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Technical specification
For
Design, Engineering, Supply, Installation and Commissioning of CCTV system for GIPCL 75MW, GSFC 10 MW and GACL 20 MW Solar PV power plants at Gujarat Solar Park on EPC basis

Revision details :R 01 **Clause 2.0 and Clause 3.e are revised on 18/09/2018.** Changes highlighted in Red color	Prepared	Approved	Date
	VCP/LNK	SA/CMH/VKY	30/08/2018

I. INTRODUCTION:

This technical specification provides BHEL's requirement for Design, Engineering, Supply, Installation and Commissioning of CCTV system for GIPCL 75MW, GSFC 10 MW and GACL 20 MW Solar photovoltaic (SPV) projects at Gujarat Solar Park, Charanka on EPC basis.

1. GENERAL INSTRUCTIONS:

a. Vendor is advised to visit site to familiarize 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 In case feasible deviations are proposed by the bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder.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 powerplant 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.
g. Bidder shall quote on EPC basis and through BOD provided the requirement for total plant shall be complied by Bidder for items like cable, Junction Box, OFC, accessories etc.

2. SCOPE:

The scope of this tender includes Design, engineering, supply, transport, store, install, cabling and commissioning of complete CCTV system at GIPCL 75MW, GSFC 10 MW and GACL 20 MW SPV power plants as per the technical specification. The vendor shall provide IP Based CCTV Camera for the Monitoring of Control Room, Inverter Rooms, Entry & Exit Gates, Switchyards complete in all respect including necessary Camera, Network Video Recorder (NVR), Network Switch, cables, Active & Passive Components, mounting structure, Software, minimum 32" LED monitor etc. Vendor has to design the CCTV system considering the locations, distance and relevant standards applicable. OFC and auxiliary power cable of CCTV system shall be laid in underground trenches through HDPE pipe as per standard practice. Excavation, Laying cables as per relevant standard and backfilling ,compactness of earth as per instruction of site incharge at site is in VENDOR scope.The tentative layout of the Solar PV power plants are attached as Annexure-1 (GSFC 10 MW), Annexure-2 (GIPCL 75 MW) and Annexure-3 (GACL 20 MW). Autocad drawing of CCTV layout will be sent to vendors on specific request through mail for purpose of cable length estimate.

3. 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.

II. Technical Specification:

a. Camera Specification (Outdoor Bullet Type):

1/3" CMOS HD sensor, Out Door Bullet H.264 Compression, 2 mega Pixels CMOS, 3DNR, The highest resolution can be up to 1920 × 1080 Low Lux, DWDR, Support Voice talk, 1CH Audio in/1CH Audio Out, Mobile P2P Viewing, Support Protocol: TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP and RTSP, Support ONVIF 2.0, Lens : 2.8-12mm Megapixel lens (4-9mm lens optional), IR Distance: 20-30m, POE (802.3af). Support ROI function, Built-in Micro SD/SDHC/SDXC card slot, Ingress Protection level: IP66, Video Bit Rate 32 Kbps –8 Mbps, Audio Compression G.711/G.722.1/G.726/MP2L2,Dual Stream, BLC, ROI STANDARD: ONVIF, PSIA, CGI, ISAPI, Operating Conditions -30°C to 60°C (-22°F to 140°F).

b. Camera Specification (Indoor Dome Type):

1/3" CMOS HD sensor, Indoor Dome fix Lens H.264 Compression, 1.3 mega Pixels CMOS, 3DNR, The highest resolution can be up to 1280×960, Shutter Speed: 1/3 s to 1/100,000s, Min. Illumination:0.01Lux @ (F1.2, AGC ON) ,0 Lux with IR 0.028 Lux @ (F2.0, AGC ON) ,0 Lux with IR, Video Bit Rate 32 Kbps – 8 Mbps, Support Protocol: TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP and RTSP, Support ONVIF 2.0, Lens : 3.6mm 1.3Mega Pixel Lens SD, 3DNR, D-WDR, Motion Detection, Privacy Mask, 24pcs LED, 20m IR distance, POE(802.3af), Support Dual stream, Impact protection:IK10, operating condition, Support ROI, BLC, Standard : ONVIF, PSIA, CGI, ISAPI, Image Settings: Rotate mode, Saturation, Brightness, Contrast adjustable by client software or web browser, H.264 Type: Baseline Profile / Main Profile.

c. Camera Specification (Outdoor PTZ Type):

HD PTZ, PoE type, 2 Megapixel, with illuminated IR range of 150 metres, IP-66 outdoor type with 360 degree view. Camera shall be suitable for operating temperature up to 60 deg Celsius ambient.

d. Technical Requirement:

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

e. Power supply:

- BHEL will supply one (1) Nos. of 230V, 1-ϕ AC, 50Hz of 500 VA capacity UPS power supply at locations of Control rooms (Vendor may indicate if additional load is required). Further distribution of power through 3cx1.5 sq.mm copper armoured cable to equipment inside Junction box/rack ,switch, etc ~~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/ rack and to camera shall also be in the scope of bidder.

f. GI 50mm, mounting poles 5m above ground with minimum IP-65 junction box for outdoor cameras

1. Outdoor Cameras to be installed in any particular location shall be mounted on rigid vibration proof CCTV Pole protected against corrosion. The height shall be 5m above ground level. Mounting locations shall be easily accessible for servicing purposes. They shall be fitted with climbing and relevant safety facility.
2. Local junction boxes for cameras shall be of weather-proof, of minimum protection Class IP-65. Junction Boxes shall be suitable for accommodating Network Equipment, LIU & Power Distribution Equipment.
3. 5-metres camera Pole with Required Foundation Bolt/Frame shall be supplied. Civil foundation works is in vendor's scope.
4. 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.

g. Min 32-inch LED industrial monitor

1. One LED colour monitor (min 32 inch diagonally) will be installed in Control room Building. Industrial grade monitor shall only be supplied.
2. 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).
3. 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.

h. Approved Vendor List:

i. CCTV Camera and Monitoring system: **Sony/ Honeywell/ Milestone** (Other makes are subject to approval by BHEL/ End User).

ii. Armoured FO Cable: **Finolex / D-Link / HFCL / Birla / R&M India / Aksh**

For all other items, whose make are not mentioned in technical specification, the offered make shall be reputed make. Before procurement Vendor shall take approval from BHEL/End User.

III. Bill of Material:

Table-1 Scope of Supply for GSFC 10 MW

Supply Scope	Qty	Unit	Quoted/Not Quoted
1) Outdoor Bullet Camera	2	No's	
2) Indoor Dome camera	3	No's	
3) Outdoor PTZ Camera	1	No's	
4) GI 50mm, Mounting poles 5m above ground with minimum IP-65 junction box	1	Lot	
5) Media converter, Industrial grade as per requirement	1	Lot	
6)Network Switch as per requirement (I/P supply 230 VAC)	1	Lot	
7) Server (Min 4 GB DDR3L 1600 MHz Intel core i5-6500, 7200 RPM SATA HDD) with 30-days storage capacity along with software and license for all cameras and clients .	1	No	
8) Min 32 -inch LED industrial monitor, Full HD	1	No	
9) OFC cable as per requirement.	1	Lot	
10) cat-6 cable as per requirement	1	Lot	
11) Power Cable for 230 VAC distribution as per requirement	1	Lot	
12) 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 as per requirement	1	Lot	
13) HDPE conduit with couplers and other accessories for OFC cable routing	1	Lot	
14) Any other supply items not covered above and required for completion of the CCTV system	1	Lot	
Mandatory Spares: Bullet Camera - 1 No Dome Camera – 1 No Network Switch -1 No (each type) Patch Card (cat-6 Cable) – 2 No's	1	Lot	(Type and Model no shall be same as main items offered)
I&C SCOPE			
Installation & commissioning of complete CCTV system	1	AU	

Table-2 Scope of Supply for GACL 20 MW

Supply Scope	Qty	Unit	Quoted/Not Quoted
1) Outdoor Bullet Camera	2	No's	
2) Indoor Dome camera	6	No's	
3) Outdoor PTZ Camera	1	No's	
4) GI 50mm, Mounting poles 5m above ground with minimum IP-65 junction box	1	Lot	
5) Media converter, Industrial grade as per requirement	1	Lot	
6)Network Switch as per requirement (I/P supply 230 VAC)	1	Lot	
7) Server (Min 4 GB DDR3L 1600 MHz Intel core i5-6500, 7200 RPM SATA HDD) with 30-days storage capacity along with software and license for all cameras and clients .	1	No	
8) Min 32 -inch LED industrial monitor, Full HD	1	No	
9) OFC cable as per requirement.	1	Lot	
10) cat-6 cable as per requirement	1	Lot	
11) Power Cable for 230 VAC distribution as per requirement	1	Lot	
12) 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 as per requirement	1	Lot	
13) HDPE conduit with couplers and other accessories for OFC cable routing	1	Lot	
14) Any other supply items not covered above andrequired for completion of the CCTV system	1	Lot	
Mandatory Spares: Bullet Camera - 1 No Dome Camera – 1 No Network Switch -1 No (each type) Patch Card (cat-6 Cable) – 2 No's	1	Lot	(Type and Model no shall be same as main items offered)
I&C SCOPE			
Installation & commissioning of complete CCTV system	1	AU	

Table-3 Scope of Supply for GIPCL 75 MW

Supply Scope	Qty	Unit	Quoted/ Not Quoted
1) Outdoor Bullet Camera	3	No's	
2) Indoor Dome camera	17	No's	
3) Outdoor PTZ Camera	1	No's	
4) GI 50mm, Mounting poles 5m above ground with minimum IP-65 junction box	1	Lot	
5) Media converter, Industrial grade as per requirement	1	Lot	
6)Network Switch as per requirement (I/P supply 230 VAC)	1	Lot	
7) Server (Min 4 GB DDR3L 1600 MHz Intel core i5-6500, 7200 RPM SATA HDD) with 30-days storage capacity along with software and license for all cameras and clients .	1	No	
8) Min 32 -inch LED industrial monitor, Full HD	1	No	
9) OFC cable as per requirement.	1	Lot	
10) cat-6 cable as per requirement	1	Lot	
11) Power Cable for 230 VAC distribution as per requirement	1	Lot	
12) 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 as per requirement	1	Lot	
13) HDPE conduit with couplers and other accessories for OFC cable routing	1	Lot	
14) Any other supply items not covered above and required for completion of the CCTV system	1	Lot	
Mandatory Spares: Bullet Camera - 1 No Dome Camera – 1 No PTZ Camera -1 No Media Converter 1 Lot Network Switch -1 No (each type) Patch Card (cat-6 Cable) – 4 No's LED Monitor -1 no Hard Disk for Server– 1 No's	1	Lot	(Type and Model no shall be same as main items offered)
I&C SCOPE			
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 on EPC basis. These additional items will be covered under item no 13 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 may 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 Main Control Room building required to meet the project requirements (for the CCTV Cameras mentioned and with 20% spare capacity for future).

6. I&C Prices shall be inclusive of travel expenses, lodging, transport and per man day charges. No extra charges will be paid. 8. 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.

7. 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. It shall be possible to view, record, search and replay simultaneously without affecting performance of the system.

8. 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 etc.

IV. Documents to be submitted along with offer without which offer is likely to be rejected.

SL. NO.	DOCUMENT TYPE
1	Data sheets / catalogs of all main items
2.	BOM
3.	Proposed System schematic diagram.
4.	Deviation sheet if any. Absence of deviation sheet will be considered as No-deviation to the specification.

V. Factory Acceptance Test (FAT):

Factory Acceptance Test procedure shall be prepared by vendor along with Quality Assurance Plan. The document shall be subject to BHEL/End User approval. The entire CCTV system items shall be made available at vendor's work for inspection (FAT) which will include complete integrated test for checking that the equipment offered is meeting the design standards and functional requirements mentioned in this specification. As a minimum, BOM verification, physical verification, integrated test shall be performed on true sample of items selected by BHEL shall be part of FAT. BHEL reserves right to check power ON functionality of entire active components of CCTV system BOM. QAP and FAT procedure shall be subject to BHEL/ End User approval.

One month prior to the FAT, Bidder shall submit a test procedure and QAP to BHEL for approval. BHEL/ End User representative may, at BHEL/ End User sole discretion, attend the FAT. In this event, Bidder shall ensure all tests are carried out in the presence of BHEL/ End User personnel. If BHEL/ End User declines to attend the FAT, Bidder shall carry out these tests and submit the results to BHEL for review.

Factory Acceptance Tests (FATs) result shall be documented and the test results shall be submitted to BHEL/ End User prior to clearance for dispatch.

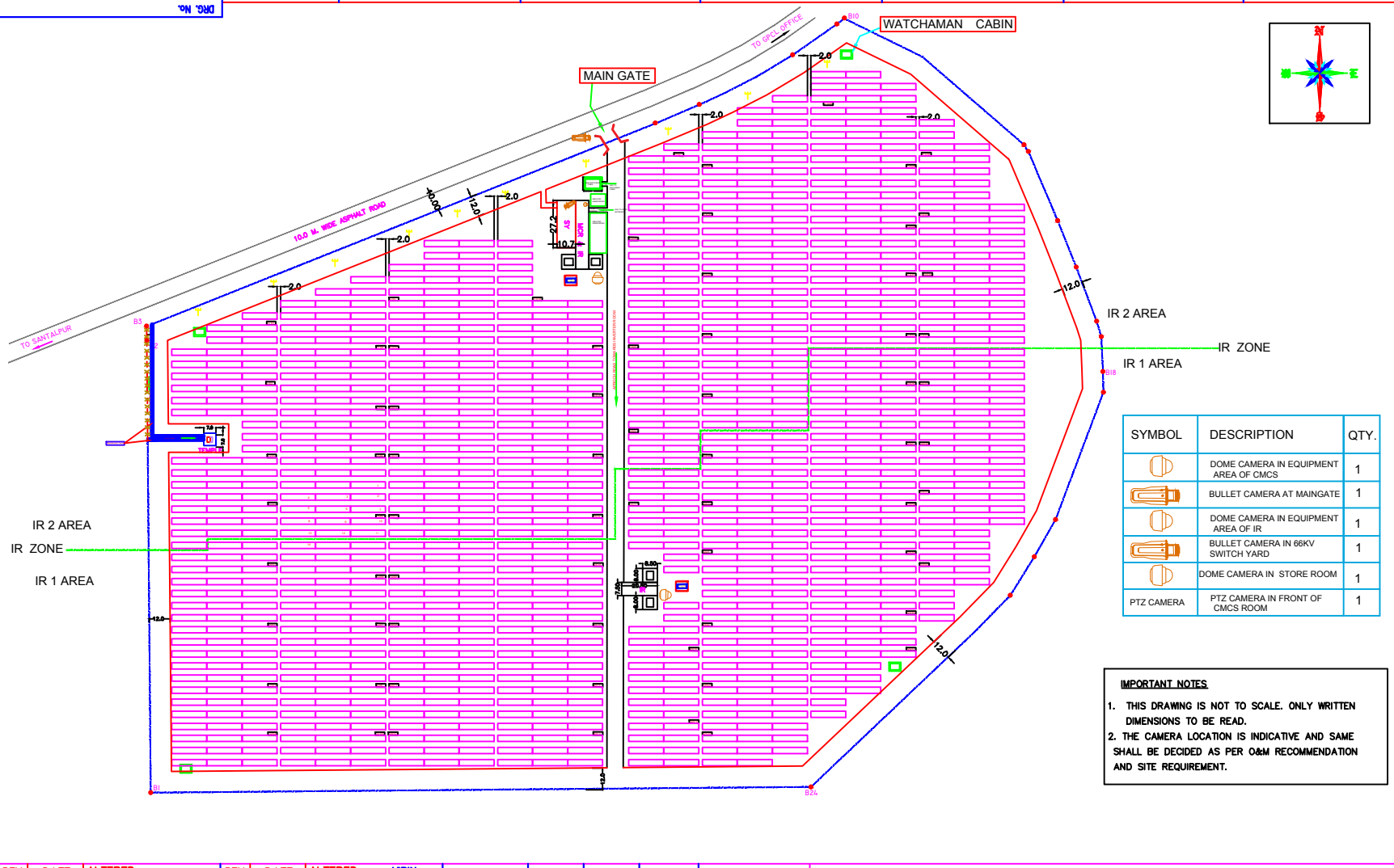
VI. COMMISSIONING

Vendor is responsible for delivering a fully functional equipment that meets all the requirements of the Specification and applicable standards. The Commissioning processes will demonstrate the above to BHEL/ End User, before handing over of the System. System Commissioning shall comprise of a number of different activities culminating in the acceptance of the operational System by BHEL/ End User. Bidder shall provide all necessary test equipment required to carry out the commissioning and acceptance testing.

VII. Warranty and Guarantee:

The equipment supplied shall be guaranteed for satisfactory operation for 24 months from the date of commissioning

ANNEXURE -1 PS/409/1230



SYMBOL	DESCRIPTION	QTY.
	DOME CAMERA IN EQUIPMENT AREA OF CMCS	1
	BULLET CAMERA AT MAINGATE	1
	DOME CAMERA IN EQUIPMENT AREA OF IR	1
	BULLET CAMERA IN 66KV SWITCH YARD	1
	DOME CAMERA IN STORE ROOM	1
PTZ CAMERA	PTZ CAMERA IN FRONT OF CMCS ROOM	1

IMPORTANT NOTES

1. THIS DRAWING IS NOT TO SCALE. ONLY WRITTEN DIMENSIONS TO BE READ.
2. THE CAMERA LOCATION IS INDICATIVE AND SAME SHALL BE DECIDED AS PER O&M RECOMMENDATION AND SITE REQUIREMENT.

REV.	DATE	ALTERED / CHECKED / APPROVED	REV.	DATE	ALTERED / CHECKED / APPROVED	VIPIN / GLNM / CMH
			01	30-08-2018		

IN LINE WITH GIPCL PROJECT,AS COMMENTED BY CUSTOMER/CONSULTANT PTZ CAMERA & DOME CAMERA IS ADDED

	NAME	SIGN	DATE
DRAWN	VIPIN		28-08-2018
CHECKED	GLNM		28-08-2018
APPROVED	CMH		28-08-2018

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DEPT.	CODE

BHARAT HEAVY ELECTRICALS LIMITED.
ELECTRONICS DIVISION, BANGALORE

TITLE: CCTV LAYOUT DETAILS FOR GSFC 10MW PLANT

No. OF SHEETS	01
SHEET No.	01
REV	01

BHEL DRG. No. BHEL-GSFC-ELEC-CCTV-41

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REF. DRG. No.
SIGN. & DATE
INVENTORY No.

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN mm

DRAWING NO. BHEL-GIPCL-ELEC-CCTV-043

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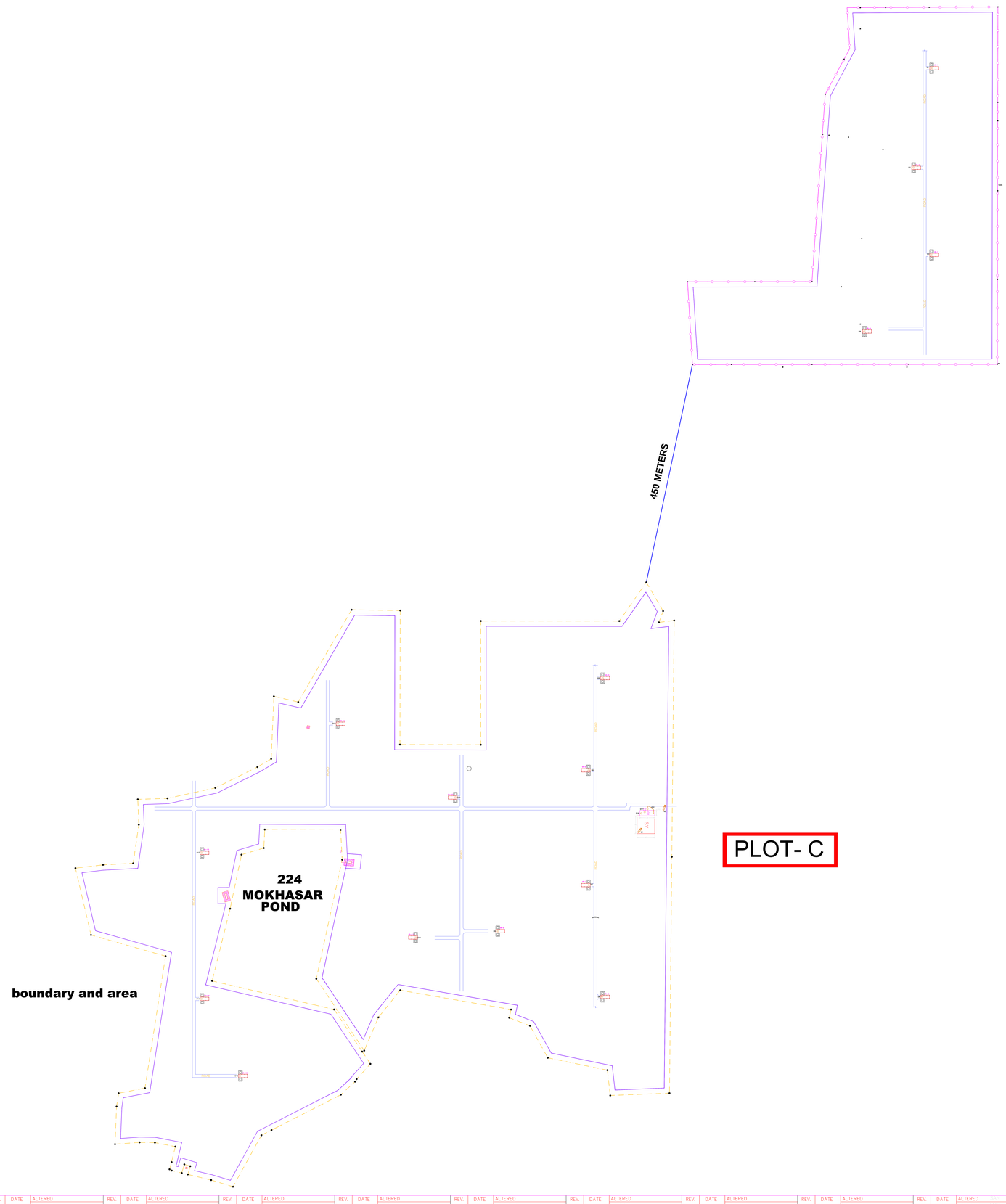

SYMBOL	DESCRIPTION
	DOME CAMERA
	BULLET CAMERA
	PTZ CAMERA

SL. NO.	CAMERA TYPE	PLOT C	PLOT B2
1	DOME CAMERA AT CONTROL ROOM	02	-
2	DOME CAMERA AT INVERTER ROOM	11	04
3	BULLET CAMERA AT SY	01	-
4	BULLET CAMERA AT MAIN GATE	01	01
5	HD PTZ CAMERA ON TOP OF CONTROL ROOM	01	-
	TOTAL	16	05

IMPORTANT NOTES

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3. THE CAMERA LOCATION IS INDICATIVE AND SAME SHALL BE DECIDED AS PER O&M RECOMMENDATION AND SITE REQUIREMENT.

ALL THE DIMENSIONS ARE IN METERS

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED			CHECKED		
		APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED			APPROVED		
																														01	31/08/18	CHECKED LNK		
																																APPROVED PR		
																																PTZ CAMERA INCLUDED IN THE DRAWING. CHANGED DOME CAMERA POSITION.		
																														00		FIRST ISSUE		

	NAME	SIGN	DATE
DRAWN	SAN		280718
CHECKED	LNK		280718
APPROVED	PR		280718

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DEPT.	CODE
SC&PV	439

PROJECT : 75MW (AC) SOLAR POWER PROJECT
CUSTOMER : GIPCL

BHARAT HEAVY ELECTRICALS LIMITED.
ELECTRONICS DIVISION, BANGALORE

TITLE: CCTV LAYOUT & DETAILS

No. OF SHEETS	01
SHEET No.	01
REV	01

BHEL DRG. No. BHEL-GIPCL-ELEC-CCTV-043

A0 SIZE

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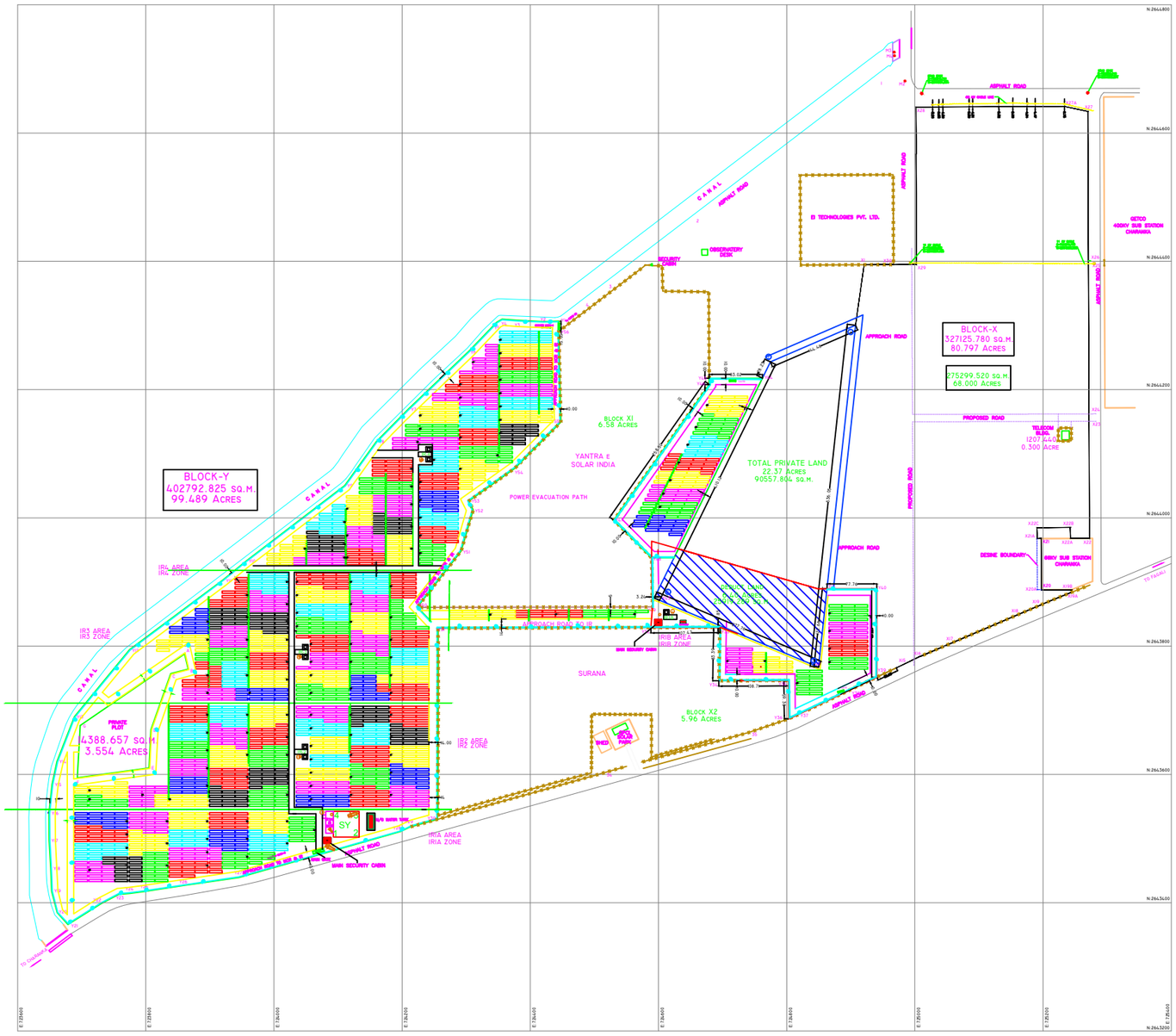
DRG. No. BHEL-GACL-ELEC-CCTV-011

Annexure-3
PS/439/1230



SYMBOL	DESCRIPTION	QTY.
	DOME CAMERA IN EQUIPMENT AREA OF IR1A,IR1B,IR2,IR3,IR4	5
	BULLET CAMERA AT MAINGATE	1
	DOME CAMERA INSIDE STORE ROOM	1
	BULLET CAMERA IN SWITCH YARD & TOP OF CONTROL ROOM	2

IMPORTANT NOTES

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2. THE CAMERA LOCATION IS INDICATIVE AND SAME SHALL BE DECIDED AS PER O&M RECOMMENDATION AND SITE REQUIREMENT.

NOTE: ESE TYPE LA OF RADIUS OF PROTECTION 107M

PROJECT : 20MW(AC) SOLAR POWER PROJECT
CUSTOMER : GACL

REV.	DATE	ALTERED / CHECKED / APPROVED	REV.	DATE	ALTERED / CHECKED / APPROVED

	NAME	SIGN	DATE
DRAWN	VCP		03-09-18
CHECKED	PM		03-09-18
APPROVED	VKY		03-09-18

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ELECTRONICS DIVISION, BANGALORE

TITLE: CCTV LAYOUT AND DETAILS

No. OF SHEETS	01
SHEET No.	01
REV	00

BHEL-GACL-ELEC-CCTV-011

BHEL DRG. No.

REF. DRG. No.
SIGN. & DATE
INVENTORY No.