colour 23 AWG, which is UL listed, 3P certified and tested, conforming to the following standards in Cat 6 UTP cable like 250 MHz speed, IEC 11 801 edition 2.0, Nominal Velocity Propagation (NVP) 72%, as per EIA/TIA standrads and cable laying shall be through the existing MS/PVC conduit or floor raceways including connections etc as required complete in all respects. (Make : Legrand (LCS2)/Ortronics/ Luscent)

b) **Infomation Outlet (I/O) of CAT-6 UTP**

Information outlet shall be RJ45 Toolless Infomation Outlet of CAT-6 UTP with white colour RJ-45 transparent shuttered socket outlets (modular) with all accessories including label holder, both side colour marking as per EIA/TIA standards. conformity of standards like ISO/IEC ed. 2, EN 50173 and EIA/TIA 568 for fast connection socket and it takes fast tool-less connectors with contact marking by double colour code 568A and B and numbers connectors with insulation displacement contact (IDC). It has the possibility of min. 5 times re-wiring in the event of error, multidirectional cable entry. (Make : Legrand (LCS2)/Ortronics/ Luscent/Othersubject to approval of owner).

c) **Face Plate (Plastic Modular Face Plate white in Colour 1 Module)**

Face Plate shall be white modular plate type front plate with accessories for 1/2 nos RJ 45 data outlet, but excluding RJ45 data outlet complete in all respect with grid plate, screws, MS box etc

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with connections as required. (Make : Legrand (LCS2)/Ortronics/ Luscent/Other make subject to approval of owner)

d) **Rack End Patch Cord-1 mtr Blue in Colour**

The Patch Cord shall be of CAT6 UTP PATCH CORD - 1 MTR (3 feet) Blue Colour factory moulded as per EIA/TIA standrads. (Make : Legrand (LCS2)/Ortronics/ Luscent/Other make subject to approval of owner).

e) **End User Site Patch Cord-2 mtr Blue in Colour**

End User Site Patch Cord shall be of CAT6 UTP LSC2 PATCH CORD - 2 MTR (7 feet) Blue Colour factory moulded as per EIA/TIA standrads. (Make : Legrand (LCS2)/Ortronics/ Luscent/ subject to approval of owner).

f) **19" rackmountable 24 Port CAT6 UTP Patch Panel Loaded**

This item shall be 24 port PATCH PANEL RJ-45 Loaded CAT-6 UTP 19" rackmountable patch panel preferbaly with front loaded 6 in a blocks as per EIA/TIA standrads, modular in mechanism. (Make : Legrand (LCS2)/Ortronics/ Luscent/Other make subject to approval of owner).

g) **9U cabinet 504.65X600X500 (HXWXD) - Wall Mounting Rack**

9U cabinet shall be of Width (mm)-600, Depth (mm) - 500, Approx.Net Wt (kg) - 20, CRCA 'D' Grade thickness (mm) - 1.2, Powder Colour for Cabinet - RAL9002, Glass - 4mm Toughened Tinted Glass Door, Accessories:, Cooling Fan (230V A/C 90 CFM) - 2 Nos, PDU 230VAC - 1 No, Cable Manager Metal- 2 Nos, Mounting Hardware (20 sets of M6 screws,washer,cage nuts (nickel coated)) - 1 No, Wall Screws (4 sets of 2'' screws, washer, rubber grommet (nickel coated)) - 1 No, Door Lock - 1 No, Front Metal Band -1 No. In the rack there must be maintained 1U = 1.75 inches space. (All Stand alone rack and server should have 6A, 220V socket link with UPS line) (Make : Legrand (LCS2)/Ortronics/Rittal/Other make subject to approval of owner).

h) **42U cabinet LCS2 2026X800X800 (HXWXD) - Stand alone Rack**

42U cabinet shall be of Width (mm) 800, Depth (mm) 800, Approx.Net Wt (kg) 150, CRCA 'D' Grade thickness (mm) 1.2, Powder Colour for Cabinet RAL 9002, Glass: 4mm Toughened Tinted Glass Door, Accessories: Cooling Fan (230V A/C 90 CFM) - 4 Nos, Cable Manager Metal- 4 Nos, PDU 230VAC - 1 No, Cable Channel 100mm wide 42U- 2 Nos, Heavy Duty Stationary Shelf 600W x 475D - 1 No., Mounting Hardware (20 sets of M6 screws,washer,cage nuts (nickel coated)) - 3 Nos., Earthing Strips 150mm H - 1 No, Door Lock - 1 No, Castor Wheels (with Brake) - 2 Nos, Castor Wheels (without Brake) - 2 Nos, Front Metal Band - 1 No. In the rack there must be maintained 1U = 1.75 inches space. (All Stand alone rack and server should have 6A, 220V socket link with UPS line) (Make : Legrand (LCS2)/Ortronics/Rittal/Other make subject to approval of owner)

i) **Splicing Tray**

It shall be Modular Splice Tray Cassette for pigtails 12 fibre capacity.

(Make : Legrand (LCS2)/Ortronics/ Luscent/Other make subject to approval of owner).

j) **19" LCS2 Modular Liu-Fiber Optic Drawer-24 Port**

The item shall be Modular fiber optic drawer modular 19"(LIU) 24 port - FIBER OPTIC DRAWER loaded with SC Pigtail - 9/125 µm for 6 Cr. OFC armoured LCS2 and adapter for 6 OFC

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SM LCS2 without Blanking plate. The LIU should either be suitable for outdoor mounting/fixing or suitable enclosure for outdoor mounting to be provided

(Make : Legrand (LCS2)/Ortronics/ Luscent/other make subject to approval of owner).

k) **Note used**

l) **Screened Twisted Pair (STP) Cables**

All the STP cables shall be of Cat.6 variety conforming to ANSI/TIA/EIA 568-B.2-1, 4 pair UL/NEC rated and shall have maximum attenuation of 54.8 dB/100m at 600 MHz. Each pair shall be separately shielded with polyester Aluminium foil.

m) **HDPE pipe**

The HDPE pipe shall be used for laying OFC and STP cables in outdoor environment. HDPE pipe shall be permanently lubricated type with ISI marked. The internal diameter of the HDPE pipe shall be suitably selected so that 50% free space is maintained during cable drawing. The pipe shall conform to DOT standard GR/CDS-08/02 Nov. 2004 with latest amendments.

n) **Not used**

o) **Power Supply Unit**

i) The system will be powered from a suitable UPS system at 240VAC, 50Hz. A power supply unit shall provide the required low voltage levels to feed the equipment and their stand-by unit.

ii) The power supply unit shall have stabilised voltage outputs for input variation between -10% and +10%.

iii) The power supply unit shall be able to supply the whole equipment load and allow 50% future growth. It shall be fitted with suitable optical indication of correct working condition.

p) **Mean Time to Repair (MTTR)**

i) The design and construction of the PSS system shall ensure high reliability and availability.

ii) The PSS system shall employ modular constructional techniques in its design. Allowing a first line maintenance philosophy of module replacement to be implemented.

iii) The average module replacement time for the system is less than 1 hour as long as the correct spares holding are maintained as recommended by Bidder.

q) **Uninterruptible Power Supply (UPS) :** 1KVA UPS with 30min backup with SMF battery.
(MAKES: HITACHI HI-REL / SCHNEIDER ELECTRIC / EMERSON NETWORK / APLAB/
Other make subject to approval of owner)

The UPS should have following features:

i) Input: 140-270V AC
ii) Frequency: 47 – 53Hz
iii) Output: 1KVA
iv) Rated voltage : 230V AC 50Hz
v) Power factor: >= 0.7
vi) Overall efficiency: >= 85%
vii) Automatic Switchover time: <5msec or better
viii) Other features: overload, short circuit, over voltage and under voltage protections

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9.00.00 ERECTION & COMMISSIONING

Bidder's scope of work shall include the complete erection and commissioning of the entire system offered (except specific exclusion in services as mentioned at cl 3.05.00). However, Bidder shall include all erection materials, consumables etc for the purpose. Bidder shall also arrange all erection tools, tackle and calibration instruments.

9.01.00**INCLUSION IN ERECTION SUPPLY & WORKS**

9.01.01 Supply of erection hardware with all accessories as specified herein.

a) Erection of equipment with all erection material & accessories
b) Cabling works as specified in earlier sections.
c) Pre-commissioning activity, loop checking, calibration & testing
d) Provide supervision of all above activities.
e) Supply of consumables
f) Supply of erection / commissioning spares.
g) Providing all necessary Tools & Tackle
h) Painting with anticorrosive paint wherever required.
i) Commissioning.

9.02.00 **SCOPE OF ERECTION/COMMISSIONING SERVICE**

9.02.01 Keep calibration records.
9.02.02 Maintaining proper documentation & handing over to Purchaser.
9.02.03 Create defect records and insurance claim documentation.

9.03.00 **TECHNICAL SPECIFICATION OF ERECTION HARDWARE**

9.03.01 This section provides the general technical requirements for the erection hardware to be supplied under this package.
9.03.02 All erection materials shall be of good quality and conform to the operating environment of the plant.

9.04.00 **RIGID STEEL CONDUIT**

i) Conduits up to and including 25 mm shall be of 16 SWG and conduits above 25 mm shall be of 14 SWG. Minimum size of conduits shall be 19 mm.
ii) Each piece of conduit shall be straight, free from blister and other defects and covered with capped bushing at both ends.
iii) All rigid conduit couplings and elbows shall be hot dip galvanized rigid mild steel in accordance with IS:9537 Part-I (1980) and Part-II(1981). The conduit interior and exterior surfaces shall have a continuous zinc coating with an over coat of transparent enamel lacker or zinc chromate. Conduits shall be furnished in standard length of 3 meters, threaded at both ends.
iv) All rigid conduit fittings shall conform to requirements of IS:2667,1976. Galvanised steel fittings shall be used with steel conduit. All flexible conduit fittings shall be liquid tight, galvanized steel. The end fitting shall be compatible with the flexible conduit supplied.

9.05.00 **FLEXIBLE CONDUIT**

i) Flexible conduit shall be of three layer construction of very high quality of lead coated steel. Outside and inside layer shall be reinforced with heat resistant material.

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ii) Lead coating outside and inside of the conduit steel surface shall provide a non-corrosive characteristic particularly in acidic atmosphere. Besides flexibility, this shall be strong enough to stay at the desired profile without support and shall be durable and strong so as to offer sufficient mechanical protection. It shall also be fully liquid dust and air tight and shall withstand a continuous hydraulic pressure up to 2 Kg/Sq. cm and temperature up to 200 °C.

9.06.00 **SPECIAL FITTINGS**

All rigid conduit fittings shall conform to requirements of IS: 2667, 1976. Galvanised steel fittings shall be used with steel conduit. All flexible conduit fittings shall be liquid tight, galvanized steel. The end fitting shall be compatible with the flexible conduit supplied.

9.07.00 **GENERAL GUIDELINES & PRACTICE FOR ERECTION**

Erection procedure shall follow sound engineering practice throughout and shall not cause hindrance to the activities of other Bidders at the work site. The sequence of work activities shall follow logical sequence and shall be based on work-front availability.

9.07.01 **Panels & Cubicles**

TECHNICAL PARTICULARS

1. Material of Construction : Cold Rolled Coal Annealed (CRCA) steel sheet
2. Thickness of Sheet :
   a) 2.0 mm for faces supporting instruments / terminals
   b) 1.6 mm for other sides and top
3. Construction : Welded throughout as per approved National Standards
4. Post welding operation :
   a) Grounding of all welds to smoothness
   b) Rounding of corners
   c) Cleaning of weld spatters
5. Panel height : 2300 mm (approx)
6. Corners : 7 mm inner radius
7. Dimensional Tolerances :

a) In height & length - 3 mm
b) In height between adjacent sections - 2 mm
c) Total for a group - 6 mm

8. Doors : Double, recessed, turned back edges, full height front & rear

i) Thickness of Sheet : 2 mm
ii) Hinges : Stainless steel
iii) Door latches : Three point type
iv) Door gaskets : Neoprene rubber on fixed frame to result dust proof/weatherproof enclosure
v) Opening of the doors : Outward
vi) Louvers : With removable wire mesh to ensure dust and vermin proof

9. Gland plates : Removable in sections 4 mm thick (bottom)
10. Cable entry : Bottom
11. Hardware :

a) Anti vibration pad- 15 mm
b) Predrilled base channel ISMC – 100 or equivalent for all sides
c) Stainless steel buff- finished 2 mm thick kick plate for all sides
d) Stainless steel scratch strips along desk edges fixed with pan-head recessed screws
e) Rubber strips to ensure air tightness between kick plate and finished floor
f) Lifting hook / Eye bolt
g) Drawing pocket

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h) Door switch, lamps, thermostat, heaters and industrial grade cooling fans, illumination fixures

12. Name Plate : Both at front and back surface of the panel
13. Fixing of name plate : Stainless steel pan head screws
14. Name plate material : Laminated phenolic (3 layers)
15. Lettering : Black with white engraved
16. Mounting of terminal blocks: Vertical angle support bracket tack welded on sheet steel plate, screwed on internal wall of enclosure

10.00.00 DOCUMENTATION

10.00.01 Details of documentation to be supplied as part of the System shall be submitted to Owner for approval prior to execution of the contract.

10.00.02 Each documentation deliverable shall be an integral part of Bidder's Project schedule and shall be identified by date for delivery.

10.00.03 N/A

10.00.04 The following data shall be shown on all documents and/or drawings:

Name of Bidder / Bidder
Correct and complete designation of the document
Exact indication of the scale employed
Revision Index and type of revision
Name of the site.

10.00.05 Bidder shall supply final approved sets of documentation in hard copy and soft copies on DVD.

10.00.06 Bidder shall provide the signature and seal on the each and every pages of this specification along with their offer for the confirmation to all the clauses. Along with submit deviation/clarification list if any in given format.

10.00.07 Final Documentation shall be assembled as per Owner's instructions for collation of Dossiers.

10.00.08 Following sections detail the minimum set of documentation that shall be supplied with the System.

10.01.00**ENGINEERING DESIGN DOCUMENTATION**

10.01.01 Bidder will produce drawings of complete system to be submitted to Owner for approval, indicating upon each the following:

a) Overall dimensional drawing of system cabinet, console and its accessories.
Block diagram of system offered with a brief write-up on operation including hook-up arrangement with existing system.
b) Data sheets.
c) Bill of Materials.
d) Typical general arrangement drawings of various handset and speaker stations.
e) Schematic diagram of each type of station.
f) Mounting details.
g) Cable connection diagram for various type of stations, clearly indicating cable size, number of pairs/cores etc.
h) Total power consumption details.
i) Heat load details of panel equipment.
j) Technical leaflets on each piece of equipment viz handset, speaker etc.

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10.01.02 The Systems Design Manual shall contain all relevant information pertaining to the design and operation of the delivered equipment.

10.01.03 This is intended to provide Owner with an understanding of the operational and design parameters of the equipment and to resolve System operational problems.

10.01.04 This documentation shall typically include the following items, presented in a Systems Design Manual:

Equipment design calculations and selection basis.
Equipment construction and assembly drawings.
Parts list and drawings with manufacturer's identification codes.
Systems connection diagrams.
Accessories list and drawings with manufacturer's identification codes.

10.02.00 **OPERATION & MAINTENANCE DRAWINGS AND DOCUMENTATION**

10.02.01 The O&M Drawings and Documentation shall typically include the following items:

Assembly drawings.
Parts list and drawings with manufacturer's identification codes.
Accessories list and drawings with manufacturer's identification codes.
O&M schedules.
Maintenance guidelines including lapping instructions.
Troubleshooting guides.

10.02.02 The O&M manuals shall be submitted in the form of handy, hard bound books which can be easily handled and transported to site.

10.03.00**DRAWING/ DOCUMENT SUBMISSION REQUIREMENTS**

10.03.01 Bid shall contain at least the following documents:

SL. NO.	DOCUMENT TYPE
1.	Data sheets / catalog of each item of BOM
2.	Proposed System schematic diagram.
3	Write up on architecture and operation of proposed system
4.	BILL OF MATERIALS with make and model no. of equipment
5.	Power requirement (capacity of FCBC and SMF battery)
6.	Clause wise technical compliance indicating each parameter value of w.r.t specification. A printout of this specification may be taken and "COMPLIED" to be mentioned against each clause with signature and seal on each page. Any deviation should be marked up at relevant clause.
7.	System Integrators participating on behalf of camera OEM should submit an authorization letter from OEM stating: a. The bidder is their authorized and trained system integrator b. They shall extend all technical support for designing and commissioning of the system c. Their product quoted by bidder is not presently in end of life list and its spare part as well as spare shall be available for a period of 5years from date of

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	supply of such items d. The product shall be brand new (not refurbished) at time of supply e. They shall continue extending technical and spares part support to BHEL through their other authorized partners in case, their tie up with bidder ceases after supply and till complete commissioning / handing over of the system.

10.03.02 Following documents shall be submitted after award of contract

SL. NO.	DOCUMENT TYPE
1.	Supply Document List
2.	Supply Program
3.	Data Sheets
4.	System Architecture Drawing
5.	Constructive equipment drawings (CCTV Controller, Camera cum database server and accessories dimensional dwgs)
6.	Technical specification /datasheet/ catalog
	Details of Panel and Installation
	Erection /Installation Drawing
	Equipment Layout Drawing in buildings / locations
	Wiring Diagram of Panel
	Cable Route Layout Drawing
	Power Distribution Scheme Diagram
	Cable schedule
7.	Test certificates
8.	Compliance certificates
9.	Quality Control Plan
10.	Test procedures
11.	Packing List
12.	Start-up , Recommended and mandatory spare parts List
13.	Tools and tackle & consumable list
14.	Operation and maintenance manuals
15.	Final version of all drawings and documents furnished with Bid.

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10.04.00**AS-BUILT DRAWINGS**

Upon completion of the final acceptance of the System by Owner, all construction drawings shall be updated by Bidder to an as-built status to reflect the equipment and System configurations as actually installed.

11.00.00 TESTING

11.01.00**FACTORY ACCEPTANCE TEST (FAT)**

11.01.01 Factory Acceptance Test procedure shall be prepared by Bidder along with Quality Assurance Plan. The document shall be subject to Owner's approval.

11.01.02 All System equipment shall be tested in the factory prior to clearance for shipping. The FAT shall include individual equipment tests and integrated under fully assembled condition.

11.01.03 The FAT shall demonstrate adherence that the equipment meets the design standards and functional compliance.

11.01.04 One (1) month prior to the FAT, Bidder shall submit a test procedure to Owner for approval. Duration of FAT at manufacturer's works shall be atleast two weeks.

11.01.05 Owner's representative may, at Owner's sole discretion, attend the FAT. In this event, Bidder shall ensure all tests are carried out in the presence of Owner's personnel. If Owner declines to attend the FAT, Bidder shall carry out these tests and submit the results to Owner for review.

11.01.06 Factory Acceptance Tests (FATs) shall be documented with the results obtained and the success or failure of the test. The test results shall be submitted to Owner prior to clearance of the FAT and authority by Owner is given to ship.

11.02.00**COMMISSIONING**

11.02.01 Bidder is responsible for delivering a fully functional equipment that meets all the requirements of the Specification and applicable standards.

11.02.02 The Commissioning processes will demonstrate the above to Owner, before handing over of the System.

11.02.03 System Commissioning shall comprise of a number of different activities culminating in the acceptance of the operational System by Owner. These activities are detailed in the following sections.

11.02.04 Bidder shall provide all necessary test equipment required to carry out the Commissioning and acceptance testing.

11.03.00 **SITE ACCEPTANCE TEST (SAT)**

11.03.01 Site acceptance test shall be performed by Bidder to verify the full operational functionality of the System.

11.03.02 Four weeks prior to the SAT Bidder shall submit a test procedure to Owner for approval.

11.03.03 All SAT tests shall be documented with the results obtained and their success or failure. These test results shall be submitted to Owner prior to clearance of the SAT and proceeding to the final performance tests.

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12.00.00 MAINTENANCE REQUIREMENTS

12.01.00 **MAINTENANCE PHILOSOPHY**

12.01.01 Owner's maintenance philosophy is to undertake first line field repair by modular replacement. The module shall then be returned to the supplier, who shall either repair it or replace it during the warranty period.

13.00.00 TOOLS & TACKLE

13.03.01 Bidder, in his proposal, shall include and provide a list of all tools and tackle which may be required for erection, maintenance, overhaul and replacement of equipment / component to be supplied under this specification. Unit rate of the same shall be provided.

14.00.00 CLEANING, PROTECTION AND PAINTING

14.00.01 All equipment shall be shipped in properly cleaned condition. All the equipment shall be thoroughly cleaned to remove mill scales, rust etc. and properly painted with anti rust primer, where applicable

14.00.02 Some of the equipment and accessories, after arrival at site, are likely to be in storage for long periods before they are taken up for erection. Bidder may provide adequate protection for preventing damage due to corrosion, dust / dirt ingress, ageing etc.

14.00.03 Plugs shall be provided at cable entry holes/adapters to avoid entry of dust and foreign particles. Paper cap will not be acceptable.

15.00.00 IDENTIFICATION, MARKING, PACKING AND STORING

15.00.01 Each equipment shall be individually packed, tagged and protected.

15.00.02 Inscription on equipment (labels) shall be in English.

15.00.03 Packing must be such to protect all goods from possible impacts and foreign matters; moreover, it must limit the influence of both the climate and the environment, and be suitable for the kind of shipping provided for.

15.00.04 In packing the equipment and accessories, all necessary precautions will have to be taken to avoid any damage during transport and delivery.

15.00.05 All items supplied shall be packed for long term storage under the climatic conditions prevailing at the site. Small items shall be packed in sealed transparent plastic bags with desiccator packs as necessary. Each item shall be clearly marked with its description, purpose and plant designation code as applicable. When more than one item is packed in a single case a general description of the contents is to be shown on the outside of each case and a detailed list enclosed. All cases and other packages must be suitably marked and numbered for identification purposes.

16.00.00 SHIPMENT

16.00.01 Bidder shall be responsible for ensuring that all equipment are carefully and/or suitably packed for shipment, so that they arrive at site in good condition and remain so during storage at site. Before dispatch, all exposed surface shall be protected by applying anti rust primer (two coats) and suitable cover shall be provided for the equipment to be supplied.

16.00.02 Bidder will be responsible for all damages due to improper preparation of the goods for shipment

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17.00.00 QUALITY ASSURANCE PLAN

17.00.01 Equipment supplied under this specification shall have assured quality and workmanship.

17.00.02 Bidder shall complete the Quality Control Plan with the information pertaining to him, in particular with the reference of the documents to be used.

17.00.03 The QCP completed by Bidder shall be submitted to Owner for approval.

17.00.04 Bidder shall carry out all the checks, tests and inspections required to verify the compliance of the supply with the specification requirements at his own expenses. Applicable test will be as per the Inspection and Test.

17.00.05 If not specified otherwise in Contract, Bidder shall notify Owner, 10 (ten) complete working days in advance, that the equipment is ready for inspection. In case the inspection is performed without due notification, repetition of those tests may be requested at Bidder's expenses.

17.00.06 Owner and/or testing body's inspector shall have free access to Bidder's works both during manufacturing and tests & trials.

17.00.07 Bidder shall stand guarantee for perfect operation of the equipment during the period specified in the warranty.

17.00.08 Regardless of the results of the tests performed in Bidder's works, the final test will be performed at the plant, under actual operating conditions.

17.00.09 Bidder shall therefore undertake to replace, free of charge and within shortest time possible, all material which, in operating conditions, shall fail to comply with contractual requirements.

17.00.10 Bidder shall arrange the inspection and tests in easily accessible location and in properly illuminated shop to carry out the inspection in proper way.

17.00.11 Bidder shall, if called for, produce the necessary technical documents (drawings, specifications etc) and copies of the codes or procedures applied to the execution of inspections and/or tests.

17.00.12 Owner reserves the right to reject the inspections and tests which fail to fulfil the above conditions.

17.00.13 Bidder shall perform inspections and tests in full compliance with industrial safety rules, to safeguard his own personnel as well as Owner's/ Consultant's Inspectors.

17.00.14 Bidder shall be responsible for the performance of the tests and shall:

a) provide qualified and specially skilled personnel

b) provide calibrated instruments with relevant certification

17.00.15 For Type or Special tests, Bidder shall indicate the location for carrying out the tests (Bidder's works or any recognized laboratory).
In case Owner is expected to give approval on the basis of certifications concerning similar previous supplies, Bidder shall submit for approval to Owner the documentation demonstrating the compliance between the supply and the certified model.

17.00.16 If during the execution or at the end of the supply, any non-conformances are noted, Bidder shall implement and adequately document all the corrective actions necessary to restore the contractually required conditions. The documentation related to the corrective actions shall be included in the final certification report. If the non-conformance compromises the functional or safety feature of the equipment or specific interface elements, the supplier shall inform Owner in advance in writing on the corrective actions he intend to implement. Owner has the right to reject (totally or partially) the proposed actions if considered

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inadequate or insufficient and Bidder may be asked for more adequate actions. The failure to communicate such non-conformances will be considered fraudulent intention.

17.00.17 During manufacture Bidder shall make available, the certificates concerning the inspections and tests performed. At the end, Bidder shall provide the certificates required for components for which a QCP has been developed. These certificates shall be kept in dossiers and shall comprise the documents concerning manufacturing, inspections and tests performed on the component and on its parts.

17.00.18 The supply shall be considered completed if:

- the documents presented to Owner have been approved;
- the materials are in compliance with the specification; and related certificates are available and acceptable;
- the necessary qualification certificates are available and acceptable; the components have been inspected, examined and tested as required and related certificates are available and acceptable;
- the non-conformances have been documented and accepted by Owner;
- the components are clean, protected and identified;
- the necessary instructions for protection, handling or storage are available; the Final Inspection Report has been submitted.

17.00.21 General requirements for inspection shall be as per the following guidelines.

a) **Non Destructive Tests (NOT APPLICABLE)**

b) **Tests** The materials, manufacturing and finished components shall be inspected, controlled and tested as defined in this paragraph in compliance with standard codes and technical specification that shall be subject Owner's approval.

c) Visual Inspections

18.00.00 **DISCREPANCIES**

18.00.01 In case of discrepancies between the technical requirements and other applicable Engineering Standards, Materials System Specifications, Standard Drawings, or industry standards, codes, and forms shall be resolved in writing by Bidder with Purchase. Before starting the manufacturing / supply, Bidder shall inform Purchase of any discrepancy between the instructions of the present specification and Bidder's standard. Bidder is also advised to discuss on any clarification required before submitting their offer to avoid any ambiguity/dispute later on.

18.00.02 It shall be the responsibility of Bidder to determine and comply with the statutory regulation (i.e. city, state, national, provincial, etc. codes or ordinances) which will apply in the location where the item is to be installed. Mandatory regulations shall supersede over this this specification.

18.00.03 In case of any discrepancy in specification / parameter mentioned in this purchase specification, the stringent between the two shall be considered and offered.

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19.00.00 Bill of Material

SL. NO.	BILL OF MATERIAL	TOTAL QUANTITY
	PERIMETER INTRUDER DETECTION & CCTV SYSTEM	
1.a	Redundant CCTV Camera cum database server with mouse, keyboard with all accessories for Unit zone 270 camera + 20% spare capacity	1 Set
1.b	Redundant CCTV Camera cum database server with mouse, keyboard with all accessories for CHP zone 120 camera + 20% spare capacity	1 Set
1.c	Redundant CCTV Camera cum database server with mouse, keyboard with all accessories for Common Plant Area zone 148 camera + 20% spare capacity	1 Set
1.d	Redundant CCTV Camera cum database server with mouse, keyboard with all accessories for perimeter zone 90 camera + 20% spare capacity	1 Set
2.a	Digital Video Management Software and Video Analytic software for unit zone 270 camera + 20% spare capacity	1 lot
2.b	Digital Video Management Software and Video Analytic software for CHP zone 120 camera + 20% spare capacity	1 lot
2.c	Digital Video Management Software and Video Analytic software for Common Plant Area zone 148 camera + 20% spare capacity	1 lot
2.d	Digital Video Management Software and Video Analytic software for perimeter zone 90 camera + 20% spare capacity	1 lot
3.	65” LVS with mouse, keyboard, joysticks and accessories	2 sets
4.	Operator work station with 32’’ TFT Monitor with mouse, Keyboard, joystick and accessories at various Control Rooms, TSGENCO official room etc for monitoring plant cameras.	08 Nos.
5.	Operator work station with 24’’ TFT Monitor with mouse, Keyboard, joystick and accessories at Security complex, admin building, main gate etc for monitoring Perimeter cameras	4 Nos.
6.	Operator work station with 32’’ TFT Monitor with mouse, Keyboard, joystick and accessories at DE-Electrical office and Switchyard control room for monitoring transformer and switchyard thermal cameras. The video of thermal cameras shall be stored in one of these OWS and facility should be there to transfer these video in any NAS. The OWS shall be installed with required VMS and analytics software with 20% spare capacity.	2 Nos.
7.a	Network Access Storage (NAS) System with RAID-5 storage capacity for unit zone cameras	1 set
7.b	Network Access Storage (NAS) System with RAID-5 storage capacity for CHP zone cameras	1 set
7.c	Network Access Storage (NAS) System with RAID-5 storage capacity at Common Plant Area cameras	1 set

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7.d	Network Access Storage (NAS) System with RAID-5 storage capacity for perimeter cameras	1 set
8.	Fixed varifocal camera with weatherproof housing, mount, power supply and accessories for perimeter surveillance	90 Nos.
9.	PTZ camera with weatherproof housing, mount, power supply and accessories	538 Nos.
10.	Fixed thermal cameras	22 Nos.
11.	Industrial grade L3 Core Switch set complete with all accessories	1 Set
12.a	Industrial grade L2 Distribution switch set complete with all accessories for Unit zone for 270 camera + 20% spare capacity (to be mounted in panel with server)	1 set
12.b	Industrial grade L2 Distribution switch set complete with all accessories for CHP zone for 120 camera + 20% spare capacity (to be mounted in panel with server)	1 set
12.c	Industrial grade L2 Distribution switch set complete with all accessories for CPA zone for CR 148 camera + 20% spare capacity (to be mounted in panel with server)	1 set
12.d	Industrial grade L2 Distribution switch set complete with all accessories for perimeter zone for 90 camera + 20% spare capacity (to be mounted in panel with server)	1 set
12.e	Industrial grade L2 Distribution switch set complete with all accessories for 22nos thermal camera + 20% spare capacity (to be mounted in 12U rack)	1 set
13.	Industrial grade L2 Field network switches with required nos. of SFP and RJ45 ports with 20% spare ports for perimeter cameras	47 Nos.
14.	Industrial grade L2 Field network switches with required nos. of SFP and RJ45 ports with 20% spare ports for plant area cameras	200 Nos.
15.	Industrial grade L2 Field network switches with required nos. of SFP and RJ45 ports with 20% spare ports for thermal cameras	7 nos
16.	10/100Mbps industrial grade media converter with suitable nos of chassis to be mounted in cabinet / racks	50 pairs
17.	10/100/1000Mbps industrial grade media converter with suitable nos of chassis to be mounted in cabinets /racks	8 pairs
18.	UPS of min 1 KVA or adequate rating and 60min back up time for 3-4 camera and 1 field switch	10 Nos.
19.	42U panel for housing the server, network switch etc in control room	4 sets
20	4 core Single mode armoured OFC cable	80,000 mtrs
21.	Twisted 4 pair STP CAT6 cable and connectors for connectivity to cameras	25,000 mtrs
22.	Passive Fiber Optic Components and termination kit consisting of .Fiber panel, Information outlet, Cabinets, LIU, face plates, SC Coupler, Fiber Optic Drawer with Pigtail, UTP CAT6 Patch cords, various connectors, cable ties, Multi strand Copper wire for grounding of equipment.	1 lot
23.	Flexible GI Conduit for cable between camera JB to camera	2000mtrs

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24	25mm PVC Conduit with coupler and other accessories for routing STP Cat6 cable	5000 mtrs
25.	32mm x 26mm permanently lubricated HDPE PIPE with coupler and other accessories for routing power and OFC cable along perimeter wall and underground FO cabling as required in plant areas	20000 mtrs
26.	Earthing system for Servers and also for cameras	1 Lot
27.	Suitable metal clamps for fixing OFC and Power cable over cable tray	1 Lot
28.	Power distribution boards for distributing power supplied to camera & switch from UPS/CCTV Panel/PDB	As required
29.	GI Poles of minimum 15feet suitable for mounting Camera and related JB etc	60nos
30.	Weather proof Storage container (with lock and key arrangement) of adequate dimension for long term storage of electronic items supplied for PSS system.	As required
31.	NMS System for IP backbone network	1 Set.
32.	Anti Virus software / firewall for server & OWS	1 Set.
33.	Any other item mentioned in technical specification & not covered above and other items required for completion of system other than specified above	1 Set.
34.	Training to TSGENCO site officials for operation and maintenance of the system	1 Set.
35	Engineering, design, documentation, testing, installation & commissioning	1 Set.
	PATROL GUARD SYSTEM	
1.	Patrol Guard PC, mouse, keyboard with all accessories at Central Control Room.	1 Set.
2.	Patrol Guard Card Reader	50 Nos.
3.	Patrol Guard Data Collection and transfer unit	10 Nos.
4.	Data Transfer cable with connector	2 Nos.
5.	Patrol Guard Software	1 Set.
6.	Engineering, design, documentation, testing, installation & commissioning	1 set
	MANDATORY SPARES OF CCTV SYSTEM	
1.	Fixed varifocal camera with power supply and enclosure (20% of main qty)	18 nos
2.	PTZ camera with power supply and enclosure (20% of main qty)	108 nos
3.	Fixed thermal cameras with power supply (20% of main qty)	5 nos
4.	L3 Core Switch (each type)	4 nos
5.	L2 Distribution switch (each type)	4 nos
6.	L2 Field network switches (each type 10%)	26 nos
7.	Patrol Guard Card Reader	5 nos
8.	10/100Mbps industrial grade media converter	10 pairs

9.	10/100/1000Mbps industrial grade media converter with suitable nos of chassis to be mounted in cabinets	2 pairs
10.	Panel wiring cables & Special cables (if any)	25% of qty used
11.	Terminal Blocks	25% of qty used
12.	Fuses	120% of qty used

Note: The plant boundary of the project is approx. 20km. The specification of fixed camera mentioned is minimum specification required for the project. However, these cameras need to cover the entire perimeter and the viewing range of the offered camera shall be adequate to identify face of intruders. Bidder may accordingly offer suitable model of 90nos of camera which can be equally spaced to cover entire perimeter or offer higher quantity of camera through which entire perimeter can be adequately covered.

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