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Subject- Corrigendum-1 to NIT No.27931 **DATE 24.06.2016**

Project		PGCIL BANASKANTHA AND SANKHARI
Equipment / Item		CCTV/VMS
Enquiry No. / Date		376E057 Date: 08-06-2016

With reference to the above tenders, kindly note the following;

Clarification along with following drg and documents
1) TB-384-510-002
2) TB-384-510-003
3) TB-384-510-004
4) TB-384-510-007
5) TB-384-510-008
6) TB-385-510-022
7) TB-385-510-023
8) Section-1 of TB-384-510-115

All other terms and conditions remain same.

24/06/16
Bhagchand Kumawat
Mgr (TBMM)

Sl. No.	PERTICULARS	CLARIFICATION
1	Scope under Banaskantha (Main) and Banaskantha Extension area	Please refer PLAN Layout TB-384-510-002 for Banaskantha Main Project scope TB-385-510-022 for Banaskantha Extension Project scope
1	If the Banaskantha (Main) and Banaskantha extension project are separately located	Both are located at single project premise.
2	Distance between storage location & erection sites.	Storage is situated within project premise.
3	Storage facility	Open & Closed store area shall be provided by BHEL. Material handling is under scope of contractor.
4	Estimated lengths of cable	Cable trench layout is attached for reference TB-384-510-007 - for 765kV Yard area (Extension area also maked in dotted) TB-384-510-008 - for 400kV Yard area
5	Scope of Future area	NIL
6	Where is the mandatory spares to be handed over to customer?	Spares are to be handed over to BHEL/Customer at their store within project premise.
7	Height of the equipments / system	Please refer section Elevation drawings, standard hight of 765kV equipmets is 14 meter and 400kV equipment is 8 meter. TB-384-510-003 for 765kV Yard area TB-384-510-004 for 400kV Yard area TB-385-510-023 for 765kV Banaskantha Extension Yard area
8	Location of Store area, CRB Gate, Main Entrance Gate, Switchrad Gate e.t.c	Marked in layout drawing TB-384-510-002
9	Location of Switchyard Panel Room (SPR)	Switchyard Panel Rooms are marked S.P.R in cable trench drawings. TB-384-510-007 - for 765kV Yard TB-384-510-008 - for 400kV Yard Total number of SPR are 6 numbers in main package. (Distribution 3 numbers in 400kV Yard, 3 numbers in 765kV Yard) Additional 2 number SPR are in extension project at identical location.
10	Page 4 of Section-1 missing	Revised Section-1 of TB-384-316-115 attached.
11	List of enclosed drawings / document	1) TB-384-510-002 2) TB-384-510-003 3) TB-384-510-004 4) TB-384-510-007 5) TB-384-510-008 6) TB-385-510-022 7) TB-385-510-023 8) Section-1 of TB-384-510-115

SECTION - 1

1.1 SCOPE

This technical specification covers the requirements of design, packing at works, supply, unloading at site ,storage at site erection/installation, testing and commissioning the complete visual monitoring system including cameras, digital video recorder system, mounting arrangement for cameras, cables, LAN switches, UPS and any other items/accessories for the 765kV/400kV Banaskantha S/s. It shall also be bidder's responsibility to provide all necessary licenses to Owner i.e. Powergrid to run the system successfully.

The VMS system is required for the following Projects

1. **Customer: Power Grid Corporation of India Ltd.**
   Project: 765kV/400kV Banaskantha Substation

2. **Customer: Power Grid Corporation of India Ltd.**
   Project: 765kV Banaskantha S/S Extension under "765/400/220kV Bhuj Pool (New) S/S and Extension of 765kV Banaskantha S/S Project "

The scope also covers

Bidder shall submit the detailed BOQ and drawings indicating qty. of each items required for Visual monitoring system in the tender stage, the drawings and BOQ shall be submitted to BHEL/Powergrid for approval. It shall be bidder's responsibility to get the approval in the drawing/BOQ from POWERGRID. Bidder shall also be required to visit BHEL/POWERGRID office for technical discussion.

Visual monitoring system (VMS) is required for effective watch and ward of 765kV/400kV Banaskantha Substation premises covering the areas of complete switchyard, control room cum administrative building, fire fighting pump house, stores and main gate.

System with colour IP cameras for VMS surveillance would be located at various locations including indoor areas and outdoor switchyard and as per the direction of engineer in charge. The VMS data partly/completely shall be recorded (minimum for 15 days) and stored on network video recorder.

It will be bidder's responsibility to assess number of cameras and their locations shall be decided in such a way that any location covered in the area can be scanned. The cameras shall be located in such a way to monitor at least the following

1. The operation of each and every isolator pole of the complete yard in case of AIS S/s.
2. All the transformer and reactors .All the entrance doors of control room building and fire fighting pump house and switchyard panel room.
3. All the gates of switchyard.
4. Main entrance gate.
5. All other Major equipments (such as CB, CT,CVT,SA etc.)

The cameras shall be mounted on structures, buildings or any other mounting arrangement to be provided by the contractor. Bidder is advised to refer Layout and Sectional elevation drawing enclosed with this specification, and if bidder feels that at any one or more locations it is not possible to cover the requisite area by placing cameras on existing structure or building, in that case bidder can suggest alternative mounting arrangement and such alternative arrangement should be supplied by bidder without any extra cost implication to BHEL. Further alternative mounting arrangement should be proposed to BHEL/POWERGRID for acceptance.

The scope of supplies shall be as per commercial terms and conditions enclosed separately with

The scope of supplies shall be as per commercial terms and conditions enclosed separately with the enquiry.

1.2 SPECIFIC TECHNICAL REQUIREMENTS

The video monitoring system shall be an integral system with IP network centric functional and management architecture aimed at providing high speed manual/automatic operation for best performance.
The system should facilitate viewing of live and recorded images and controlling of all cameras by the authorized users.
The system shall use video signals from various types of indoor/outdoor CCD color cameras installed at different locations, process them for viewing on workstations/monitors in the control room and simultaneously record all the cameras after compression using H 264/MPEG 4 or better standard. Mouse/Joystic-keyboard controllers shall be used for pan, tilt, zoom and other functions of desired cameras.
The system shall provide sufficient storage of all the cameras recordings for a period of 15 days or more @ 25FPS, at 4 CIF or better quality using necessary compression techniques for all cameras. It shall be ensured that data once recorded shall not be altered by any means.The recording resolution and frame rate for each camera shall be user programmable.
The surveillance VMS system shall operate on 230V, 50Hz single phase Power supply. System shall have back up UPS Power supply meeting the power supply need of all the cameras in the stations including those which are installed at gate for a period of 2 hrs. The bidder shall submit the sizing calculation for the UPS considering the total load requirement of video monitoring system.

System Requirements:

1. System must provide built in facility of watermarking or digital certificate to ensure tamperproof recording.
2. All cameras may be connected through a suitable LAN which shall be able to perform In 765kV class substation environment without fail.
3. All cameras recording shall have camera ID, location/area of recording & data /time shall be programmable by the system administrator with user ID & Password.
4. Facility of camera recording in real time mode (25 FPS)/15/12.5/10 or lower FPS as well as in any desired combination must be available in the system.
5. Facility of camera recording in HD (1280X720P), D1, 4CIF, CIF, VGA as well as in any combination i.e. any camera can be recorded in any quality.
6. System to have facility of 100% additional camera installation beyond the originally planned capacity.
7. In order to optimize the memory, while recording, video shall be compressed using H 264/MPEG-4 or better standard and streamed over the IP network.
8. System shall have triplex i.e. it should provide facility of viewing, recording & replay simultaneously.
9. The offered system shall have facility to export the desired portion of clipping (from a specific date/time to another specific date/time) on CD or DVD. Viewing of this recording shall be possible on standard PC using standard software like windows media player etc.
10. System shall have provision of WAN connectivity for remote monitoring.
11. The equipment should generally conform to electro-magnetic compatibility requirements for outdoor equipment in EHV switchyards. The major EMC required for cameras and other equipment shall be as under:

    1. Electrical Fast transient (Level 4) ---As per IEC 61000-4-4
    2. Damped Oscillatory (1MHz and 100kHz) (Level3)-- As per IEC 61000-4-12
    3. AC Voltage dips & Interruption/Vibration (Level 4)—As per IEC 61000-4-12
    4. Electrostatic discharge (Level 4) ---As per IEC 61000-4-2
    5. Power frequency Magnetic field (Level 4) –As per IEC 61000-4-8
    6. Ripple on DC Power supply (Level 4) ---As per IEC 61000-4-17

Type test reports to establish compliance with the above requirement shall be submitted during detailed engineering.

1.3 Video Surveillance Application software

a) Digital video surveillance control software should be capable to display and manage the entire surveillance system. It should be capable of supporting variety of devices such as cameras, video encoder, servers, NAS boxes/Raid backup devices etc.
b) The software should have inbuilt facility to store configuration of encoders and cameras.
c) The software should support flexible 1/2/4/8/16/32 windows split screen display mode and scroll mode on the PC monitor.
d) The software should be able to control all cameras i.e. PTZ control, Iris control, auto/manual focus, and color balance of cameras, selection of presets, Video tour selection etc.
e) The software should have user access authority configurable on per device or per device group basis. The system shall provide user activity log with user ID, time stamp, action performed etc.
f) The user should be on a hierarchical basis as assigned by the administrator. The higher priority person can take control of cameras, which are already being controlled by a lower priority user.
g) It should have recording modes viz. continuous , manual or programmed modes on date , time and camera-wise . All modes should be disabled and enabled using scheduled configuration. It should also be possible to search and replay the recorded images on date, time and camera wise. It should provide onscreen controls for remote operation of PTZ cameras. It should have the facility for scheduled recording. Different recording speeds (fps) and resolution for each recording mode for each camera should be possible.
h) The software for clients should also be working on a browser based system for remote users. This will allow any authorized user to display the video of any desired camera on the monitor with full PTZ and associated controls.
i) Retrieval: The VMS application should allow retrieval of data instantaneously or any date/time interval chosen through search functionality of the application software. In case data is older than 15 days and available , the retrieval should be possible. The system should also allow for backup of specific data on any drives like DVD's or any other device in a format which can be replayed through a standard PC based software. Log of any such activity should be maintained by the system.
j) VMS shall provide the full functionality reporting tool which can provide reports for user login/logoff, camera accessibility report, server health check reports etc.

1.4 Network Video Recorder

The Network video recorder shall also include at least server (Min 3GHz, 4 GB RAM, 3000GB HDD(min) , RAID 5, with suitable configuration along with colored TFT 22" High resolution monitor, and Internal DVD writer, Windows XP/Vista/7 Prof. or VMS compatible operating system latest version with hardware like graphic cards, licensed Anti virus etc.

Further the digital video recorder shall conform to the following requirements:

1	Server specification	Intel Quad core (or better) 3 Ghz (min), 8MB cache, 4 GB memory with suitable NVIDIA graphics card, 3TB HDD , Raid 5
2	Recording and Display Frame Rate	Real time 25 frames per second per channel, manual select
3	Recording Resolution	(PAL) 1280x720, 704(H)x586(V). It shall be possible to select lower resolution.
4	Compression Method	H,264/MPEG-4 or better and latest
5	Video Motion detection capable	Standard and built in (selectable in menu)
6	Monitoring Options	Split screen 1,2,4,8,16,32 or more cameras
7	Playback options	Search, still image capture
8	Alarm/Event recording Capable	To be provided with built in external alarm input/output ports minimum (8 in , 2 Out)
9	Network Operation Capable	To be provided by using WAN or LAN router
10	Remote internal viewing capable	Using WAN or LAN router
11	HDD storage consumption	1GB per hour/channel variable based on frame speed and resolution settings, as well as compression
12	Operation	Triplex operation(simultaneous recording, playback, network operation)
13	Number of video channel	32
14	Audio Recording capable	32
15	Input storage	230V AC or equivalent with UPS as a backup for 30 minutes

1.5 VMS Cameras:

1. The color IP camera for substation shall have PAN, TILT and ZOOM facilities so that it can be focused to the required location from the remote station through a controller. Whereas wireless IP cameras with PTZ controls are required for installation at gates of the Substation premises as per the direction of Engineer-In – Charge.

2. The IP camera at the main gate can be fixed or PTZ based and shall be used for monitoring entry and exit.

3. It should have sufficient range for viewing all the poles of isolators and other equipments with high degree of clarity.

4. The VMS cameras shall be suitable for wall mounting, ceiling mounting and switchyard structure mounting.

5. It shall be possible to define at 128 selectable preset locations so that the camera gets automatically focussed on selection of the location for viewing a predefined location.

6. The cameras should be able to detect motion in day & night environment having light intensity of Color: 0.5 Lux, B & W : .05lux

7. Housing of cameras meant for indoor use shall be of IP 42 or better rating

whereas outdoor camera housing shall be of IP 66 or better rating. Housing shall be robust and not have the effect of electromagnetic induction in 765kV/400kV switchyard.

8. All camera recordings shall have camera ID & location/area of recording & date/time shall be programmable by the system administrator with user ID & Password.

9. Facility of camera, recording in real time mode (25FPS)/15/12.5/10 or lower FPS as well as in any desired combination must be available in the system.

1.6 Outdoor IP Fixed Megapixel Camera Specifications (For Main Gate)

1.	Image sensor	2Megapixel Progressive 1/3" CMOS/CCD sensor, Minimum Illumination 0.1 Lux
2.	Min Luminous ring)	0.5Lux (Color) 0.05 Lux (Back)
3.	Camera Enclosure type	IP 66 Grade
4.	Iris/Focus	Auto/Manual
5.	Video Compression	Dual stream H,264 and MPEG 4 user selectable
6.	Support dual-stream	Primary/secondary stream, H 264/MPEG 4 optional
7.	Video definition	Primary stream: 1600x1200,1200x960,1280x720
8.	Video parameters	Brightness, hue, contrast ,saturation and image quality
9.	Video frame rate	PAL: 1-25 frames/second NTSC: 1-30 frames/second
10.	Video compression BR	32Kbit/S-6Mbit/S
11.	Video Output	One channel composite Streaming
12.	Supported Protocols	TCP,UDP,IP,HTTP,FTP,SMTP,DHCP ,DNS,ARP,ICMP,POP3,NTP,IPsec,UpnP,RTP,RTCP
13.	Operating Temperature	-5~+50^{0}C
14.	Operating humidity	10~90%

1.7 Outdoor IP66 PTZ HD Camera specifications (For Switchyards)

1.	Image Sensor	1/3 type solid state progressive scan CCD,WDR (high definition)
2.	Security	Multiple user access with password protection
3.	Effective Pixels	(PAL): Main stream: 1280x720 Sub stream: 640x360, 320x280 selectable
4.	Compression	Dual Stream H.264 and MPEG 4 user selectable
5.	Signal system	50Hz
6.	S/N (Signal to Noise)	Better than 50 dB
7.	Electronic Shutter	1/60~1/10,000 sec. automatic or better
8.	Scanning system	Progressive/Interlace
9.	Low Light Sensitivity (Lux)	Color: 0.5 Lux, B & W :0.02 Lux

10.	Lens	Minimum 10X (Min.)optical in high definition (The system shall be able to zoom the images on the monitor without any distortion to the maximum level of optical zoom)
11.	Lens size	Minimum 4.1~73.8mm
12.	Lens Aperture	F1.6(wide)~F2.8(tele), f=4.1~41.0mm,10X zoom Video Auto Focus Angle of view Horizontal: 52^0 (wide) 2.8^0(tele)
13.	PTZ data Transfer Baud/Bit Rates supported	Selectable 2400bps/4800bps/9600 bps
14.	Panning Range	Complete 360degrees (horizontal)
15.	Pan Speed	Adjustable, 0.1 degrees/Second ~250 degrees/second
16.	Tilting Range	Minimum 180^0 Tilt rotation
17.	Tilt speed	Adjustable, 0.1 degrees/sec~150degrees/sec
18.	In built storage	Camera should have inbuilt storage TF or SD format for recording and storing pictures
19.	IP class	IP 66 Standard
20.	Working temperature	-0^0C~$+50^0$C
21.	Working Humidity	10~90%

1.8 PTZ- Keyboards

The features of PTZ shall include:

- Fully functional dynamic keyboard/joystick controllers
- Controls all pan, tilt, zoom, Iris, preset functions
- Control up to 255 units from a single keyboard
- Many preset options and advanced tour programming
- Compatible with all connected cameras

1.	Key Application	Wired keyboard control operation of PTZ functions for weatherproof dome cameras
2.	Pan/Tilt/Zoom Protocol Languages supported	Selectable
3.	PTZ data transfer Baud Rates supported	Selectable 1200bps/2400bps/4800bps/9600bps
4.	Additional Features	Dynamic joystick for smooth camera movements, preset location option for quick access to frequently monitored areas.

1.9 Test Requirement

The vendor shall submit a FAT (factory acceptance test) & SAT (site acceptance test) plan complying the specification for POWERGRID / BHEL approval that will be used during inspection at works & and site respectively.

i) Complete operating and maintenance manuals and training of O&M personnel.
ii) System commissioning and acceptance tests as specified in site acceptance test (SAT) plan.

1.10 Documents to be provided by bidder

- Detailed BOQ to meet the requirement of specification with make, model & quantity of each item
- Technical datasheet/Catalogues/brochures of the item
- Test certificates as per relevant standards
- Reference list of the Projects where similar equipment for similar application is being used for at least 2 years.

1.11 BILL OF QUANTITY:

The VMS system is required for the following Projects

1. **Project: 765kV/400kV Banaskantha Substation (main project)**

Sno	Description	UOM	Qty
1	VMS system with all accessories	Lot	1
2	Erection ,Testing and commissioning of the complete visual monitoring system.	Lot	1
3	Training (1 day training at Site)	Lot	1

2. **Project: 765kV Banaskantha S/S Extension Project under "765/400/220kV Bhuj Pool (New) S/S & Extension of 765kV Banaskantha S/S Project"**

Sno	Description	UOM	Qty
1	Color IP Camera, with PAN,TILT and ZOOM Facilities	Nos	4
2	All items, accessories ,line interface units,Junction Boxes ,Cables ,Fiber Optic Cables, Hardware and Software etc. as applicable	Lot	1
3	ETC & Augmentation of the cameras of Banaskantha extension project with the VMS System of 765kV Banaskantha main Project.	Lot	1

Note :

The scope of the bidder shall include providing all items, accessories, line interface units, Junction Boxes, Cables, Fiber Optic Cables, Hardware and Software etc. as applicable to the product design, to meet the functional requirements.

product design, to meet the functional requirements.

Training at Site shall include familiarization of the Powergrid personnel with operation, maintenance and troubleshooting of the VMS System.

Bidder shall provide break-up of LOT quantity in the bid.

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