PART 1 - GENERAL

1.1 WORK OF THIS SECTION

A. This section of the specifications details the components to be provided by the BMCS subcontractor relating to the following:
1. Management Level LAN.
2. Field Level LAN.
3. Network Data Servers (NDS).
4. Operator Interface Workstations (OIW).
5. Remote Operator Workstations (ROW).
6. Hand Held Devices (HHD).
7. Printers.
8. BMCS Operator Workstations and Equipment Locations.

1.2 COMPUTER ANTI VIRUS

A. Provide anti virus software for every computer. Anti virus software shall be provided with free virus definition updates for the duration of the warranty. Anti virus software should automatically scan the computer bios and all files opened, created, copied, and/or received for viruses. Include directions for updating virus definition files upon expiration of warranty within the record documentation.

PART 2 - PRODUCTS

2.1 BMCS MANAGEMENT LEVEL LOCAL AREA NETWORK

A. Provide a management level LAN to provide communication of all management level LAN nodes including:
1. CCP.
2. OIW.
3. NDS.
4. ROW.
5. WAP.

B. The management level LAN shall meet, at minimum, the following requirements:
1. Ethernet TCP/IP network.
2. Certified for 1,000 Mbps data transfer rate.
3. Connections available at each OIW, CCP, and DCP to allow for the ROW to connect to the network.
4. Cabling shall be per the BMCS General Requirements of these specifications.
5. Configured such that when configured with the FLAN, the data transfer rate and data throughput are as required to meet the specified input monitoring, output control and alarm annunciation requirements specified.

C. The failure of any node on the LAN shall in no way affect the operation of the BMCS except to inhibit monitoring and control functions at the OIW for that node or any devices on a sub LAN supervised by the failed node.

D. The failure of any node shall not inhibit the communication between remaining nodes.

E. Provide, at minimum, one Network Switch, per level from Level 1 to Level 62 to allow connectivity of all BMCS LAN components. Network switches shall meet, at minimum, the following requirements:
1. Minimum 4 ports of 10/100/1000 Base T connections.
2. Minimum 2 ports SFP connections.
3. Integral power supplies.
4. Cabling and necessary connection plates to complete connection to all workstations.
5. Dedicated direct port to port connectivity.

F.   Provide Wireless Access Point (WAP) within each mechanical room for levels 2-61, within the level 2 central cooling plant, within the level 2 boiler plant, within the level 62 condenser pump room, and within the level 1 mechanical room. WAP shall meet, at minimum, the following requirements:
1.   10/100/1000 Base T uplink connections.
2.   5 internal antennas with capacity for 3 external antennas.
3.   Supports 8002.11 a/b/g/n.
4.   Supports WPA/WPA2 encryption.
5.   WAP shall be Cisco WAP551 or approved equal.

G   The management level LAN as initially configured shall have the capacity to add over 400 percent expansion of nodes with the addition of switch connection devices and LAN cabling.

H.   The Internet high-speed connection shall be a secure connection to the web. Provide a firewall to ensure that penetration to the web interface precludes access to the BMCS. The Owner shall provide connection and services contracted with the ISP or Owner's LAN. Provide a firewall to secure the MLAN from the internet. Configure the firewall to allow the following:
1.   Virtual Private Network connections for authorized Security Personnel. Provide licensing for 10 concurrent VPN connections.
2.   Outbound web site access to authorized web sites only. Initially configure access to the following web sites:
a.   Microsoft Windows Update web sites.
b.   Antivirus update web sites.
3.   Inbound and outbound TCP/IP calls to the BMCS.
4.   Internal DHCP server.
5.   The IFA shall be Cisco ASSA 5505 or approved equal.

I.   The internet connection should connect to the BMCS at a single point only. Provide the capability for the Owner to disable this feature via software and to physically disconnect the internet connection from the BMCS. Label and identify this location on the documentation and in the field.

2.2   BMCS FIELD LEVEL LOCAL AREA NETWORK

A.   Provide multiple field level LAN to provide communication of all field level LAN nodes including:
1.   DCP.
2.   UC.
3.   Software interfaces to controllers provided by others that are compatible with the field level LAN.

B.   The field level LAN shall meet, at minimum, the following requirements:
1.   BACnet MS/TP.
2.   Configured such that when configured with the MLAN, the data transfer rate and data throughput are as required to meet the specified input monitoring, output control and alarm annunciation requirements specified.
3.   Cabling shall be per the BMCS General Requirements section of these specifications.

C.   The failure of any node on the field level LAN shall in no way affect the operation of the BMCS except to inhibit monitoring and control functions at the OIW for that node or any devices served by the failed node.

D.   The failure of any node shall not inhibit the communication between remaining nodes.

E.   Each field level LAN as initially configured for the base building shall not exceed two floors and shall have the capacity to add over 50 percent expansion of UC nodes over the manufacturers rated node capacity.

F.   Use of protocol repeaters shall not be permitted.   Provide additional CCP as required.

2.3   NETWORK DATA SERVER (NDS)

A.   Provide one NDS at the Central Plant Level Engineering Control Room and one NDS at the Penthouse Level Mechanical Room. The network switches serving each NDS shall be directly

interconnected via fiber optic cabling.

B.   The NDS shall, at minimum, provide the following services:
1.   The storage, analysis and retrieval of data and information in addition to that provided at the OIW, CCP and DCP.
2.   The storage of copies of OIW, CCP and DCP software, including schedules and databases. The storage of digital copies of the record documentation. The NDS shall maintain copies of all CCP and DCP software. The NDS shall download copies to the OIW, CCP and DCP upon failure and loss of data.
3.   The supervision of connected operator terminals and other peripheral devices.

C.   The Central Plant Level NDS shall be the primary NDS and the Penthouse Level NDS shall be the redundant backup. The NDS shall be configured such that the current database, graphics, etc. are available at the backup NDS immediately upon detection of primary NDS failure and switchover to backup NDS.

D.   Provide a single hardware fault tolerant NDS at each identified location, with clustering software to provide failover between the NDS locations. Each NDS shall be single hardware fault tolerant system and shall have redundancy for each hardware component.   Provide complete assembly, testing and 72-hour burn in, with complete diagnostic report detailing burn in procedures and results. All hardware modules should be hot-swappable including hard disk drives, and CPU/IO CRU. There shall be no application interruption during the physical replacement of any of the listed hardware modules. The clustering software should provide automatic failover and data mirroring between both NDS locations in the event of disaster or complete NDS failure. The NDS shall meet, at minimum, the following requirements:
1.   Dual Processor Intel Xeon Dual-Core compatible Motherboard with a minimum of 2 PCI-x slots   Flash BIOS support.
2.   Dual Intel Xeon Dual-Core Processors minimum speed of 2.0 GHz. with cooling fans
3.   Rack case with minimum of 3 hot-swappable 3.5"" drive bays, 500 watt or greater capacity UL rated redundant hot swap power supplies and 2 Internal cooling fans.
4.   2 Gigabytes of installed DDR2 667 MHZ memory with four spare slots.
5.   Internal hardware based Raid controllers capable of Raid 1 with the ability to set the raid configuration individually for the operating system drives and data storage drives.
6.   3 x 146.5GB SAS Hard drives. Configure two drives in a Raid 1 configuration for the operating system and the application software. Configure the remaining drive in a Raid 1 configuration for the application data.
7.   2 Serial (16550 UART) and 3 USB ports.
8.   24x Slimline CD-RW/DVD Combo Drive
9.   Auto sensing full duplex PCI 10/100/1000 Ethernet adapter with bus mastering capabilities.
10.   Mouse and keyboard utilizing the USB style connectors.
11.   32 Megabyte Integrated video adapter.
12.   Latest Microsoft Windows Server version that has been tested and approved by the BMCS software manufacturer as being compatible with their BMCS software. The Microsoft Windows Server software shall be the computer and network operating system. Provide the server software with all publicly released service packs and service releases that have been tested and approved by the BMCS manufacturer. The server software shall be provided with a minimum of 5 user license on CD-ROM or approved equal.
13.   1000 watt UPS unit.
14.   NDS shall be NEC Fault Tolerant Servers or approved equal.

E.   Provide a Video Display Unit (VDU) meeting, at minimum, the following requirements:
1.   Flat panel LCD display with screen diagonal measurement of 20 inches.
2.   Resolution of 1920 x 1200 pixels.
3.   Capable of displaying both schematic and alphanumeric data at the same time.
4.   16 million discrete colors.
5.   Manufactured by NEC, Viewsonic, Sony, or approved equal.

2.4   **OPERATOR INTERFACE WORKSTATION (OIW)**

A.   The Operator Interface Workstations will comprise a Personal Computer (PC) together with operator terminals. The PC will be a fully integrated node on the MLAN and shall provide the

operator with a "window" into the entire network. The monitoring and control functions of the BMCS shall be totally independent of the PC at the OIW such that if the PC is not operational there shall be no impact on the BMCS except for the reduced operator interface capability at that location.

B.   Provide OIW at the following location:
1.   Two OIW, located within the Central Plant Level Engineering Control Room.

C.   Provide OIW meeting, at minimum, the following requirements:
1.   Intel motherboard with single Intel Xeon Quad Core processor minimum speed of 2.66 GHz.
2.   4 GB of memory, expandable to 16 GB of memory.
3.   Two 500 Gigabyte SATA hard drive.
4.   Tower style case.
5.   2 serial and 1 parallel ports.
6.   6 Rear USB ports, and 2 Front USB ports
7.   16xDVD+/-RW.
8.   Auto sensing full duplex 10/100/1000 Ethernet network interface card (NIC).
9.   USB style connectors for keyboard and mouse.
10.   2 GB video card with quad DVI outputs.
11.   All necessary mounting hardware and cables for all components.
12.   Integral power supplies which shall be suitably rated for the service.
13.   Real time software or hardware clock.
14.   800 watt UPS unit.
15.   Latest compatible Microsoft Windows workstation version that has been tested and approved by the BMCS software manufacturer as being compatible with their BMCS software. The Microsoft Windows workstation software shall be the computer operating system.

D.   Provide two Video Display Unit (VDU) per OIW meeting, at minimum, the following requirements:
1.   Flat panel LCD display with screen diagonal measurement of 26 inches.
2.   Resolution of 1920 by 1200 pixels.
3.   Capable of displaying both schematic and alphanumeric data at the same time.
4.   16 million discrete colors.
5.   Manufactured by NEC, Viewsonic, Sony, or approved equal.

2.5   REMOTE OPERATOR'S WORKSTATION (ROW)

A.   The ROW shall be a portable PC with integral display, keyboard, and drives.

B.   A communications connector shall be located at all OIW, CCP and DCP for connection of the ROW to provide the operator with a "window" into the entire network.

C.   Provide four ROW.

D.   The monitoring and control functions of the BMCS shall be totally independent of the ROW such that if the ROW is not operational there shall be no impact on the BMCS except for the reduced operator interface capability at the ROW. When connected to an OIW, CCP, or DCP, the ROW shall be able to undertake all of the control and monitoring functions that can be performed at the OIW.

E.   These devices shall not be used by the BMCS subcontractor for commissioning the BMCS and shall be delivered new to the Owner upon substantial completion.

F.   The ROW shall meet, at minimum, the following requirements:
1.   Intel i7 quad core processor with a minimum speed of 3.0 GHz.
2.   500 Gigabyte hard disk.
3.   2 GB SDRAM memory.
4.   Internal 10/100/1000 Ethernet adapter.
5.   Internal Wireless 802.11a/g/n adapter.
6.   Internal Bluetooth adapter.
7.   15.4 inch LCD.

8. Internal 8X Speed DVD/CD-ROM drive.
9. Integral power supplies which shall be suitably rated for the service.
10. Integral QWERTY keyboard with full ASCII character set.
11. Weight, including carrying case, not to exceed eight pounds in weight.
12. Provide a carrying case designed specifically for the ROW, which ensures adequate protection.
13. ROW shall be powered by a rechargeable battery and shall also be powered by a 120 VAC, nominal 60 Hz, source. Provide batteries adequate for a minimum of 4 hours of operation with all wireless features enabled and at maximum screen brightness.
14. Latest compatible Microsoft Windows workstation version that has been tested and approved by the BMCS software manufacturer as being compatible with their BMCS software. The Microsoft Windows workstation software shall be the computer operating system.

2.6   HAND HELD DEVICE (HHD)

A.   The HHD shall be touchscreen device with SSD storage or similar hand held operator interface device.

B.   Communications to the MLAN shall be via 802.11 wireless via the WAP located throughout the building.

C.   Provide four HHD.

D.   The monitoring and control functions of the BMCS shall be totally independent of the HHD such that if the HHD is not operational there shall be no impact on the BMCS except for the reduced operator interface capability at the HHD.

E.   These devices shall not be used by the BMCS subcontractor for commissioning the BMCS and shall be delivered new to the Owner upon substantial completion.

F.   The HHD shall interface with the BMCS via the BMCS manufacturer's mobile application. Provide BMCS manufacturer's mobile application for each HHD.

G.   HHD devices shall meet, at minimum, the following requirements:
1. It shall undertake all of the functions applicable to the BMCS that can be undertaken from the OIW.
2. It shall be portable, maximum weight three pounds.
3. It shall be powered from batteries, which shall be rechargeable. Batteries shall be sufficient for a minimum of eight hours operation without recharging.
4. 9 inch LED touchscreen display.
5. Internal 802.11 a/b/g/n antenna.
6. Internal Bluetooth antenna.
7. Internal storage of 128 GB.
8. Android or iOS operating system.

2.7   PRINTERS

A.   Provide alarm printers at the following location:
1. Central Plant Level Engineering Control Room.

B.   Provide report printers at the following location:
1. Central Plant Level Engineering Control Room.

C.   Alarm printers shall meet, at minimum, the following specifications:
1. Minimum print speed of 300 characters/second.
2. Selectable character sizes.
3. Sprocket paper feed.
4. Top-of-page, skip and tab control.
5. The printers shall accept continuous fan-fold paper with a width equivalent to letter size.
6. Constructed for heavy duty-cycle environment.
7. Printer shall be Okidata, Epson or approved equal.

D.   Report printers shall meet, at minimum, the following specifications:
  1.   Minimum print speed of twenty-one pages per minute black and white or color.
  2.   Single or double bin paper trays, capable of printing 8.5 inch by 14 inch.
  3.   Page feed and page discharge controls.
  4.   Color and black and white printing capability without changing ink or toner cartridges.
  5.   600 x 600 dpi black and white, 600 x 600 dpi color.
  6.   Laser jet technology.
  7.   One hundred and twenty-eight megabytes of built-in RAM.
  8.   TCP/IP connectivity.
  9.   Printer shall be Hewlett Packard LaserJet P2025dn or approved equal.

END OF SECTION