COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Technical specification

Supply, installation and commissioning of

CCTV System for

10MW (AC) Solar Photovoltaic Power Plants at

Santaldih site, West Bengal

Revision 01 details:
(i) Bill of Materials under cl no 5 edited
(ii) Editing of technical specifications in line with revised (i)

Revision 01: 01/8/2018	Approved: RADHAKRISHNAN V V. Radhakrishnan 1/8/18		
	Prepared	Issued	Date
	Sd/- SHEETAL PRASAD	SC&PV-Engg	10.07.2018

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

This specification covers the Design, Manufacture, Assembly, Testing at Bidder's Works, Packing, and Delivery to site, Erection and Commissioning of 3 nos of CCTV system at each of 10 MW solar plants at Santaldih site of District Purulia, West Bengal.

2 GENERAL INSTRUCTIONS:

a. Vendor is advised to visit site to familiarise with conditions and site layout.
b. Bidders are advised to comply to specifications in total, unless the requirement is not feasible. Incomplete offers will be rejected without intimating to bidders. In case feasible deviations are proposed by the bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder.
c. Bidders to quote models and brands with proven track record of testing and successful operation.
d. In the event of any conflict between these specifications, data sheets, related standards, codes etc. the bidder shall refer the matter to the purchaser for clarifications and only after obtaining the same shall proceed with the manufacture of the items in question.
e. CCTV System is meant for gathering video information from the various areas of the power plant with display and recording facilities as per requirement. It is the responsibility of the bidder to select proper models, which meet the technical requirements mentioned in this specification. If there is any deviation then it shall be brought to Purchaser's attention & written approval shall be taken.
f. Vendor has to enclose the deviation sheet clause wise separately in case any deviations are sought by the vendor. Absence of any deviation sheet shall be taken as compliance of BHEL specification in total without any deviation.

3. GENERAL INFORMATION

3.1 Bidder shall be responsible for providing all the items specified in the Bill of Materials (BOM) table. Any deviation in this regard will not be acceptable.

3.2 For addition/reduction of quantity, unit rate quoted in the present offer shall be considered.

3.3 Duly signed & stamped un-priced price schedule shall be submitted along with technical offer by bidder as a token of his concurrence that all items were quoted along with unit prices.

3.4 ANNEXURE-1- Plant layout drawing indicating CCTV equipment locations at Santaldih site is attached.

3.5 Bill of Quantities (BoQ/BoM) is included.

4. Standards and References:

The equipment furnished under this section shall meet the requirements of all the applicable international codes and standards or their latest amendments. Camera certification shall be CE/FCC/UL or equivalent.

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

5.1 Bill of Material –Santaldih site:

SUPPLY SCOPE	QTY	UNIT	Quoted/Not
1) PTZ outdoor, 2 MP, 20X, industrial camera with IR night vision of 150 m	2	No	
2) Outdoor fixed bullet type industrial camera with IR night vision of 70 m	20	No	
3) Indoor Dome industrial camera with IR night vision	3	No	
4) GI 50mm, Mounting poles 5m above ground with minimum IP-65 junction box	25	No	
5) 10/100 Mbps Single mode Media converter, Industrial grade	50	No	
6) Layer-3 switch, redundant power supply, Gigabit Ethernet network solution with single IP management of 4 nos of fibre optic / SFP and 8 nos of RJ-45 ports with surge protective devices, operating up to 50^0 Celsius	1	No	
7) 4-port LIU fully loaded with splice tray for switch side termination	1*	Lot	
8) Server with 20-days storage capacity along with VMS software, recording software and license for all cameras and clients	1	No	
9) 40-inch LED industrial monitor, Full HD	1	No	
10) PC Intel Core i5-6500 (6M Cache, 3.2 GHz), 4GB DDR3L 1600MHz, 1TB 7200rpm SATA HDD 1 no	1	No	
11) Keyboard and joy-stick	1	Set	
12) Layer-2 network switch functionality Gigabit Field with 4 nos of fibre optic / SFP and 24 nos of RJ-45 ports with surge protective devices, operating up to 50^0 Celsius and of wall-mounted enclosure	2	No	
13) Single mode unarmoured OFC cable	1	Lot	
14) Twisted 4-pair STP cat-6 cable	1	Lot	
15) 3-core 1.5 sq mm copper armoured PVC Cable	3400	M	
16) Passive fibre optic components & termination kit consisting of fibre panel, information outlet, cabinets, face plates, SC coupler, Fibre optic drawer with pig-tail, UTP cat-6 patch cords, various connectors, cable ties, multi-stranded copper wire for equipment ground	1	Lot	
17) HDPE conduit with couplers and other accessories for OFC cable routing	1	Lot	
18) Any other supply items not covered above and required for completion of the CCTV system	1	Lot	

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

19)Mandatory spares (i) Bullet cameras- 2 No (ii)Power adapters- 5 No (iii) Media converters- 5 No	1	Set	
I&C SCOPE			
1. Installation & commissioning of complete CCTV system	1	AU	

Notes:

1. **The BOM mentioned shall be supplied by bidder as minimum requirement. However, any material not listed in the BOM mentioned but required by bidder for successful completion and guarantee run of the project / system shall be included in the scope of the bidder. These additional items will be covered under item no 18 of BOM.**

2. Quantity required as per configuration is to be supplied. The items for which qty. is mentioned as "1 Lot / 1 set", it is the responsibility of bidder to supply the material as required for the successful completion of erection & commissioning of the complete system.

3. Supply and commissioning of any other Equipment (not listed above) for successful installation and trouble-free operation of the System shall be bidder's responsibility and shall be done by bidder without any commercial implication to BHEL.

4. It is mandatory to quote for each item mentioned in the BoM. In case any of the items is not quoted for, the offer will be liable for rejection.

5. The size and Quantity of CCTV system Racks are indicative only. However, bidder to decide the size and Quantity of CCTV Rack based on the size of Servers, Hard Disks(storage) and other network equipment to be placed in CMCS building required to meet the project requirements (for the CCTV Cameras mentioned and with 20% spare capacity for future).

6. The quantities given in BOM may vary as per finalized CCTV location layout based on Customer approval. Same shall be informed to bidder at the time of technical scrutiny. For addition/reduction of quantity, unit rate quoted in the present offer shall be considered.

7. I&C Prices shall be inclusive of travel expenses, lodging, transport and per man day charges. No extra charges will be paid.

6. Approved Make of Components:

a) For Camera:

(i) BOSCH (ii) AXIS (With Milestone Software)
(iii) PELCO by Schneider (iv) Infinova
(v) Samsung (vi) Sony
(vii) Honeywell (viii)Indigo Vision
(ix) Panasonic

Note- Compatibility of CCTV camera and software shall be ensured and the vendor shall be responsible for the same.

Other items which are not manufactured by principal manufacturer can be supplied from indigenous local source approved by Principal Manufacturer's approved source/ BHEL. The following make shall be preferred-

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

b) For Ethernet Cables
(i) Belden, (ii) Lap (iii) D-Link

c) Fiber Optic Cables
(i) Birla Ericsson Optical, (ii) Aksh Fiber (iii) Finolex (iv) R&M (v) HFCL

d) Enclosure for Panels
(i) Pyrotech, (ii) Pentair (Hoffman), (iii) RITTAL (iv) MPP

e) OWS/PC/Server
(i) HP, (ii) DELL, (iii) COMPAQ (iv) IBM (v) LENOVO

All other items supplied will be of reputable make. BHEL approval shall be taken prior to procurement.

7. TECHNICAL REQUIREMENTS

(i) General: The CCTV system for Santaldih site (in the scope of this project) mainly consists of 25 cameras, Recording & Video Management Servers, VA analytics server and other CCTV Network Accessories and erection hardware (viz. racks, junction boxes, brackets, glands, nut-bolts, conduits etc.).

20 nos of Bullet cameras will be fixed on plant boundary and 1 no each of dome camera will be at Control room (2 no), Inverter room-1 (1 no) and Inverter room-2 (1 no), 3 nos of PTZ cameras.

(ii) The CCTV system shall be designed as a standalone IP based network architecture. System shall use video signals from different cameras at different locations, process the video signals for viewing on monitors at different locations and simultaneously record all the video streams using H.264 or better compression technique. Joystick and mouse-keyboard Controllers shall be used for Pan, Tilt, Zoom and other functions of desired cameras.

The monitoring of these cameras shall be done at Control room. The required no. of hardware/software licenses to meet the requirements shall be supplied by the bidder.

(iii) All the designing of hardware / software required for the CCTV system along with erection supervision and commissioning of the same shall also be in the scope of bidder. Layout location, architecture and configuration scheme will be prepared and submitted by bidder in the event of order placement. It is the responsibility of bidder to provide a new system and supply suitable hardware/software & accessories.

All video and control signals from cameras shall be connected to control room via Cat-6 Cable for distances up to 90m and FO Cables for distances more than 90m. All unarmoured and FO cables shall be routed through flexible conduits.

Weather proof JB shall be provided for housing network equipment for connecting outdoor cameras with Control room/Inverter room rack.

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

(iii) Power supply:
BHEL will supply 3 Nos. of 230V, 1-ϕ AC, 50Hz of 3 kVA capacity UPS power supply at locations of Inverter Room-1, Inverter room-2 and Control room. Further distribution of power through 3cx1.5 sq mm copper armoured cable to equipment inside Junction box/9U rack and to cameras installed in the field shall also be in the scope of bidder.
Power/Voltage conversion equipment if required shall be in scope of bidder. Further distribution of power within equipment inside Junction box/9U rack and to camera shall also be in the scope of bidder.

(iv) The vendor shall guarantee satisfactory performance of the equipment under stipulated variations of voltage and frequency. The design and manufacture shall be such that equipment / components of same type and rating are interchangeable.
From all the Keyboards / monitors connected to the CCTV Network/Servers it shall be possible to access / control / display all the cameras.
Camera and database servers shall offer both video stream management and video stream storage management. These servers shall also manage and store configuration information/database for the whole system. Recording frame rate & resolution in respect of individual camera shall be programmable. It shall be possible to view and record at different resolutions and frame rates and this shall be individually programmable on every camera.
It shall be possible to take back-up of system configuration and database on portable media device and restoring the same if required.
System shall ensure that once recorded, video cannot be altered.
Camera server shall be provided with sufficient storage space to store recordings of all cameras at 25/30 FPS at 1920X1080 (**For HD IP cameras**) resolution. All recordings shall have camera ID, Location, Date and Time of recording.
It shall be possible to view, record, search and replay simultaneously without affecting performance of the system.
The system shall be complete in all aspects for reliable performance. The contractor shall submit the detailed block schematic, video, signal & power wiring diagram, describing the connections between the network switch/camera server systems and various cameras, monitors, keyboard and joystick.
The camera & Video Management Software shall conform to ONVIF profile S or latest available applicable ONVIF profile at the time of detail engineering.
The system shall include all the components, accessories, cabinets / console, cables, JB, mounting hardware with all required software for fully functional system. Components shall be of industrial grade. Consumer electronics is not allowed.
(iv) All the cameras shall be DIGITAL, colour, suitable for day and night surveillance (under complete darkness conditions) and IP network compatible. **Night vision feature for complete darkness shall be available in all cameras.** There will be three types of cameras viz. Bullet, PTZ & Dome.
Camera shall be directly connected to network and use of external encoder for connecting to network is not acceptable. The cameras shall be rugged, high performance colour cameras. These cameras shall provide high resolution and high sensitivity suitable for operation in a power plant,

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

both in natural and artificial lighted areas. The following cameras (Under item 7.1, 7.2 and 7.3) in scope of supply:

7.1. PTZ outdoor, industrial camera:

Non-PoE type, 2 Megapixel, vandal-proof, with illuminated IR range of 150 metres, IP-65 outdoor type. Camera shall be SEC/UL/CE listed. Camera shall be suitable for operating temperature up to 55 deg Celsius ambient.

7.2 Outdoor fixed bullet type industrial camera:

Non-PoE type, 2 Megapixel, vandal-proof, with illuminated IR range of 70 metres, IP-65 outdoor type. Camera shall be SEC/UL/CE listed. Camera operating temperature up to 55 deg Celsius ambient.

7.3. **Indoor Dome industrial camera:** Non-PoE type, 2 Megapixel, vandal-proof, with illuminated IR range of 50 metres, IP-65 indoor type. Camera shall be SEC/UL/CE listed. Camera shall be suitable for operating temperature up to 55 deg Celsius ambient.

Features of all three cameras shall meet industrial requirements, DATA SHEET should be submitted.

7.4. GI 50mm, mounting poles 5m above ground with minimum IP-65 junction box

(i) Cameras to be installed in any particular location shall be mounted on the nearest equipment structures in the plant. The height shall be 5m above ground level. Mounting locations shall be easily accessible for servicing purposes.

(ii) Local junction boxes for cameras shall be of weather-proof, of minimum protection Class IP-65. Junction Boxes shall be made of 2mm thick Cold rolled sheet steel or polycarbonate material and be suitable for accommodating Network Equipment, LIU & Power Distribution Equipment.

(iii) 5-metres camera Pole with Required Foundation Bolt/Frame shall be supplied. **Civil foundation works in vendor's scope.**

(iv) Where structures are not available, rigid vibration proof CCTV Pole protected against corrosion shall be supplied. They shall be fitted with climbing and relevant safety facility.

(iii) Camera structures shall have hoisting facility, fixing facilities for cables along the whole structure and for the cameras to be installed with ample space for servicing purposes.

5-metres camera Pole with Required Foundation Bolt/Frame shall be supplied.

7.5. 10/100 Mbps Single mode Media converter, Industrial grade

7.6. Layer-3, redundant power supply, Gigabit Ethernet network solution with single IP management of 4 nos of fibre optic / SFP and 8 nos of RJ-45 ports with surge protective devices and of IP-20 protection or better

L-3 network switch with 4 SFP ports and 8 nos for optical UTPs (RJ-45). Each UTP shall be 10/100 and SFP shall be Gigabit network switch. Shall be installed in Control room.

7.7. 4-port LIU fully loaded with splice tray for switch side termination

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

7.8. Server with 20-days storage capacity along with VMS software, recording software and license for all cameras and clients

Shall be installed in Control room. The application software shall be used to display, store, control & manage the entire surveillance system.

It shall be possible to control all cameras i.e. PTZ, auto/manual focus, selection of presets, video tour selection etc. The software shall support flexible 1/2/4 windows split screen display mode or scroll mode on the display monitors for live video.

The camera & Video Management Software shall conform to ONVIF profile S or latest available applicable ONVIF profile at the time of detail engineering.

The system shall support video analytics in respect of the following

1. Video motion detection,
2. Object tracking
3. Object classification & Tracking

Video Analytics feature shall be part of 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.

NVMS Server + Software with License for All cameras Video Analytics Server + Software with License for All cameras Recording Server with storage shall be covered under this item.

7.9. 40-inch LED industrial monitor

a) One LED colour monitor (40 inch diagonally) will be installed in Control room Building. **Industrial grade monitor shall only be supplied.**

b) The monitors shall be versatile and aesthetic units. It shall also be S-VHS/composite video compatible and shall have built in audio. Monitors are to be operable at 230V AC, 50 Hz (Power supply shall be arranged by supplier from CCTV Rack).

c) They shall comply to the following specifications:

(i) General Automatic degaussing, fast warm up time Display tube, integral implosion protection.

(ii) Resolution: 1920 x1080. Minimum Controls Colour system select, volume, colour, brightness, contrast, power, video input select and Y/C termination.

7.10 PC Industrial, Intel Core i5-6500 (6M Cache, 3.2 GHz), 4GB DDR3L 1600MHz, 1TB 7200rpm SATA HDD

Operator work station shall be in SCADA Room of Control room Building. Workstation shall be provided with following features as a minimum.

a) USB Keyboard and USB optical Mouse, b) i5 Processor, c) 4GB RAM, d) 1 TB Hard Disk

e) 10/100MBPS Ethernet Card, f) Windows 7 professional, g) Antivirus software with minimum 3 years up gradation license, h) 2GB NVIDIA graphics card, i) I/O ports : 2 USB Front, 6 USB Rear, 1 SVGA port, 1 RS232, 1 Mic IN, 1 Mic OUT, 2 PS /2, 1 RJ45, 1 HDMI Card.

Actual specification of workstation shall be finalized during detailed engineering. Bidder to note that work station features specified above are the minimum requirement. However, it is bidder's responsibility to incorporate any upgrade/additional features, if it is required for the smooth operation of the CCTV system.

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

7.11 Keyboard and Joystick

Keyboard shall have full function used for system control and programming for selection of various Network switches, camera/database servers, camera functions including pan, tilt and zoom lens controls and shall be ergonomically designed.

Joystick shall be provided for achieving all control functions.

7.12 Gigabit Field network switches with minimum layer-2 functionality and 4 nos of fibre optic / SFP and 24 nos of RJ-45 ports with surge protective devices and of IP-20 protection or better:

Shall be located in **Control room or Inverter room-2 and Inverter room-1** as per configuration design of the vendor.

PARAMETER	Specifications
General Features	2 Gigabit Copper/SFP combo ports
	SFP socket for Easy and Flexible Fiber Expansion
	Redundancy: Gigabit X-Ring (ultra high-speed recovery time< 10ms), RSTP/STP (802.1w/1D)
	Management: Web, Telnet, Serial Console, SNMP
	Control: VLAN, QoS, IGMP Snooping
	Security: IP/MAC and port binding, DHCP Server, IP access list, 802.1X, SNMPv3
	Diagnostic: Port Statistic, Port Mirroring, RMON, Syslog
	Supports wide operating temperatures (0 to 75° C)
Network Management Features	Web browser, Telnet, Serial console, TFTP, SNMPvl/v2c/v3, Port Speed/Duplex Configuration
	IEEE 802.1 Q, Port-based VLAN
	IEEE 802.1p QoS CoS/TOS/DSCP priority queuing
	SMTP, Syslog, RMON
Mechanism	Enclosure: IP-2030, metal shell with solid mounting kits
	Mounting: DIN-rail, Wall
Certifications	Safety: UL 60950-1,
	Shock: IEC60068-2-27
	Freefall: IEC60068-2-32
	Vibration: IEC60068-2-6

7.13 Single mode unarmoured OFC cable:

The optic fibre Optic Fibre cable shall be minimum 10-core (10-fibre), unarmoured, fully water blocked with dielectric central member for outdoor/indoor application so as to prevent any physical damage. The cable shall have multiple single-mode fibres on as required basis so as to avoid the usage of any repeaters. The outer sheath shall have Flame Retardant, UV resistant properties and progressive automatic sequential online marking of length in meters at every meter on outer sheath.

The cable core shall have suitable characteristics and strengthening for prevention of damage during pulling viz. Steel central number, Loose buffer tube design, 4 fibres per buffer tube (minimum), Interstices and buffer tubes duly filled with Thixotropic jelly etc. The cable shall be

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

suitable for maximum tensile force of 2000 N during installation, and once installed, a tensile force of 1000 N minimum. The compressive strength of cable shall be 3000 N minimum & crush resistance 4000 N minimum. The operating temperature shall be -20 deg. C to 70 deg. C.
Cables shall be suitable for laying in conduits, ducts, trenches, racks and underground buried installation. Suitable chemical shall be added in to the outer sheath to protect the cable against rodent and termite attack.
Spliced/ Repaired cables are not acceptable.
Penetration of water resistance and impact resistance shall be as per IEC standard.
Note: Finalization of Cable drum lengths for single mode FO cables shall be done only after approval of the same by BHEL.

7.14 Twisted 4-pair STP cat-6 cable and connectors for connectivity

PARAMETER	SPECIFICATIONS
Certified	UL
Category	CAT-6
No of Pairs	04 twisted pairs with proper color coding
Gauge	26 WG or better
Conductor	Solid Copper
Insulation	HDPE
SHIELD	Every pair is separately shielded with polyester aluminum foil
Separator	Should be a cross filler
Jacket	Flame Retardant PVC
Impedance	100 Ohms per 100 meters or better
Operating temperature	0 Deg. C to +50 Deg. C

7.15 3-core 1.5 sq mm copper armoured PVC Cable
Cables shall be of FRLS PVC sheathed cables for use in CCTV and shall conform to latest edition of Indian/International standards.

PARAMETER	SPECIFICATION
No of cores	3 (three)
Conductor size	1.5 sq mm, multistrand with annealed electrolytic copper conductor
Primary insulation	PVC insulated IS-5831 Type C
Thickness of PVC insln	0.8 mm
Color code	Red, Black and Green
Inner and Outer Jacket	Extruded Flame retardant and 90º C PVC to IS 5831- Type ST2
Thickness of PVC inner Sheath	0.3 mm

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Minimum Thickness PVC outer Sheath	1.2 mm
Inner, outer sheath	PVC Black
Armour	Galvanized Steel Wire/ flat as per IS-544 part I.
Armour coverage	95 %
Conductor Resistance	12.5 ohms/Km

7.16 Passive fibre optic components & termination kit consisting of fibre panel, information outlet, cabinets, face plates, SC coupler, Fibre optic drawer with pig-tail, UTP cat-6 patch cords, various connectors, cable ties, multi-stranded copper wire for equipment ground

7.17 HDPE conduit with couplers, bends and other accessories for OFC cable routing

7.18 Any other supply items not covered above and required for completion of the CCTV system:

7.18.1 Termination equipment:

Supply of Termination equipment including Glands, lugs, FO Termination equipment (OFC patch cords, **SPLICE KITS** and LIU panels etc.), OFC termination kits and FO jointing kits as required in line, etc., at both ends of the Cable is in the scope of Bidder.

Any interface equipment like adaptors required for providing power supply to cameras and other equipment shall be provided by Bidder.

7.18.2 Earthing

a) Each panel, cabinet, console and other equipment supplied by bidder shall be provided with an earthing lug. All these lugs shall be properly secured to the AC mains earthing bus.

b) All circuit grounds of electronic instruments, shields and drain wires of signal cables shall be connected to instrument ground bus, which is electrically isolated from the AC mains earthing bus. This bus shall be of suitable size and in scope of supply of bidder. The instrument ground bus is connected to independent instrument system earth riser through insulated wires. Purchaser will provide 3 sets of earth risers, one set each for two inverter rooms and one set for control room.

7.18.3 Any other items required:

All the cables (indoor/outdoor) connectors and plugs as required shall be supplied.

Network switches with required no of SFP slots, SFP Module (For Single Mode FO Cables), LIU panels including All accessories necessary for Termination, LAN Switches/ Network Switches, Plugs, Connectors, Glands, Patch Cords, Media Converters, suitable Racks, Power Converters, lugs, Computer Table & Operator Chair or any other hardware/software essential and as required to complete the system

7.19 Mandatory spares

(i) Bullet cameras- 2 Nos

(ii) Power adapters- 5 Nos

(iii) Media converters- 5 Nos

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

8.0 Installation and commissioning of complete CCTV system

a. Bidder shall include the erection & commissioning for this package.

b. OFC cable and Power cable shall be laid underground across entire perimeter (periphery) of the plant in both zone-A and zone-B. All the cameras will be connected through Network switches / Media converters. BHEL shall lay the OFC cable / power cable but Vendor shall depute their engineer for supervision of this work. Scaled layout of site with locations of Control room, Inverter room-1 and Inverter room-2 and with approximate locations of the three camera types is attached. Routing of the OFC cables / Power cable is shown in the layout.

c. All types of terminations to network equipment are in the vendor's scope.

d. Scope of installation, commissioning and other site services shall be as mentioned below. However, Bidder has to provide the services required for the completeness and correctness of the system irrespective of whether it is mentioned in the specification or not.

e. Bidder shall arrange their own lodging, boarding & traveling.

Activity	Scope
Unloading	BHEL
Supply Verification as per packing list, Transit damage inspection	BHEL
Storage at site	BHEL
Custody of items in stores	BHEL
Issue of Items from Stores	BHEL
Installation of equipment at intended locations	BIDDER
Supply of all Accessories for installation of bidder supplied equipment	BIDDER
Inter equipment Cable terminations, Cable glanding, Lugging, ferruling and Terminations	BIDDER
Civil work, earth excavation for preparing cable trenches, Road crossings and refilling of soil, etc.	BHEL
Termination of cable at Field/ other	BIDDER
Termination of cable at control/inverter room panels	BIDDER
OFC cables termination at equipment end	BIDDER
OFC cables jointing in trench	BIDDER
Supervision of OFC cables laying	BIDDER
Laying of all cables(CAT6/Signal Cables/Control Cables/Flexible Wires/Power Cables/F.O Cables as per scope), JBs in indoor area & outdoor area for complete package	BHEL
Erection of bidder supplied Equipment	BIDDER
Supervision of erection of complete Package	BIDDER
Commissioning of system	BIDDER
Commissioning Supervision	BHEL
Connection checking from field to CMCS Room, Invertor Room & in between all the equipment	BIDDER

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

Supervision and acceptance of networking	BHEL
Commissioning tools & tackles for the CCTV package	BIDDER
Provision of Power supply to Rack/JB	BIDDER
Special proprietary commissioning tools, tackles on returnable basis	BIDDER
System handover to customer and protocol with Customer	BIDDER /BHEL
Site Mark-up Drawings	BIDDER
Preparation of As built documents	BIDDER

9. TESTING & INSPECTION

a. All the equipment shall be tested to conform to the defined specifications as per mutually agreed test plan / FAT procedure which shall be submitted and approved by BHEL. The system shall be operationally tested to simulate field conditions before dispatch from the work. Besides all routine and acceptance test specified by applicable codes and standards. Vendor shall give inspection call with Factory test reports and the system shall be cleared only after successful completion / witnessing of the same by BHEL and BHEL's customer.

b. For bought out items, the routine and acceptances tests shall be conducted at the equipment manufacturer's works.

c. Type test certificates from a recognized testing agency shall be furnished for the offered equipment.

10. DOCUMENTATION:

Documentation shall be in three steps, during offer submission, during drawing approval stage after order placement and as built drawing.

a. Documents to be submitted with the Technical Bid as part of offer:

i. Bill of material along with details of makes
ii. **Network interconnection diagram**
iii. Technical datasheets & catalogues of all equipment
iv. Certificates
v. Preliminary Quality Assurance Plan
vi. Deviation List, if any
vii. Signed copy of BHEL purchase specification

The Bidder may note that the drawings, data and manuals listed above are minimum requirements only. The Bidder shall ensure that all other necessary write-ups, curves, calculations and information required to fully describe the equipment offered are submitted with his bid.

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

b. Documents to be submitted after PO placement:

1. CCTV location Layout and Architecture and Network interconnection diagram
2. Write up on system operation
3. Block Schematic Diagram of complete system
4. Bill of material of Complete System
5. Technical data Sheets & GA drawings for camera, enclosures, JB's, CCTV, furniture etc.
6. Power Supply requirement
7. Internal power distribution arrangement & power wiring diagram describing the connections between the network switch/camera server Systems and various cameras, monitors, Keyboard and joystick.
8. Equipment arrangement inside CCTV Rack
9. Any other relevant drawings, documents and data necessary for satisfactory installation, operation and maintenance
10. Cable Schedule
11. Quality Assurance Plan
12. O & M Manuals

Document Schedule

Sl. No	Document	Schedule
1	First Submission of Drawings	Within 7 days from the date of PO
2	Manufacturing Cycle time, Inspection call & Delivery	Within 2 months from Manufacturing clearance date
3	As Built Drawings	Within 10 days from the date of Commissioning of CCTV System

c. Final Documentation:

i. All final documents shall be submitted in 3 sets of hard copies + 1 copy of CD directly to site.
ii. All field modification shall also be recorded during system commissioning and mark up copy (3 sets) shall be submitted for day-to-day work.
iii. Complete O&M manual – all in 3 sets (2 sets to be included with item dispatch and balance to BHEL purchase dept.)
iv. Warranty and all test certificates for review and acceptance by BHEL
v. Final as built documents revised shall be submitted within 10 days from the date of Commissioning of CCTV System
vi. All engineering drawings and as built drawings shall be furnished in 1 set of CD.

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

11. WARANTEE:

The bidder shall provide full warrantee for performance of the equipment being supplied for a period of minimum 12 months from date of commissioning or 18 months from date of supply whichever is earlier.

Whereas the technical specifications of the purchaser constitutes the broad guidelines for equipment selection, supply and performance, the bidder shall bear final and total responsibility for engineering and performance to meet the purchaser's specification.

Bidder shall be fully responsible for all the items to be supplied in this package. i.e. bidder shall provide a guarantee certificate for trouble free performance of all the items for 24 months from date of supply. In case of any defect, vendor will supply the replacement material and/or visit site for troubleshooting and repair as will be required for quick resolution.

If any defect in the material, bidder is sole responsible for the replacement with in a period of 3 weeks from the supply/identified as defective.

12. MARKING

Each device shall be identified with the following information as a minimum.

a) Manufacturer's name or identity
b) Manufacturer's model and /or serial number
c) Input range
d) Tag no.
e) Power Supply
f) Area Class & IP Class
g) IS / Non IS
h) ID no. for 'FF' field devices.

The above information shall be in a permanent form on a metal nameplate, permanently attached to the device/equipment.

14. SHIPPING & PACKING

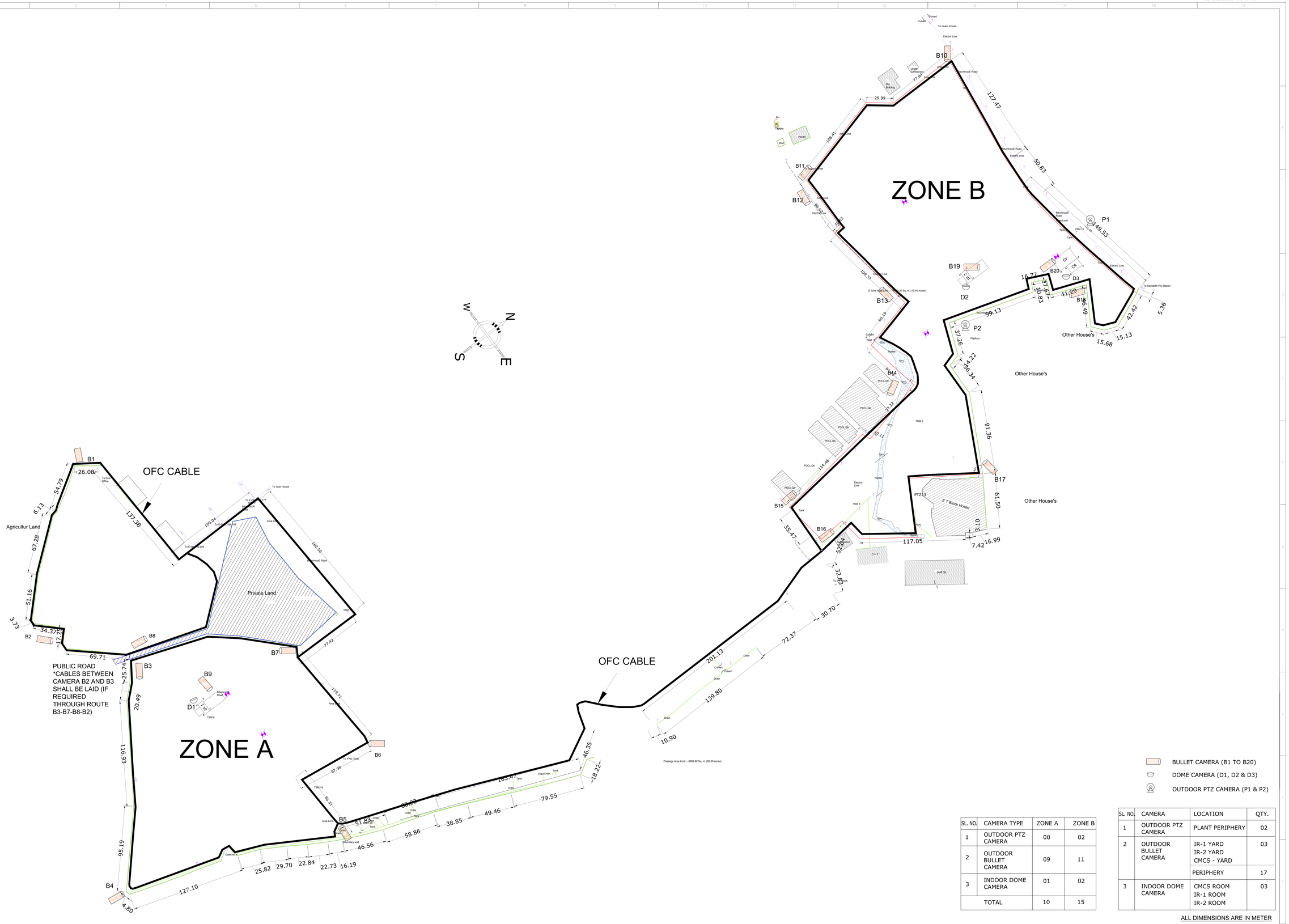
The equipment shall be transported to site by the bidder in fully assembled condition. However, in case some components are liable to be damaged during transit, the same shall be dismantled and supplied separately, to be reassembled at site by the bidder. Assembly of the item supplied loose at site and repairing of any item damaged during transport shall be in the bidder's scope. The bidder shall send each consignment to site with a detailed packing list.

FIRST ANGLE PROJECTION

DRAWING NO. BH-WBSEDCL-SANDALDIH-DG-013

ALL DIMENSIONS ARE IN mm

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of Bharat Heavy Electricals Limited
It must not be reproduced or communicated to any other party without prior written consent.



BULLET CAMERA (B1 TO B20)

DOME CAMERA (D1, D2 & D3)

OUTDOOR PTZ CAMERA (P1 & P2)

SL. NO.	CAMERA TYPE	ZONE A	ZONE B
1	OUTDOOR PTZ CAMERA	00	02
2	OUTDOOR BULLET CAMERA	09	11
3	INDOOR DOME CAMERA	01	02
	TOTAL	10	15

SL. NO.	CAMERA	LOCATION	QTY.
1	OUTDOOR PTZ CAMERA	PLANT PERIPHERY	02
2	OUTDOOR BULLET CAMERA	IR-1 YARD IR-2 YARD CMCS - YARD	03
		PERIPHERY	17
3	INDOOR DOME CAMERA	CMCS ROOM IR-1 ROOM IR-2 ROOM	03

ALL DIMENSIONS ARE IN METER

REV.	DATE	ALTERED	CHECKED	APPROVED
01	190718	SAN	SP	VRK
00				

CAMERAS INCLUDED.

FIRST ISSUE.

	NAME	SIGN	DATE
DRAWN	SAN		270418
CHECKED	SP		270418
APPROVED	VRK		270418

DISTRIBUTION OF PRINTS

DEPT.	CODE
SC&PV	4.39

PROJECT : 10MW SOLAR POWER PLANT
CUSTOMER : WBSEDCL

BHARAT HEAVY ELECTRICALS LIMITED.
ELECTRONICS DIVISION, BANGALORE

TITLE: CCTV SYSTEM-CAMERAS LAYOUT

No. OF SHEETS	01
SHEET No.	01
REV	01

BHEL DRG. No. BH-WBSEDCL-SANDALDIH-DG-013

A0 SIZE